reuse refill canada

BARRIERS AND OPPORTUNITIES FOR DRIVING REUSE IN CANADA

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CONTENTS

Promoting reusable/refillable and bulk delivery towards a circular economy

The purpose of this report is to:

- Understand how provincial policies to address post-consumer packaging waste in Canada have in fact been recycling related industrial policy that has profoundly affected the underlying economic realities of reuse as a waste reduction strategy.
- Identify the barriers to reusable/refillable systems for consumer packaging.
- Identify market opportunities where those barriers pose fewer challenges in economic. sectors and geographic regions that offer opportunities for reuse at scale.
- Identify federal policy measures that can be readily implemented that will reduce barriers to realizing market opportunities for reuse while working in support of provincial waste management policies.

Report methodology

The primary researcher of this report has 27 years of experience in the economics and operational logistics of both reusable and recyclable packaging management systems for a wide variety of consumer packaging.

This report combines primary industrial data sources (including interviews with businesses), academic research, and the direct experiential evidence collected by the primary researcher regarding the development, operation, and business systems evaluation of returnable and reusable systems for consumer packaging.

This research and direct experience has been used to establish a systems approach to understanding the economic and operational realities underpinning the operation of reusable systems for consumer packaging.

Data sources are footnoted and where the observations are of the primary researcher they are cited as such.

The role of reuse and recycling towards a circular economy for packaging

The objective of circular economy systems is to reclaim primary or raw materials and avoid the waste (i.e., solid waste, greenhouse gases, other air pollutants, effluents, etc.) associated with the production of goods from primary or raw materials. In a circular economy, systems for effecting that reclamation are powered by renewable energy [1], [2].

Reuse and recycling offer two ways to achieve this outcome. Consider these approaches in the context of a plastic bottle:

- It may be “reused” – that is, washed and refilled, which avoids the need to reconstitute the plastic in the bottle through recycling. Reuse involves the recovery and refurbishment of products and packaging in a manner that the physical structure of those products and packaging as established by the arrangements of molecules within them is retained through multiple uses; or,
- It may be “recycled” to reconstitute the plastic in the bottle either mechanically (through grinding and extruding into pellets) or chemically to recover constituent molecules in the plastic (polymers, monomers or constituent chemical building blocks such as hydrogen and carbon monoxide) as feedstock for the production of products and packaging.

Both reuse and recycling are approaches to driving a circular economy and in both cases, the objective is to reuse the plastic molecules that comprise the bottle. In the case of reuse by recirculating and reusing the bottle itself and in the other by recycling the molecules that constitute the bottle.

By extension, given that less mechanical and chemical work must be done to retain the physical structure of a package through reuse preserves "more value and embedded energy compared to recycling." [3] In the context of Canada's 12% of consumer packaging recycling rate, reuse provides an opportunity to dramatically reduce the material intensity (hence less raw materials used, less manufacturing energy expended, and fewer associated emissions generated per unit of product delivered) and associated waste [4]. Given that transportation of packaging becomes a proportionally more significant factor in the carbon intensity of reusable systems, decarbonization of transportation systems further improves the overall carbon footprint of reusable-based packaging management systems.

However, unlike recycling, packaging reuse is not simply an activity appended on to the back of current linear production supply-chain systems for the delivery of goods. Increasing its application requires a systems-based understanding of the fundamental differences between reuse and recycling as commercial activities in Canada's market economy.

The fundamental difference between reusable and recyclable based packaging systems

As described above using the example of a plastic bottle, both reuse and recycling systems are means to a circular economy. However, they are fundamentally different in their relationship to status quo systems for producing and distributing goods:

- Reusable packaging requires reverse supply chains that are integrated with the supply chains for the production and delivery of goods to consumers. This is because the reusable package must be reintroduced into the production-distribution-retail supply-chain at some point – either at product manufacture, at distribution, or at the point-of-sale where consumers bring back reusable containers for refilling (i.e., bulk refill).
- Recyclable packaging only requires that a reverse supply chain for the collection and recycling of packaging be appended to the back of the linear system of production, distribution, and consumption of goods. Recycling based reverse supply-chains – whether collection of recyclable materials is through residential recycling, industrial, commercial and institutional (ICI) collection and recycling or deposit-return systems – can, and almost always do, operate entirely separately from the production and distribution supply-chains for consumer goods.

As such, converting existing linear supply-chains for single-use recyclable packaging to reusable packaging requires fundamental reforms to current systems for the production, distribution and consumption of goods [5] in ways that are unprofitable as currently realized through status quo linear systems. Simply stated, in a market economy designed to move materials in one direction at scale using cheap and abundant raw materials, energy and cheap disposal of waste, reusable packaging systems pose a higher cost approach to producing and distributing goods.

Moreover, a transformation to reusable/refillable systems is less a conversion of systems than a reversion – up until the final quarter of the 20th century, the production and distribution of billions of servings of beer, milk and soft drinks in North America was largely achieved through returnable/reusable based systems.

Several key factors have driven the substitution of reusable systems with single-use packaging systems in Canada. Not least of these factors are the policies of Canadian provincial jurisdictions that have supported recycling as the preferred approach to deal with post-consumer packaging waste – which are de facto provincial industrial policies to build a recycling-based approach to waste reduction. [6]

Understanding the sunsetting of refillable systems in Canada by the soft drink industry commencing in the 1970s (and more recently, the Canadian beer industry) provides insights into the barriers to expanding the use of reusable/refillable systems for consumer packaging today.

Why have returnable/reusable systems been replaced with single-use packaging?

In Canada, beer and soft drinks were distributed almost exclusively in refillable glass bottles until the mid-1960s. By 1971, the share of refillable containers for soft drinks in Ontario had dropped to 55% [6] though it would rebound in following years given successive interventions by the Ontario government. Ultimately, by the early 1990s, refillable containers for soft drinks had exited most Canadian markets.

