

# Reusable Beverage Packaging and Refillable Beverage Delivery Systems in New Zealand: Discussion Document

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**GREENPEACE**

## Executive Summary

The New Zealand Government is considering ways to reduce the waste associated with beverages, including designing a container return scheme for beverage containers and contemplating mandatory product stewardship for beverage packaging. Greenpeace New Zealand wishes to contribute to this conversation by exploring alternatives to plastic beverage bottles.

The best solutions to waste issues are those that prevent and reduce waste and reuse resources, rather than those that increase recycling or disposal options. There is an urgent need to adopt circular economic frameworks to replace the linear 'take-make-dispose' pattern that currently characterises global economies.

Global beverage markets are dominated by 'one-way' packaging—a hallmark of the linear economy. Replacing one-way beverage packaging with reusable and refillable solutions offers a means of addressing plastic pollution, while supporting efforts to reduce greenhouse gas emissions and build a circular, zero waste economy. We consider three reusable and refillable delivery systems that could be incorporated into the Government's plans to reduce beverage packaging waste, and the key conditions for ensuring their scalability and efficiency. These systems are not mutually exclusive and would work best in tandem.

### **1. Reusable packaging that beverage manufacturers take-back from customers for sterilisation and refill.**

Scaled and efficient use of reusable glass bottles for beverages can reduce the overall energy and resource load of the beverage packaging system, while addressing other key environmental outcomes, such as plastic pollution. Reusable packaging systems produce more jobs than one-way systems and cost less when done at scale. Thriving reusable beverage packaging systems usually feature: a container return scheme, alongside policies to encourage reusables, such as quotas for reusables and eco-taxes on one-way containers; retailer cooperation to take empty bottles back; investment in reverse logistics, distribution and key infrastructure; standardisation of bottles; and measures to ensure convenience, efficiency and public awareness.

### **2. Refill stations where beverages are available “on tap” and customers bring their own containers.**

Expanding access to free, clean tap water and increasing the sale of beverages “on tap” in retail outlets or through automated vending machine dispensers is an efficient, low-cost, relatively simple means of eliminating business-to-consumer beverage packaging, while offering potential for circular business-to-business packaging systems too.

### **3. Flavoured and/or carbonated beverages delivered as syrups and concentrates to which customers add their own water - thus reducing the need for bottles.**

Soft drinks constitute a sizeable portion of the beverage market and are essentially a sugar syrup concentrate added to carbonated water. Pre-mixing in ready-to-drink format demands bottles and results in the transportation of water across large distances. Soft drinks manufacturers could transition to retailing concentrates, particularly to hospitality outlets, for mixing with carbonated water at point of drinks purchase. Such a system would dramatically reduce the costs, energy and resource usage, and packaging waste (particularly if syrups were delivered in reusable packaging) associated with soft drinks.

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## Full report

The New Zealand Government is considering ways to reduce the waste associated with beverages, including designing a container return scheme for beverage containers and contemplating mandatory product stewardship for beverage packaging. Greenpeace New Zealand wishes to contribute to this conversation by exploring alternatives to plastic bottles for beverages.

One clear option is scalable refillable/reusable delivery systems for beverages, which offer a means of addressing plastic pollution, while also supporting efforts to reduce greenhouse gas emissions and build a circular, zero waste economy.

Consequently, GPNZ has commissioned this discussion document to:

- explore reusable/refillable methods of getting beverages to consumers to replace 'one-way' packaging<sup>1</sup>
- highlight the key conditions (logistical, economic, regulatory) for achieving scaled and efficient reuse and refill beverage systems in New Zealand.

## Beverage containers, plastic pollution and global waste crises

The world's plastic pollution crisis continues apace, with global plastic production increasing amid few signs that recycling rates are improving.<sup>2</sup> This situation is met with public consternation. Both the 2019 and 2020 Colmar Brunton Better Futures reports show that plastic waste in the environment is a top concern for New Zealanders.<sup>3</sup> Domestically and internationally, **plastic bottles, caps and lids are consistently in the top 10 items found in terrestrial, marine and coastal plastic pollution surveys.**<sup>4</sup> Furthermore, emerging research casts doubt over plastic's appropriateness as a food or beverage contact material given it can leach toxic chemicals and endocrine disruptors—a phenomenon that may be worsened when plastic is recycled.<sup>5</sup>

1 One-way packaging is designed only to be filled once prior to recycling or disposal.

2 CIEL (2019) [Plastic and Climate: The Hidden Costs of a Plastic Planet](#).

3 Colmar Brunton (2020) [Better Futures Report 2020](#); Colmar Brunton (2019) [Better Futures Report 2019](#).

4 Ocean Conservancy (2017) [International Coastal Clean Up 2017 Report](#), p.13; Greenpeace New Zealand (2018) [Plastic-Free NZ: An action plan to end plastic pollution](#), p.2; Waste Not Consulting (2018) [National Litter Survey](#), 2017/18: Summary of Results, , p.1; Keep New Zealand Beautiful (2019) [National Litter Audit](#); 5 Gyres (2018) [Better Alternatives Now: BAN List 2.0](#), pp.6-7; Anne Schroeer, Matt Littlejohn and Henning Wilts (2020) [Just one word: refillables. How the soft drink industry can – right now – reduce marine plastic pollution by billions of bottles each year \(Oceania\)](#), p.2; Eilidh Robb and Grainne Murphy (eds) [Moving Away from Single-Use: Guide for National Decision Makers to Implement the Single-Use Plastics Directive \(Report by Rethink Plastic alliance and Break Free From Plastic\)](#), 10 October 2019), p.23.

5 Jane Muncke, Anna-Maria Andersson, Thomas Backhaus et al (2020) "Impacts of Food Contact Chemicals on Human Health: a consensus statement" *Environmental Health* 19(25) <https://doi.org/10.1186/s12940-020-0572-5>; S. Miller, M. Bolger, L. Copello (2019) Reusable solutions: how governments can help stop single-use plastic pollution (3Keel, Oxford, United Kingdom: A study by the Rethink Plastic alliance and the Break Free From Plastic movement), p.15; Audrey L. Thier, Miriam Gordon, Andria Ventura (2016) *What's in the Package?: Unveiling the Toxic Secrets of Food and Beverage Packaging* (Clean Water Action and Clean Water Fund); J.-P. Schweitzer, S. Gionfra, M. Pantzar, D. Mottershead, E. Watkins, F. Petsinaris, P. ten Brink, E. Ptak, C. Lacey and C. Janssens (2018) *Unwrapped: How throwaway plastic is failing to solve Europe's food waste problem (and what we need to do instead)* (Brussels: Institute for European Environmental Policy (IEEP). A study by Zero Waste Europe and Friends of the Earth Europe for the Rethink Plastic Alliance), p.13.

