

THE ROLE OF EXTENDED PRODUCER RESPONSIBILITY IN A PLASTIC FREE FUTURE



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THE PLASTIC PROBLEM

Plastics and other forms of single-use packaging are ubiquitous; they are used for numerous applications across various industries. The development of plastic revolutionized the ways in which humans were able to produce, package, and consume various goods and quickly became an integral part of the consumer experience. The durability, stability, and resiliency of plastic materials make them functionally appealing for many applications and thus plastic packaging has become a key component in food manufacturing and safety, medical innovation, sanitation, logistics and convenience – changing the landscape of these industries drastically.

However, the very properties that make plastics appealing for many industries also make them a prominent pollutant. The resilient structural properties and slow degradation rate of plastics have created problems for people and the planet as waste continues to persist in both natural and built environments. Because of their structural properties, plastic materials can endure in the ocean environment for anywhere from years to decades (or, in some cases, longer). [1] Considering that more than 10 million tons of plastic enter the oceans each year, the accumulation of plastic waste has become exponential. [2]

Today, plastics account for 75% of marine litter and it's estimated that roughly 90% of seabirds have likely ingested plastic. [3] Ingestion of microplastics by marine organisms can cause a range of health complications, such as the blockage of intestinal tracts, inflammation, stress, hormone disruption, and metabolic and behavioral changes[4] - not to mention the destruction and disruption of the ecosystems in which they reside. No species or space is spared; microplastics have been found almost everywhere in the environment, from the deepest ocean trenches, to both poles, and on top of the Himalayas. [5]

The production of petroleum-based plastics is also inextricably linked to the warming of the planet. In 2019, 10% of global oil extraction was used for plastic production. [6]

[1] Shaw, D. G., & Day, R. H. (1994). Colour- and form-dependent loss of plastic micro-debris from the North Pacific Ocean. *Marine Pollution Bulletin*, 28(1), 39–43. [https://doi.org/10.1016/0025-326x\(94\)90184-8](https://doi.org/10.1016/0025-326x(94)90184-8)

[2] Carney Almroth, B., & Eggert, H. (2019). Marine Plastic Pollution: Sources, Impacts, and Policy Issues. *Review of Environmental Economics and Policy*, 13(2), 317–326. <https://doi.org/10.1093/reep/rez012>

[3] Parker, L. (2021, May 3). Nearly every seabird on Earth is eating plastic. *Science*. Retrieved April 4, 2022, from <https://www.nationalgeographic.com/science/article/15092-plastic-seabirds-albatross-australia>

[4] Wright, S. L., R. C. Thompson, and T. S. Galloway. 2013. The physical impacts of microplastics on marine organisms: a review. *Environmental Pollution* 178: 483–92.

[5] Wilkinson, F. (2021, May 3). Microplastics found near Everest's peak, highest ever detected in the world. *Environment*. Retrieved April 4, 2022, from <https://www.nationalgeographic.com/environment/article/microplastics-found-near-everests-peak-highest-ever-detected-world-perpetual-planet>

[6] Jefferson, M. (2019, July 16). Whither plastics?-petrochemicals, plastics and sustainability in a garbage-riddled world. *Energy Research & Social Science*. Retrieved April 4, 2022, from <https://www.sciencedirect.com/science/article/abs/pii/S2214629619303172?via=ihub>

If plastic production and use continue at this rate, the cumulation of greenhouse gas emissions from plastic production could reach over 56 gigatons by 2050—10–13 percent of the entire remaining carbon budget [7] (An analysis of the IPCC’s SR 1.5 report projects that to limit warming to 1.5°C, the total remaining carbon budget must remain between 420 Gt CO₂e and 570 Gt. [8]). Making the connection between plastic production, pollution and climate change is important in understanding packaging’s role in the current climate crisis and why circular packaging solutions must be centered in the fight against climate change. Simply put, addressing the plastic problem is also addressing the climate problem.