From reuse to single-use: the history of soft drink packaging in Canada

There were several key factors driving the substitution of refillable bottle systems with single-use containers by major soft drink producers in Canada. [6] A primary factor was the cost of refillable systems as incurred by regional local bottler franchisees of the major soft drink producers (e.g., Coca-Cola and Pepsi Cola). [7] These regional franchise bottlers produced soft drinks by purchasing soft drink concentrate from their respective soft drink franchisors, adding water and sweetener and carbonation to the concentrate, bottling the resulting soft drinks in refillable containers and distributing them to retailers. [8] To enable refilling, bottlers maintained a pool of refillable bottles sufficient to maintain both retail inventory and production system throughput (the bottle "float"). They also operated a fleet of trucks to distribute full goods and recover empty bottles, as well as equipment to wash and inspect refillable bottles prior to filling.

Soft drink franchise bottlers were, in essence, the operators of a circular economy for soft drink packaging in Canada. The costs of these circular systems were internalized to bottlers and soft drink consumers. Some franchisees also manufactured and distributed their own non-cola "house brands" in parallel to the brands for which they were the franchisee. At the time, there were several independent soft drink cola producers in Canada. [6]

For the major soft drink brands, eliminating this franchisee-based refillable system and substituting it with a single-use packaging system offered significant advantages:

- The prices of single-use packaging had dropped due to improvements in the production of metal cans and plastic bottles. Where refillable bottles for beer and soft drinks were originally adopted in order to amortize the high cost of manufacturing glass bottles over many uses, there was no longer a cost advantage to do so, further to this;

- It offered an opportunity to replace the "middle-man" franchise bottler system with a system of corporately affiliated single-use packaging-based bottling operations[1] ("bottling affiliates"). This eliminated the costs associated with circular re-tripping of refillable containers (primarily labour) and replaced it with the lower net unit cost of using single-use containers, moreover;
- It offered economies of scale. A single-use packaging-based bottling affiliate consolidated production volume from several local refillable bottlers resulting in much higher economies of scale and lower unit costs of production. While transportation distances to retailers increased because of consolidation, transportation costs were marginal in the context of the overall savings associated with single-use containers. The overall savings were recouped as margin and/or sales volume due to lower retail prices. The real price of soft drinks fell as a result; [6]
- It eliminated the franchisee's non-cola house-brands, thus freeing up "share of stomach" for other non-cola soft drinks brands owned by the major soft drink producers.[2] The price reductions in soft drinks packaged in single-use containers also helped the major soft drink producers squeeze out cola competitors that did not have the scale to switch to single-use containers;
- It offered an opportunity for soft drink producers to avoid paying domestic corporate taxes. The major soft drink producers set up their bottling affiliates to purchase concentrate from them at set "transfer prices." These prices often result in the affiliated bottler operating at a net loss and thus not having to pay domestic corporate tax. Transfer price-related revenue thus flowed out of Canada to the soft drink producer's resident jurisdiction, which often has a significantly lower corporate tax rate;[3]
- Single-use packaging was easier to handle, was lighter than glass refillable containers[4] and consumed less space when shipped;
- Compared to glass (the only reusable option at the time), single-use packaging was unbreakable;

[1] "Large conglomerates have bought into the bottling community, eroding the local, small-business character of the industry. More significantly, both Coca Cola and Pepsi-Cola have integrated forward to bring formerly independent bottling operations under the control of the parent companies. Pepsi-Cola and Coca-Cola now have an equity interest in bottlers accounting for two-thirds of their respective national markets." [7]

[2] "Without exclusive territories [as required for refillable systems], a substantial number of soft drink brands and flavors would be eliminated in local markets" [39]

[3] "The IRS dispute with Coke primarily revolves around how the company accounts for profit from its sales of concentrate used to make soda. Coke has several concentrate plants around the world and makes money from selling the concentrate to bottlers in local markets." [35]

[4] At the time only glass containers were refillable. Today most non beverage alcohol refillable containers are made from PET.

- Single-use packaging was preferred by retailers due to reduced space requirements both in terms of shelf-stocking and space previously occupied with returned empty refillable containers. Occupancy was, and is, an especially important consideration in urban centres with high real estate costs. The opportunity cost of holding real estate was also a factor in the economics of bottling and localized sorting, both of which had to be proximate to the market to be economically viable; and
- Consumers find single-use packaging more convenient.

A notable holdout in this transition to single-use containers for soft drinks was Prince Edward Island which, until 2008, mandated by regulation that all carbonated flavoured beverages be sold only in refillable containers. [9]. Upon repeal of the regulatory requirement, the PEI soft drink market quickly switched to single-use packaging.

The erosion of market share for refillable beer containers in Canada

Refillable bottles are still in use by Canadian brewers. However, where refillable beer containers held over 80% market share in the mid-1990s, they have a national market share of just 37% today, [10]

This market share erosion for refillable containers is due to several similar factors that have affected soft drinks – single trip costs for aluminum cans (packaging costs associated and filling and distribution efficiencies) that rival the unit cost of refillable glass bottles especially in less densely populated regions of Canada with attendant larger transportation distances as well as consumer preference for lighter weight packaging.

In part, the slower rate of share erosion has been due to the industry policies to promote standardization and use of refillable bottles, long-standing brewing industry-operated deposit-refund systems for recovering refillable containers, pre-existing installed capital for depalletizing, sterilizing and refilling beer bottles and the provincially regulated and highly controlled systems for the distribution and sale of beverage alcohol.

These ongoing industry efforts to preserve the use of refillable containers have been supported by public policies to promote refillable beer containers in favour of single-use packaging. These policies include a $0.10 levy on non-refillable beverage alcohol containers in Ontario[5], quotas on the maximum share of non-refillable beer packaging in Quebec (now rescinded). and partial refunds of container deposits on non-refillable containers (and full deposit refunds on refillable containers) in regulated Maritime deposit-return systems.

[5] "In its budget of April 30 [1992], Ontario's socialist New Democratic Party government announced a doubling to C10 cents (US8 to US9 cents) of the existing tax on U.S. and other imported non-refillable beer cans and introduced the same levy for domestic beer cans.
The levy also applies to wine and spirits packaged in non-refillable containers." [11]

All of the policies in question were implemented in the early 1990s at a time when US brewers began dumping beer into the Canadian market [11], Canadian brewers reversed the increasing use of cans and increased the use of refillable bottle systems to provide a more secure competitive footing against imports of US beer. Provincial governments, recognizing that the use of refillable containers made Canadian brewers more competitive sought to protect local breweries from US dumping by encouraging refillable systems through policy.