While plastic has become a lightning rod for public and policymaker attention, the issues it raises should be seen within the broader context of the global 'take-make-dispose' linear economic system, which transcends the negative impacts of plastic waste. The linear economy not only creates waste and pollution, but also drains energy and resources—an untenable situation in an era of climate crisis and resource depletion.<sup>6</sup>

One symptom of linear economic approaches is an over-reliance on single-use packaging. In the case of beverage containers, this is exemplified by the dominance of one-way (i.e. non-refillable/non-reusable) containers in global beverage markets (including New Zealand).<sup>7</sup> One-way containers make up 80 percent of the global beverage market share, while only 20 countries account for 85 percent of reusable containers sold.<sup>8</sup>

## Formulating the right policy response

### The Waste Hierarchy

The cornerstone of waste policy is the waste hierarchy, which prioritises measures that prevent and reduce waste and reuse resources, over attempts to manage waste once produced (i.e. recycling, energy recovery and disposal).<sup>9</sup> The waste hierarchy shows that the best way to reduce plastics in the environment and in landfills is to reduce how much plastic flows through the economy in the first place.<sup>10</sup> Minimising single-use/one-way products (of any material) is also an efficient means of reducing litter.<sup>11</sup> Furthermore, actions at the top of the waste hierarchy offer the greatest greenhouse gas (GHG) abatement potential,<sup>12</sup> which is relevant given the New Zealand Government's international climate change commitments and the recently enacted Zero Carbon Act. While recycling certainly has a place in the circular economy, the waste hierarchy shows it is not the primary solution to the waste crisis (see Appendix 1 for reasons why).

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6 Platform for Accelerating the Circular Economy (2020) [The Circularity Gap Report 2020](#); C. Sherrington, C. Darrah, S. Watson and J Winter (2017) Leverage Points for Reducing Single-use Plastics (Report prepared on behalf of Seas at Risk), p.80; CIEL, above n 2, p.65.

7 Clarissa Morawski (2019) "[Global Overview of Refillable Bottles: A closer look at the data and trends](#)" (ReLoop Presentation, 24 September 2019); ReLoop "The Vanishing Refillable"; Schroerer, Littlejohn and Wilts, above n 4, p.1.

8 Morawski (2019), above n 7; ReLoop "The Vanishing Refillable".

9 CIEL, above n 2, p.65; H Blumhardt (2019) [Implementing the Plastic-Free New Zealand Action Plan](#) (Paper prepared on behalf of Greenpeace New Zealand), accessible at, pp.1-2.

10 CIEL, above n 2, p.77.

11 As the explanatory memorandum of the European Commission's proposed EU plastic Directive notes "[u]pstream measures aiming to reduce consumption are more efficient" (European Commission (2018) 'Proposal for a directive of the European Parliament and of the Council on the Reduction of the Impact of Certain Plastic Products on the Environment', COM (2018) 340 – 2018/0172(COD), p.10). See also, Sherrington, Darrah, Watson and Winter, above n 6, p.80; CIEL, above n 2, p.77; Schroerer, Littlejohn and Wilts, above n 4.

12 A Ballinger & A Hogg (2015) [The Potential Contribution of Waste Management to a Low Carbon Economy](#) (Bristol, United Kingdom: Eunomia Research and Consulting); CIEL, above n 2, p.65

## **Shifting from ‘one-way’ bottles to reusable and refillable beverage solutions**

*“... we cannot simply recycle our way out of this issue... rethinking how we bring products to people without relying on disposable packaging is a crucial part of the solution...”*

*—Ellen Macarthur Foundation and New Plastics Economy<sup>13</sup>*

A waste prevention approach of phasing-out plastic bottles would reduce the presence of plastic beverage bottles in litter and landfill streams. However, phasing-out plastic bottles without changing how beverages get to consumers will likely result in regrettable substitution—i.e. replacing one-way plastic bottles with one-way beverage containers made of alternative materials that carry their own environmental impact.<sup>14</sup> This approach may address issues associated with plastic, yet perpetuate the core problem of the linear economy.

Accordingly, zero waste and circular economy advocates increasingly note that reducing plastic usage and returning to less toxic and more readily recyclable materials must go hand-in-hand with embracing circular systems for getting goods to consumers. In particular, these experts highlight reuse models as key to eliminating our single-use plastic problem and the issue of plastic pollution.<sup>15</sup> For beverages, this means far more ambitious engagement with the potential of scaleable reuse and refill systems.

## **What are the different types of potential beverage reuse/refill systems?**

This discussion document considers three types of reuse and refill systems for beverages:

1. Reusable packaging that beverage manufacturers take-back from customers for sterilisation and refill.
2. Refill stations where beverages are available “on tap” and customers bring their own containers.
3. Flavoured and/or carbonated beverages delivered as syrups and concentrates to which customers add their own water - thus reducing the need for bottles.

Each of these systems present different opportunities, benefits and challenges for development and successful implementation. They are best seen as complementary, rather than mutually exclusive, for a thriving refillable beverage market. Given the multiplicity of actors in the beverage supply chain and the sheer range of beverage products and brands on the market, policymakers should be looking to encourage a plurality of reusable/refillable options.

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<sup>13</sup> A Lendal and S Wingstrand (2019) [Reuse: Rethinking Packaging](#) (Ellen Macarthur Foundation and New Plastics Economy), p.6.

<sup>14</sup> Robb and Murphy (eds), above n 4, p.9; Greenpeace (2019) [Throwing Away the Future: How companies still have it wrong on plastic pollution “solutions”](#).

<sup>15</sup> Miller, Bolger and Copello, above n 5, pp.2,4,15; Lendal and Wingstrand, above n 13, pp.5-6; CIEL, above n 2, pp.65-66; 5 Gyres, above n 4, p.25; Schroeer, Littlejohn and Wilts, above n 4; Greenpeace (2019), above n 14, pp.25-26.

## 1. Reusable bottles for beverages

The waste hierarchy prioritises reusable packaging over recyclable or disposable packaging. Glass and PET (Polyethylene terephthalate) are the materials most commonly used for reusable beverage packaging. Given Greenpeace New Zealand is interested in alternatives to plastic bottles, this discussion document focuses on glass bottle refill systems.

