Container Deposit Study:

Phase I: Inventory of Existing Container Deposit Programs

King County
Department of
Natural Resources and Parks
Solid Waste Division

Waste **Prevention** | *Resource* **Recovery** | *Waste* **Disposal**

www.kingcounty.gov/solidwaste

Seattle Public Utilities

June, 2020

The Responsible Recycling Task Force

The Responsible Recycling Task Force (RRTF) was formed by King County's Solid Waste Advisory Committee (SWAC) and Metropolitan Solid Waste Management Advisory Committee (MSWMAC) in April of 2018 to respond to changes in international recycling markets and to develop a coordinated approach to improving recycling in the region. The task force consists of representatives from the King County Solid Waste Division, the City of Seattle, cities in King County, solid waste management companies, and other stakeholders. This report was prepared for the RRTF by the King County Solid Waste Division in collaboration with Seattle Public Utilities.

Contact and Information

For more information on the Responsible Recycling Task Force and the resulting recommendations, go to the Responsible Recycling Task Force website.

Authors

This report was authored by Eunomia Research & Consulting Inc., with support from Cascadia Consulting and C+C.

Disclaimer

Executive Summary

Introduction

In 2018, King County formed the Responsible Recycling Task Force, including members of King County, the City of Seattle, cities in King County, solid waste haulers, and stakeholders in order to develop a coordinated approach to recycling in the region.

The task force created a set of action items, which were developed by following the "responsible recycling framework."

Eunomia Research & Consulting (Eunomia), in collaboration with C+C and Cascadia Consulting, was tasked to contribute to Action 1E: *Develop a feasible model for a beverage container deposit system in Washington similar to the Oregon Beverage Recycling Cooperative model.* The study will be conducted in three phases, as follows:

1. Phase I: Inventory of Existing Container Deposit Systems (CDS)
2. Phase II: Qualitative Research and Recommendations
3. Phase III: Quantitative Assessment of Financial, Economic and Environmental Impacts

This report presents the approach and research under Phase I.

Approach

Based on Eunomia's understanding of programs across the world, existing container deposit systems were mapped against the criteria provided in the study scope. Eunomia considered the criteria most applicable to Washington to determine the short list of programs, for which the evaluation was carried out and included:

- **Criteria 1:** Systems financed/operated/overseen by third party organizations or packaging and paper product producers.
- **Criteria 2:** Systems that include return mechanisms other than drop off at retail/grocery stores. This could include return mechanisms such as redemption centers, specialized depots, and other innovative methods used to collect containers, such as reverse vending machines (RVMs), bag drops, bulk redemption, etc.
- **Criteria 3:** Systems that work in tandem with Extended Producer Responsibility (EPR) systems for residential packaging and paper products.
- **Criteria 4:** Systems operated in jurisdictions with curbside recycling programs similar to those in Washington State.

The selected programs are summarized in Table E 1, as they relate to the above criteria.

Table E 1: Selected Container Deposit Program Summary

Jurisdiction	System Administrator	Criteria Met				CDS operating in Conjunction with Wider EPR for Packaging
		1	2	3	4	
Oregon	Oregon Beverage Recycling Cooperative	√	√		√	No

Jurisdiction	System Administrator	Criteria Met				CDS operating in Conjunction with Wider EPR for Packaging
		1	2	3	4	
Maine	Department of Environmental Protection		√		√	No
British Columbia	Encorp Pacific/Brewers Recycled Container Collection Council	√	√	√	√	Yes
Alberta	Beverage Container Management Board	√	√			No
Norway	Infinitum	√		√		Yes
Germany	Private competitive			√		Yes

These programs are detailed in this report and will be used in subsequent phases to inform the design of a container deposit program for Washington state. Each program has been reviewed against a set of key system principles that Eunomia has developed for the U.S. from our knowledge and research of programs across the world, these principles are:

Effectiveness

- Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling;
- Deposit set to maximize return with the flexibility for it to be revised without changes in legislation;
- Focus on customer access, convenience and experience;
- Broad scope of beverages and packaging materials.

Management, Oversight and Governance

- Government role of oversight, compliance and issuance of penalties;
- Management through a producer appointed 501(c)(3) organization;
- Producer report units sold and recycled independently or through 501(c)(3) organization providing transparency;
- Technology driven to facilitate verification of containers returned, reporting and fraud mitigation;
- Options for retailer participation.

Financing

- Follow Extended Producer Responsibility – Producer-funded, net of revenue from material sales and unclaimed deposits;
- Service providers fairly paid;
- Unredeemed deposits support recycling system.

A red, amber, green ranking has been used to depict the extent to which the program meets the best practice principles elements. This information as well as the more in-depth review of each program contained in the main body of the report will inform the design of a program for Washington State under Phase II and the cost benefit assessment in Phase III.

Program Summaries

Alberta

The Beverage Container Recycling Regulation created the beverage container deposit program in Alberta in 1972. In 1993, the government consolidated several pieces of legislation into the Environmental Protection and Enhancement Act, which led to the evolution of the Regulation, as it is currently in force today.

The Beverage Container Management Board (BCMB) has regulatory oversight of the redemption system.

A qualitative review of Alberta's container deposit program against the key system principles is provided in Table E 2.

Table E 2: Alberta Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	No statutory turn or recycling rate, although there is a Government set return rate of 85% that has been exceeded. In 2019, the redemption rates was 85.3%. No specified recycling rate calculation.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit (up to 1L at CAD$0.10 (USD$0.073), and over 1L at CAD$0.25 (USD$0.18) is set in legislation, which prevents BCMB from putting in place higher deposits, which would act as appropriate incentives to drive-up the return rates.
Focus on customer access, convenience and experience	Alberta's container deposit redemption is through redemption centers only, but BCMB's self-sets targets that ensure geographical coverage and minimize resident drive times, defined as less than 10 minutes for 50% of residents.[1] The by-laws and service agreements standards ensure that residents receive a consistent level of service and user experience at redemption centers. Currently 227 return depots, approximately 1 redemption center per 19,255 people.
Broad scope of beverages and packaging materials	Alberta has the broadest scope of all deposit programs, including all products (even milk-based drinks, which are excluded in many programs) and all container types (including Tetra-Brik, etc.).
Management, Oversight and Governance	

Principle	Qualitative Evaluation
Government role of oversight, compliance and issuance of penalties	Government has appointed BCMB as the regulatory oversight organization to work on its behalf, which protects the program from overly bureaucratic and slow decision-making, which can be the case when oversight is provided directly be government departments.
Management through a producer appointed 501(c)(3) organization	BCMB is a not-for-profit organization incorporated under the Societies Act of Alberta. The appointed collection agents are also non-profit organizations working on behalf of manufacturers.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation;	No province-specific barcoding to prevent cross-border fraud. Redemption centers are predominately manual collection, but there is starting to be investment in bulk sorting and counting technology to better record units redeemed.
Options for retailer participation.	No requirement for retailers to accept containers – redemption centers only. N/A
Financing	
Follow Extended Producer Responsibility – Producer funded net of material revenue and unclaimed deposits	The program is producer responsibility in how it is managed, but not in how it is financed, as the cost of the system (net of unredeemed deposits and material revenue) is passed through to consumers in the form of a container recycling fee (CRF), which is visible to the consumer as a separate charge on the price of goods.
Service providers fairly paid	Depots receive a handling fee that varies by material type and container size and which is reviewed every three years. A by-law is in place to govern the handling commission review process.
Unredeemed deposits support recycling system.	Unredeemed deposits are retained by the central administrators and reinvested in the system.

Despite some regulatory restrictions and the fact that producers pass through the cost of the program (net of material revenue and unclaimed deposits) to the consumer, the program has a strong governance structure that provides consistency through bylaws and service agreements. Alberta's program provides consumer convenience and standard service levels at redemption centers and creates a program with continuous improvement.

British Columbia

British Columbia (BC)'s Litter Act was put in place in 1970 and the deposit program in BC was established under this act.[2] In 2004, the Recycling Regulation consolidated all BC EPR regulations, including the container deposit program.

Under the Recycling Regulation, stewardship agencies set targets, license redemption centers to limit competition and guarantee collection and sales of material. The agencies operating in BC under the Recycling regulation include Encorp Pacific (Encorp), a third-party organization that manages the container deposit program for non-alcoholic beverages and Brewers Recycled Container Collection Council (BRCCC), which manages alcoholic beverages under the container deposit program.

A qualitative review of BC's container deposit program against the key system principles is provided in Table E 3.

Table E 3: BC Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	No beverage container-specific redemption or recycling target set in legislation. There is an overarching packaging and paper product recycling rate target in the Recycling Regulations but this is not statutory.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit value minimum set in legislation. BC recently increased the deposit for non-alcoholic beverage containers to match that of alcoholic beverage containers, making the deposit CAD$0.10 (USD$0.074) for all beverages.
Focus on customer access, convenience and experience	Program is both return-to-retail (for BRCCC containers) and redemption centers. Encorp is piloting different types of express drop-off facilities to provide a greater level of customer convenience. About 385 redemption centers, approximately 1 redemption center per 13,171 people.
Broad scope of beverages and packaging materials	Broad scope of alcoholic and non-alcoholic beverages in wide range of container material types.
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	The program has very little regulatory oversight and both the deposit program and the packaging EPR programs have been criticized for lack of transparency. The multi-stakeholder advisory group that reports to the government has no decision-making powers, so cannot significantly influence the program.
Management through a producer appointed 501(c)(3) organization	Encorp and BRCCC are non-profit stewardship organizations that manage the programs.

Principle	Qualitative Evaluation
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation;	Program is still predominately a manual system.
Options for retailer participation	Though there is some return-to-retail in the province for the BRCCC program, since Encorp took over management of the non-alcoholic program in 1994, return-to-retail has scaled back.
Financing	
Follow Extended Producer Responsibility – Producer funded net of material revenue and unclaimed deposits	Encorp uses unredeemed deposits and scrap material revenues to cover its program costs. The net difference between those funds and total costs are covered by the non-refundable CRF, charged on each beverage purchased. Unlike Encorp, BRCCC's program is fully funded by the deposit initiators[3] and there is no transparent pass through to consumers.
Service providers fairly paid	Encorp tries to identify costs, find a balance between high and lower volume redemption centers and determine fair compensation. Encorp also takes into account that redemption centers also receive handling fees from BRCCC and that lower-volume redemption centers often receive grants from the government, which provide a base level of revenue.
Unredeemed deposits support recycling system.	Unredeemed deposits are retained by the stewardship agencies to help cover program costs.

Germany

In 1993, the Ordinance on the Avoidance of Packaging Waste (Packaging Ordinance) was implemented in Germany.[4] The Packaging Ordinance is an EPR law, making producers responsible for the end-of-life management of their packaging including hitting targets for recycling and refilling.[5] Section 9 of the Packaging Ordinance, which requires distributors of single-use beverage containers to charge deposits of at least €0.25 ($0.28) on all containers sold and to manage the take-back of those containers, came into effect in 2003.[6]

DPG Deutsche Pfandsystem GmbH (DPG) is a non-profit organization that was established in 2005 by the beverage industry to create a collective framework for producers to comply with the Packaging Ordinance.

A qualitative review of Germany's container deposit program against the key system principles is provided in Table E 4.

Table E 4: Germany Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	Germany has targets for all packaging collectively, to which the deposit program significantly contributes. Recycling calculation in line with EU standards following 2019 legislative update.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit value (€0.25 ($0.28)), is higher than most, incentivizes a high return rate. No simple mechanism for updating value.
Focus on customer access, convenience and experience	Return-to-retail model ensures a large number of redemption points for consumers, totaling over 100,000 across the country, or one for approximately every 820 people.
Broad scope of beverages and packaging materials	Germany's program scope is broad, previous exceptions based on beverage type, packaging material and size were repealed under the 2019 update.
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	The Ministry of the Environment retains legal responsibility over the deposit program and all other EPR programs, but does not interfere much in operations. Penalties for non-compliance issued by local regulatory authorities.
Management through a producer appointed 501(c)(3) organization	DPG is a non-profit organization of the beverage industry that provides a framework for compliance, but management is left largely to individual producers.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation	The majority of redemption at German retailers is through reverse vending machines (RVMs) (80%). Germany also uses specific labeling and barcoding to track containers and prevent fraud.
Options for retailer participation	All retailers must participate and accept all deposit containers, unless they are less than 200 m^2, in which case they can choose to only accept brands that they sell

Principle	Qualitative Evaluation
Financing	
Follow EPR – Producer funded net of material revenue and unclaimed deposits	German has full EPR, producers may mark up material to compensate for additional expenses
Service providers fairly paid	Retailers do not receive handling fees, but instead retain the value of the material that they collect, meaning they are subject to market fluctuations and at a disadvantage as small sellers.
Unredeemed deposits support recycling system	Producers retain unredeemed deposits, may use as they see fit, but as they cover the cost of the system, these funds are likely used to cover that cost.

Maine

Maine's deposit program was instituted in 1978 through the Maine Returnable Beverage Container Law.[7] Subsequent updates to the law granted administration of the deposit program to the Department of Environmental Protection (DEP).[8]

A qualitative review of Maine's container deposit program against the key system principles is provided in Table E 5.

Table E 5: Maine Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	No targets in legislation. No insight into actual redemption rate nor recycling rate.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit value is low ($0.05 for most containers) and has not changed since program implementation. Legislation must be amended to update deposit value.
Focus on customer access, convenience and experience	Currently 499 redemption centers (1 per 2900 aiming to reduce to 1 per 5,000 people) use of bag drop in some areas.
Broad scope of beverages and packaging materials	Broadest scope in the US. Includes all beverages excluding dairy and cider.
Management, Oversight and Governance	

Principle	Qualitative Evaluation
Government role of oversight, compliance and issuance of penalties	Department of Environmental Protection provides oversight and system operator functions.
Management through a producer appointed 501(c)(3) organization	Department of Environmental Protection (government agency) acts as the system administrator.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation	Only 15-20% of redemption centers use RVMs to redeem containers, no other fraud protection measures.
Options for retailer participation	Retailers can opt out of redemption function by signing a Member Dealer Agreement with a nearby redemption center.
Financing	
Follow EPR – Producer funded net of material revenue and unclaimed deposits	Producers fund the handling fees, some cost to taxpayers through DEP administration functions.
Service providers fairly paid	High handling fees allow redemption centers to be profitable
Unredeemed deposits support recycling system	Commingling agreements allow most of the larger producers to retain the unredeemed deposits; otherwise, they are returned to the State.

Norway

In 1974, Norway implemented the Product Control Act, which levied an excise tax on all packaging including non-refillable beverage containers. Norway imposes an excise duty per unit of single-use beverage packaging placed on the market. The tax consists of both a base tax and an environmental tax. In 1997, Regulations relating to the recycling of waste were updated to link the excise tax to the recycling rate of single use beverage containers.

As the recycling rate increases, the tax is reduced, as follows:

Recycling rate ≤ 25%, full tax imposed;
Recycling rate 25-95%, tax inversely proportional to return rate;
Recycling rate ≥ 95%, exempt from tax.