From circular refillable systems to recycling as provincial industrial policy

Ontario

In 1985, the Ontario Soft Drink Association (OSDA) proposed an arrangement whereby it would help to set up and expand municipal "Blue Box" curbside recycling programs, and in turn, the Ontario government would lower the refillable bottle quota to 40 percent with a further reduction to 30 percent once "recycling infrastructure had been provided to more than half of Ontario householders" [6].

The soft drink industry's argument was that by focusing on residential recycling (as opposed to refillable containers and deposit-refund systems for beverage containers) a multi-material recycling system would capture a broader range of materials.

In 1987, the soft drink industry and single-use packaging suppliers agreed to provide $20 million in funding for municipal purchases of blue boxes, trucks and processing equipment.

Municipalities across Ontario began to adopt Blue Box systems, and by 1991 municipalities and the provincial government were shouldering virtually all of the Blue Box's operating costs.

In 1994, the Ontario government made it a regulatory requirement that Ontario municipalities provide curbside collection and recycling of packaging and paper to Ontario communities of population greater than 5,000. [12].

In 2002, Ontario enacted the *Waste Diversion Act 2002*, which was the basis for implementing "shared responsibility," which requires producers to fund 50% of municipal recycling costs. This regulatory approach to producer responsibility has largely been a failure in Ontario and also in Quebec.[6]

[6] "Canadian jurisdictions such as Ontario and Quebec have chosen to regulate PPP by making producers financially responsible for some or all of the costs associated with municipal delivery of PPP recycling (collection, processing and sale of materials to secondary commodity markets). Under the policy approach of "shared responsibility" producers have little or no influence on recycling system design and no role in system operation. Instead, producers (and ultimately their consumers) are mere ratepayers to municipalities who individually design and operate their PPP recycling programs that collectively run much as a public utility comprised of hundreds of municipal recycling systems."
The regulatory regime suffers from 3 primary deficiencies: "It limits the opportunities to reduce collection and recycling costs with today's practices and technologies (static efficiency), it limits the ability to drive the optimal amount of recycling (allocative efficiency) and it reduces opportunities for innovation (dynamic efficiency)" [40]

In 2016, Ontario passed the *Resource Recovery and Circular Economy Act* (RRECA) [13], which is the statutory basis by which extended producer responsibility (EPR) for the collection and management of end-of-life products and packaging is implemented. Blue Box regulation promulgated under the RRCEA in June 2021 [14] make individual producers whose products generate waste packaging and paper responsible for delivering residential recycling to Ontarians and meeting material-specific management targets[7].

Regarding alcoholic beverage products and packaging under the Blue Box regulation, Brewers Retail Inc., and the Liquor Control Board of Ontario are required to recover (reuse or recycle) 85% of those materials supplied in the previous calendar year through the deposit-refund-based packaging management system for beverage alcohol.[8]

Other Canadian jurisdictions

With the erosion of market share for refillable containers in the late 1960s and the concurrent increase in litter [15], provincial governments began passing laws requiring producers to operate or fund the operation of third-party deposit-return systems for beverage containers. British Columbia was first with its *Litter Act* of 1970. All other provincial governments (excepting Manitoba and Ontario) have followed suit.

As discussed earlier, deposit systems in Canadian provinces have been established as a backend means to collect and recycle beverage containers to avoid disposal and litter rather than to facilitate the reuse of beverage containers. All of these deposit-systems (aside from those for beer containers) are operated by third parties as appended onto what are linear systems for the production, distribution and sale of beverages.

As Ontario implemented “shared responsibility” for the Blue Box in 2002, other provinces such as Quebec and Manitoba followed suit. Currently, Saskatchewan, Manitoba, Ontario and Quebec maintain shared responsibility regimes.

In 2011, the government of British Columbia regulated EPR for residential printed paper and packaging (PPP), making producers responsible for collecting and recycling residential material. The resulting PPP program was launched in 2014.

In 2016, Ontario passed the *Resource Recovery and Circular Economy Act* (RRECA) [13], which is the statutory basis by which extended producer responsibility (EPR) for the collection and management of end-of-life products and packaging is implemented. A “Blue Box” regulation under the RRCEA was promulgated in June of 2021 and the transition to EPR will begin in July 2023.

[7] These are essentially recycling targets as set forth in s.42 of the Blue Box regulation. However, reuse of packaging may be used to meet the management targets as the definition of “recovered resources” at s.42.(2)1 encompasses, “marketed for re-use for their original purpose or function” [14]

[8] s.64(1) [14]

In March 2021, the Quebec National Assembly adopted Bill 65, which amends the *Environmental Quality Act* as the basis to modernize the province's deposit-return system for beverage containers and transition from producer-funded municipal delivery of residential recycling of paper and packaging to EPR. [16]

In addition, Alberta [17] and New Brunswick are proposing to regulate EPR for residential recycling in addition to their existing requirements for producer-operated deposit-refund systems for beverage containers.

Nova Scotia has also signaled its intention to promulgate regulations to implement EPR for packaging and paper products in 2022. All three jurisdictions maintain deposit-refund systems for beverage containers.

In summary, while deposit-refund systems are ubiquitous in Canada, containers are returned through standalone collection systems that are not connect to beverage producer supply-chains. While many Canadian jurisdictions are adopting EPR regulations for paper and packaging these are focused on driving producers to establish recycling supply-chains – none have meaningful incentives to drive reuse.

As discussed in the following sections, the reality of Canada's industrial policy on post-consumer packaging waste poses both structural barriers and, in some circumstances, key opportunities to drive reuse.

