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From Waste to Accountability:

Designing Impactful Extended Producer Responsibility (EPR) Programs

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Why Extended Producer Responsibility Matters

Plastic and packaging waste is a global crisis, with the production of plastics doubling from 234 million tons in 2000 to 460 million tons in 2019, and global plastic production is on track to nearly triple by 2060.¹ The lifetime cost of plastic production to society, the environment, and the economy was \$3.7 trillion in 2019 alone, which includes waste management costs, gross domestic product (GDP) reductions due to marine plastic pollution, and more.² Meanwhile, research continues to highlight the environmental, social, health, and economic impacts of rapid production and consumption of plastics and packaging in a linear economy, particularly for vulnerable communities.³ Microplastics have been found throughout the human body, and studies indicate that they can increase the likelihood of heart attack, stroke, and premature births, among other health impacts.^{4,5} Given the dramatic increases in plastic production and waste that are forecasted, stakeholders, from businesses to governments alike, will need to face the challenge and embrace the opportunity for change. Strong regional and global interventions will be essential to minimize plastic leakage to the environment and mitigate the associated social and health impacts.¹

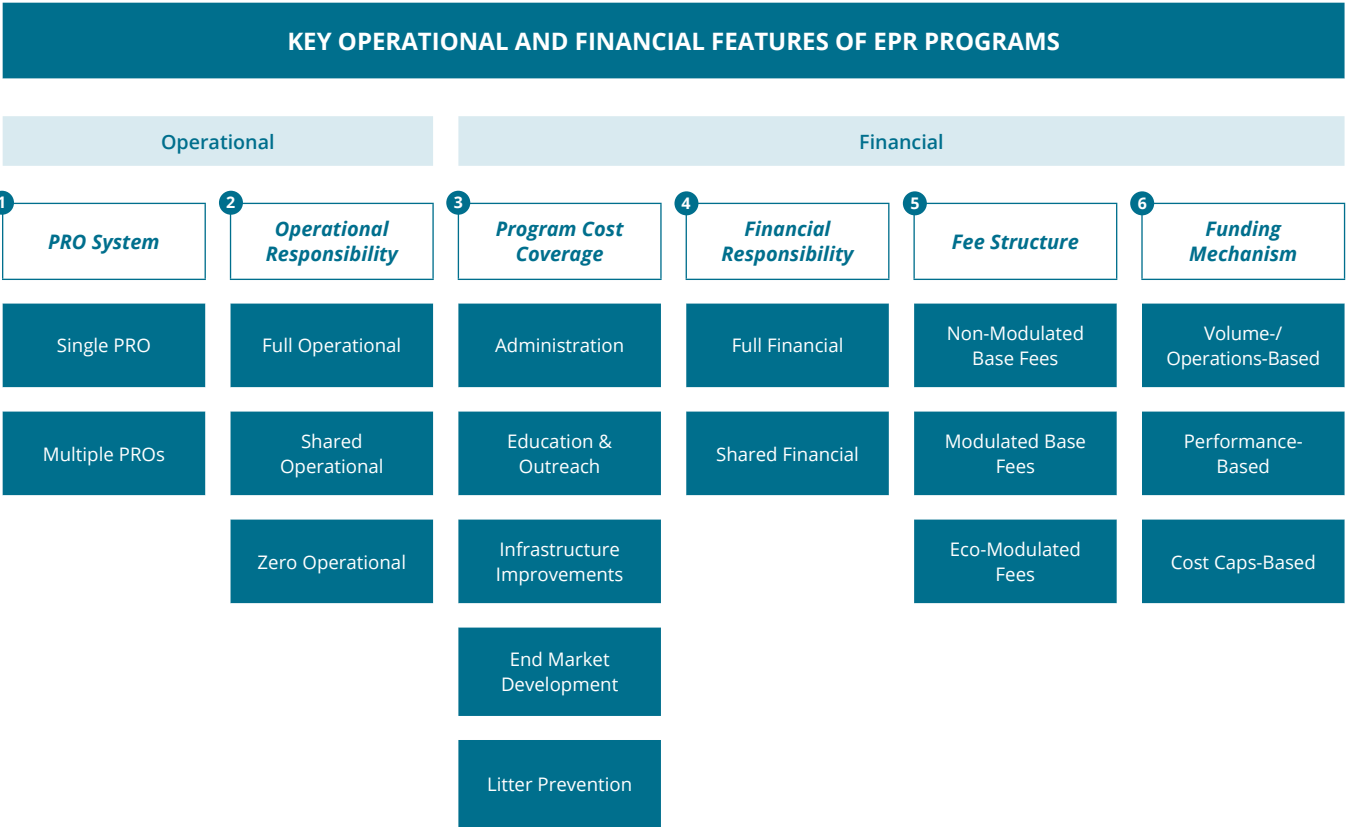
At this critical juncture, Extended Producer Responsibility (EPR) is poised to play a pivotal role in tackling plastic and packaging pollution and creating a circular economy. EPR has already been implemented in many countries around the world, across North America, South America, Europe, Africa, and Asia.⁶ It has had noticeable impact in many regions, driving the collection and recycling of target materials to over 75% in British Columbia, Belgium, Spain, South Korea, and the Netherlands.⁷ Beyond increasing collection and recycling rates, plastic and packaging EPR programs have the potential to strengthen waste management and reuse infrastructure, increase domestic supply chain resilience, and reduce the amount of waste generated, as well as the amount of single-use packaging that goes to landfill.