At every stage of its lifecycle plastic poses distinct risks to human health, too; from the extraction of petroleum feedstocks that releases toxic substances into the air and water, to refining and production that releases carcinogenic substances, all the way through the usage of plastics products and packaging which can lead to ingestion and/or inhalation of microplastic particles. [9] Communities of color, low-income communities, and Indigenous communities are at a higher risk of experiencing these health impacts because the plastic lifecycle – from production to waste - disproportionately affects these groups. The current packaging system in America is driving extreme inequities in society; in the US, 79% of waste incinerators are located in BIPOC communities and the coastal Indigenous communities that depend on healthy marine ecosystems for their livelihoods experience the direct impacts of plastic pollution. [10] In the developing world, it’s estimated that mismanaged plastic pollution results in up to 1 million deaths per year. [11] This means that packaging pollution is not only an environmental concern, but a social justice issue as well.

These impacts are a direct result of the current packaging systems in place; in the current linear system, packaging outputs are rarely recycled, reused, or returned to the earth. A linear economy follows the “take-make-waste” model where raw materials are extracted, transformed into products, used, and then promptly discarded. In this system, value is created by producing and selling as many products as possible rather than maximizing value through longevity. This system continues to drive the creation of packaging waste that will persist in the environment for hundreds of years, only to protect a product for a month and eventually be disposed of in just minutes.

[7] Feit, H., Feit, S., Muffett, C., Malone Rubright, S., Bernhardt, C., Schaeffer, E., Moon, D., Morris, J., & Labbé-Bellas, R. (2019). (rep.). Plastic & Health: The Hidden Costs of a Plastic Planet. Center for International Environmental Law. Retrieved from Plastic & Health: The Hidden Costs of a Plastic Planet.

[8] Ibid.

[9] Feit, H., Feit, S., Muffett, C., Malone Rubright, S., Bernhardt, C., Schaeffer, E., Moon, D., Morris, J., & Labbé-Bellas, R. (2019). (rep.). Plastic & Health: The Hidden Costs of a Plastic Planet. Center for International Environmental Law. Retrieved from Plastic & Health: The Hidden Costs of a Plastic Planet.

[10] “Municipal Solid Waste Incinerators Are Harmful to Public Health and Environmental Justice Communities.”Tishman Center MSW Incinerators Harm EJ Communities | The New School News Releases,ww2.newschoo.edu/pressroom/pressreleases/2020/TishmanCenterWasteIncinerators.htm.

[11] Ibid.

To address the growing plastic problem, various tools and tactics are being employed at each step of the packaging value chain. From material innovation, to manufacturing technology development, to packaging redesign, to expanded recycling capacities, to corporate commitments and consumer education through certifications, claims and labels – there is great momentum around sustainable packaging solutions. However, it's become clear that the success of many of these solutions depends on deep, systemic change. Thus, policy is becoming an increasingly important part of the conversation around packaging and extended producer responsibility (EPR) laws are in particular are being explored as a legal lever that could help mitigate the growing plastic pollution problem. EPR laws have gained traction at both the federal and state level, with various new bills being introduced each year. If embraced at both the local and federal levels, these policies have the potential to help mitigate the growing plastic pollution problem by placing responsibility back onto those who are driving the generation of waste.

PLASTIC DEPENDENCE: A MARKET FAILURE

Society's heavy reliance on single-use plastics is a result of one of the greatest market failures of our time. According to the Corporate Finance Institute, a market failure is defined as “the inefficient distribution of goods and services in the free market.”[12] Single-use plastic is the epitome of inefficiency; the World Economic Forum estimates that 95% of the value of plastic packaging material (\$80-120B) is lost to the economy annually [13] and a study published in the Marine Pollution Bulletin says that plastic pollution is costing the world up to \$2.5 trillion per year. [14] The linear production and consumption model that the lifecycle of plastic follows requires intensive inputs, consists of a short lifespan, and generates copious amounts of waste at end-of-life. Combined with the fact that less than 10% of plastics get recycled at end-of-life, the inefficiencies are staggering. [15] Additionally, the market pricing for plastics has failed to internalize the externalities associated with them. Thus, pricing for plastics has been able to remain low, especially in comparison to more “sustainable” packaging options. The failure to connect the market costs of plastics with the true social and environmental costs is fueling a market that places a higher value on convenience than natural life. In this system, plastic packaging producers are motivated by price and rewarded with profit despite the implications of the materials they create and distribute.