### ***Reusable beverage packaging in New Zealand***

The New Zealand beverage market—from milk to beer and soft drinks—formerly relied on refillable glass bottles that beverage manufacturers recovered through a voluntary deposit return system. Today, unlike markets in Latin America, Asia and parts of Europe, the New Zealand refillable glass bottle market has mostly disappeared. Nevertheless, examples remain that provide useful case studies for understanding how and why reusable beverage packaging models can succeed in New Zealand, and what barriers and opportunities exist for upscaling reuse operations. We recommend that further research is conducted to investigate these questions.

- **The Associated Bottlers Co (ABC) Swappa Crate** – a closed loop system of refillable crates of beer in glass bottles, available at most liquor stores. The bottles carry a deposit to incentivise return and are collected and redistributed by ABC to participating breweries for sterilisation and refill. The ABC Swappa Crate system has existed (in various iterations) since 1920.
- **Milk companies using reusable glass bottles** – Most notably, Oaklands Milk, which is delivered in reusable glass bottles to homes, retailers and hospitality businesses across Nelson, Tasman and Marlborough in collaboration with Milk & More (New Zealand’s longest running milk run). However, there are many other dairy companies around NZ that sell milk in reusable glass bottles: Bella Vacca (Northland), Bakewell Creamery (Auckland), Dreamview Creamery (Raglan/Waikato), Eketahuna Country Meats (Wellington), Aunt Jeans (also sells milk in one-way glass bottles, but operates some take back schemes for bottles in parts of Canterbury), Windy Ridge Milk (Otago), Holy Cow (Otago), Henderson Dairy (Southland), Farm Fresh Milk (Southland).
- **Small scale beverage companies using reusable glass bottles** – there are many examples of small producers, often found at farmers’ markets, including, MamaZing kombucha (nationwide), Ronia & Pippi non-dairy mylks (Dunedin), The Brothers Coldpress juice (Wellington).

### ***Are reusable glass bottles more environmentally-friendly?***

It is often noted that glass bottles have a higher Life-Cycle Analysis (LCA) impact than plastic bottles given their weight and the energy used for manufacture. Furthermore, critics of reuse systems query the energy and water required to transport and wash reusable containers.<sup>16</sup> While LCA studies are fraught with limitations,<sup>17</sup> they do help highlight key factors that reuse schemes must consider in order to offset potential higher

<sup>16</sup> Schroeer, Littlejohn and Wilts, above n 4, p.8.

<sup>17</sup> Brenda Platt and Doug Rowe (2002) *Reduce, Reuse, Refill!* (Washington, DC: Institute for Local Self-Reliance), produced under a joint project with the GrassRoots Recycling Network, pp.5-6; David Saphire (1994) “Executive Summary” of *Case Reopened: Reassessing Refillable Bottles* (New York, US: INFORM), p.3; Sherrington, Darrah, Watson and Winter, above n 6, p.58; Schweitzer, Gionfra, Pantzar, Mottershead, Watkins, Petsinaris, ten Brink, Ptak, Lacey and Janssens, above n 5, p.9; Greenpeace (2019), above n 14, p.5.

LCA impact.<sup>18</sup> For example, the importance of maximising how many times a bottle is reused before being eventually recycled (the ‘trippage rate’), and minimising the geographical distance containers travel for each refill circuit.<sup>19</sup> If accurate calculations are made, using New Zealand datasets, the results could form the guiding parameters of any reuse scheme, i.e. ‘each bottle must make at least x trips, and travel no further than x distance’.

Overseas experience suggests that, if done well (i.e. to scale and efficiently), reuse models reduce the overall energy and resource load of the beverage packaging system, while also addressing other environmental issues that LCAs do not consider, such as plastic waste, pollution and disposal; materials extraction, processing and manufacturing; the human health impacts of plastic packaging; and the fact that when recycled, plastic does not maintain its quality as effectively as glass.<sup>20</sup> To give just one example of factors outside the consideration of LCA studies, a recent report by Oceana found that increasing the market share of refillable bottles by 10% or 20% in all coastal countries, could reduce PET bottle marine plastic pollution by 20% and 39%, respectively.<sup>21</sup>

### ***Economic and other benefits***

Aside from environmental benefits, reusable packaging brings additional advantages, such as higher numbers of jobs than producing, filling or recycling one-way packaging.<sup>22</sup> Despite increased labour intensiveness, reusable packaging systems are cheaper than one-way packaging systems, **at least when prevalent in a market and delivered at scale.**<sup>23</sup> In fact, most of the countries with the highest market share for refillables are developing countries with lower per capita income; a clear correlation exists between a country’s wealth and its dependence on refillables.<sup>24</sup> Reuse systems also decrease a nation’s reliance on recycling—particularly beneficial in countries like New Zealand with limited onshore processing capacity.<sup>25</sup> By the same token, an efficient reuse market for beverage packaging can cut the cost of Council-funded waste management and recycling services.<sup>26</sup>

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18 Platt and Rowe, above n 17, p.9; Saphire, above n 17, pp.1-3; Bette K. Fishbein (1994) *Germany, Garbage, and the Green Dot* (New York, US: INFORM), p.84

19 Platt and Rowe, above n 17, pp.6 and 9; Saphire, above n 17, pp.1-3; Fishbein, above n 18, pp. 84, 88-89; Schroeer, Littlejohn and Wilts, above n 4, p.9; Patrick Albrecht, Jens Brodersen, Dieter W Horst and Miriam Scherf (2011) *Reuse and Recycling Systems for Selected Beverage Packaging from a Sustainability Perspective: An analysis of the ecological, economic and social impacts of reuse and recycling systems and approaches to solutions for further development* (PriceWaterhouseCoopers), p.viii.

20 Miller, Bolger and Copello, above n 5, pp. 6, 11; Saphire, above n 17, pp.1-3; Platt and Rowe, above n 17, p.8; Sherrington, Darrah, Watson and Winter, above n 6, p.58; CIEL, above n 2; Zero Waste Europe and others (2019) *Deposit Return Scheme Manifesto*, p.3; Schroeer, Littlejohn and Wilts, above n 4, pp.1,8-9; Albrecht, Brodersen, Horst and Scherf, above n 19, pp.viii, 44-47.

21 Schroeer, Littlejohn and Wilts, above n 4, p.1.

22 Fishbein, above n 18, p.88; Miller, Bolger and Copello, above n 5, p.15; Platt and Rowe, above n 17, pp.1, 14-15; Jurgen Resch (2009) [“Packaging Waste Management in Germany: Expectations, Results, and Lessons learned”](#) (Presentation delivered 24 April 2009 in Sacramento), slide 29; Reloop (2016) [“Policy Instruments to Promote Refillable Beverage Containers Fact Sheet”](#), p.1; Albrecht, Brodersen, Horst and Scherf, above n 19, pp.ix, 53.