EPR is now gaining traction in the US, with bills passed in seven states, including California, which is the world's fifth-largest economy.^{8,9} Two states, Maryland and Washington, have passed EPR bills in the 2025 legislative sessions, and 10+ others had EPR legislative activity with draft bills, signaling the growing momentum of the policy in the US.^{10,11} Evidence indicates that EPR in the US has the potential to recapture up to nearly \$100 million in lost material economic value in each state with EPR, reduce hundreds of thousands of metric tons of climate-damaging emissions in EPR states, and create thousands of jobs, as well as create positive impacts for environmental standards, public health, and job quality.^{7,12}

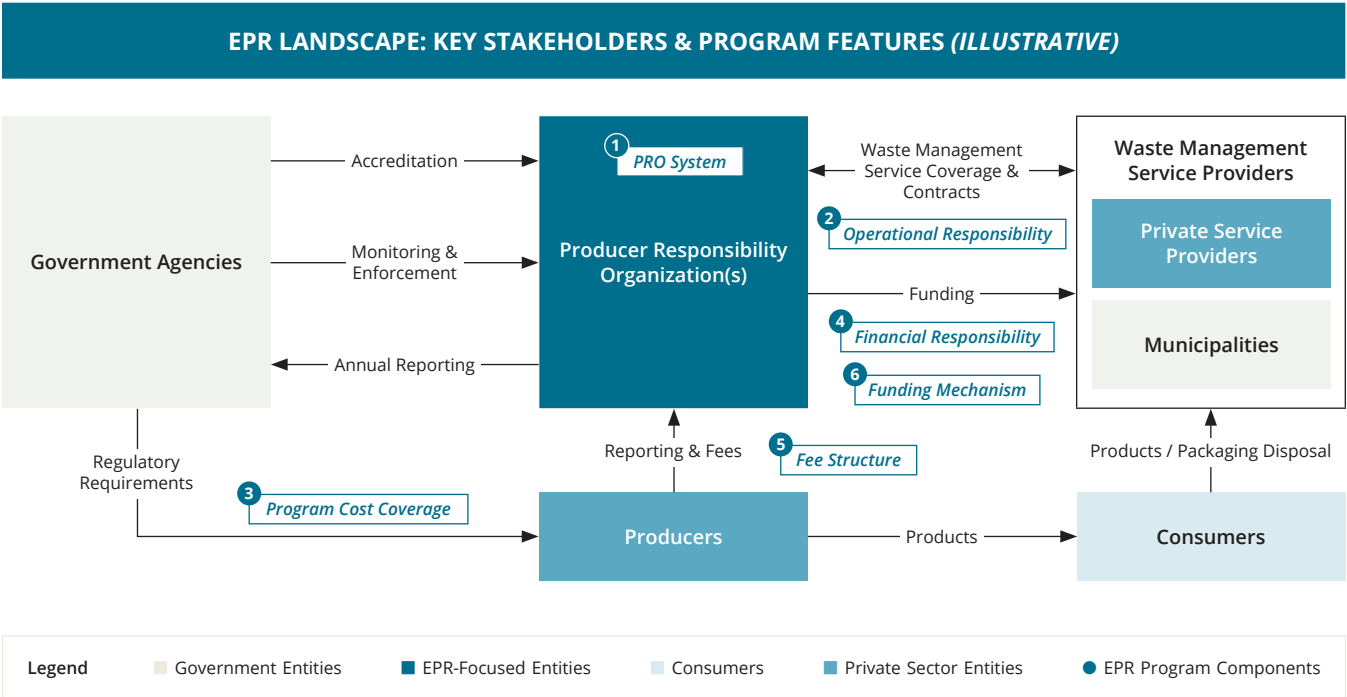
EPR programs are complex and varied—and there are many stakeholders involved in designing and implementing these programs: government agencies, producer responsibility organizations (PROs), packaging producers, waste management service providers, consumers, nonprofits, and more. The following report aims to be a straightforward and digestible resource for these stakeholders, covering key EPR program structure components to drive alignment among everyone involved. Existing US programs and global examples are discussed, along with how program components can drive toward desired environmental and social outcomes in the US. While the US context presents several unique challenges and opportunities, there is an opportunity to leverage best practices and learnings from existing state-level approaches to EPR in the US, as well as from successful implementations of EPR globally.

