PRODUCT STEWARDSHIP INSTITUTE

Extended Producer Responsibility for Packaging and Paper Products: **Policies, Practices, and Performance**

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The Product Stewardship Institute

The Product Stewardship Institute (PSI) is a national nonprofit working to reduce the health and environmental impacts of consumer products from design and production through end-of-life. PSI takes a unique approach to solving environmental problems by bringing key stakeholders together in well-designed dialogues to forge lasting agreements rooted in producer responsibility and sustainable materials management. The organization has built capacity for product stewardship in the U.S. for the past 20 years, conducting both voluntary and legislative product stewardship initiatives. PSI works closely with 47 state environmental agency members, hundreds of local government members, and over 120 partners from businesses, universities, organizations, and international governments.

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Contents

Executive Summary

Communities throughout the United States are facing an unprecedented challenge for managing packaging and paper products (PPP) in the municipal waste stream. Currently, around 50% of residential PPP is recycled in the U.S. – far less than in many other countries – and this rate has been stagnant for nearly two decades.[1] What was already a strained, fragmented system has been further impeded over the last two years by extreme market disruptions brought on by restrictions in international export markets (starting with the "China Sword"). Widespread use of single-stream recycling, which increases contamination across collected materials, has exacerbated these issues. Extended Producer Responsibility (EPR), which is common throughout much of the world, has gained increasing support in the U.S. over the past decade as a critical solution to PPP recycling challenges.

EPR shifts the responsibility for end-of-life management of products and packaging upstream to producers – rather than the public sector – and creates incentives for producers to incorporate environmental considerations into the design of their products and packaging.

Well-designed EPR systems increase recovery and recycling of PPP, reduce contamination, and develop markets for difficult-to-recycle materials. EPR not only provides sustainable financing for recycling by placing financial responsibility for the system on producers; it can also transition legal responsibility for recycling performance and the burden of day-to-day recycling management away from the public sector, allowing limited public resources to be directed toward other priorities. Many existing EPR for PPP programs are beginning to incorporate "eco-modulated fees" that incentivize producers to reduce the end-of-life impacts of their packaging by using more recyclable or reusable materials, and to consider other environmental factors such as greenhouse gas (GHG) emissions in packaging design. In short, EPR fundamentally changes the landscape of PPP reduction and recycling.

Striking the right balance between *government oversight and control* of system outcomes on the one hand, and *producer flexibility and control* over system implementation on the other is key to the success of EPR programs. In addition, local governments seek options that are both suited to their unique circumstances *and* achieve regional harmonization. Producers, for their part, need flexibility to reach performance goals. They also seek control over how their financial contributions are spent to ensure efficiency and effectiveness. Experience has shown that more successful programs achieve a healthy balance between government and producer interests, while also addressing the needs of waste management companies, environmental groups, and other key stakeholders.

The most successful programs to date place full responsibility on the producers to achieve results, but also provide municipalities the option to continue collecting recyclable materials and educating residents. Many communities have taken advantage of the opportunity to shift collection and education activities to producers. One of the most transformative benefits of existing programs has been the standardization of collected materials across jurisdictions, reducing resident confusion and contamination at regional or

even national levels. In Europe, where EPR has been established for decades, many countries have PPP recycling rates above 70% or 80%.[2]

EPR for PPP can also restore public faith in recycling during a time of unprecedented global uncertainty and skepticism. Although no U.S. states currently have EPR for PPP systems in place, multiple states have introduced legislation over the past several years. As plastics, packaging, and the plight of municipal recycling programs continue to be topics of great interest for U.S. decision-makers, states will continue to introduce EPR for PPP legislation in 2020 and beyond.

This report provides a brief history of EPR for PPP and gives an overview of the key elements of existing EPR for PPP programs around the world. Two fundamental approaches to EPR for PPP are defined:

1. Full Producer Responsibility. Under this approach, PPP recycling is entirely financed and operated by producers. Local governments choose their degree of involvement – they can either fully or partially opt into the EPR system, or they can opt out altogether.
2. Municipal Reimbursement. In this approach, local governments retain responsibility for the collection and processing of PPP materials. Producers typically reimburse municipalities for a majority of their costs, but do not cover costs entirely.

To illustrate these approaches, this report summarizes and compares four provincial EPR for PPP programs that have been operational in Canada for up to 15 years. The report also includes a detailed case study of the full producer responsibility system in British Columbia (B.C.), which is one of the more recently established programs in Canada and was the country's first full producer responsibility program for packaging. Full producer responsibility has transformed the recycling landscape in B.C., offering flexibility for local governments to either fully or partially opt into the system and enabling them to opt out altogether if they choose. The B.C. Government and producers were able to implement the program without stranding assets or otherwise seriously impacting local haulers and recovery facilities. Small businesses are exempt or pay a flat fee that relieves them of administrative burdens. At present, Recycle BC (the producer responsibility organization in B.C.) reports a 78% recovery rate and a 90% recycling rate.[3]

EPR systems can buffer states and local governments from disruptions to the global recycling market, reduce taxpayer spending on recycling infrastructure, increase material recovery rates, and help to generate local markets where they are needed for emerging and difficult-to-recycle materials. As public pressure to solve the global plastic pollution crisis grows and companies continue to commit to design and use more eco-friendly, sustainable packaging, U.S. producers have recognized that they cannot reach their sustainable packaging goals without significant improvements to the recycling system.[4] ***Producers are ready for a harmonized system that can help them achieve a circular economy and meet their sustainability goals – and EPR provides a path to building this system.*** PSI has already developed model legislation and guidance on the key elements of EPR for PPP, which can be applied to a spectrum of EPR approaches.

Key Terms

CCME: Canadian Council of Ministers of the Environment: An intergovernmental forum in Canada focused on environmental issues of national and international concern. The Council is led by the environment ministers from the federal, provincial, and territorial governments.

CSSA: The Canadian Stewardship Services Alliance: A national, not-for-profit organization founded in 2013 to provide administrative and management services to product stewardship programs, including program design and implementation, compliance, reporting, call center support, IT systems, data analytics, financial services support, and supply chain consulting. CSSA serves four of the five existing Canadian EPR for PPP programs – Ontario, Manitoba, British Columbia, and Saskatchewan (the exception is Québec). CSSA also serves Stewardship Ontario's Household Hazardous Waste and Special Waste Program and the Ontario-based Automotive Materials Stewardship Program.

Composting: Composting is the process by which organic solid waste is decomposed. Throughout this document, composting primarily refers to the decomposition of compostable packaging. According to the Ellen Macarthur Foundation's *New Plastics Economy* report, "packaging or a packaging component is compostable if it is in compliance with relevant international compostability standards and if its successful post-consumer collection, sorting, and composting is proven to work in practice and at scale."

Contamination: Oregon's Department of Environmental Quality (DEQ) defines contamination in recycling as "any items that are not accepted for recycling in a particular recycling program or don't belong in materials being recycled. Contaminants include both non-recyclable items and recyclable items that are dirty or unsuitable for a particular recycling stream." For the purposes of this report, contamination is primarily any material put into the recycling system that is not a program material, and therefore not accepted. Where contamination is discussed in the context of the Recycle BC program, the term is further clarified.

ÉEQ: Éco Entreprises Québec: The Product Stewardship Organization (referred to as a PRO in this report) in Québec for packaging and printed paper. ÉEQ is a private non-profit organization representing the companies that place PPP materials onto the market in Québec in their responsibilities to finance the cost of effective and efficient municipal curbside recycling services. ÉEQ's mission is to optimize the curbside recycling value chain and implement innovative approaches to recycling with a view to sustainable development and the creation of a circular economy.

Engineered Fuel: A Canadian term describing a commodity composed of materials collected through a recycling collection program, such as Recycle B.C., that cannot be recycled either due to their composition or excessive contamination. The fuel is used as a replacement for coal in industrial settings.[5]

MMSM: Multi-Materials Stewardship Manitoba: The Product Stewardship Organization (referred to as a PRO in this report) in Manitoba for packaging and printed paper. MMSM is a not-for-profit, industry-funded organization that funds and provides support for the province's residential recycling programs for PPP. Producers in Manitoba currently reimburse municipalities for up to 80% of the net cost of the

residential recycling system through MMSM. MMSM's mission is to promote the reduction, reuse, and recycling of covered materials.

MRF: Material Recovery Facility: A MRF is a plant that separates single or multi-stream recycling materials after they are collected and prepares them to be sold to market buyers.

Net Cost: Throughout this document, the net cost of recycling or net cost of managing PPP materials refers to the operational costs to collect, sort, and transport materials minus the revenue earned from selling these materials.

Net Reasonable Costs: In discussions of Canadian EPR for PPP, the term net reasonable costs refers to the portion of municipal recycling costs reimbursed by producers under municipal reimbursement programs. Each provincial EPR for PPP program includes a set of criteria for costs that are eligible to be reimbursed (i.e., net reasonable costs). Producers are required to reimburse the net reasonable costs of municipal programs, rather than actual costs, to account for differences in operating costs among municipalities resulting from autonomous decision-making by local governments.

PPP: Packaging and Paper Products: PPP includes all the materials brand owners use to package everything from cereal and cleaning supplies to bottled water and shampoo, as well as junk mail and grocery bags. PPP materials are the focus of the EPR programs covered in this report. EPR for PPP programs referred to throughout this report cover residential PPP materials – i.e., PPP materials that are designed to be disposed or recycled at home by consumers.

PRO: Producer Responsibility Organization: PROs are organizations created by producers to fulfill EPR requirements on their behalf. Names for such organizations vary by country – in Canada, for example, they are primarily referred to as Product Stewardship Organizations. For consistency, this report uses PRO.

Recovery: In Oregon, material recovery includes "all materials collected for recycling or composting, and for a subset of materials, incineration with energy recovery."[6] Canadian and European provincial programs vary significantly in their definitions of recovery. Definitions for the four Canadian programs discussed in this report are described in Appendix A. Throughout this report, the term recovery will refer to all materials that are collected in the recycling stream, regardless of their end-of-life management. Composting is excluded from this definition. Where certain EPR programs use the term recovery in a different way, the alternative definition is noted in the text.

Recyclable: For the purposes of this report, recyclable refers to materials that can be successfully collected, sorted, and delivered to viable end markets. Materials that are technically recyclable (i.e., technology capable of recycling these materials exists), but are not practical to recycle either because the necessary technology is not widely available or the cost of recycling them is prohibitive, are not defined as recyclable in this document.

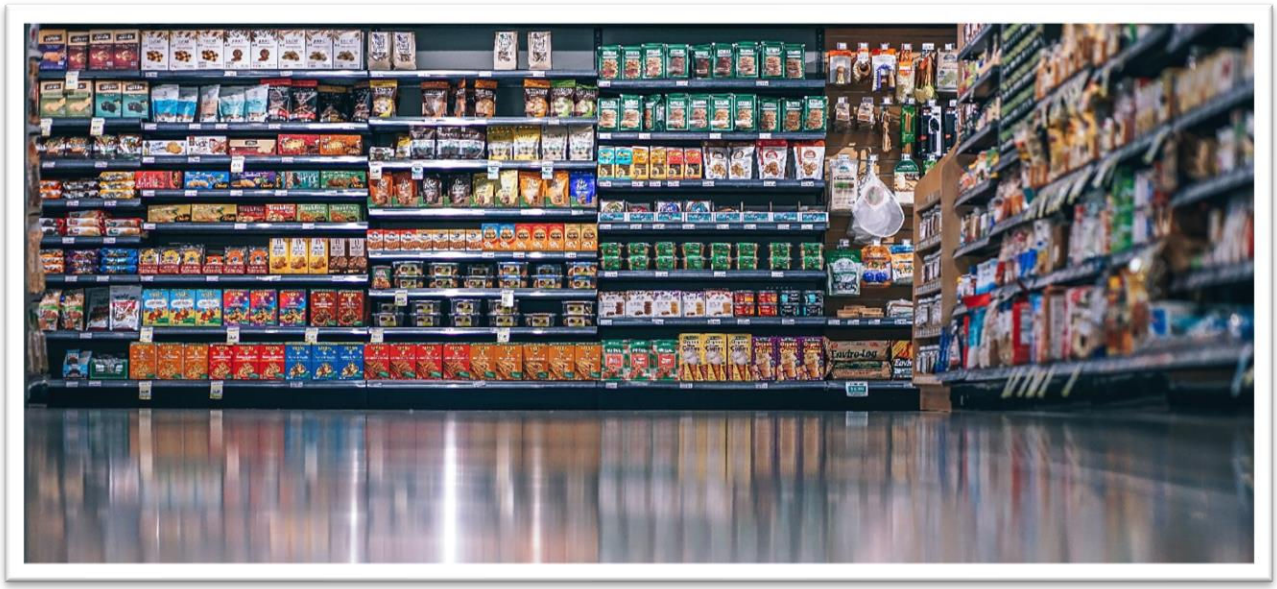
Recycling: According to the U.S. Environmental Protection Agency, recycling refers to the series of activities by which discarded materials are collected, sorted, processed, and converted into raw materials and used in the production of new products. Recycling excludes the use of these materials as a fuel substitute or for energy production. This report adheres to the U.S. EPA's definition.

Reusable/Reuse: The terms reuse and reusable throughout this report refer to packaging or paper products that are used multiple times by the consumer (reuse) or can be used multiple times (reusable) after their initial intended purpose has been fulfilled. This definition also includes returnable items that are or can be used multiple times by producers to fulfill the same purpose (e.g., glass milk bottles).

SMM: Sustainable Materials Management: According to the U.S. Environmental Protection Agency, sustainable materials management is a systemic approach to using and reusing materials more productively over their entire life cycle. "An SSM approach seeks to:

- Use materials in the most productive way with an emphasis on using less.
- Reduce toxic chemicals and environmental impacts throughout the material life cycle.
- Assure we have sufficient resources to meet today's needs and those of the future."

WTE: Waste to Energy: The conversion of solid waste into fuel through direct combustion. In Oregon, this process is also referred to as energy recovery.[7]



1. Introduction

Communities throughout the United States are facing an unprecedented challenge for managing packaging and paper products (PPP) in the municipal waste stream. What was already a strained, fragmented system with stagnant recycling rates has been further impeded over the last two years by extreme market disruptions brought on by restrictions in international export markets. Widespread use of single-stream recycling, which increases contamination across collected materials, has exacerbated these issues. Municipalities struggling with budget shortfalls in the thousands or millions of dollars must now make difficult choices about whether to eliminate costly materials from their programs, or even whether to recycle at all. At the same time, public pressure to address both climate change and marine litter, particularly plastics, continues to grow. Many states and municipalities have adopted sustainability and greenhouse gas (GHG) reduction goals for which recycling is critical. The need to reduce contamination in the recycling stream and develop markets to ensure collected materials are returned to the circular economy is more urgent than ever.

Extended Producer Responsibility (EPR), which is common throughout much of the world, has gained increasing support in the U.S. over the past decade as a solution to these challenges. EPR is a mandatory type of product stewardship that includes, at a minimum, the requirement that the manufacturer's responsibility for its product extends to post-consumer management of that product and its packaging.[8] EPR provides a sustained financing stream for recycling and has vast potential to increase collection, reduce contamination, and develop markets through efficiencies gained by operating at a large scale. EPR for PPP is prevalent throughout Canada and the European Union (EU) and has arisen in many South American and Asian nations as well. While EPR for PPP is not yet required in the U.S., there are currently 119 U.S. EPR laws regulating 14 products in 33 states.[9] Many of these states have begun – and continue – to introduce legislation targeting PPP.