23 Miller, Bolger and Copello, above n 5, p.15; Lendal and Wingstrand, above n 13, p.6; Saphire, above n 17, p.4; Platt and Rowe, above n 17, pp.1, 10, 12, 13, 14; Albrecht, Brodersen, Horst and Scherf, above n 19, p.ix.

24 Clarissa Morawski (16 March 2020) [“Just One Word: Refillables: a study by Oceana & report from Reloop”](#) (Presentation at Container Recycling Institute “Best Practices in Container Deposit Laws Conference”, Online Webinar).

25 Platt and Rowe, above n 17, pp.1&4.

26 Ibid, pp.1, 14

## **Key conditions necessary for scaled reusable beverage packaging**

International literature on reusable beverage packaging notes several key conditions for a thriving reusable beverage container market at scale. Reviving and/or maintaining these conditions in New Zealand will likely require active Government intervention, as has been the case in other jurisdictions.<sup>27</sup>

### **1. Beverage Container Return Scheme (CRS) to ensure high recovery rates of bottles**

Bottles must be returned to be reused. High return rates are also key to ensuring high trippage rates and thus reducing the overall energy and resource impact of the system.<sup>28</sup> Successful reusable beverage markets require some economic incentive to ensure bottles are returned—either the packaging carries a redeemable deposit, or customers who return packaging receive a discount off their next purchase.<sup>29</sup>

A nationwide, regulated container return scheme (CRS) can require all beverage packaging to carry redeemable deposits. In New Zealand, a Government-mandated working group is currently designing a CRS for New Zealand.<sup>30</sup> If implemented, a CRS could lift bottle recovery rates and thus make reusable packaging possible at scale. A CRS can be implemented using regulatory powers under s 23(1)(e) of the WMA.

### **2. Leveraging CRS to boost reusables**

While CRS is a necessary component of a reuse market, on its own it cannot create such a market. The opportunity CRS presents to boost reusables must be leveraged through additional policy (particularly in countries like New Zealand where market share for reusable packaging is very small), to ensure returned bottles are refilled, not just recycled.<sup>31</sup> Such additional policy could include reuse quotas or targets, differential deposit refund rates, or eco taxes on one-way bottles. These policies could be included within a CRS design, or developed through a wider product stewardship scheme for beverage packaging.

#### **(a) Mandate Reusables**

The key policy tool for leveraging CRS to increase reuse is to mandate reusables within the scheme.<sup>32</sup> As Platt and Rowe note: “In markets in which one-way containers dominate, the most effective policy instrument is one which forces a complete or partial transition

<sup>27</sup> Ibid, pp.4,16; Schroeer, Littlejohn and Wilts, above n 4, p.10.

<sup>28</sup> Platt and Rowe, above n 17, pp.2,11.

<sup>29</sup> “In-Store refilling: Kensington beverage dispenses with disposal” (1997) Solid Waste and Recycling, Vol.2, Issue 5, n.p.; Sapphire, above n 17, pp.4-6; Zero Waste Europe and others, Deposit Return Scheme Manifesto, above n 20, p.2; Ida Ferrara and Charles Plourde (2003) “Refillable versus non-refillable containers: the impact of regulatory measures on packaging mix and quality choices” Resources Policy 29, pp.8-9; Lendal and Wingstrand, above n 13, pp.60-61; Container Recycling Institute (n.d.) “[The Decline of Refillable Beverage Bottles in the U.S.](#)” (Page on Container Recycling Institute website); Reloop (2016) “[Policy Instruments to Promote Refillable Beverage Containers Fact Sheet](#)”, p.1; Schroeer, Littlejohn and Wilts, above n 4, pp.4,10; Robb and Murphy (eds), above n 4, p.23.

<sup>30</sup> Hon Eugenie Sage (2019) “[Work underway for beverage container return scheme](#)” (Press Release, 25 September 2019).

<sup>31</sup> Miller, Bolger and Copello, above n 5, pp.11,18; Deposit Return Scheme Manifesto, p.3; Sapphire, above n 17, p.6; Platt and Rowe, above n 17, pp.17, 46; Ferrara and Plourde, above n 29, pp.8-9; Reloop (2016) “[Policy Instruments to Promote Refillable Beverage Containers Fact Sheet](#)”, pp.1-2; Robb and Murphy (eds), above n 4, p.24.

<sup>32</sup> Miller, Bolder and Copello, above n 5, p.18.

to refillables.”<sup>33</sup> This can be achieved through medium to long-term reduction targets for one-way beverage packaging, and/or quotas and targets for reuse.<sup>34</sup> Total bans on one-way packaging are also an option and can be phased in by applying them only to targeted locations to begin with.<sup>35</sup> For example, bans in public spaces or for public procurement, restaurants, bars, cafes, universities or municipal events.<sup>36</sup>

Quotas and targets should be ambitious to ensure reuse systems operate at scale. For example in Europe, various zero waste commentators have called for legally binding national, and European-wide, targets for the market share of refillable beverage packaging to reach at least 70% by 2030.<sup>37</sup> Overseas experience suggests that quotas and targets are most effective if required of each individual beverage company, rather than a combined quota for the beverage industry as a whole.<sup>38</sup>

The Government can institute quotas by requiring beverage companies to take-back empty beverage containers for reuse (and specify minimum take-back for reuse rates) under s 23(1)(c) of the WMA. National consumption reduction targets and reuse targets can also be stipulated through an overarching regulated product stewardship scheme for beverage packaging. Targets can be reinforced and reusables strengthened if the product stewardship scheme includes a requirement to follow the waste hierarchy (as in British Columbia).<sup>39</sup>

### ***(b) Different deposit refund rate for reusables vs one-way***

A multi-tier deposit system in which reusable and non-reusable beverage packaging attracts different deposit rates, or where consumers receive a full-deposit refund when returning refillable bottles and only 50% refund for one-way containers, is another tool for leveraging CRS to promote reuse.<sup>40</sup> Such systems must be carefully constructed so that the unredeemed 50% deposit is not retained by the beverage industry (which could perversely incentivise use of one-way containers).<sup>41</sup> The Government could retain the non-redeemed percentage to reinvest into necessary reuse infrastructure (see Key Infrastructure – below).<sup>42</sup>

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33 Platt and Rowe, above n 17, p.17.