Essential Features of EPR Programs

EPR programs are grounded in several distinct operational and financial components and are executed by Producer Responsibility Organizations (PROs). The guidance below breaks down these elements (as shown in the figure below), compares different program structures and design options, and highlights real-world examples. It also explores key considerations for selecting an effective structure that aligns with EPR goals. Ultimately, packaging EPR programs aim to maximize the collection, hauling, sorting, and processing of packaging materials in end markets while also providing incentives for reduction, reuse, and design change, ultimately supporting a more circular system.



The following diagram is intended to demonstrate how these operational and financial components exist between stakeholders in the EPR landscape.¹³ The PROs are at the center of the EPR landscape, implementing EPR programs in alignment with regulations, supporting producers' regulatory compliance, and overseeing waste management coverage in collaboration with waste management service providers. The design of key EPR program features will impact the way these stakeholders interact and engage with the system.



Essential Features of EPR Programs

Operational Components Drive Ownership and Accountability in the EPR System

1. PRO System

1

PRO System

Administering an EPR program is a complex endeavor. PROs are third-party organizations formed by producers to assume financial and operational responsibility within an EPR program on the producers' behalf. Under an EPR program, the structure of the PRO system can vary from single to multiple PROs, which may be for-profit or nonprofit. These structures are compared below, and key considerations are described in more detail.

Single PRO	Multiple PROs
A single PRO under one EPR program, typically functioning as a nonprofit. - Recycle BC is a nonprofit PRO in British Columbia for residential packaging and paper products. It is the sole program plan approved by the province.¹⁴ - In Oregon, California, Colorado, and Minnesota, Circular Action Alliance (CAA), a nonprofit PRO, is currently the sole PRO that has registered or been approved in each state, so these EPR programs will start with a single nonprofit PRO.¹⁵ However, there is language in the legislation for some of these states that would leave the door open for multiple PROs in the future.⁸	Multiple PROs under one EPR program in a for-profit, competitive system, or in some cases, in a nonprofit PRO system in which there is a clear scope split among product categories or geographic areas. - In 2003, Germany's EPR system for packaging moved from a single, nonprofit PRO acting as the system operator to a system in which various for-profit PROs fulfill their responsibilities in competition with each other. The total volume of collected packaging materials under the EPR system was divided among the various PROs, and this system is still in use today, with nine PROs currently in operation. Each PRO develops contracts with certain obliged companies within the system.¹⁶ - In Belgium, two nonprofit PROs function in parallel, with Valipac covering industrial packaging and Fost Plus covering household packaging.¹⁷

