Interim regulatory impact statement: A beverage container return scheme for Aotearoa New Zealand

Ministry for the Environment
Manatū Mō Te Taiao

Te Kāwanatanga o Aotearoa
New Zealand Government

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Interim Regulatory Impact Statement: A beverage container return scheme for Aotearoa New Zealand

Coversheet

Purpose of document	
Decision sought:	Analysis produced for the purpose of informing Cabinet decisions on the release of a consultation document seeking public feedback on a proposed container return scheme for Aotearoa New Zealand
Advising agencies:	Ministry for the Environment
Proposing Ministers:	Minister for the Environment
Date finalised:	11 February 2022, updated on 7 March 2022

Problem definition

- Compared to other jurisdictions, New Zealand's beverage container recovery rates are low. This results in high rates of beverage container litter, environmental harm, a burden for councils, and lost opportunity for recycling/resource recovery.
- Our current waste collection practices and recycling systems do not enable or incentivise people to appropriately dispose of or recycle their beverage containers, particularly when away from home. The costs of resource recovery are largely borne by councils and ratepayers.

Executive summary

The Government is committed to:

- a low-emissions, low-waste and climate-resilient future for Aotearoa New Zealand
- a productive, sustainable and inclusive economy that lifts the wellbeing of us all.

Why government intervention is required

Compared to other jurisdictions, New Zealand's beverage container recovery rates are low and litter rates high. In 2020/21, New Zealanders consumed an estimated over 2.57 billion beverages sold in single-use containers made from plastic, aluminium, glass and liquid paperboard. Only an estimated 45 per cent of these containers were recovered for recycling by weight, which means an estimated 1.7 billion beverage containers are being either stockpiled, littered or sent to landfills.

The externalities of single-use beverage containers are not borne by those who benefit from the sale and consumption of single-use beverages (eg, beverage producers, retailers and consumers). As such, there are limited incentives for producers to take responsibility for the containers sold, or to improve the recyclability of their containers.

Our predominant resource recovery systems (ie, kerbside recycling) are not designed to capture away-from-home consumption and disposal of goods. There is limited incentive for individuals to take steps to ensure containers are recycled or disposed of correctly.

Low recovery and high litter rates for beverage containers are resulting in:

- environmental and social harm: beverage containers are consistently the most commonly littered items in Aotearoa New Zealand. Litter pollutes our environment and has impacts on habitats, wildlife and communities
- unfair burden for councils: councils are required to fund the costs of managing litter, waste recovery systems and recycling for beverage containers, produced and sold by businesses, creating an unfair burden on councils and ratepayers
- lost opportunities for resource recovery: large numbers of beverage containers made of plastic, glass and aluminium end up in landfills. The failure to recycle these valuable materials represents a lost opportunity and contributes to both additional resource extraction and carbon emissions.

Objectives

To address these problems, the proposals in this interim regulatory impact statement (RIS) are intended to:

- increase the circularity of beverage containers, resulting in reduced litter, improved recycling outcomes and reduced emissions
- enable a producer responsibility model, by shifting the costs of beverage container resource recovery and waste minimisation from ratepayers and councils to the producers and consumers of beverages
- create community benefits, such as new opportunities for employment in the circular economy, community participation, fundraising for charities and social enterprises, and with consideration for iwi/hapū participation.

Options for intervention

This interim RIS considers five options as against the status quo.

- Option 1: increase powers under the Litter Act 1979
- Option 2: increase the accessibility of public place recycling
- Option 3: regulate enforcement of commercial recycling
- Option 4: apply product stewardship fees
- Option 5: implement a New Zealand container return scheme (ie, apply a refundable deposit and scheme fees)

Preferred option

The preferred option is the implementation of a container return scheme in Aotearoa New Zealand (NZ CRS). A CRS is a recycling scheme and form of product stewardship that involves the use of both scheme fees and a refundable deposit. When compared to the other options, the Ministry for the Environment (the Ministry or we) has assessed a NZ CRS as the most likely to:

- address the root causes of the beverage container recovery and litter problem, with the refundable deposit being a key incentive to improve waste practices across the value chain

- shift costs away from councils, ratepayers and the environment, and, instead, towards responsible parts of the supply chain (ie, beverage manufacturers, retailers and the consumers of beverages)
- limit costs to businesses, retailers and consumers
- align strategically with the proposed waste strategy and complement other waste initiatives (particularly proposed changes to kerbside recycling)
- be achievable in the medium term.

Cabinet decisions

In August 2021, Cabinet agreed in principle to progress the development of a NZ CRS and invited the Minister for the Environment to provide further information on key design considerations for a NZ CRS [CAB-21-MIN-0402]. The draft consultation document submitted to Cabinet alongside this interim RIS seeks feedback on the proposed design of a NZ CRS, including whether New Zealanders support the implementation of a CRS.

In October 2021, the Minister for the Environment sought direction from Cabinet on key design considerations for a NZ CRS [ENV-21-MIN-0049 and ENV-21-MIN-0048 refer]. Cabinet agreed in principle to preferred CRS design considerations (including those related to scope, the refundable deposit level, the return network design, the financial model, targets, governance and scheme fees) and directed that updated modelling and analysis be carried out. Details are set out below.

CRS design options

An effective CRS will balance incentives and interests through interconnected design considerations. While individual policy setting options can be influential, it is the overall combination of scheme design considerations that determines the beverage container recovery rate and success of a scheme. The Ministry has assessed a range of scheme design options and identified preferred options as outlined in table 1 below.

Table 1: Interconnected scheme design considerations for a NZ CRS

Design element	Preferred option	Additional options considered
Deposit level The refundable deposit amount applied to beverage containers Incentivises consumers to return their beverage containers for the refund	NZD 20 cents +GST applied to all eligible beverage containers	NZD 10 cents NZD 15 cents NZD 30 cents (+ GST) applied to all eligible containers Apply different deposit levels to different container materials, packaging types or beverage product types (eg, fresh milk)

Network design The network of return points where people can return empty beverage containers	Mixed return model using regulated take back (return-to-retail) requirements for some retailers while enabling voluntary participation by other retailers and some depot operators	Mandatory return-to-retail (regulatory approach to retailer participation and take back requirements) Voluntary participation (non-regulatory, procurement led approach)
Scheme financial model How the scheme manages the deposit and fees for the beverage containers eligible to be collected through the CRS each year	Deposit financial model: beverage producers pay a deposit and scheme fees on all eligible containers sold to market, regardless of whether the containers are returned through the CRS	Refund financial model: beverage producers pay a deposit in proportion to the *actual* number of containers returned to the scheme
Recovery targets Targets in legislation to help drive the recovery of eligible beverage containers and hold the scheme's managing agency to account	A target of 85% beverage container recovery by year 3 of scheme implementation, and 90% recovery achieved by year 5, proposing to review and possibly increase the deposit level and network regulatory settings if targets are not met	Not applicable
Scheme fees The core cost of a CRS (alongside the refundable deposit) Flow through the system to fund the CRS, including the cost of recycling a container, transport, administration Variable costs, which can depend on the design and efficiency of a scheme	Financial modelling for a NZ CRS has modelled the gross scheme fee costs at NZD 8.8 cents per container (a 7 cent handling fee and 1.8 cents for all other scheme fees) Scheme net costs to consumers (accounting for unclaimed deposits) are likely to be NZD 3–5 cents per container (+GST) Modelled fees are likely conservative (high), actual costs such as the handling fee will be determined if the scheme is implemented	Not applicable

Scheme governance Schemes are usually managed by an external not-for-profit organisation, appointed by Government	Not-for-profit, industry-led scheme Central government regulatory oversight	Government-led scheme Community-led scheme Any combination
Scope of containers Determines which beverage containers are eligible and subject to the refundable deposit and can be returned through the scheme for a refund	Broad scope of single-use beverage containers including all single-use metal, glass, plastic (HDPE, PET and PP; and recyclable bio-based HDPE and PET) and liquid paperboard (LPB) Exempt fresh milk in all packaging types Exempt beverage containers intended for refilling Exempt beverage containers over 3 litres	Exclude one or more beverage container material type (eg, glass) Include fresh milk in some or all packaging formats Exclude containers <150ml in size Include containers >3 litres in size

Assessment and recommended scheme design

As set out in Section 3 of this document, the Ministry has assessed the various design options for effectiveness, efficiency and fairness, separately and as a package (noting the interplay between each design component). The latest financial modelling prepared by PricewaterhouseCoopers (PwC) and a cost-benefit analysis prepared by Sapere Research Group (attached at appendix 2) has informed this assessment.

The Ministry has assessed the preferred design options set out above as providing the necessary balance to deliver high return rates of beverage containers (which will increase recycling and reduce litter), and an efficient and even-handed scheme. Questions seeking feedback on design elements of a proposed CRS are included in the public consultation document *Transforming Recycling*. Feedback will inform final policy decisions.

Impacts and cost benefits of a proposed CRS, designed as proposed

Key benefits of implementing the preferred option (including proposed design features) are:

- a deposit set at a level that provides a sufficient incentive for consumers to return their containers, which is modelled to increase recycling rates and reduce litter rates (an increase in the order of 1.17 billion additional containers recycled annually – increasing from 864 million containers recycled now to approximately 2 billion containers recycled under a CRS)
- a network design that enables easy and convenient return for consumers. This drives up return rates, and also enables community fundraising for charities and social enterprises, and iwi/hapū participation

- a scheme financial model that enables scheme fees and kerbside costs to be offset by unclaimed deposits (unclaimed deposits represent litter and landfill, ie, polluter pays principle)
- a well-regulated scheme that is industry led, enabling innovation and efficient scheme operation
- a self-funding model that shifts the costs away from councils and the community, with expected kerbside related benefits to councils modelled at approximately NZ$50 million per annum or approximately 53 cents per household per week
- broad material type coverage to capture the bulk of beverage containers and maintain an even playing field across industry participants
- exemptions (fresh milk, refillables and large beverage containers) that reflect:
  - a balance between managing household costs and incentives for change
  - pragmatic choices to reduce complexity.
- support for a stronger culture of valuing materials, to keep them in circulation for as long as possible
- an overall benefit-cost ratio of 1.61, as set out in appendix 2.

Based on the design set out above, key costs are:

- for households, assuming 100 per cent pass through of scheme costs[1], an average household under the NZD 20 cent scenario would see NZ$283 (+NZ$43 GST) in scheme fees paid in year 1. With an estimated NZ$248 worth of deposits refunded, the net scheme fee cost would be NZ$78 per year (including NZ$43 of GST), or NZ$1.50 per week. Households that redeem all of their containers would only experience the GST cost of the scheme
- However, it is important to note that rather than absorb the additional net scheme fee costs, many consumers may simply purchase slightly fewer beverage containers in the year of scheme commencement as has been observed in Australian schemes. This market response leads to an impact for businesses.

- for business, expected costs are:
  - an expected drop in container sales of approximately 6.5 per cent on average, which, based on data from Australian schemes, is expected to be recovered within three years, although latest container sales data suggests this could be recovered in as little as one year for some producers/product types
  - increased costs at the beginning of the scheme as a result of the use of a deposit financial model, although these costs are able to be recovered from consumers in advance if the scheme is implemented in a staged manner
  - opportunity costs related to the provision of reverse vending machines at supermarket/retail sites – noting that supermarkets and any other container return facility is remunerated via a 'handling fee' per container recovered – this fee has been modelled at seven cents per container, the actual fee would be set following establishment of the managing agency
  - costs of labelling changes.

Risks with respect to data

[1] Scheme modelling necessarily assumes 100% pass through of costs to consumers even though evidence from Australia shows that this is unlikely to be the reality at the individual product level. Price setting negotiations are commercial-in-confidence between parties (beverage producers and retailers) and take into account the price elasticates of different product types.

Data on New Zealand's waste and recycling sector is incomplete and often based on a snapshot in time. Data for commercial recovery estimates of recyclables, including beverage containers is held, disaggregated, by many different organisations and is incomplete; glass is the only figure that is publicly reported by an industry association. Every effort has been made to validate and test data and assumptions[2] used as an input for the scheme financial modelling and cost-benefit analysis. There is however a risk that individual businesses and organisations that hold commercially sensitive data may not agree with the data and take a different position based on their own insights. The Ministry will consider any further data or insights that can be provided by industry through the proposed consultation.

Further details of key assumptions made are set out in appendix 2 and summarised in the section below, titled 'Quality of data and evidence used in developing this proposal'.

Summary of stakeholder views

Key stakeholders have been engaged throughout the CRS policy process (detailed further below), either as part of the co-design process in 2020 or through subsequent engagement with the Minister and/or Ministry officials during 2021.

The New Zealand glass packaging forum (or GPF) opposes a container return scheme that includes glass in New Zealand. The GPF is working on an alternative scheme that would likely see its voluntary scheme upgraded to a mandatory (regulated) scheme whereby industry pays a scheme fee in order to cover collection costs and shift the costs of recycling away from households. Key differences with a CRS are likely to be the absence of a refundable deposit mechanism in the GPF's proposed scheme and the continued reliance on kerbside recycling systems as the main pathway for glass recovery in New Zealand.

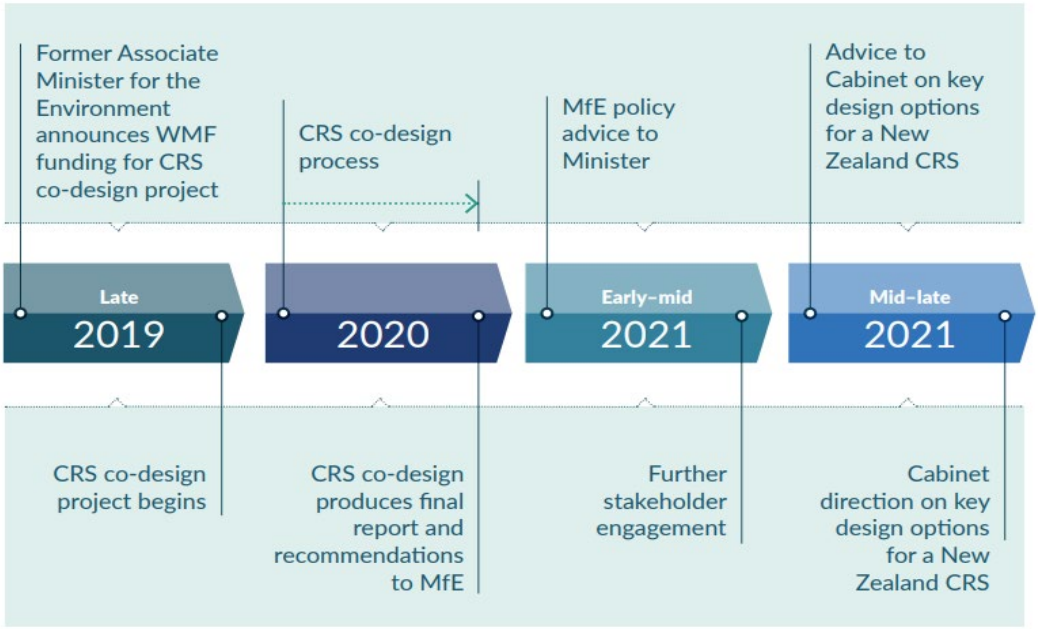
There is broad community support for a CRS in New Zealand. Local government has repeatedly called for the introduction of a New Zealand scheme and prior surveys also show consumer support for a scheme (which aligns with the proposed design).

2 This was done during the co-design process in 2020. See the section below, titled 'Co-design for a potential CRS'.

Summary of the policy process and constraints, assumptions and limitations on analysis

A summary of the policy development process for the proposals contained in this interim assessment is set out in figure 1 below.

Figure 1: High level timeline of CRS process to date



Co-design for a potential CRS

In late 2019, then Associate Minister for the Environment (Hon. Eugenie Sage) instigated work on the option of a NZ CRS. Funding was approved for Auckland and Marlborough District Councils (the Project Team) to work with stakeholders to investigate and provide recommendations on the design of a potential CRS for New Zealand.

The co-design process involved a substantial body of work, with review and input from a broad range of representatives including: the beverage industry, the packaging industry, retailers, local government, recyclers/waste collectors, Māori perspective, youth, and other non-government and community organisations. The co-design process identified split stakeholder views on several key issues within the specific design settings of a NZ CRS. The project concluded in late 2020 with the submission of the Project Team's final report and recommendations, accompanied by an independent (of the co-design process) technical advisory group report.

Further analysis and Cabinet direction for a CRS

Building on the momentum and outputs from the co-design project, including the independent technical advisory group report, Ministry officials began policy work on the option of a NZ CRS in 2020/2021. This involved additional analysis and further engagement with co-design stakeholders. Cabinet was then consulted on the potential for a CRS, and on design elements, as set out in Table 2 below.

Table 2: Previous CRS Cabinet papers

CRS Cabinet paper scope	Cabinet decision
Paper 1: Problem definition and overview of a CRS	In principle decision to proceed with the CRS, subject to design considerations, August 2021
Paper 2a: Design considerations: driving recovery	Indicated proposed design considerations and directed the Ministry for the Environment to prepare a draft consultation document to test the proposals, October 2021
Paper 2b: Design considerations: scope of containers	

A detailed analysis of a CRS as against other potential options is included in Section 2. The consultation document submitted alongside this interim RIS seeks feedback as to whether New Zealand should proceed with a CRS and, if so, seeks feedback on the proposed key scheme design options.

Quality of data and evidence used in developing this proposal

Officials have undertaken and commissioned data analysis, and considered a range of evidence, as follows:

- commercially sensitive data from individual businesses and organisation (shared confidentially with MfE or as part of the co-design process described above)
- scheme financial modelling by PricewaterhouseCoopers (PwC), over four stages, initially as part of the co-design process, and then updated for improved functionality and the ability to test differing scheme design considerations, including the scheme design proposed in this document
- beverage container sales data updates provided by GS1 New Zealand Incorporated
- independent cost-benefit analysis, carried out by Sapere Research Group, updated in February 2022, based on the proposed design and attached at appendix 2
- data and key design characteristics on the range of international CRS schemes currently operating (Reloop, 2020)
- geo-spatial modelling for NZ retail (supermarket only) container return point convenience
- resource recovery data from Territorial Authorities (TAs) and materials recovery facilities (MRFs)
- testing key assumptions and market trends with industry – such as the impact of the COVID-19 pandemic and other notable changes in the market (very rapid growth in sales of beverage products in aluminium cans)

Assumptions

Key assumptions relevant to the impacts set out above are:

- the price elasticities of individual products and price setting negotiations between producers and retailers are commercially sensitive, so the necessary assumption of the proposed scheme financial model is 100 per cent pass through of scheme costs to consumers – evidence from Australia indicates this is unlikely to be the case for all products and producers, and retailers may experience some cost impact
- household-level analysis necessarily assumes an average household impact, so variable impact is uncertain

- estimates and assumptions used in the modelling are generally conservative, ie, where there is more than one information source that informs an assumption, either a mid-point or the most conservative (towards the case for a scheme) assumption is used
- where assumptions are key, such as the development of the cost-benefit analysis (CBA), independent review and sensitivity testing has been applied
- return rates are based on data drawn from a review of global schemes (regulated retail take back, depot and mixed network model schemes)
- it is expected that after launching, total return rates would continue to grow with the sector and achieve at least an 84 per cent recovery target in year three
- a 6.5 per cent decrease in the volume of beverage containers sold is assumed upon CRS commencement based on experience from similar Australian schemes, noting a different deposit level is proposed (expected to be recovered within approximately three years)
- the estimated average 6.5 per cent decrease represents consumers buying fewer containers in response to a price signal increase. The reality, however, includes complexities such as market responses for individual product elasticities which are compounded by different container sizes and bundling options which may shift in response to a scheme being implemented. There is no data available to support modelling of these complexities at this time
- the CBA study period is over 30 years and applies a discount rate of 5 per cent
- markets for recyclable materials fluctuate. Higher-value clean materials such as those generated by the proposed CRS are more likely to be viable in the long term
- consumption of beverages in single-use containers has been growing rapidly both globally and in New Zealand, and is likely to continue in the foreseeable future (nonetheless, a more conservative 2 per cent annual growth rate [in container volume] for the sector is assumed for modelling purposes)
- there are numerous other assumptions within the GS1, PwC and Sapere models which inform their reports. Many of these assumptions are informed by commercial-in-confidence information that is either their intellectual property or provided by industry stakeholders to inform the analysis

Further work required on population impacts

Household-level analysis necessarily assumes an average household impact as beverage consumption can be influenced, and vary, by any number of metrics at a household level. While this interim analysis has not focused on specific population groups per se, international evidence shows that benefits of litter reduction are most significantly found in lower socio-economic communities where the frequency of litter is typically higher. Subject to data availability, the analysis provided to support the proposed design of a NZ CRS could be strengthened by further analysis on beverage consumption and recycling habits by population demographics (eg, age, socio-economic status, rural/urban dwelling). In particular, it would be ideal to model impact for Māori.

Responsible manager
Shaun Lewis, Director – Waste and Resource Efficiency Ministry for the Environment      11 February 2022, updated on 7 March 2022

Quality assurance (completed by QA panel)	
Reviewing Agency:	Ministry for the Environment
Panel Assessment & Comment:	The Ministry for the Environment's Regulatory Impact Analysis Panel has reviewed the Impact Statement: A beverage container return scheme for Aotearoa New Zealand, which will accompany the consultation document upon release. The Panel confirms that the level of information provided partially meets the quality assessment criteria. The Impact Statement uses an appropriate framing of problem, objectives and options. The analysis that supports the preferred design options is comprehensive and information from stakeholders has been used in its development. However, further analysis is needed to convincingly support the economic and policy case for a container return scheme in general. Where data allows, information on the costs and benefits could be further disaggregated and presented more consistently. Where possible, more information on how the status quo will develop under current policies, and on the impacts of options, would assist their comparison. Consultation should aim to draw out further information on the case for intervention and the options for policy change alongside the detailed design options of a container return scheme. This will inform further policy development and support the later delivery of a Regulatory Impact Assessment to inform subsequent decisions.

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Section 1: Diagnosing the policy problem

What is the context behind the policy problem and how is the status quo expected to develop?

The bigger picture: More than just beverage container waste

1. Global waste generation in high-income countries is set to increase by 19 per cent by 2050.[3] Aotearoa New Zealand creates some of the highest levels of waste per person among high-income countries, at 17.5 million tonnes of waste per year. An estimated 12.6 million tonnes of this is sent to landfill. Subsequent to the implementation of the Waste Minimisation Act in 2008, and introduction of the waste disposal levy in 2009, waste sent to Class 1 municipal landfills has increased by nearly 50 per cent over a decade, reaching 3.7 million tonnes in 2018/2019 (or 740 kilogrammes per person).

Beverage consumption is on the rise and container recovery is decreasing

2. Consumption of single-use beverages has increased by 9 per cent and 7 per cent respectively over the last two years.[4] This is in part likely due to the impact of the COVID-19 pandemic and increased consumption at home. (Having adjusted inputs for an updated 2020/21 baseline, industry growth assumptions have been modelled at a more conservative 2 per cent per annum growth rate.)

3. Given the rapid growth in beverage container numbers, the relative performance of kerbside recovery (on average) has declined over the last three years.[5] For some materials, recovery has actually increased in response to more containers in the market, but nowhere near the rate of container sales growth.

4. Therefore, the corresponding resource recovery and litter issues are likely to worsen in the absence of action and the growing gap underscores the issue of away from home consumption, even in the context of the last two years.

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3 The World Bank, 2019. What a Waste 2.0: A Global snapshot of Solid Waste Management to 2050. https://openknowledge.worldbank.org/handle/10986/30317. Note: this 19% represents daily per capita waste generation in high-income countries.

4 GS1 New Zealand beverage sales data and PwC 2022.

5 National kerbside recovery of beverage containers is estimated from council data representing a majority of New Zealand's population. Reported recovery included a three-year period from 2018/19 to 2020/21.

Key features of the regulatory system already in place to manage waste

The Waste Minimisation Act 2008 (WMA)

5. The WMA establishes that territorial authorities (TAs) are responsible for promoting effective and efficient waste management and minimisation within their districts. TAs do this through waste management and minimisation plans (WMMPs), which are revised and updated every 6 years. In preparing WMMPs TAs must consider the principles of the *waste hierarchy* in descending order of importance:
    - reduction
    - reuse
    - recycling
    - recovery
    - treatment
    - disposal.

6. We note that while TA responsibilities are broadly for waste management, this encompasses beverage container waste but does not set out specific requirements for the management of beverage containers. The WMA is currently undergoing legislative review. There is scope for additional provisions to specifically address beverage container resource recovery and litter.

The Litter Act 1979 (Litter Act)

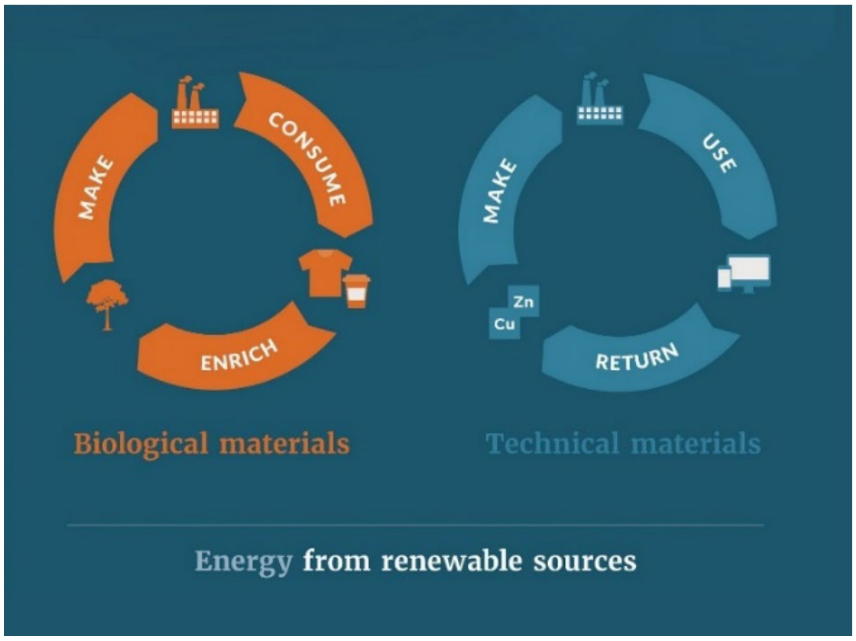
7. The Litter Act prohibits littering and dumping in public places. It contains provisions for, among other things, granting enforcement officers and litter wardens powers to issue fines and abatement notices. The enforcement and administration of the Litter Act sits with public authorities, which includes territorial authorities, the New Zealand Transport Authority, airport authorities and several other classes of bodies. Territorial authorities have the primary enforcement role.

8. The Litter Act has not been substantively amended or rewritten since its enactment in 1979. Ministry officials are currently reviewing the Litter Act as part of a broader waste legislation review (which includes the review of the WMA). As part of the review, officials will be looking at opportunities to have a diverse and best-practice array of regulatory tools to manage litter and waste, more broadly.

Moving towards a circular economy

9. The Government has set ambitious goals for a transition to a circular, low emissions economy. Our linear 'take-make-waste' economy (refer figure 2) relies on the extraction and importation of virgin materials and promotes replacement, over keeping products and materials in circular use. As our population grows and our individual resource use increases, the cost of a linear system becomes increasingly unsustainable. Continuous resource extraction and subsequent disposal is simply not a viable option for our people nor our planet.

Figure 2: Linear versus circular economy models



10. Globally, a shift towards a circular economy is gaining momentum through multi-lateral initiatives such as the European Union's Circular Economy Action Plan,[6] the Global Alliance for Circular Economy and Resource Efficiency,[7] and the G7 Alliance on Resource Efficiency,[8] as well as the growing number of countries with circular economy strategies and legislation.

11. The Government is consulting on a new waste strategy to guide the transformation of our resource recovery system. The new strategy's headline statement is a circular economy for Aotearoa New Zealand in 2050. This is deliberately ambitious – achieving a circular economy within 30 years will require transformational change and a reconfiguration of how New Zealanders think about waste. The strategy will set the direction and guide investment as we address waste and resource recovery challenges over the coming decades.

12. In addition to the review of the waste strategy, there are several other work programmes currently under way at the Ministry to support the transition to a circular economy, increase resource recovery and recycling, and reduce litter. These work programmes are set out in Table 3 below.

6 https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en

7 https://ec.europa.eu/environment/international_issues/gacere.html

8 https://www.g7are.com/

Table 3: Description of the Ministry's waste work programme

Waste work programme	Description
Improving household kerbside recycling	Work to align the kerbside waste and recycling collections across TAs to reduce confusion for households and increase the quality and quantity of materials collected through kerbside recycling Proposals for kerbside standardisation will be publicly consulted on in joint consultation with CRS
Waste legislation review: Waste Minimisation Act 2008 and Litter Act 1979	To strengthen various legislative provisions to support the wide-ranging government work programme for waste Strengthened legislation will support the new waste strategy by providing tools and incentives to transform the waste sector and help transition to a more circular and resource-efficient economy
Work on reducing harm from plastics	Shifting away from hard-to-recycle and single-use plastics will help reduce plastic waste, improve our recycling systems and protect our environment Includes development of a national plastics action plan and guidelines to inform the sustainable use of plastic in Government procurement
Product stewardship	Regulated product stewardship helps put responsibility for a product's lifecycle and waste management on manufacturers, importers, retailers and users rather than communities, councils, neighbourhoods and nature The Government has declared six priority products for regulated product stewardship under the WMA: plastic packaging, tyres, electronic and electrical waste (e-waste), agrichemicals and their containers, farm plastics, refrigerants and other synthetic greenhouse gases
Increasing and expanding the waste disposal levy	Progressively increase the levy rate for landfills that take municipal waste from NZ$10 per tonne (set in 2009) to NZ$60 per tonne by 1 July 2024 Expanding the levy to cover additional landfill types, including construction and demolition fills Collecting better waste data Revenue gathered from the waste disposal levy is used for initiatives to reduce waste and encourage resource recovery (eg, composting and recycling projects)
Investment in recycling infrastructure	As part of the Covid-19 Response and Recovery Fund announced on 1 July 2020, the Government is investing nearly NZ$100 million in recycling and resource recovery infrastructure initiatives across the country, including materials recovery facility improvements, as well as organics and plastics reprocessing facilities

13. However, the programmes listed above do not specifically address the particular problem of beverage containers, particularly those consumed away from home.

Beverage containers: What is the policy problem or opportunity?

What is the problem?

14. Over 2.57 billion single-use beverages were sold in the New Zealand market in 2020/2021.[9] Beverage container sales grew 7 per cent and 9 per cent respectively in the last 2 years from 2.19 billion in 2018/19. Using 2020/2021 data, this equates to an average of approximately 7 million single-use beverage containers sold in Aotearoa New Zealand every day. Current production and consumption of beverages almost

[9] GS1 New Zealand beverage sales data and PwC, 2022.

entirely relies on single-use, one-way beverage containers for ease of production, distribution and on-the-go (convenient) consumption.

15. In modern society, time, money and effort are generally highly valued, therefore the convenience of buying a cold drink on-the-go (at the right price) appeals to many. Once the beverage container has served its purpose as a 'vessel' for the beverage product, for many, its purpose has been served and its value is greatly diminished. The container can become an inconvenience and, with limited recycling opportunities (ie, away from the at-home kerbside service) and with no incentive to recycle, it is perhaps not surprising that many beverage containers become landfill and litter.

16. Current resource recovery for single-use beverage containers primarily occurs through the broader provision of kerbside recycling services and, to a much lesser extent, public place recycling bins. Commercial recovery also occurs, and there is poor (almost no) data on this activity, except for glass which is estimated to be approximately 15–20 per cent of the kerbside recovery volume.[10] Resource recovery of beverage containers in Aotearoa New Zealand is therefore a largely council/ratepayer funded activity.