34 Ferrara and Plourde, above n 29, pp.8-9; Platt and Rowe, above n 17, p.20, 46; Saphire, above n 17, p.5; Reloop (2016) “[Policy Instruments to Promote Refillable Beverage Containers Fact Sheet](#)”, p.2; Schroeer, Littlejohn and Wilts, above n 4, p.10; Albrecht, Brodersen, Horst and Scherf, above n 19, p.43; Robb and Murphy, above n 4, pp.11-12.

35 To avoid discriminating against aluminium cans, the bans could apply only to packaging that can be reused, i.e. bottles – see Platt and Rowe, above n 17, p.47.

36 Robb and Murphy, above n 4, p.12.

37 Miller, Bolger and Copello, above n 5, p.2; Deposit Return Scheme Manifesto, p.4.

38 Hans Wiesmeth (2012) *Environmental Economics: Theory and Policy in Equilibrium* (Berlin: Springer), p.148.

39 Susan Collins (2015) [The Environmental and Economic Performance of Beverage Container Reuse and Recycling in British Columbia, Canada](#) (A report of the Container Recycling Institute, Canada), p.17.

40 Saphire, above n 17, p.6; Platt and Rowe, above n 17, p.18; Ferrara and Plourde, above n 29, pp.6-7; Reloop (2016) “[Policy Instruments to Promote Refillable Beverage Containers Fact Sheet](#)”, p.2; Schroeer, Littlejohn and Wilts, above n 4, p.10.

41 Platt and Rowe, above n 17, p.18, 47.

42 Ibid, p.47.

### **(c) Eco-taxes to disincentivise one-way packaging**

The CRS can reduce the appeal of one-way packaging by internalising its environmental costs through a tax or levy,<sup>43</sup> as has been trialled in various jurisdictions (Finland, Norway, Denmark, Belgium, Ontario).<sup>44</sup> Unlike bans on one-way containers, eco-taxes preserve choice for beverage consumers and manufacturers.<sup>45</sup> In the New Zealand context, rather than a tax or levy that would require new legislation, a fee could be placed on one-way beverage packaging under s 23(1)(d) of the WMA, which could go towards the costs of developing reuse infrastructure.

### 3. Retailer cooperation

Research suggests that reusable beverage packaging systems work best when empties are returned to the place of purchase.<sup>46</sup> However, retailers generally have the least to gain from beverage reuse systems and often resist calls to act as drop-off points.<sup>47</sup> In fact, the demise of reusable beverage packaging partly relates to the rise of supermarkets who prefer to stock beverages in one-way packaging that demands less storage space and staff time.<sup>48</sup>

Accordingly, Government policy may be needed to compel retailers of beverages to participate in reusable packaging drop-off networks.<sup>49</sup> This can be achieved under s 23(1)(c) of the WMA, which creates the regulatory power to require specified classes of person (in this case, retailers) to provide a take-back service for beverage packaging for the purpose of reuse. This obligation could be limited to stores of a certain size, particularly those with car parks that can more easily host bottle drop-off points.

To ease the burden on retailers, beverage manufacturers can be required to pay retailers a handling fee.<sup>50</sup> Such a fee can be established under s 23(1)(d) of the WMA, which creates the regulatory power to set fees payable by specified classes of person for the management of a product. To avoid the retailer handling fee acting as a de facto levy on reusables, it should be set no greater than the handling fee for one-way containers (or no greater than the one-way container handling fee plus a one-way container levy). Costs for retailers can also be reduced through automation (such as reverse vending machines – see Key Infrastructure, below)<sup>51</sup>.

43 Miller, Bolger and Copello, above n 5, p.18; Saphire, above n 17, p.5; Collins, above n 39, p.6; Reloop (2016) "[Policy Instruments to Promote Refillable Beverage Containers Fact Sheet](#)", p.2; Schroerer, Littlejohn and Wilts, above n 4, p.10; Albrecht, Brodersen, Horst and Scherf, above n 19, p.43.

44 Platt and Rowe, above n 17, p.18; "[Norway](#)" (Page on Bottle Bill Resource Guide, a project of the Container Recycling Institute); Collins, above n 39, p.14.

45 Platt and Rowe, above n 17, pp.4,19.

46 Ibid, p.11; Lendal and Wingstrand, above n 13, p.21.

47 Platt and Rowe, above n 17, pp.11, 12, 16, 17; Fishbein, above n 18, p.92.

48 Platt and Rowe, above n 17, pp.4, 10-11; Fishbein, above n 18, p.92; Saphire, above n 17, p.3; Reloop (2016) "[Policy Instruments to Promote Refillable Beverage Containers Fact Sheet](#)", p.1

49 Platt and Rowe, above n 17, p.12; Albrecht, Brodersen, Horst and Scherf, above n 19, p.43.

50 Platt and Rowe, above n 17, pp.10,11,12, 46; Saphire, above n 17, p.6.

51 Platt and Rowe, above n 17, p.3; Albrecht, Brodersen, Horst and Scherf, above n 19, p.41.

#### 4. Reverse logistics and distribution

Even presuming the existence of a CRS (which goes some way to establishing collection logistics and infrastructure necessary for reusables), the logistics of reusable beverage packaging systems differ from one-way packaging and must be planned for. They include:<sup>52</sup>

- Drop-off locations with sufficient physical space for reusable bottles, which must be stored and handled sensitively to avoid breakages.
- Transportation/delivery companies with sufficient space in vehicles for reusable bottles, which cannot be compacted or crushed like one-way bottles.
- Systems for tracking returned bottles
- Training for employees of drop-off locations as well as transportation companies for handling reusable bottles.

To maximise efficiency, distribution systems should also be simplified to reduce the number of parties handling empty bottles,<sup>53</sup> and harmonised so that transportation companies that deliver full bottles to retailers return with empty bottles to minimise trips.<sup>54</sup> The beverage industry may need to restructure bottling operations geographically to be close to markets, consider converting any existing bottling and distribution facilities for reuse, and identify where new plants and facilities will be needed.

Many of these reverse logistics would be organised by industry if the Government regulates to require reuse systems. However, regulations under s 23(1)(c) of the WMA could set key parameters for reuse schemes, such as minimum trippage rates for reusable bottles and maximum transport distances for each refill circuit.

#### 5. Key infrastructure

Reusable beverage packaging requires specific infrastructure for refilling, including washing facilities/sterilisation plants, and bottle inspection equipment.<sup>55</sup> Drop-off network infrastructure is similar to what would be required for CRS (such as depots and reverse vending machines), but as mentioned above, reusable packaging demands extra storage space and more careful handling, which should be planned for and may increase initial system costs.