Evidence suggests the following system aspects should be considered when designing the PRO system within an EPR program:

Start-Up: PRO structure may impact program operations and efficiency, particularly during start-up. When first launching EPR programs, opening the door to multiple PROs may create confusion and lead to cost inefficiencies, as seen in Ontario's new program, as well as in the US, where EPR is in its early stages.¹⁸ Most countries with effective EPR schemes start with a single nonprofit PRO.¹⁶

Efficiency: A nonprofit PRO system can reflect true system costs in fees collected. While for-profit PROs can make profits due to competitive price pressures, there is a risk of losses and insolvency, which would result in a disruption in service.¹⁶ Additionally, a single PRO system may increase the potential for economies of scale due to aggregation of waste and larger feedstock and funding commitments¹⁹ and can be more effective, results-oriented, and operationally efficient compared to multiple PROs.²⁰

Maturity: After an EPR program's operations and effectiveness have been established, implementing a multiple PRO system may incentivize cost efficiencies.^{19, 21} After over a decade of EPR in Germany, multiple for-profit PROs were implemented in this mature EPR environment and introduced the potential to optimize system efficiency.¹⁶ As written in Maine's EPR program, additional PROs will be allowed to apply after initial program implementation but must provide a strong justification.²²

Monitoring & Transparency: Monitoring of the PRO's execution of the EPR program is less challenging in a single nonprofit PRO system than in a for-profit PRO system, which requires more monitoring as there are generally lower levels of transparency.^{16, 21} Under a single PRO, it is also easier for the PRO to identify free riders due to the 1:1 relationship between the PRO and producer(s). In a system with multiple PROs, other techniques like a separate register and a supervisory authority are required to ensure that every obligated company pays fees across the PROs, which may also result in additional system costs.¹⁶

Standardization: In Canada, the Council of Ministers of the Environment released “Guidance to Facilitate Consistent Extended Producer Responsibility Policies and Programs for Plastics” with the goal of standardizing EPR across jurisdictions. This council notes that aligning PRO roles and responsibilities across jurisdictions can create opportunities to share learnings internally, decrease administrative burden, and increase efficiency by allowing programs to operate at a larger scale.²¹



A worker observes waste falling from a conveyor belt at a plastic recycling facility

2. PRO Operational Responsibility for Waste Management Services

2

Operational Responsibility

Across all EPR programs, PROs assume some level of operational responsibility for waste management services for covered materials, including collection, hauling, sorting, and processing. This responsibility is often distributed between the PRO and municipalities. High-level distributions of operational responsibility are compared below, and key considerations are described in more detail.

Full Operational Responsibility	Shared Operational Responsibility	Zero Operational Responsibility
PRO is fully responsible for waste management services for covered materials by providing service or contracting with public and private service providers. In Ontario, producers are fully responsible not just for the costs of the curbside recycling system but also for the operation of the system itself, including contracting, collection, and processing.¹⁸	PRO shares responsibility with municipalities for waste management services for covered materials by providing service or contracting with public and private service providers—this may be through responsibility for certain services, responsibility only for services beyond existing coverage, and/or collaboration on a per municipality basis. - In Belgium, France, and Spain, municipalities are responsible for collection, and the PRO contracts with service providers for sorting and recycling.¹⁶ California, Oregon, and Minnesota have a shared responsibility model in which municipalities are reimbursed, but producers and municipalities share collection duties.²³ In Oregon, municipalities will continue to be responsible for existing collection and processing activities, while the PRO is responsible for expanding services to meet the program scope.²⁴ - In Colorado, the PRO is responsible for the costs and operations by providing service or contracting with public and private service providers.⁸ This program provides flexibility for local governments to decide if and how to engage in recycling collection—the PRO will then provide reimbursement or contract for services.²⁵	PRO has no operational obligation for waste management services for covered materials, only financial obligation—municipalities continue to be solely responsible for providing and operating waste management services. Maine's law is considered a full municipal reimbursement model, in which the producers pay fees but leave waste management service duties to the municipalities.²³