A qualitative review of Norway's container deposit program against the key system principles is provided in Table E 6.

Table E 6: Norway Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	Minimum redemption rate set in legislation and environmental tax tied to increased performance. Have a precise method for calculating recycling.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit is relatively high (NOK 2 ($0.25) for plastic and metal containers ≤0.5 liter (from NOK 1) and NOK 3 ($0.38) for plastic and metal containers >0.5 liter (from NOK 2.5)). Set in legislation, but there is a history of increases.
Focus on customer access, convenience and experience	Return-to-retail with 15,000 return locations across the country, or approximately one for every 352 people.
Broad scope of beverages and packaging materials	Container deposit applies to all beverage types, but limited to plastic and metal containers.
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	Norwegian Climate and Pollution Agency, an agency of the Norwegian government, oversees the system.[9]
Management through a producer appointed 501(c)(3) organization	Infinitum, a non-profit organization whose board includes representatives of both the beverage and retail industry, operates the deposit system and container collections.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation	Norway uses the return-to-retail model with a mix of RVMs and manual services; 93% of containers are returned to an RVM. Additional labeling requirements to prevent fraud.
Options for retailer participation	All retailers, including small shops and gas stations, must accept containers for refund.
Financing	

Principle	Qualitative Evaluation
Follow EPR – Producer funded net of material revenue and unclaimed deposits	Operating expenses are covered by revenues that include unredeemed deposits, material sales and administrative fees.
Service providers fairly paid	High handling fee, structured to help compensate retailers for investment in RVMs.
Unredeemed deposits support recycling system	Unredeemed deposits returned to Infinitum to help cover cost of system.

Oregon

Oregon's *Beverage Container Act* was originally enacted in 1971 to reduce litter and increase recycling and was the first bottle bill implemented in the US.

The 2011 update to the bottle bill was especially significant and made major changes, following recommendations of a task force, the prior establishment of the Oregon Beverage Recycling Cooperative (OBRC) and compromise with industry. This update (HB 3145) had the following provisions:

1. Scope expansion to all beverages except for wine, liquor, milk and milk substitutes;
2. Provision that allowed the deposit value to increase to $0.10 if the if beverage container redemption rate fell below 80% for two consecutive years;
3. A coalition of producers was approved to pilot a redemption program, if successful OBRC could expand on the pilot to build a system of redemption centers.

The program is run by the OBRC, which is owned by beverage distributors and grocers that retains as members producers of over 95% of the beverage brands sold in Oregon.

A qualitative review of Oregon's container deposit program against the key system principles is provided in Table E 7.

Table E 7: Oregon Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	Clause required increasing deposit value if redemption rate fell below 80%; triggered in 2017, deposit is now $0.10. Reporting requirements tied to calculation of redemption rate.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	High deposit value relative to the rest of the US. Clause for increasing deposit value is not recurring.
Focus on customer access, convenience and experience	Recent emphasis on growing OBRC redemption center network, with 55 locations across the state and options including express bag drops, approximately one for every

Principle	Qualitative Evaluation
	10,955 people. 64.4% of containers returned through OBRC network, remainder through retailers.
Broad scope of beverages and packaging materials	Relatively broad scope, including all beverages except for wine, liquor, milk and milk substitutes.
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	Oregon Liquor Control Commission has the legal right to audit and review OBRC's records, little involvement otherwise.
Management through a producer appointed 501(c)(3) organization	Oregon Beverage Recycling Cooperative (OBRC) is a producer-owned non-profit organization that runs the system.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation	Bulk sorting of containers returned through bag-drop and redemption centers, however no use of state-specific bar codes or unique markings to prevent cross border fraud.
Options for retailer participation	Retailers may refuse to redeem if they are in a convenience zone near a redemption center.
Financing	
Follow EPR – Producer funded net of material revenue and unclaimed deposits	OBRC covers the costs of the system.
Service providers fairly paid	OBRC runs all redemption centers, there is no handling fee to compensate retailers.
Unredeemed deposits support recycling system	Unredeemed deposits retained by OBRC and invested back into program.

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Introduction

Background

In 2018, King County formed the Responsible Recycling Task Force, including members of King County, the City of Seattle, cities in King County, solid waste haulers, and stakeholders in order to develop a coordinated approach to recycling in the region.

The task force created a set of action items, which were developed by following the "responsible recycling framework" that calls for recycling systems to:

- Focus on the quality vs. quantity of recyclables;
- Use consistent messaging across the region;
- Prioritize domestic processing and markets;
- Consider the social and environmental effects of exporting recyclables;
- Create domestic demand for recyclables;
- Realize that responsible recycling is not free;
- Measure real recycling

To address one of the resulting action items, Action Item 1A, King County contracted with C+C Consulting (C+C) to facilitate a study in 2019 that examined how various Extended Producer Responsibility (EPR) programs and policy elements could be applied to Washington state's current recycling infrastructure to achieve responsible recycling.

Following this work, Eunomia Research & Consulting (Eunomia), in collaboration with C+C and Cascadia Consulting, was tasked to work on Action Item 1E: *Develop a feasible model for a beverage container deposit system in Washington similar to the Oregon Beverage Recycling Cooperative model.* The study will be conducted in three phases, as follows:

- Phase I: Inventory of Existing Container Deposit Systems (CDS)
- Phase II: Qualitative Research and Recommendations
- Phase III: Quantitative Assessment of Financial, Economic and Environmental Impacts

This report presents the research conducted under Phase I.

Study Approach

To begin this analysis a long list of all beverage container deposit programs was considered, with emphasis on those that could possibly be used as background information to develop a feasible model of a container deposit system in Washington.

Based on Eunomia's understanding of programs across the world, existing container deposit systems were mapped against the criteria provided in the study scope. Eunomia considered the criteria most

applicable to Washington to determine the short list of programs, for which the extended evaluation was carried out. These criteria are listed below, along with the identified programs that meet each criterium.

- **Criteria 1**: Systems financed/operated/overseen by third party organizations or packaging and paper product producers;
    - Oregon – operated by Oregon Beverage Recycling Cooperative (OBRC), a cooperative corporation owned by Oregon beverage distributors and grocery retailers[10];
    - British Columbia – operated by two administrators: the BC Brewers' Recycled Container Collection Council (BRCCC) for beer, and Encorp (for non-alcoholic beverages);
    - Alberta – operated by the Beverage Container Management Board, a legislatively appointed non-profit organization;
    - Norway – operated by Infinitum, a non-profit organization owned by Norwegian bottlers and retailers[11]
- **Criteria 2**: Systems that include return mechanisms other than drop off at retail/grocery stores. This could include return mechanisms such as redemption centers, specialized depots, and other innovative methods used to collect containers, such as reverse vending machines (RVMs), bag drops, bulk redemption, etc.
    - Oregon – includes return-to-retail, redemption centers and bag drops;
    - British Columbia – includes return-to-retail, redemption centers and bag drops;
    - Maine – includes return-to-retail, redemption centers and bag drops;
    - Alberta – includes redemption centers
- **Criteria 3**: Systems that work in tandem with Extended Producer Responsibility (EPR) systems for residential packaging and paper products.
    - Germany - Green Dot packaging EPR system in place prior to deposit system;
    - BC – container deposit system in place prior to EPR system for packaging, run by Recycle BC;
    - Norway – EPR for packaging established in 2017.
- **Criteria 4**: Systems are operated in jurisdictions with curbside recycling programs similar to those in Washington State.
    - BC – geographically similar;
    - Oregon – US system, geographically similar;
    - Maine – US system.

The selected programs are summarized in Table 1, as they relate to the above criteria.

Table 1: Selected Container Deposit Program Summary

Jurisdiction	System Administrator	Criteria Met				CDS operating in Conjunction with Wider EPR for Packaging
		1	2	3	4	
Oregon	Oregon Beverage Recycling Cooperative	√	√		√	No
Maine	Department of Environmental Protection		√		√	No
British Columbia	Encorp Pacific/Brewers Recycled Container Collection Council	√	√	√	√	Yes
Alberta	Beverage Container Management Board	√	√			No
Norway	Infinitum	√		√		Yes
Germany	Private competitive			√		Yes

These programs are detailed in this report and will be used in subsequent phases to inform the design of a container deposit program for Washington state.
While not explicitly called for within the scope of work, each program has been reviewed against a set of key system principles that Eunomia has developed for the US from our knowledge and research of programs across the world. These principles have been used to qualitatively review and develop key takeaways from the existing programs.

Effectiveness

- Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling;
- Deposit set to maximize return with the flexibility for it to be revised without changes in legislation;
- Focus on customer access, convenience and experience;
- Broad scope of beverages and packaging materials.

Management, Oversight and Governance

- Government role of oversight, compliance and issuance of penalties;
- Management through a producer appointed 501(c)(3) organization;

- Producer report units sold and recycled independently or through 501(c)(3) organization providing transparency;
- Technology driven to facilitate verification of containers returned, reporting and fraud mitigation;
- Options for retailer participation.

Financing

- Follow Extended Producer Responsibility – Producer-funded net of material revenue and unclaimed deposits;
- Service providers fairly paid;
- Unredeemed deposits support recycling system.

A red, amber, green ranking has been used to depict the extent to which the program meets the best practice principles elements.

Program Summaries

Alberta

Alberta is a one of the western provinces of Canada. It's one of the three prairie provinces in Canada and the 4th most populous province overall, with a population of 4.08 million.[12]

The Beverage Container Recycling Regulation created the beverage container deposit program in Alberta in 1972. In 1993, the government consolidated several pieces of legislation into the Environmental Protection and Enhancement Act, which led to the evolution of the Regulation, as it is currently in force today. Alberta's program includes All beverage types and has the broadest scope of North American programs by including all milk products [which are often exempt in other programs].[13] The revised Regulation requires manufacturers of both regulated non-refillable and refillable beverage containers to appoint a common collection system agent to collect redeemed containers from depots and recycle them. The Alberta Beverage Container Recycling Cooperation (ABCRC) is the appointed collection agent for non-refillable containers[14] And the Alberta Beer Container Corporation (ABCC) is the agent for the collection of refillable beer containers from depots that are returned to brewers for refilling.

A further update to the Regulations in 1997 gave regulatory authority and oversight of the system to the newly-created Beverage Container Management Board (BCMB),[15] Further details on the role BCMB provides is provided in Section 0.

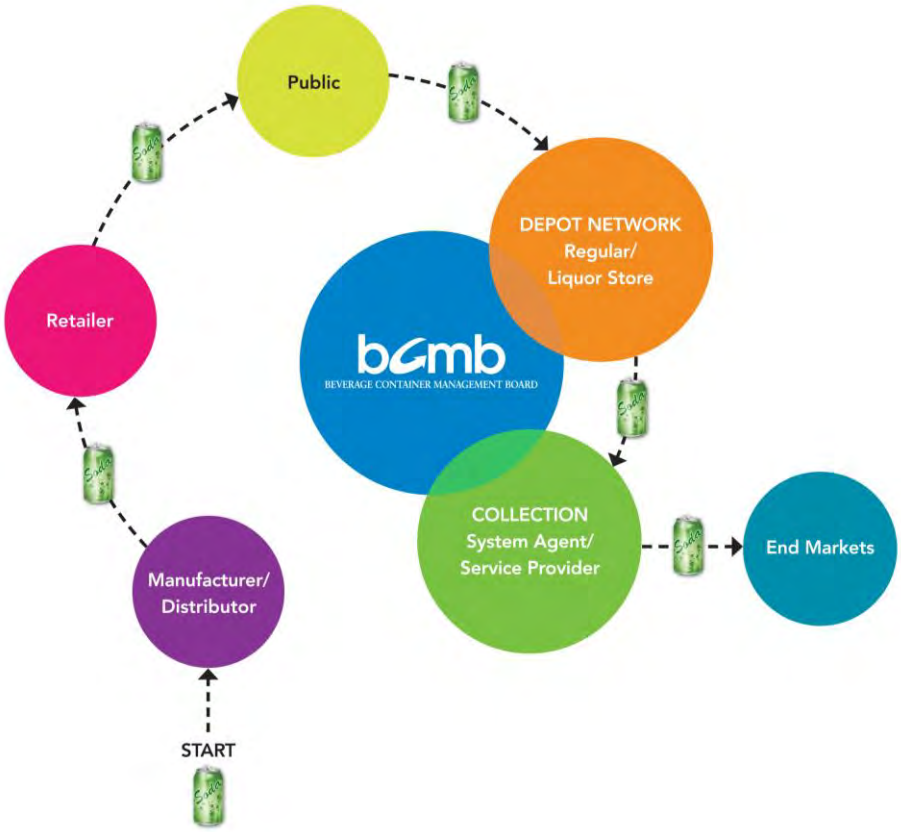
The regulation prescribes the following:

- Requires BCMB to create by-laws pertaining to:
    - Frequency and manner of collections by collection agents and manufacturers from redemption centers and retailers;
    - Frequency and manner of payments to redemption center operators and retailers by the collection system agent and manufacturers;
    - Criteria for determining handling fees;
    - Processes for producers to register containers;
    - Processes for permitting redemption centers.
- Requires manufacturers to register containers with BCMB and to appoint collection system agents;
- Sets the deposit values for containers up to 1L at CAD$0.10 (USD$0.073), and over 1L at CAD$0.25 (USD$0.18);
- Sets rules requiring retailers to accept containers for redemption and clarify any exceptions; to those rules; and

- Requires payment of handling fee from manufacturer to retailers or redemption center operators.