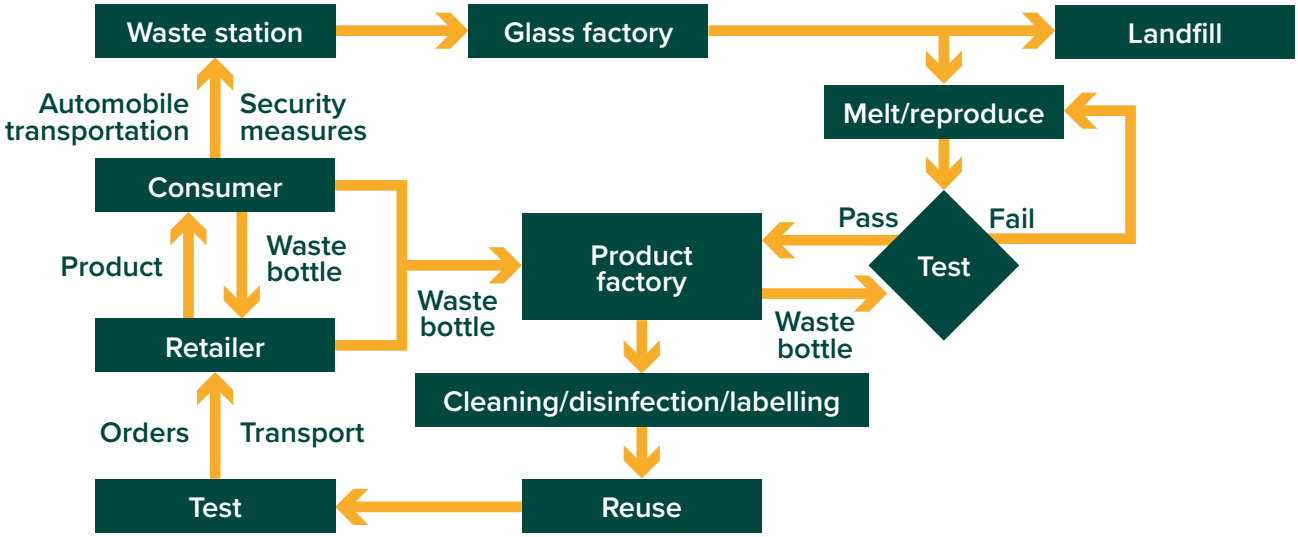
Barriers to reuse

There are two fundamental barriers to reuse:

1. The disparity in unit delivery price between products packaged in single-use fossil-based plastic packaging and reusable packaging. Single-use fossil-based plastic packaging is cheap to buy, fill, and distribute and is tailored to linear supply chains. The same basic price disparity that makes recycling of most plastics uneconomic makes reuse even more so. The unpriced environmental and financial externalities associated with the 12% [4] recycling rate for plastic packaging in Canada can be summarized as:
   - Upstream greenhouse gas emissions, discharges, and effluents associated with oil and gas production;
   - Plastic leakage into the environment;
   - Lost resources and embodied energy associated with disposal of plastics;
   - Air emissions from disposal through incineration/energy from waste (toxic releases as well as greenhouse gases);
   - "As part of the petrochemical sector the production of fossil-based plastics is integrated with upstream oil and gas production. It benefits from large scale efficiencies whereas recycling systems are of much smaller scale and are constrained by the amount of high quality collected plastics available for recycling and demand for the recycled plastics produced." [2]
2. The supply-chain requirements of reusable systems:

   A reusable packaging system requires:
   - A float of reusable containers that must be capitalized with the cost of capital amortized over a sufficient number of uses to bring the per-trip cost to parity with single-use packaging;
   - A system to collect refillable packaging from consumers at the point-of-sale; and
   - A system to sort, wash/sterilize reusable packaging in a manner that is integrated with the production of goods so as to minimize transportation to third-party washing facilities and associated handling. Standardization of containers (such as the Canadian brewing industry's industry-standard bottle) allows for multiple brand-owners to use the same containers reducing sorting costs and allows for standardization of washing/sterilizing systems, conveyors, inspection and filling equipment.

Figure 1: System to produce, distribute, sell, collect, clean and reuse glass bottles [18]



A bulk-fill system where consumers provide containers requires:

- A point-of-sale dispenser that to be economic must provide for the same number of sales the equivalent amount of shelf space that may often contain a number of different brands and stock-keeping units (SKU) of different sizes and bundled multi-container formats; and
- A supply chain to refill the dispenser itself.

The Ellen McArthur Foundation [1] estimates that 20% of plastics packaging can be converted into reuse system.

However, interviews with companies that run concurrent reuse and single-use systems suggest that implementing a reuse system in the current context requires pushing higher costs to consumers. Current market conditions mean reusable systems operate at a low scale. Absent dedicated reuse-based circular supply-chains, consumers may need to pay as much as a 25% premium to participate in a reusable system[9] to make it economically viable, which is not tenable for sustaining demand[10].

Reuse requires scale – when the fixed costs of infrastructure and float of reusable packaging are amortized over many sales, unit costs drop. As such, reuse will only be viable when the economic and structural barriers discussed are addressed, and scale can be achieved. Here, public policy focused on waste reduction, diversion and recirculation of materials, may have a role in reshaping markets.

[9] Personal communication by Usman Valiante and Alyssa Calladine with a major Canadian retailer participating in the Loop reusable packaging pilot system. The retailer did not wish to be cited by name in this report.

[10] "Even price premiums for refills or reusable packaging systems have been found, assuming that sustainable-conscious consumers are willing to pay extra. These pricing strategies negatively affect the introduction of sustainable packaging options. For the general public, the 'feel-good factor' is not enough, and hence a financial incentive may be important to change consumers to switch to a reusable packaging system." [41]

Overcoming the barriers to reuse

While there is much small-scale "boutique" activity on returnable and reusable systems, it does little to mitigate Canada's plastic waste problem. The bulk of single-use plastic packaging waste in Canada is associated with major consumer brands. [4] For reuse to be an effective strategy to reduce plastic packaging waste, it has to be a viable commercial strategy at scale.

For reuse to be viable at scale, public policy will have a key role in helping to overcome the barriers identified above.

Canada's changing public policy landscape on waste and opportunities for reuse

Provincial, and territorial governments are either developing or are in the process of implementing policies to address Canada's 9% national plastics recycling rate [19].

As discussed above, EPR is becoming the default provincial policy mechanism to address post-consumer waste associated with products and packaging. EPR assigns the property rights for end-of-life waste products and packaging to producers of the products and packaging that generate waste and holds the producers responsible for meeting regulatory performance standards such as recycling targets.

Canadian jurisdictions are also seeking to address waste generated in the Industrial, Commercial and Institutional sectors through mechanisms such as EPR or by assigning responsibilities for plastics source separation and recycling to facilities (e.g., shopping malls, commercial buildings, restaurants, hospitals, etc.) that generate waste.