A cargo ship transports containers of waste to a recycling factory

Evidence suggests that the following aspects should be considered when assigning responsibility to stakeholders for waste management service coverage:

Start-Up: PROs and municipalities must collaborate over a sufficient start-up period to transition from today's waste management service coverage to the scope of coverage specified within the EPR program in order to ensure complete, cost-efficient coverage. In Ontario, PROs have been forced to accept expensive waste management contracts when they are facing procurement deadlines. Producers expect EPR fee costs to more than double and continue to increase due to a rushed operational transition that left waste management contracts in limbo, leaving the PRO minimal negotiation ability to avoid disruption in service.¹⁸ Leveraging existing waste management processes, contracts, and coverage may enable more efficient start-up.²⁶

Collaboration: PROs and municipalities must collaborate to leverage existing coverage, as well as expertise. Stakeholder collaboration is core to ensuring that regional nuances and goals are accounted for. Aligning on an efficient distribution of responsibilities that is considered fair is key to municipalities' engagement with the PRO, especially when engagement is voluntary.²⁷ In Belgium, the household packaging PRO, Fost Plus, coordinates closely with municipalities to optimize collection logistics, ensure cost-efficient contracts, and maintain high material recovery rates. These models leverage municipal expertise in collection and PRO expertise in financing and processing to enhance system effectiveness.^{28, 16} Defining the ownership of material streams is also essential—in France, ongoing disputes among manufacturers, municipalities, and waste management companies over who should collect and sell plastic bottles, a valuable post-consumer material, have delayed progress toward the country's recycling goals.²⁹

Maturity: Canadian EPR programs, which have grown and matured since their introduction as early as 2014, are transitioning to full responsibility, as was called upon by the Canadian Council of Environment Ministers in 2019.³⁰

Standardization: Alignment in roles and responsibilities of the PRO across geographies can create opportunities to share learnings internally and decrease administrative burden by allowing programs to operate at a larger scale, leading to cost efficiencies.²¹ This could also include regional collaborations and waste aggregation for processing solutions.²⁶

Essential Features of EPR Programs

Financial Components Drive the Financing Scope and Flow in the EPR System

3. Program Cost Coverage

3

Program Cost Coverage

EPR programs have an assigned scope of cost coverage for what the defined program will fund. Waste management services are inherently part of EPR, but coverage may also include program administration, education and outreach, infrastructure improvements, end market development, litter prevention, and other costs.^{8, 31, 32} Example cost coverage scopes are compared below.

	Administration	Education & Outreach	Infrastructure Improvements	Market Development	Litter Prevention
	Administration of the PRO, processing programs, program enforcement, etc.	Development of accessible educational resources and campaigns in systems across varying consumer demographics and needs.	Investments in new infrastructure, which may include equipment or facilities for reuse, recycling, and composting.	Development of markets to ensure that covered products collected for processing reach responsible end markets.	Identification of contributions of covered products to litter and water pollution.
Belgium	Y	Y	Y	Y	N
B.C.	Y	Y	Y	Y	N
Maine	Y	Y	Y	N	N
Oregon	Y	Y	Y	Y	N
California	Y	Y	Y	Y	N
Colorado	Y	Y	Y	Y	N
Minnesota	Y	Y	Y	Y*	Y

Notes: *Minnesota’s program notes that cost coverage must include “expansion or strengthening of demand for covered materials.”⁸

The table above provides a simplified breakdown of EPR program cost coverage at a high level across US states, as well as Belgium and British Columbia, which serve as case studies from Europe and Canada. Across the selected programs, coverage of administration, education and outreach, and infrastructure improvements is typical. Coverage of litter prevention is not common, with only Minnesota including this within its EPR program scope.⁸ For market development, requirements vary among programs. In Colorado, the PRO must invest in market development; in Oregon, the PRO

must support sectors in meeting responsible end market requirements; and in California, the PRO must support the establishment, expansion, and continued existence of responsible end markets.³³ It is also important to note that market development coverage within the EPR program isn't necessarily reflective of efforts within the state. For instance, in Minnesota, the Minnesota Pollution Control Agency is proactively leading an effort to strengthen end markets for the state. The agency works with recyclers, manufacturers, and government agencies to build end markets by increasing the number of local manufacturing companies that use recycled materials, organizing sustainable purchasing practices, and introducing business and research partnerships.³⁴