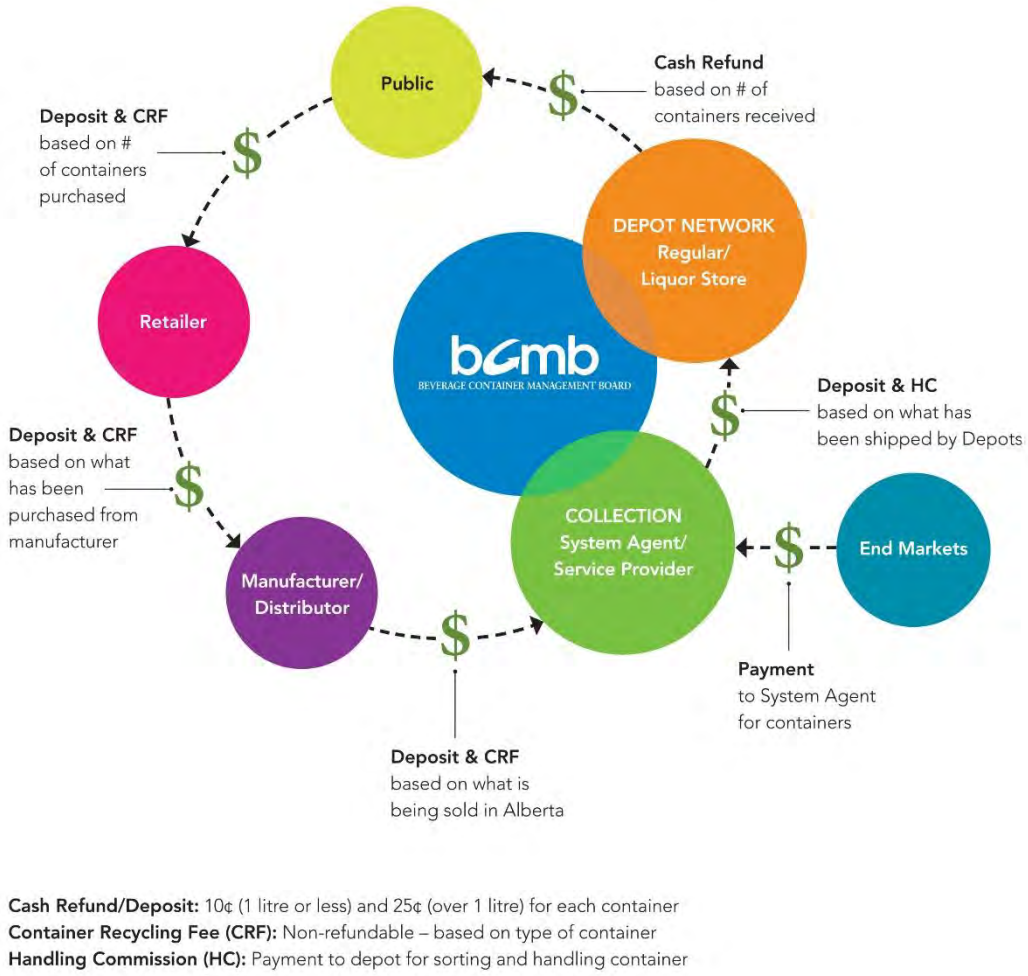
BCMB's system diagrams of beverage container flow and cash flow are provided in Figure 1 and Figure 2.

Figure 1: Alberta Container Deposit Program Beverage Container Flow



Source: BCMB

Figure 2: Alberta Container Deposit System Cash Flow



Source: BCMB

By granting regulatory oversight of the redemption system to the BCMB and operational control for reuse and recycling to producers' agents, the regulation allows for the program to develop and optimize as market conditions change without unnecessary legislative burden, although this excludes changes to the deposit value which is set in legislation.

Governance, Management and Oversight

The Alberta Government produces legislation related to the container deposit system but does not supply any funding for the operation of the beverage container recycling system. The BCMB consists members across sectors, including: beverage manufacturers, redemption center owners, municipal and provincial government officials and the public.[16] BCMB licenses redemption centers and provides regulatory oversight of the activities of retailers, redemption centers, deposit initiators and the two manufacturer-appointed collection system agents.

BCMB conducts audits on compliance on a variety of measures outlined and regulated through its bylaws. Non-compliance results in fines and additional corrective action, such as:

- If a redemption center provides a refund to an auditor that is greater than +/- $0.50 of the actual total refund value, a CAD$200 (USD$150) fine is imposed and further targeted audits are undertaken;[17]
- Manufacturers of refillable containers that do not provide collection systems capable of recovering containers from all redemption centers or who do not use a common collection system are subject to a fine of not more than CAD$50,000 (USD$37,378) for individuals and CAD$500,000 (USD$373,775) for corporations;[18] and
- A compliance fee of CAD$400 (USD$299) can be applied for each event of non-compliance with a BCMB bylaw to any person participating in the container deposit program.[19]

Additionally, The Societies Act Bylaw allows the BCMB Board of Directors to make fees, charges, levies or assessments to further the objects of the Society, including those permitted under any legislation, regulation, quotes, standards or agreements.[20]

Operational Delivery

Redemption Infrastructure

As of 2016, there were 218 independently owned "universal" redemption centers (accepting all beverage containers) and 17 Class D redemption centers (accepting liquor containers only) across the province. Approximately 49% of the population lives within a 10-minute drive of a redemption center, and 35% live within an 11-20-minute drive.[21]

The legislation in Alberta prohibits competitors from being established within proximity to an existing redemption center without approval by the BCMB, which helps to ensure that there is enough volume for each established redemption center to be financially viable payments are based on a per unit handling fee. The BCMB keeps a list and map of active redemption centers with hours of operation on its website.[22]

Redemption center permits are non-transferable with redemption center sales. New owners must apply with the BCMB.[23] BCMB evaluates all prospective redemption center owners. Prospective redemption center owners must submit an application and have a minimum 30-day period during which the application will be reviewed by the BCMB.[24] New redemption centers can only be established in response to a Request for Applications (RFA) posted by BCMB.

Collection and Processing

Alberta has two beverage deposit return system operators, one for non-refillable containers and one for refillable beer bottles.

- ABCRC operates under not-for-profit provisions as the agent for beverage manufacturers in Alberta and operates the collection and recycling system for non-refillable containers. ABCRC is responsible for collecting deposits from deposit initiators, paying refunds and handling fees, and collecting, processing and marketing scrap materials. Unredeemed deposits and scrap revenues

accrue to ABCRC for management of the system. It works on behalf of manufacturers of non-alcoholic beverages to collect and recycle non-refillables from depots, and process and ship them to recyclers. To facilitate this collection, it outsources 100% of transportation services to third-party transport truck companies, and contracts with a regional processor in Lethbridge for a small portion of processing capacity.[25] The ABCRC also operates two of its own processing facilities: one in Edmonton and the other in Calgary that process paper board, aluminum, PET plastic, gable top containers, HDPE and bi-metal products.[26]

- The ABCC is the collection service provider for beer manufacturers and is responsible for collecting and processing standard-sized, refillable beer bottles. Since 2009, the ABCC has outsourced the management of non-refillable beer containers to the ABCRC.[27]

BCMB's Collection System Agent and Collection Service Provider bylaws specify that those parties need to negotiate a Service Agreement with redemption centers or with the Alberta Bottle Depot Association that outline collection frequency and terms.[2829]

Reporting and Performance

The Government of Alberta set an unofficial return rate target of 85% by the end of 2011. Although this rate is currently being achieved, it is not mandatory and is not material specific. The BCMB has independently set target return rates by material, however, these, too are not mandatory and there are no repercussions if the rate is not met. In 2016, this included an overall redemption rate of 84.1% for that calendar year. Subsequent years have increasing redemption rate targets, borne increasing redemption targets, including 86.1% in 2017, 85.8% in 2018, and 86.4% in 2019.

BCMB self-reports on a wide range of performance indicators and measures, making it one of the most transparent systems. These relate to several desired outcomes, including: environmental protection, fiscal stewardship, governance excellence, customer excellence and system efficiency and effectiveness. Table 2 provides a selection of indicators reported on by BCMB annually as well as their associated desired outcome, key strategy area and 2019 result.

Table 2: BCMB Performance Indicators

Outcome	Key Strategy	Indicator	2019 Result
Environmental Protection	Minimize impact	Return rate	85.3%
	Reduce footprint	Distance per container	1.45 meters
		Landfill space saved	451,435 tonnes

Outcome	Key Strategy	Indicator	2019 Result
Fiscal Stewardship	Reporting & Transparency	Net system cost ($CAD/container)	$0.0294
Governance Excellence	Compliance	Refund Compliance (% audits refunded within industry standard)	91%
		Quality control compliance (shipments of containers within industry standard)	91%
		Operational compliance (% depots inspected that did not enter compliance framework[30])	70%
Customer Excellence	Satisfies/Quality	Participation	92%
		Average travel time to depot	51% < 10 min 35% = 11-20 min
		Overall satisfaction rated as very satisfied	78.5%
		Average time spent at depot	13.7 min
		Depot overall satisfaction with operator	98% (64% highly satisfied)
	Awareness	Individuals aware of deposit/refund program	98%
		Individuals who believe recycling beverage containers has a significant impact on the environment	60%
		Individuals aware of deposit amount	52%

Outcome	Key Strategy	Indicator	2019 Result
System Efficiency and Effectiveness	Innovation	Automated sorting technology (return on investment demonstrated in >1 demonstrated)[31]	Yes
	Cost effectiveness	Nest cost for recycling consumer (cents/container)	2.40 (2018 actual)
		Labor seconds/container at depots	4.34 (2018 actual)

Source:https://www.bcmb.ab.ca/uploads/source/Annual_Reports/2019.06.05.BCMB.2018.Annual.Report.Web.Version.pdf

BCMB also provides a full set of financial statements in its annual report.

In addition to the reporting from BCMB, ABCRC issues its own sustainability report on an annual basis that reports on additional metrics associated with their operations of the deposit program, including:

- A return summary by material;
- Percent of materials recycled (as reported by end processor);
- End markets of materials; and
- Social and community programs.[32]

Redemption/Recycling

Alberta's non-refillable beverage container system has the widest scope and highest redemption rates of any province in Canada. Of the 2.34 billion beverages containers sold in 2019, an estimated 1.99 billion, representing an 85.6% of all beverage containers, were redeemed.[33,34] The beverage container program is the highest performing and lowest cost program in Canada.[35]

Redemption rates by material are reported by ABCRC, for 2018 (overall rate of 85.6%). A comparison of return rate targets for 2016 and actual return rates is provided in Table 3.

Table 3: Targets and Return Rates by Material in Alberta

Material	2016 Target[36]	2016 Return Rate[37]	2018 Return Rate[38]
Aluminum	89.2%	91.0%	85.6%
Bi-metal	89.1%	75.4%	81.6%

Material	2016 Target[36]	2016 Return Rate[37]	2018 Return Rate[38]
Glass	92.0%	93.7%	97.2%
Plastics (≤ 1 litre)	78.1%	79.1%	90.4%
Plastics (≥ 1 litre)	88.9%	91.0%	81.0%
Polycoat (Tetra, Pouches and Gable Top)	65.8% (Tetra & pouches), 66.9% (Gable top)	74.1% (Tetra & pouches), 69.9% (Gable top)	72.3%

Since ABCRC sells the material collectively, it can track the end destination of all the redeemed containers and therefore the percent of each material that is actually recycled is known. This includes:

- 95-99% of weight of aluminum shipped (less moisture and contaminants);
- 80%+ of PET and HDPE bottles (20% being substandard or contaminants) and 98% of caps;
- 95% of glass (5% waste including caps, cork, dust);
- 80% of gable tops by weight;
- 95% of bi-metal;
- Tetra-Brik, drink pouches, ceramics and aerosols are used in energy recovery through gasification or landfilled. [39]

Carbon Emissions

Some operational GHG related impacts are currently being captured by ABCRC, including:

- ABCRC employee and director travel (km)
- Distance travelled transporting products
- Natural gas and diesel fuel usage

Data from the above is used to calculate a transport-related CO_2e/tonnes impact. BCMB intended to report on carbon footprint as a key performance indicator based on CO2e/tonne freighted beginning in 2018, but found that they had insufficient data to do so.[40] However, the Alberta Depot Network provides a less formal calculation of avoided greenhouse gas emissions and reports that in 2018, this equated to 195,998,487 kg.[41]

System Finances

Funds to operate the non-refillable beverage container program come from three sources:

- Unredeemed deposits;
- Sales of processed materials; and
- Container recycling fees (CRFs).

BCMB's budget for 2018 is summarized in Table 4 below.

Table 4: BCMB 2018 Revenues and Expenditures Summary

Budget Category	CAD $	USD $
Revenues	2,850,000	2,099,000
Container Fees	2,629,000	1,937,000
Permit Fees	45,000	33,000
Compliance Fees	8,000	6,000
Product Registration Fees	112,000	83,000
Other	54,000	40,000
Operating Expenditures	2,882,000	2,123,000
Profit	(32,000)	(24,000)

Source: 2018 BCMB Annual Report https://www.bcmb.ab.ca/uploads/source/Annual_Reports/2019.06.05.BCMB.2018.Annual.Report.Web.Version.pdf

ABCRC also reports on their revenues and expenses. An abridged statement of revenues and expenses is provided in Table 5.

Table 5: ABCRC Abridged Statement of Expenses and Changes in Net Assets

Category	CAD $	USD $
Revenue	**137,891,000**	**103,247,000**
Regulated deposits	253,855,000	190,077,000

Category	CAD $	USD $
Container recycling fees	60,965,000	45,648,000
Deposits refunded	(218,797,000)	(163,827,000)
Sale of processed container material	40,931,000	30,655,000
Other revenues	938,000	702,000
Expenses	**130,098,000**	**97,412,000**
Handling fees	95,505,000	71,510,000
BCMB board fees	1,269,000	950,000
Other expenses	33,224,000	24,877,000
Excess of revenue over expenses	**7,794,000**	5,836,000

Source: ABCRC 2018 Sustainability Report https://www.abcrc.com/assets/ABCRC-Sustainability-Report-2018.pdf

CRFs are charged on each container sold in addition to a deposit and are non-refundable. CRFs generated a total of CAD$70.0 million (USD$51.1 million) in 2018, accounting for over half (51%) of the system revenue in 2018.[42] Administered by the ABCRC, the CRF is a fee that beverage manufacturers are required to pay to cover the net costs of recycling beverage containers that remain once the funds from unredeemed deposits and material sales are depleted. This essentially takes packaging that is not easily recycled and puts a price on its management. Although the decisions by manufacturers and retailers regarding cost internalization are made independently, this fee is typically passed down to the consumer, which means that the beverage industry bears no direct costs for the operation of the program.[43] CRFs range from $0.00 to CAD$0.10 (USD$0.073).

Total system costs, as reported by ABCRC for 2018 totaled approximately CAD$128.7 million (USD$93.9 million), broken down as follows:

- Handling fees CAD$95.6 million (USD$69.8 million)
- Administration: CAD$4.8 million (USD$3.5 million)
- Depreciation: CAD$1.7 million (USD$1.2 million)
- Marketing and technology: CAD $2.2 million (USD$1.6 million)

- Processing: CAD$14.4 million (USD$10.5 million)
- Transportation: CAD$10.0 million (USD$7.3 million)

This translates to approximately CAD$0.067 (USD$0.049) per container.[44]

ABCRC is responsible for collecting deposits from deposit initiators, paying refunds and handling fees, and collecting, processing and marketing scrap materials. ABCRC and ABCC are the only recycling and refillable container collection agents that redemption center owners need to liaise with in order to have their containers collected. [45]

Beverage container manufacturers are responsible for paying both the deposit and the CRF to ABCRC. They may choose to pass the CRF onto the retailer and ultimately, the consumer, along with the deposit. The deposit is refunded to consumers once containers are returned to a redemption depot. ABCRC collects the beverage containers from depots and pays them the deposit and handling fee.

Handling Fees

Handling fees vary by material type and container size and range from CAD$0.0317 (USD$0.023) to CAD$0.2279 (USD$0.17), calculated via formal process which aims to cover the actual cost of handling the containers plus a small return margin. [46]

Every three years, the BCMB's Board of Directors commences a Handling Commission Review to determine and set handling commissions for the following three-year period.[47]

The flexible handling fee allows the redemption centers to cover costs and also to retain a fair return margin through which they can cover their working capital requirements and sustain a reasonable income.