The Problem: PPP Recycling in Crisis

The U.S. generates more than a quarter of a billion tons of municipal solid waste annually, which is about one ton per person per year.[10] More than 40% of that waste (over 100 million tons) is composed of PPP,[11] including plastic containers, steel and aluminum cans, plastic film, glass bottles, newspaper, and cardboard. PPP includes all the materials brand owners use to package everything from cereal and cleaning supplies to bottled water and shampoo, as well as junk mail and grocery bags. While the amount of paper waste has declined over the last two decades,[12] the amount of plastic waste has climbed.[13] Packaging materials are also growing increasingly complex, with multi-material packaging and multi-layer flexible packaging becoming more common. These materials pose new challenges to recycling in the U.S., causing significant disruptions at material recovery facilities (MRFs), as they are often beyond the capabilities of existing technology to process and recycle.

About 50% of residential PPP in the U.S. is recycled– far less than in many other nations that have implemented EPR – and this rate has been stagnant for nearly two decades.[14] Over the past two years, recycling costs have skyrocketed, driven primarily by the loss of international markets due to policy changes in China that limit recyclable material imports (the "China Sword"),[15] as well as inherent flaws in a disjointed system that has long needed updating. In some cases, cities and towns are facing costs in the hundreds of thousands, or even millions, of dollars to maintain their recycling programs.[16]

One of the main underlying challenges to recycling in the U.S. is that municipalities and MRFs are tasked with collecting, processing, and marketing materials over which they have no design input or control. As new types of packaging continue to emerge, often designed without knowledge of the recycling system in mind, recyclers must manage these materials with limited public funds. As local leaders around the country struggle to operate in an inefficient and underfunded environment, they are forced to make difficult choices on where to spend scarce resources.

In the wake of the recent international market setbacks, communities are stockpiling previously recyclable materials, changing what their recycling programs will accept, raising taxpayer fees, or suspending recycling altogether. Upstream benefits from recycling, such as greenhouse gas reductions, are lost as programs shutter or shrink. Such changes threaten the public's already fragile understanding of, and confidence in, recycling and could erode much of the progress made over the last three decades.

The Solution: Extended Producer Responsibility

In the face of mounting public pressure to solve the plastic pollution crisis, corporations around the world have announced voluntary commitments to design and use more eco-friendly, sustainable packaging. For example, General Mills has pledged that its packaging will be 100% recyclable by 2030;[17] Procter & Gamble pledged to have 90% recyclable packaging by 2030;[18] and Coca-Cola pledged to manufacture

bottles with an average of 50% recycled content by 2030, as well as to collect and recycle the equivalent of 100% of the packaging it produces.[19] However, these brands have publicly recognized that they cannot reach their sustainable packaging goals without significant improvements to the recycling system in the U.S.[20] For materials to be truly recyclable, comprehensive collection systems, efficient processing facilities, and viable end markets are all needed. Companies also need a steady supply of recycled feedstock to meet their recycled content goals.[21]

Producers are in the best position to recover PPP materials, incorporate them back into the economy, and minimize their adverse impacts because they directly control the packaging materials they put onto the market. Thus, in many countries around the world, producers have supported product stewardship programs that enable them to meet their sustainability goals and draw value from recycled materials.

Product stewardship is the act of minimizing the health, safety, environmental, and social impacts of products and packaging throughout their life cycle, while also maximizing economic benefits.[22] EPR is a legislated type of product stewardship that requires manufacturer responsibility to extend to post-consumer management of products and packaging. There are two important features of EPR policy:

(1) Shifting primary financial – and sometimes management – responsibility upstream to the product manufacturer (typically referred to as the producer) and away from the public sector, with government oversight; and

(2) Incentivizing producers to incorporate environmental considerations into the design of their products and packaging.

EPR is a game-changer for PPP reduction and recycling. Other strategies, including voluntary product stewardship efforts and local government education, result in small, incremental changes to the current system. EPR takes a systemic policy approach to create a much-needed, significant transformation from the current state of disparate and fragmented recycling programs operated by local governments to a comprehensive statewide or even nationwide system. When designed well, an EPR for PPP program can optimize material collection, weather market challenges, and restore public trust in recycling. In Europe, where EPR has been established for decades, many countries have PPP recycling rates above 70% and even 80%,[23] whereas rates in the U.S. are 50% across all PPP materials and as low as 8% in key categories, such as plastics.[24] Meanwhile, British Columbia's (B.C.'s) EPR for PPP program in Canada has achieved a contamination rate of just 8%,[25] while it is common to find rates upwards of 25% in the U.S.[26]

Aims of this Paper

This report summarizes the application of EPR policies and practices around the world as a management solution for PPP, with a focus on Canada and the EU. It describes key aspects of EPR for PPP, including program costs, materials typically covered by programs, performance goals, fee structures to incentivize

design changes and address collection challenges, contamination and recycling rates, consumer convenience, and municipal cost savings. Additionally, this report provides a detailed case study of the EPR for PPP program in B.C., which is one of the more recently established programs in Canada and was the country's first full producer responsibility program for packaging. The B.C. program, along with EPR for PPP programs in other Canadian provinces and EU member states, serves as a potential model for the adoption of EPR for PPP in Oregon.

2. EPR for PPP: Around the World

Over the past 35 years, a global product stewardship movement has arisen to address the impacts of products and their packaging on the environment. Governments have adopted EPR programs for a range of products, most notably for packaging, electronics, and tires, but also for paint, pharmaceuticals, batteries, mattresses, and other common household items. There are now well over 350 EPR programs worldwide.[27]

The first EPR for PPP laws emerged in Europe in the early 1990s and have since spread around the world. Under these systems, EPR relieves municipalities of the financial and/or operational burdens of collecting and recycling (or safely disposing of) packaging and paper products. Instead, these costs and responsibilities fall to producers and their retail customers in the supply chain, creating a more sustainable and equitable system. Producer responsibility for packaging recycling has also created a stable environment for investment, leading to advancements in hauling, processing, and recycling infrastructure. Once in place, EPR for PPP programs are typically adjusted over time to increase recycling rates and optimize performance. EPR for PPP continues to spread around the world because it is recognized as an effective means for end-of-life management of PPP, and increasingly as a tool for reducing PPP generation.

Origin and Evolution of EPR for PPP in Europe

Long before the China Sword, countries in Europe recognized the benefits of EPR for PPP and incorporated these systems into their overarching waste policies to reach ambitious waste diversion and recycling targets. Germany became the first country in the world to implement an EPR program in 1991,[28] which soon influenced comprehensive regional legislation through the EU's *Directive on Packaging and Packaging Waste* (the *Packaging Directive,* 1994).[29] The *Packaging Directive* set all EU member states on a path to target significant portions of packaging for recycling.

The *Packaging Directive* has been updated several times (2004, 2005, 2013, 2015, and 2018), with the most recent update setting a goal of 65% of all household, industrial, and commercial packaging by weight recycled by the end of 2025, increasing to 75% by the end of 2030.[30] While EU member states were initially presented with a range of policy options for compliance with the *Packaging Directive*, EPR

emerged as the frontrunner due to the success of the established program in Germany. Many member states began passing EPR laws shortly after the *Packaging Directive* took effect.

Germany's Green Dot program, which was an early version of EPR, required producers to pay fees on packaging to defray the costs of municipal collection and recycling programs. The Green Dot symbol was placed on all participating packaging on the market for which producers had contributed recycling funds, although the symbol did not reflect whether the packages themselves were recyclable. The introduction of fees on packaging incentivized producers to use less packaging overall and has resulted in industry contributions to local systems of approximately $13 USD per inhabitant per year as of 2020.[31]

Figure 1: Germany's Green Dot symbol, which was placed on packaging when producers contributed to recycling costs.

Based on Germany's success with the Green Dot, other countries across Europe either directly adopted the program or began enacting their own EPR laws. Some programs offered producers flexibility to decide how best to organize and handle recycling (e.g., Spain),[32] but ultimately every program made producers responsible for meeting the recycling targets mandated by the *Packaging Directive.* One of the most widely acclaimed systems was introduced in Belgium in 1994.[33] This program required producers to form one central organization to handle the collection, sorting, and recycling of household packaging across all three regions of the country (Fost Plus), and a second organization to do the same for industrial packaging (VALIPAC). Both organizations cover a portion of commercial and institutional packaging as well.[34] Belgium's program currently leads others in the EU with a packaging recycling rate of 83% and contamination rates below 10%.[35]

Since the original *Packaging Directive* was enacted in 2004, the EU has passed increasingly prescriptive laws on EPR for PPP, driven largely by calls from producers and member states to create a level playing field across all EU countries, and by broader sustainability goals such as the establishment of a circular economy for plastics and other materials. In 2015, the EU introduced the *Circular Economy Package (CEP)*[36] and the *Circular Economy Action Plan (CEAP)*.[37] These were followed in 2018 by the EU's *Strategy for Plastics in the Circular Economy*.[38] The *CEP* and *CEAP* have been vehicles for governments to shift from the "take-make-dispose" economy (also known as a linear economy) to one in which waste and resource use are minimized – a circular economy. Under a circular economy, the value of materials is kept within the economy for as long as possible beyond the end of an initial product's useful life. In the *CEP,* the *CEAP,* and the *Strategy for Plastics,* EPR for PPP is framed as the centerpiece of a circular economy for Europe.

The latest update to the EU's *Packaging Directive* (2018) mandated that EU countries adopt EPR programs for all packaging by December 31, 2024.[39] Packaging is defined in the *Directive* as "all products made of any materials of any nature to be used for the containment, protection, handling, delivery, and

presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer."[40] The new rule formalized and standardized EPR across the EU by introducing minimum EPR requirements, as well as clarifying that producers must accept returned products, take management and financial responsibility for post-consumer waste, and provide consumer education on reusability and recyclability of packaging materials.[41] The *Directive* also emphasized that EPR programs "should help incentivise packaging that is designed, produced, and commercialised in a way that allows its reuse or recovery and that has minimal impact on the environment."[42] For the majority of EU countries that had already implemented EPR for PPP frameworks, the requirement ensured that EPR for PPP would continue to mature and improve with the advent of consistent programs across Europe. In 2021, the EU is expected to amend its EPR requirements to mandate that all plastic packaging is reusable, or is collected, sorted, and sold to existing end markets by 2030.[43]

EPR for PPP has significantly increased recycling rates and reduced public spending on waste management throughout Europe.[44] For example, in Ireland, recycling rates for PPP jumped from 19% in 2000 to 65% in 2017.[45] Over the same timeframe, rates in Spain increased from 40% to 68%, and in Italy from 38% to 67%.[46] Nearly all participating EU countries have achieved PPP recycling rates of at least 60%, with many reaching 70% to 80%.[47] Today, industry is contributing approximately $5.5 billion USD per year for the collection, sorting, and recycling of packaging across Europe, mainly from households.[48]

Adoption of EPR for PPP in Canada

With EPR programs already in place for several products, including tires, electronics, and household hazardous waste (HHW), the concept of EPR for PPP was introduced in Canada in 1996 by the federal government's *Guiding Principles for Packaging Stewardship*,[49] written by the Canadian Council of Ministers of the Environment (CCME). By the early 2000s, Ontario had passed provincial legislation requiring producers to fund 50% of the net reasonable costs (see Key Terms) to operate residential recycling programs. Québec and Manitoba soon followed suit with their own programs partially funded by producers. By 2009, Canada's *Action Plan for Producer Responsibility*[50] had committed (though not legally required) the country to implement EPR for PPP in all provinces by 2015, catalyzing programs in B.C. (2014) and Saskatchewan (2016). Interest in EPR for PPP legislation has also been expressed by municipalities in both Alberta[51] and the Atlantic Provinces.[52]

The 2009 *Action Plan for Producer Responsibility*, adopted by the CCME, was aimed at increasing stagnant recycling rates across many priority product categories (e.g., mercury-containing lamps, HHW, construction and demolition materials, and automotive products).[53] Packaging and printed materials were identified as high-priority products ripe for immediate action, and thus became a primary focus nationwide. A *Canada-Wide Strategy for Sustainable Packaging* was also released by the CCME in 2009.[54] The *Strategy* called for harmonization of EPR for PPP programs across the country and provided guidance on best practices for implementation. More recently, in 2019, the CCME published its *Zero Plastic Waste*

Action Plan,[55] which commits to creating a harmonized approach to EPR throughout Canada. The Canadian Government has highlighted EPR for packaging as a key element in its overarching strategy for addressing plastic pollution.[56]

Spreading Worldwide

Following the success of EPR for PPP in Europe and Canada, similar frameworks have been enacted in countries around the globe (Figure 2). Japan, Brazil, Russia, Chile, Colombia, and Israel have all adopted EPR for various priority products, usually starting with packaging and electronics.[57] Countries continue to adopt EPR for packaging, including China, which recently passed legislation and will implement a program by 2025.[58] India has also passed EPR legislation for PPP, which will take effect in 2020 followed by an expected ban on single-use plastics nationwide in 2022.[59] Some elements of global EPR programs for PPP are unique to developing economies, such as meeting the needs of an informal labor force and lack of capacity for enforcement against producers that violate EPR laws. Nevertheless, in addition to Europe and Canada, EPR for PPP has been operational within Asia, South America, and the Middle East for years, realizing cost savings for municipalities and improved recycling rates.

EPR in the U.S.

In the U.S., there are currently 119 EPR laws in 33 states and the District of Columbia covering 14 products, including electronics, batteries, paint, mattresses, thermostats, and pharmaceuticals. Additionally, laws passed in the 1980s and 1990s require producers in 10 states to manage beverage containers (called "bottle bills" or container deposit laws). These systems are effective at recovering beverage containers and providing high-quality materials to recycling markets. Oregon's beverage container deposit system is considered one of the best in the country, reporting return rates of 90%.[60]

Although no U.S. states currently have EPR for PPP programs, legislation has been introduced in multiple states over the past seven years and continues to be a topic of strong interest in state legislatures. EPR for PPP bills have been introduced in the following states in the 2019 and 2020 sessions, with more activity expected:

- Maine passed a "Resolve" in 2019 that required the state's Department of Environmental Protection to propose legislation for EPR for PPP, which was introduced in the 2020 legislative session.
- New York introduced bills in both the state senate and state assembly in 2020.
- Massachusetts introduced two bills in its 2019-2020 session.
- Vermont passed a bill that included bans on certain single-use plastics and led to the formation of a Single-Use Products Working Group, which recently published a report recommending that the state consider EPR and other solutions for reducing packaging waste.[61] Later in 2020, a "Resolve"

similar to Maine's was introduced, which would direct the legislature to introduce EPR for PPP legislation in the future.

- A strong EPR for plastics bill was amended and passed as a study bill in Washington state in 2019, requiring a report back to the legislature in 2020.[62] Washington state also passed a bill in 2019 that created the Recycling Development Center, a new state program focused on policy and other avenues for improving the recycling system.[63]
- California's EPR for PPP bill, introduced in 2019, was transformed into recycled content mandates for packaging and ultimately vetoed by the Governor. However, in 2020, a bill mandating recycled content in consumer packaging did pass the legislature. An additional set of "same-as" bills that would have authorized an EPR for PPP program for the state did not pass the legislature but are expected to be reintroduced in 2021, and a separate ballot initiative that includes a producer fee on consumer packaging earned enough signatures to be included on the 2022 ballot.
- Oregon conducted a comprehensive, consensus-based stakeholder engagement process regarding a potential EPR for PPP program for the state, releasing recommendations in September 2020 that are expected to inform an EPR bill to be introduced in 2021.
- Additional EPR for PPP bills were introduced in Connecticut and Indiana in 2019. Connecticut's DEEP is now co-leading a project with municipal leaders to improve waste management systems, asking all Mayors and First Selectmen to share their vision of an equitable, sustainable, affordable waste system. The project will form working groups to discuss top solutions, which include EPR for PPP.
- The Maryland legislature has also begun to discuss EPR for PPP, as has a state-led stakeholder group working to address plastic pollution in Hawaii.
- Colorado's legislature required that the state conduct a literature review of EPR for PPP, which is expected to be completed in 2021 and may inform legislation.