[12] Market failure. Corporate Finance Institute. (2022, April 23). Retrieved April 27, 2022, from <https://corporatefinanceinstitute.com/resources/knowledge/economics/market-failure/>

[13] The New Plastics Economy: Rethinking the future of plastics. How to build a circular economy. (n.d.). Retrieved April 7, 2022, from <https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics/>

[14] Beaumont, N. J., Aanesen, M., Austen, M. C., Börger, T., Clark, J. R., Cole, M., Hooper, T., Lindeque, P. K., Pascoe, C., & Wyles, K. J. (2019). Global ecological, social and economic impacts of Marine Plastic. *Marine Pollution Bulletin*, 142, 189–195. <https://doi.org/10.1016/j.marpolbul.2019.03.022>

[15] Fox, A. (2019, April 23). Just 10% of U.S. plastic gets recycled. A new kind of plastic could change that: Science. *LiveScience Tech*. Retrieved April 27, 2022, from <https://livescience.tech/2019/04/23/just-10-of-u-s-plastic-gets-recycled-a-new-kind-of-plastic-could-change-that-science/>

AMERICA'S FRAGMENTED SYSTEM

The over accumulation of plastics in the environment is also a symptom of the fragmented recycling system in the US. Due to recent policy changes in China that restrict the exportation of recycled materials, plastics with no end market are beginning to accumulate across the country. As a result, recycling costs have skyrocketed, and the impacts have been absorbed by both consumers and cities. This has created a disproportionate burden on municipalities to manage waste streams that they do not even play a role in creating.

In addition to being overwhelmed with unprecedented levels of waste, the recycling capacities of waste management facilities have not kept up with the rate of material innovation. Today's facilities are often unequipped to properly break down the increasingly complex plastics on the market as they require more specialized equipment and meticulous sorting. [16] This is because today's plastics are filled with novel colors, additives and fillers that complicate the recycling process. [17] Even if a company's plastic packaging is inherently recyclable, there is no guarantee that it will get recycled by consumers and/or recovered and recycled by municipalities due to the fact that post-consumer plastics have different recycling values and the costs associated with collecting and reprocessing them have continued to increase. [18] Additionally, because the US relies on a single-stream recycling system, municipalities end up with a mixed stream of materials that are burdensome to separate. The increasing costs associated with recycling combined with the low market value of recycled plastics and low costs of virgin materials prevents plastic recycling from being a profitable industry in the US. Because of this, only nine percent of all plastic ever discarded since 1950 has been recycled and 12 percent has been incinerated. [19]

EMBRACING A CIRCULAR ECONOMY

As more people have become aware of the implications of the current packaging system in the US, there has been an increased focus on alternate models. A large emphasis has been placed on embracing a more circular economy where waste is prevented at the source, resources are kept in use, and the planet is regenerated in the process.

[16] Hailstone, J. (2022, February 3). We cannot recycle our way out of the plastic crisis, warns WWF. *Forbes*. Retrieved April 27, 2022, from <https://www.forbes.com/sites/jamiehalstone/2022/02/01/we-cannot-recycle-our-way-out-of-the-plastic-crisis-warns-wwf/?sh=1cc4021c44f1>

[17] Saey, J., Chen, W.-T., & Ternes, M. E. (2020, November 3). Waste plastic: Challenges and opportunities for the chemical industry. *AIChE*. Retrieved April 27, 2022, from <https://www.aiche.org/resources/publications/cep/2020/november/waste-plastic-challenges-and-opportunities-chemical-industry>

[18] Diggle, A., & Walker, T. R. (2020). Implementation of harmonized Extended Producer Responsibility strategies to incentivize recovery of single-use plastic packaging waste in Canada. *Waste Management*, 110, 20–23. <https://doi.org/10.1016/j.wasman.2020.05.013>

[19] Feit, H., Feit, S., Muffett, C., Malone Rubright, S., Bernhardt, C., Schaeffer, E., Moon, D., Morris, J., & Labbé-Bellas, R. (2019). (rep.). *Plastic & Health: The Hidden Costs of a Plastic Planet*. Center for International Environmental Law. Retrieved from *Plastic & Health: The Hidden Costs of a Plastic Planet*.