As a tangential case study for education and outreach, Norway's beverage container deposit return scheme integrates consumer education with financial incentives, achieving a 92.3% container return rate in 2023, which indicates that incorporating consumer education can impact program success.³⁵ Further research will be necessary to determine how varying cost coverage impacts efficiency and program outcomes in US EPR while considering efforts occurring outside the scope of cost coverage.



A conveyor belt carries plastic waste to be recycled in a recycling facility

4. PRO Financial Responsibility



Across all EPR programs, PROs assume some level of financial responsibility for the expanded costs that drive collection, hauling, sorting, and processing. This responsibility is often distributed between the PRO and municipalities and can be characterized as either full or shared financial responsibility—these options are compared below, and key considerations are described in more detail.

Full Financial Responsibility	Shared Financial Responsibility
PRO has full responsibility for funding the scope of costs covered by the EPR program. • In Maine, producers have full responsibility for program costs.²³ • In Colorado, the PRO will cover 100% of the costs of recycling services, including consumer education and government oversight of the program, despite a split in the operational coverage of waste management services.³⁶	PRO and municipalities share responsibility for funding the scope of costs covered by the EPR program—this may be through a split in waste management service responsibility or through a split of full program costs. • In Oregon's shared responsibility scheme, producers only fund the expansion of collection and processing activities beyond their current scope, managing their total cost coverage. It is estimated that collection makes up 70% of today's systems costs, and this will continue to be funded by local governments.³⁷ • In Minnesota, producers will begin by covering 50% of net recycling costs in 2029, 75% in 2030, and 90% by 2031.³⁸ • In Washington, producers' financial contributions will include paying into a reuse financial assistance program, which will begin with \$5 million in 2029 and continue annually.³⁹

Evidence suggests the following considerations will help inform the financial responsibility model:

Start-Up: At the beginning of an EPR program, particularly in a low-maturity waste management landscape, some programs are designed to allow municipalities and the PRO to share start-up costs.³⁸

Maturity: Financial responsibility split can change over time, and some programs phase this split gradually to increase the PRO's financial responsibility after start-up costs as the waste management system matures.³⁸ As Canadian EPR programs have matured, they are now in the midst of a transition to full responsibility.³⁰

Collaboration & Outcomes: When the PRO has the majority of financial responsibility within EPR, this approaches alignment with the intention of EPR, which is to put the responsibility on brand owners to pay for the recycling system and end-of-life management for these products.⁴⁰ A shared financial responsibility model with industry ultimately responsible for 90% of costs was introduced in Minnesota and is becoming a common compromise between producers and municipalities, with both Maryland and Washington following suit.^{38, 26, 41} Investing in the supply chain is also integral to closing the loop—for example, Minnesota state agency MPCA is working with stakeholders throughout the supply chain, providing \$5.3 million in grants to support recycling market development projects across the state.³⁴ As EPR programs develop, these are the types of investments that can be made by the PRO to develop end markets and ensure adequate procurement of recycled materials.

5. Fee Structure

5

Fee Structure

Material fees are collected by the PRO based on data reported by the producers and will fund the ongoing costs of collection, hauling, sorting, and processing of plastic and packaging.⁴² Options for fee structures are compared below, and key considerations are described in more detail.