On the national level, U.S. Senator Tom Udall of New Mexico and U.S. Congressman Alan Lowenthal of California introduced comprehensive legislation with EPR for packaging at its core in February 2020.[64] As plastics, packaging, and the plight of municipal recycling programs continue to be topics of great interest for U.S. decision-makers, states will continue to introduce EPR for PPP legislation in 2020 and beyond.

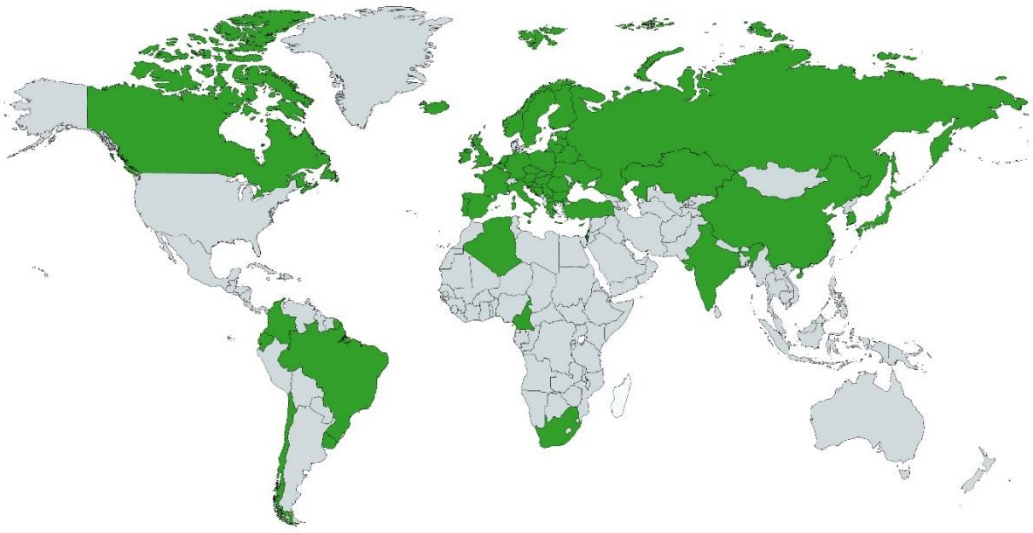


Figure 2: Countries that have enacted EPR for PPP laws around the world (in green). (Map adapted from Environmental Packaging International Lorax)[65]

3. EPR for PPP: The Fundamentals

All EPR systems for PPP share the same fundamental principles. Producers take responsibility for the post-consumer management of their products financially and/or operationally. The role of state, national, or regional governments is to set, monitor, and enforce a level playing field among producers. Local governments tend to continue to play a key role as the collection interface with residents, depending on their capacity and desired outcomes. Under all EPR for PPP systems, municipalities continue serving their residents, for example by providing complementary services such as waste and organics collection, and often providing education and processing.

EPR for PPP is a pillar of waste management around which many complementary policies can be built. Recycled content standards for packaging, ingredient and/or product bans, pay-as-you-throw recycling and disposal programs, and container deposit laws are all complementary programs that can enhance EPR systems. For example, Oregon's statewide *2050 Vision and Framework for Sustainable Materials Management*[66] prescribes a life cycle approach to setting targets for waste reduction and prioritizing various end-of-life management methods. This approach could serve Oregon as an overarching framework within which EPR programs function. Similarly, financial incentives for sustainable design (eco-modulated fees) are an emerging element of EPR for PPP programs that influence upstream decisions to optimize environmental outcomes and minimize impacts.

EPR for PPP: Basic Approaches

EPR for PPP takes many forms as it is adapted for local conditions.[67] However, there are two basic approaches policy makers around the world use to craft EPR for PPP systems: Full Producer Responsibility and Municipal Reimbursement.[68] The primary dimension along which these two approaches vary is the degree to which producers assume financial and operational responsibility for elements of the system.

- *Full Producer Responsibility.* These programs are entirely financed and operated by producers, from collection through the processing and marketing of materials. Under full producer responsibility, vertical integration is built into the value chain. Producers manage the production, distribution, collection, and recycling of their packaging, which tends to result in greater investments in recycling capacity and overall efficiency. Municipalities continue to collect other solid waste, including non-PPP materials, unless industry manages certain materials under other product stewardship programs. Although producers have significant control, local governments may be provided with choices as to the degree of involvement they prefer, such as the following:
  - Full Opt-in: Producers assume full control over the day-to-day operations of the recycling system, including collection, processing, and sale to market buyers. In this case, local governments choose to no longer directly manage PPP recycling services or resident education, although municipalities may choose to partner with producers on outreach and education to residents.
  - Partial Opt-in: Municipalities could choose to continue running collection services, but do so as contractors to a centralized Producer Responsibility Organization (a PRO) under consistent, jurisdiction-wide requirements such as maximum contamination levels and minimum levels of service. In this system, the PRO might offer municipalities a standard payment for collection services. Payments are often based on data reflecting the average cost for collection services and may not entirely cover a given municipality's expenses.
  - Opt-out: Municipalities may choose *not* to participate *at all* in the EPR system, even if EPR is implemented within the region and neighboring local governments opt in. If this is the case, municipalities would simply continue to provide existing services to their residents and would not receive funding from producers.
- *Municipal Reimbursement.* Under this approach, local governments retain responsibility for collection (and sometimes processing) of PPP materials, and are reimbursed for their net costs by producers. Municipalities continue to control which materials and items are accepted for recycling and to manage staff and day-to-day operations. They may retain direct contracts with haulers and/or processors. In most cases, producers reimburse the majority of municipal net costs, but do not cover costs entirely. For instance, producers may be responsible for reimbursing net recycling expenses based on average costs for all municipalities in a region,

but not for expenses above the average. This type of reimbursement calculation is done to incentivize municipalities to control costs. In some programs, producers share expenses with municipalities (e.g., 50/50 or 80/20).

Key Elements of EPR for PPP

Certain elements are standard to all EPR systems, regardless of the materials covered. With input from numerous state and local government EPR experts, PSI developed the *Elements of an Effective EPR Bill for PPP*,[69] which provides options within each standard element based on EPR programs around the world. Key elements include:

Producer Responsibility Organizations (PROs)

Under both full producer responsibility and municipal reimbursement, producers typically organize under structures known as Producer Responsibility Organizations (PROs), which meet regulatory requirements on their behalf. PROs may operate as non-profit organizations or as for-profit entities, although most North American systems prefer or require PROs to be non-profits because of the governments' interest in greater data transparency.[70] Most PROs in the U.S. today that operate EPR programs are non-profits. Some EPR laws require PROs to seek input from multiple stakeholders in the form of an advisory board or committee, which may include representation from local and state governments.

One of the primary functions of PROs is to manage producers' financial responsibilities. This includes setting fees on all packaging and paper materials introduced into the market, which PROs collect from producers. When establishing fees, a PRO may be required to propose a fee structure to the governing authority for approval. In some regions, private sector service providers help PROs calculate and set fees, and often offer a suite of additional services, such as annual reporting. For example, several Canadian PROs contract with the Canadian Stewardship Services Alliance (CSSA),[71] which provides administration and management services for packaging in multiple provinces. PROs in Europe, as well as several non-European countries and the province of Québec, subscribe to the Extended Producer Responsibility Alliance (EXPRA).[72]

Under full producer responsibility (in which producers finance and operate a collection and processing system for PPP), PROs will contract directly with waste haulers (including local governments) and processors on behalf of member producers. Under municipal reimbursement (in which producers are responsible for reimbursing municipal recycling costs), a PRO may distribute funds directly to municipalities (e.g., Ontario and Manitoba), or through a quasi-governmental agency that in turn distributes funds to local governments (e.g., Québec).

Stewardship Plans

Under most EPR programs, producers are required to submit a stewardship plan, either individually or collectively under a PRO. If producers have formed a PRO, the PRO will submit a stewardship plan on their behalf. A stewardship plan describes every element of an EPR program, including all aspects of a PRO's structure and financing approach. Typically, a draft stewardship plan is submitted to the governing authority (e.g., state, provincial, or national government) for review and approval before the EPR program can be launched. A five-year initial plan is standard, with subsequent plan updates submitted for approval at five-year intervals. A critical element of EPR policies is to allow the governing authority to require changes before a stewardship plan is approved and then at any time throughout the duration of the program if targets are not met or circumstances change in a significant way. Local governments and other stakeholders can also influence the EPR system via the stewardship plan, typically by submitting comments and participating in a stakeholder engagement process.

Covered Materials

Throughout Europe and Canada, EPR programs cover a similar range of PPP, including residential/consumer-facing packaging and printed paper (e.g., newspapers, flyers, and marketing brochures). Packaging is defined by its functions: containment and/or protection of goods. Service packaging designed and intended to be filled at the point of sale (e.g., paper or plastic produce and bulk food bags) is also covered under these programs. Packaging and paper products are covered under EPR programs regardless of their current recyclability. In other words, producers pay into these programs for any PPP materials they supply to the market, regardless of whether those materials are currently reused, recycled, composted, or disposed.

Industrial, commercial, and institutional (ICI) packaging is also covered under many European programs, but producers organize under separate PROs for ICI and residential PPP (e.g., Belgium). Most Canadian programs currently cover residential packaging only, but some provincial governments are considering including ICI materials in their programs.[73] Packaging-like products such as sandwich bags, cardboard moving boxes, and aluminum foil, as well as single-use plastic products such as cutlery and straws, are options to consider in EPR frameworks. Given that residents often place these items in recycling bins, Recycle BC proposed adding them to its program, but the proposal was opposed by the packaging-like product producers.[74] No existing program has incorporated these items.

Internalized Costs

All EPR for PPP programs around the world are financed by "cost internalization" and not point of sale fees (which are called "eco fees" in the U.S.). Under cost internalization systems, producers incorporate program costs into their business expenses. Program costs usually include collection, transportation, processing, recycling, and other recovery of PPP. They also include consumer education, program administration, and government oversight. Costs are paid by producers via fees set by the PRO. Fees are

typically based on a variety of factors related to costs to manage covered materials in the recycling system, weight, and environmental impacts. They tend to be a fraction of a cent on a per-item basis, such that consumer prices for products have not noticeably risen to cover system costs.[75] Small businesses are typically protected from an undue burden within this system by being exempted if they are below a given threshold (e.g., less than $1 million in annual revenue or one ton of materials supplied per year), or by paying flat fees.

Producers pay material fees to the PRO on all packaging and paper products they supply to the market, regardless of whether the materials are ultimately collected and recycled. Funding from covered materials that are not collected, processed, or recycled is used to cover general program costs as well as to advance the adoption of difficult-to-recycle materials in the system. For example, funds may be used to develop markets for difficult-to-recycle materials to increase their value.

Point of sale fees that flow to the PRO, which are currently part of EPR systems for paint, mattresses, and carpet in the U.S., are not practical for PPP due to the vast number of packaging materials that would need to be itemized on a receipt, many of them a fraction of a cent. Point of sale fees are also not applicable for materials that are distributed rather than sold, such as flyers, because there is no monetary transaction with a consumer during which a fee could be assessed.

In most instances, costs to manage PPP imported from outside the jurisdiction of an EPR program are financed by the importer (i.e., the resident retailer or distributor). One aspect of modern markets that poses challenges to some existing programs in other countries is the purchase of goods through e-commerce.[76] In those countries, online shopping poses legal obstacles to enforcing EPR for PPP schemes, as online retailers may have no physical presence within the jurisdiction of the program and thus evade paying material fees for items they ship directly to consumers. However, following a U.S. Supreme Court decision in 2018,[77] most states have enacted laws to facilitate the collection of sales taxes from remote sellers. This sales tax obligation will enable states to take compliance and enforcement action to ensure that fees that may result from EPR obligations can be collected.[78]

Material Fees

Fees that producers pay usually fall into two types: modulated fees that are based on weight and net recycling costs, and eco-modulated fees that are based on more nuanced factors that attempt to provide an incentive for producers to reduce the environmental impact of their packaging. Early EPR programs routinely used modulated fees as the basis to set fees producers paid on their packaging. However, there is now a significant trend toward building on the basic fees and adding eco-modulated fees to have a greater influence on product design.

Modulated Fees. PROs in Europe and Canada typically calculate material fees based on two basic variables:

- Weight. Producers pay fees for PPP based on the total amount of materials they introduce into the market, which is measured by weight.
- Net recycling costs. Fees are calculated to cover the cost to manage each material in the recycling system, minus its market value. Materials that are easy to sort at MRFs and have high market value, such as steel cans, often incur lower fees per kg relative to other materials.

For example, in Canada, three EPR for PPP programs use a fee-setting methodology developed by CSSA that apportions system costs across materials in accordance with the costs to manage them, ensuring that difficult-to-recycle materials attract sufficient funds to advance their adoption in the recycling system. This is known as the Four-Step Fee Methodology. CSSA is currently conducting a Material Cost Differentiation study to more accurately assess the cost impacts of materials on the system, which will be a key input to the methodology. [79]

Eco-Modulated Fees. During the last five years, some EPR for PPP programs have evolved beyond modulated fees. Increasingly, PROs are setting eco-modulated fees that more precisely incentivize upstream design changes to reduce environmental impacts. Eco-modulated fees incorporate such considerations as:

- Recycled content. Producers that use recycled content may receive a bonus, and producers that do not use recycled content may pay a penalty.
- Greenhouse gas emissions. PPP materials with lower lifecycle or GHG impacts may incur lower fees.
- Reusability. Reusable packaging may be exempt from fees.
- Light weighting. Producers that reduce the amount of raw material used in PPP may receive a bonus.
- Recyclability. Producers that use widely recyclable PPP may receive a bonus, and producers that use difficult-to-recycle materials may pay a penalty.

For example, France's PRO for PPP, CITEO, has implemented a 50% fee bonus for producers that integrate a minimum of 50% recycled HDPE into LDPE films.[80] CITEO also charges a 10% "malus" fee (beyond the cost to manage the material) for materials (e.g., dark plastics) that are disruptive to recycling systems or are not consistently recyclable.[81] In Québec, the PRO (Éco Entreprises Québec, or ÉEQ) offers a 20% credit to producers for the inclusion of recycled content in certain materials at specified thresholds.[82] ÉEQ also recently established an *Ecodesign and Circular Economy* team that is developing a model to incorporate environmental criteria, such as GHG emissions, into its fee structure.[83] Eco-modulated fees are expected to spark more upstream design changes in the coming years, and will soon be mandatory in all EU member states.[84]

Recycling Access

One of the key facets of EPR for PPP is convenient access to recycling for residents at no extra charge. In many cases, convenience standards are set by the governing authority, which can mandate access to curbside pickup or drop-off services for a minimum percent of the population (e.g., 95% of all households). EPR laws typically require producers to meet or exceed existing state and local convenience levels for recycling. For example, producers may be required to preserve and/or expand curbside pickup in places where it exists prior to the implementation of EPR. In locations where there is no curbside pick-up service, EPR systems must maintain or expand the existing level of convenience. In areas without pre-existing services (e.g., subscription customers), residents are provided a level of service consistent with the wider region (e.g., neighboring municipalities). Maintaining convenient access to recycling with minimal service interruptions preserves public trust in the recycling system and is a key requirement in EPR for PPP policies.

Performance Standards

Under full producer responsibility, governments often set ambitious (yet achievable) collection and recycling targets for producers across each material type (e.g., glass, paper, plastic, metal) either through statute or regulations. Alternatively, producers may propose targets in their stewardship plan, subject to approval by the oversight agency. In either case, producers determine how best to meet performance standards. Initial targets are often informed by baseline data and can increase over time. PROs are required to report on their performance annually. Countries or provinces often include audit requirements for data collection and material disposition in EPR for PPP laws to ensure accuracy of progress and performance reports.

Holding producers accountable to numeric performance targets can be challenging if the producers are not managing the system. Under municipal reimbursement, governments are typically unable to set or enforce recycling targets for producers because producers do not have the management authority to make system changes that might improve efficiency or reduce contamination. No existing EPR for PPP municipal reimbursement programs have effectively enforced measurable performance targets for producers. However, some PROs, such as in Ontario and Québec, offer municipalities incentives and technical assistance to encourage efficiency and enhanced recycling outcomes.