In the context of covid-19, the funding of specific refill/reuse infrastructure could be included in the Government's planned stimulus packages to combat economic slowdown and could be applied locally, which would also fulfill regional development objectives.

Existing bottling plants could be expanded to allow for reusable packaging. Alternatively, collection, sterilisation and bottling facilities for reusables could be outsourced to third party companies to build and operate.<sup>56</sup> These third parties could then 'sell' reusable packaging to beverage manufacturers—not dissimilar to beverage manufacturers buying recycled glass bottles from third parties currently.

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<sup>52</sup> Miller, Bolger and Copello, above n 5, pp.2,16; Platt and Rowe, above n 17, pp.10-11; Albrecht, Brodersen, Horst and Scherf, above n 19, p.41.

<sup>53</sup> Sapphire, above n 17, p.5

<sup>54</sup> As in BC: Collins, above n 39, p.17.

<sup>55</sup> Miller, Bolger and Copello, above n 5, p.16; Sapphire, above n 17, p.5; Platt and Rowe, above n 17, pp.3, 10; Lendal and Wingstrand, above n 13, p.21; Albrecht, Brodersen, Horst and Scherf, above n 19, p.40.

<sup>56</sup> Platt and Rowe, above n 17, p.10, 48; Sapphire, above n 17, p.4.

In jurisdictions like New Zealand where distribution networks are highly consolidated and one-way packaging dominates the beverage market, rebuilding reuse infrastructure requires significant upfront capital investment and thus represents an economic risk for most businesses.<sup>57</sup> Clear Government policy direction to commit to reusables will give businesses the necessary security to invest, as will the provision of funding support and financial incentives to develop reuse systems.<sup>58</sup>

Funds could be raised from fees on one-way packaging or diverted from existing funding streams. For example, Platt and Rowe note that reuse infrastructure could be “integrated into local economic development efforts”.<sup>59</sup> Given bottling plants and infrastructure will be needed across the country in local and regional hubs (to minimise transport distances), and given reusable beverage packaging systems create jobs, reviving provincial bottling infrastructure could be an opportune use of the Provincial Growth Fund.

Furthermore, the Government’s proposed Levy Investment Plan to manage increased revenue from a potential increase and expansion of the Waste Disposal Levy<sup>60</sup> could also prioritise investment in sterilisation plants and washing facilities, particularly if such facilities could be used for other reusable packaging in future (e.g. glass jars for food products). Such investments align with the Government’s circular economy goals and the ethos of the Waste Minimisation Fund, which should prioritise infrastructure and activities achieving outcomes higher up the waste hierarchy.

As noted above, refill and reuse infrastructure is an ideal candidate for the Government’s proposed post-covid19 stimulus package.

## 6. Standardised and durable bottles

Reusable beverage packaging schemes can maximise efficiency and minimise system complexity and return and refill logistics through the use of standardised bottles that can be shared across brands and beverage types.<sup>61</sup> The fact that standardised bottles can be returned to any system participants minimises costs and transport/shipping distances, maximises refill rates, and thus decreases the scheme’s energy demands.<sup>62</sup>

The use of standardised bottles also permits regulation to specify key bottle design features, including requirements for durability (the more durable a bottle, the more times it can be refilled) and end-of-life recyclability (which improves life cycle analyses). Reports from modern reusable beverage packaging schemes indicate glass bottles can be filled up to 40 or 50 times.<sup>63</sup> Durable bottles that can achieve such high trippage rates greatly

57 Miller, Bolger and Copello, above n 5, p.16; Sapphire, above n 17, p.5; Platt and Rowe, above n 17, p.10; Albrecht, Brodersen, Horst and Scherf, above n 19, pp.ix, 4

58 Miller, Bolger and Copello, above n 5, pp.2, 18.

59 Platt and Rowe, above n 17, p.48.

60 Ministry for the Environment (2019) [Reducing Waste: a more effective landfill levy](#) (Wellington, November 2019).

61 Platt and Rowe, above n 17, pp.2,47; Sapphire, above n 17, p.6; Fishbein, above n 18, pp.88-89; Lendal and Wingstrand, above n 13, pp.11, 19, 60-61; Collins, above n 39, p.18; Schroeer, Littlejohn and Wilts, above n 4, p.10; Albrecht, Brodersen, Horst and Scherf, above n 19, p.39.

62 Sapphire, above n 17, p.6; Fishbein, above n 18, p.92; Miller, Bolger and Copello, above n 5, p.2; Resch, above n 22, slide 23.

63 [“Germany”](#) (Page on Bottle Bill Resource Guide, a project of the Container Recycling Institute); Reloop (2016) [“Policy Instruments to Promote Refillable Beverage Containers Fact Sheet”](#), p.1; Cassandra Profita (17 September 2018) [“Oregon Launches First Statewide Refillable Bottle System in US”](#) Oregon Public Broadcasting; Schroeer, Littlejohn and Wilts, above n 4, p.1; Albrecht, Brodersen, Horst and Scherf, above n 19, p.ix.

decrease the energy and resource demands of the system, especially if distribution networks are shortened through shared infrastructure and standardised bottles.<sup>64</sup>

## 7. Convenience and efficiency

As Miller, Bolger and Copello note, “Convenience is king for mainstream retail”, while energy and resource efficiency of reusable beverage packaging schemes increase with scale.<sup>65</sup> Both convenience and efficiencies can be achieved through shared infrastructure across brands, sectors, and wider networks, including standardised packaging, shared logistics, drop-off points, cleaning facilities, or outsourcing to third-party service providers.<sup>66</sup> As Ellen Macarthur Foundation notes, such “network collaboration” can create a higher density of drop-off points, and thus “improved convenience” for consumers.<sup>67</sup> Convenience is also boosted through the use of reverse-vending machines in retail locations, alongside networks of drop-off depots where consumers can also drop-off other recyclables (such as community resource recovery centres).<sup>68</sup>

Economies of scale in reusable packaging systems are most easily achieved in areas of higher population density where beverage companies can rely on enough proximal users and vendors, as well as nearby cleaning facilities. In contrast, reuse systems in remote areas risk a high carbon footprint.<sup>69</sup> In parts of New Zealand where populations are more dispersed, beverage refill stations may be a more cost and energy efficient solution (see Refill Stations - below).<sup>70</sup>

Achieving scalable solutions will require Government policy, regulation and coordination to help fund key infrastructure, ensure all major players are on board, and establish economic drivers and incentives to direct innovation and investment towards reuse solutions.<sup>71</sup>

## 8. Public awareness and buy-in to the reuse system

Today, countries with the highest rates of reusable beverage packaging are usually those where reusables have maintained an ongoing share of the market, even as one-way packaging increased. Such countries enjoy high levels of cultural normalisation, acceptance and commitment to reusable packaging amongst the public, retailers and beverage companies.<sup>72</sup>

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64 Miller, Bolger and Copello, above n 5, p.16; Albrecht, Brodersen, Horst and Scherf, above n 19, p.45.