Non-Modulated Base Fees	Modulated Base Fees	Eco-Modulated Fees
Base fees vary by material type but are the same across material categories. DSD, a PRO in Germany, has fees that vary by material type (e.g., glass, plastics, aluminum) but are the same within material types.⁴³	Base fees vary by material category based on factors that may include program cost, cost to recycle, revenues, and recycling performance.⁴⁶ Valorlux, the PRO in Luxembourg, has varying fees by material category, including paper/ cardboard, aluminum, colorless transparent PET bottles, opaque PET bottles, PE films, and others.⁴³	Fees include a bonus or malus based on sustainability, reuse, and recyclability within material categories. - CITEO, a PRO in France, had eco-modulated fees that add bonuses or maluses to a base fee based on sustainability and recyclability considerations, including recycled content, consumer education campaigns, and opacity.⁴⁴ - In Oregon, there will be bonuses on top of the modulated base fees. The bonuses are specific to producers and are based on life cycle assessment and packaging improvements.⁴⁵ - In California, multiple eco-modulation factors will be introduced, and in Colorado, eco-modulation will be required across eight factors, including material recycling rates.⁴⁶ Both states will require the PRO to ensure that eco-modulation factors incentivize reuse.⁴⁷

Evidence suggests the following considerations can guide the development of a fee structure:

Incentives & Outcomes: Modulated base fees and eco-modulation may incentivize the market to shift toward sustainable materials by providing producers with stronger design incentives.^{48, 49} Modulated base fees can create an incentive for producers to consider their packaging options by material category—with varying fees across material reporting categories, e.g., flexible plastic vs. poly-coated paperboard. Eco-modulation can create an incentive for individual producers to consider their packaging options within a material category (e.g., adding additional post-consumer recycled content to existing packaging) and incentivize reuse.^{50, 47} CITEO, the French PRO, implemented a 10% malus for packaging with carbon black in 2020, increasing to 50% and then 100% in 2023. In 2021, about 17,000 tons of packaging used carbon black, and by 2022, that number had fallen to 6,000 tons.⁵¹

Standardization: Regardless of the approach, it will be important to harmonize calculation methodologies and categories for setting fees across geographies, including eco-modulation approaches to fees. This is seen with the EU's Packaging and Packaging Waste Regulation (PPWR), which offers a valuable case study in cross-jurisdictional standardization and will align methodology for EPR eco-modulations across the EU.⁵² CAA has established a national fee-setting methodology to align methods for calculating base fees and eco-modulated fees, as well as guiding principles.⁴⁶ However, the fee numbers themselves will be unique to the local geography.



Plastic debris found on Milman Island, Queensland, Australia—Milman Island, a remote and uninhabited island in the northern Great Barrier Reef, is an important nesting site for marine turtles

6. Funding Mechanism for Waste Management Services

6 Funding Mechanism

To cover their scope of financial responsibility, PROs generate funding through producer fees, which are used to reimburse municipalities or directly pay service providers through contracts. Various bases for funding mechanisms are compared below, and key considerations are described in more detail.

Volume-/Operations-Based	Performance-Based	Cost Caps-Based
The PRO provides payments that reflect the actual costs of delivering waste management services, independent of metrics, and outcomes. In Maine's full municipal reimbursement model, the producers make full reimbursements for waste management services regardless of material end destination.²³	Payments are linked to achieving specific targets, such as collection rates, processing efficiency, and contamination rates. - In Minnesota, reimbursements must only be provided to service providers that "meet the performance standards established under an approved stewardship plan."⁵³ Colorado's reimbursements and service agreements will include incentives related to improvements such as efficiency and yield.³⁶ - In Ontario, processors will need to meet high recovery standards for materials.⁵⁴	Payments are limited to a defined cost threshold, such as the median cost of comparable services. In Manitoba, waste processors are reimbursed based on the median operational rate in the municipality.⁵⁵

Evidence suggests that driving alignment on outcomes will help direct the selection of a funding mechanism:

Outcomes: If processors are reimbursed based on total material volumes and/or operating costs, the system may risk the movement of waste rather than the recycling of materials.⁵⁶ In Maine's program, there are concerns regarding the fact that reimbursements will be made regardless of the end destination of the materials—how much is sent to recycling vs. landfill vs. incineration.²³ Similarly, measuring and rewarding progress based on the percentage of recyclables sorted coming out of the materials recovery facilities (MRFs)—rather than the percentage of materials collected—drives improved outcomes. If material is weighed at collection, the program is at risk of counting waste.²⁶