Education & Outreach

PROs often have additional responsibilities for education and outreach under EPR for PPP systems. Under full producer responsibility, producers take a lead role in educating consumers on proper end-of-life management for their products, which may include promoting recycling through social media channels, maintaining a consumer-facing website, and/or producing ad campaigns (e.g., Figure 3). Under municipal reimbursement, local governments retain the responsibility for recycling education and outreach. However, under either approach, producers and local governments can share responsibility for consumer outreach. For example, PROs often provide templates that municipalities customize for their own needs. System-wide educational materials can create more consistency and reduce confusion across a state, country, or region by unifying messaging across jurisdictions. A main objective of EPR for PPP programs should be cohesive, standardized, region-wide resident education.

Figure 3: Recycling outreach campaign by Recycle BC (the PRO in British Columbia).

In addition to educating consumers, PROs and organizations that serve PROs provide educational resources to producers to encourage packaging sustainability and re-design. For instance, EXPRA has formed a Sustainability and Packaging Working Group to educate producers about packaging design for recyclability and to help producers ensure that their packaging is recyclable.[85] Many PROs offer tools that help producers understand and navigate product and packaging requirements, as well as advice and resources to help them re-design packaging that better meets system requirements (e.g., ÉEQ's OptimEco Kit).[86]

EPR for PPP in Canada: A Review of Four Programs

All Canadian EPR for PPP programs are either fully or partially financed by producers. The Recycle BC program is the only full producer responsibility system in place in Canada, with producers fully financing and operating the program. In Ontario, Quebec, Manitoba and Saskatchewan, local governments manage the collection and recycling of materials and producers pay a percentage of municipal costs as outlined in their respective regulations. Notably, these programs are all transitioning to EPR systems that provide greater operational authority to producers. Ontario and Québec are both transitioning to full producer responsibility. Four of the five Canadian provincial programs are described in detail below and compared in Table 1.

In Canadian programs, PROs measure program success in part with material recovery rates, which are defined differently in each province (see Appendix A). In Ontario and Manitoba, only materials managed by recycling are considered recovered. In Québec and B.C., as in the U.S., materials converted to

engineered fuel and managed in other ways (e.g., disposal) are included in the calculation of recovery rate, although these tend to be minimal components of the overall program. As in all recycling programs around the world, some collected materials cannot be recycled, including both accepted materials that are contaminated or broken (e.g., glass) and non-accepted materials. Given the variability across programs in definitions of recovery and priorities for materials management, extracting comparable PPP recycling rates remains a challenge. Recycle BC does report the percentage of materials that are truly recycled (i.e., sold to recycling markets), converted to engineered fuel, and disposed (see Table 3).

Ontario

Ontario is the birthplace of curbside recycling. The program first emerged as an industry and government funded pilot in 1981.[87] By 1994, most municipalities in Ontario were required by the provincial government to implement curbside recycling, referred to as the Blue Box Program.[88] (For the full list of covered materials, see Appendix B.) Additional requirements were introduced over the last decade for the provision of collection infrastructure in public spaces, and remain in effect today. Provincial EPR for PPP began under the *Waste Diversion Act* (2002),[89] which required producers to fund 50% of the net Blue Box Program costs (a model referred to as "shared cost"). In 2019, the 50% funding level total for producers amounted to approximately $97 million USD.[90] Producers contributed these funds through their PRO, Stewardship Ontario.

Stewardship Ontario

Stewardship Ontario currently sets material fees for producers based on the recycling rate and net cost to manage each material.[91] This fee structure is designed to fairly allocate costs across designated materials. It incorporates data from material composition studies conducted curbside and at MRFs, as well as studies that estimate the costs to handle materials from collection through transfer, sorting, and processing.

The EPR for PPP program in Ontario is set to transition from a shared cost model to full producer responsibility. A new oversight body established by the Ontario Government, known as the Resource Productivity and Recovery Authority (RPRA), is overseeing the transition. Until the transition to full producer responsibility is complete at the end of 2025, RPRA is responsible for setting the amount producers are required to pay municipalities. The 50/50 shared cost model is still in place, with costs based on collection data provided by municipalities and adjusted for best practices. There are currently no legally mandated recovery or recycling performance targets for municipalities or producers.

Table 1: Comparison of Key EPR Elements Across Select Canadian EPR for PPP Programs

Key Element	Ontario	Québec	Manitoba	British Columbia
EPR Approach	Municipal Reimbursement*	Municipal Reimbursement*	Municipal Reimbursement	Full producer responsibility
PRO (primary)	Stewardship Ontario	Éco Entreprises Québec (ÉEQ)	Multi-Material Stewardship Manitoba (MMSM)	Recycle BC
PRO structure	Not-for-profit	Not-for-profit	Not-for-profit	Not-for-profit
Covered Materials *(See Appendix B for full lists)*	Residential PPP (liquor bottles covered in deposit program)	Residential PPP (soda and beer bottles covered in deposit programs)	Residential PPP (includes most containers)	Residential PPP (most beverage containers covered in deposit programs)
No. of Registered Producers	1,830	3,400	796	1,186
% of Producer Funding	50% of net reasonable costs* (see Key Terms)	100% of net reasonable costs* (see Key Terms)	80% of net reasonable costs (see Key Terms)	100% producer financing and management
% of Households with Recycling Access (curbside & depots)	94%	99%	95%	98.6%
No. of Participating Municipalities	249	568 [92]	148	176
Recovery Rate (& how defined)**	60.2% (recycled tonnes / generated tonnes)	64% (collected tonnes / generated tonnes)	85.7% (recycled tonnes / market supply)	78.2% (net collected tonnes / market supply)
Legal responsibility for performance targets	N/A (no performance targets mandated)*	Municipalities*	N/A (no performance targets mandated)	Recycle BC
Education & Outreach	Municipalities lead; Stewardship Ontario voluntarily supports with regional ads & social media	Municipalities lead	Municipalities lead; MMSM provides customizable print materials & funds some local campaigns	Recycle BC leads; runs province-wide and targeted campaigns; coordinates with service providers

**The Ontario and Québec programs are shifting to full producer responsibility – see "Ontario" and "Québec," above.*

***Each province calculates recovery rates differently, which makes direct comparisons across programs difficult for this metric. Here, "generated tonnes" refers to metric tons derived from waste characterization studies, while "market supply" refers to metric tons supplied to the market, as reported by producers. Recycle BC reports "net collected tonnes" because the system integrates materials covered by multiple stewardship programs (e.g., beverage bottles and newspapers), and the PPP recovery rate is corrected for these materials. For more information on each province's recovery rates and how they are calculated, see Appendix A.*

Ontario's EPR for PPP system is changing because producers and municipalities alike recognize the need for a reboot. Despite numerous successful initiatives by Stewardship Ontario, such as a Continuous Improvement Fund[93] to assist municipalities in optimizing recycling performance and efficiency, investments in local recycling markets to improve plastics recycling, and comprehensive technical support for producers, Ontario's system continues to face many challenges. By 2016, recovery rates had stagnated at an average of 60% across materials for over 10 years, with some hard-to-process materials recycled at rates less than 10%.[94] Although there are no legal performance requirements for municipalities or producers under the current system, all parties agree that improved recycling outcomes are necessary given increasingly tight global markets and growing public pressure to address waste. Tired of paying for the system without the operational control to reduce costs and increase performance, producers were ready for a change. As expressed in Stewardship Ontario's 2018 annual report:

> *"The current shared responsibility model for Ontario's Blue Box Program is inadequate. It fosters system fragmentation by leaving operational decisions to individual municipalities. Across Ontario there are hundreds of different recycling programs, meaning decisions are localized and disconnected. This fragmentation creates confusion for consumers; businesses have no way of influencing local programs and therefore do not fully engage on packaging design choices; and essential economies of scale cannot be achieved to support a circular economy because uncertainty deters investment in new processes and systems."* [95]

Ontario's *Resource Recovery and Circular Economy Act* (2016),[96] which was supported by municipalities as well as producers, created a province-wide framework for more robust EPR across all targeted products. With PPP materials evolving, markets shrinking, and public demand growing, municipalities undertook negotiations with producers and reached agreement in 2019 to transition to full producer responsibility for the province under the *Act's* framework.[97]

The Ontario Government intends to consult on a new Blue Box Program regulation in 2020 that will solidify the province's transition to full producer responsibility. Under the new system, producers will be financially and operationally responsible for PPP collection, sorting, transportation, and processing. Materials accepted in the Blue Box Program will be standardized across all municipalities within the province. The changes will enable the government to set enforceable waste diversion targets for the first time. It is anticipated that producers will be legally responsible for achieving these targets. The transition will be complete by 2025, with some municipalities and First Nations transitioning by 2023.[98]

Under Ontario's new system, producers will register directly with RPRA, which is a delegated administrative authority (DAA) for the Ontario Government with staff who are authorized to act as enforcement officers. Stewardship Ontario will be dissolved as a corporation, and one or more new PROs will be formed. Over the next three years, the Ontario Government will consult with stakeholders to address issues such as how to create a standard list of materials to be collected, what performance

targets should be included, the setting of minimum levels of accessibility, and the service standards to be met by producers to ensure a smooth transition. Local governments will have the opportunity to bid on collection services for PROs if they wish to continue providing these services.[99]

Québec

Québec's EPR for PPP system launched in 2005. (For the full list of covered materials, see Appendix B.) Under this system, producers reimburse municipalities for their net reasonable recycling costs (i.e., municipal reimbursement). Initially, producers were responsible for 50% of recycling costs, similar to Ontario, but the program gradually transitioned to a greater share of producer funding. Since 2013, producers have reimbursed 100% of net reasonable municipal costs in Québec, as determined by the quasi-governmental agency, Recyc-Québec. Curbside collection and sorting are managed directly by municipalities, either in-house or by contract with private collectors. There are two PROs managing PPP materials: RecycleMédias, which oversees newspaper recycling, and Éco Entreprises Québec (ÉEQ), which oversees all other covered materials.

Municipalities report the net costs of their recycling operations to Recyc-Québec, which then determines the level of financial reimbursement required by producers. Recyc-Québec calculates the average municipal cost for groups of programs serving similar population sizes and located at similar distances to major metropolitan areas. Municipalities are reimbursed based on the average cost within their group, which creates a financial incentive to control costs. A flat percentage (currently 6.45%[100] and adjusted periodically based on waste studies) is also deducted from net costs to account for materials collected by municipalities for which producers are not responsible (e.g., items subject to the bottle deposit program that residents place in curbside recycling rather than redeem for deposit). In 2019, ÉEQ reimbursed municipalities a total of $146 million USD.[101]

ÉEQ collects fees from producers and submits them to Recyc-Québec for distribution to municipalities. Each year, ÉEQ undertakes a consultation process with producers to create a Schedule of Contributions outlining all material fees (see Appendix B).[102] Fees in the Québec program are modulated, accounting for weight, collection rates, and the net costs of managing each material in the system. For example, those materials with high collection rates and low management costs will pay less than those with low collection rates and high management costs. The average fee is $220 USD per metric ton put onto the market.[103]

ÉEQ also provides services to producers beyond setting fees, such as case studies and tools to encourage best practices in both recycling operations and packaging design, and a phone service offering free direct support. To enhance system performance, the PRO facilitates investment in research and optimization for material-specific recycling technologies and end markets. For example, the producer-funded Innovative Glass Works Plan[104] was launched in 2016 to improve purity in recycled glass streams and develop markets for 100% of collected glass. ÉEQ also funded the region's first study of the economic opportunities and impacts of the local circular economy.[105]

In 2011, the Quebec Government established a 70% target recovery rate for paper, cardboard, plastics, glass, and metals in its *Residual Materials Management Policy Action Plan,*[106] with primary responsibility for achieving these targets resting on municipalities. However, the average recovery rate across materials in Québec remains at 64%.[107] ÉEQ has noted that improvements to education and outreach, as well as investments in end markets, are still needed to improve this rate.[108] But one of the greatest challenges to the Québec system is its legal structure, with municipalities still making individual decisions as to which PPP items are collected, and producers are not legally obligated to achieve any performance measures. As in Ontario, this framework has perpetuated a fragmented system, with inconsistent collection lists and public education across the province.[109] ÉEQ has struggled to achieve a streamlined, modernized processing network, significantly reduce contamination, and achieve efficiencies at scale due to such inconsistencies, which are outside the PRO's control.

As in Ontario, producers in Québec expressed a desire for more control over curbside collection and sorting. To this end, Québec created an "action committee for the modernization of waste recovery and recycling,"[110] with objectives to:

- Define new roles and a new model for shared responsibility for the actors in the packaging value chain, and
- Determine measures to improve the current system's performance.

As a result of the PRO's recommendations and the committee's work, the program will transition to full producer responsibility.[111] Proposed elements of a new program include standardization of collected materials province-wide, a greater emphasis on eco-design for packaging, and increased development of local markets for recycling materials.[112] Under the new regulations, ÉEQ anticipates that it will assume legal responsibility for achieving recovery targets and other program performance metrics.[113]

Manitoba

Manitoba's EPR for PPP program is managed by two PROs: Multi-Material Stewardship Manitoba (MMSM) and the Canadian Beverage Container Recycling Association (CBCRA). MMSM is responsible for most PPP materials and reimburses municipalities for 80% of their net reasonable recycling costs (i.e., municipal reimbursement). Under this system, local governments are responsible for both curbside collection and drop-off facilities, as well as materials sorting. The program was launched in 2010 by the *Waste Reduction and Prevention (WRAP) Act*[114] and subsequent *Packaging and Printed Paper Stewardship Regulation.*[115] While these regulations required producers to establish the program, they did not set specific recovery or program performance measures for either producers or municipalities. The Environment Minister reserves the right to issue guidelines regarding performance requirements or recovery targets for any specific materials, but thus far such guidelines have only been issued for plastic

bags.[116] In practice, MMSM proposes program targets in its *Packaging and Printed Paper (PPP) Program Plan,*[117] which are negotiated and ultimately approved by the Minister. In 2018, MMSM reported an 85.7% recovery rate across materials, which include containers that are covered by deposit programs in other provinces.[118]

While the Manitoba system uses a municipal reimbursement approach, municipal programs must meet certain efficiency requirements to receive producer funding. Municipalities are also required to consult with MMSM before making any changes to their recycling programs that would have significant cost implications.[119] MMSM sets fees based on the costs to recycle materials, as described earlier. Producers supplying difficult-to-recycle materials will pay relatively more for their products because the fee structure assigns revenues only to materials that earn them (i.e., are sold to recycling markets) and assigns additional costs to difficult-to-recycle materials to invest in new options for their end-of-life management.

MMSM assists municipalities with contractual arrangements and equipment purchases and in other ways that improve overall system efficiency and cost savings. MMSM also invests in education and outreach by providing municipalities with a customizable recycling guide and customizable posters, and funds recycling campaigns in various municipalities each year to help spread consumer awareness and drive traffic to consumer-facing websites (e.g., Figure 4). In addition, the PRO undertakes province-wide initiatives, such as a 2016 plastic bag reduction campaign.[120] However, municipalities retain primary responsibility to ensure consumers comply with recycling rules.

Figure 4: Sample outreach materials produced by MMSM.

Overall, MMSM has achieved a high recovery rate across materials. Even so, direct comparison with recovery rates in other provincial EPR programs is challenging due to differences among programs, including how recovery is calculated (Appendix A) and what materials are collected. Population size and density are also likely factors impacting recovery rates (Manitoba's population is approximately 1 million people compared to 5.1 million in B.C., 8.5 million in Québec, and 19 million in Ontario). Additionally, MMSM collects most bottles and beverage containers sold in the province (which does not have a bottle deposit program), and the recovery rate accounts for these containers. By contrast, all four other provinces with EPR for PPP programs in Canada have at least some portion of bottles covered by deposit schemes, and those containers are not reflected in their recovery rates.