The BCMB methodology is designed to calculate a return margin for regulated companies that lack a sizeable asset or rate base and therefore bases the return margin on the cost of goods sold. BCMB determined that redemption centers require working capital requirements and require a margin on top of cost coverage. The BCMB, therefore, implemented a return margin methodology based on the average return margin for retail and wholesale companies with high turnover ratios. [48]

Material Value

The sale of material is done by the collection agents. ABCRC relied on material sales for approximately 24% of its revenue in 2018.[49]

Unredeemed Deposits

Unredeemed deposits are retained by the central administrators and account for 25% of ABCRC's 2018 revenue.[50]

Qualitative Review and Key Takeaways

A qualitative review of Alberta's container deposit program against the key system principles is provided in Table 6. Other takeaways from Alberta's system that are not covered by these principles are provided below the table.

Table 6: Alberta Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	No statutory turn or recycling rate, although there is a Government set return rate of 85% that has been exceeded. No specified recycling rate calculation.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit (up to 1L at CAD$0.10 (USD$0.073), and over 1L at CAD$0.25 (USD$0.18) is set in legislation, which prevents BCMB from putting in place higher deposits, which would act as appropriate incentives to drive-up the return rates.
Focus on customer access, convenience and experience	Alberta's container deposit redemption is through redemption centers only, but BCMB's self-sets targets that ensure geographical coverage and minimize resident drive times , defined as less than 10 minutes for 50% of residents. The by-laws and service agreements standards ensure that residents receive a consistent level of service and user experience at redemption centers. Currently 227 return depots, approximately 1 redemption center per 19,255 people.
Broad scope of beverages and packaging materials	Alberta has the broadest scope of all deposit programs, including all products (even milk-based drinks, which are excluded in many programs) and all container types (including Tetra-Brik, etc.).
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	Government has appointed BCMB as the regulatory oversight organization to work on its behalf, which protects the program from overly bureaucratic and slow decision-making, which can be the case when oversight is provided directly be government departments.

Principle	Qualitative Evaluation
Management through a producer appointed 501(c)(3) organization	BCMB is a not-for-profit organization incorporated under the Societies Act of Alberta. The appointed collection agents are also non-profit organizations working on behalf of manufacturers.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation;	No province-specific barcoding to prevent cross-border fraud. Redemption centers are predominately manual collection, but there is starting to be investment in bulk sorting and counting technology to better record units redeemed.
Options for retailer participation.	No requirement for retailers to accept containers – redemption centers only. N/A
Financing	
Follow Extended Producer Responsibility – Producer funded net of material revenue and unclaimed deposits	The program is producer responsibility in how it is managed, but not in how it is financed, as the cost of the system (net of unredeemed deposits and material revenue) is passed through to consumers in the form of a container recycling fee (CRF).
Service providers fairly paid	Depots receive a handling fee that varies by material type and container size and which is reviewed every three years. A by-law is in place to govern the handling commission review process.
Unredeemed deposits support recycling system.	Unredeemed deposits are retained by the central administrators and reinvested in the system.

Despite some regulatory restrictions and the fact that producers pass through the cost of the program (net of material revenue and unclaimed deposits) to the consumer, the program has a strong governance structure that provides consistency through bylaws and service agreements. Alberta's program provides consumer convenience and standard service levels at redemption centers and creates a program with continuous improvement.

British Columbia

British Columbia (BC) is a province on the west coast of Canada with a population of 4.7M[51] and a land area of 944,735 square kilometers.[52]

BC's Litter Act was put in place in 1970 as a solution to the epidemic of roadside trash and the deposit program in BC was established under this act.[53] In 1997, the Litter Act was replaced by the Beverage Container Stewardship Program regulation, which expanded the program's scope to all ready-to-drink beverages, except for milk and milk substitutes. In 2004, the Recycling Regulation consolidated all BC EPR regulations, including the container deposit program.

The Recycling Regulation (B.C. Reg. 449/2004, Schedule 1) prescribes a deposit program as the EPR program for beverage containers. All retailers selling beverage containers are to collect beverage container deposits at the point of sale and pay deposit refunds for redeemed containers of the same type and brand that the retailer sells. Retailers are entitled under the regulation to limit the total number of returns to 24 containers per person per day. BC's Recycling Regulation was amended in November 2019 to increase the deposit value for BC to: CAD$0.10 (USD$0.074) for all obligated beverages.[54] The program scope was additionally amended to remove all exceptions, so milk and milk substitutes are now obligated to carry a deposit as well, effective February 1, 2022.[55]

The Recycling Regulation provides a single results-based framework for EPR with a recovery goal of 75%.[56] However, there are no penalties for failing to meet this target, nor any specific requirements for continuous improvement. The Regulation also requires "reasonable and free consumer access to collection facilities" but does not specify a target. It states that "efforts be taken to reduce environmental impacts" but again, does not specify any environmental impact targets.

Under the Recycling Regulation, producers are required to submit an EPR plan every five years as well as an annual report to the director by July 1st each year and to post a copy of the report on their website.[57]

The following outlines the requirements and recommendations for annual reports:

- *Program performance and recovery rate:* Producers are required to document the product's recovery rate information. This should include a description of the recovery rate of the product(s) compared to the target listed in the stewardship plan. The regulation also states that producers should report on the amount of product collected province-wide and in each regional district;
- *Educational materials and strategies*: The report should detail both the educational materials and the various strategies that were used to meet program targets;
- *Collection facilities*: Provide details on collection facility locations and any change in the number and location of these facilities since the previous report. Producers should also report on the number and location of their processing and disposal facilities as well as the services used in the management of the product;
- *Environmental impacts through the product life cycle and pollution prevention hierarchy:* The report must include efforts taken by producers to reduce the environmental impacts throughout the lifecycle of the product and increase recyclability or reusability. The report could include examples of changes in:
    - product design to increase reusability or recyclability;

- processing;
- packaging;
- greenhouse gas emissions; and
- program operations.

The producer may report on the performance of the financial mechanisms the agency is using to promote the reduction of the product's environmental impact. The producer may also report on the status of any studies the producer is undertaking to assist with measuring the environmental impact. Producers are also required to describe how the recovered product was managed in accordance with the pollution prevention hierarchy including the percentage managed at each level;

- *Financial statements:* Producers are required to submit independently audited financial statements for deposits charged in the case of beverage containers.

A system diagram for beer bottles in BC is provided in Figure 3.

Figure 3: BRCCC Container Deposit System in BC

Source: BDL Product Stewardship Annual Report Year Ending December 31, 2011

While the Recycling Regulation defines the scope and deposit value, it is loose in its definition of many of the responsibilities, with requirements to produce a plan, but no requirements for targets or penalties for failing to meet them. The overall structure is flexible and allows a lot of discretion for the stewardship agencies to regulate and innovate in terms of redemption infrastructure.

Stewardship agencies set targets, license redemption centers to limit competition and guarantee collection and sales of material. The agencies operating in BC under the Recycling regulation include Encorp Pacific (Encorp), a third-party organization that manages the container deposit program for non-alcoholic beverages; Brewers Recycled Container Collection Council (BRCCC), which manages alcoholic beverages under the container deposit program; and Recycle BC, which manages the curbside recycling program for packaging.

Governance, Management and Oversight

Though the Recycling Regulation is under the purview of the BC Ministry of Environment and Climate Change Strategy and therefore, its Minister, the Ministry has little involvement in the implementation or enforcement of BC's recycling programs, as the Recycling Regulation grants management to the producers. Yet, the Minister holds the power over decisions on the nature and evolution of the system. The director of waste management or a proxy appointed by the Minister is defined in the legislation as having approval responsibility for EPR plans submitted by the stewardship agencies and for addressing non-compliance.[58]

To carry out the obligations laid out in the Recycling Regulation, deposit initiators formed two stewardship agencies for container deposits:

- BRCCC serves as the non-profit stewardship agency for most domestic beer and some cider brands (all refillable glass beer and cider bottles, as well as all metal beverage alcohol cans). BRCCC contracts with Brewer Distributors Limited (BDL) to operate its program; [59]
- Encorp is the non-profit stewardship agency and serves as the industry's container stewardship agency for all other beverage types including wine, coolers, spirits, some import beer and all non-alcoholic beverages). Encorp operates the "Return-It" redemption centers across BC, where all types of beverage containers (other than milk and milk substitutes) can be returned for a refund of the deposit. [60]

Recycle BC, the agency that operates the curbside packaging recycling program, was formed under the same regulation and operates alongside the container deposit program, but reports independently.

A multi-stakeholder advisory group, the Container Management Board, oversees Encorp's system. This board has no decision-making powers, but advises the Minister on issues relating to the system.[61]

On top of the legislated requirements, the collection agencies define and report on service goals related to collection, awareness, accessibility and convenience as well as environmental performance and operational finances. The Recycling Regulation defines the obligations of producers and that if an offence is committed by failing to meet these obligations, they may be subject to a fine not to exceed CAD$200,000 (USD$150,043).[62]

Operational Delivery

Redemption Infrastructure

There are over 200 redemption centers in BC between the two programs, which handle the majority of container deposit redemptions.[63]

- The Encorp program reported 168 Return-It depots, 1 Return-It Express Plus location and 3 Express & GO station (described below) in 2019[64];
- For containers covered under the BRCCC program, containers are accepted at 1,140 locations, including 72 authorized redemption centers. [65]

Though there is some return-to-retail in the province for the BRCCC program, since Encorp took over management of the non-alcoholic program in 1994, return-to-retail has scaled back. As of 2013, 92% of non-alcoholic container returns were through redemption centers, as well as 86% of alcoholic containers other than beer.[66]

Return-It redemption centers must be licensed by Encorp. However, redemption centers are only licensed when Encorp sees a geographical gap in its redemption network. Encorp publicly posts its openings for redemption center operators when it determines that an area is underserved and partners with entrepreneurs to open redemption centers.[67]

In the past few years, the agency has slowed the pace of opening redemption centers; there has not been a new redemption center in 2-3 years, mostly due to real estate constraints. The program is now piloting express redemption centers with smaller express locations and unmanned bag drop locations, known as Return-It Express Plus and Express & GO stations, respectively.

Collection and Processing

Encorp contracts out their collection, transportation and processing to third-party organizations across BC through competitive procurement processes. Material is compacted and shipped to various recyclers in BC and beyond.[68]

Reporting and Performance

Reporting

Encorp and BRCC both report on a variety of performance indicators, some of which overlap, though Encorp reports on a greater number.

The collection agencies define and report on service goals related to collection, awareness, accessibility and convenience as well as environmental performance and operational finances. In addition to the collection rate targets, Encorp and BRCCC have set the following additional targets:

- Encorp set its recovery target of 82% in 2018.[69] Additional goals under its Stewardship Plan include:[70]
    - A 97% consumer access goal, based on drive times (30 minutes for urban areas and 45 minutes for rural areas) set out in the Stewardship Agencies of British Columbia (SABC) accessibility standard[71];

- A 90% awareness goal of locations to which containers can be returned. [72]

- The BRCCC has set a recovery target of 87.5% for the years 2015-2019. [73]
  - An additional accessibility target includes 385 return locations by 2019 (or 80% of the population living within a 10-minute drive of a return location).[74]

Encorp and BRCCC's performance against their redemption goals are stated below.

Redemption/Recycling

The redemption rate across BC's two deposit return is approximately 82%.[75]

- Encorp collected a total of 1.1 billion beverage containers in 2019 of the over 1.3 billion containers sold covered in its program, which equates to 207.8 units collected per capita and an overall redemption rate of 78.1%.[76] This falls short of their issued goal of 82%, but is up from the 2018 rate of 77.4% and above the regulated requirement of 75%.[77]
- Redemption rates for containers recovered under BRCCC's deposit program were significantly higher than Encorp's. In 2018, BDL collected 621.7 million containers for an overall redemption rate of 89.2%, surpassing their goal of 87.5%.[78]

Though the recycling target is an aggregate for recycling across the province, each system administrator reports recovery rates separately. In 2018, Recycle BC reported a recovery rate of 78.1%.[79] Stewardship agencies work together informally in consultation with the Ministry of Environment to meet the targets outlined in the regulation.

In addition to the provincial requirements, Encorp Pacific (Canada) develops recovery targets based on the commodity categories of beverage containers collected. Encorp's 2018-2022 Stewardship Plan proposes the following targets[80]:

- **2018:** aluminum 80.7%; glass 87.7%; plastic 71.4%; polycoat 58.2%; other 58.2%; overall rate 76.2%
- **2019:** aluminum 87.9%; plastic 71.6%; polycoat 58.7%; other 58.6%; overall rate 76.4%
- **2020:** aluminum 81.2%; glass 88.1%; plastic 71.8%; polycoat 59.0%; other 59.3%; overall rate 76.7%
- **2021:** aluminum 81.4%; glass 88.3%; plastic 72.0%; polycoat 59.2%; other: 59.7%; overall rate: 76.9%
- **2022:** aluminum 81.5%; glass 88.5%; plastic 72.3%; polycoat 59.4%; other 60.0%; overall rate 77.1%

Carbon Emissions

Encorp reported that its activities in 2019 contributed to the reduction of about 1,048,000 tonnes of CO_2e, an increase over its 2018 report of 1,026,000 tonnes.[81]

BRCCC reported for 2018 an avoided CO_2e of 81,822 tonnes.[82]

System Finances

Encorp uses unredeemed deposits and scrap material revenues to cover its program costs. The net difference between those funds and total costs are covered by the non-refundable CRF, charged on each beverage purchased. The CRF varies for each beverage container category. As a not-for-profit, product stewardship agency, Encorp only charges the net system costs after revenue is subtracted. These fees fluctuate and are calculated on an annual basis. A summary of Encorp's finances for 2019 is provided below.

- Deposits collected: CAD$90,315,218 (USD$65,908,885);
- Refunds issued: CAD$77,587,390 (USD$56,620,562);
- Total revenue: CAD$84,236,942 (USD$61,473,172);
- Total expenses: CAD$96,091,448 (USD$70,124,176).[83]

Unlike Encorp, BRCCC's program is fully funded by the deposit initiators and there is no transparent pass through to consumers.[84] This cost is factored into the shelf price of the product (i.e. not added at the till) as any other business cost, such as labour, energy, or transportation.[85] Therefore, they report only on the deposits received and refunded, as follows for 2018:

- Deposits collected: CAD$71,396,551 (USD$52,102,704);
- Refunds issued: CAD$62,195,012 (USD$45,387,743)[86].

Redemption centers recoup paid deposits from Encorp and BDL. Payment terms are set through agreements with the stewardship agencies.

A large proportion of redemption centers (approximately 100 of the existing redemption centers) participate in other activities to increase revenue. Most commonly, this includes the collection of materials for other stewardship programs, including electronics, paint and batteries.[87, 88]

Handling Fees

Handling fees are calculated by negotiation between the stewardship agencies and the redemption center owners. Encorp conducts a review every five years. The agency works with a group of redemption centers that represent a cross-section (selected by a third-party accounting firm to represent rural and urban, different volumes, etc.). Encorp tries to identify costs, find a balance between high and lower volume redemption centers and determine fair compensation. Encorp also takes into account that redemption centers also receive handling fees from BRCCC and that lower-volume redemption centers often receive grants from the government, which provide a base level of revenue.[89]

The handling fees are not publicized and information is scarce. In 2013, Encorp's handling fees were, on average, CAD$0.047 per container.[90]

For the BRCCC program, redemption centers independently negotiate handling fees directly with the industry. The average rate is about CAD$0.29/dozen or CAD$0.0242/bottle for beer.