65 Miller, Bolger and Copello, above n 5, p.16.

66 Lendal and Wingstrand, above n 13, pp.19, 21; Platt and Rowe, above n 17, p.10; Sapphire, above n 17, pp.4, 6.

67 Lendal and Wingstrand, above n 13, p.21.

68 Sapphire, above n 17, p.6.

69 Miller, Bolger and Copello, above n 5, p.16.

70 Ibid, p.2.

71 Wiesmeth, above n 38, p.146.

72 Fishbein, above n 18, p.92.

Given New Zealand's refillables market remains niche, public engagement will be key for reviving the system and enabling widespread community and business adoption and participation.<sup>73</sup> Such engagement will require policies,<sup>74</sup> including adequate labelling on refillable packaging (possible under s 23(1)(f) of the WMA), alongside information and public campaigns on the difference between reusable and recyclable packaging, the benefits of reuse, and the importance of high bottle return rates.<sup>75</sup>

## 2. Refill Stations, plus customer BYO bottles

Consumer-facing beverage packaging can be circumvented by infrastructure that dispenses beverages 'on tap' from which individuals refill their own reusable containers.<sup>76</sup> Such systems do not require deposit-return systems as customers bring their own container.<sup>77</sup> They can work well for people on low incomes as customers dispense just the quantity of beverage they can afford (thus also reducing the inefficiency associated with small or single-serve beverage packaging).<sup>78</sup> The dispensing points can be located in public spaces or made mobile to improve access to products,<sup>79</sup> and can be replenished through business-to-business reusables (such as kegs), which reduces supply chain packaging. Automation, such as vending machine systems, reduced distribution logistics, and the fact customers provide their own containers can all lower beverage prices.<sup>80</sup> Refill BYO container reuse solutions may also be more efficient than reusable packaging in dispersed communities with low population density.<sup>81</sup>

### 1. Free and accessible tap water

Bottled water can be dramatically reduced through increased public access to free tap water.<sup>82</sup> Apart from waste reduction, studies suggest that water from fountains and taps uses only a fraction of the energy and resource impact of bottled water.<sup>83</sup> Increasingly, overseas jurisdictions are installing water fountains and developing online maps that list premises that allow the public to refill reusable water bottles for free.<sup>84</sup> For events, mobile water stations can also be used to cut back on the need for bottled water.<sup>85</sup>

In New Zealand, the RefillNZ campaign<sup>86</sup> has produced a map of hospitality businesses that provide free water,<sup>87</sup> and provides those businesses with stickers for their shop windows to let the public know. RefillNZ has also launched a petition calling for the Government to legislate that all councils must have public drinking fountains in 50% of playgrounds, parks and sports grounds.<sup>88</sup> In 2020 the Ministry for the Environment

73 Miller, Bolger and Copello, above n 5, pp.2, 16.

74 *ibid*, pp.16, 19; Robb and Murphy (eds), above n 4, p.27.

75 Platt and Rowe, above n 17, p.17, 47; Saphire, above n 17, p.6; Miller, Bolger and Copello, above n 5, p.19; Albrecht, Brodersen, Horst and Scherf, above n 19, pp.x, 43; Robb and Murphy (eds), above n 4, p.27.

76 Miller, Bolger and Copello, above n 5, p.11.

77 "In-Store refilling", above n 29, n.p.

78 Lendal and Wingstrand, above n 13, p.17.

79 *Ibid*, p.17.

80 "In-Store refilling", above n 29, n.p.

81 Miller, Bolger and Copello, above n 5, p.16.

82 *Ibid*, p.11; 5 Gyres, above n 4, p.27.

83 Sherrington, Darrah, Watson and Winter, above n 6, p.78.

84 Miller, Bolger and Copello, above n 5, p.11; Lendal and Wingstrand, above n 13, p.17; Sherrington, Darrah, Watson and Winter, above n 6, p.78.

85 Sherrington, Darrah, Watson and Winter, above n 6, p.80.

86 [www.refillnz.org.nz](http://www.refillnz.org.nz)

87 <https://refillnz.org.nz/where-to-refill/>

88 <https://www.change.org/p/hon-nanaia-mahuta-minister-for-local-govt-and-asso-minster-for-the->

launched their own campaign, in conjunction with RefillNZ, called Feels Good to Refill, encouraging the public to refill drink bottles.<sup>89</sup>

Mobile water stations that can be hired for events or used for civil defence purposes also exist in New Zealand, such as the Hydrohub in Bay of Plenty.<sup>90</sup>

Increased provision of free, accessible tap water and drinking fountains should go hand-in-hand with a phase-out of bottled water in those public spaces in order to drive people towards refill stations.<sup>91</sup> For example, in 2016 San Francisco banned the sale of bottled water on city property, alongside taking action to increase the number of fountains and taps in public places.<sup>92</sup>

It should be noted that maintaining access to unbottled tap water requires continued policy efforts to protect and improve the quality of New Zealand's drinking water supply. For example, in some parts of the country, increasing nitrate levels has made tap water unsafe to drink. Such trends need to be both halted and reversed to maintain the viability of free, unbottled water.

## 2. Retail dispensing points for beverages

Opportunity exists to increase the sale of beverages “on tap” in retail outlets, from which customers can refill their own bottles. Beverages can arrive in retail outlets in refillable bulk dispensers, such as kegs, thus decreasing business-to-business waste as well as business-to-consumer waste. Alternatively, they can be delivered in plastic bladders that, while still disposable, represent a considerable reduction in waste per litre of beverage than one-way bottles.

Across New Zealand, almost all breweries (and many liquor stores too) permit customers to purchase beer on tap into refillable/BYO riggers, bottles and flagons. Similarly, the growth of zero waste grocery stores across New Zealand and the renaissance of bulk bin stores such as Bin Inn has seen an expansion of beverages sold on tap in these outlets, such as kombucha.