British Columbia

The first EPR program in B.C. was launched for paint in 1994.[121] In 1997, producers began the Beverage Container Stewardship Program,[122] covering ready-to-drink beverages. In 2003, B.C. adopted the *Environmental Management Act (EMA)* to streamline EPR and expand producer responsibility to more product categories. The *EMA* provided a legal framework for waste management throughout the province. In 2004, the B.C. Ministry of the Environment developed the *Recycling Regulation* to implement the *EMA*, which required producers of many product types to submit stewardship plans to the Ministry and obligated them to achieve target material recovery rates of at least 75% (described below). One of the main features of the *Recycling Regulation* is the requirement for producers to take "full producer responsibility" for the end-of-life management of their products.[123]

While the *Recycling Regulation* broadly established EPR in B.C. in 2004, PPP was not listed as a designated product until 2011. Producers formed the PPP PRO, Multi-Material BC, shortly thereafter, and launched the EPR for PPP program in 2014. In 2017, Multi-Material BC was rebranded as Recycle BC. **Recycle BC was the first PRO to operate a full producer responsibility program for PPP in Canada.** Two additional PROs manage PPP materials in B.C.: Brewers Recycled Container Collection Council (BRCCC), which primarily handles beverage bottles (see A Note on Bottle Bills, below) but also collects the cardboard cases and boxboard cartons used to package glass bottles and metal cans,[124] and News Media Canada (NMC), whose first stewardship plan for the management of printed newspapers throughout the province was approved in 2017.[125] NMC relies on Recycle BC as a service provider. Newspapers are collected together with other PPP materials using Recycle BC's existing infrastructure throughout the province.

On behalf of producers, Recycle BC is responsible for residential collection services across the province, as well as materials processing and marketing collected materials to end users. (For the full list of materials collected by Recycle BC, see Appendix B.) Recycle BC's EPR for PPP program currently serves more than 1.8 million single- and multi-family households.

Under the Recycle BC framework, local governments and First Nations are provided flexibility to choose from among three options for participation in the EPR program (akin to the options outlined in EPR for PPP: Basic Approaches, above):

- **Opt for Recycle BC to Directly Manage Collection ("Full Opt-in")**: In this case, local governments elect to have Recycle BC directly manage their curbside recycling service. These local

governments are no longer responsible for oversight or management of recycling services or resident education.

- Participate as Collectors Under Contract to Recycle BC ("Partial Opt-in"): Local governments choose to deliver recycling collection services to their residents under commercial contract to Recycle BC. In this case, local governments must meet Recycle BC's collector qualification standards. Collectors are paid incentive rates for their services,[126] and Recycle BC is responsible for processing and marketing collected materials. This option tends to be favored by local governments because it enables them to bundle services (e.g., recycling, garbage, and organics collection).
- Opt-out: Local governments elect to maintain the status quo and do not receive funding from Recycle BC. Instead, they continue to manage their own recycling services outside of the Recycle BC program.

When the program first launched in 2014, Recycle BC made initial offers to local governments across the province. Most chose to accept these offers and act as collection service providers for the PRO ("partial opt-in"). While few local governments initially chose to turn collection over to Recycle BC ("full opt-in"), as the program was still unfamiliar, only a handful (less than 10) opted out entirely. Over time, interest and trust in the program has expanded. As of 2020, some local governments have transitioned from partial to full opt-in, and several that initially opted out have now transitioned to partial opt-in. While most local governments continue to operate as collectors under contract to Recycle BC (partial opt-in), the local governments that have fully opted in contain over half of the province's population.

The reasons municipalities made their choices depend on their priorities. For example, a community acting as a collector for Recycle BC (partial opt-in) might want to use their existing trucks to collect both garbage and recycling. Several local governments, especially in the province's large population centers, have transitioned to direct management by Recycle BC ("full opt-in"). Some of these communities chose this option from the start to obtain greater net benefit by reallocating funds saved on municipal recycling to other environmental priorities, such as organics collection, while others that initially acted as service providers have since transitioned to direct management (full opt-in). The City of Vancouver, for example, initially acted as a collection service provider for Recycle BC. In 2015, faced with prohibitive costs to replace its collection fleet,[127] the City decided to have Recycle BC directly manage its curbside and multi-family recycling services. Recycle BC now contracts with commercial haulers for collection services previously provided by City of Vancouver employees, thus significantly expanding local opportunities for private collectors.

Looking to the Future

Ten years after the passage of the CCME's federal *Action Plan for Producer Responsibility,* Canada's provincial EPR programs are evolving. A new national *Zero Plastic Waste Action Plan* has committed the CCME to harmonizing EPR for PPP across the country, and the trend is clearly toward full producer responsibility. Producers are increasingly driven to expand and improve recycling as public pressure to solve the waste crisis continues to grow. Public commitments by many household brands are motivating these companies to invest in the recyclability of their products and packaging. EPR has shown promise as an effective approach to achieving their goals in Canada.

Under full producer responsibility, producers have greater incentive – and the means – to increase the performance and efficiency of recycling systems. They are also legally responsible for program performance, which helps to ensure success. With control over operations, producers can increase the quality of collected materials, decrease contamination, and cultivate recycling markets. Canadian officials have stated that assigning full accountability to PPP producers throughout Canada is viewed as the best path forward to create a coordinated, cross-regional system that can stimulate investment at scale.[128] Provincial governments and producers are both looking to the full producer responsibility approach to enhance material collection, reduce waste and carbon emissions, and supply businesses with a reliable, high-quality stream of resources to return to the circular economy.

A Note on Bottle Bills

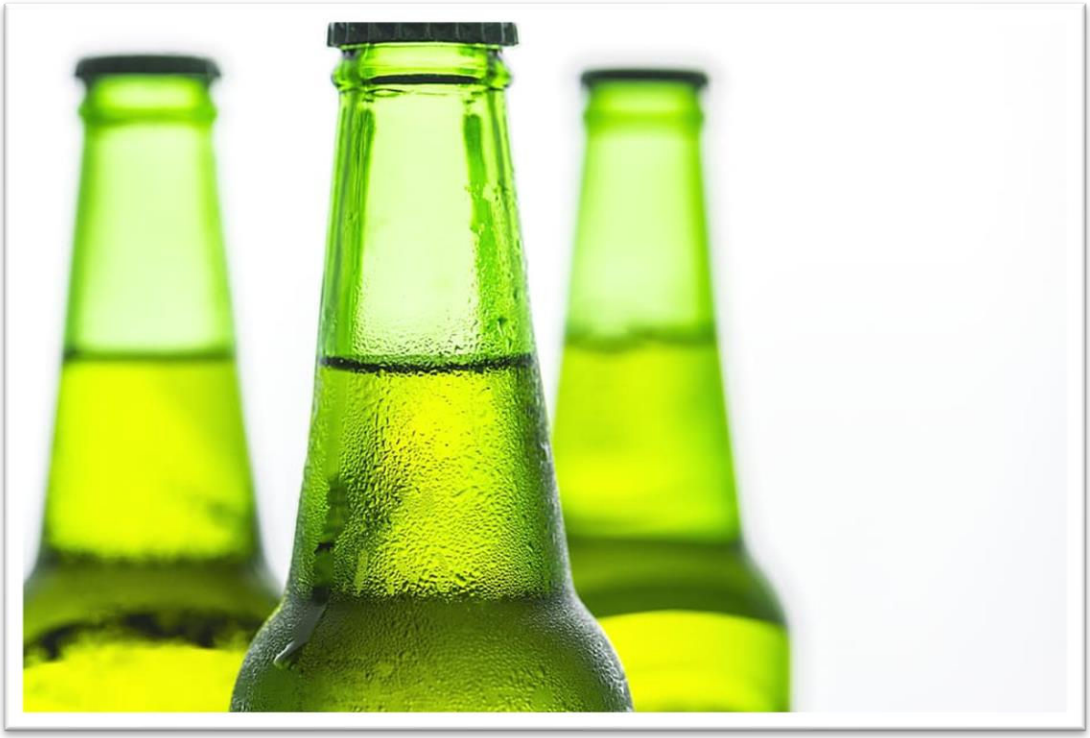
Many Canadian provinces have long-established container deposit laws that require producers to provide infrastructure for bottle collection and impose deposits on consumers who purchase these products. As EPR for PPP has spread across the country, provinces have largely kept these programs separate from container deposit programs. While each province operates slightly different container deposit and EPR programs, the two systems have been able to work in harmony alongside one another in each province.

For example, in Québec, soda bottles are managed by the producer organization Boissons Gazeuses Environment, while beer bottles are managed by brewers, as well as by Recyc-Québec. All deposit containers can be returned at the point of sale by consumers wishing to redeem their deposits.

In Ontario, EPR first emerged as a means for producers to avoid expansion of the provincial container deposit system[129] (i.e., producers agreed to contribute funding to the Blue Box Program because the Ontario Government was considering expanding requirements for consumer-paid deposits). As the Blue Box Program transitions to full producer responsibility, bottles not covered by the existing container deposit law will continue to be collected by producers in curbside bins, while long-covered alcohol containers will remain under the existing bottle deposit scheme.

In B.C., two PROs operate deposit systems for bottle returns. BC Brewers Recycled Container Collection Council (BRCCC) covers most domestic beer and cider brands, while Encorp Pacific covers all other beverage containers that are subject to a deposit, including wine, spirits, and non-alcoholic beverages. Bottles are returned at retail locations as well as drop-off depots managed by Encorp Pacific. Recycle BC earns the deposit value of any beverage containers that flow through its system (i.e., bottles that wind up in curbside bins or at Recycle BC's collection depots) and uses these funds to offset gross system costs. No fees or refunds are remitted to municipalities from bottle deposits because the container deposit systems are entirely managed by B.C.'s beverage PROs.

In Manitoba, consumers do not pay deposits on beverage containers, but there is a two-cent visible fee applied at point of sale for beverage containers that is used to fund and recover containers in both residential and away-from-home locations.



4. British Columbia: A Case Study

PSI examined the EPR for PPP program in B.C. in detail because it is one of the more recently established programs in North America and was designed with the benefit of knowledge gained through many other programs. It is also the only full producer responsibility program operating in Canada for PPP. This case study provides further insight into the operational elements of the B.C. program. (For background on Canadian EPR programs and the evolution of EPR in B.C., see EPR for PPP in Canada: Five Provincial Programs, above).

Governing Structure

Producer Responsibility Organization (PRO)

As described earlier, Recycle BC carries out producers' responsibilities for the collection of PPP materials from consumers, the processing of these materials, and the sale of materials to recycling markets. Recycle BC manages curbside collection and drop-off depot locations through contracts with haulers, private depots, or local governments. The B.C. program offers flexibility for local governments to participate to varying degrees in the EPR for PPP system. Local governments can either turn the management and financing of residential collection over to Recycle BC or continue to collect materials and receive a payment for each household served or, in the case of depots, the volume of materials collected.

For municipalities that have chosen to act as collection service providers to Recycle BC, payments are distributed directly to local governments by the PRO. For curbside collection, Recycle BC pays municipal collectors based on the number of households served, with some variation based on factors such as whether municipalities choose to offer single- or multi-stream collection, and household/population density. For depots, Recycle BC pays an incentive rate based on the volume of material collected. As of 2018, payments ranged from $25 to $33 USD per household for curbside collection.[130]

All collection providers, including local governments, private companies, and non-profits, must meet certain qualification standards, such as providing collection service on a consistent schedule and furnishing residents with collection containers of sufficient size.[131] Collectors work under a Master Service Agreement with Recycle BC.[132] Each year Recycle BC assesses collection needs and may add collection providers to its network.

Recycle BC is informed by an Advisory Committee with representatives from industry and local government.[133] The Committee meets four times each year to discuss core elements of the program, identify and resolve issues, and provide feedback and recommendations to the PRO.

Investments in Infrastructure

The transition to full producer responsibility in B.C. was relatively smooth for collectors. As previously described, municipalities had the option to continue providing collection services, and any collection providers in the province signed agreements with Recycle BC to ensure consistent service standards for all residents. In terms of post-collection, implementation of the Recycle BC program led to significant investments in processing infrastructure. At the start of the program, Recycle BC published a Request for Proposals (RFP) for post-collection transport and processing services. The RFP divided the province into several regions, so that bids from smaller operators could remain competitive (i.e., so as not to force small, local operators to compete with larger-scale, regional companies). Waste management companies had the option to provide proposals for multiple zones to achieve efficiencies of scale.

During that procurement process, three of the largest industrial recyclers in the province (Cascades Recovery, Emterra Environmental, and Merlin Plastics) joined together to form a private consortium called Green By Nature (GBN).[134] GBN consulted with receiving facility operators and haulers across the province and secured agreements from a significant number of them to sub-contract within their networks, enabling GBN to submit a proposal to serve the entire province. This efficient use of existing infrastructure, as well as the partnership created with sub-contractors, allowed small operators to maintain their role in the system and insulated the region from job loss and stranded assets. More than 20 subcontracted businesses, local governments, and non-profits operated approximately 32 receiving, consolidation, and transfer facilities (RCTs) and 11 pre-conditioning facilities (PCFs) on GBN's behalf (Figure 5).[135]

Stable funding and regional consistency spurred unprecedented levels of investment in recycling across B.C. To launch the program, Green By Nature invested approximately $25 million USD into B.C.'s recycling infrastructure .[136] A portion of this funding enabled Merlin Plastics to build a $15 million USD container recovery facility (CRF) specifically designed to meet the demands of the province's anticipated recycling growth, with enough capacity to process all containers (of all material types) collected throughout the province. The CRF, which was the first of its kind in North America, used the most advanced technology

available in the recycling industry to maximize sorting efficiency and the quality of each material stream.[137]

Market stability created by the EPR program also resulted in a secure environment for small haulers, MRFs, and local governments to make voluntary upgrades to equipment and systems with little market risk. Investments in infrastructure and harmonization of collected materials across the province allowed local operators to handle increased volumes of material and to optimize their roles based on their unique capabilities and specializations. At the municipal level, some communities were able to redirect resident taxes that were no longer needed for recycling collection into complementary collection services, such as organics composting, while others simply reduced taxes for their residents overall.[138] Since the program's inception, producers have provided $514 million USD to manage residential PPP across the province.[139]

Having the option to participate in a producer-funded system enabled curbside recycling for many communities across the province for the very first time. Within one year of Recycle BC's launch, 20 communities and First Nations had new curbside recycling programs, including Prince George, which has a population of over 85,000.[140]

With its post-collection contract set to expire in 2020, Recycle BC developed a new RFP in 2019 after consulting with several waste management companies (local, national, and international) in a "market-sounding exercise." Ultimately, Recycle BC outlined several desired outcomes of the procurement process, including:

- Prioritizing local recycling markets;
- Fostering investment in recycling infrastructure;
- Enhancing system efficiency;
- Delivering clear and transparent business processes; and
- Encouraging on-going innovation and technology investments.

In late 2019, Recycle BC announced that it had signed an agreement with Canada Fibers, Ltd. to assume its post-collection work (receipt, transportation, processing, marketing, and reporting of the materials that Recycle BC collects).[141] Under the new agreement, Recycle BC intends to process more materials in North America, especially fiber. In January 2020, GFL Environmental Inc. (GFL) completed its purchase of Canada Fibers.

In creating its post-collection network for Recycle BC, GFL secured agreements with 28 local receiving facilities that had previously been part of the Recycle BC network under GBN, including several receiving facilities owned by the GBN partners themselves. In total, the new post-collection network has 38 facilities, including 36 receiving facilities and two material recovery facilities.