17. Given households pay for kerbside services whether they use them for recycling beverage containers or not, and the majority of containers are either captured by the kerbside system or lost to landfill or litter, this is in effect, externalising the end-of-life cost impact of beverage containers onto rate payers and the environment. Of the over 2 billion beverage containers sold in 2018/19, approximately 54 per cent, by weight, were recovered for recycling.[11] In 2020/21, this is estimated to have fallen to 45 per cent by weight.[12] The reduction is in part a reflection of the weight bias that glass brings to the data and the significant overall increase in beverage container sales.

18. Correspondingly (to weight estimates which are skewed upwards by glass), it is estimated that approximately 1.7 billion containers were stockpiled, littered or landfilled in Aotearoa New Zealand in 2020/21.[13] This represents a large proportion of material value lost to the recycling industry and larger issues with waste in the resources and energy required to produce those materials in the first place. Beverage containers are a significant source of litter, constituting 66 per cent of recognisable branded litter and 24 per cent of all litter in Aotearoa New Zealand.[14]

19. Low recycling rates and high litter rates for beverage containers present various costs to human beings and te taiao:

    - *Environmental and social harms:* Beverage containers are consistently among the most commonly littered items in Aotearoa New Zealand. Litter pollutes our environment and impacts habitats and wildlife (eg, through animals' ingestion of plastic). Litter also has economic costs for ratepayers and volunteers (such as the time and labour costs of litter clean ups), and negatively affects social amenity and human health (eg, through toxins and broken glass). The prevalence of waste and

10 Glass Packaging Forum and CRS co-design report.

11 CRS co-design report and MfE estimated commercial recovery.

12 PwC beverage container estimates and MfE estimated commercial recovery.

13 PwC beverage container estimates and MfE estimated commercial recovery.

14 Keep New Zealand Beautiful (KNZB), 2019. *National Litter Audit.*

litter has broader implications, in particular for lower socioeconomic areas where litter is often more prevalent.[15]

- *Unfair burden for councils and rate payers:* The costs of managing litter, waste recovery systems and recycling for beverage containers creates an unfair burden on councils and ratepayers. For example, litter clean-up costs in Auckland are in the order of NZ$11 million per annum.
- *Lost opportunities for resource recovery:* Large numbers of beverage containers made of plastic, glass and aluminium end up in landfills. The failure to recycle these valuable materials represents a lost opportunity and contributes to carbon emissions.[16]

Root causes

20. Root causes are:
    - the externalities of single-use beverage containers are not borne by those who benefit from the sale and consumption of single-use beverages (eg, beverage producers, retailers and consumers). This results in little-to-no incentive on producers to take responsibility for the containers sold, or to improve the recyclability of containers
    - existing resource recovery systems (ie, largely through kerbside recycling) are not designed to capture away-from-home consumption and disposal of goods. There is limited incentive for individuals to take steps to ensure containers are recycled or disposed of correctly
    - based on our relative 'waste' performance, New Zealand society as a whole does not take action that recognises the value in waste resources, even though individuals are likely to feel quite strongly about those same values. This is in part because our systems and services are inadequate, which is exacerbated with on-the-go consumption behaviours.

Broader impacts and implications for stakeholders

21. Single-use beverages (and their containers) play a role in many peoples' lives and the New Zealand economy. Addressing the issues associated with beverage containers will therefore have wide-ranging impacts for households, communities, small- and large-scale businesses in the beverage, packaging, retail and waste industries, as well as local councils. Table 4 below covers stakeholder views on the broader problem of beverage container recycling and litter. Note: stakeholder group categories in Table 4 are generalised, subgroups within these categories may have differing views/impacts to those described.

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15 Schuyler et al., 2018. Economic incentives reduce plastic inputs to the ocean.

16 Numerous international studies and life cycle analyses have indicated that making beverage containers using recycled material uses significantly less energy than using virgin materials, as well as reducing resource extraction emissions. For example, see https://zerowasteeurope.eu/library/the-potential-contribution-of-waste-management-to-a-low-carbon-economy/. NB: there is limited specific data for emissions saved from recycling in New Zealand. Key industry sources all cite the emissions reduction benefits of recycling. The analysis prepared in support of this RIS has used default data. Refer appendix 2.

Table 4: Stakeholder interest and perceived impacts of beverage container issue

Stakeholder group	Nature of interest	Perceived impacts of beverage container issue
Local government	Efficiency/access Cost	Councils and ratepayers bear the substantive costs of current beverage container resource recovery and recycling systems, and associated litter clean-ups. Territorial authorities are responsible for waste management under the WMA 2008
Large beverage producers (non-alcohol)	Product ownership Market access Brand reputation	No regulated product stewardship/producer responsibility for beverage producers at the end-of-life for their product's packaging. Strong interest in brand sustainability, while managing costs efficiently. Voluntary product stewardship scheme in place for glass containers (approximately 8% of glass beverages are non-alcohol)
Large beverage producers (alcohol)	Product ownership Market access Brand reputation	No regulated product stewardship/producer responsibility for beverage producers at the end-of-life for their product's packaging. Strong interest in brand sustainability, while managing costs efficiently. Voluntary product stewardship scheme in place for glass containers (approximately 92% of glass beverages sold are alcohol drinks). Significant over-supply of glass to New Zealand market relative to domestic processing capacity. Industry seeking to establish an alternative regulated scheme for glass (ie, both beverage and non-beverage containers)
Commercial recyclers (collectors and processors)	Material and market access Operational	Provide most existing services/facilities for recovery/reprocessing (including but not limited to beverage containers). Lost recyclable resources equate to lost economic opportunity
Public community groups and NGOs	Purchase cost and product choice Environmental and social impacts	The public are the primary consumers of single-use beverage containers There is increasing public awareness of environmental harms posed by litter. The public bear the costs of litter (through voluntary or council-funded clean-ups). Community groups organise litter clean ups and some data collection/reporting on litter. Some NGOs operate waste collection/resource recovery sites (including for but not limited to beverage containers). Some NGOs operate zero waste/product stewardship/litter reduction campaigns and education
Retailers and supermarkets	Material and market access Brand reputation	Primary distributors of the market share of single-use beverage containers / beverage products. 95% of New Zealanders live within 20-minute drive from a supermarket Have sponsored previous waste-related or recovery initiatives (eg, soft plastics)

What objectives are sought in relation to the policy problem?

22. The three overarching policy objectives for improving outcomes associated with beverage containers are to:

    - increase circularity of beverage containers, resulting in reduced litter, improved recycling outcomes and reduced emissions
    - shift the costs of resource recovery and waste minimisation from ratepayers and councils to the producers and consumers of beverages
    - create new opportunities for employment in the circular economy, community participation, fundraising for charities and social enterprises, and with consideration for iwi/hapū participation.

23. The primary objective is to improve resource recovery outcomes of beverage containers (specifically, increase recycling and reduce litter). Secondary to this, is shifting the costs of beverage container recovery to the responsible supply chain (consumers and producers) as this will encourage changes higher up the waste hierarchy, such as reducing the waste produced in the first instance.

Section 2: Deciding upon an option to address the policy problem

What criteria will be used to compare options to the status quo?

24. The Ministry applied the following criteria to evaluate options against the status quo:

    - Effectiveness – Will the option achieve one or more of the following:
        - significantly increase beverage container recovery and improve recycling outcomes for beverage containers
        - reduce beverage container litter
        - shift the costs of resource recovery and waste management associated with beverage containers from ratepayers and councils to producers and consumers of beverages
        - reduce emissions?
    - Cost efficiency – Can the option be implemented without placing unnecessary costs on stakeholders (eg, households, businesses or councils)?
    - Alignment with strategic direction – Will it help progress towards the Government's goals for a more circular, low-emissions Aotearoa New Zealand (with consideration of increased employment and community participation opportunities)?
    - Achievability – Is it achievable alongside amendments to waste management legislation currently underway? Is it easy, timely and practical to implement?

25. In our analysis of the options to address the beverage container issue, we applied the following weightings:

    - double weighting for effectiveness, as this closely reflects the key objectives of the policy intervention and addresses producer/consumer responsibility
    - single weighting for the three remaining criteria.

What scope will options be considered within?

Former Minister's commissioning sparked work on the option of a NZ CRS

26. In late 2019, then Associate Minister for the Environment (Hon. Eugenie Sage) instigated work on the option of a CRS, driven by an increasing international evidence-base and

growing domestic calls for a NZ CRS,[17] including recommendations from Local Government New Zealand in 2018[18] and the Prime Minister's Chief Science Advisor.[19]

27. Then Associate Minister for the Environment approved funding[20] for Auckland and Marlborough District Councils (the Project Team) to work with stakeholders to investigate and provide recommendations on the design of a potential CRS for New Zealand.

28. The Project Team developed its recommendations through an iterative co-design process. This involved review and input from a multi-stakeholder Scheme Design Working Group (SWDG) and a Technical Advisory Group (TAG), as well as extensive global research.

29. The SDWG consisted of a broad range of representatives from the beverage industry, the packaging industry, retailers, local government, recyclers/waste collectors, and non-government and community organisations. While there was clear overall support for a CRS from the SDWG, the co-design process elucidated split stakeholder views on several key issues within the specific design settings of a NZ CRS.

30. Key stakeholders have been engaged throughout the CRS policy process either as part of the co-design's SDWG or through subsequent engagement with the Minister and/or Ministry officials.

31. The co-design project produced substantial research, modelling, cost-benefit analysis and identified key design options for a NZ CRS. The project concluded in late 2020 with the submission of the Project Team's final report and recommendations.

Investigating a CRS: a Government priority

32. The Labour Party's 2020 Election Manifesto noted a commitment to investigate a NZ CRS. Implementing a CRS is also a recommendation of the Prime Minister's Chief Science Advisor's 2019 *Rethinking Plastics* report. Further, work on a CRS aligns with the New Zealand Labour Party and Green Party of Aotearoa's Cooperation Agreement.

33. Building on the momentum and outputs from the co-design project, the Ministry began policy work on the option of a CRS in 2020/2021. This involved additional analysis and engagement with stakeholders, in order to develop comprehensive advice and options for Ministers (including on the range of design considerations and combinations). Options considered are set out in the rest of this section and section three of this RIS.

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[17] A 2020 Consumer New Zealand poll showed 78% public support for a CRS, with 10% undecided. Despite this support, there are varied opinions among stakeholder groups about the preferred overall combination/balance of design considerations for a CRS.

[18] See: 2018 LGNZ remit on waste, passed with 96% support from the sector.

[19] Prime Minister's Chief Science Advisor, 2019. Rethinking Plastics.

[20] Funding was provided through the Waste Minimisation Fund.

What options are being considered?

Option one – Status quo

34. Continue business as usual. If no action were taken, beverage container growth is expected to continue at a rate of at least 2 per cent per annum (model assumptions), noting container sales growth has been 9 per cent and 7 per cent per annum respectively for the last two years, mainly driven by the non-alcohol sector. Beverage container litter and low resource recovery would persist as an issue for New Zealand's resource recovery system and environment.

Option two – Increase powers under the Litter Act 1979

35. The Litter Act 1979 (Litter Act) prohibits littering and dumping in public places. It contains provisions for, among other things, granting enforcement officers and litter warden powers to issue fines and abatement notices. The enforcement and administration of the Litter Act sits with public authorities, which includes territorial authorities, the New Zealand Transport Authority, airport authorities and several other classes of bodies. Territorial authorities have the primary enforcement role.

36. The Litter Act has not been substantively amended since its enactment. The Ministry is currently reviewing the Litter Act as part of its broader waste legislation review (which includes the review of the Waste Minimisation Act 2008 (WMA).

37. New legislation could include: stronger penalties; more enforcement options; clearer responsibilities for monitoring and enforcement; and regular reporting and data collection provisions.

Option three – Increase the accessibility of public place recycling (PPR)

38. Public place recycling (PPR) refers to the away-from-home recycling infrastructure (bins) provided in public places such as streets, transport hubs, and tourism and hospitality venues. PPR aims to reduce litter and increase the recovery of away-from-home packaging. New Zealand's public place recycling schemes are generally carried out by territorial authorities, often in conjunction with one-off grants from the packaging industry.

39. A scaled-up version of this type of collection is sometimes deployed in rural locations or at community recycling drop off points. It often involves a containerised hook bin alongside an access platform with posting slots for various recyclable materials including, and in some cases specifically for, beverage containers (eg, bottle banks).

Option four – Regulated enforcement of commercial recycling

40. Commercial recycling is associated with small businesses and larger commercial activities, including the hospitality sector, multi-unit developments and apartment complexes (ie, those not serviced by rates-funded kerbside collections). These collections can be undertaken through a direct contract between private parties or, where permitted/available, through bespoke council contracted kerbside collections.

41. Bylaw controls can be used by councils to better manage recycling (wherever it is occurring) and use of public bins. For example, a bylaw can include:

- a licencing regime and approvals process for any individual or company involved in collecting, transporting and managing/disposing of waste that also enables councils to inspect and obtain information from licenced operations
- a requirement for separation of recyclable and compostable materials from other waste deposited/placed on public places (eg, limits on the per cent of recyclable or organic material in waste collections – whether they be public place, CBD collections, kerbside or private contract collection)
- a requirement for a Waste Minimisation and Management Plan for new developments where Councils have the opportunity to ensure adequate provision is made for materials separation and management proportional to the occupancy and use of the building/site.

Option five – Apply product stewardship fees

42. A Product Stewardship Fee can be applied to materials or products to fund end-of-life waste management costs via a product stewardship scheme. An advanced materials recycling fee is a type of Product Stewardship Fee that could fund the costs of different beverage packaging formats being successfully recycled or, at a minimum, beneficially reused.

43. Under existing legislation, application of a Product Stewardship Fee to beverage containers could enable a number of options, including:

- Declaration of a priority product and an alternative industry-led scheme
- Applying a recycling fee to beverage packaging to recover costs for its end-of-life management.

Option six – Implement a container return scheme (both product stewardship fees and a refundable deposit incentive)

44. A CRS is a resource recovery scheme and type of product stewardship that incentivises consumers and businesses to return beverage containers for recycling or refilling through the application of a refundable deposit at purchase. When someone buys a drink, they pay a scheme fee which includes a refundable deposit, in addition to the normal price of the drink. Empty beverage containers are 'redeemed' in exchange for the deposit refund at designated collection points.

45. Globally, approximately 50 schemes operate, with more expected by 2023. Every Australian state has, or is in the process of implementing, a CRS. Schemes vary significantly in terms of their design and requirements, as does scheme performance (ie, recovery of beverage containers).

46. Note that, with the exception of the status quo scenario, the options outlined above are not mutually exclusive and could be combined to address the beverage container issue, noting that different options, or combinations thereof, will have varying levels of impact on the issue. A comprehensive policy approach could include a mix of components such as law change, targeted monitoring and enforcement, establishment of new systems, and enabling infrastructure and public education to encourage new waste behaviours.

What options are not being considered?

47. Options that were not considered as part of this options analysis include:

- *ban or phase-out of single-use plastic bottles:* Greenpeace Aotearoa currently has a petition underway to ban all single-use plastic bottles. We note this petition has over 100,000 signatures. Such a ban or phase-out is not considered in this analysis because it would be inconsistent with international trade policy. It may also have negative unintended consequences, such as producers and consumers shifting to less recyclable packaging materials/formats such as liquid paperboard or materials with a higher carbon footprint, such as glass
- *education campaign to reduce consumption of single-use beverage containers, increase resource recovery and reduce litter:* education campaigns are considered useful tools to supplement other policy interventions. While information provision and persuasion together may lead to improved pro-environmental behaviours, an education campaign alone would also not address the wider chain of responsibility, nor the infrastructure needed, to shift responsibility back to producers and consumers
- *refillable network for beverage containers:* refillable containers have an important role to play in facilitating the transition from a linear economy to a circular economy. Reported environmental benefits of refillable beverage containers compared to single-use (and recyclable) containers include savings in energy needed to extract raw materials and manufacture new bottles, reduced emissions and waste. Moving up the waste hierarchy towards refill/reuse is aligned with circular economy objectives and will help New Zealand achieve emissions reduction targets.

  A large-scale refillable beverage system for New Zealand would require new and different logistical management alongside national or regional collection and sterilisation infrastructure. Further investigation is required to understand how existing or future infrastructure could support a shift toward reusable/refillable containers.[21]

  A key element of implementing a NZ CRS would include procurement and development of scheme infrastructure (the return network and consolidation facilities), including consideration for how CRS infrastructure could support a future shift to reusable/refillable containers
- *improvements to kerbside recycling:* the Government is also proposing to measure and improve the performance of household kerbside recycling collections. Household kerbside collections vary significantly across New Zealand. There is no national consistency on what materials are collected at kerbside, which leads to public confusion and high levels of contamination. As a result, potentially recyclable materials are sent to landfills.

  Standardising the materials collected for kerbside recycling nationally would reduce household confusion and contamination, improve the quality of recyclable material and divert more materials from landfills. In addition, best-practice collections systems and food scrap collections would accelerate our progress towards a circular economy. This would complement work to address the beverage container issue

[21] Limited information is currently available on New Zealand's reuse systems. Some New Zealand businesses are considering or have already established (or re-established) their own return reuse/refillable networks for their products. This is a notable example of businesses taking the lead to develop a low-waste, low-carbon circular economy.

but is not considered in this options analysis because the kerbside work programme is already in train and primarily addresses beverage containers consumed and disposed of at home, rather than away from home.

How do the options compare to the status quo/counterfactual?

Table 5: Comparison of options to address beverage containers

Scoring: 2 = yes 1 = somewhat 0 = unknown or no evidence -1 = no

	Option one – Status quo	Option two – Increase powers under the Litter Act 1979	Option three – Increase the accessibility of public place recycling (PPR)	Option four – Regulated enforcement of commercial recycling	Option five – Apply product stewardship fees	Option six – Implement a container return scheme
Effectiveness *(double weighting)* – will the option achieve one or more of the following: • significantly increase beverage container recovery and improve recycling outcomes for beverage containers • reduce beverage container litter • shift the costs of the beverage container issue from ratepayers and councils to producers and consumers of beverages • reduce emissions?	-1 (-1 x 2 = -2)	0	-1 (-1 x 2 = -2)	1 (1 x 2 = 2)	1 (1 x 2 = 2)	2 (2 x 2 = 4)
	Current settings do not enable high levels of resource recovery and recycling nor prevent litter associated with beverage containers Costs are borne by councils and ratepayers Beverage container embodied emissions are relatively high	Some positive impact on litter but is unlikely to increase container recovery rates for out of home consumption This option does not address the issue of beverage container collections costs being largely borne by rate payers Very limited impact on beverage container embodied emissions	May reduce litter but limited impact on beverage container recovery and therefore, embodied emissions PPR bins can also become a source of litter if not maintained frequently enough, which increases their operational cost for local authorities The costs of maintaining PPR bins almost always falls to local authorities – more bins would drive significant cost increases Limited impact on beverage container	Would improve recovery and recycling of the key beverage container recycling streams to some degree, but still relies on an enforcement approach which has had limited effect to date where councils have regulated through bylaw controls[22] Negligible impact on away from home recycling (on-the-go) and negligible impact on litter reduction Cost for councils for enforcement could be	Would improve recovery and recycling of the key beverage container recycling streams to some degree (market barriers for container-to container recycling for some product types would likely continue) Negligible impact on litter reduction as no financial incentive (refundable deposit) or infrastructure (besides bottle banks and PPR bins) to capture away from home containers Shifts costs/ responsibility from	A refundable deposit incentivises the return of beverage containers, with a likely 85–90% recovery rate in New Zealand International examples have seen up to 60% reduction of beverage container litter and the reduction is likely to see a 'stadium effect' – a reduction in other forms of litter as well[23] [24] Beverage containers recovered through a CRS are generally clean and good quality materials (reduced contamination)

[22] For example: Auckland Council's solid waste bylaw controls.

[23] While not included in the cost-benefit analysis, the stadium effect is well recognised, and a sensitivity test suggest this impact would significantly increase the BCR (from 1.61 to 2.72-5.15).

[24] In a 2017 report for Auckland Council, Sapere Research Group previously estimated that the costs of litter collection and public space maintenance, specifically associated with beverage containers that would be avoided if a CRS was implemented, would be between NZ$2.9 million–NZ$4.4 million per annum.

	Option one – Status quo	Option two – Increase powers under the Litter Act 1979	Option three – Increase the accessibility of public place recycling (PPR)	Option four – Regulated enforcement of commercial recycling	Option five – Apply product stewardship fees	Option six – Implement a container return scheme
			recovery and, therefore, embodied emissions	significant in the absence of other further incentives to recycle Limited impact on beverage container embodied emissions – does not address container-to-container market capacity issues	councils and ratepayers to producers Some impact on beverage container embodied emissions – potential to address container-to-container market capacity issues through investment if scheme fees set high enough	Shifts costs/ responsibility from councils and ratepayers to producers Depending on scheme design, potential for high impact on beverage container embodied emissions – high resource recovery and offers opportunity to address container-to-container market capacity issues through a market response mechanism, eg, eco-modulation fees[25]
Cost efficiency – can the option be implemented without placing unnecessary costs on stakeholders (eg, households, businesses or councils)?	-1	-1	-1	1	1	2
	Current settings see high rates of unrecovered beverage containers (littered, stockpiled or landfilled), which represents inefficient use of resource and a significant lost opportunity for recycling. Kerbside system costs are borne by councils and households, whether or not they use the service	Implementation, compliance and enforcement costly for councils, given that littering of beverage containers is frequent and low level	Costly (per tonne managed) for councils to service PPR sites – inefficient option for scaled up recovery PPR in New Zealand has been recognised as a highly inefficient means of achieving resource recovery at scale (ie, relative to kerbside) – one such review noted the cost of recycling via	Some small change in costs to consumers (increased commercial resource recovery costs would likely be passed on at some level) Cost for councils for enforcement could be significant in the absence of other further incentives to recycle	Scheme costs are linear (assuming pass through to consumers) Costs shift from councils and ratepayers to producers and consumers of beverage containers	Scheme costs are largely circular, eg, refundable deposit (assuming pass through to consumers) Costs shift from councils and ratepayers to producers and consumers of beverage containers

[25] See Section Three, 'Additional considerations, Eco-modulation' for more information.

	Option one – Status quo	Option two – Increase powers under the Litter Act 1979	Option three – Increase the accessibility of public place recycling (PPR)	Option four – Regulated enforcement of commercial recycling	Option five – Apply product stewardship fees	Option six – Implement a container return scheme
	for recycling beverage containers. Environmental impact (litter, embodied emissions) and end of life management costs are largely externalised by the beverage industry and associated supply chain		PPR bins was estimated at NZ$10,250 per tonne[26]	Regulated enforcement for commercial recovery does not address market issues (eg, glass oversupply		
	-1	1	1	1	1	2
Alignment with strategic direction – will the option help progress towards Government's goals for a more circular, low-emissions Aotearoa New Zealand (with consideration of opportunities for increased employment or community participation)?	Business as usual settings are not aligned with achieving broad scale waste minimisation, high levels of resource recovery, reduced emissions and litter reduction outcomes. Our current disposal centric resource management system providers fewer employment opportunities than a resource efficient circular economy	Review of the Litter Act is already underway, this is highly aligned to strategic direction, however, in this context, a stronger regulated approach to litter is considered complimentary to other behaviour change incentives and there is limited opportunity to increase resource recovery of beverage containers	Partially aligned – PPR is expensive and cannot deliver scale recovery of beverage containers. Some services are likely to continue, however, as there is a public expectation in many parts of New Zealand that the service should be available. Hook bin services in remote and rural situations are strategically aligned, but do not incentivise recovery	Aligned, increased commercial recovery/recycling of beverage containers would help improve recycling outcomes. However, the option ultimately relies on enforcement	Product stewardship is strongly aligned with strategic direction towards a circular economy – likely less effective in the context of beverage containers, many of which are consumed 'away from home'	Container return scheme is strongly aligned with strategic direction towards a circular economy – includes both a scheme fee and a refundable deposit which provides the incentive to recycle (and not litter)

[26] See: https://wellington.govt.nz/-/media/your-council/meetings/committees/strategy-and-policy-committee/2021/8-april/2021-04-08-agenda-spc.pdf – page 72.

	Option one – Status quo	Option two – Increase powers under the Litter Act 1979	Option three – Increase the accessibility of public place recycling (PPR)	Option four – Regulated enforcement of commercial recycling	Option five – Apply product stewardship fees	Option six – Implement a container return scheme
	0	2	-1	2	2	1
Achievability – is it achievable alongside amendments to waste management legislation currently underway? Is it easy, timely and practical to implement?	N/A	Would align with review of waste legislation currently underway Requires resources to safely and effectively enforce (eg, data and privacy protections and procedures for enforcing fines)	Some PPR schemes previously deployed are now removed – very high-cost model, impractical for scale of recovery proposed (over 1 billion additional containers)	Requires bylaws under current legislation Waste legislation review process already in train could be implemented directly under new legislation Enforcement approach likely needed to ensure compliance (potentially litigious)	Achievable under current legislation – existing regulation making powers (note: limitations for application of scheme fees under current legislation)	Implementation of a CRS requires bespoke legislation Waste legislation review process underway. An appropriate vehicle for new CRS legislation
Weighted total score	-4	2	-3	6	6	9

What option is likely to best address the problem, meet the policy objectives and deliver the highest net benefits?

Ranking of options (from most to least preferable)

1) Implement a container return scheme (combination of applying a refundable deposit and product stewardship fee)
2) Apply product stewardship fees
3) Regulated enforcement of commercial recycling
4) Increase powers under the Litter Act 1979
5) Increase the accessibility of public place recycling
6) Status quo

Narrative analysis of options

48. Amending the Litter Act 1979 (Litter Act) would not prevent minor litter offences from occurring on their own. Minor littering offences (eg, cigarette butts and beverage containers) are intensive to monitor, enforce and prosecute. A comprehensive response requires broader system change that also promotes, enables and incentivises good behaviour as well as improving the legislative framework that targets this illegal and harmful behaviour.

49. The waste diversion benefits of public place recycling (PPR) come at a high transaction cost, up to 10 times more per tonne of material otherwise diverted through kerbside. Creating more PPR bin sites does not guarantee litter reduction or greater away-from-home recovery. Over the years, many PPR schemes have been trialled, promoted and, in the end, removed in Aotearoa New Zealand.[27] PPR could be further enhanced by education campaigns and broader system-level change.

50. Depending on how it is enacted, regulated enforcement of commercial recycling activities would help to increase the recovery of beverage containers and other recyclables. In practice, compliance and enforcement of commercial recycling is costly if used in isolation. For example, Auckland Council has noted limited effect using an enforcement approach for separation of materials in commercial settings under its bylaw controls (including beverage containers) relative to the scale of kerbside recovery.

51. A product stewardship fee only based scheme for beverage containers (with no refundable deposit incentive) would help shift costs to those responsible for the production and consumption of beverage products, but would not directly incentivise consumers to recycle beverage containers or reduce litter.

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[27] For example, Wellington City has twice installed and later removed PPR bins since New Zealand hosted the Rugby World Cup in 2011. In both instances, very high costs and marginal benefits were key rationale behind the removal.

Preferred option: A beverage container return scheme (combination of applying a refundable deposit and product stewardship fee)

52. A beverage container return scheme (CRS) is considered a comprehensive option to address the interconnected recycling, litter and embodied emissions issues. Crucially, applying a refundable deposit to beverage containers will incentivise consumers to return their beverage containers for recycling. This incentive is the key feature that sets the CRS option apart from other options. A CRS provides an additional incentive for people to pick up and return beverage containers that would otherwise have been littered or landfilled.

53. CRS shifts the costs of recycling beverage containers away from councils and ratepayers to the responsible supply chain (ie, manufacturers, retailers and consumers who do not return bottles to the scheme).

54. By introducing a refundable 'value' to the purchase price of a beverage, a CRS encourages consumers and households to rethink how they value waste and the packaging more broadly. A CRS also helps to reduce emissions by reducing the use of virgin materials in container manufacture. International research has shown that, in general, recycling key materials such as glass, plastic and aluminium reduces emissions.[28]

55. Most of the scheme costs are ultimately borne by the consumers and producers of beverages. The costs and benefits of a scheme are, to some degree, determined by the key design characteristics. The design options along with the scheme costs and benefits are discussed further in section three. The full CRS cost-benefit analysis can be found in Appendix 2.

[28] See footnote 16.

Section 3: Key scheme design options within a CRS

56. For the purpose of this interim RIS, each of the key design elements of a CRS have been split into individual discussion sections. As this policy is introducing an interconnected system, it is important to note that each option has specific dependencies with other scheme design elements. How each scheme design element interacts with the wider CRS system, will determine the extent to which the key policy objectives are met.

57. Set out below are key scheme design elements, which are analysed and developed using a combination of:

- the PwC scheme financial model – projects the cashflows (revenues and costs) of an operating CRS in Aotearoa New Zealand
- a cost-benefit analysis (Appendix 2), prepared by consultants Sapere Research Group – takes the PwC model outputs and models the broader monetised costs and benefits of the proposed scheme (including sensitivity testing of key parameters)
- data from operational schemes abroad and expert input that informs the modelling assumptions
- recommendations from the co-design process, independent technical advisory group report and key insights or issues from stakeholder engagement.

58. A summary of the proposed key scheme design elements will be compared to the status quo.

What criteria will be used to evaluate the scheme design options?

59. Evaluation criteria are used to assess how well the options within each scheme design element meet the relevant objectives. Some evaluation criteria are common across scheme design elements and some are element specific.

60. As noted above, the overall impact of any CRS design relies on the balance of key scheme design settings, with some key design elements having a greater impact on achieving the overall scheme objectives. Depending on the type of data available, we have included multi-criteria analysis (MCA) tables for some of the scheme design elements and narrative analysis for others.

61. The key policy judgments centre on ensuring a high-performing scheme (ie, recovery, recycling and litter outcomes), whilst balancing potential scheme costs to business and consumers. The criteria outlined below will be used to assess the options within each scheme design element:

- High recovery of beverage containers – Does the design option enable high (>85%) recovery of beverage containers? Does the design option improve recycling outcomes for beverage container materials?

- Litter reduction – Does the design option reduce the harmful impacts of beverage containers being littered?
- 'Efficient' scheme operation – Is the scheme accessible and easy to use for consumers? Can it be managed easily by scheme operators?
- 'Fair' scheme operation – Will the scheme be even-handed and not unfairly advantage/disadvantage scheme participants?

What scope are scheme design options considered within?

Previous work on the option of a CRS for Aotearoa New Zealand

62. Refer to Section 2 for context on the development of the proposals included in this interim RIS, including the Waste Minimisation Fund (WMF) CRS co-design project.

Evidence base from a wide range of international examples

63. Both the WMF-funded CRS co-design project and subsequent Ministry policy work has been informed by the key characteristics and performance data of the schemes operating globally. Schemes operate on the same 'refundable deposit' principle and vary significantly beyond this. The combination of scheme design choices can impact a scheme's performance significantly (eg, Germany and Connecticut's schemes have a 98 per cent and 51.5 per cent beverage container return rate, respectively – refer figure 3 International scheme deposit level and network type scatter plot).

64. The following key design considerations work together to substantially influence the recovery of beverage containers within a CRS:
    - the refundable deposit level
    - the network design (convenience, accessibility and degree of retail participation)
    - the scheme financial model
    - the scheme governance arrangements
    - the scope of containers to be included in a scheme.

65. As a CRS impacts a range of stakeholders, effective schemes balance the commercial interests of industry through interconnected design settings (such as the deposit level and network design).

66. For example, a scheme with fewer regulatory controls may require a higher deposit level (to further incentivise the return of containers) and more government involvement in the scheme's managing agency function to ensure that recovery targets are met. This is because the more containers a scheme manages, the more the scheme's costs increase. The costs are borne by the beverage industry in the first instance and this can create a tension between the recovery objectives of the scheme and the industry's desire to reduce costs.