Material Value

The stewardship agencies collect and sell collected material, which contributes to the financing of the program.

Unredeemed Deposits

Unredeemed deposits are retained by the stewardship agencies to help cover program costs.

Complementary EPR for Packaging

In BC, the two beverage deposit programs operate alongside a fully-producer funded and operated EPR model for curbside recycling of materials. In aggregate, these programs are subject to the target recovery rate of 75% for each subcategory of beverage containers covered under the program, as outlined in the Recycling Regulation.[91] Recycle BC is the system administrator for the curbside recycling program and produces its own EPR plan and annual reports. The DRS and curbside programs report on their own redemption rates, which can be compared to the generation data provided by producers to calculate the province-wide recovery rate. However, there are no penalties for failing to achieve this target and no requirement for increased targets if the target is met or mechanisms to enable achievement if it is unmet.

Qualitative Review and Key Takeaways

A qualitative review of BC's container deposit program against the key system principles is provided in Table 7.

Table 7: BC Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	No beverage container-specific redemption or recycling target set in legislation. There is an overarching packaging and paper product recycling rate target in the Recycling Regulations but this is not statutory.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit value minimum set in legislation. BC recently increased the deposit for non-alcoholic beverage containers to match that of alcoholic beverage containers, making the deposit CAD$0.10 (USD$0.074) for all beverages.
Focus on customer access, convenience and experience	Program is both return-to-retail (for BRCCC containers) and redemption centers. Encorp is piloting different types of express drop-off facilities to provide a greater level of customer convenience. About 385 redemption centers, approximately 1 redemption center per 13,171 people.

Principle	Qualitative Evaluation
Broad scope of beverages and packaging materials	Broad scope of alcoholic and non-alcoholic beverages in wide range of container material types.
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	The program has very little regulatory oversight and both the deposit program and the packaging EPR programs have been criticized for lack of transparency. The multi-stakeholder advisory group that reports to the government has no decision-making powers, so cannot significantly influence the program.
Management through a producer appointed 501(c)(3) organization	Encorp and BRCCC are non-profit stewardship organizations that manage the programs
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation;	Program is still predominately a manual system.
Options for retailer participation.	Though there is some return-to-retail in the province for the BRCCC program, since Encorp took over management of the non-alcoholic program in 1994, return-to-retail has scaled back.
Financing	
Follow Extended Producer Responsibility – Producer funded net of material revenue and unclaimed deposits	Encorp uses unredeemed deposits and scrap material revenues to cover its program costs. The net difference between those funds and total costs are covered by the non-refundable CRF, charged on each beverage purchased. Unlike Encorp, BRCCC's program is fully funded by the deposit initiators[92] and there is no transparent pass through to consumers.
Service providers fairly paid	Encorp tries to identify costs, find a balance between high and lower volume redemption centers and determine fair compensation. Encorp also takes into account that redemption centers also receive handling fees from BRCCC and that lower-volume redemption centers often receive grants from the government, which provide a base level of revenue.

Principle	Qualitative Evaluation
Unredeemed deposits support recycling system.	Unredeemed deposits are retained by the stewardship agencies to help cover program costs.

Germany

Germany has a population of approximately 83.8 million people[93] and, as a member of the European Union (EU), is subject to laws of the EU as well as its own.

The *Ordinance on the Avoidance of Packaging Waste* (Packaging Ordinance) was implemented in Germany in 1993 to reduce the environmental impacts associated with waste arising from packaging.[94] The Packaging Ordinance is an EPR law, making producers responsible for the end-of-life management of their packaging including hitting targets for recycling and refilling.[95] Section 9 of the Packaging Ordinance requires distributors of beverages in one-way [single-use] packaging to charge deposits of at least €0.25 ($0.28) on all containers sold and to manage the take-back of those containers. This section of the Packaging Ordinance came into effect in 2003, following the triggering of a provision that mandated that deposits would apply to single-use containers, if the share of reusable containers fell to less than 72% of the market, which occurred between 1997 and 2000.[96] The container deposit applies to all beverages except milk products, fruit and vegetable juices, between 0.1L and 3L in any packaging except reusables, cartons, heat-sealed-bags or standing foil bags.[97]

DPG Deutsche Pfandsystem GmbH (DPG) is a non-profit organization that was established in 2005 by the beverage industry to create a collective framework for producers to comply with the Packaging Ordinance. The same year, the government passed the Third Ordinance amending the Packaging Ordinance, which simplified the provisions in regards to single-use beverage containers.[98]

In 2019, the Packaging Act was created to update and replace the Packaging Ordinance, targets for all packaging were increased and the Central Agency Packaging Register (ZSVR) was created. This agency is responsible for registering all packaging producers and creating a more transparent reporting system. The centralized database will enable more oversight into proper reporting by ZSVR.[99] Incentives were introduced for the use of ecological packaging materials; this was the beginning of fee modulation. This update intends to incentivize producers to take steps to reduce all packaging waste as much as possible, and promote institutional recycling and reutilization of materials, particularly single-use plastics.[100] Targets in the original packaging ordinance as well as the 2019 update are presented in Table 8.

Table 8: German Packaging Targets

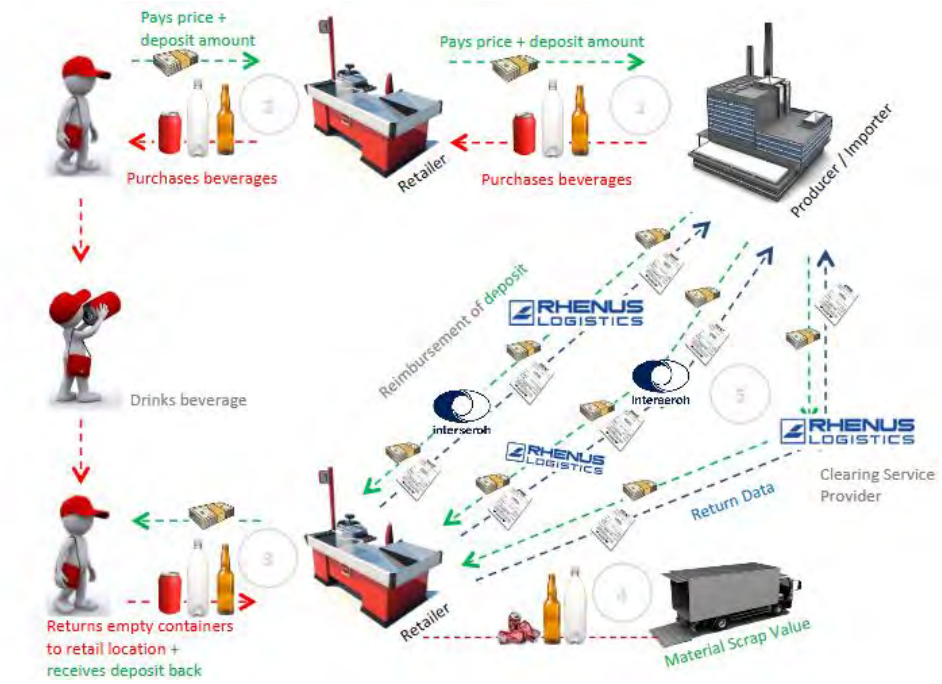
Material	Target Packaging Ordinance (%)	Target 1st Jan 2019 (%)	Target 1st Jan 2022 (%)
Glass	75	80	90
Paper, board and cartons	70	85	90
Ferrous metals	70	80	90
Aluminum	60	80	90
Beverage carton packages	60	75	80
Other composites	60	55	70
Plastics	60	90	90
Mechanical recycling (plastic)	36	58.5	63

Source: DSD https://www.grontpunkt.no/media/2866/2017-11-22-denison-dsd-oslo-final.pdf

The German system is decentralized, meaning no one body manages the refunds of deposits. Instead, Germany has an organization of producers that establishes a framework under which producers settle deposits themselves.

At €0.25 ($0.28), the German deposit is higher than most (see table in Appendix 0). In its favor, it is linked to an impressive reported return rate of approximately 97%.[101]

Figure 4: German Containers Deposit System Flows



Source: Reloop Platform, https://www.reloopplatform.org/wp-content/uploads/2018/05/BOOK-Deposit-Global-27-APR2018.pdf

Governance, Management & Oversight

The German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (Ministry of the Environment) retains legal responsibility over the deposit program and all other EPR programs as the agency responsible for the Packaging Ordinance. However, control and compliance is done by local regulatory authorities who may remit penalties in the case of non-compliance by producers (e.g. shops selling beverages without deposits).

DPG provides the legal and organizational framework for producers to fulfill their obligations in regards to the requirements under the Packaging Ordinance. Due to the decentralized nature of Germany's system, DPG has no knowledge of deposit money, sales quantities / return quantities nor bilateral conditions.[102]

All organizations involved in the deposit system in Germany (manufacturers, distributors, importers, retailers, etc.) must sign a contract with the DPG to be authorized to take part in the management of the German container deposit system.

Other stakeholders in the German system are deposit account service providers and refund claimant service providers. These organizations can assist the manufacturers or distributors in the management of deposit accounts, receipts and disbursements or retailers in claiming the deposit from the deposit account holder.

Operational Delivery

Redemption Infrastructure

The German container deposit system is solely return-to-retail, with over 100,000 redemption points across the country.[103] Retailers are required to take back all containers of a material that they sell in their store, even if they do not sell a particular brand.[104] However, stores smaller than 200 m^2 may limit the containers they accept to only those brands that they put into circulation.[105] Most retailers in Germany use reverse vending machines (RVMs) for container collection. The take-back at retailers is estimated to be approximately 80% automated and 20% manual.[106]

Collection and Processing

Retailers collect all material returned in the German container deposit system and are also in charge of selling it, so they essentially determine the flow of material. This system has led to some large retailers, such as the grocery retailers Lidl, to become vertically integrated and expanding into processing, and recycling of material, producing rPET to feed back into the supply chain. Most smaller retailers contract waste management companies to provide this function.[107]

Reporting and Performance

Reporting

The German Federal Ministry of the Environment reports on overall recycling rates and the shares of beverage containers in reusable packaging.[108] Due to the decentralized nature of the system, reporting specific to beverage containers is disparate and difficult to track.

Redemption/Recycling

At €0.25 ($0.28), the German deposit is higher than most. In its favor, it is linked to an impressive reported return rate of approximately 97%.[109]

Though one of the aims of the Packaging Ordinance was to increase the share of reusables, since the implementation of the deposit program, the overall percentage of reusable bottles has actually sunk from approximately 70% to 44% by 2017.[110]

Carbon Emissions

There is currently no total GHG reduction calculation associated with avoided impacts of recycling versus landfill or of returning containers through a deposit program versus curbside recycling.

System Finances

DPG is financed by the membership fees paid by organizations that register as members to be part of the deposit system.

Germany's long land borders with countries that do not have a DRS and freedom of movement within the EU, means there is high risk of fraud. Therefore, the German system relies on more expensive fraud prevention measures than other systems, with an associated cost for beverage producers.

Though these measures are reported to be effective in preventing fraud, they also add considerably to producers' costs (approximately €0.005 per container)[111] for a two-step verification process. In addition to a unique bar code, container labels must include the DPG marking (pictured), which uses special DPG security ink that is read by the RVM's infrared scanning technology.

The German system accordingly means additional costs and bureaucracy that, while believed to reduce the likelihood that only deposit-bearing containers are redeemed, would not be justified in other systems that have a lower deposit.

This complex system of fraud prevention, in addition to annual system costs, required initial investment costs for industry and retailers (for RVMs). Industry is estimated to have spent €24 million ($27 million) and retailers, in aggregate, approximately €702 million ($790 million).[112]

Handling Fees

None, retailers are instead compensated via the value of the material (see below).

Material Value

Retailers in Germany are not paid a handling fee but are instead the material owners. While the revenue from the material sales will help to compensate them for the costs of the service they provide, it has the same drawbacks as the US systems for producers. Additionally, as material prices fluctuate significantly, retailers in Germany cannot predict the income they will receive so they cannot be confident that their costs will be covered.

Unredeemed Deposits

Unredeemed deposits are retained by individual producers.

Complementary EPR for Packaging

The curbside recycling program for packaging, known as Der Grüne Punkt, or Green Dot, was the first EPR system for packaging and was authorized through the same Packaging Ordinance that enacted the deposit program. The Ordinance required a separate stream of collection for packaging from household waste and made it mandatory for producers to ensure recovery of their packaging and to cover the costs to meet national recovery targets for each material.

Qualitative Review and Key Takeaways

A qualitative review of Germany's container deposit program against the key system principles is provided in Table 9.

Table 9: Germany Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	Germany has targets for all packaging collectively, to which the deposit program significantly contributes. Recycling calculation in line with EU standards following 2019 legislative update.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit value (€0.25 ($0.28)), is higher than most, incentivizes a high return rate. No simple mechanism for updating value.
Focus on customer access, convenience and experience	Return-to-retail model ensures a large number of redemption points for consumers, totaling over 100,000 across the country, or one for approximately every 820 people.
Broad scope of beverages and packaging materials	Germany's program scope is broad, previous exceptions based on beverage type, packaging material and size were repealed under the 2019 update.
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	The Ministry of the Environment retains legal responsibility over the deposit program and all other EPR programs, but does not interfere much in operations. Penalties for non-compliance issued by local regulatory authorities.
Management through a producer appointed 501(c)(3) organization	DPG is a non-profit organization of the beverage industry that provides a framework for compliance, but management is left largely to individual producers.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation	The majority of redemption at German retailers is through RVMs (80%). Germany also uses specific

Principle	Qualitative Evaluation
	labeling and barcoding to tack containers and prevent fraud.
Options for retailer participation.	All retailers must participate and accept all deposit containers, unless their stores are less than 200 m^2, in which case they can choose to only accept brands that they sell
Financing	
Follow EPR – Producer funded net of material revenue and unclaimed deposits	German has full EPR, producers may mark up material to compensate for additional expenses
Service providers fairly paid	Retailers do not receive handling fees, but instead retain the value of the material that they collect, meaning they are subject to market fluctuations and at a disadvantage as small sellers.
Unredeemed deposits support recycling system	Producers retain unredeemed deposits, may use as they see fit, but as they cover the cost of the system, these funds are likely used to cover that cost.

Maine

Maine is the northernmost state in the northeast US and relatively rural with 40% of the 1.3M[113] population located in the Portland metropolitan area, despite a land area of 30,842.92 sq. miles.[114]

Maine's deposit program was instituted in 1978 through the Maine Returnable Beverage Container Law.[115] The intended purpose of Maine's beverage container redemption program is to prevent beverage containers from becoming litter or being disposed of via the municipal solid waste stream. It is designed to achieve this purpose by incentivizing the return of containers.[116]

Subsequent updates to the law transferred administration of the deposit program from the Department of Agriculture, Conservation and Forestry to the Department of Environmental Protection to the Department of Environmental Protection (DEP) and increased the handling fee half a cent, effective in January 2020. [117] [118]

Maine's program scope includes all beverages excluding dairy and cider.[119] The deposit value is $0.15 for wine and liquor above 50 mL and $0.05 for all others. [120] The deposit has been the same since the law was implemented and the law must be amended to increase it.