While there is no legal definition prescribed for a “circular economy”, the Ellen MacArthur Foundation’s definition (“an economy that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times”) is probably the most recognized. In a circular packaging economy, materials are reused, redesigned, or returned to the soil, ultimately reducing reliance on raw material extraction, and simultaneously eliminating the generation of waste. A circular model is based on regenerative principles and keeps products and materials in use indefinitely, thereby minimizing waste and maximizing value.

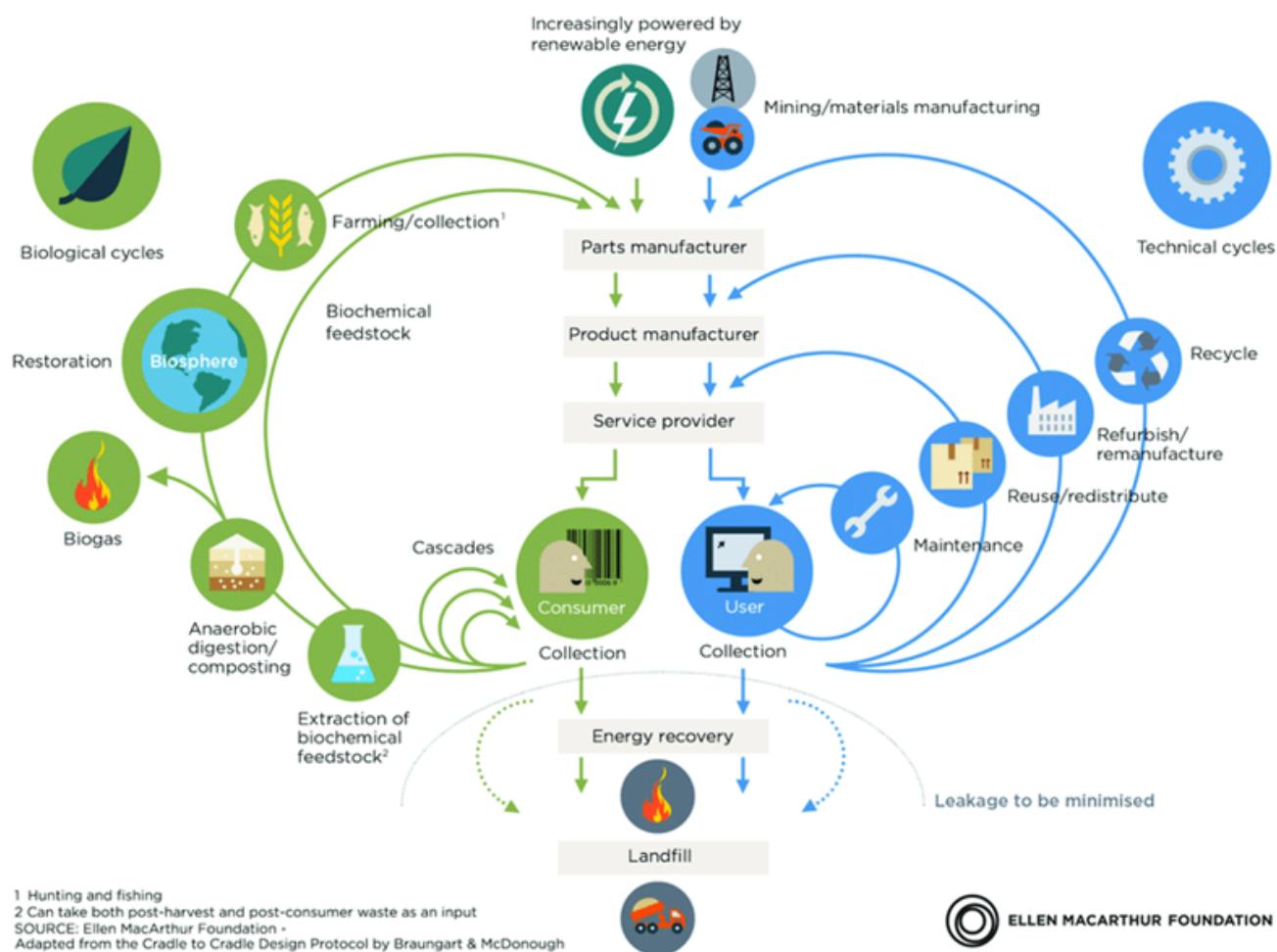


Figure 1. The circular economy – an industrial system that is restorative by design
Source: The Ellen MacArthur Foundation