67. Alternatively, a scheme that is well-regulated (such as one that requires retailers to take back used beverage containers) may achieve high recovery rates with a lower deposit level and less government involvement, as the network is highly convenient. The options

analysis in this section draws upon international evidence and further data/modelling, where applicable.

Approach of advice to Cabinet

68. In August 2021, Cabinet agreed in principle to progress the development of a NZ CRS, subject to further advice on key design considerations, prior to making its decision on whether to publicly consult on the design of a NZ CRS. Cabinet has since given its in principle direction on the design considerations to be included in a draft consultation document on a NZ CRS, including:

    - a deposit level of NZD 20 cents
    - a mixed-model return network (mandatory and voluntary), with feedback sought on the degree of mandatory retail participation (eg, size of retailers that are required to take back containers)
    - a deposit financial model
    - industry-led governance
    - a broad scope of containers (plastic,[29] glass, aluminium, LPB) to be included in a scheme, with the exception of fresh milk, which is proposed to be excluded from a CRS in all container material types

69. This Cabinet direction, informed by the Ministry's advice, determined some of the proposals presented in the draft discussion document and the options discussed in this interim RIS. The analysis below presents the options considered for each key scheme design element.

Scheme design options informed by stakeholder views

70. The scope of scheme design options for a NZ CRS has been informed in part by stakeholder engagement throughout the CRS policy process as we have built upon the research, recommendations and stakeholder views elucidated from the CRS co-design process.

71. The scheme design options analysis below also integrates feedback from stakeholder engagement with the Minister for the Environment and Ministry officials, after the completion of the CRS co-design. These meetings broadly reinforced support for a NZ CRS and reflected divergent views on key design considerations that emerged from the co-design process. Ministry officials also met with various stakeholders to discuss matters relating to the option of a NZ CRS.

72. Table 6 presents an overview of broad stakeholder feedback on the option of a NZ CRS to date. Specific stakeholder feedback is integrated as applicable in the subsequent scheme design analysis sections.

73. Public consultation will provide an opportunity to seek both broader public feedback and specific feedback from key stakeholders on the proposed design.

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[29] Specifically: PET, HDPE, PP and recyclable bio-based PET and HDPE.

Table 6: Overview of stakeholder feedback on the option of a NZ CRS to date

Stakeholder group	Feedback to date on the option of a NZ CRS
Local government	Support an effective and convenient scheme that shifts costs for recycling beverage containers from councils and ratepayers to the consumers and producers of beverage containers
Large beverage producers (non-alcohol)	Support an industry-led scheme (based on the predominantly depot model of Queensland and Western Australia)
Large beverage producers (alcohol)	Industry groups opposed to inclusion of glass in a NZ CRS. Actively working on an alternative scheme proposal for glass. Not opposed to a CRS for non-glass beverages
Commercial recyclers (collectors and processors)	In favour of an 'all materials/products included' scheme as recycling issues go beyond beverage containers. Concerns regarding impacts on existing services/facilities and advocate that the 'unclaimed deposit' value placed in kerbside be allocated to offset the loss of scheme material revenues from their existing recycling activities
Community groups and NGOs	Overall public support for CRS NGOs support an ambitious, convenient scheme that is a 'mixed-return model' with some mandated retailer take back options while also providing opportunities for community participation through the operation of return point depots (voluntary participation)
Retailers and supermarkets	Support a CRS in principle, concerns regarding cost and requirements for return points and likely to oppose any mandatory take-back requirements, eg, costs associated with establishing take-back facilities on site

What scheme design options are being considered?

74. The key scheme design elements (and their respective design options) considered in this interim RIS are outlined in table 7 below.

Table 7: Scheme design elements and options/considerations

Key scheme design element	Options considered
Refundable deposit level	• NZD 10 cents • NZD 15 cents • NZD 20 cents • NZD 30 cents
Return network design	• mandatory return-to-retail • procurement led – voluntary participation • mixed-return model
Scope of containers Overarching eligibility criteria and requirements: • definitions • container size • obligations for retailers and importers .	• include a broad scope of container materials • exempt one or more container material types: – glass in – glass out • include all beverage product or packaging types • exempt one or more beverage product or packaging types: – exempt fresh milk in all packaging types – exempt beverage containers that are intended for refilling and have an established return/refillables scheme
Scheme financial model	• deposit model • refund model
Scheme governance	• industry-led • alternatives to industry-led, eg, split

Key scheme design element one – Refundable deposit level

It is proposed that a NZ CRS uses an NZD 20 cent refundable deposit, applied to all eligible containers within a scheme.

75. In a CRS, all eligible beverage containers are required to have a refundable deposit to incentivise consumers to return used containers to a designated scheme drop-off point for a refund. The refundable deposit is an amount of money that is added to the normal price of the beverage. Some schemes internationally apply different deposit levels to different types of beverage containers (eg, by container size, material type or, in some cases, whether the product is an alcoholic or non-alcoholic beverage).

76. When the empty drink container is returned to a designated collection point, the consumer gets their deposit refunded. Deposit refunds can be provided in many different ways[30] including:

- cash
- electronic funds transfer
- supermarket vouchers (for cash or credit)
- optional donation to charity.

77. Pending return network design, refundable deposit can enable community groups (such as sports clubs and schools) to run litter clean ups and charity drives for containers. This can deliver financial benefits to these organisations.

78. The Organisation for Economic Co-operation and Development notes that a deposit level should be high enough to incentivise consumers to put in the extra effort to return their used beverage containers, and encourage litter avoidance and collection.[31]

Relevant objectives

79. If set right, the deposit level is one of the main drivers for achieving the key policy objectives by:

- incentivising the return (or recovery) of beverage containers. This will increase circularity of beverage containers, resulting in reduced litter, improved recycling outcomes and reduced emissions
- shifting the costs of resource recovery to the producers and consumers of beverage containers. If a beverage container is not returned to the scheme, both the consumer (and the producer, under the deposit financial model) bear the cost of the deposit
- opportunities for community participation in the scheme, such as fundraising for charities and social enterprises to collect litter and return beverage containers.

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[30] 2020 Consumer NZ research on container return schemes found that most people (40%) would prefer to receive a refund in cash, followed by direct payment to their bank account (21%).

[31] Organisation for Economic Co-operation and Development (OECD), 2015. Creating Incentives for Greener Products: A Policy Manual for Eastern Partnership Countries.

The deposit level has a strong influence on the scheme's return rate

80. The primary objective of the deposit level is to set the right refundable deposit price to incentivise consumers to return their beverage container through the scheme for recycling or reuse.

81. Modelling and regression analysis based on international scheme deposit levels, median income and return rates suggests a strong relationship between the deposit level and recovery rates, and that the deposit level has the greatest impact on returns. A NZD 30 cent deposit is more likely to reach and exceed an 85 per cent recovery rate than a NZD 10 cent deposit.[32]

82. High-performing international schemes with return rates above 85 per cent, have deposit levels ranging from 12 to 67 cents, with an average of 28 cents across higher performing schemes. For example, overseas schemes – including Germany, Netherlands, Finland, Norway and Denmark – have refundable deposits of 30 cents or more and achieve beverage recycling rates of over 90 per cent.

83. By contrast, low refundable deposit levels (NZD 10 cents or lower) create a low incentive for consumers to return their beverage containers for the refund, resulting in schemes that do not break through the 85 per cent recovery level.

Additional variables that intersect with deposit level

84. The deposit rate is not the only variable that influences return rates. For example, Lithuania is the only scheme to have achieved over 90 per cent recovery rate (92 per cent) in just three years and on a deposit level of NZD 17 cents (noting that the relative value of 17 NZD cents in Lithuania is higher, as the average household income is lower). This was achieved by also providing mandatory 'return-to-retail' take back requirements for retailers that sell beverages, which means it is easier for consumers to return their beverage containers to anywhere that sells the beverage (see section three, 'Proposed network design').

85. Thus, a low- to mid-level deposit combined with high levels of convenience can still achieve high recovery rates. This is the performance target zone for scheme design: a strong enough incentive to recycle, and highly convenient for consumers to return containers so that they can get their deposits back (which makes the scheme more affordable for consumers); this performance target zone is highlighted by the yellow box in figure 3.[33]

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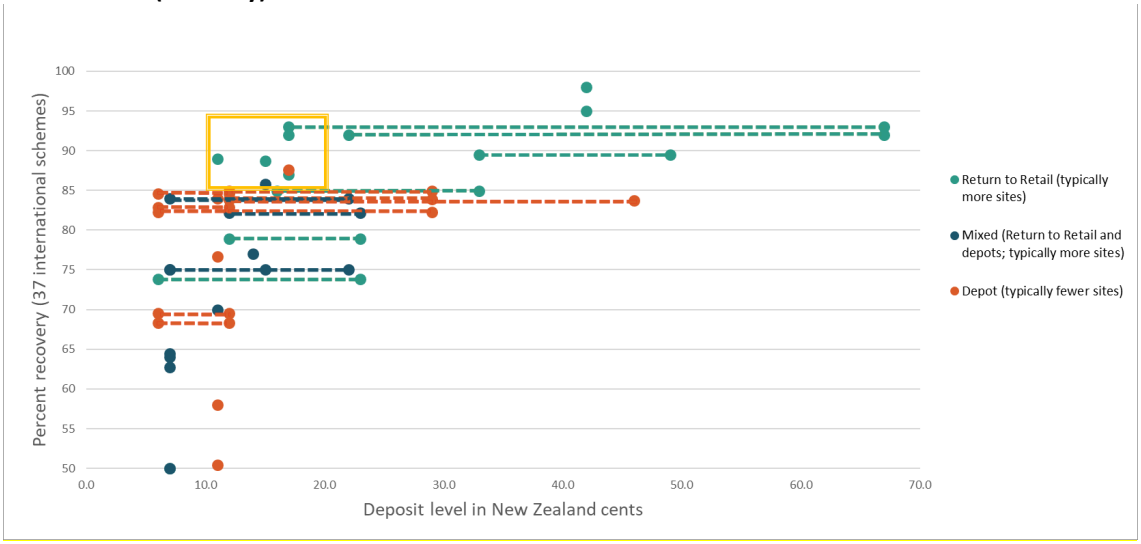
[32] All international values have been converted into NZD for the purpose of this analysis.

[33] Note that the regression analysis that supports the PwC modelling and assumed return rates based on analysis of 37 schemes also includes adjusted net national income data. Source: The World Bank Adjusted net national income per capita (current US$) | Data (worldbank.org).

Figure 3: **International scheme performance – Network types with deposit levels (including ranges where different deposit levels exist within one scheme) and reported return (recovery) rate**



86. Most of the schemes in the performance target zone (refer figure 3) require mandatory take-back of beverage containers by retailers of those beverages. One scheme, Iceland, uses the depot model (voluntary take-back) and performs highly (refer red dot in the yellow box).

87. Higher performing depot-based schemes (refer figure 3, upper cluster of red dots and lines), which are more typical of Australia and Canada than Europe, usually perform highly when the population is relatively low and typically centred in one large city. Iceland, for example, has a total population of 364,000 residents, with the majority (60 per cent) living in the capital region (Reykjavik). Similarly, Northern Territory, Australia's best performing depot-based scheme, has a population of 247,000, the majority of which live in the capital (Darwin).

Options considered for the refundable deposit level

88. The options considered for the proposed CRS design, as outlined in the consultation document, include:

- NZD 10 cents
- NZD 15 cents
- NZD 20 cents
- NZD 30 cents

89. A range of deposit levels including NZD 10, 15, 20, and 30 cents have been considered for an NZ CRS. As can be seen in table 8 below, a higher deposit level (30 cents or more), while likely to achieve very high recovery and very low litter rates, would also see more significant cost increases for consumers.

90. At the other end of the spectrum, a 10 cent deposit would place an NZ CRS amongst the lowest deposit levels for schemes globally. A 10 cent deposit level would likely see a lower recovery rate, estimated at approximately 78 per cent of beverage containers. Based on the proposed container return scheme's scope, and commencement in 2025, we estimate that this would continue to see approximately 526 million eligible containers ending up as litter or landfill every year.

Table 8: Refund deposit level options

	Refund deposit level options considered Modelling assumes 'milk-out' and total in-scope beverage containers to market in the first year a CRS is implemented as 2.31 billion containers. Year 5 is 2.39 billion. Modelling is based on performance data from 37 schemes.			
Criteria **Comments/interpretation of criteria for this option**	NZD 10 cents	NZD 15 cents	NZD 20 cents	NZD 30 cents
Recovery of beverage containers Does the design option enable high recovery of beverage containers?	Year 1: 70% return rate (1.62 billion containers) Year 5: 78% return rate, 1.87 billion containers	Year 1: 73% return rate (1.68 billion containers) Year 5: 81% return rate, 1.94 billion containers	Year 1: 76% return rate (1.75 billion containers) Year 5: 84% return rate, 2.01 billion containers	Year 1: 81% return rate (1.87 billion containers) Year 5: 90% return rate, 2.15 billion containers
Litter reduction Does the design option reduce the harmful impacts of beverage containers being littered? *Strongly correlated to recovery*	Containers to landfill and litter: Year 1: 689 million Year 5: 526 million	Containers to landfill and litter: Year 1: 627 million Year 5: 456 million	Containers to landfill and litter: Year 1: 567 million Year 5: 385 million	Containers to landfill and litter: Year 1: 443 million Year 5: 244 million
Efficient scheme operation Does the design option enable an efficient and easy-to-use scheme?	Yes – all refund types enabled	No – the 5c coin is no longer legal tender in NZ, so will preclude cash refunds, which research has shown is attractive for most consumers	Yes – all refund types enabled	Yes – all refund types enabled
'Fair' scheme operation Does the option enable the scheme to be even handed and not unfairly advantage/ disadvantage scheme participants? *Net cost to participating households*	A CRS with a 10c deposit would increase the face value price of most beverage products by 14c + GST For the average household, this would see NZ$171 + GST in scheme fees paid, with NZ$124 refunded at net scheme fee cost of NZ$73 per year (including GST), or NZ$1.40 per week	A CRS with a 15c deposit would increase the face value price of most beverage products by 18c + GST For the average household, this would see NZ$225 + GST in scheme fees paid, with NZ$186 refunded at net scheme fee cost of NZ$73 per year (including GST), or NZ$1.40 per week	A CRS with a 20c deposit would increase the face value price of most beverage products by 23c + GST. For the average household, this would see NZ$285 + GST in scheme fees paid, with NZ$248 refunded at net scheme fee cost of NZ$78 per year (including GST), or NZ$1.50 per week	A CRS with a 30c deposit would increase the face value price of most beverage products by 33c + GST. For the average household, this would see NZ$409 + GST in scheme fees paid, with NZ$372 refunded at net scheme fee cost of NZ$98 per year (including GST), or NZ$1.90 per week

Note: The above costs are year 1 start-up costs. Scheme fee costs are variable and do not account for scheme related cost-benefits also experienced by households. GST is 54% of the NZ$78/year/household cost in the NZD 20 cent option scenario, as the refundable deposit also attracts GST. Some schemes do not apply government tax to the refundable deposit, they only apply tax to the non-refundable scheme fees, or the GST is internalised within the deposit value and able to be recovered by beverage producers. In any case, the above household net scheme fee costs will likely be somewhat or almost entirely offset by households buying fewer beverage containers, such as the 6.5% reduction in sales observed following establishment of the Queensland scheme, which resulted in a net cost increase to households of only 93 cents per month for non-alcoholic beverages (data limitations did not allow the same analysis for alcoholic beverages).

Preferred option summary: NZD 20 cent refundable deposit level

91. On the basis of the analysis included in table 8 (above), the preferred option is that a NZ CRS would apply a deposit level of NZD 20 cents to all eligible beverage containers. A 20 cent refundable deposit included in the price of beverages sold in bottles, cans and liquid paper board containers would provide a strong incentive for consumers to return over 2 billion containers for recycling, while simultaneously significantly reducing the proportion of containers being landfilled and littered.

92. The benefits of a 20 cent deposit level are that it:

- creates a stronger incentive to return the container for the refund and the net cost to households is only marginally higher (compared to 10 cents)
- is more likely to achieve a higher return rate, 84 per cent based on modelling that averages 37 schemes, likely higher when combined with other scheme design characteristics and aligning towards those schemes in the performance target zone (85–90 per cent)
- is more likely to significantly reduce beverage container litter – as, in addition to recycling incentives that would see far fewer containers available to be littered, a container worth 20 cents that has been littered is more likely to be picked up and recycled
- strikes a balance between ensuring an effective scheme with managing increased costs to consumers.

93. A NZD 20 cent deposit level is expected to achieve a recovery rate of 84 per cent based on modelling that includes a wide range of international schemes. As the broader design is targeted toward more high performing schemes, depending on other design elements – such as the level of mandated take back for retailers (see CRS design element in section three, 'Return network' below) – the aspirational target has been set higher (85 per cent for year three and 90 per cent for year five). Should the scheme not meet these targets, it is proposed the scheme deposit level and retailer take back requirements be reviewed with a view to increasing recovery to meet these targets.

94. Consultation will enable feedback from a range of stakeholders on the proposal. In particular, it will be important to understand likely impacts for particular population groups if possible (eg, age, socio-economic status, rural/urban dwelling).

Key scheme design element two – Return network

It is proposed that a NZ CRS return network would use a 'mixed-return model' to ensure convenient return points for eligible containers. A mixed-return model would:

- use regulations to mandate certain retailers (eg, those over a certain size) to take back eligible beverage containers and provide a refund to consumers
- provide additional opportunities for voluntary participation in the network (eg, by wider retailers, community organisations and businesses).

95. A container return facility (CRF) is where consumers and businesses can return eligible beverage containers to redeem their container to receive the deposit refund. Each CRF type is developed to suit certain situations, container volumes and customers. Typically, eligible containers can be returned to any participating CRF for a refund; it does not have to be the same place the beverage was purchased.

96. The main CRF network for a CRS is only established once. While the number and location of CRFs can change over time, the core system's effectiveness, efficiency and carbon footprint are all largely locked in at the implementation stage. An efficient, convenient, low-carbon network is one where most people can return containers to places they frequent regularly and that can be well managed as a redemption site.

97. The main CRF types are:

- *reverse vending machines* (RVMs) – an automated vending machine that accepts empty containers (up to 100 per minute in standard models) using technology to accurately verify, count and sort containers by material type, then provide a refund or donation option. RVMs are typically set up outside (or inside) retail locations and the machines can be sized for low, medium and high-volume sites
- *depots (manual or automated)* – eligible containers are brought to a depot and counted onsite, either manually (by staff) or using automated counting, verification and sorting technology before a refund is given. Depots are generally managed by interested stakeholders such as entrepreneurs, community groups, charities and waste operators (eg, scrap metal operators). In particular, depots cater to large private and commercial-scale customers such as collections from charity drives, hotels, bars and restaurants
- *over-the-counter returns* – small volumes of containers are received/redeemed by small businesses (eg, dairies) and are then on-shipped to a depot for verification and aggregation.

Relevant objectives

98. If established properly, the return network contributes towards the key policy objectives as follows:

- the return network enables the return (or recovery) of beverage containers. The easier it is for people to return their containers, the more containers are likely to be returned and recovered through the scheme. This will increase circularity of beverage containers, resulting in reduced litter, improved recycling outcomes and reduced emissions
- how a return network is designed impacts how accessible the scheme is for all consumers, including those in both rural and urban settings.

The return network has a strong influence on the scheme's return rate and how equitable the scheme is for consumers and retailers

99. The main objective of the return network design is to ensure an efficient and convenient scheme that enables high scheme participation for the lion's share of the population.

100. A CRF's accessibility and customer convenience (eg, hours of operation, location and travel distance) is critical to the scheme's overall effectiveness and efficiency. The location, number and type of CRF locations per head of population impact operational

scheme costs, customer convenience, public engagement in the scheme and the network's embedded carbon footprint.

101. CRF operators receive a handling fee to cover the costs of collecting, storing, packaging and transporting returned containers. The handling fee has been modelled at a gross cost of NZD 7 cents per container, based on international schemes. The actual handling fee would be determined by the market-driven costs of the scheme (see section three, 'Scheme fees').

Options considered for the scheme's return network

102. Container return schemes use a range of legislative and non-legislative tools to create the return network for a scheme. The most common approaches are:

- using legislation or regulations to require beverage retailers to take back eligible beverage containers (*mandatory return-to-retail*)
- a non-regulatory approach relying on incentivising potential operators to participate in the scheme, typically depot based (*voluntary participation*)
- a mixed approach using both mandatory return requirements and voluntary participation, eg, depots (*mixed-return model*).

103. An overview of the return model options can be found in table 9, with more detail and analysis on each option provided below.

Table 9: Return network options

Return model	Description
Mandatory return-to-retail (regulatory approach)	• requires retailers to take back used beverage containers • guarantees conveniently located CRFs for majority of the population • higher return rates typically achieved • may apply to certain type or size of retailer • retailers may face initial costs to establish return points on their premises (direct purchase or lease) • majority of schemes globally use 'return-to-retail' legislation to some degree (common in EU, US, Canada)
Voluntary participation (procurement led approach)	• relies on incentivising potential CRF operators (including retailers) to engage in network procurement process being run by the scheme manager, typically depot based • disrupts 'business as usual' so uptake is likely piecemeal • overall limited network accessibility, efficiency and effectiveness
Mixed-return model (combination approach)	• would use both mandatory and voluntary return frameworks • retailers (eg, by type or size) that sell beverages for away from home consumption would be required to take back eligible containers and provide a refund to consumers • other organisations (retailers, community groups, businesses) could voluntarily engage in the network through the managing agency's procurement process, via depots

Mandatory return-to-retail

104. Most schemes overseas use legislation or regulations to require certain retailers that sell beverages to take back empty containers and provide the refund. This ensures that consumers are guaranteed convenient return points, such as supermarkets, dairies, bottle shops and petrol stations. This approach is common to European schemes and is also used in the United States and Canada, but not in Australia.

105. For example, in Lithuania, all retailers that sell beverages, with a shop floor size of over 300m^{2,} are required to take back containers. If you are a rural retailer that sells beverages, the requirement applies to stores over 60m², to capture smaller stores like dairies (eg, in the absence of large supermarkets). In Germany, retailers that sell beverages, whose stores are over 200m², are mandated to take back containers.

106. Higher return rates are typically observed in mandatory return-to-retail schemes because of the high convenience that retail return point locations such as supermarkets provide to consumers. For example, Lithuania (NZD 17 cent deposit) and Germany (NZD 42 cent deposit) recover approximately 92 per cent and 98 per cent of beverage containers, respectively, despite having very different deposit levels.

107. Depending on the scheme design, mandatory return-to-retail legislation typically only applies to those retailers who sell beverages (eg, supermarkets and other retailers that sell beverages). Internationally, mandatory return-to-retail requirements have been done in a number of different ways, including:

- all retailers (of any type) that sell beverages mandated to take beverage containers back
- all retailers above a certain size (eg, shop floor area in m² or an annual turnover threshold) that sell beverages must take beverage containers back. Different size thresholds can also be applied for urban and rural communities
- all retailers from a certain retail format (eg, only supermarkets) that sell beverages must take beverage containers back.

108. There are also options to provide exemptions for retailers (ie, they would not be subject to mandatory return-to-retail requirements). Exemptions can include: limiting take-back requirements only to beverage packaging types that retailers sell (and in some cases this is further narrowed to only brands that they sell); limiting take back container numbers per customer (eg, 24 bottles/cans in small retail settings); for health and safety, or food safety reasons; or where there is another CRF nearby.

109. Mandatory return-to-retail legislation for a NZ CRS could:

- only apply to larger retailers or supermarkets (such as those exceeding a specific floor area, which could differ for urban and rural communities)[34]
- include or exclude small retail stores such as convenience stores and dairies
- provide conditions and/or exemptions for retailers (eg, for health and safety, or food safety reasons; or where there is another CRF point in close proximity, eg, within 500 metres).

110. Requiring retailers to take back eligible containers would mean that mandated retailers may face initial costs to establish return points on their premises (such as RVMs). This could be done through direct purchase and management of store-owned return systems, or through the procurement (lease) of a return-point provider, and technology to establish and manage return points.

111. Under a mandatory return-to-retail model, options for retailers are influenced by a number of factors including the regulatory requirements of the scheme (such as the

[34] The number of retailers to achieve optimal coverage in the network has been modelled on 679 supermarkets.

need for fraud protection, digital verification of containers and data reporting), the return on investment associated with different infrastructure ownership models and other important considerations such as the desired level of customer service/experience (ie, good sites draw in new customers).

Voluntary participation (non-regulatory, procurement led approach, typically depot based)

112. Schemes without mandatory return-to-retail regulations rely on existing and new businesses voluntarily choosing to establish a return point in the market. The viability and convenience of depot sites largely rely on their cost structure, which is often driven by handling fee revenues and operational costs (including the venue lease cost).[35] The business opportunity of generating revenue through handling fees encourages operators to enter the return-point (usually depot) market and participate in the network procurement process when the scheme is established.[36]

113. While the voluntary return-to-retail model has some merits, the associated network is often less convenient for consumers with relatively fewer sites per person. Sites are also more likely to be located in less accessible locations, such as commercial/industrial parks where land and buildings are cheaper. This model often leads to lower (less than 85 per cent) return rates and would increase vehicle movements (and associated emissions) because many more consumers have to travel farther and to sites they normally would not visit to return their beverage containers.

Geo-spatial analysis for a New Zealand network

114. Initial geo-spatial analysis used 679 urban and rural supermarkets across Aotearoa New Zealand as an example, with Countdown, Four Square, Fresh Choice, New World, Pak'n Save and Super Value stores selected. This modelling has shown that on average:

- 80 per cent of New Zealanders live within a 5-minute drive of a supermarket
- 90 per cent live within a 10-minute drive
- over 95 per cent live within a 20-minute drive.

115. Similarly, approximately 89 per cent of New Zealanders live within 5 kilometres of a supermarket, and 95 per cent live within 10 kilometres of a supermarket. This suggests that if regulations required retailers such as supermarkets to take back empty beverage containers, the majority of New Zealand's population would have accessible, convenient return points for containers.

116. Moreover, it is estimated that New Zealand supermarkets alone sold about 1.38 billion beverage containers in 2019/20 (57 per cent of the beverage container market) and 1.41 billion in 2020/21 (54 per cent of the market).[37]

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[35] As outlined above, the handling fee is paid to CRF operators to cover the costs of collecting, sorting, storing, packaging and transporting returned containers.

[36] Under a voluntary return model, the scheme's managing agency typically manages the procurement of return points.

[37] GS1 New Zealand beverage sales data, 2022.

Table 10: Return network options analysis

	International return network types considered		
Criteria **Comments/interpretation of criteria for this option**	**Mandatory return-to-retail network (regulatory approach to network establishment)** Requires retailers who sell beverages to take back used/empty containers May apply to specific type/size/subset of retailers who sell beverages	**Voluntary network (non-regulatory, procurement led approach to network establishment, typically depot based)** Relies on incentivising potential CRF operators to engage in network procurement process being run by the scheme managing agency (MA)	**Mixed-return network (combination of regulation and procurement led approach to establishing network eg, depots)** Requires retailer take back and often includes broad exemptions for retailers (typically incentivises retailers to establish a smaller number of depots)
Recovery of beverage containers Does the design option enable high recovery of beverage containers?	Return-to-retail schemes (irrespective of deposit level) are highly convenient and typically achieve over 85% recovery European return-to-retail schemes have convenience levels (return points to population) ranging from 1:338 to 1:3,624, with an average of 1:1,218. Return points are also often open longer hours (supermarket hours), which also increases accessibility in evenings and weekends for consumers	Depot based schemes (irrespective of deposit level) do not typically achieve or exceed 85% recovery More typical of Australia and Canada, depot based schemes have convenience levels (return points to population) ranging from 1:1,494 to 1:22,174, with an average of 1:12,853. Return points can be located in more convenient shopping areas, but are more likely to be based on a drive through model and in an industrial site where land is cheaper	Mixed-return model schemes (irrespective of deposit level) do not typically achieve or exceed 85% recovery More typical of the United States, mixed-return model schemes have convenience levels (return points to population) ranging from 1:3,878 to 1:26,229, with an average of 1:13,355 (more similar to the depot model than a true return-to-retail scheme)
Litter reduction Does the design option reduce the harmful impacts of beverage containers being littered? *Strongly correlated to recovery*	Highly convenient return-to-retail schemes are the best performing schemes in the world, averaging over 90% recovery. Therefore, they have fewer containers available to litter and disposal	Lower performing scheme network types have more containers available to litter and disposal, however this can be offset (to some degree) with a higher deposit that incentivises more recovery	Lower performing scheme network types have more containers available to litter and disposal, however this can be offset (to some degree) with a higher deposit that incentivises more recovery. The proposal is to design a 'mixed-return' model with a higher level of convenience than would typically be seen, reducing litter rates.
Efficient scheme operation Does the design option enable an efficient and easy-to-use scheme?	Return-to-retail model is highly efficient and guarantees conveniently located CRFs for the majority (~95%) of New Zealand's population As beverages are returned where they are purchased, the scheme generates relatively few new trips, minimising the CRF network carbon footprint.	The depot model is less efficient from a consumer perspective as the procurement led approach usually results in fewer CRFs Fewer CRFs per population leads to fewer containers returned, which reduces scheme costs for the beverage industry	Mixed-return network guarantees some conveniently located CRFs for the majority of New Zealand's population, however, this model is typically implemented with broad exemptions, which reduces convenience levels to those similar to depot only schemes

	International return network types considered		
	A return-to-retail only model is less efficient for returning commercial recovery volumes	Depots are typically very well suited (efficient) to servicing bulk commercial customers, eg, collections/drop offs from the hospitality industry A depot only model also creates many more new trips due to drop off locations in more remote (industrial) sites, which increases the carbon footprint of the network	The efficiency of a mixed-return model will largely depend upon the level of convenience that is established by the regulated take back requirements of the network. Typically, these favour lower levels of convenience, but do not have to. The proposal is to design a 'mixed-return' model with a higher level of convenience than would typically be seen.
'Fair' scheme operation Does the option enable the scheme to be even handed and not unfairly advantage/ disadvantage scheme participants? *Cost-benefit considerations*	Retailers may face initial costs to establish return points on their premises (direct purchase or lease), however, the costs are reimbursed via a per-container handling fee As schemes are self-funding, costs are largely borne by the producers, retailers and consumers of beverages A fair scheme for consumers is one where it is easy to get their refundable deposits back	Depot based schemes typically have fewer return points per population Depots are often located in less convenient locations, making it harder for consumers to get their deposits back Depot only schemes provide an increased number of opportunities for third parties to be involved in (and profit from) the network A fair scheme for the beverage industry is one that minimises costs – fewer return points would typically reduce scheme operating costs	Mixed-return model requires some retailers that sell beverages be required to take them back A mixed-return model allows for some third party organisations (iwi/hapū, retailers, community groups, charities, businesses) to voluntarily engage in the network through the managing agency's procurement process for depots and any over the counter sites A mixed-return model with high levels of convenience for consumers, that does not require all retailers to take back beverages, provides a fair approach to balancing the scheme network design

Preferred option summary: A convenient 'mixed-return' network model

117. Based on the analysis set out in table 10 (above), the preferred option is that a NZ CRS return network would use both regulated take back for retailers to establish a base level of higher convenience and a procurement led approach to establishing depots and over the counter sites to create a 'mixed-return' model, with a higher level of convenience than would typically be seen in mixed networks, eg, 1 return point per 5,000–7,500 people (ie, the range modelled to achieve an 84 per cent return rate at NZD 20 cents deposit).

118. Evidence shows that convenient schemes with mandated take back for retailers are a key design consideration to drive the recovery of eligible beverage containers. However, unlike European schemes, we do not consider that all New Zealand retailers need to act as container return facilities.