There is also policy activity at the national and federal level.

In November 2018, through the Canadian Council of Ministers of the Environment (CCME), the federal, provincial, and territorial governments approved in principle a *Canada-wide Strategy on Zero Plastic Waste*, building on the global *Ocean Plastics Charter Canada*, advanced during their G7 presidency in 2018. Phase 1 and Phase 2 of the *Canada-Wide Action Plan on Zero Plastic Waste* were published through the CCME in 2019 and 2020, respectively.

In October 2020, the Government of Canada announced proposed next steps to achieve the goal of zero plastic waste by 2030. In May 2021, "plastic manufactured items" was added to Schedule 1 to the *Canadian Environmental Protection Act, 1999* (CEPA), enabling regulatory and other action in support of reaching Canada's zero plastic waste goal and setting the conditions for a plastics' circular economy. Proposed regulations are under development to ban or restrict certain single-use plastics and to establish recycled content requirements for plastic products.

In early 2022, Environment and Climate Change Canada issued a technical issues paper to regulate protocols for setting recycled content performance standards for certain manufactured items. [20]

At a fundamental level, the cumulative effect of these policies is to internalize the externalities associated with plastic waste. Where EPR policy is implemented with stringent recycling targets and in concert with federal recycled content standards, the effect is to internalize a significant portion of these unpriced externalities.

The internalization of the costs of plastic waste is driving producers to make investments[11] in plastics recycling supply-chains and assume the costs of operating systems to collect, sort and recycle plastics.

With costs of collecting and managing plastics internalized to producers, there may be an incentive for producers to revisit reuse as an opportunity to mitigate the cost of plastics recycling. Stringency of recycling targets will be critical as producers consider the alternatives of meeting aggressive plastics recycling targets or alternatively employing reuse strategies[12].

However, where plastics recycling becomes effective and efficient at scale, it may widen the cost chasm between recycling and reuse, posing a much more fundamental financial and structural barrier to reuse as investments in end-of-life plastics recycling create barriers to reconfiguring systems of production and distribution towards reusable systems.

The choice between reuse and recycling will be largely driven by the economic and logistic context.

For example, where collecting plastics and transporting them for recycling to southern cities for recycling may be cost-prohibitive, the transportation of consumer products to northern Canadian communities in bulk for local filling, distribution and sale in reusable containers could not only provide significant cost advantages over single-use plastic packaging, but opportunities for local reuse/refill infrastructure (collection, washing sorting) development and employment.

Currently, Canadian EPR laws and laws to reduce waste from the ICI sectors largely focused on waste reduction through recycling. They typically only recognize recycling as a packaging waste reduction approach. As such, producers of products and packaging that have obligation under EPR to collect and manage materials focus on recycling[13].

In the next section, we explore approaches to designing public policy to incentivize reuse.

[11] In Ontario alone it is estimated that net Blue Box system costs will be in the order of $600M annually by 2026.

[12] Early European and Canadian EPR policies have largely failed to internalize the costs of plastic waste and pollution because plastics' recycling was poorly defined (unprocessed exports of plastics counted as "recycling") and collection and recycling targets were not stringent enough.

[13] A notable exception is Ontario's Blue Box regulation [14]. Under the regulation "recovered resources" for meeting management targets include those, "marketed for re-use for their original purpose or function".

Reuse and public policies on waste

Building reuse into public policies on waste means coordinating federal policy activities to address plastic manufactured items with provincial EPR policy development on packaging waste. Specifically, this means using federal voluntary instruments to formally recognize returnable/refillable systems that would, in turn, be recognized and credited to participating producers toward resource recovery and waste reduction targets under provincial EPR policies.

Federal voluntary instruments under the *Canadian Environmental Protection Act, 1999*

Two federal voluntary instruments under the *Canadian Environmental Protection Act, 1999* (CEPA) are of interest as mechanisms for recognizing and formally establishing reusable systems:

- ***Pollution Prevention Plans*** (P2 Plan) [21] are quasi-regulatory instruments under Part 4 of the *Canadian Environmental Protection Act*, which give Environment and Climate Change Canada (ECCC) authority through a P2 Notice to require the preparation and implementation of P2 plans by certain facilities[14] that use a specific substance or group of substances (plastic manufactured items). An obligation under such a plan is to submit declarations and reports summarizing the facility's activities and the information contained in their P2 plan. A required facility must implement a P2 plan and report on its progress.

  Under a P2 Plan, whoever the Government of Canada targets (such as brand-owners) would be required to implement a plan that could choose to employ reusable systems in their plan. The plan developed pursuant to P2 Notice would then specify the reuse systems that will reduce waste associated with "plastic manufactured items" by displacing those items with packaging that is reused (reusable plastic packaging or reusable packaging otherwise). The reports produced to report on the operation of the P2 Plan and its outcomes provided to ECCC could then be used by producers to receive waste diversion credit under provincial EPR regulations.
- **Environmental Performance Agreements** (EPAs) [22] allow parties (e.g., a group of producers) with common goals (e.g., operate a reusable system) to address a particular environmental issue (e.g., reduce single-use plastic waste). They are negotiated and signed between ECCC and industry (and sometimes other parties such as provincial governments) in order to achieve specific environmental results. These agreements may be used to provide opportunities for industry to show leadership and take early voluntary action on environmental or health issues. An agreement requires reporting of results to ECCC, and verification of the results is an important characteristic of EPAs.

[14] Facilities do not have to submit P2 plans. They must declare that a pollution prevention plan has been prepared and is being implemented and that it has been implemented.

A group of producers that wish to implement reusable systems could enter into an EPA that would specify the reusable systems that will reduce waste associated with "plastic manufactured items." Consistent with reporting under P2 Plans, the reports established for the purpose of reporting to ECCC on the performance of the activities under the EPA could then be used by producers to receive waste diversion credit under provincial EPR regulations.

Provincial regulation of EPR to recognize reuse

Where provincial governments set management performance standards (recycling targets) for plastics under EPR, the federal government should work with the provinces to establish a mechanism by which a brand owner's reuse-based federal *Pollution Prevention Plan* (P2 Plan) is recognized by provincial regulation, which then sets a mechanism to recognize that the brand owner is operating a reusable system to meet resource recovery or materials management target.