A study done by Accenture, a leading global management consulting firm, projected \$4.5 trillion of additional economic output by 2030 if a more circular economy is adopted. This is made possible through circular business models that “decouple economic growth and natural resource consumption while driving greater competitiveness.” [20] The authors of the study highlight 5 key strategies to drive the circular economy; sharing platforms, products-as-a-service, product life extension, circular supply chains, and increased recovery and recycling. Today, businesses are reevaluating the ways they design, produce, and dispose of the products used in everyday life to better embrace circular and regenerative principles. However, without some form of incentive, many businesses will likely stick with the take-make-waste model that has continued to benefit them.

CULTIVATING CIRCULARITY THROUGH POLICY

Proponents of a circular economy are advocating for the application of extended producer responsibility (EPR) in packaging law as a solution to growing plastic pollution levels and America’s waste management system that needs improvement. Extended producer responsibility law is a type of policy lever that mandates stewardship from producers of waste; EPR laws for packaging redistribute responsibility for the disposal and recycling of packaging waste from consumers (taxpayers) and cities to the companies who are producing and selling plastic packaging products on the market. Simply put, under EPR policy, companies putting packaging on the market are required to pay for and/or physically manage the collection, sorting, and recycling of packaging after use. [21] These companies (i.e. packaging producers and brands) dictate the predominate types of materials on the market and thus wield a significant degree of control over the packaging landscape. For this reason, they are being centered in the discussions around EPR policies.

In traditional waste management systems, packaging manufacturers and consumer goods brands sell products on the market but rarely play a role in the recovery or recycling of these products and/or product packaging at end-of-life because they have little incentive to do so. While there are varying formats for EPR policy, EPR laws for plastic packaging would redistribute the burden of waste management onto companies like Coca Cola or Nestle by mandating that they direct some of the revenue from their waste-generating products towards the management of their very own waste.

[20] Accenture. (1970, September 29). The circular economy could unlock \$4.5 trillion of economic growth, finds new book by Accenture. Newsroom. Retrieved April 4, 2022, from <https://newsroom.accenture.com/news/the-circular-economy-could-unlock-4-5-trillion-of-economic-growth-finds-new-book-by-accenture>

[21] Extended producer responsibility is a necessary part of the solution to packaging waste and pollution. plastics.ellenmacarthurfoundation.org. (n.d.). Retrieved April 4, 2022, from <https://plastics.ellenmacarthurfoundation.org/epi>

In many cases, EPR policies create a financial mechanism that is used to direct funds back into the waste management system, helping to create more robust recycling services and expand markets for post-consumer-recycled (PCR) material, which can in-turn help these very same companies meet the packaging commitments they continue to make (i.e. Coca Cola's commitment to 50% PCR content by 2030). [22] If recycling rates in the US do not improve, these massive companies will not have access to the amounts of post-consumer recycled material they need to fulfill these commitments which is why many of these companies have actually voiced support of EPR policies. In fact, 150 global businesses and organizations across the packaging value chain have publicly shown their support for EPR policy by formally signing onto Ellen Macarthur Foundation's EPR policy statement that acknowledges "without EPR, packaging collection and recycling is unlikely to be meaningfully scaled and tens of millions of tons of packaging will continue to end up in the environment every year." [23]

Some of the demonstrated benefits of EPR include the increased recovery and recycling of plastic and packaging materials, reduced environmental and waste stream contamination, and the development of end markets for difficult-to-recycle materials. [24] EPR also aims to incentivize producers to decrease overall packaging material and waste, encouraging more eco-friendly packaging design. A study on existing EPR-for-packaging policies in both Spain and Portugal found that the implementation of EPR policies have had a positive impact on packaging waste reduction and contribute to increasing recycling rates seen in both countries. [25] The Spanish and Portuguese packaging systems consist of a producer fee scheme in which "Green Dot" fees support the costs of packaging waste collection and sorting. [26] In Europe, many countries with EPR policies are seeing PPP (plastic and paper packaging) recycling rates above 70% or 80%, compared to a rate of ~50% in America. [27]

EPR FORMAT AND FUNDING

EPR policies leverage market-based instruments and regulatory standards (both upstream and downstream) to achieve goals related to source reduction, waste prevention, increased recovery, environmentally friendly design, and circularity.