119. If New Zealand's network was made up of 795 sites – including 645 RVM sites (such as at major brand supermarkets), 50 depots and a number (100) of over the counter sites to fill gaps and service remote rural areas that do not have access to a major brand supermarket – the concentration of return facilities would be 1:6,623. This ratio would ensure a convenient scheme for consumers (urban and rural), as well as providing depot services for commercial volumes from the hospitality sector.

120. A 'mixed-return' model provides opportunities for businesses, community organisations and charities to participate in a scheme. In a mixed-return model, the majority of return points would be established through regulations at retail locations (supermarkets), while the scheme's managing agency would procure additional voluntary return points, including depots.

121. A mixed-return network model balances the need for a convenient low carbon scheme for consumers, against the opportunity for other parties to participate in and benefit from the scheme.

122. We consider that supermarkets could play a greater role in being responsible for the products that they sell (eg, through mandatory return-to-retail), as they are the majority sales point channel for beverage sales in New Zealand and already in locations highly convenient to 95 per cent of New Zealanders.

123. In a 2020 survey undertaken by Consumer NZ, 70 per cent of respondents noted that supermarkets would provide the most convenient place to return scheme eligible containers in New Zealand.

124. During public consultation we are seeking feedback on the degree of mandatory retail participation, in particular what size and type of retailer should be required to take back beverage containers.

125. The scheme managing agency would procure and approve additional voluntary return points, including depots, and the business case for the depots would need to enable them to be viable operations. As depots target commercial volumes, while there may be fewer of them, they would still be expected to manage significant volumes on a site-by-site basis. However, they would more likely be located in less convenient locations for consumers, such as industrial zones.

Key scheme design element three – Scope of containers

It is proposed to include all single-use beverage containers less than or equal to 3 litres in volume made from glass, plastic (PET, HDPE and PP, and recyclable bio-based HDPE and PET), metal and liquid paperboard.

Beverage containers that are not within the scope above are proposed to be excluded from the NZ CRS at this stage.

Fresh milk in all packaging types and refillable beverage containers are proposed to be exempted from the NZ CRS.

Some containers are **out of scope**. This includes non-beverage products, cups and coffee cups.

126. *Scope of containers* broadly refers to the eligibility of beverage containers considered in scope of a NZ CRS. The scope of beverage containers is key to the design of any scheme as it determines which types of beverages and containers would be required to have a refundable deposit and, accordingly, which containers would be eligible to be returned for the deposit refund. In doing so, the scope of containers eligible under a NZ CRS also determines what beverage packaging types would be able to be sold on the New Zealand market – unless specifically exempted from the scheme, beverage producers/importers would need to apply for a license from the scheme's managing agency in order to sell their products in New Zealand.

127. Eligibility is determined on the intersection of the:

- type of beverage container material (eg, plastic, metal, glass, liquid paperboard [LPB])
- size of beverage container
- type of beverage product (eg, dairy and non-dairy milk, soft drink, juice, beer)
- type of beverage container format (eg, bottles, cans, sachets, bladders).

128. Approximately 90 per cent of overseas schemes include beverage containers made of key materials – metal, plastic and glass – and some schemes (such as those in Canada and Australia) also include liquid paperboard (LPB). Some schemes exempt certain packaging formats and/or beverage product types irrespective of packaging material, such as fresh milk.

129. Schemes have specific conditions of acceptance (eg, size, type, material) implemented through legislation to manage the containers eligible under a scheme. Eligible containers usually have means to determine acceptance for return, such as a scheme label or identifying mark, barcode, QR code or other form of unique identification.

130. To strengthen waste minimisation and circular economy outcomes, a NZ CRS would ideally include recyclable beverage container materials that have existing recycling pathways and stable markets, while also providing opportunities to support the growth of markets and better recycling outcomes for other materials (such as LPB).

Relevant objectives

131. The beverage containers included within a scheme contributes towards the key policy objectives in the following ways:

- the more containers included in a scheme, the more materials that can be recovered through the scheme for recycling and reuse, and therefore the more containers prevented from being littered or landfilled
- producers of the beverage containers (and beverage products) included within a scheme would be required to register their containers and may be subject to data and reporting requirements. Less-recyclable materials may be subject to an eco-modulation fee, to incentivise producers to shift towards more recyclable container materials (see section three, 'Additional considerations, Eco-modulation' for more information)
- a broad, clear and easy-to-understand scope of containers makes it easier for consumers to participate in the scheme, and for community groups to coordinate collection/take-back drives or depots.

Improving (and ensuring) recycling outcomes for beverage container materials

132. To achieve circular economy outcomes, a NZ CRS would ideally include recyclable beverage container materials that have existing recycling pathways and stable markets, while also providing opportunities to support the growth of markets and better recycling outcomes for other materials (such as LPB). Because a CRS would increase the amount of beverage container materials captured for recycling, it is important that there is recycling infrastructure available for the collected materials with viable end markets. This could include both onshore and offshore markets. Where materials are exported, it is important that they are managed in an environmentally sound manner.

Broad eligibility criteria and requirements

133. It is proposed that all beverages and beverage containers that fit the below definitions and size descriptions are considered to be in scope of a NZ CRS at this stage, unless explicitly exempted.

Obligations for beverage producers and importers

134. Beverage producers/importers would need to sell their products in accordance with the scheme and the regulated scope of containers. In practice, beverage producers/importers would need to establish a contract with the scheme's managing agency, potentially through a licensing mechanism, in order to sell their beverage products in New Zealand.

135. Container labelling would be a legal requirement and would likely include a scheme logo, barcode, the deposit/refund amount and any security features deemed necessary.

136. Suppliers exporting eligible containers outside of New Zealand would be eligible for an exemption from the scheme fees for the exported containers. The scheme's managing agency would be responsible for establishing appropriate control measures and processes for managing imports and exports of beverages.[38]

[38] GS1 data suggests that 25% of all beverage packaging material is imported in New Zealand (the vast majority of which is glass, at 21%).

Definitions[39]

137. The consultation document proposes the following definitions for eligibility:

- *beverage* means a liquid substance that is intended for human consumption by drinking
- an eligible *beverage container* refers to a vessel or casing of a beverage (regardless of whether it is sold alone or as a unit in a multipack), that is sealed in an airtight and watertight state at the point of sale.

138. The proposed definitions above would mean that beverage containers such as cups and coffee cups, and non-beverage containers (eg, sauce bottles, ice cream tubs) are not in scope of the scheme. These could still be able to be sold in the New Zealand market, however, they would not be able to be returned through the CRS (ie, to a CRS return point or depot).

139. For reference, *single-use* refers to beverage containers which are designed, and predominantly used, for one off use, ie, once the seal has been broken and the beverage is consumed. While some beverage containers may be reused time and again (such as a plastic juice bottle being reused as a drink bottle), consumption and production models for beverage containers are generally not designed for multi-use, as they are merely the packaging for the beverage product, ie, it is the *beverage product* people are purchasing, not the container it comes in. Conversely, a bottle specifically sold as a 'drink bottle' is designed for continual reuse – the consumer is intentionally buying the reusable bottle as the product.

Container size

It is proposed that the size of eligible beverage containers would be less than or equal to 3 litres in volume, with no lower limit for minimum beverage container size.

140. The size of eligible beverage containers varies between schemes elsewhere, with many including all single-use beverage containers less than 3 to 4 litres in volume or, as in Denmark, all containers less than 20 litres. For overseas schemes (where information on eligible beverage container sizes is available) the following broad categories apply for container size eligibility criteria:

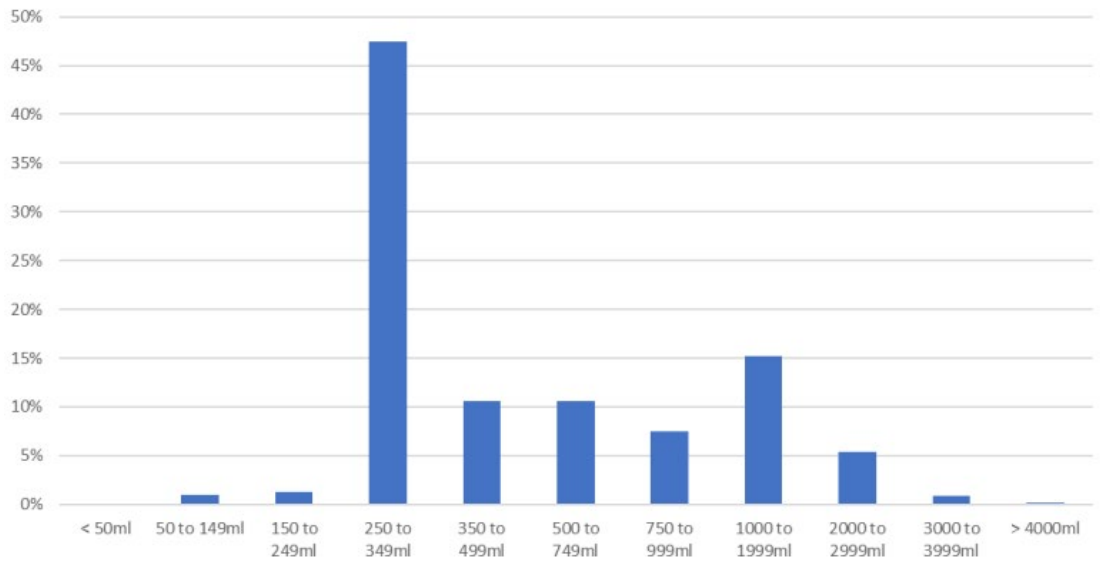
- less than or equal to 3 litres
- less than or equal to 5 litres
- 100 millilitres to 3 litres
- greater than 3 litres.

141. New Zealand supermarket beverage sales data (refer figure 4) shows that most (99 per cent) single-use beverage containers sold in supermarkets are less than 3 litres in volume. 2020/21 data shows that almost half of all beverage containers sold via supermarkets are 250 to 349 millilitres in volume, with over 95 per cent of these being

[39] Note: these definitions are provided for the purpose of this interim RIS and associated consultation document, noting that key definitions would be developed in the regulation-making phase, should Cabinet decide to implement a NZ CRS.

containers between 250 and 2,999 millilitres in volume. Examples from scheme operators elsewhere indicate that the small number of containers larger than 3 litres can be challenging to collect through a scheme, particularly where reverse vending machines (RVMs) are the main method for return.

Figure 4: New Zealand supermarket beverage container packaging size distribution (2020/21)



No lower limit on container size

142. Australian schemes, such as Queensland and New South Wales, specify minimum beverage container sizes of 150 millilitres, however, we are proposing to have no lower limit, to enable more containers to be captured by a NZ CRS and to simplify the scheme for New Zealanders. This aligns with overseas schemes, including South Australia, Northern Territory and most Canadian schemes.

143. Excluding beverage containers smaller than 150 millilitres could lead to perverse outcomes and litter, given that some beverages in New Zealand are smaller than this size (eg, some mixed spirit plastic containers are 40 millilitres).

144. While there is a small number of containers sold at the small size end (1.1 per cent being 150 millilitres or less), excluding beverage containers smaller than 150 millilitres could lead to some products shifting to reduced size packaging. The risk of increased volumes and sales in products under 150 millilitres, and any associated litter issues, is a key reason for having no lower limit for the scheme.

Feedback on container size from previous consultation

145. Previous consultation on proposed priority products[40] showed a clear majority of submitters supported the proposed scope for beverage packaging that has more than 50 millilitres and less than 4 litres of capacity. This majority support carried through all submitter categories. Some submitters wanted a narrower range of volumes, including increasing the minimum beverage container size from 50 millilitres to 150 millilitres, or reducing the maximum from 4 to 3 litres. Others wanted to have no minimum volume, and no maximum volume, to cater for larger container outliers.

Beverage container materials for inclusion: Overview

It is proposed that the following beverage container materials are included:

- metal (aluminium)
- plastic (PET, HDPE and PP, and recyclable bio-based HDPE and PET)
- glass
- liquid paperboard.

Trends for beverage packaging materials in latest New Zealand beverage sales data

146. 2020/2021 New Zealand sales data highlights that New Zealanders bought over 2.57 billion beverages in total. New Zealanders are also drinking more beverage products across every packaging material type.

147. Over the last two years, sales volumes have grown 9 per cent and 7 per cent respectively, with significant increase in metal (aluminium) container sales. While its growth has been relatively flat (approximately 1 per cent), glass is still the top packaging choice with 944 million containers sold, 92 per cent of which were alcoholic beverage products. Refer table 11 for further detail regarding sales by beverage container material type.

Table 11: New Zealand supermarket beverage sales by packaging material type for the 2020/2021 financial year

Packaging type (beverage containers)	Plastic	Liquid paperboard	Metal	Glass	Total
2018/19 total estimated containers	514,796,074	147,352,478	547,494,360	982,100,402	2,191,743,314
2019/20 total estimated containers	571,566,550	163,668,731	677,146,786	985,622,645	2,398,004,712
2020/21 total estimated containers	587,488,807	167,917,125	820,138,665	994,927,186	2,570,471,784
Estimated growth in container volume 2018/19–2019/20	11%	11%	24%	0%	9%
Estimated growth in container volume 2019/20–2020/21	3%	3%	21%	1%	7%

[40] See submissions on proposed priority products and priority product stewardship scheme guidelines (2019): https://environment.govt.nz/publications/proposed-priority-products-and-priority-product-stewardship-scheme-guidelines-summary-of-submissions/

New Zealand support for a broad scope of containers

148. 2020 Consumer NZ research showed that 64 per cent of New Zealanders thought a NZ CRS should cover a broad scope of beverage container materials (ie, plastic, glass and metal).[41] This support for a broad scope of containers was also reflected in a 2019 consultation on proposals for priority products. A clear majority of submitters (97 per cent) supported the proposed broad scope of beverage containers (ie, plastic, glass, metal, paperboard or mixed laminated materials) being declared as priority product, which is the basis of a regulated product stewardship scheme under the current Waste Minimisation Act 2008. This included 85 per cent support from business/industry.

Beverage container materials for inclusion: Plastic

It is proposed to include beverage containers made out of plastics PET, HDPE and PP (and recyclable bio-based HDPE and PET).

149. PET, HDPE, and PP are conventional packaging plastics that are higher value plastic types with growing onshore reprocessing capacity, and good markets both onshore and overseas. The two main plastic beverage container materials are PET and HDPE. While PP is less commonly used, it is proposed to be in included because it is easily recyclable and is used for some beverage container lids and caps.

150. Plastic beverage containers are included in nearly all (approximately 96 per cent) overseas container return schemes. Most plastic beverage containers are highly recyclable and have stable onshore or offshore recycling markets. A CRS is an opportunity to recover cleaner, separated plastic beverage container material. This would deliver higher quality recyclable products to market with a higher commodity value and also reduce littering of plastic beverage containers in our environment.

151. Including the proposed plastics in a NZ CRS would:

- increase the low recovery and recycling rates for plastic beverage containers
- reduce plastic beverage litter and associated clean-up costs
- increase the quality of plastic collected for recycling
- address the high market demand for high quality plastic
- support the viability of increased onshore domestic processing
- align with recent decisions to phase out certain hard-to-recycle plastics
- create a level playing field for all beverage producers
- create a convenient and simple scheme for consumers and businesses to use.

Sales and recovery of plastic beverage containers in Aotearoa New Zealand

152. In 2020/21, approximately 587 million beverages in plastic containers were sold in the New Zealand market. Of this, fresh milk and cream accounted for 177 million plastic containers, followed by carbonated beverages (147 million plastic containers) and water

[41] Consumer NZ, 2020. Beverage container return scheme: Phase 1 consumer research survey results.

(115 million plastic bottles).[42] In 2019, the available data suggests only 33 per cent of these plastic containers were recovered for recycling.

153. Introducing a CRS that accepts all single-use plastic beverage containers would see increased recovery of plastic beverage containers for recycling, alongside significant litter reduction and improved recycling outcomes. Quality separated plastic materials can achieve over NZ$200 per tonne for PET and up to NZ$850 per tonne for natural coloured HDPE.

154. Kerbside recycling audits from 2019 show that households recycle 81 per cent of PET and 86 per cent of their HDPE beverage containers at home. Therefore, even a kerbside recycling system with 100 per cent recovery has limited maximum potential for recovering plastic beverage containers, which further underscores the rationale for a CRS alongside wider improvements to kerbside collection systems.

Forecasted consumption of beverages in plastic containers and increase in domestic reprocessing capacity

155. New Zealand's onshore domestic plastic reprocessing and recycling industry is growing, driven by increasing volumes of virgin materials and plastic products entering the domestic market and increasing consumer demand for better (environmental) outcomes associated with products made from plastic.

156. Relative to the size of the market opportunity (virgin materials imports[43]), onshore processing and manufacturing for recycled content is only just getting started in Aotearoa New Zealand. New Zealand's onshore plastic reprocessing and recycling industry needs systems that recover clean, separated, materials in order to grow. Increased recovery of cleaner, separated plastic beverage materials through a NZ CRS would support our onshore domestic plastics recyclers and enable bottle-to-bottle recycling in New Zealand.

Bio-based HDPE and PET

157. There are some bio-based[44] plastic beverage containers in circulation on New Zealand's market (for example, plant-based plastic water bottles or milk bottles). Bio-based plastics can be made to be either recyclable or compostable, but they cannot be both. Unfortunately, these bottles can look identical to other plastic bottles and often end up contaminating recycling systems (or, conversely, composting plants) by mistake.[45]

158. While bio-based plastics are a relatively small portion of New Zealand's beverage container market, recyclable bio-based PET and HDPE beverage plastics are proposed to be included in the NZ CRS because:

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42 GS1 and PwC New Zealand beverage sales data, 2022.

43 In 2019, New Zealand imported 575,000 tonnes of plastic resin and plastic materials. Source: Prime Minister's Chief Science Advisor, 2019. *Rethinking Plastics in Aotearoa New Zealand.*

44 Just as conventional plastics are fossil fuel-based, bio-plastics are made from plant materials (or a combination of plants and fossil fuels). For example, PET and HDPE plastics can both be made from biobased materials and can be recycled in conventional recycling systems, such as Ecostore's recyclable plastic bottles, which are sugar cane-based HDPE.

45 Note: Capturing compostable and biodegradable materials is not a key policy objective of reducing litter and increasing recycling of beverage containers.

- of the emissions reduction potential
- the materials are compatible with conventional recycling systems.

Beverage container materials for inclusion: Metal

It is proposed to include beverage containers made out of metal, including aluminium, steel, tinplate and bi-metals.

159. Metal beverage containers are included in nearly all (94 per cent) overseas container return schemes. This is mostly aluminium cans, but some schemes also include lower value metals. Recycled aluminium has high demand and is a valuable commodity; prices vary but are typically around NZ$1,200 per tonne, making this the most valuable beverage container material.

Sales and recovery of metal beverage containers in Aotearoa New Zealand

160. In 2020/21, approximately 823 million containers – or about 32 per cent of total beverage containers sold – were made out of metal, mostly aluminium. Carbonated beverages were the most sold beverage in metal containers, with about 394 million sold, or 48 per cent of total metal beverage containers (equating to 15 per cent of all beverages sold). Alcoholic drinks (including beer and spirit-based drinks) accounted for another 299 million containers, or 36 per cent of metal beverage containers sold (11 per cent of all containers).

161. In 2019, our existing systems recovered less than half (estimated 45 per cent) of metal beverage containers sold. Including metal beverage containers in a CRS could significantly increase this recovery rate to upwards of 85 per cent.

162. Given aluminium cans are a valuable commodity, highly recyclable, reduce emissions when recycled and have good circular potential, eco-modulation of the scheme fee would mean those using aluminium packaging could have their scheme fees modulated (reduced) as an incentive towards this highly recyclable and lightweight commodity (see section three, 'Additional considerations, Eco-modulation' for more information).

Beverage container materials for inclusion: Glass

It is proposed to include beverage containers made out of glass.

163. Glass beverage containers are included in most (approximately 87 per cent) of overseas container return schemes, including all Australian schemes. Glass accounted for about 41 per cent of all beverage containers sold in New Zealand in 2020/21.

164. The large glass/alcohol industry associations oppose inclusion of glass in a CRS. As such, a cost-benefit analysis (CBA) has been given to this option. The CBA demonstrates that excluding glass containers from the scheme would significantly reduce the overall benefits of a CRS, due to the size of the glass market. In a NZD 20 cent deposit scenario and over a 30 year time horizon, the benefit-cost ratio (BCR) dropped from 1.61 for a 'glass-in' scheme to 1.10 for a 'glass-out' scheme. Net benefits dropped from NZ$1.39 billion (glass-in) to NZ$167 million (glass-out).

165. Including glass beverage containers in a NZ CRS would:

- increase our recovery and recycling rates for beverage glass, including new market drivers to help address recovered glass market issues (eg, eco-modulation and refillable targets)
- reduce glass beverage litter and associated clean-up costs
- reduce contamination of glass in kerbside collections
- reduce the cost of kerbside collections for ratepayers and councils
- create a level playing field for all beverage producers
- create a convenient and simple scheme for consumers and businesses to use.

Sales and recovery of glass beverage containers

166. In New Zealand, glass was the most sold beverage container type (approximately 994 million containers) in 2020/21. Glass was the also the most littered beverage material in 2019, representing 51 per cent of beverage litter items by count. Beer bottles represented the largest proportion of national litter weights in 2019.[46]

167. In 2018/19, New Zealand's recovery rate for glass was 60 per cent (upper figure), and the bottle-to-bottle recycling rate was 48 per cent. As a proportion of total glass beverage containers to market, kerbside recovery levels for glass have declined slightly in 2020/21 for many councils. Comparatively, CRS glass recovery is typically over 80 per cent in Europe and in Canada.

New Zealand market demand and oversupply of glass for onshore reprocessing

168. New Zealand has one glass bottle manufacturing plant in Auckland. Currently, New Zealand has stable market demand for glass to the point where our onshore processing and manufacturing capacity is exceeded; approximately half of the glass beverage product sold into the market every year can be recovered and processed into new bottles (bottle-to-bottle recycling).

169. The additional volume of recovered glass that is not able to be remade into new bottles is in excess supply, with limited alternative onshore market opportunities that are sustainable. Manufacturing glass is *very* carbon intensive; using the oversupply as a substitute for aggregates or simply stockpiling the glass has carbon implications and limits its circularity.

170. The existing furnace capacity of the manufacturing plant could be more effectively utilised and more glass could be recycled into new bottles if the quality of glass recycled was improved through a CRS and/or through improvements to kerbside. However, the gains would be limited if other proposed drivers enabled by a CRS (eg, eco-modulation fees and targets for refillable beverage containers), aren't also approved.

171. A key risk with the CRS 'glass-out' scenario, is the potential to incentivise more producers to switch to glass from more recyclable packaging formats (eg, aluminium) to avoid CRS refundable deposits being applied to the face value of those products. With

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46 Keep New Zealand Beautiful (KNZB), 2019. *National Litter Audit.*

New Zealand's onshore furnace capacity limited to approximately half of all glass sold, this would exacerbate the existing oversupply issue.

172. Potential solutions for the glass oversupply issue include:

- recycled content requirements for all glass containers, not just those produced in New Zealand
- development of alternative end-markets for bottle-to-bottle recycling (offshore if necessary)
- investment in increased domestic reprocessing capacity (noting that the South Australian market could potentially take much of New Zealand's surplus glass)
- the application of an eco-modulation fee to incentivise the market (to shift towards other recyclable materials, and/or improve demand for higher recycled content NZ glass)
- a shift to refillable (lower carbon) glass containers.

Stakeholder views on glass in a CRS

173. Some industry participants are opposed to including glass in a CRS. This includes the Glass Packaging Forum (GPF), which runs a voluntary accredited product stewardship scheme that primarily leverages the rates-funded kerbside system. The scheme participants and the glass and alcohol industry pay a small levy into the GPF scheme, which is used to fund projects that increase glass recovery (such as public place recycling bins). The GPF has proposed that glass be declared a priority product in order to make its scheme a regulated (mandatory) product stewardship scheme under the Waste Minimisation Act 2008. This would mandate participation in the GPF's scheme for New Zealand producers and importers of beverage and non-beverage products in glass containers (ie, bottles and jars).

174. Other beverage industry stakeholders strongly support glass being included in a CRS, in particular, non-glass and non-alcohol beverage industry stakeholders, and some craft brewers (who tend to favour cans and kegs). This position is primarily taken because not including glass in a scheme would create a very unequal playing field within the beverage industry.

175. In response to the glass industry's advocacy on a 'glass out' CRS, in 2020, approximately 65 New Zealand (largely non-government) organisations signed a collective letter calling for a CRS that includes glass.[47]

Beverage container materials for inclusion: Liquid paperboard (LPB)

It is proposed to include beverage containers made out of LPB.

176. LPB is a composite multi-material packaging made from plastic, aluminium and fibre. It has an important role in the packaging of aseptic, long-life, shelf-stable products, including UHT (long-life) dairy milk, plant-based milks and juice beverages to consumers.

[47] https://www.osof.org/wp-content/uploads/2021/05/Open-letter-in-support-of-a-comprehensive-CRS.pdf

LPB containers are included in less than half (38 per cent) of schemes globally and is most commonly accepted by Australian and Canadian CRS.

177. Better outcomes are possible for LPB containers if they are included in a NZ CRS, including:

- providing the means to collect greater quantities and cleaner streams of LPB (which would otherwise be landfilled or contaminate kerbside recycling systems)
- improved recycling outcomes for LPB through the proposed application of an eco-modulation fee to reflect the costs of recycling LPB
- reducing emissions through the reduced quantity of cardboard entering landfill
- Tetrapak developing an onshore waste-to-building materials plant with scalable capacity, which increased recovery of post-consumer beverage LPB would help to feed.

178. Excluding LPB from a CRS could have a free-rider effect and incentivise producers to switch to LPB as a cheaper packaging option.

179. The consultation document also proposes to apply an eco-modulation fee to LPB containers, in order to ensure recycling of LPB is achieved (whether domestically or offshore). This is in recognition of the limitations of LPB's recyclability and to incentivise movement toward beverage containers with greater recyclability. Further discussion of eco-modulation is set out at section three, 'Additional considerations, Eco-modulation'.

Sales and recovery of LPB beverage containers

180. The LPB beverage container format has grown rapidly in New Zealand, with a 14 per cent increase in the last two years, accounting for 7 per cent of our domestic beverage container market in 2020/21 (approximately 167 million LPB beverage containers).

181. Currently only two councils collect LPB at kerbside, leaving much of the approximately 8,000 tonnes of LPB packaging material to go to landfill. Where the material is recovered, it is unclear whether it is treated as contamination (waste), or is able to be recycled at its end destination offshore. LPB cartons are hard to recycle as the container is a composite, multilayer material made from a combination of fibre (cardboard), plastic and aluminium. These materials are not easily separated for recycling. Recycling these cartons is possible but requires scale and energy-intensive processing technology to separate out the materials, which New Zealand does not have. As a result, these container types are sent to landfills or, at best, downcycled onshore.

182. Given that recovery through kerbside collection services for LPB is limited, and that we are also proposing to remove LPB from all kerbside recycling collections across New Zealand, it is appropriate that LPB be included in a regulated product stewardship scheme.

Stakeholder views on the inclusion of LPB

183. Tetrapak, a large multinational producer of LPB containers, is supportive of its products being included within the NZ CRS and is developing a LPB waste-to-building materials plant with scalable capacity. Tetrapak says that it can take up to 4,000 tonnes of LPB building product material per year, which is about half of the estimated packaging tonnage sold in New Zealand in 2021.

Out of scope beverage products, containers or container materials

Non-'beverage' products and beverage containers that do not meet the 'beverage container' definition

184. Overseas, most schemes exclude all non-beverage products, such as kitchen and laundry products (eg, detergents), garden shed products (eg, garden sprays) and bathroom products (eg, shampoos).

185. In New Zealand, non-beverage glass (jars and bottles) and metal (cans and tins) are a relatively small proportion of New Zealand's recycling stream by weight. Non-beverage containers are not commonly found in the litter stream because, similarly to fresh milk, these products are commonly consumed at home and are captured through kerbside recycling. Non-beverage food grade plastics containers such as ice cream and margarine tubs are also not commonly found in the litter and are usually consumed at home or in commercial premises.

186. Non-food grade plastic containers (such as those containing kitchen, bathroom, laundry, garage and garden products) typically contain chemicals. Not including these types of products also ensures CRS materials are of higher, food grade quality, which have a higher market value, and are therefore more likely to remain in closed-loop (container-to-container) recycling systems.

187. The Government has several key commitments underway to address non-beverage packaging:

- standardising kerbside recycling, which captures most 'non-beverage' packaging materials
- phasing-out some hard-to-recycle packaging plastics
- declaring non-beverage plastic packaging as a priority product for a regulated product stewardship scheme
- investing in onshore recycling plant technology through the NZ$124 million Covid-19 Response and Recovery Fund investment
- the NZ$50 million Plastics Innovation Fund.

188. Single-use cups and coffee cups are not proposed to be included in the CRS, because they do not meet the proposed definition of a 'beverage container' (ie, they are not sealed in an airtight and watertight state at the point-of-sale). In response to the feedback received through public consultation on proposals to phase out certain plastics, a parallel work programme is underway by the Ministry to coordinate sector experts and inform a plan for single-use cups and coffee cups, including possible options for phasing out these cups by 2025.

Exempted beverage products, containers or container materials

189. Some beverage containers/products meet the proposed definitions of 'beverage' and 'beverage container' but are proposed to be exempt from a CRS. This means that these containers/products could still be sold in New Zealand and would not carry a refundable deposit and scheme fees in the purchase price, and could not be returned through the NZ CRS. Exempted beverage containers/products may still be subject to some level of

regulation, including data reporting requirements. Other beverage containers/products may be determined to be exempt from a CRS in future.

Refillable beverage containers

190. The discussion document proposes that beverage containers which are intended for refilling and have an established return/refillables scheme would be exempted from a CRS at this stage.[48]

191. Refillable beverage containers would not be eligible within the scheme at the outset and would not include a refundable deposit. This would not prevent existing refillable systems from operating, nor prevent new beverage producers from moving into the refillable/reusable market.

192. Subject to further analysis, future-proofing provisions for refillable containers are proposed be included within the CRS legislation. These provisions would enable refillable containers to be incentivised in future once further work has been completed,[49] for example, by using an eco-modulation fees and/or refillable targets.[50]

193. A large-scale refillable beverage system for New Zealand (either integrated within, or alongside a NZ CRS) would require new and different logistical management alongside national or regional collection and sterilisation infrastructure. Further investigation is required to determine the optimal arrangements to support a future shift toward reusable/refillable containers.

194. A key element of implementing a NZ CRS would include procurement and development of scheme infrastructure (the return network and consolidation facilities), including consideration for how CRS infrastructure could support a future shift to reusable/refillable containers.

Fresh milk in all packaging types

195. 'Fresh milk' includes white dairy milk that requires refrigeration. This definition includes cream but does not include beverages that are shelf-stable (long-life) or partially dairy/milk-based, such as (but not limited to) drinkable fermented dairy drinks like kefir, flavoured milk, smoothies, drinkable yoghurt and plant-based milk alternatives (eg, oat, almond, coconut, soy).

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48 Further consideration would be given to the definition of 'refillable' and 'single-use' beverage containers at the regulation/legislation-making stage should a NZ CRS proceed.

49 Overseas, lower fees are often applied to reusable/refillable beverage containers so that they have a lower deposit than single-use containers.

50 Refillable targets are legally binding limits on the percentage of total packaging volume that must be refillable. For example, Germany has included a reuse quota in the German Packaging Law to ensure at least 70 per cent of beverages are bottled in returnable packaging. Such measures would help to increase the market share for reusable beverage packaging, reduce the carbon footprint of beverage containers, alleviate the pressure on New Zealand's glass furnace capacity, and provide opportunities for growth in New Zealand's refillable container market.