Collaboration: Ensuring a fair financial agreement is key to municipalities' engagement with the PRO, especially when engagement is voluntary.²⁷

Incentives: Private sector recyclers and MRFs should be able to earn increasing revenue from selling higher-quality output so that they can reinvest in improving the facilities in their region. States can provide additional incentives for MRFs to invest, such as by offering funding to manage any contaminants delivered to MRFs in their collected material mix. This was included in Oregon's legislation and is believed to be part of Waste Management's decision to build their next recycling facility in the state.^{57, 58} This creates an opportunity to reduce the cost associated with processing recyclables.⁵⁷

Driving Impact Through EPR Program Design

EPR and PRO structural components can have a significant impact on the environmental, social, health, and economic outcomes of EPR programs alongside increases in material processing rates. To design a program that will achieve the desired outcomes, it is critical to create the right blend across the PRO system type, program cost coverage, financial and operational responsibility, fee structure, and funding mechanisms.

- **Thoughtful design of program components affects outcomes.** Designing the optimal program requires considering many factors, including the maturity of a jurisdiction's EPR program and the existing waste management infrastructure, stakeholder collaboration and incentives, and, in particular, standardization of components with nearby regions.
- **Harmonization of program components drives greater program efficiency and impact.** Aligning responsibilities for the PRO and municipalities, along with producer incentives, across regions could direct larger industry shifts. As referenced, the EU's PPWR and the Canadian Council of Ministers of the Environment's "Guidance to Facilitate Consistent Extended Producer Responsibility Policies and Programs for Plastics" have separately sought to drive alignment across European countries and Canadian provinces and territories.^{52, 21} They mandate or call for the alignment of fee-setting guidelines, PRO roles and responsibilities, and program performance measurement, among other areas, to achieve benefits including cost savings, transparency, reduced administrative burden, and innovation. The EPA's recent call for a national EPR framework shows that the need for EPR standardization in the US is recognized as well.⁵⁹ Prior to a mandatory national framework in the US, it will be up to individual states to align these components and incentives to maximize impacts to recycling, among other outcomes.
- **Well-designed EPR programs have increased recycling rates.** Since the nonprofit PRO Fost Plus began operating in Belgium in 1994, with robust collaboration between the PRO and municipalities and a strong focus on consumer education and outreach, the packaging recycling rate increased from 10% in the 1990s to 90% in 2021.^{32, 7}
- **Improving recycling is just one piece of the puzzle.** It is important to consider recycling within the broader waste hierarchy and desired environmental, social, health, and economic impacts. Outcomes beyond recycling include reducing packaging material generation at the source, reducing waste generation, increasing reuse, decreasing toxics in packaging, increasing product transparency from production to end of life, and addressing environmental injustices. CAA's program plans in Oregon and Colorado include goals such as reducing waste, expanding access to recycling, particularly in underserved areas, stimulating new business growth, increasing the use of reusable and refillable packaging, and increasing equity in the recycling system.^{45, 36} EPR programs should act as a rollout framework to promote and enable such initiatives, and in the long term, they may offer opportunities for shared infrastructure.
- **EPR programs are designed to create positive economic outcomes.** EPR programs increase the flow of funding from packaging producers into waste management systems, reducing public spending on waste disposal and waste management. The higher recycling rates that result from this funding lead to more recyclable materials being put back into economic use, where the energy efficiency of recycled materials decreases greenhouse gas generation while increasing economic growth.⁴⁰ EPR in the US has the potential to recapture up to nearly \$100 million in lost material economic value in each state with EPR and create thousands of jobs.⁴⁰

EPR programs have the potential to shape how Americans manage packaging material and interact with everyday products. Collaboration across government agencies, PROs, producers, waste management and reuse service providers, consumers, and nonprofits is critical to developing these well-designed programs. By incorporating critical programmatic aspects, these programs can improve recycling systems, encourage more sustainable product design, and enhance waste management practices. As EPR policies continue to evolve, balancing effectiveness, feasibility, and environmental impact will be key to their long-term success.

Footnotes

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