A key component of realizing this opportunity is ensuring provincial definitions of resource recovery that underpin resource recovery targets allow both reuse and recycling to count as resource recovery. As an example, under Ontario's Blue Box regulation [14] "recovered resources" for meeting management targets include those, "marketed for re-use for their original purpose or function".

Where provincial EPR regulations either require the development of stewardship plans for delivery of provincial common collection-based recycling systems (i.e., Blue Box systems) or require the establishment of such systems under performance based geographic coverage requirements, federal recognition of reuse based P2 Plan would provide recognition of a reuse-based alternative under EPR.

As an example, and unlike other Canadian jurisdictions, the Ontario Blue Box regulation [14] allows for the operation of "an alternative collection system for one or more material categories of blue box material". A reuse-based P2 Plan could be the basis of specifying such an alternative collection system.

Once established, the producer would then report the reusable package supplied as part of its EPR packaging supply related reporting to the regulator and in turn would claim "resources recovered" on each packaging trip through the reuse system. In this way, the producer will get credit for reuse-based resource recovery, while the province can verify system performance through standard reporting.

Using reuse system performance as reported by the producer would also allow the estimation of single-use package waste that was displaced as a result of reuse (i.e., where a reusable package displaces a 500 ml PET bottle the producer would receive a 32 g PET credit towards its recycling target for each trip).

The benefit of this approach is that it allows the producer to quantify the waste reduction benefits of reuse against its EPR obligations while leaving the oversight of the reuse system to the non-intrusive voluntary mechanisms under CEPA.

With regard to system cost, where a producer employs reuse under EPR the producer's net costs of managing its packaging is the gross cost of operating the reuse-based system net of the avoided costs associated with recycling fees through the Blue Box system.

Reuse and federal recycled content standards

Whether through reuse or recycling, the objective of a circular economy system is to recirculate the molecules in products and packaging for the next use or production cycle [1]. As such, where the federal government establishes recycled content standards for plastics and a brand-owner elects to develop and implement a reuse system that is based on reusable plastic packaging, that brand-owner could be given 100% recycled content credit for each re-trip of that package. While the government could exempt reuse packaging from a recycled content regulatory regime recognize the reuse of plastics as a means to reduce plastic waste and pollution under recycled content standards brings both reuse and recycling into one coherent, internally consistent regulatory approach.

The effect of this policy would be to create further incentives for reuse by allowing producers to discharge their recycled content obligation in part where they can demonstrate plastics are being reused.

Green Job Creation Tax Credit

Reuse systems are often referred to as trading 'waste for jobs' or, more explicitly, 'waste costs for labour costs.' The sorting, cleaning, and transportation affiliated with a reusable system can pose a serious barrier to companies because of both the cost and, sometimes, the challenge to find people to fill these roles.

Green Jobs Tax Credits, as adopted by the US Government, [24] rebate taxes to companies for hiring individuals for jobs that directly support transitions to renewable energy or another sustainability-focused transition. This addresses the barriers of finding, training, and paying new employees and encourages companies to pay salaries rather than waste fees. One example of a program like this that focuses on renewable energy is in Virginia, where companies will be given a rebate of $500 per employee [25]. Where the collection, sorting and transportation of refillable containers is more labour intensive than the production, distribution and sale of single use packaging, a targeted Green Jobs Tax credit to producers employing refillable systems could have a significant benefit is closing the cost divide between reusable and single-use packaging.

Reuse and accelerated capital cost allowance (ACCA)

Building a reuse-based circular economy for plastics is capital intensive. Reusable systems require investments in the packaging float, systems to collect and sort containers and facilities to sterilize them. In the example above, 1 billion servings in a reusable system with a 95% recovery rate requires a float of 50 million containers.

In Ontario, lack of sorting capacity (and capital to build such capacity) to sort beverage alcohol spirits-cooler containers and wine containers collected under the Liquor Control Board of Ontario's (LCBO) Ontario Deposit-Refund Program has been cited [26] as posing both a barrier in its current operational and future opportunities to reuse for beverage alcohol containers.

As discussed above, investments in reuse will be made in the context of a deeply entrenched virgin plastics sector and in a commercial environment that will be subject of rapid innovation and change (i.e., high risk). Additionally, the environmental benefits and commercial returns will only be realized gradually after the investments are made.

Accelerated depreciation allows larger tax deductions in the earlier years of the life of a capital asset. For example, where an investment is made in plastics recycling technology (say optical sorters or a recycling plant), accelerated depreciation applied to the investment reduces the amount of taxable income early in the life of an asset and defers tax liabilities to a later date when the plant is profitably operating.

By allowing reuse facilities that employ automated sorters, packaging inspectors and sterilization equipment to recover its initial investment sooner, accelerated depreciation (or Accelerated Capital Cost Allowance) reduces investment risk, frees up cash for the business and improves the overall economics of reuse-based circular economy efforts. For example, the Loop pilot in Canada sends recovered reusable packaging to the United States for sterilization because the cost of capital is prohibitive and the current scale of the pilot, yet one of the barriers to increasing scale is the lack of local reuse infrastructure[15].

[15] Ibid. Ref. 11

Target opportunities for driving reusable/ refillable systems

Based on the understanding of barriers to reuse, there are three primary opportunities to deploy reuse to address waste associated with single-use plastics. These are:

- Sub-sectors of the Industrial Commercial and Institutional Sector (ICI) where provincial governments are seeking to reduce waste associated with single-use plastic products and packaging.
- In northern Canadian communities where EPR based policies directed at the collection and management of plastic packaging may prove to be inordinately expensive and where shipment of bulk goods for local refilling may provide an alternative lower-cost option for producers that collect and transport of waste plastics south for recycling[16].
- For beverage alcohol containers (primarily wine and spirits coolers) sold by the Liquor Control Board of Ontario.

While these sectors are not the largest source of waste plastics, they represent the fewest barriers in terms of setting up closed reused-based supply chains (ICI and beverage alcohol containers) or in terms of the cost differential between reuse and recycling (northern Canadian communities).