196. Fresh milk accounted for about 7 per cent of the total beverages sold in New Zealand in 2020/21. New Zealanders bought about 183 million single-use fresh milk beverages in 2020/21, of which 97 per cent were sold in plastic. The remaining 3 per cent of fresh milk beverages (5.5 million) were sold in LPB packaging.

197. Overseas, fresh milk is exempt from most CRS schemes, including all Australian schemes. However, some depots overseas will receive plastic milk bottles regardless, because natural-coloured HDPE is a valuable recyclable commodity, fetching up to NZ$850 per tonne.

198. Unlike many other single-use beverage containers, fresh milk is not frequently consumed in the public domain. Typically, fresh milk is consumed 'at home' and thus these containers are captured by existing kerbside recycling systems. In 2018/19, about 86 per cent of plastic fresh milk containers consumed at home were captured in kerbside recycling collections.

199. An additional cost, albeit with a refundable deposit, could have unwarranted financial impacts on households that are already recycling most of their milk containers through kerbside recycling systems.

200. The main gap in the recovery of fresh milk containers is from the commercial and hospitality sectors (such as cafés, restaurants, commercial offices, apartment buildings and hotels). We will continue to investigate alternative means of increasing recovery rates from these sectors, such as declaring fresh milk in all packaging types a priority product or strengthening obligations for commercial entities under the Waste Minimisation Act 2008 (WMA).

201. If milk is exempt from a CRS, as proposed, further engagement will be needed with key stakeholders (such as fresh milk producers and the hospitality sector) to investigate and develop alternative options for increasing the commercial recovery of milk bottles, and to ensure that fresh milk beverage containers are not sent to landfills.

Beverage products, containers or materials proposed to be excluded at this stage

202. Most beverage containers that are 3 litres or smaller can be categorised into single-use plastic, metal, glass and liquid paperboard containers. Beverage containers not within the scope of the proposed NZ CRS are proposed to be excluded from the NZ CRS at this stage and would need to be assessed on a case-by-case basis by the scheme managing agency and government agency responsible for the scheme to be considered for inclusion.

203. Current regulations in relation to priority products under WMA section 22(1)(a) include prohibiting the sale of a priority product, except in accordance with an accredited scheme. While new bespoke legislation is proposed for a NZ CRS, this principle is proposed to be carried forward to manage the free rider risk for a NZ CRS. If the principle were carried into CRS legislation, this would mean that without a contract and/or a license from the scheme's managing agency (ie, if the product is not readily recyclable), the beverage packaging type would not be able to be sold in New Zealand. In this instance, the producer/importer would need to shift to a more recyclable packaging format that is accepted by the scheme.

204. If a NZ CRS proceeds, the scheme's scope of containers and a process for assessing new products would need to be developed with industry and through further consultation on possible regulations.

Biodegradable and compostable plastics

205. Fossil fuel-based and bio-based 'biodegradable' or 'compostable' plastic products contaminate the recycling stream and many composting plants will not accept them. Compostable packaging is being addressed through another part of the Ministry's waste work programme.

Hard-to-recycle plastics

206. Hard-to-recycle plastics (types 3, 4, 6 and 7) are proposed to be excluded from a CRS, consistent with recent decisions to phase-out hard-to-recycle plastic packaging products. Beverage containers are typically not made from these types of plastic. These plastic types have limited markets for recycling or are technically difficult to recycle. Where recycling is possible, they often represent low economic value in a post-consumer recovery system.

Table 12: Scope of containers – analysis against scheme design criteria

Note: The table includes key areas of interest for some stakeholders – the PwC model can provide for a very wide range of analyses/scenarios

Criteria **Comments/interpretation of criteria for this option**	**Broad scope of container materials ('glass in', 'milk out')** **Include: all beverages in metal, plastic (1, 2 and 5), glass and LPB containers** **Exclude: fresh milk in all container types**	**Broad scope of container materials ('glass in', 'milk in')** **Include: all beverages in metal, plastic (1, 2 and 5), glass and LPB containers**	**Narrowed scope of container materials ('glass out', 'milk out')** **Include: all beverages in metal, plastic (1, 2 and 5), and LPB containers** **Exclude: all glass containers and fresh milk in all container types**
Recovery of beverage containers Does the design option enable high recovery of beverage containers?	This option would have the potential to achieve a high recovery rate of beverage containers, given that an estimated 2.38 billion (or 92%) of potentially eligible beverage containers would be able to be returned through the NZ CRS annually (ie, excluding approximately 183 million fresh milk beverage containers)	This option would enable the highest recovery of beverage containers, given that an estimated 2.57 billion (or 100%) of potentially eligible beverage containers would be able to be returned through the NZ CRS annually	This option would reduce the total number of eligible beverages by nearly 1 billion glass containers and approximately 183 million fresh milk containers. Only an estimated 1.39 billion (or 54%) of potentially eligible beverage containers would be able to be returned through the NZ CRS annually. Glass containers have the highest recycling rate of any container type currently at ~51%. However, the glass market has significant barriers to recycling more recovered glass that the proposed CRS would also address
Litter reduction Does the design option reduce the harmful impacts of beverage containers being littered?	This option would have the potential to achieve a high reduction in litter as all of the container types that are commonly found in the litter stream are in scope (fresh milk is not commonly consumed while out and about and correspondingly, fresh milk containers are not commonly found in the litter stream)	This option would have the potential to achieve a high reduction in litter as all of the container types that are commonly found in the litter stream are in scope	Glass was the most sold and the most littered beverage material in 2018/19, representing half of beverage container litter items by count. Beer bottles represented the largest contribution to the national litter weights.[51] Excluding glass from a scheme would significantly impact the scheme's ability to reduce beverage container litter

[51] Beverage containers constituted 66% of recognisable branded litter and 24% of all litter collected. Alcoholic beverage containers and packaging were the predominant industry source of branded litter (49.6%), followed by non-alcoholic beverage containers and packaging (14.3%). Source: Keep New Zealand Beautiful.

Criteria Comments/interpretation of criteria for this option	Broad scope of container materials ('glass in', 'milk out') Include: all beverages in metal, plastic (1, 2 and 5), glass and LPB containers Exclude: fresh milk in all container types	Broad scope of container materials ('glass in', 'milk in') Include: all beverages in metal, plastic (1, 2 and 5), glass and LPB containers	Narrowed scope of container materials ('glass out', 'milk out') Include: all beverages in metal, plastic (1, 2 and 5), and LPB containers Exclude: all glass containers and fresh milk in all container types
Efficient scheme operation Does the design option enable an efficient and easy-to-use scheme?	An efficient, easy to understand and accessible scheme for consumers is where all of the main beverage container types are eligible for a refundable deposit Exempting fresh milk in all packaging types from a NZ CRS would still enable an efficient and easy-to-use scheme. Fresh milk is largely consumed at home and households are already recovering 86% of their HDPE containers	An efficient, easy to understand and accessible scheme for consumers is where all of the main beverage container types are eligible for a refundable deposit	A scheme with too many rules (exclusions or exemptions) for different beverage container types can be confusing for consumers and lead to poorer scheme performance Excluding glass containers from the scheme would significantly reduce the overall benefits of a NZ CRS due to the size of the glass market. In the NZD 20c deposit scenario and over a 30 year time horizon, the BCR dropped from 1.61 for a 'glass-in' scheme to 1.1 for a 'glass-out' scheme. Net benefits dropped from NZ$1.39 billion (glass-in) to NZ$167 million with glass-out
'Fair' scheme operation Does the option enable the scheme to be even-handed and not unfairly advantage/disadvantage scheme participants? *Cost-benefit considerations and stakeholder views*	Excluding milk from a NZ CRS is estimated to reduce scheme net costs for households by NZD 5–6 cents per week. However, it also prevents the face value price increase of fresh milk by NZD 23c (+GST) on a product that is considered an essential grocery item by many households. Assuming 100% pass through of costs to consumers, the net cost of all other beverage containers being in scope of the scheme is estimated to be 1.50 per week for the average household. While not an insignificant cost, these products are largely non-essential items including alcohol, soda and juices, and the total number of beverages sold to market has been growing rapidly	Including all beverage containers and all material types (including plastic, aluminium, glass and liquid paperboard) will ensure a level playing field in the beverage industry	Excluding glass from the NZ CRS scheme significantly impacts the scheme financials, as well as the wider monetised costs and benefits A 'glass out' scheme creates an uneven playing field for the beverage industry as glass beverage products would not carry the same face value refundable deposit and scheme fee (NZD 23c +GST in year 1) While this option would shift costs from councils (to some degree), the product face value price differential of a scheme with refundable deposit operating alongside one without, does not represent a level playing field for beverage producers. Further, it may incentivise a move towards more glass packaging when the market is already in an oversupply situation

Preferred option summary: broad scope of containers for inclusion, with some exemptions and proposed exclusions at this stage

207. Following analysis of scope of containers options against scheme design criteria (see table 12 above) the preferred option is to target the beverage container materials that are most frequently bought, under-recovered and littered, rather than specific product types. All single-use (ie, 'one-way') beverage containers would be in scope of the scheme and eligible for a refund if they are made from one or more of the following frequently bought beverage container materials:
    - plastic (PET, HDPE and PP only, and recyclable bio-based HDPE and PET)
    - metal (eg, aluminium, steel, tinplate and bi-metals)
    - glass
    - liquid paperboard.

208. Beverage products that are included in a NZ CRS would be required to be part of the NZ CRS and beverage producers/importers would need to establish a contract with the scheme's managing agency in order to sell their beverage products in New Zealand.

209. Including this broad scope of container materials is more likely to create an easy to understand, convenient and effective scheme for consumers and businesses. This approach will increase overall beverage container recovery, significantly reduce litter, and ensure a level playing field for beverage producers, reducing the risk of free riders.

210. Some beverage containers or products meet the proposed definitions of 'beverage' and 'beverage container' but are proposed to be exempt from a NZ CRS. The proposed exemptions from the NZ CRS include:
    - fresh milk in all packaging types
    - beverage containers intended for refilling (that have an established return/refillables scheme)

211. This means that these containers or products could still be sold in New Zealand but cannot be returned through the NZ CRS. They may still be subject to some level of regulation, including data reporting requirements, subject to further consideration as a CRS is implemented. Other beverage containers or products may be determined to be exempt from the NZ CRS in future.

212. Containers that are not within the scope of the proposed NZ CRS would be assessed on a case-by-case basis by the scheme managing agency and Government agency responsible for the scheme to be considered for inclusion. If the product is considered to be not readily recyclable, then the scheme may not approve the alternative container materials and issue a contract and/or license. Without a contract and/or a license (ie, if the product is not readily recyclable), the beverage packaging type would not be able to be sold in New Zealand. In this instance, the producer/importer would need to shift to a more recyclable packaging format that is accepted by the scheme.[52]

213. Public consultation will provide an opportunity to draw out further impacts and considerations relating to the scope of containers to be included in a scheme.

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[52] If a NZ CRS proceeds, the scheme's scope of containers and a process for assessing new packaging product types would need to be developed with industry and through further consultation on possible regulations.

Key scheme design element four – Financial model

It is proposed that a NZ CRS would use a 'deposit' financial model which would require beverage producers/manufacturers to pay a deposit on all eligible beverage containers sold to market, regardless of whether these containers are returned through the scheme or not.

214. The financial model of a CRS creates a structure for how the scheme manages money flows and transactions. It is one of the key design considerations that needs to be balanced to get an efficient, effective and workable scheme that is fair to all participants.

215. To start a scheme, an investment by the scheme's managing agency is required to cover the upfront costs, including the establishment of the scheme's core infrastructure and the managing agency's operational costs. Over time, these upfront costs will be recovered by the managing agency from the scheme itself as more containers are returned through the scheme. In most CRS schemes, large beverage companies and/or organisations established by a consortium of companies establish and govern the managing agency.[53] These companies are responsible for financing the (not-for-profit) managing agency's establishment costs.

Relevant objectives

216. A key policy objective is to achieve high recovery rates. As recovery rates drive costs, an industry-led scheme can create tensions that seek to reduce costs by managing the scheme towards lower recovery rates.

217. The financial model, on balance with other key design settings such as legislated recovery targets and the return network design, can incentivise the managing agency to ensure a scheme is easy and convenient to use for consumers.

Options considered for the scheme financial model

218. The scheme itself generally has one of two types of financial model: often known as the 'deposit' financial model and the 'refund' or 'redemption' financial model. The main difference depends on whether beverage importers and producers are required to pay the full scheme fees (including the full deposit value) for any eligible beverage containers that they place on the domestic market.

Deposit financial model

219. Under the deposit model, beverage producers pay for scheme fees and deposit fees on all eligible containers sold to market, regardless of whether the containers are returned through the CRS. This ensures that beverage producers are not incentivised towards lower return rates.

220. Most of the best-performing schemes globally (eg, European schemes) use a deposit financial model.

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[53] See section three, 'Scheme governance' for more detail on the managing agency arrangements.

221. Under the deposit financial model, beverage containers that are not redeemed by the consumer for the refund (for example, that go to kerbside recycling, landfill or litter) would also be used by the managing agency to offset the scheme's operating costs. This would lower the scheme fees for consumers at the point of purchase.

222. However, the deposit model increases the start-up cost to beverage producers at the outset of a scheme. To mitigate this, producers and retailers would be allowed to sell eligible beverages with refundable deposits before the scheme starts, so that producers can recover costs from consumers and pay them into the managing agency before the scheme commences.

Refund financial model

223. Some schemes use a 'refund financial model' rather than a 'deposit financial model'. Under the refund model, beverage producers would only pay the deposit fee and scheme fees for the amount of containers returned for recycling. For example, if only 50 per cent of containers sold to market are returned through a CRS, the beverage producer would only need to pay 50 per cent of the deposit amount. Under the refund model, scheme fees would be higher, as there would be no unclaimed deposits to offset the scheme fee cost.

224. Australian schemes typically use the refund model. They require a government loan to support start-up of the CRS and the schemes have relatively low recovery rates compared to many other overseas schemes.[54]

225. Although the refund model reduces the up-front financial contribution for beverage producers to the CRS, the risk is that producers are incentivised towards lower return rates over the life of the scheme. The fewer containers that are returned, the less producers are required to pay into the scheme. The refund model can create an unnecessary tension that undermines scheme performance.[55]

Preferred option summary

226. If a NZ CRS adopted a refund model, the scheme would need to be accompanied by strong regulatory drivers and/or stronger scheme governance and central government oversight to ensure the scheme would not be susceptible to perverse incentives and would achieve the recovery targets. Alternatively, if a deposit model was chosen alongside a mandatory return-to-retail network there would be less financial incentive (or ability) for an industry-led scheme to limit return rates of eligible containers in order to reduce scheme costs.

227. It is proposed that the NZ CRS would have a deposit financial model. The deposit model is one regulatory way that a CRS can more strongly enact product stewardship principles, which helps to ensure a high recovery of beverage containers.

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[54] For example, the Queensland and New South Wales schemes recover only 58% and 70% of containers respectively, compared to higher-performing European schemes that achieve over 90% recovery.

[55] The deposit financial model does not require a Crown loan to float the scheme. The refund financial model does require a Crown loan to float the scheme.

228. The deposit model makes producers financially responsible for the cost of recycling their containers by requiring them to pay the full deposit amount into the scheme for all containers produced. The deposit model has the added benefit of ensuring the scheme's deposit float is self-funding from the outset.

Key scheme design element five – Scheme governance

It is proposed that a NZ CRS would be a not-for-profit, industry-led scheme.

229. Container return schemes are usually managed by an external organisation, appointed by the government for the purpose of managing and overseeing the scheme. Many schemes also include a governance board, responsible for ensuring the scheme meets and exceeds the scheme's requirements as set out in legislation or regulations.

230. A scheme's 'managing agency' is typically set up as a not-for-profit to ensure that scheme revenues are solely used to support the operation of the CRS scheme. The organisation is responsible for administering the CRS in accordance with the legislation and regulations that govern the scheme's establishment and operating framework. The agency manages both the monetary and container recovery material flows, growing the scheme quickly towards its performance targets. It must also manage fraud risk and ensure smooth operations and a high level of service for all customers and stakeholders that participate in the scheme.

231. Most overseas schemes are led by the beverage industry, often through a collaboration between multiple beverage producers (typically large producers). Retailers are also frequently involved in the scheme governance where the return-to-retail model is used. Globally, schemes use different degrees of regulatory or structural controls to balance the incentives and interests in a scheme.

Relevant objectives

232. The governance model for a CRS is best considered in light of other design considerations, such as the deposit amount and network design, to ensure overall balance within the design and to best meet the overarching policy objectives.

Options considered for scheme governance

233. Governance and management structures vary across CRS schemes. Some schemes have one manager that oversees the entire operation of a scheme (financial management and container recovery), while other schemes split the responsibility for administrative oversight and operational oversight between two or more organisations.

234. It is widely recognised that industry is well placed to ensure the scheme is run as efficiently as it can be. However, given a scheme's costs increase with return rates, a scheme must be well designed and established in legislation in such a way as to ensure that pursuing efficiency of the scheme operations does not have a negative impact on recovery of containers.

235. Split structural models have been used in Australia (eg, New South Wales) to better manage tensions that exist within their scheme designs. In contrast, European schemes

tend to have a sole scheme manager (usually made up of beverage producers and retailers), because they have more structured regulatory requirements (such as higher deposit levels and mandatory return-to-retail requirements).

236. Schemes may also be run by a majority of non-beverage industry representatives. These options may be considered necessary for a less-regulated scheme design.

237. In most CRS schemes, large beverage companies and/or special purpose organisations established by a consortium of companies seek to establish and govern the managing agency once a scheme is committed to in legislation and/or regulation. These companies also typically finance the managing agency's establishment costs. In some situations, a government loan may be required to float some or all of the scheme start-up costs. In either case, scheme start-up costs are recovered from the scheme itself once the scheme is operational and any loan (whether industry or government funded) would be of relatively short duration.

Preferred option summary

238. The proposed governance model is an industry-led scheme to ensure it is run efficiently and effectively. Considering the scheme design elements proposed – including the mandatory return-to-retail regulations (within a mixed-return network model), the NZD 20 cent deposit amount and the deposit financial model – it is proposed that an NZ CRS should also be a not-for-profit, industry-led scheme. The structure provided by key regulated design elements creates the framework necessary for high recovery rates.

239. The NZ CRS could be led by retailers, beverage producers, recyclers or any such combination of industry representatives. Scheme governance should be well-balanced among industry members from different sectors, particularly beverage producers and retailers. An industry-led scheme does not exclude community, NGO, nor iwi/Māori representation from scheme governance. Any proposal to become the managing agency would need to be considered and approved by government.

240. Central government would play a key role in the establishment of a scheme, then moving into an oversight role. Legislation would set out requirements for a government agency (such as the Ministry for the Environment) to act as the central regulator for the scheme. The regulator's role would be to receive reports from the scheme's managing agency, and review the scheme's management and performance (including whether it is meeting any legislated recovery targets).

241. It is proposed that scheme fees would take into account costs to the regulatory agency (or agencies) of compliance, monitoring and enforcement, as well as other government costs (so that these are not borne by taxpayers).

Additional considerations

Lids on

242. The discussion document proposes separate lid collection through a CRS to help ensure clean and uncontaminated streams of lids are received for processing and recycling. However, there would be less incentive to return lids separately, and processors could remove the lids through mechanical separation later.

243. Beverage lids and caps are often littered in New Zealand.[56] Beverage lids can include tethered caps, metal pull-tabs (eg, on cans), metal crown caps (eg, beer bottle caps), metal screw bottle tops (eg, wine caps), plastic or metal ring-pull caps, and plastic screw caps.

244. Most overseas schemes accept and encourage consumers to return empty beverages with their lids attached to the container, or 'lids-on'. Reverse vending machines could be designed with slots for lids that cannot be reattached (eg, metal crown caps) or that are found separate from their bottles (eg, in litter clean ups). A 'lids on' requirement would also limit odour and hygiene issues.

245. Overseas, a 'lids-on' requirement (for beverages that can have their lids fastened back on) tends to see a higher total volume of lid recycling, because it is easiest for consumers if lids and containers are kept and recycled together. Alternatively, beverage lids could be removed ('lids off') by the consumer at the point-of-return and collected by the CRF.

246. 'Lids on' is not proposed to be a legislative requirement, but it would be allowed, preferred and encouraged. A beverage container without a lid could still be returned for a refund. The scheme's managing agency would be responsible for ensuring that lids are recycled.

Recovery targets

247. Many overseas schemes include targets in their legislation to help drive the recovery of eligible beverage containers and hold the scheme's managing agency to account. Some schemes include penalties if targets are not met. Overseas schemes use a variety of penalties including:

- giving Ministerial direction with extended deadlines to meet the existing targets
- issuing a compliance notice
- suspending or cancelling the appointment of the managing agency
- increasing the deposit amount if targets are not met
- increasing the number of return points if targets are not met.

248. It is proposed that the NZ CRS will target 85 per cent recovery of eligible containers by year three of scheme implementation and a 90 per cent recovery target by year five. This proposal assumes the high-performing key design settings, as proposed in the consultation document. If either of these targets are not met, or maintained, it is proposed that government would review the proposed deposit level of NZD 20 cents and consider increasing this amount, in addition to reviewing the regulated component of the return network.

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[56] The Keep New Zealand Beautiful 2019 National Litter Audit reported that metal bottle caps, lids and pull tabs were the fifth most commonly littered sub-category (2,534 in total; 5 items per 1,000m²). Plastic bottle tops were also frequently littered (729 in total).

Scheme fees

249. Aside from the refundable deposit, the core costs of a CRS are covered by a non-refundable CRS 'scheme fee'. Scheme fees flow through the system to fund the scheme, cover the cost of managing the scheme and are a core financial element of schemes globally. Scheme fees include:

    - the handling fee
    - transport costs
    - scheme material consolidation facility costs
    - scheme administration.

250. The refundable deposit is the majority of the cost consumers pay up front. For example, under a NZD 20 cent deposit scenario, the purchase price of a typical beverage is likely to increase by NZD 23 to 25 cents per container + GST (a NZD 20 cent refundable deposit and a non-refundable NZD 3 to 5 cent scheme fee + GST).

251. The scheme fees are variable costs and depend on the nature and efficiency of a scheme. They are also proportional to the number of containers returned, because the substantive cost within the scheme fee is the 'handling fee' paid to return facility operators for each container that comes back to a CRF.

252. Financial modelling for a NZ CRS indicates the gross scheme fee will cost approximately NZD 8.8 cents per container, of which NZD 7 cents is the estimated handling fee paid to container return facility operators. However, this estimate may be high (based on international scheme costs) and, in any case, scheme net costs (ie, costs to consumers) are likely to be no more than NZD 3 to 5 cents (+GST) per container.[57]

253. Scheme fees and the refundable deposit are likely to attract GST, which is non-refundable. The actual scheme fee would be set once the scheme's managing agency is established and takes into account the market response to the scheme's operational needs.[58]

254. Beverage producers and retailers pass on some or all of the scheme costs to consumers when they purchase eligible, labelled containers. The price setting negotiations between producers and retailers are commercially sensitive, so we can only assume 100 per cent of scheme costs are passed on to consumers, although this may not be true for all products (ie, all scheme costs may not be passed through to the purchase price).[59]

255. Beverage producers recover the scheme costs from consumers (often via retailers), and pay the per-container scheme fees (including the deposit value) to the scheme's managing agency. The managing agency distributes payments to the collection/ redemption network (ie, to the CRFs where consumers redeem their containers for cash). This flow of fees underpins the 'polluter pays' and 'producer responsibility' principles embedded in a CRS (ie, shifting the costs of recycling containers from councils and ratepayers to the producers, retailers and consumers of beverage containers).

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[57] Assuming the 'deposit model' and a NZD 20 cent deposit scenario.

[58] Comparative scheme fees overseas can be found in the Reloop Global Deposit Book 2020, which provides a short summary of the headline information for every established scheme operating (noting that more schemes are still being implemented).

[59] Different products have different price elasticities. In addition to the scheme cost that individual products might carry, market response may also cause some products to change format (eg, bottled water multipack sales may shift to those with fewer and/or larger containers).

256. Scheme fees can be offset in two ways:

- using unredeemed deposits from containers that have not been returned (deposit financial model)
- by producers only paying for deposits on containers that come back into the scheme (refund financial model).

Eco-modulation

257. Eco-modulation is a pricing mechanism that can be used to improve waste minimisation and circular economy outcomes. A fee is modulated to reflect the costs of recycling a given product and the fee typically increases when a product is hard to recycle. Equally, products that are easy to recycle have lower scheme fees, encouraging producers to use recyclable materials. The eco-modulation fee incentivises producers to improve the environmental sustainability of their product design.

258. Eco-modulation ideally follows the 'true cost' principle to reflect the actual end-of-life management costs of products, plus the associated environmental costs. It aims to individualise producer responsibility by linking the financial responsibility for a product with its true life-cycle management and environmental costs.[60]

259. The amount of an eco-modulation fee usually varies depending on whether products (beverage containers in this case) are designed towards the top, middle or lower levels of the waste hierarchy. Products designed for enabling reduction and re-use should incur lower fees than those solely designed for improved recyclability. Products that are hard to recycle (eg, recovery/disposal tier) would incur higher fees to incentivise producers towards better packaging choices.[61]

260. It is proposed that the scheme fee would be eco-modulated to reflect the actual end-of-life management costs to recycle all beverage containers, plus the associated environmental costs. The scheme fees would be modulated based on criteria linked to the waste hierarchy and/or modulated through specific scheme recycling targets to be developed alongside other scheme regulations. The modulation would encourage more sustainable product design and incentivise recyclable and, in the future, reusable packaging.

261. Eco-modulation criteria and/or more specific recycling targets would need to be developed with industry and through further engagement and consultation on regulations.

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60 European Commission. 2014. Development of Guidance on Extended Producer Responsibility (EPR).

61 Sachdeva et al. 2021. Extended Producer Responsibility and Ecomodulation of Fees.

What are the marginal costs and benefits of the option?

Overview of costs-benefit analysis process and analysis

262. Sapere Research Group (Sapere) undertook an initial cost-benefit analysis (CBA) of a NZ CRS as part of the CRS co-design project in 2020. The CBA looked at costs and benefits including reduced litter clean-up costs, reduced contamination of kerbside recycling and additional value from material recycled. With a 30 year time horizon and a NZD 20 cent deposit level, a NZ CRS would have net benefits of NZD$1.1 billion and a benefit-cost ratio of 1.49 ('glass-in' scenario).[62]

263. This CBA has been updated since the completion of the co-design project in February 2021 to integrate feedback independently provided by the New Zealand Institute of Economic Research (NZIER) and, in February 2022, following Cabinet's scheme design direction on a NZD 20 cent deposit level, return-to-retail and a broad scope of containers (ie, 'glass in' and fresh milk out).

264. The first version of the CBA has been peer reviewed by Sense Partners and independently reviewed by NZIER (commissioned by the Glass Packaging Forum). Feedback and improvements from both reviews has been included in the current CBA.

Commentary on monetised costs and benefits analysis

265. The latest iteration of the cost-benefit analysis prepared by Sapere is attached in full at appendix 2. The below costs and benefits table (table 13) is drawn from that report. Key assumptions include a 30 year time horizon and 5 per cent discount rate. Costs are dominated by household participation and CRS infrastructure operating costs. Benefits are dominated by welfare gain from additional recycling and litter reduction.

266. Key assumption inputs such as the modelling time period, discount rate and household willingness to pay for litter reduction have sensitivity testing applied and can be found in the Sapere report. The sensitivity testing suggests the benefit-cost ratio (of 1.61) is relatively stable and remains positive in most scenarios tested.

Table 13: Key monetised impacts table, drawn from Sapere's cost-benefit analysis

Key impacts and affected groups	**Comment** *nature of cost or benefit (eg, ongoing, one-off), evidence and assumption (eg, compliance rates), risks*	**Impact** *NZ$m present value where appropriate, for monetised impacts; high, medium or low for non-monetised impacts*	**Evidence certainty** *high, medium, or low, and explain reasoning in comment column*
Households	Ongoing participating costs (time and transport). There is a time cost but the appropriate value to apply is household time is unclear	NZ$751	Medium
Producers (labelling costs)	One off changes, possibly avoidable depending on timing	NZ$11	Low

[62] The CBA uses Treasury's 2021 discount rate of 5%.

Key impacts and affected groups	Comment *nature of cost or benefit (eg, ongoing, one-off), evidence and assumption (eg, compliance rates), risks*	Impact *NZ$m present value where appropriate, for monetised impacts; high, medium or low for non-monetised impacts*	Evidence certainty *high, medium, or low, and explain reasoning in comment column*
Container return facility operators (business, community, charities)	Ongoing – mix of reverse vending machines, over the counter and depots. Exact specifications unlikely to operate as modelled.	NZ$628	Medium
CRS managing agency – operating	Ongoing managing agency administration, material consolidation, facility operations, export of materials. Based on similar CRS operating models	NZ$861	Medium/High
CRS managing – capital agency	Material consolidation facilities (MCF) One off (35 year life) with some short term assets (4 years) MCF locations uncertain	NZ$26	Medium
Total monetised costs		NZ$2.277 billion	Medium
Households	Ongoing from increased recycling and reduced litter, litter volunteers, avoided, landfill costs. There is a welfare impact but monetising is imprecise	NZ$3,300	Low
Councils/recycling contractors	Ongoing from litter clean up, kerbside collection savings, reduced contamination Assumes operating efficiencies	NZ$209	Medium/High
Environment	Ongoing emissions Assumes reduction in virgin material use	NZ$56	Medium
CRS managing agency	Value of additional material recovery. Conservative current values as recycling markets are volatile	NZ$101	Medium/High
Total monetised benefits		NZ$3,667 billion	Medium

Notes to cost-benefit analysis and assumptions

267. The analysis uses the best information available. There are a number of unknowns, assumptions and judgments required, as set out in detail in the full report attached at appendix 2 of this RIS.

268. The CBA provides benefit values for kerbside collection and associated disposal costs that sum to NZ$8.6 million per year. However, when including the estimated kerbside donated deposit value, the PwC financial model estimates the value of benefits to councils/recyclers to be in the order of NZ$50 million per year (of which NZ$35 million is unclaimed deposits in year 1).

Overall summary of impacts of implementing a CRS, designed as proposed

269. On the basis of the analysis set out in this document, the Ministry has assessed a CRS as proposed as the most likely to:

- address the root causes of the beverage container recovery and litter problem, with the refundable deposit being a key incentive to improve waste practices across the value chain
- shift costs away from councils, ratepayers and the environment, and, instead, towards responsible parts of the supply chain (ie, beverage manufacturers, retailers and the consumers of beverages)
- not unfairly add costs to businesses, retailers and consumers
- align strategically with the waste strategy and complement other waste initiatives (particularly proposed changes to kerbside recycling)
- be achievable in the medium term.

270. In terms of overall impacts by groups affected, table 14 below sets these out at a high level.

Table 14: Overall impacts of preferred option by affected group

	Cost	Benefit	Net impact	Evidence certainty
Affected groups	**Additional impacts of the preferred option compared to taking no action**			
Households	Additional costs to households when purchasing beverage containers (assuming 100% pass through from producers)[63] Those households not returning beverage containers will not receive a refund (which may affect time poor families or those in rural areas) For those households returning containers, additional time and transport costs Scheme implementation is not expected to involve costs to households until 2025	Deposit refunded when container returned Ratepayer costs avoided due to less costs on local government in dealing with litter Efficient and convenient drop off points will enable most families to return containers easily Those buying or selling refillable containers will not be impacted, which may help to drive a shift to reusable/refillables (given refillables are proposed to be exempt) No impact on households purchasing fresh milk, given fresh milk is proposed to be exempt in all packaging types Better wellbeing as a result of improved community litter outcomes Building a stronger culture of recycling and good practice in New Zealand	Overall positive impact	Time and transport costs can be modelled (CBA) but wellbeing measures are less certain
Local government	Transitional costs such as contract amendments and kerbside service level changes (that will lead to savings)	Reduced kerbside and litter costs. Increased value of beverage containers 'donated' to kerbside recycling by residents who choose to forgo their deposit refunds (note: assumes a highly convenient return network is available to enable a genuine choice)	Overall positive impact	High – Scheme financial modelling suggests councils (and/or recyclers) with a CRS operating in their region will benefit overall

[63] However, it is important to note that rather than absorb the additional net scheme fee costs, many consumers may simply purchase slightly fewer beverage containers in the year of scheme commencement as has been observed in Australian schemes. This market response leads to an impact for businesses.