Maine's container deposit program is notable as one of the more successful programs in the US, though it is difficult to confirm its exact performance, as there is no central repository for data to confirm redemption rates, which prevents the program from being fully transparent and assessable. However, redemption rates are believed to be among the highest in the US, based on estimates from program operators.

Maine has the highest handling fees of any program in the US, which has resulted in market saturation of redemption centers, though their proliferation has since been limited through new legislation. Maine's legislation also allows for commingling groups, which allow similar bottle types to be sorted together for a lower handling fee. Maine also requires retailers to accept containers for redemption unless they join a "Member Dealer Agreement," which allows them to discharge their redemption obligations by working with a redemption center. Member dealer retailers must post the location and hours of the associated redemption centre and be a registered affiliate with the DEP.[121]

An overview of Maine's deposit system is provided in Figure 5.

Figure 5: Maine Container Deposit System Overview

Governance, Management and Oversight

The Department of Environmental Protection (DEP) is responsible for the overall administration of the redemption program and establishes the program processes, including

- licensing and renewals of redemption centers;
- registration of beverage container labels and labeling requirements; and
- registration of contracted collection agents.

However, there are no performance indicators to monitor services provided to redemption centers from deposit initiator (e.g. collection and payment terms set in legislation) and there is the potential for free riding, as there no collection of data on beverages sold and containers redeemed.

Operational Delivery

Redemption Infrastructure

Container redemption in Maine is through both return-to-retail and redemption centers. There are currently 449 redemption centers licensed by the Maine DEP across the state. This is up from 294 in 2001. Although the DEP does not have official redemption numbers, it is estimated by a collection agent that 20% of redeemed units are redeemed through retailers and 80% through redemption centers.[122] This is likely due to the proliferation of redemption centers and the option of the Member Dealer Agreement.

The market for redemption centers in Maine is considered saturated, with one redemption center for every 2,900 people in the state. The most recent legislative update in 2019 created a limit on redemption centers per capita for new centers (one for every 5,000 people), but the DEP has discretion on enforcing the limit through the issue of new licenses, existing centers were grandfathered in and not subject to the new rule.

About 15-20% of redemption centers use RVMs to redeem containers. This percentage is increasing as RVM technology has been recognized as driving efficiency; allowing for automated sorting and counting of beverage containers, saving time and labor costs.[123] The relatively high handling fee enables redemption centers to afford RVMs, which would not be possible in other jurisdictions (for example, in Iowa, where the handling fee is $0.01). RVM technology, though a large upfront investment, reduces labor cost and reduces the amount of space needed for redemption centers.

Redemption centres play an informal, but important role in identifying and rejecting ineligible containers and reporting suspicious redemptions to the DEP. Additionally, large volume redeemers (>2500 containers at once) must provide identification and fill out a form that identifies the redeemer to be submitted to the DEP, in order to record large redemptions and prevent fraudulent redemption.

Collection and Processing

Under the legislation, producers or their pickup agents are required to collect their materials from redemption centers and pay handling fees to redemption centers. Producers are required to provide pickups to redemption centers every 15 days. If necessary, redemption centers can request additional pickups after collecting 10,000 beverage containers from a single brand owner or commingling group. Additional collection service requests must be made within ten days.[124]

Commingling Agreements

The legislation provides special allowances for producers that participate in commingling agreements. These agreements allow brands to join together to collect material from redemption centers, reducing the number of sorts that redemption centers must do and collection agents that they must liaise with. The intention of these agreements is to reduce the labor burden on redemption centers, who must sort containers according to brand to allow producers to collect their applicable containers. The commingling groups allow redemption centers to group containers of participating producers together. The state allows two or more brand owners to enter into a commingling agreement. A commingling group must include 50% or more of the beverage containers of like product group, material, and size for which deposits are being initiated in the state.[125]

However, the structure of the agreement is flawed, as even though 76% of brands are covered under these agreements, the remaining and smaller brands do not have the volume to create their own commingling groups and are often excluded from existing groups, as larger deposit initiators prefer to work with fewer partners. This results in smaller brand owners having to pay a higher handling fee and being required to forfeit their unredeemed deposits to the state (the two benefits afforded brands in commingling groups) as well as redemption centers receiving lower payments overall due to the reduced handling fee on the majority of the containers.[126]

Reporting and Performance

Redemption/Recycling

There is no mechanism for determining the redemption rate in Maine. This is due to the fact that deposit initiators in commingling groups are not required to report their statistics to the State. Though there are no overall redemption rates for the system, the following were reported by different parties, in terms of redemption figures:

- In 2015, an estimated 1.2B deposit containers were sold in Maine.[127]
- In 2016, brand owners whose containers are not subject to a commingling agreement self-reported to Maine Revenue Services total sales and redemptions of beverage containers that represented a redemption rate of 74.7%.[128]
- The Bureau of Alcoholic Beverages and Lottery Operations (BABLO) provided total sales and redemptions figures for 2016 that suggest a calculated redemption rate of 87.2% for distilled spirits.[129] This rate is down from those reported in a 2001 study, of 6.7 million wine and hard liquor containers returned in 2001 at 98.8% redemption; and 96.9% in 2000.[130]

The absence of data to assess the effectiveness of the program has long been a concern and was reported by a Study Commission in 2001.[131]

Carbon Emissions

Maine's beverage container recycling avoided an estimated 82,588 metric tons of CO_2e in 2015.[132] Of this total, 59% was attributed to the recycling of aluminum cans, 17% to PET bottles and 21% to glass bottles.

System Finances

The system cost is effectively funded by producers/distributers and as such could be deemed a form of producer responsibility. The main costs to the DEP are personnel costs. As the DEP does not take a very hands-on approach, the system costs are relatively low, as seen in Table 10.

The main source of revenue are the licensing fees that producers and collection agents pay to participate in the system.

Table 10: DEP Estimated FY2018 Costs and Actual FY2017 Offsets

	$
Costs	**204,000**
Personnel	183,000
Other Costs	21,000
Offsets	**218,000**
Licensing Fees	218,000
Late Fees	69
Net Revenue	**14,000**

Source: https://legislature.maine.gov/doc/2316

Handling Fees

Maine has the highest handling fees in the US. Handling fees are set in the legislation at a fixed value of $0.04 and $0.035 for beverages in a commingling agreement. Maine has periodically increased handling fees, with the latest increase in 2019, which made the handling fee $0.045 beginning in January 2020.[133]

Redemption centers must deal with individual deposit initiators or their agents in order to receive their handling fees and deposit refunds. Since each deposit initiator is only responsible for its own products (or those in the commingling group), the redemption centers may have to liaise with over one hundred different parties. Deposit initiators are required to pay within 10 days of accepting material.[134]

Material Value

Deposit initiators are responsible for the collection and sale of material and use this income to offset costs. Therefore, redemption centers do not depend on material value income which can vary due to market fluctuations, reducing their business risk.

Unredeemed Deposits

In Maine, the State retains unredeemed deposits in its General Fund, unless the associated producer is part of a commingling group. If they participate in a commingling group, the producer is able to retain the unredeemed deposits on their containers.[135]

Qualitative Review and Key Takeaways

A qualitative review of Maine's container deposit program against the key system principles is provided in Table 11.

Table 11: Maine Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	No targets in legislation. No insight into actual redemption rate nor recycling rate.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit value is low ($0.05 for most containers) and has not changed since program implementation. Legislation must be amended to update deposit value.
Focus on customer access, convenience and experience	Currently 499 redemption centers (1 per 2900 aiming to reduce to 1 per 5,000 people) use of bag drop in some areas.
Broad scope of beverages and packaging materials	Broadest scope in the US. Includes all beverages excluding dairy and cider.
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	Department of Environmental Protection provides oversight and system operator functions.

Principle	Qualitative Evaluation
Management through a producer appointed 501(c)(3) organization	Department of Environmental Protection (government agency) acts as the system administrator.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation	Only 15-20% of redemption centers use RVMs to redeem containers, no other fraud protection measures.
Options for retailer participation.	Retailers can opt out of redemption function by signing a Member Dealer Agreement with a nearby redemption center.
Financing	
Follow EPR – Producer funded net of material revenue and unclaimed deposits	Producers fund the handling fees, some cost to taxpayers through DEP administration functions.
Service providers fairly paid	High handling fees allow redemption centers to be profitable
Unredeemed deposits support recycling system	Commingling agreements allow most of the larger producers to retain the unredeemed deposits; otherwise, they are returned to the State General Fund.

Norway

Norway is a Scandinavian country with a population of approximately 5,282,220.

In 1974, Norway implemented the Product Control Act, which levied an excise tax on all packaging including non-refillable beverage containers. Norway imposes an excise duty per unit of single-use beverage packaging placed on the market. The tax consists of both a base tax and an environmental tax, the rates of which are shown in Table 12. Rather than legislative targets, as in some other countries, this environmental tax is the key mechanism for incentivizing high return rates.

Table 12: Norwegian Beverage Packaging Excise Tax

Tax on beverage packaging	NOK/ container	USD$ equivalent/ container
Basic tax, disposable packaging	1.19	0.12

Tax on beverage packaging	NOK/ container	USD$ equivalent/ container
Environmental Tax		
A) Glass and metal	5.79	0.60
B) Plastic	3.50	0.36
C) Cartons and cardboard	1.43	0.15

Source: https://www.regjeringen.no/no/tema/okonomi-og-budsjett/skatter-og-avgifter/avgiftssatser-2018/id2575160/

In 1997, Regulations relating to the recycling of waste were updated to link the excise tax to the recycling rate of single use beverage containers. The regulation states:

"A precondition for approval is that the take-back system is expected to achieve a minimum recovery rate of 25%, and that the packaging is made available for environmentally sound recycling. Take-back systems based on energy recovery will only be approved if reuse or materials recycling is not technically, environmentally or financially feasible."[136]

This applies to all beverage types in plastic and metal containers. The regulation also stipulates that all beverage retailers are obliged to take-back and refund used containers.

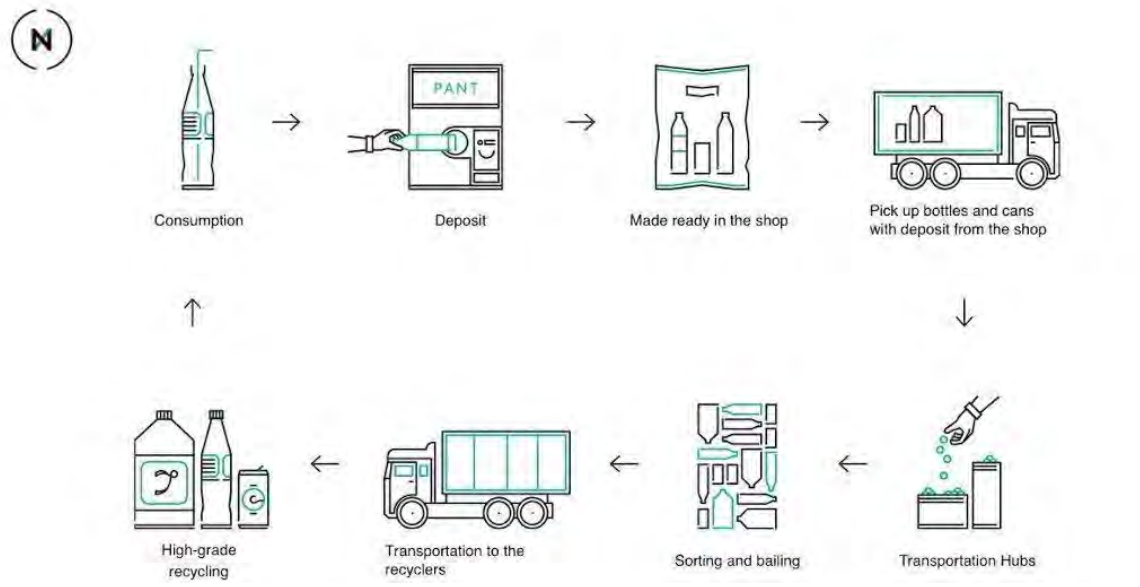
As the recycling rate increases, the tax is reduced, as follows:

- Recycling rate ≤ 25%, full tax imposed;
- Recycling rate 25-95%, tax inversely proportional to return rate;
- Recycling rate ≥ 95%, exempt from tax.

Norway increased its deposit in 2018 to NOK 2 ($0.25) for plastic and metal containers ≤0.5 liter (from NOK 1) and NOK 3 ($0.38) for plastic and metal containers >0.5 liter (from NOK 2.5).[137]

A depiction of Norway's container deposit system is provided in Figure 6.

Figure 6: Overview of Norway Container Deposit System



Source: Infinitum

Governance, Management and Oversight

The Norwegian Climate and Pollution Agency approves the take-back system. They set the Beverage Container Tax and discount the tax that producers pay as they increase the percentage of containers that they collect. At a minimum, the system must be able to achieve a 25% recovery rate, but the Agency sets the expected return rate.[138]

Infinitum, a non-profit organization whose board includes representatives of both the beverage and retail industry, operates the deposit system and container collections. It is a not-for-profit organization owned by the brewing and retail industries. Its goal is the "efficient, forward-looking and environmentally friendly operation of the deposit system." Infinitum's board and members choose many of its reporting requirements. Infinitum's membership agreement with producers commits it to notifying return rates to the Tax Directorate.

Operational Delivery

Redemption Infrastructure

Norway uses the return-to-retail model with a mix of RVMs and manual services, depending on whether the retailer chooses to provide an RVM. Containers can be returned to 15,000 shops, kiosks and gas stations, meaning consumers do not have to travel far, undertake a special journey to redeem their deposit or sort their containers and return to a number of shops with different brands.[139]

While there are 15,000 return locations, there are only 3,700 RVMs in Norway.[140]Despite this, 93% of containers are returned to an RVM; this enables Infinitum to make the logistics

operation as efficient as possible as the RVMs compact the containers and provide data for predicting return patterns and determining collection schedules.

Container labels are required to include the deposit logo to signify the level of deposit paid. Additionally, producers can choose whether to use a universal bar code (which allows the beverage to be sold in any country), or a bar code unique to Norway. These are registered with the system and recognized by RVMs, which can then approve a refund or reject the container. Unique bar codes are more expensive for producers, as they require separate stock keeping units for each country. Conversely, they reduce the costs of fraud for the DRS, as they prevent containers bought outside Norway being returned for a refund that was not paid in the first place. As a result, the producer fees are lower for containers that use a unique bar code. All bar codes are registered with Infinitum and are scanned by the RVMs, which can reject containers that are not registered. Additionally, data from the RVMs enable Infinitum to monitor remotely return volumes and detect any unusual patterns that would indicate fraud.