[22] Johnson, J. (2018, January 25). Coca-Cola seeking 50 percent recycled content by 2030. *Plastics News*. Retrieved April 27, 2022, from <https://www.plasticsnews.com/article/20180124/NEWS/180129967/coca-cola-seeking-50-percent-recycled-content-by-2030>

[23] Extended producer responsibility is a necessary part of the solution to packaging waste and pollution. *plastics.ellenmacarthurfoundation.org*. (n.d.). Retrieved April 4, 2022, from <https://plastics.ellenmacarthurfoundation.org/epr>

[24] Cassell, S., Harris, S., & Aldred Cheek, K. (2020, March). EPR for Packaging & Paper Products: Policies, Practices, & Performance. *Product Stewardship Institute*. <https://cdn.ymaws.com/www.productstewardship.us/resource/resmgr/packaging>

[25] Rubio, S., Ramos, T. R. P., Leitão, M. M. R., & Barbosa-Povoa, A. P. (2019). Effectiveness of extended producer responsibility policies implementation: The case of Portuguese and Spanish packaging waste systems. *Journal of Cleaner Production*, 210, 217–230. <https://doi.org/10.1016/j.jclepro.2018.10.299>

[26] *Ibid.*

[27] *Ibid.*

While the exact structure of EPR policy varies across materials and regions, a few predominant mechanisms have emerged [28];

- **Take Back Programs:** Mandates “producers” in a region take back the products they have put on the at the end of the products’ life. The producer or an organization on behalf of the producer might be responsible for collection. **Advanced Disposal Fees:**
- Fees that are used towards managing waste. These fees are often visible and passed onto the consumer, otherwise known as an “eco-fee.”
- **Deposit/Refunds:** A deposit is required upon purchase of certain items (i.e. bottles) and refunded upon return/recovery. Typically, retailers collect deposits, pay out refunds, and return materials to recyclers in exchange for compensation.
- **Recycled Content Standards:** A mandate that outlines the required percentage of recycled material that must be incorporated into the production of new products.
- **Combined Upstream Tax/Subsidy:** Producers pay a tax on their products that is determined by weight, volume, type, or units. Taxes may be increased or decreased based on environmental impact or innovation. This fee is used to subsidize the actual disposal and recycling of said products. This encourages both a reduction at the source and an increase in recycling.

There are many ways that the principles of EPR can be translated into packaging policy in particular; physical responsibility might require the producer to engage in the physical management (i.e. collection, processing, treatment or disposal) of the packaging at its end-of-life, financial responsibility may mandate that the producer pays all or a portion of the costs associated with the management of their waste, informational responsibility might require producers to provide information to consumers about the contents and impact of their packaging, and legal responsibility extends a producer’s traditional liability for packaging into the post-consumer phase (“end-of-life”). [29] EPR can be voluntary, mandated by law or be guided by a framework of recommendations. However, studies have indicated that voluntary EPR programs are not as effective at achieving change as mandated regulation. [30] While type and degree of responsibility may vary policy to policy, most EPR bills for packaging share the overarching goals of inspiring more planet-friendly packaging design (i.e. design for environment – DfE) and achieving higher recycling rates.

[28] Kaffine, D., & O'Reilly, P. (2015, January 21). WHAT HAVE WE LEARNED ABOUT EXTENDED PRODUCER RESPONSIBILITY IN THE PAST DECADE? A SURVEY OF THE RECENT EPR ECONOMIC LITERATURE. Retrieved April 28, 2022, from https://www.colorado.edu/faculty/kaffine/sites/default/files/attached-files/cv_kaffine.pdf

[29] Quinn, L., & Sinclair, A. J. (2006). Policy challenges to implementing extended producer responsibility for packaging. *Canadian Public Administration*, 49(1), 60-79. doi:10.1111/j.1754-7121.2006.tb02018.x

[30] *Ibid.*

Typically, EPR policies around packaging outline a fee-based schedule where packaging producers pay a fee to have their products managed through a producer responsibility organization (PRO). [31] A PRO is defined as a “collective entity set up by producers or through legislation, which becomes responsible for meeting the recovery and recycling obligations of the individual producers.” [32] The PRO acts as the middleman between the waste collection points and the recycling operators, streamlining waste collection on behalf of those producing and selling plastic materials. In the case of more than one PRO, a clearing house might be formed to efficiently and evenly allocate waste amongst PROs.