	Cost	Benefit	Net impact	Evidence certainty
Affected groups	**Additional impacts of the preferred option compared to taking no action**			
Beverage producers	Transitional costs – Registering with the managing agency, labelling, scheme fee start-up costs etc. Loss of sales at scheme commencement, modelled as a one off 6.5% reduction across all beverage container types[64] and expected to be recovered within three years Any producers involved in establishment of the managing agency may also provide a loan facility to the managing agency. Scheme fees (including any eco-modulation) will represent the impact of current container life cycle externalities, becoming an internalised cost Small producers with slower stock turnover may be more greatly impacted by scheme start-up costs, even with phased implementation Producers using packaging that is hard to recycle may need to consider alternative packing options	Scheme costs will likely be largely or completely recovered from consumers in time, noting container sales have grown rapidly. Producers are sensitive to customer preferences – There is evidence of a strong desire by producers (as communicated through marketing and industry communications) to be presenting packaging options to the market that are sustainable A CRS as proposed would enable container-to-container recycling at a scale in New Zealand that is unprecedented	Overall neutral or negative impact	Medium – The degree to which beverage producers may be impacted will depend upon the landed scheme fees and the degree to which any given producer is able to pass through scheme costs
Commercial recyclers (collectors and processors)	Loss of revenue from beverage container materials at kerbside (partially mitigated by exemption of fresh milk – natural HDPE is the second most valuable recyclable commodity). Compliance (administration audit) costs in obtaining deposit refunds from managing agency	Councils and/or recyclers will benefit from the unredeemed (donated) deposits on beverages placed in kerbside. As affected recyclers largely operate through council contracts – and bias in costs and benefits to either party will likely net out Benefits from reduced contamination and reduced landfill costs (associated with both recycling and waste collection)	Overall neutral impact	Medium – The degree to which recyclers may be impacted will depend upon the landed negotiations with councils. Ultimately, if recycler costs increase, they will pass these onto councils

[64] Based on experience from similar Australian schemes, noting a different deposit level is proposed.

	Cost	Benefit	Net impact	Evidence certainty
Affected groups	**Additional impacts of the preferred option compared to taking no action**			
Charities, community groups and NGOs	Potential loss of revenue from container materials at community recycling centres	Significant opportunity to generate revenue from operating scheme depots (through receiving a handling fee for compensation) or, for those not participating in the network directly, fundraising drives as a part of the 'informal network', eg, collection points at schools, sports clubs	Overall positive impact	High – International evidence overwhelmingly supports the positive impacts of a CRS
Retailers and supermarkets	If mandatory return-to-retail is imposed, supermarkets or other regulated retailer take back points will have significant up-front costs to establish return facilities. However, if they so choose, supermarkets can deliver this as an outsourced service and use the scheme handling fee (modelled at 7 cents per container) to cover the costs Any retailers involved in establishment of the managing agency may also provide a loan facility to the managing agency	Supermarkets or any other regulated retailer take-back point/redemption centres will receive a per unit handling fee as compensation for collecting and sorting containers Subject to their investment model, if supermarkets choose to own their own infrastructure, they may see profits from the return facilities Consumer foot fall is also likely to increase and customer loyalty to 'good' container return facilities can see increased customers in retail stores	Overall – Neutral impact (initially negative, longer term likely positive)	Medium – The degree to which a retailer may benefit will ultimately depend on the scheme handling fee (to be set by the managing agency) and the number of returned containers (and customers) it receives
Environment	While a return-to-retail network model would see relatively few 'new trips' for consumers, there would be additional vehicle movements for the recovery and transport of over 1 billion additional containers. A regulated network that leverages supermarkets may be able to utilise reverse logistics to reduce this impact. Electric light truck vehicles may also be appropriate in more densely populated settings	Significantly increased resource recovery enables increased (recycled content, lower emission) container-to-container recycling of beverage containers Significant litter reduction of beverage containers, with the likelihood of 'stadium effect', which is a reduction in other forms of litter with no other intervention. Reduced litter will have positive impacts on our wildlife and environment Reduced emissions by reducing the use of virgin materials in container manufacture	Overall positive impact	High – International evidence overwhelmingly supports the positive impacts of a CRS and associated litter reduction

271. In summary, and subject to consultation, the Ministry prefers the implementation of a CRS, designed as proposed in this document, with:

- a deposit set at a level that provides a sufficient incentive for consumers to return their containers, increasing recycling rates and reducing litter rates (an increase in the order of 1.17 billion additional containers recycled annually – increasing from 864 million containers recycled now to approximately 2 billion containers recycled under a CRS)
- a network design that enables easy and convenient return for consumers, driving up return rates, yet also enables community fundraising for charities and social enterprises, and iwi/hapū participation
- a scheme financial model that enables scheme fees and kerbside costs to be offset by unclaimed deposits (unclaimed deposits represent litter and landfill, ie, polluter pays principle)
- a well-regulated scheme that is industry led, enabling innovation and efficient scheme operation
- a self-funding model that shifts the costs away from councils and the community, with expected kerbside related benefits to councils modelled at approximately NZ$50 million per annum or approximately NZD 53 cents per household, per week.
- broad material type coverage to capture the bulk of beverage containers and maintain an even playing field across industry participants
- exemptions (fresh milk, refillables and large containers) that reflect:
  - a balance between managing household costs for essential items and incentives for change
  - pragmatic choices to reduce complexity.
- an overall benefit-cost ratio of 1.61.

Interim Tiriti o Waitangi analysis

272. This analysis has not identified any Waitangi Tribunal settlements pertaining to solid waste, at this stage. Tiriti o Waitangi principles may apply to a proposed NZ CRS, including (but not limited to):

- partnership
- rangatiratanga and expression of kaitiakitanga
- equity and good governance
- right to development
- Crown's duty of active protection
- Treaty obligations (eg, the Crown's responsibility for local government to work closely with tangata whenua).

273. Pending the outcomes of consultation, the Ministry will undertake further Treaty analysis, to be included in a full RIS to be attached to a Cabinet paper seeking policy decisions.

274. Para Kore[65] participated in the CRS co-design process as a member of the Scheme Design Working Group. Overall, Para Kore were supportive of the option of a NZ CRS, with strong community participation in the scheme and measures that saw the greatest amount of beverage container recovery and reduced litter.

275. More recently, feedback from Para Kore on broader waste proposals emphasised the importance of minimising waste in the first instance, and noted the need to build a network of community resource recovery centres across New Zealand and that our relationship with products needs to reflect our shared responsibility for products at end of life, with particular responsibility for litter placed on the companies that create the product.[66]

Consultation

276. The Ministry is seeking feedback via public consultation on a range of design features for a NZ CRS. Key areas where feedback will be important are:

- impacts on specific population groups (eg, age, socio-economic status, rural/urban dwelling)
- how Māori groups can participate in a proposed scheme
- the views of producers and retailers on the practical aspects of participation in such a scheme.

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[65] Para Kore is an organisation that supports marae and organisations across Aotearoa New Zealand to work towards zero waste, through the delivery of innovative education and support within the frameworks of kaupapa and tikanga Māori.

[66] Para kore, 2021. *Para Kore Submission Template.* https://docs.google.com/document/d/1KVi0tCAmHMq4JTivZTrPGSoCaXSpHnRZvqSocNxfmZ8/edit

Section 4: Delivering a NZ CRS

How will the new arrangements be implemented?

277. This is an interim RIS to support Cabinet on the decision to consult on the option of a NZ CRS. Subject to Cabinet decisions, a final RIS will be provided following public consultation alongside advice on final policy proposals.

278. The below overview of the implementation for a NZ CRS is preliminary and will be further developed ahead of seeking final policy approval from Cabinet, in 2022, to proceed with a scheme.

Who will be responsible for the ongoing operation and enforcement of the new arrangements?

279. CRS are usually managed by an external agency, appointed by the government, for the purpose of managing and overseeing the scheme.

280. A scheme's 'managing agency' is the organisation responsible for the operation, performance and strategic direction of the scheme. Generally, these organisations are not-for-profit to ensure that scheme revenues are used to support the operation of a scheme. Many schemes also include a governance board who are responsible for ensuring the scheme meets and exceeds the scheme's requirements (as set out in legislation or regulations).

281. Broadly, the leadership in the managing agency can be any singular, or combination of, key stakeholders, such as:

- beverage producers
- retailers
- recyclers
- government.

282. While there may be a dominant group or groups represented in the governance and leadership of a scheme, governance can be more broadly representative (ie, include representatives from iwi, community groups, consumers etc).

283. Most global container return schemes are led by the beverage industry, which may be a collaboration between multiple beverage producers. Often retailers are involved in the scheme governance as well.

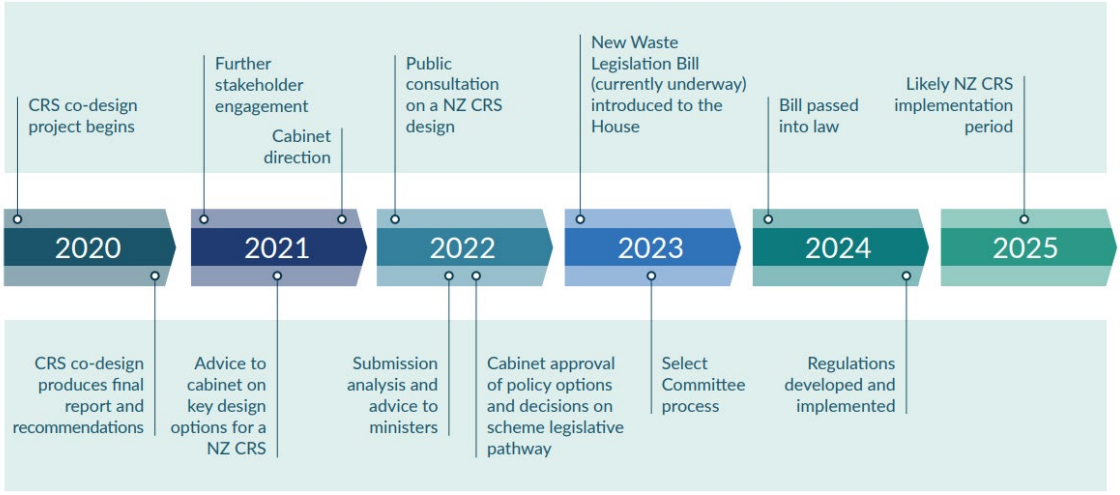
284. While the scheme's managing agency would be responsible for the ongoing operation and enforcement of the scheme, additional government oversight would be required to monitor the overall performance of a NZ CRS.

When will the arrangements come into effect? Does this allow sufficient preparation time for both the regulated parties and the regulators?

285. Subject to Cabinet agreement to consult on the option of a NZ CRS, and subsequent decisions to proceed with a NZ CRS, it is expected that a CRS would not be implemented until 2025. This would allow for:

- submission analysis and advice to Ministers
- drafting of legislation and regulations
- select committee process and targeted consultation on regulations with key stakeholders
- final Cabinet approvals for legislation
- entry into force of legislation
- 1 to 2 years implementation before a scheme is launched (including establishing the managing agency, return network and container labelling).

Figure 5: Indicative timeline for implementing a container return scheme



286. Timeframes for drafting legislation and regulations are intended to coincide with the Bill process for the review of the Waste Minimisation Act 2008.

How will stakeholders or other agencies with a substantive interest in the relevant regulatory system be involved in its implementation and ongoing operation?

287. Subject to Cabinet agreement, the Ministry will undertake public consultation on the option of a NZ CRS. Stakeholders and the general public will be able to provide feedback on the proposed design of the scheme at this time, including participating in webinars and workshops.

288. Once legislation and regulations have been drafted, the Ministry intends to undertake targeted consultation with key stakeholders on the exposure draft of the regulations. There will also be opportunity for stakeholders to provide feedback on the legislation during the Select Committee process.

289. As noted above, the scheme's managing agency will likely be made up of key stakeholders and industry representatives (eg, beverage producers and retailers). This will enable them to be directly involved in scheme implementation and the ongoing operation of a scheme.

How will people be notified about any changes to their responsibilities resulting from this proposal? What assistance will be made available to help them comply?

290. Subject to Cabinet approval to proceed with a NZ CRS, a full communication and engagement plan will be prepared to support the development and implementation of the scheme. This could include:

- Government or Ministry press releases
- direct engagement with key stakeholders
- engagement with industry bodies and representatives
- media messaging and education campaigns.

What are the implementation risks? How will these risks be mitigated?

291. Implementation risks will be considered further after we have received feedback from public consultation. Table 15 outlines initial risks and mitigations that have been identified.

Table 15: Implementation risks and mitigations

Risk	Mitigation
Timeframes for implementation	Consult with industry stakeholders on timeframes for implementation during regulation drafting
Limited budget to engage specialist CRS consultants to support legislation drafting and implementation	Work with Treasury on funding options including submitting comprehensive budget bids to support the development and implementation of a NZ CRS
Industry-led scheme and how to strike a balance between governance and regulatory settings	Government oversight of the scheme, review of legislation and regulations (in particular recovery rate targets), CRS expertise to support regulatory design
Limited or lack of expertise amongst stakeholders (particularly smaller retailers, community groups, smaller beverage producers etc)	Provide guidance (docs/webinars) on roles, responsibilities and provide resources where necessary
Changes in beverage container production or consumption, or recycling markets	Review scheme and markets, and adjust scheme if necessary
Inconsistency with trade obligations	Consideration of New Zealand's international trade obligations, to ensure the proposed scheme's design and implementation is consistent with New Zealand's obligations

How will the existing stewardship arrangements of the regulatory system support the implementation of this proposal and help to manage implementation risks?

292. Depending on the design of a NZ CRS, new legislation and regulations will likely be required to implement a scheme. This is particularly the case for the design proposed in the discussion document. Drafting of new legislation and regulations would be in line with the current review and amendments to the Waste Minimisation Act 2008 (WMA).

293. There are some existing provisions in the WMA that may be able to be used or built on to support implementation and manage any risks. This could include looking at current requirements for regulated product stewardship schemes, or compliance, monitoring and enforcement provisions.

294. In addition, the Ministry will look to existing schemes and their associated legislation in other jurisdictions around the world to understand best practice regulatory systems.

How will the new arrangements be monitored, evaluated and reviewed?

295. Monitoring and evaluation of a NZ CRS would be undertaken between the scheme's managing agency and the government regulator responsible for compliance, monitoring and enforcement of a scheme.

296. Container return schemes are usually managed by an external organisation, appointed by the government, for the purpose of managing and overseeing the scheme. A scheme's 'managing agency' is set up as a not-for-profit and the organisation is responsible for administering the CRS in accordance with the legislation and regulations that govern the schemes establishment and operating framework.

297. The organisation delivers the critical central function of managing both the monetary and container recovery material flows, growing the scheme quickly towards its performance targets, while managing fraud risk, and ensuring smooth operations and a high level of service for all stakeholders (including consumers) that participate in the NZ CRS.

298. Legislation would set out requirements for a government agency (such as the Ministry for the Environment) to act as the central regulator for the scheme. The regulator's role would be to receive reports from the scheme's managing agency, review the scheme's management and performance (including whether it is meeting any legislated recovery targets), and broader compliance, monitoring and enforcement.

299. As part of the regulator's oversight of a scheme, it would work closely with the managing agency to ensure that the scheme is running smoothly. In addition, legislation or regulations would set out annual reporting requirements for the managing agency to fulfil. This could include reporting on return rates, beverage producer participation, return points, instances of fraud.

300. The regulator would also review the scheme's legislated return rate targets in line with intervals set in the legislation (proposed to be 85 per cent of eligible beverage containers by year three and 90 per cent by year five). If the scheme's managing agency cannot show that the return rates at years three and five are met, it is proposed that the regulator would review the scheme design, in particular the deposit level, with the possibility of increasing the deposit level if required.

Appendix 1: Cost recovery impact statement, stages 1 and 2 (CRIS)

Description of proposal

As set out in the interim RIS, Cabinet has directed the Ministry for the Environment to prepare a consultation document, seeking feedback on:

- whether the Government should implement a container return scheme (CRS) in New Zealand
- how the CRS should be designed.

A CRS is a resource recovery scheme and type of product stewardship that incentivises consumers and businesses to return beverage containers for recycling or refilling through the application of a deposit at purchase. Empty beverage containers are 'redeemed' in exchange for the deposit refund at designated collection points.

Refer to the interim RIS for full details of the rationale for Government intervention and the policy outcomes the proposals are designed to achieve. A summary is set out below.

Rationale for intervention

- Compared to overseas jurisdictions, beverage container recovery rates in New Zealand are low, resulting in high rates of beverage container litter, environmental harm, a burden for councils and lost opportunity for recycling/resource recovery.
- Our current waste collection practices and recycling systems do not enable or incentivise people to appropriately dispose of or recycle their beverage containers, particularly when away from home. The costs of current resource recovery are largely borne by councils and ratepayers.

Proposed outcomes

To address these problems, the proposals in this document are intended to:

- increase the circularity of beverage containers, resulting in reduced litter, improved recycling outcomes and reduced emissions
- enable a producer responsibility model, by shifting the costs of beverage container resource recovery and waste minimisation from ratepayers and councils to the producers and consumers of beverages
- create community benefits, such as new opportunities for employment in the circular economy, community participation, fundraising for charities and social enterprises, and with consideration for iwi/hapū participation.

Decisions made to date

In August 2021, Cabinet agreed in principle to progress the development of a NZ CRS and invited the Minister for the Environment to provide further information on key design consideration for a NZ CRS [CAB-21-MIN-0402].

In October 2021, the Minister for the Environment sought direction from Cabinet on key design considerations for a NZ CRS [ENV-21-MIN-0049 and ENV-21-MIN-0048 refer]. Cabinet agreed in principle to preferred CRS design considerations and directed that updated modelling and analysis be included in a draft consultation document on a NZ CRS. Questions seeking feedback on design elements of a proposed CRS are included in the consultation document accompanying this document. Feedback received will inform final policy decisions.

Authority to charge

Depending on the design of a CRS for New Zealand, new legislation and regulations will likely be required to implement a scheme. This is particularly the case for the design proposed in the consultation document submitted alongside the interim RIA. Drafting of new legislation and regulations would be in line with the current review and amendments to the Waste Minimisation Act 2008 (WMA).

We note that existing powers in the WMA set out a framework for implementing product stewardship regulations more broadly (a CRS is a form of product stewardship). Under the existing WMA, section 23(1)(c) sets out that regulations may be made to require specified groups to provide 'take-back' services for certain products and requirements on how to manage the reuse, recycling, recovery, treatment or disposal of the products taken back. Section 23(1)(d) enables a fee to be set for the management of the product.

There are, however, limitations in using the existing WMA legislation to enact a CRS, which is a relatively unique type of product stewardship scheme. Bespoke legislation and regulations would allow for a more robust scheme design.

Policy rationale: Why a user charge? And what type is most appropriate?

Why is cost recovery appropriate?

Requiring beverage producers to cover the costs of recycling beverage containers they produce shifts the substantive costs of recycling from councils and rate payers to the producers, retailers and consumers of beverage containers. This underpins the 'polluter pays' and 'producer responsibility' principles that underpin product stewardship schemes. The aim of CRS schemes is to ensure that manufacturers, retailers and consumers bear the responsibility for the life cycle costs of the products they place onto the market.

What is the nature of output from the activity?

Beverage producers pay the scheme fees and refundable deposit to the scheme's managing agency to manage/distribute. The scheme fee covers the costs of managing the scheme,

including the cost of recovering (container return facilities), transporting and processing (material consolidation facilities) the returned containers.

Is full or partial cost recovery being proposed? What is the rationale for proposing full or partial cost recovery?

Full cost recovery is being proposed. The scheme fees would include the following costs of to the scheme:

- the handling fee (paid to container return facilities)
- transport costs
- scheme material consolidation facility costs
- export costs
- scheme administration
- the deposit.

In addition, it's proposed that the scheme fee would take into account costs to the regulatory agency (or agencies) for compliance, monitoring and enforcement, and other government costs (so that these are not reflected on tax payers more generally). Details about how these costs are calculated will be determined at a later stage, following consultation.

What type of charge is being proposed, eg, fee, levy, hourly charge? What is the rationale behind selecting this type of charge?

A CRS scheme fee is being proposed to be paid by beverage producers to the scheme's managing agency to cover the costs of managing the scheme. The mechanism for how this fee is set, eco-modulated and able to be adjusted to accommodate variable market costs is to be determined through the policy development process, which will then be reflected in new legislation. Beverage producers and retailers pass on some or all of the scheme costs to consumers when they purchase eligible, labelled containers.

Who will pay the cost recovery charges?

Beverage producers would pay the scheme fee (including the refundable deposit) to the scheme's managing agency. It is expected that beverage producers and retailers pass on some or all of the scheme costs to consumers through the purchase price of their eligible beverage products.

The price elasticities of individual products and price setting negotiations between producers and retailers are commercially sensitive, so the necessary assumption of the proposed scheme financial model is 100 per cent pass through of scheme costs to consumers – although we note this may not be the case for all products and the model does have the ability to model different product elasticities should data to support this analysis become available.

Beverage producers, having recovered the additional scheme costs from consumers (typically via retailers), then pay the per-container scheme fees including the deposit value to the scheme's managing agency to operate the scheme. The managing agency then distributes payments to the collection/redemption network (ie, to the container return facilities where consumers redeem their containers for cash).

Eco-modulation of the scheme fee

Eco-modulation is a pricing mechanism that can be used to improve waste minimisation and circular economy outcomes. A fee is modulated to reflect the costs of recycling a given product, and the fee typically increases when a product is harder (more costly) to recycle. Equally, products that are easy to recycle have lower scheme fees, encouraging producers to use more recyclable materials in their products. The eco-modulation fee incentivises producers to improve the environmental sustainability of their product design and is a key tool for enabling improved circular economy outcomes.

In the context of the new NZ CRS legislation, the recommended proposal includes provision for a scheme fee to be eco-modulated to reflect the actual end-of-life management costs to recycle different types of beverage containers, plus the associated environmental costs. The scheme fees would be modulated based on criteria linked to the waste hierarchy and/or modulated through specific scheme recycling targets to be developed alongside other scheme regulations. The modulation would likely take a phased approach to encourage more sustainable product design and incentivise recyclable and, in the future, reusable packaging. A phased approach would allow for producers and markets to adapt to the impact of the modulation.

The eco-modulation of fees in a NZ CRS would prioritise container-to-container recycling solutions where possible, including to export markets if necessary, over downcycling materials that maintain the linear resource extraction and consumption economic model. It could also prioritise upstream processes – such as designing for reusability, reparability and durability – to facilitate the transition to a circular economy, lower emissions and enable greater waste minimisation.

For example, eco-modulation of the scheme fee could mean that producers of harder to recycle packaging such as liquid paperboard and glass would likely have a slightly higher scheme fee, given there is limited market demand for the recovered materials onshore and they are more likely to be downcycled in New Zealand. On the other hand, eco-modulation would mean beverage producers using aluminium cans could have their scheme fees reduced as an incentive, given aluminium cans are a valuable commodity, highly recyclable, reduce emissions when recycled and have good circular potential.

If a NZ CRS proceeds, eco-modulation criteria and/or more specific recycling targets would need to be developed with industry and through further engagement and consultation on regulations.

Scheme fee offsets

Scheme fees can be offset using either unredeemed deposits from containers that have not been returned (using a deposit financial model) or by producers only paying out on deposits on containers that come back into the scheme (refund financial model).

High level cost recovery model (the level of the proposed fee and its cost components)

Scheme fees are variable depending on the nature and efficiency of a scheme. For example, a scheme that uses mandatory return-to-retail is likely to be more efficient than a voluntary scheme as reverse logistics to and from retail locations may be utilised.

Modelling undertaken has estimated the handling fee at a gross cost of NZD 7 cents per container based on international schemes (mainly Australia) and inflation adjusted for the first five years of scheme implementation. In reality, the handling fee is set by the managing agency. The fees will need to cover both fixed and variable costs for container return facilities. An iterative scheme fee setting process will likely be required. Additional scheme costs are estimated to be NZD 1.8 cents, bringing the total scheme fee to NZD 8.8 cents.

Under the deposit model recommended, revenue from unclaimed deposits becomes available to off-set scheme costs (including the handling fee) to producers and consumers, or for scheme enhancement. Under the deposit model, the total scheme fee would likely be as low as NZD 2 to 3 cents as the unclaimed deposit offsets the scheme costs for all involved.

Table 16: Gross and net costs per container (deposit level and scheme fee)

Gross and net costs per container	Description	Estimated amount
Deposit level (refundable)	Creates a direct financial incentive to recycle eligible containers	Proposed NZD 20 cents
Scheme fee (gross cost)	Made up of: • handling fee (paid to container return facilities, ie, retailers and depot operators to cover costs of collecting, sorting, storing and packaging empty containers for transport) • Additional managing agency scheme fees (including administration, transport of collected materials to centralised processing facilities, operational and capex costs of consolidation facilities, export of materials as required)	Based on international schemes (mainly Australia), modelled at: • NZD 7 cents (handling fee) • NZD 1.8 cents (additional scheme fee). Total gross scheme fee – NZD 8.8 cents (before offset)
Scheme 100 per cent pass through costs (includes offsets – creating lower net costs)	The full scheme fees and/or deposit can be offset using either unredeemed deposits (from containers that have not been returned, deposit model) or by producers only paying out on deposits on containers that come back into the scheme (refund model)	Modelling of the 'deposit model' shows the net scheme pass through cost to consumers would be approximately NZD 3 cents (year 1) and 5 cents (year 5) (+ GST) of non-refundable fees per container and NZD 20 cents of refundable deposit plus GST (NZD 20 cent scenario)

PwC modelling necessarily assumes a 100 per cent pass through of scheme costs to the consumer although this may not be the case. Under a NZD 20 cent scenario using the deposit model, the additional cost added to the purchase price of beverages would be between NZD 23 and 25 cents. Consumers would receive the NZD 20 cent refund upon returning the container, leaving the outstanding cost to consumers of NZD 3 to 5 cents.

Consultation

In the development of the proposals contained in the interim RIS, consultation has included:

- input by stakeholders as part of a co-design process carried out in 2019 and 2020
- additional engagement with stakeholders undertaken in 2021, with the Minister and/or Ministry officials.

Details of a proposed CRS are included in the draft consultation document, submitted for approval by Cabinet together with the interim RIS. Subject to Cabinet approval, the intention is to seek feedback from stakeholders and the public to test the proposals, including how deposit and scheme fees are set and modulated, and what they should be used for.

Appendix 2: Cost-benefit analysis (Sapere Research Group)

A Container Return System for New Zealand

Cost-benefit analysis update

Preston Davies, Ben Barton

February 2022

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Tables

Figures

Glossary

BCR	Benefit-Cost Ratio
BAU	Business As Usual
CBA	Cost-Benefit Analysis
CDS	Container Deposit Scheme
CRCs	Community Recycling Centres
CRS	Container Return Scheme
GHG	Greenhouse gas
HDPE	High density polyethylene
KNZB	Keep New Zealand Beautiful
LPB	Liquid paperboard
MA	Managing Agency
MCF	Material Consolidation Facility
MRFs	Material Recovery Facilities
OTC	Over the Counter
PET	Polyethylene terephthalate
RF	Return Facility
RVM	Reverse Vending Machine
TLA	Territorial Local Authority
WG	Working Group

Executive summary

This report presents the findings of an update to economic cost-benefit analysis (CBA) of a container return scheme (CRS) in New Zealand.

The CBA relies on updated financial modelling from PwC finalised in January 2022. That is, we largely take as given the design features, options and operations of a CRS based on expert input.

Compared to a 'business as usual' situation of no CRS, a CRS would result in society being better off to the tune of $1,391 million, in present value terms. In that scenario, benefits exceed costs by 61 per cent. Such a 'business as usual' counterfactual necessarily assumes that the existing pattern and volume of recycling and other factors affecting willingness to recycle remain unchanged throughout the study period. This may seem unrealistic but is the most tractable approach given our lack of knowledge around the future, particularly over a 30-year period. To attempt to predict likely outcomes in that time effectively reflects 'the pretence of knowledge', which can lead to less useful and potentially incorrect results.

The central estimate of the largest categories of benefits (welfare gain from reduced litter and increased recycling) is the average of two willingness to pay studies representing the midpoint of the two studies' results. Using only the lower of these two estimates for both litter reduction and increased recycling would result in $100 million net benefit, and applying only the higher estimates results in $2,682 million net benefit. While acknowledging the large spread in estimated benefits and the well-rehearsed caveats around results using such estimating approaches, the studies represent the best available – though not perfect – information. We present the midpoint results with a range in brackets.

These results are largely robust to sensitivity testing.

Category	CRS estimates
Total benefits ($m, PV)	$3,667 ($2,376 to $4,958)
Total costs ($m, PV)	$2,276
Net benefits ($m, PV)	$1,391 ($100 to $2,682)
Benefit-cost ratio	1.61 (1.04 to 2.18)

Introduction and background

This report is an update of previous cost-benefit analysis (CBA) for a New Zealand container return scheme (CRS) finalised in February 2021. The update is required due to direction from the Government on the proposed design of a New Zealand CRS (for the purpose of public consultation), ahead of key decisions on whether to progress with a scheme for New Zealand.

CRSs have a range of objectives, meaning precise problem definition is elusive

Cost-benefit analysis is usually motivated by a problem statement. CRSs are designed to address several issues related to waste markets and consumer behaviour. A high-level problem statement relevant for this analysis is as follows:

A mismatch between private costs and social costs of disposal and recycling leads to excessive amounts of beverage containers being disposed into landfill or discarded as litter.

We acknowledge that the expression of the problem a CRS (as designed) could address is part of the wider policy development and consideration process, but we include a problem statement here for clarity and completeness.

This analysis follows previous work

In 2016, Auckland Council commissioned us to prepare a CBA of a proposed container deposit scheme (CDS). Data from Auckland Council were combined with specialist advice and extrapolated to the national situation. The CDS modelled was 'generic' in nature, with a range of assumptions applied for tractability reasons.

The 2016 CBA indicated that society would be better off from the introduction of a CDS, relative to the status quo of no CDS. Benefits exceeded costs by a factor of around three, meaning society was better off by $184 million in present value terms, across the 10-year study period.

Subsequently, in September 2019 funding was provided by the Waste Minimisation Fund to *Design a Container Return Scheme for New Zealand* in particular, and a Working Group (WG) was put together to advise on scheme design.

A CBA of the resulting scheme, referred to as a CRS, was part of the work programme of the WG. Relative to the previous work, the analysis extended the study period to 30 years, modelled two scenarios (i.e. a CRS with and without glass containers) and included additional effects (e.g. emissions and machine-based return facilities).

Compared to a 'business as usual' situation of no CRS, a CRS that includes glass containers would result in society being better off to the tune of $1,089 million, in present value terms. In that scenario, benefits exceed costs by 49 per cent. If glass containers were removed from the CRS design, society

would be made better off from introducing a CRS by $68 million and benefits exceed costs by 6 per cent.

The results were largely robust to changes in the discount rate applied and the analysis time period. However, results were sensitive to the type of metric chosen to measure the litter. Using item count caused the benefit-cost ratio (BCR) to decrease to 0.92 and increase to 1.97 if weight was used rather than the average of weight, item count and volume reported in the central scenario to avoid bias of selecting one metric.