In response to the growth in online shopping, Norway (like Germany) has made provisions for people to return their empty beverage containers via a home delivery service provided by retailers. Consumers can buy Infinitum bags from their online retailer, which are bar coded and embedded with a code to track the bag and its contents. This means all retailers are treated fairly and people who do not have the time, or capacity due to health issues, to visit a shop can still return their containers for a refund. In Norway approximately 1% of returns are via home delivery.

Collection and Processing

Norway's program relies on reverse logistics to transport containers from retailers to wholesalers for consolidation. Infinitum transports containers from wholesalers to its sorting and compacting centers and sends it to contracted recyclers for final processing.[141]

Reporting and Performance

Reporting

All members of Infinitum must report their sales to Infinitum every month. Infinitum uses this information to create a monthly deposit and administration fee invoice for each producer.[142]

Infinitum produces an annual report that includes several key performance indicators, including (in 2017):[143]

- The return rate by material;
- Number of cans and bottles that are collected;
- Number of return locations;
- Number of RVMs;
- Number of newly registered products and producers/ importers;

- Number of containers that are recycled;
- Number of containers sent for energy recovery;
- Financial statements, including income and operating expenses.

Infinitum also reports on fees charged to producers and paid to retailers.

Redemption/Recycling

In 2018, the return rates were 87.3% for cans and 88.6% for bottles. This rate was down from the highs of the system, but is expected to rise again following a change in the deposit value, which was implemented in late 2018. Norway raised the deposit value in 2018 from NOK 1 to NOK 2 for containers less than 500mL and from NOK 2.50 to NOK 3 for containers 500mL or greater.[144]

In addition to the bottles and cans returned, additional beverage containers are captured, which contribute to the recycling rates. Through this combination, producers have recycled[145] over 95% of beverage containers every year since 2012, exempting them from the excise tax. The breakdown to this recycling rate is shown in Table 13.

Table 13: Norwegian Reported Recycling of Cans and PET Bottles

Recycling Pathway	Number of Cans	Can Percentage	Number of PET Bottles	PET Bottle Percentage
Sold into market	652,256,153	100%	632,805,000	100%
Returned via RVM and deposit refunded	567,763,101	87.3%	564,117,000	88.6%
Recycled from waste	76,742,920	11.6%	49,924,000	6.5%
Via centralized sorting	5,926,413	0.9%	705,000	0.1%
Via slag sorting[146]	52,236,195	7.9%	N/A	N/A
Via materials sorted at source	7,301,178	1.1%	1,891,000	0.3%
Energy recovery	11,279,135	1.7%	47,328,000	6.1%
Total Recycled	644,506,021	98.9%	614,041,000	95.1%

Source:https://infinitum.no/file/27/a40179d6890780d5260c405147ecd9ce/Infinitum_annual_report_2018_spreads.pdf

Carbon Emissions

Infinitum reports that every increase in the return rate for plastic bottles by one percentage point means a reduction in carbon emissions of 990 tonnes a year, while the same figure for cans is 620 tonnes.[147]

System Finances

Infinitum publishes their financial statements within their annual report. An abridged summary of profits and losses for 2018 is presented in Table 14.

Table 14: Infinitum Income Statement for 2018

Operating Revenues and Expenses	NOK	USD $
Administration Fees	118,000	12,000
Income from deposit-return scheme	2,207,000	228,000
Sale of collected materials	183,000	19,000
Other operating revenues	36,000	4,000
Total operating revenues	**2,544,000**	**263,000**
Deposit-return scheme expenses	2,031,000	210,000
Handling charges	243,000	25,000
Transport costs	115,000	12,000
Other costs	76,000	8,000
Total operating expenses	**2,465,000**	**254,000**
Operating profit/loss	**79,185**	**8,000**
Profit/loss after financial items and overhead	**19,000**	**2,000**

Administration Fee

Producers pay an administration fee for every container they place on the market. These are listed in Table 15. The fee structure is designed so that producers of containers that have low return rates, and/or which cannot be recycled, or are harder to recycle due to design, pay proportionally more into the program to cover its costs. The fee structure is additionally used to incentivize eco-design and ensure that producers pay for the additional costs if they are using materials that are less easily recycled, unnecessary packaging, or materials that have a lower value. Additionally, producers in Norway have the option to use a universal bar code or a country-specific bar code. A country-specific bar code is one of the most effective mechanisms for preventing fraud in the system. As such, if a producer chooses to use a

universal bar code, they pay a higher producer fee. In Eunomia's experience, levels of fraud in deposit systems typically run at between 3-6% when country/region specific bar codes are not in place, and fraud impacts most when systems have high return rates, as it reduces the level of unredeemed deposits that offset system costs.

Table 15: Norway Producer Fees by Material

Beverage Container Type	NOK/Beverage Container	USD $ Equivalent/ Beverage Container
Aluminum Can	0.08	0.0083
Steel Can	0.21	0.022
Additional fee if can has plastic sleeve	0.03	0.0031
PET Bottle	0.10	0.001
HDPE Bottle	0.10	0.001
Additional fee for light blue plastic	0.08	0.0083
Additional fee for colored plastic	0.15	0.015
Additional fee for standard bar code	0.06	0.0062

Source: https://infinitum.no/kostnadskalkulator

In addition to the per container fee, producers pay a one-off registration fee of NOK 10,000 ($1,032) for every type of container they place on the market.[148] This covers the costs of registering the container in the system and checking it is RVM-compatible.

Handling Fee

The handling fee is intended to reflect costs (in terms of staff time, retail space foregone and any RVM costs) and is used to promote more efficient options and, consequently, to reduce the overall system costs.

Where manual collection, or collection via a non-compacting RVM is undertaken, the retailer receives a handling fee of NOK 5 ($0.52) per can and NOK 10 ($1.03) per plastic bottle.[149] Where a compacting RVM is installed, the retailer receives a handling fee of NOK 20 ($2.06) per can and NOK

25 ($2.58) per plastic bottle.[150] The higher handling fee reflects the fact that a compacting RVM creates efficiencies in subsequent transportation of the collected beverage containers, due to the increased bulk density. Compaction also significantly reduces the opportunity for fraudulent multiple claims for refunds from the same used beverage container.[151] It also means retailers can make an informed decision about whether to invest in an RVM. Different values are attached to different materials, as these again carry different storage costs.

The fees are set by Infinitum, whose board includes representatives of both the beverage and retail industry, so all interests will be taken into consideration and the decision-making is transparent. Handling fees in Norway are paid by the system administrator out of a central funding pot.

Material Value

Infinitum owns the material and is responsible for organizing the containers' collection, processing and sale. Infinitum then invests the revenue back into the system, reducing the level of fees producers need to pay to cover the costs. Since Infinitum works as a single material owner, the material can be collected and processed together and does not need to be separated by brand, which increases the efficiency of the system.

Unredeemed Deposits

Alongside material revenues, Infinitum uses unredeemed deposits to cover some of their operating costs; unredeemed deposits represent the majority of Infinitum's funding, despite Norway's high redemption rates.

Complementary EPR for Packaging

In August 2017, the Norwegian Ministry of Climate and Environment adopted an amendment (Regulation No. 1289/2017) to the Waste Regulation No. 930/2004 in order to introduce mandatory EPR for all packaging.[152] This law includes requirements relating to the design of the packaging that is allowed to be put on the market, including recyclability and reusability. Packaging must be manufactured in such a way that a certain percentage of the materials used can be recycled for the production of marketable products in accordance with applicable Community standards. Producers have a duty to work towards the prevention of waste caused by packaging. Further guidelines on this responsibility may be issued by the Environmental Protection Agency at a later date.[153] Producers must join a collection program and report annually on their waste prevention efforts.

Qualitative Review and Key Takeaways

A qualitative review of Norway's container deposit program against the key system principles is provided in Table 16.

Table 16: Norway Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	Minimum redemption rate set in legislation and environmental tax tied to increased performance. Have a precise method for calculating recycling.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	Deposit is relatively high (NOK 2 ($0.25) for plastic and metal containers ≤0.5 liter (from NOK 1) and NOK 3 ($0.38) for plastic and metal containers >0.5 liter (from NOK 2.5)). Set in legislation, but there is a history of increases.
Focus on customer access, convenience and experience	Return-to-retail with 15,000 return locations across the country, or approximately one for every 352 people.
Broad scope of beverages and packaging materials	Container deposit applies to all beverage types, but limited to plastic and metal containers.
Management, Oversight and Governance	
Government role of oversight, compliance and issuance of penalties	Norwegian Climate and Pollution Agency, an agency of the Norwegian government, oversees the system.[154]
Management through a producer appointed 501(c)(3) organization	Infinitum, a non-profit organization whose board includes representatives of both the beverage and retail industry, operates the deposit system and container collections.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation	Norway uses the return-to-retail model with a mix of RVMs and manual services; 93% of containers are returned to an RVM. Additional labeling requirements to prevent fraud.

Principle	Qualitative Evaluation
Options for retailer participation	All retailers, including small shops and gas stations, must accept containers for refund.
Financing	
Follow EPR – Producer funded net of material revenue and unclaimed deposits	Operating expenses are covered by revenues that include unredeemed deposits, material sales and administrative fees.
Service providers fairly paid	High handling fee, structured to help compensate retailers for investment in RVMs.
Unredeemed deposits support recycling system	Unredeemed deposits returned to Infinitum to help cover cost of system.

Oregon

Oregon's Beverage Container Act was originally enacted in 1971 to reduce litter and increase recycling and was the first bottle bill implemented in the US. Expansions in 2007 and 2011 increased the scope and amended the governance structure.

The 2011 update to the bottle bill was especially significant and made major changes, following recommendations of a task force, the prior establishment of the Oregon Beverage Recycling Cooperative (OBRC) and compromise with industry. This update (HB 3145) had the following provisions:

1. Scope expansion to all beverages except for wine, liquor, milk and milk substitutes;
2. Provision that allowed the deposit value to increase to $0.10 if the if beverage container redemption rate fell below 80% for two consecutive years;
3. A coalition of producers was approved to pilot a redemption program, if successful OBRC could expand on the pilot to build a system of redemption centers.

The legislation requires annual reporting on the return rate by material type and a report to the legislature every 2 years on:[155,156]

- The number of beverage containers returned as a percentage of those sold;
- Number of redemption centers

The OBRC in a producer-owned organization that was granted administrative control of the deposit program in 2009.

Under the Act, OBRC must report annually to the Oregon Liquor Control Commission with:

- a list of all distributors and importers that are members of the cooperative;
- return data, by material

The OLCC has the legal right to audit and review OBRC's records.

In 2019, Oregon passed SB 522, which institutes a fine of $250 on those who return 50 or more out-of-state containers in one day at redemption locations. This bill was aimed specifically at fraud originating from Washington.[157]

Governance

The program is run by the OBRC, which is owned by beverage distributors and grocers that retains as members producers of over 95% of the beverage brands sold in Oregon.

OBRC manages the deposit and financial flows, collects and processes returned containers and operated BottleDrop redemption centers. OBRC partners with ORPET, the state's PET recycling facility.

Performance is monitored by the state legislature, the OLCC, and OBRC's members.

Oregon's container deposit system is illustrated in Figure 7.

Figure 7: Oregon Container Deposit System Overview

Source: Oregon Beverage Recycling Cooperative

Operational Delivery

Redemption Infrastructure

For the first nearly four decades of the Oregon deposit program, all redemption was done through retailers. The BottleDrop program began following the establishment of OBRC as an experiment in distributor-run collection. This has led to a proliferation of BottleDrop redemption centers, currently totaling 55 locations across Oregon.

With the permitting of redemption centers, responsibilities for retailers have been reduced. The law prescribes two convenience zones surrounding a redemption center. The first is a radius of two miles, the second extends from the first up to 3.5 miles from a redemption center. Large retailers (≥5,000 square feet) within a convenience zone may choose to participate in a redemption center or to provide equivalent services. Participating large retailers located in the first convenience zone may refuse to redeem any containers and participating large retailers located in the second convenience zone may refuse to redeem more than 24 containers. Small convenience type retailers (≤5,000 square feet) within either redemption center convenience zone may refuse to redeem more than 24 containers from any one person per day.[158] Retailers that do not participate in a convenience zone must accept 144 containers per person per day.

Although the redemption centers have gained prominence, of the containers returned in 2019, 64.4% were through the BottleDrop, and the remainder were still redeemed through retailers.[159]

In conjunction with the BottleDrop infrastructure, OBRC provides online functionality through a membership account that moves the system from primarily cash-based to a percentage of payments made electronically. This allows consumers the ability to save credit from containers and use when convenient and also the ability to donate credit, if they choose. It also allows manufacturers the potential for brands to give offers through membership program.

In addition to traditional BottleDrop redemption centers, OBRC has pioneered BottleDrop Express locations, which function as bag drops for consumers that have a membership account. At these locations, patrons drop off a filled and labeled Green Bag with deposit containers. The containers are later picked up and versified by OBRC and the appropriate refund amount is credited to the member's account within 5 days.[160]

OBRC is also pioneering the return of refillable bottles in the state, introducing an industry standard bottle (ISB) that is redeemed through the same redemption system and is being adopted by local craft breweries, further reducing waste and encouraging the management of material further up the waste hierarchy. As of 2019, there were 407,840 refillable glass bottles in circulation, being bottled through 10 producers, all local craft breweries.

Collection and Processing

OBRC picks up returned containers at stores across Oregon and reconciles deposits on behalf of distributors. At each store, an OBRC driver records the container count and pays the outstanding deposit amount. The containers are then taken to one of eight recycling facilities across the state for processing.[161]

OBRC partners specifically with ORPET, Oregon's first PET recycling facility. By keeping materials in Oregon, OBRC is able to decrease resource expenditure.[162]

Reporting and Performance

Reporting

In Oregon, there are statutory reporting requirements for OBRC and non-member distributers to report sales and redemption rates. This data is used to calculate state redemption rates. OBRC also voluntarily reports on other metrics. The 2017 Annual Report included:[163]

- Annual budget;
- Proportion of budget spent on BottleDrops;
- Percentage of material processed at plants in the state;
- Proportion of budget spent on administration and compliance;
- Proportion of budget spent on retailer services and transportation;
- Proportion of budget spent on stewardship initiatives;
- Value of unredeemed deposits;
- Weight of material collected;
- Number of employees;
- Number of return locations;
- Number of containers returned;
- Percentage of containers returned at BottleDrops;
- Number of green bag accounts and sign-ups;
- Average cost of building a redemption centre;
- Weight of plastic recycled;
- Fundraising totals;
- Goals for forthcoming year

Redemption/Recycling

In 2017, the return rate was 75.7%,[164] this triggered the increase in the deposit value from $0.05 to $0.10.

Oregon's deposit was updated to reflect price changes and to increase the return rate and was extremely successful. Oregon's return rate during January –March 2017, before the deposit increase, was 59%. Subsequently, between April and December 2017, with the increased deposit, the return

rate was 82%. In 2018, the first full year with the higher deposit, Oregon reported an 85% return rate.[165]

In 2019, the return rate was 90.8%, translating to 1.84 billion containers recycled. Of this total, 55% were aluminum, 32% plastic and 13% glass.[166]

Carbon Emissions

Oregon's beverage container recycling levels lead to an estimated 152,785 metric tons avoided of CO_2e in 2015.[167] Of this total, 65% was attributed to the recycling of aluminum cans, 13% to PET bottles and 18% to glass bottles.