Target sub-sectors of the Industrial Commercial and Institutional Sector (ICI) for reuse piloting

Focusing on key sub-sectors of the ICI sector offers prime opportunities for the implementation of reusable systems. These include:

1. Food service contractors
2. Institutions, including hospitals, universities, boarding houses, and hotels

[16] The cost to collect, consolidate and transport residential recyclable materials from Northern Ontario communities is significantly higher than in Southern Ontario providing clear indication that northern based reuse systems may have an advantage for certain packaged products currently packaged in plastics. Collection and recycling of residential Blue Box materials from Northern depots exceeds $1,200/tonne or 20 times that in urban areas in Southern Ontario [42]

Methodology of identifying potential reuse pilot industries

A preliminary analysis based on the categorization followed by the North American Industry Classification System (NAICS) [27] was undertaken to assess their potential to meet the following success factors.

Success Factor	Explanation
1. Transportation	There is potential to implement a reuse system without a large net addition of transportation between supplier, distributor, consumer, sorting/cleaning facility, and supplier. While a decarbonized transportation sector will reduce the importance of this consideration, it remains a point of concern in the interim.
2. Scale and Standardization	The industry has enough volume and market share within a particular region to distribute infrastructure costs over a large number of transactions.
3. Transition/ Infrastructure	There is minimal requirement of expensive or complicated infrastructure to set up, including sorting/cleaning facilities and reverse logistics design.
4. Number of Uses and Return Rate	The industry and nature of the packaging will enable high return rates, many uses, and rapid return rates to maintain packaging stock.
5. Labour	Additional labour costs are minimal or desirable and counterbalanced by the reduction in costs elsewhere.
6. Eventual End of Life	EPR legislation is already in place to cover this packaging or could be put in place. Additionally, the nature of the reusable packaging is such that it can be recycled at end-of-life and not disposed of.
7. Comparative materials production	The production costs (environmentally and economically) of the reusable container are not substantially higher than the single-use container.
8. Consumer Experience	It is not necessary for the consumer to undergo considerable inconvenience to engage with the reusable system.

As per the scope of this research, the analysis of reuse opportunities was limited to sectors that result in waste consumer packaging. Sectors that are supplied by wholesale distributors of bulk packaged goods pose the fewest barriers in terms of setting up closed reused-based supply chains that could be used for the forward distribution of full goods to backhaul reusable packaging to centralized sorting and washing facilities[17]. Specifically, the following categories may offer immediate opportunities for implementing reuse systems:

[17] Such closed-loop system for the recovery and recycling of mercury containing lamps for ICI sources. See: https://takebackthelight.ca

7211 - Traveller accommodation

72111 - Hotels (except casino hotels) and motels

72112 - Casino hotels

72119 - Other traveller accommodation

7213 - Rooming and boarding houses

72131 - Rooming and boarding houses

7223 - Special food services

72231 - Foodservice contractors

72232 - Caterers

6221 - General medical and surgical hospitals

62211 - General medical and surgical hospitals

6222 - Psychiatric and substance abuse hospitals

62221 - Psychiatric and substance abuse hospitals

6223 - Specialty (except psychiatric and substance abuse) hospitals

6112 - Community colleges and CEGEPs

61121 - Community colleges and CEGEPs

6113 - Universities

61131 - Universities

6114 - Business schools and computer and management training

61141 - Business and secretarial schools

61142 - Computer training

61143 - Professional and management development training

6115 - Technical and trade schools

61151 - Technical and trade schools

These categories can be broadly classified into several groups that define why they would likely be opportunities for reuse.

Food and Beverage Services within Institutions

Institutions such as hospitals, boarding houses, universities and hotels are prime opportunities for reuse because:

- The consumption of food and beverages takes place in a contained space, minimizing consumer inconvenience and transportation distances for return .
- Food and beverage systems are often run by a single contractor or central catering office, allowing for easily systemized reuse cycles and scale.
- The sole supplier arrangement typical in food and beverage service in this system increases consumer participation and ensures that units get returned to the same source float.

Reusable systems in institutions would most likely be designed with a float of standardized reusable containers that was created, maintained and sorted/cleaned either by vendors or by a central entity created by the vendors. A deposit return scheme could incentivize the rapid return of the containers and ensure all participants maintain the integrity of the system.

The physical infrastructure allows for multiple collection points. This design and the lack of transportation required to support this reuse system would mean that additional costs come primarily from labour, not transportation.

Provincial ICI waste reduction policies could provide an incentive to foodservice providers (e.g., Chartwells, Sodexo, and Aramark) who hold the contracts for food and beverage within these institutions. Both these food service providers and smaller independent foodservice providers under NAICS code 72231 offer a meaningful opportunity to drive reuse.

Where provinces seek to reduce ICI packaging waste, reusable systems established by producers under federal P2 Plans recognized by the province could provide a pathway to expanding reuse as a plastic packaging waste mitigation measure in the ICI sector.

Case Study: Canadian Hotel Chains

Discussion with sustainability directors in the Canadian Hotel industry backed up the intuition that contained supply chains in institutions are a viable area for the implementation of reuse systems. Many hotel chains are phasing out single-use toiletry items, while others have ambitious targets to phase out all guest-related consumer plastics in the next couple of years. The movement to reusable systems is considered to be cost viable based on a simple analysis of production savings from a reuse system. The success potential in this industry comes from the opportunity to manage reuse systems in-house rather than transporting containers offsite.

In this model, hotel guests have refillable water bottles in their rooms (largely for consumption outside of the room in common areas and in recreation areas nearby), which they can refill at the tap or at water dispensers throughout the hotels. Guests can either keep the bottles or leave them behind, in which case they are sanitized and reused. Within hotels, as with any industry, there is a unique set of benefits and challenges faced by reuse models:

Benefits:

- Sustainability
- Consumer experience with reusable bottles
- Saved costs of producing or buying water bottles, etc.

Challenges:

- Hygiene – packaging must be sterilized after each use and associated potential liability as the hotel becomes the "bottler"
- Lost revenue at meetings and events where single-use bottles would be sold
- Incorporating water purification stations into older hotels, aesthetically and logistically
- Hiring people to manage refill system (approx. two full-time jobs per hotel)
- Lack of space to incorporate sorting and sanitizing into the backend on each floor
- Cost of building infrastructure
- Guests bringing water bottles home and failing to continue reusing them

We heard that certain hotels, specifically those with outdoor group activities and modern, aesthetic design are a better fit for this reusable system in its current form.