The CBA was peer reviewed by Sense Partners, with the results presented reflecting feedback given as part of that review. In addition, a commissioned review by NZIER and feedback received from a range of stakeholders were also incorporated into the analysis, where available evidence allowed.

A return to retail model with fresh milk excluded

This update to analysis incorporates changes to design decisions and updates to primary sales and kerbside recycling data. As in the previous version of analysis, the inputs from PwC financial modelling are used as the basis for the economic analysis.

While the primary categories of costs and benefits are unchanged, there are some important changes. Rather than reporting the difference between glass-in and glass-out options throughout the report, glass-out is addressed in sensitivity testing.

Fresh milk containers were previously included; they are now proposed to be excluded. This changes the volume of plastic containers included. Specifically, it excludes most HDPE beverage plastic from the CRS. Plastic was previously treated as a single mixed material type due to analysis limitations; it is now separated in PET and HDPE but, due to data availability, it is assumed all HDPE is not included in the scheme (in reality, immaterial volumes of HDPE may still be in scope).

The number and type of return depots is updated based on the proposal for a mixed return to retail model. However, actual system implementation decisions and therefore costs are still unknown, meaning adjustments to this aspect of the model are limited to adding manual over-the-counter facilities and adjusting the volume of containers allocated to the three return depot types. The majority of return depots and the container volume throughput is forecast to utilise Reverse Vending Machines (RVMs).

There are also significant changes to the capital costs for the Material Consolidation Facilities (MCFs), the forecast growth rates for container numbers and updated base year values.

Further investigation into the recycling of existing liquid paperboard (LPB) containers found that while it is collected in kerbside recycling by one or two councils, it is unlikely to be recycled. A small recovery volume was previously counted as business as usual (BAU) kerbside recycling. Given the materials were unlikely to have been recycled, updated recycling figures have not included LPB. The very small change in volume has a negligible impact on over all recycling estimates.

Previously, the value of avoided marine litter was monetised. Upon review, this impact is now discussed qualitatively. This change is not material to the result and is in part a response to previous peer review that illuminated issues with the calculation and the source.

Data are imperfect and participants' responses uncertain

While this iterative process has increased the certainty associated with the estimated costs and benefits of the CRS, there are a number of assumptions required due to data gaps and inherent uncertainty.

Recycling data largely relies on council-reported information and some industry sources. Considerable effort has been put into collating the data, and while it represents the best available information, there are a number of unknowns meaning assumptions are required. These assumptions reduce the accuracy of estimates.

Commercial volumes have been estimated and used to refine assumptions around unaccounted-for material flows. Modelling assumes no net change to commercial recycling costs as a result of the CRS.[1] Adjustments have been made for what is collected and what is rejected as contamination. The estimates for volumes diverted from kerbside refuse are based on 25 days of auditing of domestic kerbside rubbish and recycling at five locations around New Zealand in 2019 (Yates, 2020). Since this bin auditing, behaviour may have changed, and key assumptions such as conversion ratios from container numbers to tonnes and vice-versa likely reduce accuracy.

Public space refuse and recycling volumes are uncertain but, on examination, appear to be relatively small in terms of beverage container recovery.

The consumer response to price changes is assumed to follow the evidence reported in Australia with a one-off across the board 6.5 per cent reduction (Queensland Productivity Commission , 2020). This is a simplifying assumption used in the PwC (2021) financial modelling. In reality there are numerous beverage types, sizes and product bundles that will all likely result in different price impacts and consumer demand responses. It is also uncertain if the scheme costs will be fully passed on to consumers or partially absorbed by producers.

[1] We assume commercial contracts will adjust in a manner that results in no net change in costs of recycling collection for businesses even though volumes may increase.

What we modelled

We have modelled a return to retail CRS model with fresh milk excluded. The specific details of return facilities – especially Reverse Vending Machine (RVM) models and location – are to be decided by retailers, so we have avoided speculation on opportunity and space costs. Due to commercial sensitivity, we use averages of available international examples for estimates of RVM costs.

Collection model

We model the capital and operating costs of three components of the CRS:

- Managing Agency (MA) oversees the operation and administration of the scheme.
- Material Consolidation Facility (MCF) collects, aggregates and bales returned containers for sale and processing.
- Return Facilities (RF) are locations for consumers to return containers for deposit refunds.

Costs for the MA and MCFs were provided by the 2021 PwC financial model, which includes updated data on volumes and changes to forecasting assumptions used previously. In the absence of information on the costs of the RFs, which we recognise would be available during the implementation (procurement) stage of a CRS, we used international evidence. The RFs are modelled as a mix of RVMs, Over the Counter (OTC) and automated depots that have differing cost structures and capacity. The 2020 WG guidance was for a lease model to operate the RVMs. Given data and confidentiality constraints, we continue with a lease cost rather than capital cost approach.

Scheme fees

The CRS fee is applied to all beverage containers, paid by the beverage producers and assumed to be fully passed on to retailers and ultimately consumers. The only relevant aspect for the CBA is the demand response to the price increase, which is modelled as a one-off 6.5 per cent reduction in beverage sales in year 1 of the scheme. Refer to PwC's (2021) financial model for details.

Ideally, for an economic CBA, we would use estimates of the price elasticity of demand for different beverages to model the reduction in consumption as a result of a price rise due to the CRS. As indicated in the earlier CBA iterations, there is very little data in New Zealand on the relevant elasticities.

In addition, the bundling options available for beverages (particularly alcohol) make it extremely difficult to determine the price impact and consequently the consumption reduction. Moreover, it is not a classical increase in price (e.g. from a tax), as consumers have the possibility of recouping most of the additional payment (although that is not costless). Thus, the somewhat 'blunt' and possibly overstated consumption reduction explained above is used in this analysis.

Material flow changes

As a result of the CRS, beverage containers are diverted from kerbside refuse and recycling collections, and the quantity of beverage containers that become litter is reduced.

Key inputs to determine BAU and CRS material volumes and flows were provided by PwC 2021 and the 2020 WG:

- Updated GS1 container sales data by beverage type and container material are used to establish consumption.
- WasteMINZ and Territorial Local Authority (TLA) data on the beverage container flows by material type in kerbside refuse and recycling collections across the country.
- Previously container consumption and disposal were modelled to grow at 2.03 per cent annually after the initial drop of 6.5 per cent in consumption when the CRS is introduced. PwC's (2021) updated analysis used the population growth rate for the growth in beverage container sales. We have followed this as it has implications for the capital costs for MCFs. The average population growth rate used over the core 30-year analysis period is 0.7 per cent.

The updated financial modelling assumes an initial total return rate of 75.5 per cent, which is 90 per cent of the maximum return rate (83.9 per cent), and that it takes three years to reach the maximum return rate (steady state achieved in year 4). The financial model return rate is used as the household participation rate. This means in year 1, 75.5 per cent of households will divert beverage containers from kerbside refuse and recycling into the CRS, and by year 4, 83.9 per cent of household beverage containers are diverted from kerbside collections, and this rate continues for the 30-year modelling period.[2]

Table 1: Change in eligible containers in kerbside recycling and refuse during implementation (tonnes)

Category	**Year 1 (75.5% diversion)**				**Year 4 (83.9% diversion)**			
	BAU		CRS		BAU		CRS	
Kerbside	Recycling	Refuse	Recycling	Refuse	Recycling	Refuse	Recycling	Refuse
PET	4,521	5,213	1,015	1,193	4,644	5,355	801	806
LPB	-	2,719	-	622	-	2,793	-	420
Metal (aluminium)	3,809	1,683	864	385	3,913	1,729	682	260
Glass	110,566	12,374	25,308	2,832	113,578	12,712	19,989	1,912

[2] Note the actual change in volume is greater due to reduce demand (6.5 per cent) from the CRS price being passed onto consumers.

HDPE	2,418	2,185	2,418	2,185	2,484	2,245	2,484	2,245
Total	**121,313**	**24,175**	**29,605**	**7,219**	**124,618**	**24,834**	**23,957**	**5,643**

Source: PwC 2021 financial model, Sapere analysis.
Note these figures represent the tonnes of eligible containers in the kerbside refuse and recycling streams.

Litter volumes are modelled to reduce by 61 per cent once the CRS is fully implemented. 60 per cent of this reduction happens in year 1 and 100 per cent by year 4. Establishing a baseline for the level of litter is challenging. Assuming that half the unaccounted-for container volumes become litter aligns roughly with the Keep New Zealand Beautiful (KNZB) national litter audit that reports a total of 190,000 tonnes litter was collected in 2016. The 2019 survey finds 36 per cent of litter by weight is beverage containers, which equates to 69,000 tonnes. If the average of metrics (item, weight and volume) is used, this results in around 45,000 tonnes of beverage container litter. Beverage litter is modelled to reduce by about 26,000 tonnes in year 1 and around 42,000 tonnes once the full impact is achieved, as seen in Table 2. The actual tonnes of litter have little impact on the benefits and costs modelled, as the benefit calculation for litter reduction is based on the percentage reduction in litter expected.

Table 2: Change in litter volumes (tonnes)

Category	**Year 1 (60% impact)**		**Year 4 (100% impact)**	
	BAU	CRS	BAU	CRS
HDPE	3,531	3,531	3,627	3,627
PET	6,401	3,785	6,575	2,382
LPB	2,028	1,169	2,057	736
Metal (aluminium)	4,627	2,731	4,753	1,719
Glass	50,567	29,905	51,944	18,820
Total	**67,154**	**41,121**	**68,958**	**27,284**

Source: Sapere analysis

Return rates modelled through assumed household participation rates

We did not assume that the CRS will achieve a set rate of material recovery, as the details of the system implemented and how consumers react involve a high degree of uncertainty. Data limitations and gaps, particularly around commercial flows, mean we did not have visibility over what the assumed diversion would be displacing and thus could not calculate the net impact.

We applied assumptions to the areas where there was the best data, household kerbside collections and litter reduction. We use household participation rates to assume the volume of material that is

diverted from kerbside refuse and recycling schemes into the CRS.[3] We feel this more conservative approach is appropriate given the inherent uncertainty and nature of supporting data available.

Table 3: Recovery of material flows CRS and BAU (tonnes)

Category	Year 1 BAU	Year 1 CRS	Year 4 BAU	Year 4 CRS
Total consumption	319,889	302,602	328,604	308,703
Total kerbside recycling	121,313	29,605	124,618	20,839
CRS recycling transferred from kerbside recycling	-	83,866	-	95,723
CRS recycling transferred from kerbside refuse	-	15,527	-	17,722
CRS from Kerbside contamination		7,354		7,554
CRS recycling from litter	-	21,833	-	37,362
Total recycling with CRS	-	158,184	-	179,200
Commercial recycling[4]	22,901		23,542	
Recovery rate	**45%**	**60%**	**45%**	**66%**

Source: Sapere analysis, PwC 2020 financial model

The table above captures only the flows where we have sufficient data to model changes brought about by the CRS. The table is restricted to the diversion of eligible containers from kerbside collections and a reduction in litter.

[3] As stated earlier, the household participation rates are aligned with the financial modelling return rates.
[4] While not included in modelling it is likely commercial recycling rates will increase with costs to business unchanged.

Relevant costs and benefits

The categories of costs and benefits included in this analysis are summarised in Table 4.

Employment effects are not included, but are a qualitative feature of a CRS

In common with other proposals of this nature, claims are often made that employment opportunities arise from a CRS and that these opportunities are a benefit that should be included in any economic CBA. In general, economic CBA does not directly or explicitly include employment effects. This is the position that was taken in the previous CBA.

The opportunity cost of labour employed (i.e. the going wage rate) is implicitly included as part of the various cost elements, while any beneficial effect that arises from the deployment of labour to produce goods or services would be captured in terms of the outputs of that labour process (e.g. in the scale of additional recycling, or reduced litter).

The rationale behind excluding employment effects is that labour resources used to undertake activities associated with a CRS would (or could) have been deployed elsewhere in the economy, and it is therefore a resource transfer rather than resource creation. However, where there is unemployment in the relevant catchment or for the relevant skill area, it is possible that the opportunity cost of labour employed could be low (perhaps even zero) (Treasury, 2021, p. 17).

In such cases the impact of employment could be viewed as positive (i.e. the output produced comes at very low or no cost). There may also be fiscal benefits if the labour that is to be used was previously receiving transfer payments from the government but would no longer do so following a CRS.

Lack of available data and the transfer nature of employment effects (i.e. labour deployed as part of a CRS would likely have been deployed elsewhere in the economy) means we do not include employment effects in the analysis.

We note, however, that the benefits associated with employment may be broader than just the market wage, with such "externalities" thought to include better civic engagement, enhanced social interactions and overall gains in self-esteem/well-being.

Measuring consumer welfare with willingness to pay

The major non-market benefit category relates to consumer welfare (see Table 4). In particular, people may perceive and value the aesthetics of cleaner public places due to less (beverage container) litter now and into the future (i.e. "bequest" benefits for future generations from less visible litter and litter going to landfill).

Two studies that sought to quantify/monetise such amenity benefits have been frequently cited in analysis of CRS[5] and other waste management projects.[6] PwC (2010) is an Australian study and Wardman et al., (2011) a similar United Kingdom based study. The PwC (2010) study also quantifies the value of increased recycling, as does the New Zealand based Covec (2007) study on willingness to pay for increased recycling.

Willingness-to-pay surveys have been accused of producing over-stated benefits, as respondents may not fully understand the context of the question. Perhaps more importantly, respondents can claim values that are greater than what they would actually pay as they don't believe there is a strong possibility that they will be faced with having to pay.

In the context of litter reduction, a particular question is whether the willingness to pay is predicated on the mechanism used to bring about the change in question. In particular, is adequate consideration given to the cost-effectiveness of particular options to reduce litter? Covec (2016) suggests that amenity values should only be included in analysis if a CRS is the most cost-effective policy to reduce litter and increase public space amenity and that further work should be done on optimal litter reduction measures.

While we agree further research would be helpful, we also acknowledge that analyses of this type often take place in an information-poor environment, and judgment is required. In other words, it is very rare for a CBA to take place with perfect information or complete certainty. Reliance on the best available evidence will always be required, and we believe that this is the case here. In addition, the objective of a CBA is to determine the extent to which society is made better off (if at all) as a result of a policy proposal, rather than to necessarily determine the least cost method of achieving a particular goal.

A further question that has been raised in relation to the type of direct consumer benefits under study here is whether they are additional to the other benefits. Covec (2007) questioned whether there is a benefit that households are receiving that is not accounted for elsewhere. Their view was that there is, and that including the consumer surplus (the difference between their willingness to pay and current costs of litter reduction) can be added to other avoided cost-related benefits.

We consider increased recycling benefits to be additional to those in respect of litter reduction, as we interpret litter reduction as relating to visual amenity (i.e. the presence of litter), while recycling is what happens to relevant litter once it is cleared (i.e. the appropriate disposal of beverage containers).

[5] See NSW EPA, (2017); Government of Western Australia (b), (2018); ACT Government, (2018).
[6] Such as Perry, Varua, & Hewitson, (2018)

Table 4: Overview of costs and benefits

	Description	Calculation used	Source
Costs			
Household participation	Costs incurred by households for activity related to the CRS	Time required multiplied by time cost multiplied by proportion of participating households	NZTA Economic Evaluation Manual, author's estimates
Infrastructure-capital	Asset costs for processing and collecting containers for MCFs	Estimated market cost of assets	SDWG, PwC (2020), Author's estimates
Infrastructure-operating	Transport, administration, handling and processing/staff costs for MCFs, collection facilities and Managing Agency	Cost per tonne for transport and handling Annual estimated labour and other costs	PwC (2020), Auckland Council
Labelling	Costs to display information on containers, potentially including bar codes and value of refund	One-off cost based on product lines and daily cost for four days' work by design company	Hogg et al (2015), Eunomia
Exporting cost	Costs associated with sending additional volumes of recyclate matter offshore	Price per tonne, by recyclate matter	PwC (2020)

	Description	Calculation used	Source
Benefits			
Welfare gain from additional recycling	The value households place on additional recycling as a result of a CRS	Willingness to pay per household multiplied by the net change in volumes for the relevant number of households. Updated to today's value and averaged across two sources used.	PwC (2010), Covec (2007)
Welfare gain from less litter	The value households place on the reduction in litter recycling as a result of a CRS	Willingness to pay per household multiplied by the net change in volumes for the relevant number of households. Updated to today's value and averaged across two sources used.	PwC (2010), Wardman et al, (2011)
Lower landfill costs	Avoided costs of landfill due to tonnes diverted from kerbside refuse	Diverted volume multiplied by cost per tonne of landfill	PwC (2020)
Value of material collected	Additional value due to better quality of material	Dollar value per tonne for relevant material type multiplied by respective volume	PwC (2020)

	Description	Calculation used	Source
Reduced litter clean-up costs-market-based	Lower costs of litter clean-up due to reduced volume of litter	Dollar cost per person multiplied by relevant litter reduction	Auckland Council, Author's calculations
Reduced litter clean-up costs-non-market-based	Avoided damage from marine litter and notional value of volunteers	Qualitative.	Beaumont et al (2019), NZTA Economic Evaluation Manual, Author's calculations
Reduced contamination	The lower level of contamination in landfills as a result of better quality/less-contaminating material ending up in landfills	Reduction in tonnage multiplied by landfill cost	PwC (2020), Author's estimates
Emissions	Impact on carbon footprint as a result of CRS. Largest impact stems from replacing virgin material.	Net total of additional emissions from transporting material and reduced emissions from replacing virgin use and landfill emissions (due to paperboard)	NZTA Economic Evaluation Manual, UK Government (for emissions factors)
Lower collection costs	Savings from reduced burden of kerbside collection	Reduction in volume of kerbside refuse and recycling multiplied by cost saving per tonne	PwC (2020), Covec (2016)

* denotes categories not included in previous work

Estimated costs and benefits

This section presents the (quantified) estimates of the costs and benefits of the CRS, as proposed. The estimates are based on the core assumptions contained in Table 5. We highlight that, where value ranges are presented, we use the midpoint for modelling purposes.

Table 5: Core assumptions

Relevant factor	Value	Source
Discount rate	5%	Treasury (2021)
Study period	30 years	Author's estimate
Phase-in period to steady state	3 years	PwC (2021)
Average annual household and consumption growth	0.69%	Statistics New Zealand, PwC (2021)
Maximum household participation	83.9%	PwC (2021), estimate of return rate used as proxy for participation

Total costs of $2,276 million

Modelling estimates the CRS to cost almost $2.3 billion over 30 years, with household participation costs the largest single category of costs at $751 million. Combined operating costs are almost $1.5 billion with Return Facilities ($628 million), Material Consolidation Facilities ($429 million) and the Managing Agency ($409 million) the highest components.

Table 6: Summary of costs (30 year Present Value)

Cost categories	Value $ millions
Managing Agency	409
MCF capital costs	26
MCF operating costs	429
Return facility costs	628
Participation costs	751
Labelling costs	11
Exporting cost	23
Total costs	**2,276**

Material Consolidation Facilities capital costs of $26 million

Capital costs relate to the assets required for the MCFs only. Long-term assets have an asset life of 35 years, and terminal values[7] (of $2.7 million) are netted off capital costs at year 30. Short-term assets are replaced every four years, so costs reappear every four years (see Table 7).

[7] Terminal value refers to the estimated useful life of assets and therefore, when assets have an expected life that exceeds the time period of the analysis some residual value remains, which needs to be accounted for in the analysis. In this case, the value of the estimated five remaining years of functional life of the assets are removed from the costs.

Table 7: Capital costs for MCF (PV, $m)

Category	Cost	Asset life
Long term assets (balers, conveyors and silos)	$18.6	35 years
Short term assets (conveyor belts)	$0.2	4 years
Land	$3.6	1.9ha at $186m^2
Cages	$4.4	35 years

Source: PwC (2021) Note the model uses an escalator and land costs have been updated to reflect recent value changes

Operating costs of $1,466 million

This category of costs is made up of operating expenses for the MA, MCFs and RFs.

Managing Agency costs total $409 million

Table 8 outlines the MA operating costs for the initial implementation phase and the 'steady state' or ongoing yearly costs.

Table 8: Managing agency fixed costs (PV, 2021 $m)

Year	Zero	One	Ongoing
Admin and support services	-	$11.3	$9.1
Professional services	$9.6	$3.9	$2.4
Marketing and communication	-	$5.7	$4.5
Employee benefits	$0.3	$3.8	$3.8
Other expenses	$1.7	$6.9	$6.9
Office lease	-	$0.2	$0.2

Source: PwC 2021 financial model

Material Consolidation Facilities costs total $429 million

The WG (and previous work) signalled an intention to make use of existing facilities such as Community Recycling Centres (CRCs) and existing return points for recycling and existing MRFs that could be converted, expanded or contracted for the required services.[8]

Nevertheless, there are still sizeable operating costs, reflecting the incremental volume of material that such facilities would face. There are transport and processing costs, which are based on cost per tonne multiplied by tonnage, as well as staff and utilities costs. Glass crushing costs are also included as we understand that local bottle-to-bottle processing is at capacity and any additional glass returned due to the CRS would need to be crushed in the absence of any other regulatory or system changes.

Table 9 shows that total transport and processing costs are estimated to be $331 million. The glass cost per tonne figures are at the high end of ranges considered, possibly overstating true costs of glass transport and processing.

Table 9: Transport and processing costs

Category	Cost per tonne	Steady-state cost (PV, $m)	30-year cost (PV, $m)
Transport (plastic, metal, LPB)	$171	$3	$57
Transport glass	$112	$12	$230
Glass crushing	$90	$2	$43

Source: PwC Financial modelling final report July 2020 and PwC 2021, Sapere analysis

Staff and utilities costs are estimated at $98 million, based on financial modelling by PwC that uses escalators to increase costs with material throughput.

Table 10: Variable costs per MCF (PV, $m)

Category	Initial costs	30 year cost (PV, $m)
Staff costs	$3.9	$84
Utilities costs	$0.8	$14

Source: PwC Financial model 2021

[8] Whether this is practical remains to be seen and is a matter for the future managing agency to determine, alongside other considerations such as fraud risk management

Return facilities costs total $628 million

The costs included in this category are population-based, with one facility for every 6,400 people. Based on a 2019 population of 4.9 million, 816 return facilities (103 over the counter, 51 automated depots and 662 RVM locations) are included in year 1 of the modelling and increase in a constant ratio with population growth. As indicated earlier, RVMs make up 85 per cent of facilities and the remaining 15 per cent are OTC and automated depot return facilities.

The model has the costs of leasing and maintaining the RVMs fixed but the number of RVMs growing with population, so the cost per container drops as the CRS is implemented then stays constant. In year 1, RVMs cost 4.4 cents per container, while by year 4, when the system is fully implemented, the cost per container is 3.6 cents. The assumption for OTC and automated depot return facilities is a constant 3.0 cents per container.

RVMs are usually considered more efficient for the system. For example, they can reduce collection costs through compacting containers and automatically verify units, further reducing administrative costs (Edwards, Grushack, Elliot, Kelly, & Card, 2019).

The costs for RFs have been estimated by reference to international evidence, applied to New Zealand with relatively little adaptation. Thus, there is more of a question about the validity of these estimates than is the case for others. We have sought to calibrate the model estimates with CRS financials and material volumes as a check, but doubt around the precision of these estimates remains.

Reverse vending machines costs total $549 million, based on the recommended lease model

The space, capital and operating expenses all differ across potentially suitable models. It is likely that a range of models would be used depending on the volumes expected at an RF.

A lease model is proposed for the RVM return facilities. While there are many iterations that could eventuate, we make simplifying assumptions and rely on international experience to estimate the costs involved.

We estimate, based on publicly available information, lease costs would total $31 million per year. The inputs into that cost estimate follow.

Model specifications important for capital, space and participation costs

The recently launched Tomra R1 model enables over 100 empty beverage containers to be inserted into the machine at one time, meaning the household participation costs could be drastically reduced when compared to a single-feed machine.

The standard T-90 Tomra RVM has two chambers, meaning two machines would be required per location for a CRS including glass, plastic, LPB and metal cans.

Capital cost estimates

In 2015, Zero Waste Scotland estimated that the upfront cost of an RVM would cost £30,000, development of the business case and scheme design resulted in a forecast of approximately 3,000 RVMs required, with upfront capital costs of approximately £60 million (Scottish Government, 2019).

A report prepared for British Glass indicates Tomra RVM model costs range from £19,000 to £25,000 with glass and £17,100 to £22,500 without glass. A lease for a standard model is estimated at £7,190 per year. Assumed functioning life of models ranges from five to seven years (Simpson, 2019).

Cost per machine

We convert to NZD at an exchange of 1.97[9] and inflate to 2021 dollar terms for a lease cost of $14,762 per RVM per year.

2200 RVMs required

The average density of RVMs in Europe is around 1 per 1,900 people. This is deemed appropriate for Scotland based on similar population densities (Hogg, et al., 2015). Using the assumption that 85 per cent of return facilities will be RVMs and serve 85 per cent of the population results in an assumption of almost 2,300 RVMs required in year 1 and 2,400 in year 4. This equates to about four RVMs per return facility. We acknowledge the design of the Scottish system has some key differences to the proposed design. The mandatory Scottish model means there is a much larger number of return points in the Scottish model than is proposed for New Zealand. It is therefore quite possible that a lower number of RVMs will be required per return facility with a minimum of two RVMs likely (one for glass and another for plastic, metal and LPB). As we have not made any allowance for space and operating costs of RVMs, we consider the potential over-estimate in the number of RVMs required to best approximate actual costs. Modelling suggests allowing for around 1.5 cents per container of operating costs and reducing the number of RVMs to two per location results in similar costs.

Without knowledge of the specification of the machines it is hard to determine if these assumptions are appropriate for the volumes of material modelled.

Over the counter return facilities ($26 million) and automated depot facilities ($52 million) cost $79 million

For OTC and automated depot return facilities, we use estimates from Australia, the United Kingdom and Canada for an average cost of 2.7 cents per container, which after adjusting for income differences and inflation give an average of 3.0 cents per container (see Table 11). The Ontario and Scottish models are designed to encourage more adoption of RVMs as this reduces the overall cost of the system, whereas the Australian estimate accounts for increased cost in remote locations.

[9] Three-year average exchange rate available at https://www.ofx.com/en-ca/forex-news/historical-exchange-rates/yearly-average-rates/

Table 11: Manual return depot costs cents per container

Cost Element	Ontario (2019)	Scotland (2019)	Australia (2013)	Average
Original	0.73	1.5	6	2.3
Updated	0.80	2.8	5.3	3.0

Source: (Edwards, Grushack, Elliot, Kelly, & Card, 2019; Scottish Government, 2019; Marsden Jacobs, 2013)

Labelling costs of $11.4 million

An allowance for one-off changes to beverage container labels is based on international examples. Industry will have a greater understanding of how these costs translate to the local setting. It seems, with appropriate consultation and timing of the introduction, these costs could be minimised or largely incorporated into other design updates and reviews.

Exporting costs of $21.5 million

The total additional tonnes of recovered material that is exported for processing is multiplied by costs provided in PwC financial model. LPB is exported at a cost of $190 per tonne and metal at $100 per tonne (PwC, 2022).

Participation costs total $751 million

Beverage containers must be sorted, stored, and transported to return facilities. Thus, there are two elements to household participation costs: the additional time needed to sort and return/redeem the containers and the transportation costs to get to the return facility. This estimates the increased cost to households to claim the deposit refund.

Any change in costs to households/consumers from the scheme passed onto consumers as price increase are highly uncertain. At 100% pass through of cost to consumers, financial modelling assumes a 23 cents per container cost from the scheme whereas the economic cost is estimated as the cost of the managing agency, return facilities and material consolidation facilities.

Household time cost of $370 million

As a result of the CRS, households are likely to spend additional to time sort, store and redeem containers. We assume that such trips will often be combined with other trips, such as weekly grocery shopping.

As indicated above, containers can be returned either at a depot, or by RVM. For this analysis, we assume 85 per cent of containers will be returned through RVMs, 10 per cent at automated return depots and 5 per cent at OTC (manual) depots.

Table 12: Household participation time variables (seconds per week) for RVMs

Weekly components	Low	High	Midpoint
Additional sorting and storing	30	60	45
Walk time	30	60	45
Wait time	10	30	20
Total	70	150	110
Seconds per container	3	5	4

Given the number of containers assumed to be redeemed per household, the figures above translate into households spending just **under one and a half hours per year** participating via RVMs once the CRS is fully up and running, made up of around 0.66 hours per year putting containers into RVMs and 0.79 hours in additional sorting, storing, walking and wait time per year.

In the case of OTC (manual) and automated depot return facilities, we assume monthly to quarterly frequency (i.e. eight return trips per household per year). These trips are estimated to take five to 10 minutes per trip. Based on these figures and a test of likely container number thresholds to generate a trip, our best estimate of the time taken by households to use OTC and automated collection depots **is one hour per household per year**.

These time estimates are comparable to findings from overseas studies:

- Container deposit redemption time is 1.6 minutes for RVM and 10 minutes for other refund points (Government of Western Australia (a), 2018).
- RVM is equivalent to 1.7 minutes. Return facility, five minutes per transaction (PwC & WSC, 2011).

We used a household value of time of $10.63 per hour. This value is the same category of time cost used in the previous CBA, adjusted upwards (from $6.90 per hour) by the update factor contained in the New Zealand Transport Agency Economic Evaluation Manual (EEM). Reflecting the information we have to hand and the assumption around CRS-dedicated trips being in the minority, the monetary value chosen is the lowest of those contained in the NZTA EEM. In effect, the opportunity cost of households' time is minimal, as sorting would occur at home and the redemption trip is, by and large, already being undertaken and hence does not crowd-out otherwise valuable time.

The present value of total time costs for household participation is estimated at $370 million.

Transport cost $380 million

We combine vehicle operating costs (calculated by multiplying estimated additional kilometres travelled and cost per km given by Inland Revenue of $0.79) and the extra time travelling, a function

of distance and speed multiplied by the NZTA EEM time costs of $10.63 per hour. Table 13 summarises the transport-related costs.

Underlying assumptions are set out further below.

Table 13: Breakdown of household transport costs (PV, $m)

Component	Value
Vehicle operating costs	$268.6
Time in car	$111.9

We assume that 10 per cent of trips to both RVMs and automated depots and OTC (manual) return facilities are new trips, on the basis that:

- the origin of shopping trips is not always the household, e.g. people may shop on the way home from work
- households are not likely to make a trip for the sole purpose of returning containers unless they have a significant quantity (PwC & WSC, 2011).

Table 14: Distance and frequency assumptions for participation cost estimation

Depot type	Share of returns	Distance (km)	Average speed (km/h)	Time per trip (minutes)	New trips per year	Minutes per year
RVM	80%	5	30	10	2.6	26
Manual	5%	20	50	24	0.8	19
Automated	15%	20	50	24	0.8	19

Total benefits $3,667 million over 30 years

Total benefits are estimated to be over $3.6 billion over 30 years. The largest category is the welfare gain from a reduction in litter with increased recycling also resulting in significant benefit.

Table 15: Benefits summary (PV 30 year total)

Benefit category	Value $ millions
Welfare gain from increased recycling	913
Welfare gain from reduced litter	2,348
Value of additional material recovery	101
Litter clean-up costs	69
Litter volunteers	4
Avoided landfill costs	35
Kerbside collection savings	113
Reduced contamination of recycling	27
Emissions	56
Total benefits	**3,667**

Welfare gain from increased recycling is $912 million

The welfare gain to households is proxied by their willingness to pay for additional recycling. This willingness to pay is expressed in terms of weight, which naturally places greater emphasis on glass containers. We acknowledge that use of a weight measure might mean that some estimates could be mis-stated, but we were unable to source any evidence on which to base willingness-to-pay figures for alternative recycling measures, such as item counts.