GFL has made significant investments in recycling infrastructure in B.C., including investments in new technology and processing capability in two new material recovery facilities. In total, GFL has invested approximately $18.7 million USD in the facilities located in New Westminster and Richmond, BC. Both facilities have the latest sorting technology, including artificial intelligence, with the Richmond location featuring a building dedicated exclusively to fiber and another building acting as a container recovery facility. The Richmond location processes multi-stream collection, while the New Westminster location processes both single- and multi-stream.

As a result of these investments, Recycle BC will continue to market the majority of its plastic in BC; however, whereas it previously shipped the majority of its fiber to overseas markets, it should now be able to keep the majority in the Pacific Northwest of North America. The new material recovery facilities allow GFL to tailor its commodities (material bales) to the demands of the marketplace, creating better access to local markets and allowing it to meet more stringent international markets as well. Overall, this further reduces Recycle BC's reliance on overseas markets so that now the majority of materials remain in North America, thus providing support for a local circular economy.

Stewardship Plan

Recycle BC initially submitted its *Packaging and Printed Paper Stewardship Plan* in 2012 to the B.C. Ministry of Environment for approval. As required by law, the PRO consulted with stakeholders prior to submitting the plan. Final approval for the program was granted in 2013.[142] The plan covered all elements of the proposed EPR framework for the region, including the formation of the PRO, covered materials, the proposed program structure, and performance measures to be reported annually over five years. In 2016, the plan was updated ahead of schedule to account for the program's growth during its first two years of operation. Local governments that had initially declined to participate in the system had been placed on a waitlist while Recycle BC built capacity to accommodate their needs. The updated plan outlined a process for adding these municipalities to the program.[143]

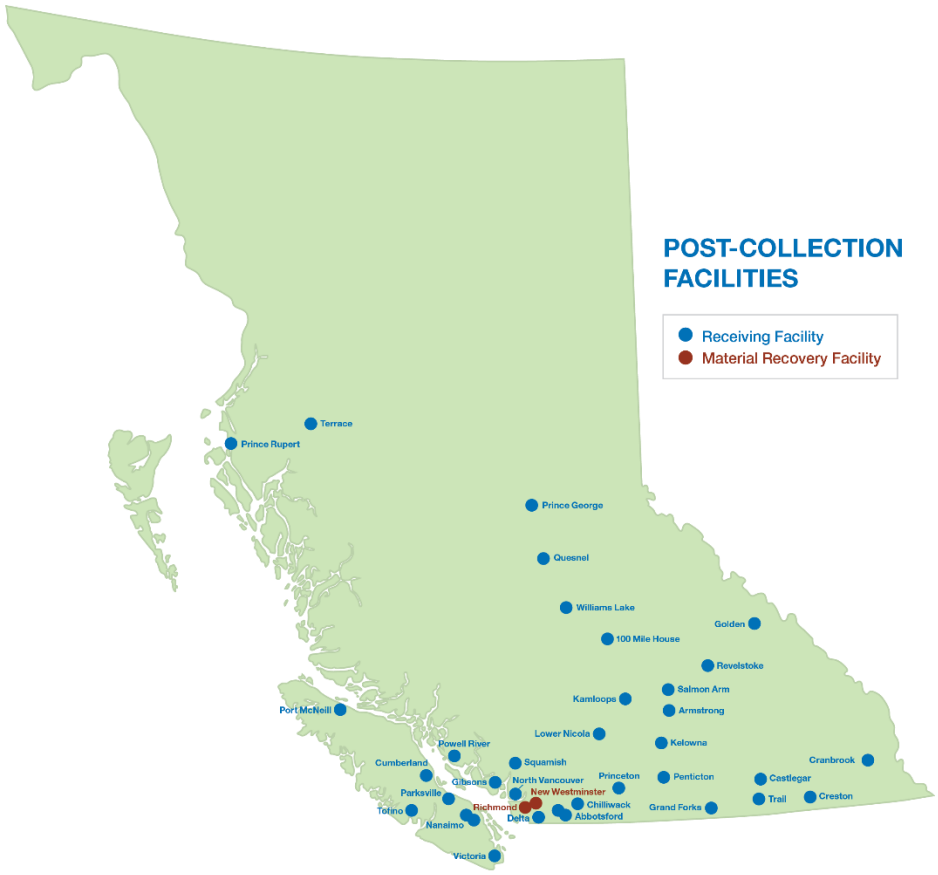


Figure 5: RFs throughout B.C., as well as two MRFs provided by Recycle BC. Image courtesy of CSSA.

Recycle BC began the process of consulting on a revised plan by hosting a stakeholder workshop over two days in November 2017 and completing multiple rounds of stakeholder consultation through September 2018. Local governments, haulers, processors, and producers provided feedback to inform the revised plan prior to its submission. The revised *Packaging and Paper Product Extended Producer Responsibility Plan* for Recycle BC was approved in June 2019.[144] The revised plan lays out a renewed vision that includes geographic expansion and special projects, continued reduction of contaminants, and technical innovation for difficult-to-recycle materials. The plan also highlights consistent metrics for reporting recycling performance on a material-specific basis, including material-specific recovery targets and recycling performance targets in specific sub-categories, with an emphasis on plastics.

Collected Materials

One of the most transformative aspects of EPR for PPP in B.C. has been the introduction of Recycle BC's standardized list of collected materials, which has enabled the PRO to meet and exceed the initial

government-mandated 75% recovery rate, achieve relatively low contamination rates, and successfully market its collected materials. Prior to the implementation of EPR for PPP, local governments made individual decisions about what to collect based on capacity, existing technology, costs, and other individualized factors, which led to inconsistencies between municipalities and resident confusion.

All types of packaging and printed paper are covered under the EPR for PPP system in B.C., regardless of their material content. B.C.'s *EMA*[145] and *Recycling Regulation*[146] set the definitions of packaging and paper products. The *EMA* defines packaging as "a material, substance or object that is (a) used to protect, contain, or transport a commodity or product, or (b) attached to a commodity or product or its container for the purpose of marketing or communicating information about the commodity or product."[147] Schedule 5 of the *Recycling Regulation* defines paper as "paper of any description," including flyers, brochures, catalogues, phone books, and other paper materials[148] (see Appendix C for the full definitions of packaging and paper products).

Recycle BC's *Stewardship Plan* further clarifies the definition of packaging that is covered by the program with a **list approved by the B.C. Government via the approval of the *Plan*.** The list encompasses consumer facing primary, secondary, and tertiary packaging, as well as certain single-use and carry-out items such as grocery bags[149] (see Appendix C for details). Certain items may be excluded from collection if they are agreed upon by the PRO and the Ministry; for example, Recycle BC does not currently collect the following items, although producers must still pay fees on them:[150]

- Plastic-lined paper;
- Paper-lined plastic;
- Biodegradable and/or compostable plastic;
- Vinyl; and
- Plastic squeeze tubes.

Fees paid by producers on materials that are not collected are used to cover program costs, including operational, administrative, and educational expenses, as well as dedicated projects initiated to advance the recyclability of materials in the system (as described below).

Additionally, Recycle BC has implemented location-specific and material-specific requirements where necessary. Foam (packaging, containers, trays, and cups) is only accepted at drop-off depots.[151] Curbside glass collection is only available in a select number of municipalities that choose to collect it, and glass is required to be separated from other recyclables to reduce contamination in other collection streams. If residents mistakenly include glass in their curbside bins, haulers do not pick up these materials, but instead leave educational tags to explain why they have been left behind. Glass packaging not collected curbside (and not covered under the province's two bottle deposit programs) is accepted at Recycle BC depots. These and other specific material considerations are included in the PRO's *Stewardship Plan*.

Since only a handful of materials are not collected by Recycle BC, consumer recycling guides are clear, simple, and uniform throughout participating communities. As previously mentioned, beverage containers (both alcoholic and non-alcoholic) that are subject to a deposit are managed under a separate producer-run system and are therefore not covered under Recycle BC's EPR for PPP system (see A Note on Bottle Bills, above).

Recycle BC has launched multiple pilot programs to expand the number of materials it collects. While the program already accepted plastic bags and overwrap at drop-off depot locations, in 2018 Recycle BC introduced the material category Other Flexible Plastic Packaging (OFPP) through a pilot program, and officially added the category as a part of its accepted materials in January 2019.[152] Examples of OFPP include stand-up zipper lock pouches (e.g., pouches for granola, frozen berries, etc.); crinkly wrappers and bags (e.g., coffee bags, chip bags); flexible trays with a peel-off seal (e.g., packaging for fresh pasta or pre-packaged deli meats); non-food protective wrap (e.g., bubble wrap or plastic envelopes); and net bags for produce. Items in this category are currently only accepted at drop-off depots and certain return-to-retailer locations. Recycle BC also conducted a pilot program in the City of Coquitlam for the collection of plastic squeeze tubes in 2018 (placed curbside in a special bag; see Figure 6), but these have not yet been added to the program's province-wide accepted materials list.[153]

Figure 6: Plastic squeeze tube pilot, 2018

The program has also included various special projects to expand collection mechanisms, including a streetscape collection program piloting various PPP collection bins on public streets and park pathways. Recycle BC funded this project to develop a proof of concept for streetscape PPP collection so that in the future it can include public collection bins among the services it offers.

Internalized Costs

As with all EPR for PPP programs, producers in B.C. do not apply material fees as point of sale charges. Instead, fees are internalized by producers as part of the cost of doing business. Recycle BC has well-established methodologies for setting producer fees, which were developed in partnership with CSSA. Fees are calculated annually by the PRO and paid by producers on an annual or quarterly basis.[154] (The latest fee schedule for Recycle BC is shown in Appendix B.)

Smaller businesses, if they supply fewer than 2,200 pounds of PPP to the B.C. market annually or earn less than $1 million CAN ($765,000 USD) in annual revenue, are exempt from the system altogether. Businesses producing between 2,200 pounds and 33,000 pounds annually may qualify to pay flat fees to avoid undergoing the fee calculation process. Recycle BC provides an online assessment tool to help smaller businesses determine whether they are eligible for flat fees.[155]

Under B.C.'s system, material fees paid into the system by producers increased by an average of 26% between 2019 and 2020 due to the China Sword policies taking effect in 2018 (the highest increase since the start of the program). Despite this increase, consumer impact has been less than one cent per household item, and consumers in B.C. have not changed their purchasing behavior since the implementation of EPR.[156] Thus far there is no evidence that producers have passed their costs to consumers.[157]

Modulated Fees

Recycle BC uses CSSA's standardized Four-Step Methodology to calculate material fees. As described above, this fee formula is designed to ensure that all covered materials contribute to the system, even when they are not yet recyclable, by allocating a portion of overall program costs to materials based on the quantities supplied by producers. Additional costs are imposed for materials that are difficult-to-recycle, and revenues are only credited to materials that have adequate market value.

Performance Standards

B.C.'s *Recycling Regulation* requires producers to achieve "any performance measures, performance requirements, or targets" for each material that may be specified by the B.C. Government.[158] These parameters are finalized through the approval of the *Stewardship Plan*. Recycle BC proposes targets and performance measures within its plan and the Province amends and ultimately approves these measures once they are deemed satisfactory.

Recycle BC measures its performance based on several metrics, including recovery rate. This rate is calculated by dividing the net tonnes (metric tons) of PPP materials collected by the total amount of materials supplied to the market, as reported by producers (referred to as "generated tonnes" in Table 2, below). For this calculation, net tonnes are gross collected tonnes minus materials collected on behalf of other stewardship programs, such as beverage bottles and newspapers. Currently, Recycle BC has a mandated target recovery rate of 77% across materials, which will increase to 78% in 2022. In 2019, the PRO reported a 78.2% recovery rate.[159]

In Table 2, each material category managed by Recycle BC is listed individually. Contaminants are collected materials that are not accepted or covered by the program. For instance, a resident may include scrap metals in their curbside bin, such as metal pipes, which are not PPP materials and are not accepted as part of the EPR program. These materials are included in net tonnes collected because Recycle BC still

collects them and makes every effort to recycle or otherwise manage them if they make their way into the system. Although the metal pipes are counted as a contaminant even if recycled, they are not included in the program recycling rate since they are not a covered PPP material on which producers pay a fee. Contaminants that are unable to be recycled and are disposed are included in tonnes disposed (see Table 3).

Table 2: Recycle BC Program Performance in 2019* [160]

Covered Materials	Tonnes Supplied	Net Tonnes** Collected	Recovery Rate (net collected /supplied)
Paper	141,426	117,451	83%
Glass	19,146	16,606	87%
Metal	12,889	9,446	73%
Rigid Plastic	44,724	24,883	56%
Flexible Plastic	19,396	4,316	22%
Contaminants (not-accepted materials)		*12,990*	*7%*
Aggregate	237,582	185,692	**78%**

**Amounts reported in metric tons (tonnes). One tonne is equal to 1,000 kg, or roughly 2,200 pounds.*
*** Net tonnes are gross collected tonnes minus materials collected on behalf of other stewardship programs, such as newspapers.*

Recycle BC also follows the Province's pollution prevention hierarchy as established in the *Recycling Regulation* (generally: reduce, reuse, recycle – for the full hierarchy see Appendix D). Recycle BC's goal is to direct 85% to 90% of collected materials to commodity markets. For 2019, the program reported that 90.3% of collected materials were "managed by recycling."[161] For 2019, recycling rates, disposal rates, and the rate of conversion of materials to engineered fuel are reported in Table 3. In addition to Recycle BC's reported recycling rate, Table 3 also shows the rate of materials recycled as a proportion of the amount of materials supplied to the market.

Table 3: Collected Materials Managed by Recycling, Fuel Conversion, and Disposal (2019)* [162]

Gross Tonnes Collected	Gross Tonnes Recycled	Percentage of generated materials recycled (recycled /generated)	Reported Recycling Rate (recycled/ gross collected)	Converted to engineered fuel	Disposed
207,411	187,228	78.8%	90.3%	8,7626,185 (4.2%)	14,39916,742 (6.9%)

**Amounts reported in metric tons (tonnes). One tonne is equal to 1,000 kg, or roughly 2,200 pounds.*

Recycle BC does not report material-specific recycling rates because covered PPP materials are processed with materials the PRO collects on behalf of other stewardship programs (e.g., beverage bottles and newspapers) at receiving facilities and the province's central CRF (described earlier). All materials processed at the CRF are commingled before sale to recycling markets, making data on recycling of only covered PPP materials challenging to calculate. The PRO thus reports gross tonnes recycled (Table 3), which includes materials recycled on behalf of other stewardship programs. While gross tonnes recycled includes some non-covered materials, dividing by gross collected tonnes (which includes the same non-covered materials) to calculate the recovery rate helps to account for non-program items.

Overall, Recycle BC uses mechanical processes to convert 4.2% of collected materials (plastics that cannot otherwise be recycled) to engineered fuel that can replace coal in mostly industrial purposes. Notably, the PRO differentiates this process from incineration, which is the burning of any type of waste without energy recovery. No PPP materials collected by Recycle BC curbside or at depots are incinerated. Currently, a portion of the flexible plastics collected (those in the OFPP category) are converted to fuel, as well as a small portion of rigid plastics that are too contaminated to be recycled. B.C.'s pollution prevention hierarchy prioritizes conversion to fuel over landfilling these materials. Some flexible plastics collected by Recycle BC that are *not* in the OFPP category, such as plastic bread sleeves, are in fact recycled, and the PRO is continuing to seek recycling solutions for all OFPP items.

The last resort for managing PPP materials in B.C. is disposal in a landfill. Materials that are landfilled by Recycle BC include any collected materials that cannot be managed by other means, such as materials that are too dirty to be processed and recycled, or non-covered materials that have ended up in the system for which there are no other end-of-life solutions. In 2019, approximately 7% of collected materials were disposed (Table 3). Recycle BC does not report material-specific data on contamination, which often leads to disposal.