Packaging-free dispensers are also a growing area of innovation in New Zealand. For example, Spout Alternatives<sup>93</sup> in Dunedin supplies cafes in the city with refillable kegs of local milk to eliminate the need for milk bottles. Meanwhile, in Canterbury, Glen Herud has recently patented a mobile milking, pasteurisation, refrigeration and dispensing unit—dubbed “a milk factory in a box”—that would take milk from the cow to the retail outlet in one unit with no need for bottles.<sup>94</sup>

Vending machines are another means of dispensing beverages without packaging. Milk vending machines are dotted around New Zealand—predominantly for raw milk sold at the farm gate, but also for pasteurised milk. For example, Oaklands Milk operates a range of vending machines (in addition to their reusable glass bottle system) throughout Nelson

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[environment-public-drinking-fountains-need-to-be-compulsory-in-public-places](#)

89 <https://www.mfe.govt.nz/feels-good-to-refill>

90 <https://envirohub.org.nz/hydrohub/>

91 5 Gyres, above n 4, p.27.

92 Sherrington, Darrah, Watson and Winter, above n 6, p.79.

93 <https://www.spoutalternatives.com/>

94 <https://happycowmilk.co.nz/>

and Tasman. Retail outlets can allocate floor space for a vending machine, as is done by the River Kitchen Café in Nelson. The customer arrives at the machine with a pre-purchased bottle, or a bottle of their own of the appropriate capacity, to fill. The potential for vending machines to be used more widely for commonly purchased beverages such as milk, and installed in supermarkets and other retail locations around New Zealand, is worthy of consideration.

Vending machines can also dispense other beverages and be adapted in innovative ways. Overseas, Coca-Cola DASANI PureFill machines are self-serve water stations where consumers can refill bottles with still water for free, or, for a small fee, add flavours and/or carbonisation through a user-friendly touchscreen interface.<sup>95</sup>

Another medium for dispensing beverages are mobile refill trucks. For example, in Hawkes Bay, two mobile milk refill trucks (Replenish and Co<sup>96</sup> and Barefoot Bottles<sup>97</sup>) sell Origin Earth milk on tap across the region; consumers simply bring a bottle to fill.

### **3. Delivering flavoured and/or carbonated beverages as syrups and concentrates to which customers add their own water - thus reducing the need for bottles**

*“... the typical soft drink manufacturer transports vast quantities of water to get their product to market”— In-Store Refilling, np*

Soft drinks, which generally consist of flavoured syrup added to carbonated water, make up a large share of the overall beverage market. These beverages only require bottles because water and carbon dioxide are added to the syrup prior to bottling, which also adds extra transport weight (and thus energy usage).<sup>98</sup> As Lendal and Wingstrand note, beverage manufacturers “can reduce transportation and packaging costs by supplying products as concentrates to be mixed with water on the spot”, which would also reduce costs for the consumer.<sup>99</sup>

Until recently, many bars in New Zealand received soft drinks as concentrate to which soda water was added in the glass at the time of purchase and consumption. This continues to be how many fast food premises dispense soft drinks. Thus, the model could be reinstated in hospitality premises and also expanded to consumers. One company that is developing this model of delivering carbonated, flavoured beverages to consumers is Sodastream,<sup>100</sup> though the flavours are currently delivered in single-use bottles; to optimise the model, these flavours could be purchased by consumers on tap or in reusable beverage packaging.<sup>101</sup>

95 Lendal and Wingstrand, above n 13, pp.48-49.

96 <https://www.originearth.co.nz/mobile-milk-bottle-refills-south-of-the-clive-river>

97 Ibid.

98 “In-Store refilling”, above n 29, n.p.

99 Lendal and Wingstrand, above n 13, p.15.

100 Ibid, pp.44-45.

101 Ibid, p.15.

## The Time is Now!

Right now, New Zealand has an unmissable opportunity to create a truly circular, low-waste, future-focused market for reusable beverage packaging and refillable beverage delivery systems. Alternatives to one-way beverage packaging are increasing and, if promoted and encouraged by Government, could allow for a diverse and innovative beverage market that not only reduces waste and energy and resource use, but increases consumer choice and reduces beverage prices.

Many New Zealand beverage companies and initiatives are already creating and implementing ways of getting their product to consumers without one-way packaging. These companies have useful knowledge to share about how they have succeeded to offer reusable packaging or refillable beverage delivery systems in a market that favours one-way packaging, and what opportunities and challenges exist to upscale these operations.

With the design of a CRS ongoing and the possible declaration of beverage packaging a 'priority product', potential exists to boost reusable and refillable beverage packaging and delivery options in a strategic, considered way that creates convenient and efficient outcomes at scale. This requires policymakers to follow the waste hierarchy and prioritise reusables and refillables, and to learn from, encourage and provide practical and policy support to those beverage companies who are already leading the way.

## Appendix 1 – Limitations of Recycling for Plastic Beverage Bottles

For some time, recycling has been promoted as the primary tool for managing waste, including plastic. However, only 9% of the plastic ever produced has been recycled.<sup>102</sup> Furthermore, unlike other materials typically used for beverage containers (glass and aluminium), plastic is not infinitely recyclable, which arguably makes it inappropriate for packaging of products like beverages that are consumed daily.

Plastic beverage bottles are generally made of either PET or HDPE – the two most readily recyclable polymer types. In New Zealand, capacity exists to recycle both HDPE and clear PET plastic bottles onshore, although the better description is that we ‘downcycle’ these bottles as there are no bottle-to-bottle recyclers. Instead, recyclers turn clear PET bottles into items like food-grade plastic trays, and HDPE milk bottles into items like piping and fence posts.

Regardless of existing (albeit limited) local recycling capacity, large proportions of plastic recyclate (including PET and HDPE, both clear and coloured) continue to be exported. Since China’s National Sword policy, recycling brokers have turned to South East Asian markets instead, but poor environmental regulations have led to much of this plastic recyclate being ‘processed’ through illegal dumping and burning. Spurred by such revelations, signatories to the Basel Convention amended the treaty in 2019 to place further restrictions on the export of plastic recyclate to developing countries.<sup>103</sup>

Alongside these logistical, economic and practical problems with recycling plastic, recent research building on existing knowledge about plastic toxicity, including as a food contact material, suggests that recycled plastic could be more hazardous than its virgin counterpart.<sup>104</sup> These findings sound a warning that ‘closed-loop’ plastic recycling for food contact materials, such as beverage containers, may have unintended consequences. These should sit at the forefront of policymakers’ minds when considering long-term investments in on-shore plastic recycling plants.

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102 Roland Geyer, Jenna R Jambeck & Kara Lavender Law (2017) “Production, Use and Fate of All Plastics Ever Made” *Science Advances* Vol 3, No 7.

103 BAN (2019) “[Basel Convention Agrees to Control Plastic Waste Trade](#)”.

104 Muncke et al, above n 5.