Rather than rely on a single measure, we have used two separate studies and derived the estimated benefits using a simple average. The average willingness-to-pay value used in the modelling at year 4 is $35.67 per household per year for increased recycling.

As indicated above, these studies reflect the best available – rather than ideal – information. Both studies are somewhat dated, and one reflects Australian household values, which can only be translated to New Zealand equivalents imperfectly. Further, the method used to produce values of willingness to pay is known to be subject to questions. Absent a more up-to-date and

comprehensively designed study, these values remain the only plausible representation of household values. Setting aside the values due to questions on the actual size of the estimated effects would, in our view, result in a less complete picture of relevant costs and benefits.

The first method produces benefits of $1,518 million

The first method, from PwC (2010), estimates households are willing to pay, on average, $2.77 per year for every 1 per cent increase in the weight of waste packaging recycled (PwC, 2010). This is adjusted for income differences and inflation to $2.72 per percentage point increase. The CRS is modelled to increase the indirect recycling rate by 19 per cent once fully implemented, which translates to households being willing to pay $60 per year for the increase in recycling from indirect sources such as litter and kerbside refuse.[10]

The second method results in benefits of $308 million

Covec (2007) used a survey to find that people were willing to pay $1.68/week to recycle paper, plastic and glass, which implied a surplus of $350/tonne (based on 4.8 kg per week). Using the EEM cost update factors to adjust the $6.90 figure used for the value of time to $10.63 per hour resulted in a value per tonne of $373, compared to $242 per tonne used in the previous analysis. This led to a willingness-to-pay figure of $11 per household per year and total benefits of $307 million. This method would seem to understate value as it does not include aluminium cans, which would likely be part of the CRS. Once fully implemented, the modelling conducted (which only considers transfers from kerbside refuse and reduction in litter and recycling contamination) results in the CRS increasing recycling of beverage containers by around 55,000 tonnes per year.

Welfare gain from reduced litter is around $2,348 million

The approach to calculating the welfare gain is very similar to that used for estimates of the benefits of additional recycling, utilising willingness-to-pay data and averaging across two separate sources. Like the benefit estimates associated with additional recycling, litter benefits are weight-based. Further, the same caveats identified above in relation to additional recycling apply.

The first step was to estimate the proportion of litter explained by beverage containers. We used the 2019 Keep New Zealand Beautiful (KNZB) national litter audit and then calibrated assumptions on proportion of consumption that becomes litter with the 190,000 tonnes litter that was collected in 2016.

[10] This only accounts for increased recycling from litter reduction, transfers from kerbside refuse to the CRS and a reduction in recycling contamination.

Table 16 indicates that the percentage of litter that beverage containers account for is 23.6 per cent. This figure was derived using an average of all the metrics available in the KNZB litter audit including weight, volume and item. [11]

Overseas evidence suggests that litter reduction due to CRS implementation produces an average of 61 per cent less container waste, from a range of 84 per cent to 35 per cent (Bottlebill.org; NSW EPA, 2019; Boomerang Alliance, 2020; West, Angel, Kelman, & Lazarro, 2013). The average litter reduction based on composition and overseas evidence is 14.5 per cent for all containers.

Table 16: Litter reduction due to CRS

Litter reduction	Current beverage container litter	Average (61%)	High (84%)	Low (35%)
Percentage litter from beverage containers	23.6%	14.5%	19.8%	8.3%
Total litter reduction (stadium effect)		47%	64%	30%

Source: KNZB litter audit 2019, Sapere analysis

While the average figures are slightly above estimated litter reduction from beverage containers in the 2016 CBA, they may still be understated given the possibility outlined in some of the overseas studies cited above that a CRS would reduce total litter rather than just beverage container litter, possibly due to behavioural biases such as the stadium effect, which we explain further below. We have not included such effects in the core modelling but investigate the impact in sensitivity testing.

Benefits of $1,724 million estimated in one study

An Australian study finds households are willing to pay, on average, $4.15 per 1 per cent point reduction in litter, or $41.50 per annum for a 10 per cent reduction in litter and $83.00 for a 20 per cent reduction (PwC, 2010). Equating to New Zealand dollar terms and adjusting for income differences and inflation results in a value of $4.08. A 14.5 per cent reduction in litter would result in households being willing to pay $59 per year.

This study has been used in the economic analysis of NSW and Western Australia CDS schemes.

[11] Lids and caps are included as beverage container related litter. While the lids and caps are not directly part of the refund, given the evidence that CRS can reduce total litter supports their inclusion in the litter calculations.

Benefits of $2,972 million estimated in another study

A University of Leeds study for DEFRA found that people were willing to spend £3.95 per month on council tax for a 1 point improvement on a 10 point litter scale. On this basis, it is estimated that each household would be willing to spend an additional £47.40 on council tax per year to achieve a 1 point reduction of litter (Wardman, Bristow, Shires, Chintakayala, & Nellthorp, 2011).

Equating the £47.40 to New Zealand dollar terms, adjusting for income differences and inflation, results in a value of $70.38. Translating that effective 10 per cent reduction in litter to the average of 14.5 per cent reduction in New Zealand results in an estimated willingness-to-pay of $102 per household per year for the reduction.

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

Additional value from material recycled is $101 million

The extra CRS material collected for recycling would have an additional market value. In addition, the value of existing collected materials would increase due to reduced cross-contamination (i.e. a CRS produces cleaner material than existing systems).

Table 17 contains the components used in the calculation of benefits. At the 'steady state' of the CRS, about $7 million a year in benefits would accrue that otherwise wouldn't.

Glass is not included in calculation as there are costs to crush regardless. Current bottle to bottle recycling is at capacity, so increased material is considered a cost to crush rather than a benefit through sales of revenue-generating material. Investment in increased capacity could increase the value of collected glass. HDPE is milk container material so is also not included.

Table 17: Value of CRS materials recovered, PV

Revenue per tonne	$/tonne	Tonnes CRS steady-state	Value, $m per year
HDPE	$650	-	-
PET	$200	7,788	$1.6
LPB	$10	3,007	$0.03
Metal (aluminium)	$1,250	4,189	$5.2
Glass	-	-	-
Total			**$6.9**

Source: PwC financial model ($/tonne from PwC) Tonnes calculated by Sapere analysis

Reduced contamination of kerbside recycling $27 million

Broken glass is a common contaminant. With the 81 per cent reduction in kerbside volumes, a plausible assumption is that the CRS reduces contamination rates at MRFs by half. Current contamination rates are reported to be around 12 per cent. The reduction in volume of contamination is multiplied by a conservative estimate of the landfill cost, $129 per tonne.

The volume of beverage containers that were lost in contamination is transferred to the CRS. This is equal to about 7,500 tonnes per year in the steady state.

Kerbside collection costs are $113 million lower

The CRS reduces collection costs by removing cumbersome, low-value glass and higher-value but still bulky plastic bottles from the waste stream, allowing for better productivity and efficiency in collection.[12] The saving of $60 per tonne estimated by (Covec (2016) and used in the previous CBA is multiplied by the difference in volume from kerbside refuse and recycling with and without a CRS.

Table 18: Reduction in kerbside collection costs

Category	Tonnes CRS steady-state	Savings $m per year
Change in kerbside refuse	18,613	$1.1
Change in kerbside recycling	100,662	$6.1
Total change from CRS	**119,275**	**$7.2**

Source: Sapere analysis

Avoided landfill costs are $35 million

This is a simple calculation where tonnes of kerbside refuse diverted from landfill are multiplied by the $129 tonne landfill cost (see Table 19).

Table 19: Avoided landfill costs

Category	Tonnes CRS steady-state	Saving $m per year
Kerbside refuse diverted glass in	17,145	$1.4

Source: Sapere analysis, PwC financial model

[12] Councils could also see benefits from the unclaimed deposit value in the bins, but as this considered a "transfer" so is not considered an economic benefit.

Reduced litter clean-up costs are $69 million

Estimated litter clean-up costs in Auckland are in the order of $11 million per annum, which means average annual litter clean-up costs per person of $6.95, which is scaled to the national population.

Volunteer time savings are $4 million

This benefit is estimated by updating the value in the 2016 CBA for the new proportional reduction in litter (14.5 per cent), translating to hours spent by volunteers and multiplying by the updated NZTA EEM time costs of $10.63 per hour.

Reduced emissions result in benefit of $56 million

Greenhouse gas (GHG) reductions arise from the increase in recycling as a result of the CRS and the reduced volumes going to landfill. This is offset by the increased emissions from transporting additional material to recycling destinations. Due to lack of detailed data we have used a coarse approach relying on the Ministry for the Environment (MfE) emission factors.

Most of the benefit from increased recycling tonnage is the theoretical replacing of virgin material production.

Emissions associated with the collection/return, and disposal of materials included in the scheme are calculated. We have not been able to include embedded emissions associated with the required infrastructure in this calculation. We assume a cost of carbon of the midpoint of Treasury CBAx guidance shadow price projections.

As the approach is coarse, we have taken a conservative approach whenever a choice is required.

Table 20: Emissions categories ($ millions, 30 year PV 5% discount rate)

Emissions category	Glass in
Household transport	10.6
Landfill	-3.0
Virgin material	-65.4
Export of material	2.4
Decreased consumption	-0.8
Total	**-56.2**

Note: negative values are a reduction in total emissions compared to status quo and hence represent benefits

Household transport costs of $10.6 million

We use the emission factor of 0.207kg CO_2-e/km for a standard petrol vehicle and model an additional 14 million kilometres in year 1 and 21 million kilometres in year 5 once the CRS is in the steady state. These inputs result in costs of $0.3 million in year 1 and in year 4. Costs for the glass-out scenario are scaled by a factor of 0.54 to reflect reduced volume and weight.

Table 21: Additional household travel from CRS

Return depot type	Distance (km)	Trips per year	New trips	Km/year per household
RVM	5	26	10%	13
Manual	20	8	10%	16

Landfill emissions $2.5 million benefit

We calculate the change in emissions caused by a reduction in material going to landfill. LPB is assumed to be 88 per cent cardboard and 12 per cent plastic and aluminium. Other materials are considered inert and result in negligible landfill emissions.

Substitution of virgin material results in $65 million benefit

Only the additional recycling tonnages collected by the CRS system and reprocessed results in a net emissions reduction. The per-tonne emissions of recycling (the carbon saving from replacing virgin materials in production with recycled materials) is only estimated for aluminium. Glass is excluded from this calculation as it is assumed the CRS will result in increased glass crushing rather than an increase in bottle-to-bottle recycling. While for plastic European estimates using one tonne less of plastic packaging can result in a saving in the order of 3 tonnes CO_2e, and recycling the same type of material might result in a benefit of around 0.5 tonnes CO_2e per tonne of plastic, we have not applied these estimates to the New Zealand context (Hogg & Ballinger, 2015).

Export of material cost $2.4 million

Increased tonnages from refuse and litter are multiplied by the containership average emissions rate CO_2e per tonne kilometre. The distance is an average of Asian destinations in Table 22.

Table 22: Export rate of recycled material

Material	Rate	Tonnes once fully implemented
HDPE	0%	0
PET	0%	7,788
LPB	60%	3,007
Metal (aluminium)	95%	4,189
Glass[13]	0%	43,737

Source: Tranche 1 p.19-23, Sapere analysis

Destination of material is assumed to be an average of the following Asian countries.

Table 23: Destination assumptions

Destination	Nautical miles	Kilometres
Malaysia	5,016	9,290
Vietnam	5,398	9,997
Thailand	5,739	10,629
Indonesia	3,508	6,497
Average	4,915	9,103

Source: sea-distances.org

Decreased consumption benefit of $0.8 million

The CRS price increase is modelled to reduce sales of all beverage containers by 6.5 per cent. This is considered a one-off reduction in year 1. We have not attempted to model the loss of consumer surplus from the reduction in consumption, as we do not have sufficient information on the demand curve for beverages. Moreover, at least some of the loss would be made up by consumption of other goods. Finally, we have not sought to model any public or personal health or other effects from reduced consumption of alcohol or sugary beverages, which would also tend to offset any loss of consumer surplus. The inverse with healthy beverages would also need to be considered.

[13] Analysis assumes onshore crushing of additional glass recovery, the application of an eco-modulation fee could increase costs for glass export.

Qualitative assessment

In addition to the effects outlined above, co-benefits also arise from a CRS. The major co-benefit relates to additional recycling of non-CRS materials as a result of CRS collection depots or hubs having the potential to become a "drop-off" service for a broader range of materials. The key issue for such analysis was the ability to determine the extent to which whether any non-beverage container recycling that does take place at the "drop-off" was over and above what would have happened in the absence of a CRS.

Support for charitable objectives

Experience in South Australia suggests that voluntary and/or charitable organisations are able to capitalise on a CRS to boost their fundraising activities. Scouts in particular are frequently mentioned as major beneficiaries of a CRS. This can occur either in terms of such organisations establishing collection points or through the redemption of containers that are donated by others or sourced directly. In CBA terms, the degree to which people voluntarily donate their containers to charitable organisations is effectively a transfer (i.e. it does not alter the resources available to the economy in any meaningful way). As such, a CBA does not account for such transactions. As discussed in relation to employment, where organisations establish operations to undertake other activities that have financial reward, these undertakings are captured in terms of resources invested (i.e. opportunity costs) and outputs from the activities (i.e. increased recycling and/or avoided costs of landfill). Separate consideration of such impacts would risk double-counting.

There may be some argument that revenue raising through a CRS means that volunteer or charitable organisations are better able to supply services or could reduce their reliance on other fundraising actions. The latter might give rise to the possibility of additional resources being made available to other charities (who might otherwise have given to the organisation who now has CRS-sourced revenue streams). In essence, this series of possibilities also represents wealth transfers from one party to another. To the extent that there is some additional well-being effect from the transfer, it is likely that it would be captured in the willingness-to-pay estimates summarised above. Again, our approach is to recognise the possibility of such effects, but not include such effects in the CBA.

Marine plastics reduction

Previously we monetised this benefit based on recent analysis that showed the total economic cost of marine plastic pollution in 2011 was US$3,300 to US$33,000 per tonne in the ocean (Beaumont, et al., 2019). We conservatively used the lower figure and equated to New Zealand dollar terms, adjusting for income differences and inflation, to arrive at a figure of $4,616 per tonne of plastic. We assumed 50 per cent of reduced litter would have entered waterways. This estimate was a more conservative adaptation of available evidence from Jambeck, et al., (2015) suggesting that 1.75 per cent of total production enters the ocean.

Peer review suggested this was speculative and queried the accuracy of the method. Upon review, we decided the uncertainty around how and when plastic litter is collected – including what washes up on the beach and is then collected, or what the differential impact is of plastic marine litter that sinks to

the bottom of the ocean – makes this study of less value. Given the monetary value of this benefit is immaterial to the result, we highlight the reduction in marine plastic is a benefit rather than include a monetary value.

Net impacts

This section compares the benefits to the costs over the study period of 30 years. To be of most use for decision-makers, the estimated costs and benefits are expressed in present value terms, using a discount rate of 5 per cent. A three-year phase-in period is assumed.

Table 24 shows a net benefit to society of around $1,391 million and benefits exceed costs by 61 per cent. The result represents the midpoint of a range of willingness to pay benefits that deliver net benefit between $100 million and $2,682 million, meaning benefits exceed costs by 4 per cent to 118 per cent.

We reiterate that these results are measured against a 'business as usual' scenario where there is no CRS; therefore, no change is assumed in the return rates or methods of collection and disposal than is presently the case.

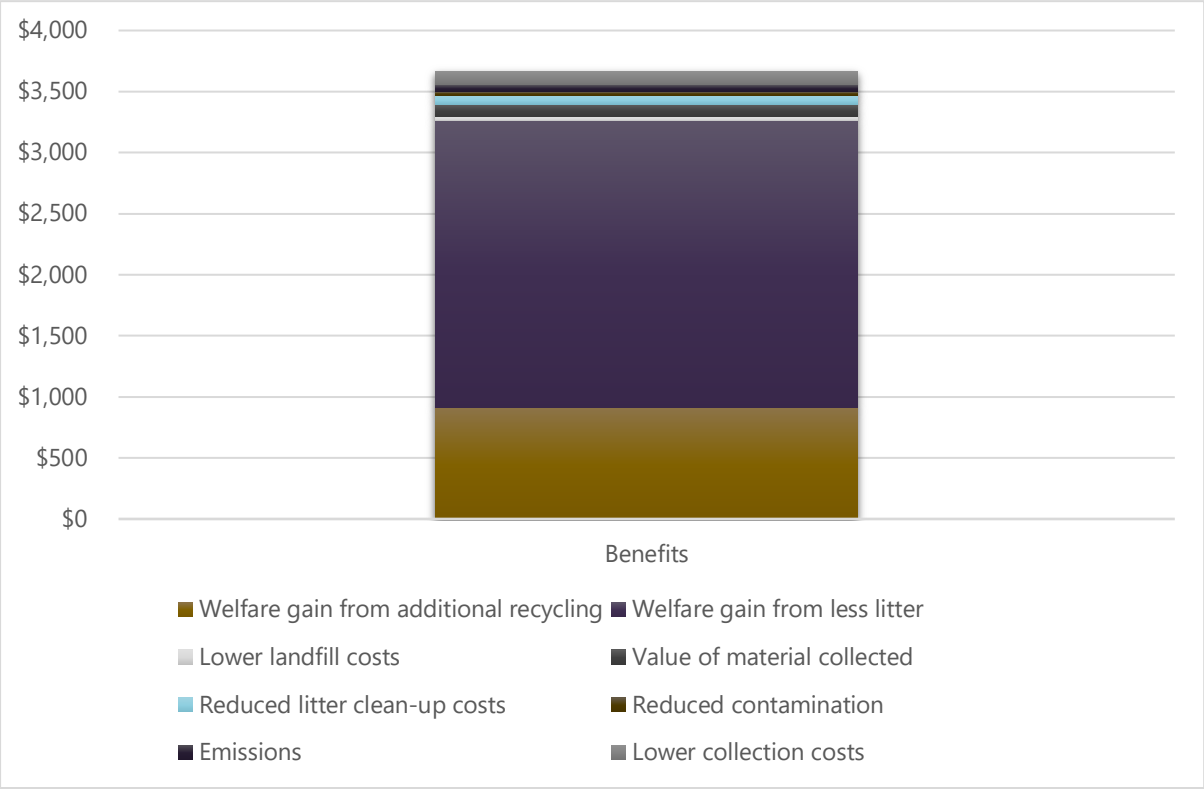
Table 24: Summary CBA results (PV, $m)

Category	Value
Total benefits	$3,667 ($2,376 to $4,958)
Total costs	$2,276
Net benefits	$1,391 ($100 to $2,682)
Benefit-cost ratio	1.61 (1.04 to 2.18)

Gains in welfare responsible for 89 per cent of total benefits

Figure 1 shows that the major benefit category is the welfare gain to households from a reduction in litter following the introduction of the CRS. On its own, this benefit category accounts for about 64 per cent of the total estimated benefits. When combined with the welfare gain to households from additional recycling, the welfare gains account for 89 per cent of total benefits. Given the magnitude of this impact a range of sensitivity analysis (BCR sensitive to litter metric used) has been conducted and ranges are reported in brackets to indicate the uncertainty around these calculations.

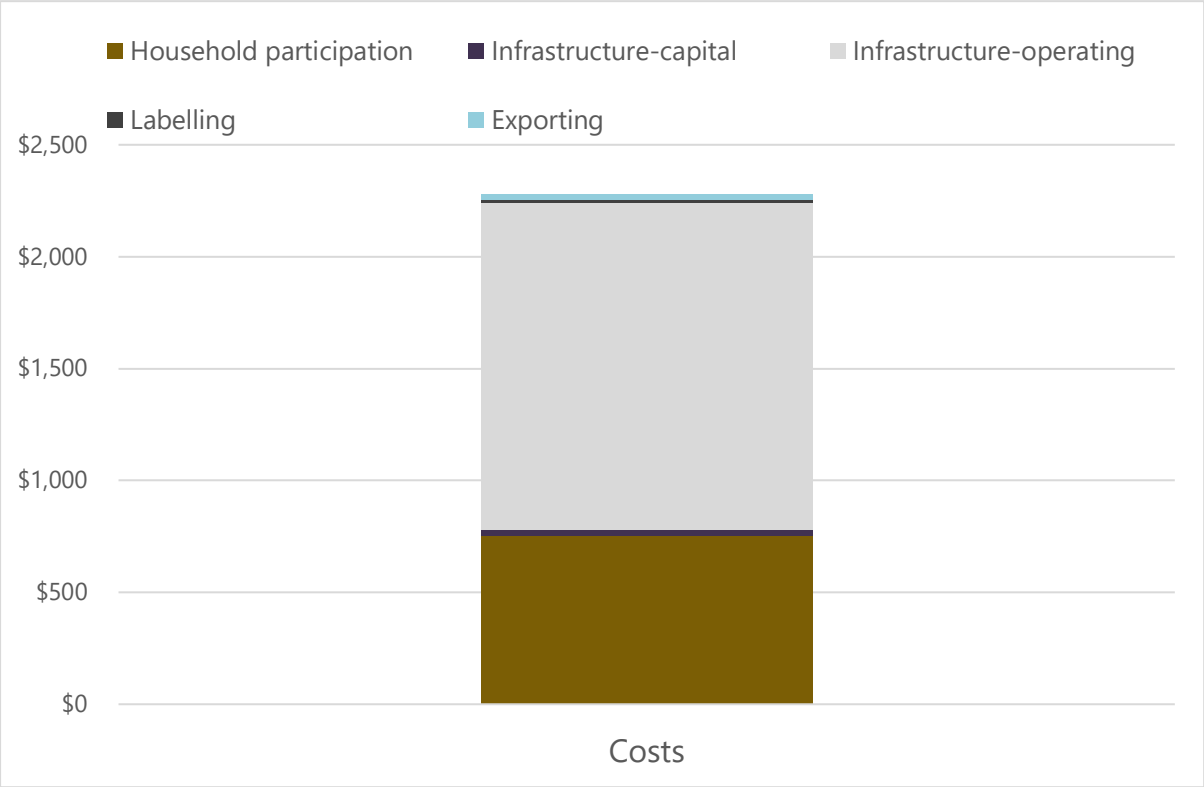
Figure 1: Composition of benefits (PV, $m)



Total costs are dominated by MCF and Collection Facility costs

Figure 2 shows the composition of costs for the glass-in and glass-out scenarios. The lion's share of costs relates to the operations of the MCF and collection depots (around 64 per cent of total costs). Household participation costs represent around 33 per cent of total cost.

Figure 2: Composition of costs (PV, $m)



Basic results mainly robust to sensitivity analysis

We subjected the results above to changes in some key assumptions. While there is an array of possible changes, for simplicity we focus on changes to the:

- analysis time period
- discount rate
- method of measuring litter
- optimum bias
- litter reduction beyond beverage containers
- weight-based factors driving key benefit estimates.

We present effects on the benefit-cost ratios (BCRs) but can report additional values, if required.

Timing and discount rate changes

The following two tables outline the effect of separate changes to the relevant parameters. The effect of shortening the study period is to lower the BCR, while the opposite effect is observed for reducing the discount rate.

Both changes are largely immaterial. This is not surprising given the ongoing nature of both benefits and costs. That is, rather than being a capital-heavy undertaking with significant costs incurred close to inception and then falling away until asset renewal is required, the majority of costs are operational in nature and continue to be incurred over time, much like benefits which continue to accrue across time. Thus, any differential that might be brought about through the effect of timing and discounting is effectively nullified.

Table 25: Benefit-cost ratios for alternative time periods

Period	BCR
10 years	1.51
20 years	1.58
30 years	1.61
40 years	1.62
50 years	1.63

Table 26: Benefit-cost ratios for alternative discount rates

Discount rate	BCR
2%	1.64
4%	1.62
5%	1.61
6%	1.60
8%	1.58

BCR sensitive to litter metric used

Using the average beverage container litter reduction reported from jurisdictions with a CRS, we investigate the relative impact of the chosen litter metric and associated willingness to pay for reductions. The results of the sensitivity test are reported in Table 27, showing that if item count is used with only the PwC (2010) method, then the BCR dips below 1, meaning that the costs of a CRS outweigh the benefits. If weight is used as the metric to measure litter, the BCR is over 2, meaning benefits are over twice the costs of the CRS. Our preferred average measure represents a practical middle ground.

Table 27: Willingness to Pay litter reduction benefit with different metrics and studies

Litter metric	(PwC, 2010)		Wardman et al., (2011)		Average	
	30 year PV $m	BCR	30 year PV $m	BCR	30 year PV $m	BCR
Average	1,724	1.34	2,972	1.89	$3,667	1.61
Item	638	0.86	1,099	1.06	$2,188	0.96
Weight	2,653	1.75	4,574	2.59	$4,933	2.17
Volume	1,881	1.41	3,244	2.00	$3,882	1.71

Litter can be measured with a variety of metrics. Ultimately, we could not determine the best litter metric to use, because:

- weight places emphasis on heavier material
- item count places more emphasis on small pieces of litter that may not be as noticeable
- volume would place more emphasis on larger bulky containers.

Table 28: KNZB litter audit results

	Item count	Weight	Average volume	Average
Percent litter	9%	36%	26%	24%

Source: KNZB litter audit 2019

Table 29: Total litter reduction by different metrics

Beverage litter reduction	Item	Weight	Volume	Average
Low (35%)	3.1%	12.7%	9.0%	8.3%
Average (61%)	5.3%	22.2%	15.8%	14.5%
High (84%)	7.3%	30.5%	21.6%	19.8%

Stadium effect increases BCR

A simpler approach would be to apply the total litter reduction reported in jurisdictions with CRS in a blanket fashion. The reduction ranges from 30 per cent to 64 per cent, with an average of 47 per cent

reported and could be associated with a "stadium effect".[14] The results are presented in Table 30. The 30 per cent litter reduction using the PwC (2010) study results in households' willingness to pay of $122 per year for the litter reduction.

Table 30: CRS induced total litter reduction

Total litter reduction	(PwC, 2010)		Wardman et al., (2011)		Average	
	30 year PV $m	BCR	30 year PV $m	BCR	30 year PV $m	BCR
30%	3,578	2.15	6,169	3.29	4,874	2.72
47%	5,606	3.04	9,666	4.83	7,636	3.93
64%	7,634	3.93	13,162	6.36	10,398	5.15

Analysis robust to recycling willingness to pay study applied

The availability of relevant studies of willingness to pay is extremely limited. We have found two studies, and one is based on Australian households' willingness to pay. Arguably, the results of the Australian study could be ignored in favour of the New Zealand specific study. We would support such an approach if a number of other relevant studies were available to draw from, but that is not the case. In our view, two data points are preferable to a single source, notwithstanding potential issues with the transfer of benefits from other jurisdictions. Table 31 shows the analysis is robust to either method.

Table 31: Recycling willingness to pay

Study	30 year PV $m	BCR
PwC (2010)	4,273	1.88
Covec (2007)	3,062	1.35
Average	3,667	1.61

[14] Packaging Forum spokeswoman Lyn Mayes recognises that when people see litter they could feel licensed to litter too, meaning less littering of one type leads to less littering of all types known as a "stadium effect" (Woolf, 2018).

Accounting for optimism bias, the BCR falls below 1 with 50 per cent adjustment

A response to the potential for households to overstate their willingness to pay for reduction in litter and increases in recycling is to allow for so-called optimism bias. Optimism bias has been known to reduce costs and inflate benefits. We model a range of bias values in relation to households' willingness to pay estimates. Table 32 shows it takes almost a 50 per cent reduction in willingness to pay benefits to result in net social costs.

Table 32: Optimism bias applied to willingness-to-pay benefits measures ($m, 30y PV)

Optimism bias	0%	10%	20%	30%	40%	50%
Recycling	913	822	730	639	548	456
Litter	2,348	2,113	1,879	1,644	1,409	1,174
BCR	1.61	1.47	1.32	1.18	1.04	0.89

Glass-out scenario

The relativity between the benefits and costs for the respective glass-in, glass-out scenarios highlight the predominance glass containers have with respect to gains in welfare from reduced litter and additional recycling, which are both calculated on a weight basis.

Table 33: Comparison of result for a CRS excluding glass (30 year PV)

	Glass-in scenario	Glass-out scenario
Total benefits	$3,667 ($2,376 to $4,958)	$1,753 ($1,130 to $1,386)
Total costs	$2,276	$1,587
Net benefits	$1,391 ($100 to $2,682)	$167 (-$388 to $671)
Benefit-cost ratio	1.61 (1.04 to 2.18)	1.10 (0.79 to 1.43)

Adjusting deposit levels

A high-level analysis of the impact of adjusting the deposit level through a range from 10 cents to 30 cents was undertaken by adjusting the assumed participation rate, diversion from kerbside collections and the expected rate of litter reduction. The intuition behind this change is that the deposit level acts

as a participation incentive so adjustments will impact participation costs and diversion (from litter and kerbside refuse and recycling collections) rates.[15]

The core assumption for participation based on PwC modelling of return rate is a starting rate of 90 per cent of the expected steady state recovery rate. In this analysis we adjust the final participation from the core of 84 per cent down to 77 per cent for a lower deposit level, and up to 86 per cent for the higher deposit level, which adjusts household participation costs and the timing of litter reduction benefits.

For the 10 cent deposit level we assume litter reduction is reduced to the lowest level reported from international experience (35 per cent), resulting in a lowering of the litter reduction rate from 14.4 per cent to 8.2 per cent. This decreases the BCR to 1.20.

For a 30 cent deposit we correspondingly assume the highest rate of container litter reduction reported in international experience (84 per cent), resulting in a 19.8 per cent total litter reduction. This raises the BCR to 1.97.

Table 34: Deposit level sensitivity analysis ($ millions)

Steady state participation	Deposit level	Total benefits	Total costs	NPV (30 year)	Glass in BCR
77%	10 cents	2,622	2,183	438	1.20
84%	20 cents	3,667	2,276	1,391	1.61
86%	30 cents	4,551	2,304	2,247	1.97

[15] There is no empirical evidence we are aware of to assess the deposit level and litter reduction association. PwC has conducted regression analysis of 37 international schemes recovery rates in relation to deposit level and median household income that informs the PWC modelling.

Containers per tonne adjustment

Adjusting the assumptions around containers per tonne has little bearing on the model, as the most significant calculations are not influenced by this conversion factor. The change does increase household participation costs and manual return depot costs as both of these are determined by the number of containers. Hence, the BCR reduces to 1.57.

Table 35: Containers per tonne conversions

	(000's) per tonne (PwC financial model 2020)	(000's) per tonne (PwC & WSC, 2011)	PwC 2021
Plastic	24.230	24.607	
HDPE			15.030
PET			18.080
LPB	10.024	24.060	20.919
Metal (aluminium)	60.770	66.821	52.537
Glass	3.711	4.784	3.923
BCR	**1.61**	**1.57**	**1.61**

Source: (PwC & WSC, 2011)

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For more information, please contact:

Preston Davies
Phone: +64 4 909 5822
Mobile: +64 21 412 102
Email: pdavies@thinkSapere.com

Wellington	Auckland	Sydney	Melbourne	Canberra
Level 9 1 Willeston Street PO Box 587 Wellington 6140	Level 8 203 Queen Street PO Box 2475 Shortland Street Auckland 1140	Level 18 135 King Street Sydney NSW 2000	Office 2056, Level 2 161 Collins Street GPO Box 3179 Melbourne 3001	PO Box 252 Canberra City ACT 2601
P +64 4 915 7590 F +64 4 915 7596	P +64 9 909 5810 F +64 9 909 5828	P +61 2 9234 0200 F +61 2 9234 0201	P +61 3 9005 1454 F +61 2 9234 0201 (Syd)	P +61 2 6100 6363 F +61 2 9234 0201 (Syd)

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