In 2018, at the B.C. Government's direction, Recycle BC undertook an internal process with its member producers to establish specific recovery targets for paper, plastics, metal, and glass, as well as targets for

sub-categories of plastics (rigids and flexibles). These were based on actual recovery rates for each material category in 2017 and are being staggered so that only the paper (90%), metal (67%), and glass (76%) targets must be achieved in 2020. Plastics (both rigid and flexible) will ramp up to initial targets (55% and 22%, respectively) by 2022 and higher rates (60% and 25%) by 2025. The full details of Recycle BC's material-specific recovery targets are shown in Table 4.

Beyond recovery rates, Recycle BC sets targets for accessibility and consumer awareness. The program aims to provide access to recycling through curbside collection or depots to 98% of residents, and to ensure that at least 90% of consumers are aware of their PPP recycling options by the end of the first five years of implementation (2019). Recycling access is measured by the population size within a 30- or 45-minute drive of each depot, or the number of residents receiving curbside pickup services. Consumer awareness is measured through annual consumer research. Recycle BC estimates that it has exceeded, and will continue to exceed, this target.[163] The PRO also estimates that 51% of the population is aware that producers are funding the province-wide recycling system under the Recycle BC brand.[164] In 2020, Recycle BC will conduct consumer awareness campaigns aimed at multi-family residences to support its efforts to achieve material-specific recovery targets.

Table 4: Material-specific recovery targets for Recycle BC

Material Category	2017 Recovery Rate	Target Recovery Rate*	Year to Achieve Target
Paper	87%	90%	2020
Glass	72%	75%	2020
Metal	66%	67%	2020
Plastic	41%	50%	2025
Rigid Plastic	50%	55%	2022
		60%	2025
Flexible Plastic	20%	22%	2022
		25%	2025

**Target recovery rates are calculated as net tonnes collected divided by tonnes supplied to the market (generated tonnes)*

As of 2019, GHG emissions have been added as another program performance measure. Collectors and processors are now obligated to report their emissions annually to Recycle BC across all stages of the value chain, including collection, transportation, processing, and delivery to recycling markets.[165] The data will be compiled and included in annual reports from the PRO to the province. The GHG metric does not currently have a numeric target, as 2019 data will provide the baseline for subsequent years. The 2019 baseline GHG data will be reported in the fall of 2020 and included in future annual reports.

Recycle BC must annually report on its performance relative to its recovery targets and other performance measures. The recovery metrics included in the most recent annual report to the B.C. Government (for program year 2019) were as follows:

- Tonnes of PPP and other materials collected within each of the province's 28 Regional Districts;
- Kg per capita of PPP and other materials collected within each Regional District;
- Tonnes of PPP and other materials recycled and recovered for the province;
- Kg per capita of PPP and other materials recycled and recovered for the province;
- PPP recovery rate expressed as a percentage for the province;
- Tonnes and recovery rate expressed as a percentage for the major categories of paper; plastic, metal, and glass, as well as the sub-categories of flexible and rigid plastics.

Overall program costs (measured as cost per kg and cost per household) are also included in annual performance reports. Recycle BC's annual budget together with producers' fees for the upcoming year are set and published every October in the Report to Stewards[166].

Recycling Access

Producers in B.C. are required by the *Recycling Regulation* to provide "reasonable and free consumer access to collection facilities or collection services."[167] Like most other program performance measures, specific accessibility targets such as access to curbside collection and drop-off depots, are set by the PRO itself (with Ministry of Environment approval) within the *Stewardship Plan*.

Recycle BC is committed to several metrics for accessibility, including **access to recycling[168] for 98% of residents throughout the province** (either through curbside collection or depots).[169] In its 2019 *Plan*, Recycle BC outlined updated accessibility performance targets, including targeted expansion of collection services to remote communities and First Nations. The PRO currently provides curbside collection to 1,052,000 single-family households and 441,000 multi-family residences, as well as access to 238 drop-off depots throughout the province.[170]

Education & Outreach

Recycle BC is responsible for creating, distributing, and funding educational activities for its recycling program to ensure consumer awareness and minimize contamination. The *Recycling Regulation* states that the PRO's educational program must fulfill two objectives:[171]

- Increase resident awareness of the recycling program's features (including availability of collection services) and benefits; and
- Encourage residents to make smart decisions about management and preparation for PPP recycling.

Recycle BC uses several strategies to accomplish these goals, including awareness campaigns and research on consumer habits.[172] In 2019, the PRO conducted several education campaigns, including:[173]

- *Get Your Containers Off the Bench*. Recycle BC partnered with the Vancouver Canucks on an advertising campaign raising awareness that containers, especially hard plastics, need to go in the recycling bin (Figure 7).
- *Careless Recycling Can Kill*. To combat the number of hazardous materials and fire incidents in receiving facilities, Recycle BC ran a campaign to raise awareness of what to do with hazardous materials.

Figure 7: Vancouver Canucks partnership with Recycle BC for "Get Your Containers Off the Bench" campaign.

- *We All Win*. Through TV ads, digital display ads, YouTube, social media and native advertising, the campaign focused on recycling plastic containers – the material with the most ambitious target amongst the program's material-specific targets.

In addition to direct consumer outreach campaigns, Recycle BC's Community Events Team coordinates with local governments to arrange visits to communities throughout the province.[174] Activities offered by the team in 2019 included displays of the recycling process, a sorting game, and a virtual reality experience.[175] Recycle BC also provides printed and digital educational resources to all collectors, including local governments, mainly for the purposes of ensuring that residents place only properly cleaned, accepted materials in their curbside bins. The new five-year *Stewardship Plan* identifies increased outreach to First Nations and remote communities as an area of strategic focus.

Adoption & Adaptation

Locating and Developing Markets

Prior to implementation of EPR for PPP, B.C.'s processing facilities exported many bales of recovered materials overseas. With the launch of the Recycle BC program, the promise of a consistent, clean supply of materials enabled the PRO to cultivate robust markets for recycled materials (especially plastics) locally. Through its province-wide processing contract, the PRO leverages its network of local buyers (including Merlin Plastics) to keep materials as close to home as possible. Currently 99% of all plastics collected by Recycle BC are managed in B.C.[176] When identifying recycling markets outside of Canada, Recycle BC prioritizes those located in Organization for Economic Cooperation and Development (OECD)

countries, which tend to have stringent environmental and human health standards for end-of-life materials management.

In 2019, 90.3% of Recycle BC's materials were sold to recycling markets (180,532 tonnes out of 206,778 collected).[177] The markets for these materials were as follows:

- Plastic containers, plastic bags, and overwrap were collected and processed in B.C. For example, a facility in Vancouver processes these plastic materials into pellets, flakes, and bricks, which are then shipped to other companies to manufacture new packaging and other products. About 99% of plastic containers, bags, and overwrap are processed within B.C.[178]
- Glass was shipped to Abbotsford, B.C. to be processed into new bottles. It was also shipped to Quesnel, B.C. to be made into sandblasted materials. A portion of recycled glass is also incorporated into agricultural mulch.
- Metal containers were sold to markets in Ontario, B.C., and the United States. Metal is often recycled into new packaging, like aluminum cans, as well as sheet metal for automotive manufacturing.
- Paper was sold to markets overseas (South Korea, Indonesia, and China), in the United States, and in B.C. Recovered and recycled paper can be made into egg cartons, boxes, and other paper products.
- Foam packaging was recycled locally in Vancouver, B.C. as well as overseas, and was used to make products like picture frames and molding.
- Other Flexible Plastic Packaging (OFPP) is currently collected as part of a research and development project to determine how to best manage this material. Until recycling opportunities are available, OFPP is being converted into engineered fuel along with contaminated rigid and flexible plastics not in the OFPP category.

Program Results

Recycle BC has achieved high recovery rates province-wide and has significantly expanded the scope of PPP materials collected in B.C. Across materials, the 2019 recovery rate was 78.2%, with 90.3% of collected materials successfully sold to recycling markets (see Tables 2 and 3, above). Collection rates for plastics have outpaced growth in generated tonnes year to year, with an overall plastics recovery rate of 46% in 2019 – up 4% over 2018 and nearly twice the average rate in the U.S., which was last reported at 24%.[179]

One of the most important achievements of the B.C. system is a relatively low contamination level, which helps to ensure that collected materials are marketable and, therefore, actually recycled. Contamination across materials is currently below 10% (see Tables 2 and 3).

Recycle BC's centralized post-collection contract provides producers, governing authorities, and the public with a clear understanding of how materials are managed at their end-of-life. In 2019, a Canadian news segment produced by CBC Marketplace purportedly revealed that bales of household plastics were being landfilled or incinerated rather than recycled.[180] Recycle BC was able to quickly clear up this misinformation and clarify that these bales consisted of non-covered materials managed outside of the Recycle BC system by other parties.[181] To comply with Ministry of Environment requirements for auditing end-of-life treatment of materials, Recycle BC's system includes traceability and auditability of all shipments sent to recycling markets or disposal facilities.

Recycle BC has fared better than most recycling systems in North America following the China Sword crisis, in large part due to the high quality of materials produced through the program and robust relationships with local markets. While PPP recycling programs across Canada and the U.S. have been forced to remove difficult-to-recycle materials from collection lists over the past two years, Recycle BC has continued to expand the items it accepts in curbside containers and at drop-off depots. The program has pushed the cutting edge of recycling technology through investments in research and technical capacity, with curbside collection in participating municipalities now including such items as aerosol cans for non-toxic products, coffee cups, and thin rigid plastics such as plant pots and berry cartons – all items that are commonly excluded in other programs since the China Sword.[182]

However, the program is not entirely immune to the rising costs of recycling. All of Canada's EPR programs have been impacted by these costs. In municipal reimbursement programs, municipalities and producers share the burden of these cost increases, whereas in B.C. producers have borne the burden. Recycle BC's operating costs in 2019 were $414 USD per tonne[183] – up from $300 USD per tonne in 2016.[184] This increase in operating costs, largely due to market changes related to the China Sword, forced Recycle BC's Board of Directors to draw from program reserves in an effort to contain fee increases.[185] Material fees increased by an average of 26% to cover program costs, as previously described. Critically, the impact of rising program costs on consumers has been minimal and there is no evidence to suggest that producers pass these costs directly to consumers.

As new packaging continues to emerge, the B.C. program can adapt more nimbly than municipal-run alternatives in other provinces since it covers the entire province with one set of recyclables and integrated collection and processing systems. Recycle BC can add new forms of packaging to its list of collected materials at any time and can incentivize investment in processing capacity for these materials.

Summary

Full producer responsibility has transformed the recycling landscape in B.C.

EPR for PPP has transformed the recycling landscape in B.C. from a collection of disjointed municipal operations into a unified and streamlined network spanning the entire province. With producers fully

responsible for the financial and day-to-day operations of PPP recycling, Recycle BC has used its autonomy to design a province-wide system that greatly enhances efficiency and environmental outcomes. Access to recycling has expanded at multi-family residences and in rural and remote communities since the program launched in 2014.[186] The standardized list of accepted materials has reduced consumer confusion and contamination across material streams.

Economies of scale provide reliable recycled material for local recycling markets.

Because producers finance and operate the entire recycling system in B.C., they have been able to expand the overall list of PPP materials that are collected and recycled. At the same time, they have expanded collection services. The provincial scale of the B.C. system optimizes efficiencies in a way that individual municipal systems cannot achieve. For example, processing all collected containers for the province at a single CRF spurred major investments in state-of-the-art technology that reduces contamination and produces a clean, reliable stream of materials. This reliability assists in accessing markets for key materials such as plastics, the majority of which are in Canada or North America.

The centralized post-collection contract supports small haulers and MRFs.

From its inception, Recycle BC's province-wide post-collection processing contract maintained healthy diversity among RCTs and processors by generating a network of subcontracts. This efficient use of existing assets mitigated impacts to haulers and processors during the transition to EPR. In some instances, a sustained supply of ICI materials managed outside of the EPR program further enabled MRFs to continue previous business operations.

Smaller businesses pay lower fees or are exempt.

Businesses that supply less than 1,000 kg (2,200 pounds) to the market are exempt from paying material fees, and a flat fee structure is offered for entities producing between 1,000 and 15,000 kg (2,200 – 33,000 pounds). Because the fee structure is designed to ensure that materials pay their own way through the recycling system, there is no cross-subsidization of materials (e.g., higher value materials do not subsidize the processing of lower value materials).

Non-recyclable items such as OFPP remain a challenge for the B.C. system. Items such as flexible pouches and polyethylene tubes, which may be technically recyclable but still lack robust end markets, are currently converted to engineered fuel. Out of 207,411 tonnes of PPP collected by Recycle BC in 2019, 14,399 tonnes (6.9%) were ultimately disposed because they were too contaminated or contained non-recyclable items mistakenly included in PPP collection bins by residents.[187] 4.2 percent of collected tonnes was converted into engineered fuel, most of which consisted of non-recyclable OFPP.[188] Recycle BC is working to address these challenges through projects such as the OFPP pilot. Collected OFPP is currently sent to a local market, where industry is working to develop recycling solutions for these materials.

The B.C. system continues to evolve and improve.

With each year, B.C.'s EPR for PPP program continues to evolve and mature. Recycle BC is enhancing transparency within the system through its annual reports, website, consultations, and online publications. Innovative pilot projects, such as the OFPP pilot, are addressing the program's biggest challenges to ensure the PRO meets or exceeds its material recovery and waste hierarchy targets each year. Although the B.C. system faces challenges such as emerging, hard-to-recycle packaging types, its overall success has led to widespread acclaim and recognition.[189]

As the CCME and CSSA continue to advocate for consistency in product stewardship across Canada, other provinces are looking to B.C.'s program as a promising approach to EPR for PPP. Producers are attracted to the autonomy they can exercise over the entire post-consumer supply chain to achieve ambitious environmental outcomes. They also value the ability to weather extreme volatility in global markets by cultivating relationships with local buyers. Local governments appreciate that the program has removed, or greatly relieved, the financial burden of providing recycling services, and has offered choices regarding their level of engagement in the system.[190]

5. Conclusion and Recommendations

EPR for PPP has proven to be successful across the EU and Canada and continues to spread around the world. Collection, recovery, and recycling rates in countries with EPR for PPP far outpace the current industry averages in the U.S., and municipalities have realized significant savings by shifting costs to producers. EPR for PPP can also restore public faith in recycling during a time of unprecedented global uncertainty and skepticism. As producers continue to announce sustainability goals and circular economy initiatives regarding their packaging, EPR provides a path to achieving these outcomes by increasing overall material recovery and recycling rates and providing reliable, clean streams of recycled content for packaging and paper production.

Striking the right balance between government oversight and control of system outcomes and producer flexibility and control over system implementation will be critical to the success of EPR for PPP in the U.S. There are several opportunities for negotiations to take place that will arrive at the proper balance for each U.S. state, including in legislation, regulations, and product stewardship plans. State and local governments need assurance that existing recycling programs will continue to provide residents with the service they expect, and states must have authority to adjust implementation efforts as needed to achieve those goals. Local governments also seek options to find the right approach for their jurisdiction that meets local needs while improving recycling outcomes. Producers, for their part, need flexibility to reach performance goals and seek control over how their financing is spent to ensure program efficiency and effectiveness.

Experience has shown that programs that are more successful and sustainable have achieved a healthy balance between government and producer interests, while also integrating the important interests of waste management companies (which are the backbone of the domestic recycling infrastructure), environmental groups, and other key stakeholders. Full producer responsibility programs in Europe and Canada have achieved large-scale efficiencies and investments in infrastructure that have significantly improved recycling performance. Producers have expressed support for these programs and have advocated for greater control over recycling systems and consistent application of EPR legislation at national and provincial levels. Producers are ready for a harmonized system that can help them achieve a circular economy and meet their sustainability goals – and EPR provides a path to building this system.

Eco-modulated fees can further strengthen EPR systems and advance the circular economy by incentivizing upstream design innovation to minimize environmental impacts at end-of-life. As these fee structures continue to evolve worldwide and become mandatory throughout the EU, we can expect to see changes in packaging production that favor materials that have less impact on the environment. These materials will continue to be recycled at increasing rates and will increasingly be made with reusable and recyclable materials. We also expect a reduction in the overall volume of packaging produced for consumer goods as the cost to avoid externalities is internalized into business operations.