What we can learn from this:

- Refillable systems can be cost viable in contained supply chains where there is no offsite transportation included in the system design
- Infrastructure and labour costs are the largest barriers in this context
- Consumer demand, especially from large corporate clients with sustainable agendas, are an increasingly relevant force against single-use plastics
- Education about factors like greenwashing (for hotel managers) and the cleanliness of water (for guests) is an important element in transitioning to reuse

Reuse in northern Canada

Another example where reuse may have an economic advantage over recycling is in communities in the north and remote First Nations communities. Here collecting, consolidating, transferring and shipping recyclable plastic from the north to processing facilities in the south is prohibitively expensive.

As such, transportation of consumer products to the north in bulk for local filling in reusable containers for local distribution and sale not only could provide significant cost advantages over single-use plastic packaging, but opportunities for local reuse/refill infrastructure (collection, washing sorting) development and employment.

Reuse systems could be designed so that bulk goods (e.g., health and personal care products, food and beverage and pantry products, cleaning and laundry products) would be transported to a central location amongst several remote communities where reusable consumer packaging would be refilled and distributed to retailers in those communities for consumer purchase. Consumers would return these containers to retailers, and the containers would be returned to bulk fill centers for washing and refilling in northern communities that would act as a hub for distribution for a few other smaller communities.

Consumer convenience in terms of trips would be unimpacted, and consumer-to-store transportation would not increase. Additionally, the resulting savings on waste would be a larger incentive based on the cost of collecting, baling and transporting waste plastics south for recycling.

Establishing reuse systems in remote northern communities still faces the challenge of the upfront infrastructure investment to create sorting/cleaning facilities and build an initial float stock. However, remote communities are faced with fewer choices and higher costs for the types of products they can pick from in a typical grocery store (trucks deliver fewer types of goods to remote communities [28]). A less diverse portfolio of products itself makes re-use easier in the north.

Reuse for beverage alcohol containers in Ontario

In Ontario, there is a distinct opportunity to increase the use of refillable bottles by harnessing the province's *Ontario Deposit-Refund Program* (ODRP) for beverage alcohol.

Under ODRP, as established in 2007, 82% of all containers sold are recovered. The recovery rate for glass bottles greater than 630 ml in size is over 90%. The ODRP program, in concert with the pre-existing deposit-refund system for beer containers, diverts over 168,000 metric tonnes of glass associated with wine, spirits and non-refillable beer containers annually for higher-order recycling uses.

Currently, the Ontario the Ministry of Finance applies an environmental tax of $0.0893 per container [29] ($0.10 per container after application of HST) on non-refillable, single-use beverage alcohol containers sold into the province whether produced domestically or imported. This tax accrues over $130 million in revenue to the Ontario Government annually.

However, despite both the ODRP program and the tax on non-refillable containers, wine and spirits are sold in single-use glass, and wine and spirits coolers are typically sold in single-use PET [30].

A key barrier to offering more refillable options is that The Beer Store (the operator of the LCBO's ODRP program) retail and distribution system is at capacity in terms of being able to sort any additional containers for reuse.

Overcoming the sorting barriers could facilitate a refillable container option to other interested brands as an option to avoid $1.20/dozen units in environmental tax, reduce the costs of buying single-use containers, and improve overall industry competitiveness.

To overcome this barrier requires a cross-industry collaboration between vintners [31] and spirits cooler producers in the beverage alcohol sector, the government of Ontario (via the Ministry of Environment and Climate Change and the Ministry of Finance), The Beer Store (as ODRP program operator) and manufacturers of refillable containers and refillable bottle sorting systems.

The primary objective of this collaboration would be to fully assess the potential for reuse and explore opportunities to capitalize both a centralized sorting facility whereby containers collected by TBS can be sorted for reuse and a facility to sterilize those containers for beverage alcohol producers.

Next Steps: Better understanding reuse through data

Generally, varied conditions that may or may not make reuse feasible in each industry means that critical analysis should be pursued in each industry to consider whether a reuse system would be possible given changes to a few fundamental conditions. However, with the right policy-driven incentives, as outlined above, individuals within the industry should self-sort with their own analysis of the merits of transitioning to a reusable system.

To attempt to identify the 'low hanging fruit' for a reuse pilot means identifying industries that face the fewest barriers as identified above in the identification of sub-sectors of the ICI Sector for reuse piloting. The three primary factors that should come together to make a reuse pilot successful are: comparatively small transportation distances, with opportunities for back-haul of reusable packaging; large amounts of unit sales, which would enable scale; and infrastructure to ensure efficient returns and packaging management.

Across North America and Europe, there is a broad lack of data that would enable deeper research about the success of and potential for reusable systems [32]. Reuse proposals and research papers depend largely on case studies, anecdotal evidence, and specific Life Cycle Analyses of certain industries in national or local level contexts.

A preliminary analysis could be done using waste audit, primarily in the ICI sectors. Waste audits are being done to identify detailed strategies, tactics and opportunities to minimize waste, and this work could be extended to study the potential for expanding reuse [33]. Within Canada, compiling data from waste auditors would allow for the analysis of how much waste average firms in each industry are disposing (indicating scale) and how much they are currently diverting to recycling (indicating the potential for positive impact from reuse).

The primary goal of the waste audit collection would be to determine if the industry currently creates a large enough quantity of plastics waste that:

- considerable reduction is possible.
- economies of scale with reuse are achievable quickly.

To achieve unbiased and external validity will require external third-party audits[18]. Using either Full-Time Equivalents (labour) or square footage can enable the normalizing of this data across firms [34]. This audit information could be combined with knowledge of the supply chain of each industry to assess the best businesses for reuse.

A reuse pilot would allow for more comprehensive data collection. Data on the material, reconditioning process, supply chain design (including transportation distances), number of units, number of transactions and number of actual rotations each unit gets would be highly valuable in analyzing the feasibility and benefit of reuse systems.

[18] Of note waste audits are already conducted in the ICI sector in Ontario under O. Reg. 102/94: Waste Audits and Waste Reduction Work Plans [12]

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