System Finances

In 2019, OBRC's annual budget was approximately $44 million, broken down as follows:

- BottleDrop Centers & Green Bag Program: 41%
- BottleDrop Refill Program: 2%
- BottleDrop Express & Transportation: 2%
- Material Processing at Statewide Plants: 14%
- Accounting, Administration & Compliance: 12%
- Retailer Services & Transportation: 26%
- Stewardship Initiatives: 3%

In 2019, OBRC collected $18.2 million in unredeemed deposits.[168]

OBRC has a program known as BottleDrop Gives, which provides funding to over 2,000 non-profits. Throughout the lifetime of the program, $7.9 million has been donated to non-profits, $1.8 million in 2019 alone.

Cash Flows

Online functionality allows Redemption centers to have reduced risk from handing cash, better cash flow and the ability for the deposit to be paid from another party other than redemption center, removing the liability altogether.

Handling Fees

There are no handling fees in Oregon, as OBRC funds the BottleDrop redemption centers, in partnership with retailers.

Material Value

The material returned through the BottleDrop centers and retailers is sold and the value retained by OBRC.

Unredeemed Deposits

OBRC retains unredeemed deposits and uses them for program funding.

Qualitative Review and Key Takeaways

A qualitative review of Oregon's container deposit program against the key system principles is provided in Table 17.

Table 17: Oregon Container Deposit Program Review vs. Key System Principles

Principle	Qualitative Evaluation
Effectiveness	
Minimum redemption (collection for recycling) set in legislation with clear methodology for calculating actual recycling	Clause required increasing deposit value if redemption rate fell below 80%; triggered in 2017, deposit is now $0.10. Reporting requirements tied to calculation of redemption rate.
Deposit set to maximize return with the flexibility for it to be revised without changes in legislation	High deposit value relative to the rest of the US. Clause for increasing deposit value is not recurring.
Focus on customer access, convenience and experience	Recent emphasis on growing OBRC redemption center network, with 55 locations across the state and options including express bag drops, approximately one for every 10,955 people. 64.4% of containers returned through OBRC network, remainder through retailers.
Broad scope of beverages and packaging materials	Relatively broad scope, including all beverages except for wine, liquor, milk and milk substitutes.
Governance, Management and Oversight	
Government role of oversight, compliance and issuance of penalties	Oregon Liquor Control Commission has the legal right to audit and review OBRC's records, little involvement otherwise.

Principle	Qualitative Evaluation
Management through a producer appointed 501(c)(3) organization	Oregon Beverage Recycling Cooperative (OBRC) in a producer-owned non-profit organization that runs the system.
Technology driven to facilitate verification of containers returned, reporting and fraud mitigation	Bulk sorting of containers returned through bag-drop and redemption centers, however no use of state-specific bar codes or unique markings to prevent cross border fraud.
Options for retailer participation	Retailers may refuse to redeem if they are in a convenience zone near a redemption center.
Financing	
Follow EPR – Producer funded net of material revenue and unclaimed deposits	OBRC covers the costs of the system.
Service providers fairly paid	OBRC runs all redemption centers, there is no handling fee to compensate retailers.
Unredeemed deposits support recycling system	Unredeemed deposits retained by OBRC and invested back into program.

APPENDICES

A.1.1 Definitions of Producers

Alberta

"Manufacturer" means a person who manufactures a beverage and includes:(i)a person who carries on the business of filling containers with a beverage; and(ii)a person who imports a beverage in a container into Alberta for the purpose of distribution or sale in Alberta;

British Columbia

In BC, the Recycling Regulation defines a producer as:

"(b)(i) a person who manufactures the product and uses in a commercial enterprise, sells, offers for sale or distributes the product in British Columbia under the manufacturer's own brand,

(ii)if subparagraph (i) does not apply, a person who is not the manufacturer of the product but is the owner or licensee of a trademark under which a product is used in a commercial enterprise, sold, offered for sale or distributed in British Columbia, whether or not the trademark is registered, or

(iii)if subparagraphs (i) and (ii) do not apply, a person who imports the product into British Columbia for use in a commercial enterprise, sale, offer for sale or distribution in British Columbia." [169]

Maine

"Distributor" means a person who engages in the sale of beverages in beverage containers to a dealer in this State and includes a manufacturer who engages in such sales.

"Manufacturer" means a person who bottles, cans or otherwise places beverages in beverage containers for sale to distributors or dealers.[170]

A.1.2 European Deposit Programs

Table A 1 provides a snapshot of selected European container deposit programs.

Table A 1: Summary of Selected Container Deposit Programs in Europe

Country	Deposit	Deposit in USD $	PPP-Adjusted USD $	Return Rate
Denmark	1 – 3 DKK	0.15 - .45	0.11 - .034	90%
Estonia	€0.10	0.11	0.13	83%
Finland	€0.10 - €0.40	0.11 – 0.45	0.09 – 0.36	87-94% (3)
Germany	€0.25	0.28	0.18	98%
Lithuania	€0.10	0.11	0.16 – 0.24	92%
Norway	NOK 2-3	0.24 -0.36	0.09 – 0.18	95%
Sweden	SEK 1-2	0.11 – 0.21	0.19	85%

1 Most recent (2015) goal defined as <10 minutes for 50% of residents and 11-20 min for 35% of residents.
2 http://www.container-recycling.org/images/stories/PDF/BC%20study%20MJD%208-26-15%20press%20quality.pdf
3 A deposit initiator is the first bottler, distributor, dealer, or agent to collect the deposit in a container deposit program.
4 Packaging Ordinance, April 2009. English Version from: http://www.bottlebill.org/assets/pdfs/legis/world/germany2009.pdf
5 Packaging Ordinance, April 2009. English Version from: http://www.bottlebill.org/assets/pdfs/legis/world/germany2009.pdf
6 Report by the Government of the Federal Republic of Germany on the implementation of the compulsory deposit for one-way drinks packaging by October 2003. October 2003.

7 http://www.bottlebill.org/index.php/current-and-proposed-laws/usa/maine
8 https://legislature.maine.gov/doc/2316
9 https://www.regjeringen.no/en/dep/kld/organisation/Subordinate-agencies/norwegian-environment-agency/id85642/
10 https://obrc.com/About/WhoWeAre
11 https://infinitum.no/english/how-to-join-norways-refundable-deposit-system-for-refundable-packaging
[12] *http://worldpopulationreview.com/canadian-provinces/alberta-population/*
[13] *https://www.qp.alberta.ca/documents/Regs/1997_101.pdf*
[14] *https://www.abcrc.com/about-us/about-abcrc/*
[15] *http://www.bottlebill.org/index.php/current-and-proposed-laws/canada/alberta*
[16] *https://www.bcmb.ab.ca/about/board-directors/*
[17] https://www.bcmb.ab.ca/depot-owners-operators/depot-compliance/
[18] https://www.bcmb.ab.ca/uploads/source/By-laws_Current/CSP_By-law/2018.06.20.CSP.Bylaw.BOARD.APPROVED.pdf
[19] https://www.bcmb.ab.ca/uploads/source/By-laws_Current/Fee_By-law/2020.02.19.Fee.By-law.BOARD.APPROVED.pdf
[20] https://www.bcmb.ab.ca/uploads/source/By-laws_Current/Societies_Act_Bylaw/2019.06.20.Societies.Act.Bylaw.Member.Approved.pdf
[21] https://www.cmconsultinginc.com/wp-content/uploads/2018/10/WPW-2018-FINAL-5OCT2018.pdf
[22] *https://albertadepot.ca/find-a-depot/*
[23] *https://www.bcmb.ab.ca/rfps-rfas/*
[24] *https://www.bcmb.ab.ca/rfps-rfas/*
[25] *https://www.abcrc.com/assets/ABCRC-Sustainability-Report-2018.pdf*
[26] *https://www.abcrc.com/assets/ABCRC-Sustainability-Report-2018.pdf*
[27] *https://www.cmconsultinginc.com/wp-content/uploads/2018/10/WPW-2018-FINAL-PROGRAM-SUMMARIES.pdf*
[28] *https://www.bcmb.ab.ca/uploads/source/By-laws_Current/CSA_By-law/2019.02.01.CSA.Bylaw.Board.approved.November.7.2018.pdf*
[29] *https://www.bcmb.ab.ca/uploads/source/By-laws_Current/CSP_By-law/2018.06.20.CSP.Bylaw.BOARD.APPROVED.pdf*
[30] Compliance frameworks have been developed to respond to evidence of non-compliance of an industry accepted standard. The BCMB or other industry developed programs are in place to monitor performance and assess that performance against those standards. When the standard is not met a progressive action framework (compliance framework) is used to encourage improved performance until the industry standard is achieved. More information can be found at: https://www.bcmb.ab.ca/uploads/source/Depot_Owners/Notices/2018/2018.12.20.Compliance.Frameworks.Depot.Notice.pdf
[31] The implementation of automated sorted technology in redemption centers is considered Innovation. The standard of achievement for this Indicator was having at least one redemption center not only implement automated sorting technology, but seeing a return on investment for that technology.
[32] *https://www.abcrc.com/assets/ABCRC-Sustainability-Report-2018.pdf*
[33] *https://www.bcmb.ab.ca/uploads/source/Annual_Reports/2020.06.09.BCMB.2019.AR.FINAL.pdf*
[34] *https://www.abcrc.com/assets/2017-Sustainability-Report.pdf*
[35] 2017 Beverage Container Management Board Annual report *https://www.bcmb.ab.ca/uploads/source/Annual_Reports/BCMB_2017_Annual_Report_Final_Web.pdf*
[36]https://www.bcmb.ab.ca/uploads/source/Annual_Reports/2017.05.26.BCMB.2016.Annual.Report.Web.Version.FINAL.pdf

[37]https://www.bcmb.ab.ca/uploads/source/Annual_Reports/2017.05.26.BCMB.2016.Annual.Report.Web.Version.FINAL.pdf
[38] *https://www.abcrc.com/assets/ABCRC-Sustainability-Report-2018.pdf*
[39] *https://www.abcrc.com/assets/ABCRC-Sustainability-Report-2018.pdf*
[40]*https://www.bcmb.ab.ca/uploads/source/Annual_Reports/2019.06.05.BCMB.2018.Annual.Report.Web.Version.pdf*
[41] *https://albertadepot.ca/*
[42] *https://www.abcrc.com/assets/ABCRC-Sustainability-Report-2018.pdf*
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[45] *http://www.bottlebill.org/index.php/current-and-proposed-laws/canada/alberta*
[46] *https://www.bcmb.ab.ca/depot-owners-operators/depot-fees-handling-commissions/*
[47] *https://www.bcmb.ab.ca/depot-owners-operators/depot-fees-handling-commissions/*
[48] BCMB, Bottle Depot Viability Policy, December 2, 2009
[49] *https://www.abcrc.com/assets/ABCRC-Sustainability-Report-2018.pdf*
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[51] *http://worldpopulationreview.com/canadian-provinces/british-columbia-population/*
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[53] *http://www.container-recycling.org/images/stories/PDF/BC%20study%20MJD%208-26-15%20press%20quality.pdf*
[54] *https://www.return-it.ca/beverage/recycling/tencents/*
[55] *https://www.retailcouncil.org/advocacy/sustainability-advocacy/bc-amends-recycling-regulation-changing-product-stewardship-for-packaging/?_cldee=bWljaGVsbGVzQGZjcGMuY2E%3d&recipientid=contact-10e3fd0eea39e911a993000d3af3e0fd-771ed52daba740888c84180076cbfa0e&utm_source=ClickDimensions&utm_medium=email&utm_campaign=coronavirus-daily-bulletin&esid=dc143c9f-fbb7-ea11-a812-000d3af3afcd*
[56] *"British Columbia." WHO PAYS WHAT: An Analysis of Beverage Container Recovery and Costs in Canada.* 2010
[57] *https://www.electrorecycle.ca/wp-content/uploads/2015/04/BC-recycling-regulatoin-guide-2012.pdf*
[58] https://www.bclaws.ca/civix/document/id/complete/statreg/03053_01#section1
[59] *https://www2.gov.bc.ca/assets/gov/environment/waste-management/recycling/recycle/beverage-containers/sp/brccc_sched_1_plan.pdf*
[60] *http://www.bottlebill.org/index.php/current-and-proposed-laws/canada/british-columbia*
[61] *http://www.bottlebill.org/index.php/current-and-proposed-laws/canada/british-columbia*
[62] British Columbia *Recycling Regulation*. Section 16. https://www.bclaws.ca/civix/document/id/complete/statreg/449_2004
[63] *https://www.return-it.ca/locations/?St=&Sv=express&Se=38&Se=40&Se=100*
[64] *https://www.return-it.ca/ar2019/pdf/Encorp_AR2019_AnnualReport.pdf*
[65] *https://www.cmconsultinginc.com/wp-content/uploads/2018/10/WPW-2018-FINAL-5OCT2018.pdf*
[66] *http://www.container-recycling.org/images/stories/PDF/BC%20study%20MJD%208-26-15%20press%20quality.pdf*
[67] *https://www.return-it.ca/opportunities/*
[68] *https://www.return-it.ca/ar2019/pdf/Encorp_AR2019_AnnualReport.pdf*
[69] *https://www.cmconsultinginc.com/wp-content/uploads/2018/10/WPW-2018-FINAL-5OCT2018.pdf*
[70] *https://www.return-it.ca/cfm/index.cfm?It=100&Id=92&Se=2&Lo=2&AA=Download&AT=100&AD=112,Dlf1*

[71] The SABC is a coalition of stewardship agencies in BC. The SABC recommendations are SABC member representatives' proposed solutions to improving EPR in the province, but are non-binding. https://www.bcrecycles.ca/

[72] *https://www.bcrecycles.ca/cfm/index.cfm?It=100&Id=5&Se=2&Lo=2&AT=100&AA=Download&AD=14,Dlf1*

[73] *https://www2.gov.bc.ca/assets/gov/environment/waste-management/recycling/recycle/beverage-containers/sp/brccc_sched_1_plan.pdf*

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[75] Eunomia calculations

[76] *https://www.return-it.ca/ar2019/pdf/Encorp_AR2019_AnnualReport.pdf*

[77] https://www.return-it.ca/ar2018/executive-summary.php

[78] *https://envirobeerbc.com/wp-content/uploads/2019/06/BRCCCs-2019-Annual-Report-to-Ministry-Covering-2018-Calendar-Year.pdf*

[79] *http://recyclebc.ca/wp-content/uploads/2019/06/Recycle-BC-2018-Annual-Report-1.pdf*

[80] Public consultation on the updated performance targets began on May 8, 2018 and was open for comment and input for 45 days.

[81] *https://www.return-it.ca/ar2019/pdf/Encorp_AR2019_AnnualReport.pdf*

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