EPR for PPP systems will buffer states and local governments from disruptions to the global recycling market, reduce taxpayer spending on recycling infrastructure, increase material recovery rates, and help

to generate local recycling markets where they are sorely needed. PSI has already developed model legislation and guidance on the key elements of EPR for PPP, which can be applied to a spectrum of EPR approaches.

Appendix A: The PPP Recovery Rate in Each Canadian Province

In the U.S., recovery is typically understood to be a measure of materials collected with the intention of recycling, even though not all materials collected will ultimately be recycled. The recovery rate is therefore the percentage of all generated materials that are collected, as follows:

Recovery = Collection / Generation

However, each Canadian province defines recovery differently, including differing in how generated and collected tonnes are measured. While some define recovery as all collected materials, others define recovery only on the basis of whether materials are actually recycled. The provincial programs also differ in that some recovery rates include newspapers while others do not. A summary of the recovery rate, and how it is calculated, in each of the four provinces is discussed in detail below. (*Note: Amounts are reported in metric tons (tonnes). One tonne is equal to 1,000 kg, or roughly 2,200 pounds.)*

Ontario:

Stewardship Ontario defines recovery as collected tonnes that are recycled. The program's recovery rate is calculated as recycled tonnes divided by generated tonnes, where generated tonnes are estimated based on waste audits conducted by municipalities.

Recovery = Recycling / Generation

Materials that are managed by conversion to fuel, waste to energy, gasification, or other thermal treatment, as well as by disposal, are not counted toward this recovery rate. Thus, Ontario's recovery rate more closely represents what U.S. programs call a recycling rate.

For more information on Stewardship Ontario's recovery rate, see: https://stewardshipontario.ca/wp-content/uploads/2019/06/SO2018.pdf

Québec:

Éco Entreprises Québec (ÉEQ) defines recovery as collected tonnes. The program's recovery rate is calculated as collected tonnes divided by generated tonnes, where generated tonnes are extrapolated from audits of curbside collection bins conducted by ÉEQ in over 800 communities.

Recovery = Collection / Generation

Collected tonnes are counted toward recovery regardless of how they are ultimately managed, so the program's recovery rate includes some materials that are disposed due to contamination or other factors. Collected tonnes are not broken down by the amount of materials recycled, disposed, or converted to fuel.

For more information on ÉEQ's recovery rate, see: https://www.ÉEQ.ca/wp-content/uploads/carac_residentielle_finale_2012-2016_eng.pdf

Manitoba:

Multi-Materials Stewardship Manitoba (MMSM) defines recovery as collected tonnes *that are recycled,* as does Ontario. The program's recovery rate is calculated by dividing recycled tonnes (based on municipal recycling reports) by tonnes supplied into the market (as reported by producers).

Recovery = Recycling / Market Supply

This recovery rate methodology was introduced in 2018. Prior to that time, MMSM estimated the amount of supplied PPP materials using curbside waste audits, similar to curbside audits conducted in Québec.

For more information on MMSM's recovery rate, see: https://stewardshipmanitoba.org/wp-content/uploads/2019/06/Jun3_203870-MMSM-2018-Annual-Report-Web.pdf

British Columbia:

Recycle BC defines recovery as net tonnes collected, after subtracting materials collected on behalf of other stewardship programs (e.g., beverage bottles or printed newspapers). The program's recovery rate, which is defined in the *Recycling Regulation,* is calculated as net collected tonnes divided by tonnes supplied into the market (as reported by producers).

Recovery = Collection / Market Supply

Net collected tonnes are counted toward recovery regardless of how they are ultimately managed, so the program's recovery rate includes a percentage of materials that are converted to engineered fuel or disposed (which was 11% in 2018, see Table 3). Annual recycling, fuel conversion, and disposal rates are reported individually. Newspaper is **not** included in the figure for recovered tonnes.

For more information on Recycle BC's recovery rate, see: http://recyclebc.ca/wp-content/uploads/2019/07/RecycleBCStewardshipPlan_16July2019.pdf

A Note on Compostable PPP

Currently, compostable PPP is not collected in Canadian EPR programs. However, Recycle BC is conducting research on compostable packaging. If the quantity of PPP in the compost stream (managed outside of the existing EPR system) is determined to be significant and Recycle BC is able to determine the quantity of PPP by material category recovered annually in local governments' organic waste collection programs, the PRO will include the end-of-life management of compostable PPP in its Pollution Prevention Hierarchy report. If feasible, the PRO will then develop financial incentives to promote the management of appropriate types of PPP (e.g., soiled paper and compostable bio-plastics) in the organic material stream.

Appendix B: Fee Schedules for Canadian EPR Programs

Note: Fees are provided in Canadian Dollars. One Canadian Dollar is equal to $0.75 USD as of March 3, 2020.

2020 Fee Schedule, Ontario

STEWARDSHIP ONTARIO FEE SCHEDULE (CENTS/KG)				
Category	**Material**	**2020 Fee Rates (cents/ kg)**	**2019 Fee Rates (cents/ kg)**	**Variance %**
PRINTED PAPER	Newsprint - CNA/OCNA	0.63	0.59	6.8%
	Newsprint - Non-CNA/OCNA	6.90	5.98	15.4%
	Magazines and Catalogues	12.70	9.04	40.5%
	Telephone Books	13.25	11.06	19.8%
	Other Printed Paper	16.00	18.45	-13.3%
PAPER PACKAGING	Corrugated Cardboard	11.28	10.13	11.4%
	Boxboard	11.28	10.13	11.4%
	Gable Top Cartons	28.33	22.44	26.2%
	Paper Laminates	28.33	22.44	26.2%
	Aseptic Containers	28.33	22.44	26.2%
PLASTICS	PET Bottles	17.39	19.65	-11.5%
	HDPE Bottles	13.92	13.21	5.4%
	Plastic Film	36.67	33.07	10.9%
	Plastic Laminates	36.67	33.07	10.9%
	Polystyrene	36.67	33.07	10.9%
	Other Plastics	36.67	33.07	10.9%
STEEL	Steel Food & Beverage Cans	6.97	7.10	-1.8%
	Steel Aerosols	6.97	7.10	-1.8%
	Steel Paint Cans	6.97	7.10	-1.8%
ALUMINUM	Aluminum Food & Beverage Cans	5.16	3.68	40.2%
	Other Aluminum Packaging	13.32	7.96	67.3%
GLASS	Clear Glass	4.07	3.80	7.1%
	Coloured Glass	7.95	6.76	17.6%
IN-KIND	In-Kind Amount	$4,860,588	$5,112,007	-4.9%

Source: https://stewardshipontario.ca/stewards-bluebox/fees-and-payments/

2020 Fee Schedule, Québec

Material	2020 Schedule $/t	Variation
Printed matter	335.24	43.2 %
Newsprint inserts and circulars	292.25	43.4 %
Printed matter	425.74	45.0 %
Containers and packaging	278.36	17.5%
Paper / Cardboard	239.12	18.9 %
Corrugated carton and Kraft paper	217.80	19.2 %
Boxboard and other paper packaging	238.67	19.2 %
Gable-top containers	225.34	18.3 %
Aseptic containers	278.48	19.2 %
Laminated paper	340.81	18.9 %
Plastic	409.36	14.6 %
PET bottles and containers	300.08	5.9 %
HDPE bottles and containers < 5 l.	162.66	50.0 %
Plastic film, bags and plastic laminates	542.67	15.1 %
PVC, PLA and polystyrenes	941.97	19.3 %
Other plastics	359.08	25.5 %
Aluminium	204.95	13.9 %
Steel	175.80	2.4 %
Glass	208.66	21.1%
Clear glass	210.06	22.0%
Coloured glass	207.67	20.6%
Average rate	289.54	22.5%

Source: https://www.eeq.ca/wp-content/uploads/SE_consultations_2020_VF_EN-2.pdf

2020 Fee Schedule, Manitoba

Category	Material	Cents/ kg
Printed paper	Newsprint	10.29 ¢/kg
	Magazines and Catalogues	15.54 ¢/kg
	Telephone Books	16.91 ¢/kg
	Other Printed Paper	11.77 ¢/kg
Paper packaging	Corrugated Cardboard	31.78 ¢/kg
	Boxboard	31.78 ¢/kg
	Gable Top Cartons	71.39 ¢/kg
	Paper Laminates	71.39 ¢/kg
	Aseptic Containers	71.39 ¢/kg
Plastics	PET Bottles	43.62 ¢/kg
	HDPE Bottles	52.25 ¢/kg
	Plastic Film	51.30 ¢/kg
	Plastic Laminates	51.30 ¢/kg
	Polystyrene	51.30 ¢/kg
	Other Plastics	51.30 ¢/kg
Steel	Steel Food & Beverage Cans	17.85 ¢/kg
	Steel Aerosols	17.85 ¢/kg
	Other Steel Containers	17.85 ¢/kg
Aluminum	Aluminum Food & Beverage Cans	-7.32 ¢/kg
	Other Aluminum Packaging	10.89 ¢/kg
Glass	Clear Glass	5.00 ¢/kg
	Coloured Glass	5.00 ¢/kg

Source: https://stewardshipmanitoba.org/stewards/fees-and-payments/

2020 Fee Schedule, British Columbia

RECYCLE BC FEE SCHEDULE (CENTS/KG)				
Category	**Material**	**2020 Fee Rates (cents/ kg)**	**2019 Fee Rates (cents/ kg)**	**Variance %**
PRINTED PAPER	Newsprint	16.00	11.00	45.5%
	Magazines and Catalogues	26.00	14.00	85.7%
	Telephone Books	26.00	14.00	85.7%
	Other Printed Paper	26.00	14.00	85.7%
PAPER PACKAGING	Corrugated Cardboard	36.00	25.00	44.0%
	Boxboard	36.00	25.00	44.0%
	Gable Top Cartons	83.00	55.00	50.9%
	Paper Laminates	83.00	55.00	50.9%
	Aseptic Containers	83.00	55.00	50.9%
PLASTICS	PET Containers	77.00	63.00	22.2%
	HDPE Containers	77.00	63.00	22.2%
	Plastic Film	112.00	100.00	12.0%
	Plastic Laminates	141.00	128.00	10.2%
	Polystyrene	112.00	100.00	12.0%
	Other Plastics	112.00	100.00	12.0%
STEEL	Other Steel Packaging	30.00	27.00	11.1%
	Steel Aerosols	30.00	27.00	11.1%
	Steel Paint Cans	30.00	27.00	11.1%
ALUMINUM	Aluminum Food & Milk Containers	56.00	42.00	33.3%
	Other Aluminum Packaging	56.00	42.00	33.3%
GLASS	Clear Glass	17.00	16.00	6.3%
	Coloured Glass	17.00	16.00	6.3%

Source: https://recyclebc.ca/stewards/feespayments/stewards-fee-schedule/

Appendix C: Packaging and Paper Definitions in British Columbia

Environmental Management Act – Definitions:

"**'Packaging'** means a material, substance or object that is

(a) used to protect, contain or transport a commodity or product, or

(b) attached to a commodity or product or its container for the purpose of marketing or communicating information about the commodity or product."

Source: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/03053_01#section1

B.C. Recycling Regulation, Schedule 5 (Packaging and Paper)

"Schedule 5

[en. B.C. Reg. 88/2011, Sch. s. 13; am. B.C. Reg. 206/2017, s. 20.]

Packaging and Paper Product Category

"Definition

1 (1) In this Schedule, '**paper**' means, subject to subsection (2), paper of any description, including

(a) flyers,

(b) brochures,

(c) booklets,

(d) catalogues,

(e) telephone directories,

(f) newspapers,

(g) magazines,

(h) paper fibre, and

(i) paper used for copying, writing or any other general use.

(2) For the purposes of subsection (1), paper does not include

(a) paper products that, by virtue of their anticipated use, could become unsafe or unsanitary to recycle, or

(b) any type of bound book not mentioned in subsection (1).

"Packaging and paper product category

2 The packaging and paper product category consists of packaging and paper."

Source: http://www.bclaws.ca/Recon/document/ID/freeside/449_2004#Schedule5

Recycle BC Stewardship Plan – Definitions:

"Packaging: Packaging for purposes of producer obligation and reporting under the Program Plan includes:

(a) Primary packaging, i.e., packaging that contains the product at the point of sale to the residential consumer;
(b) Grouped packaging or secondary packaging that goes to the household;
(c) Transportation, distribution or tertiary packaging that goes to the household;
(d) Service packaging designed and intended to be filled at the point of sale and 'disposable' items sold, filled or designed and intended to be filled at the point of sale such as:
    a. Paper or plastic carry-out bags provided at checkout;
    b. Bags filled at the shelves with bulk goods, produce, baked goods, etc.;
    c. Disposable plates and cups;
    d. Take-out and home delivery food service packaging such as pizza boxes, cups, bags, folded cartons, wraps, trays, etc.;
    e. Flower box/wrap;
    f. Food wraps provided by the grocer for meats, fish, cheese, etc.;
    g. Prescriptions bottles filled and provided by pharmacists;
    h. Gift wrapping/tissue paper added by the retailer; and
(e) Packaging components and ancillary elements integrated into packaging, including ancillary elements directly hung or attached to a product and which perform a packaging function unless they are an integral part of the product and all elements are intended to be consumed or disposed of together.

"Paper: Paper product is now defined as paper of any description, including:

(a) flyers,
(b) brochures,
(c) booklets,
(d) catalogues,
(e) telephone directories,
(f) newspapers,
(g) magazines,
(h) paper fibre, and
(i) paper used for copying, writing or any other general use.

"This definition of paper does not include paper products that, by virtue of their anticipated use, could become unsafe or unsanitary to recycle, or any type of bound book not mentioned above. For the purposes of the Program Plan, paper product comprises any type of cellulosic fibre source including, but not limited to wood, wheat, rice, cotton, bananas, eucalyptus, bamboo, hemp, and sugar cane (bagasse) fibre sources."

Source: https://recyclebc.ca/stewards/regulation_and_stewardship_plan/

Appendix D: British Columbia's Pollution Prevention Hierarchy

As defined in the *Recycling Regulation* (Section 5(3)):

"The pollution prevention hierarchy is as follows in descending order of preference, such that pollution prevention is not undertaken at one level unless or until all feasible opportunities for pollution prevention at a higher level have been taken:

(a)reduce the environmental impact of producing the product by eliminating toxic components and increasing energy and resource efficiency;

(b)redesign the product to improve reusability or recyclability;

(c)eliminate or reduce the generation of unused portions of a product that is consumable;

(d)reuse the product;

(e)recycle the product;

(f)recover material or energy from the product;

(g)otherwise dispose of the waste from the product in compliance with the Act."

Source: http://www.bclaws.ca/Recon/document/ID/freeside/449_2004#section5

[1] U.S. Environmental Protection Agency, *Advancing Sustainable Materials Management: 2017 Fact Sheet* (2019, November). Retrieved from https://www.epa.gov/sites/production/files/2019-11/documents/2017_facts_and_figures_fact_sheet_final.pdf.

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[68] Note: this is not the standard terminology used in EPR for PPP programs across the EU or Canada. PSI has adopted these terms for the purposes of this report.
[69] See PSI's website for more info and resources: www.productstewardship.us.
[70] Typically, producers form a single non-profit PRO for PPP. In some early European systems, for-profit PROs were established where multiples PROs for PPP formed within a single program (e.g., Austria).
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the mechanics of implementing and operating Extended Producer Responsibility (EPR) programs and its services include: design, implement and support EPR programs; "One-window" reporting for producers according to harmonized administrative rules and call centre support for all programs; a common IT platform for all programs; business data warehouse and analytics support; full financial service support—payables receivables, reporting, audit support, fee calculations; procurement and supply chain support to PROs; and tools and Resources to simplify reporting for smaller businesses."

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