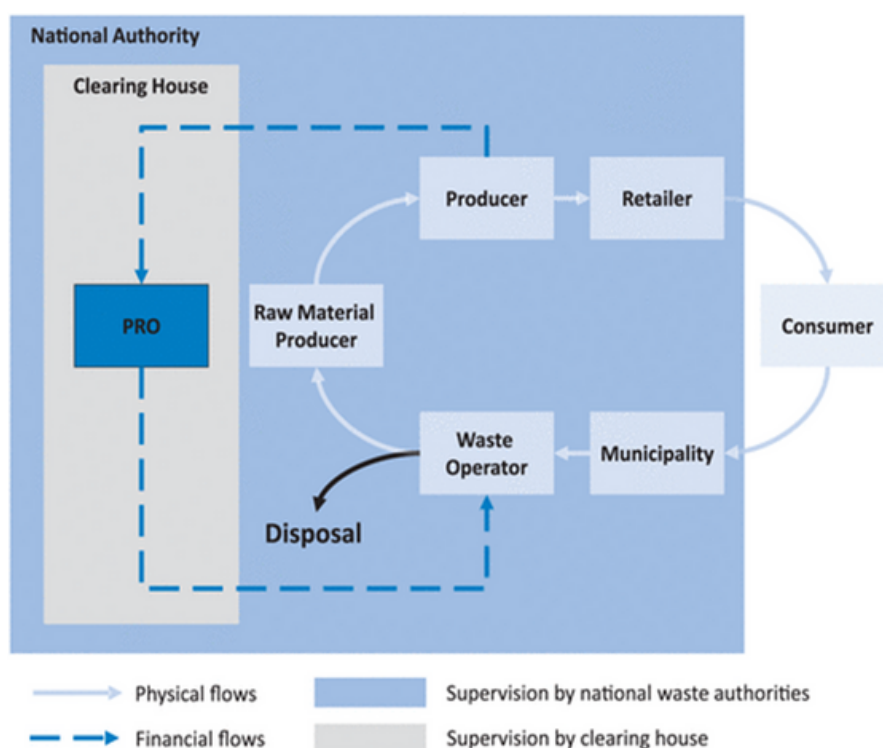


Figure 2. Interactions between EPR stakeholders

Source: California Management Review

Figure 2 demonstrates the flow of resources (physical and financial) throughout the network of packaging stakeholders under an EPR scheme. While this diagram reflects stakeholder interactions under a national EPR scheme, similar dynamics appear under EPR at the state level where state authorities provide supervision. While the PRO takes the physical burden off plastic producers, they are still held accountable by being required to finance collection and recycling processes through a fee that is relative to the type and amount of their waste that is managed.

[31] Northeast Waste Management Officials' Association (NEWMOA) & the Northeast Recycling Council (NERC) . (2020). (rep.). White Paper Extended Producer Responsibility (EPR) for Packaging & Paper Products . Retrieved from https://www.newmoa.org/solidwaste/EPR_for_PPP_White_Paper.pdf.

[32] Andreasi Bassi, S., Boldrin, A., Faraca, G., & Astrup, T. F. (2020). Extended producer responsibility: How to unlock the environmental and economic potential of plastic packaging waste? Resources, Conservation and Recycling, 162, 105030. <https://doi.org/10.1016/j.resconrec.2020.105030>

There is some debate about the effectiveness of requiring producers to physical manage their own waste vs. outsource management to a PRO. A comparative study of various applications of EPR policy suggests that the most “successful” cases were ones in which producers were limited to the financial responsibility of collection and recycling services by paying a fee to external organizations that physically manage waste. [33] The fee schedule might be determined by packaging weight, volume and/or material type. While these fees might eventually be passed onto the consumer (either visibly or invisibly), the intention is for producers to internalize the fee into the overall cost of the product, ultimately incentivizing producers to redesign their product in ways that minimize, or eliminate, the need for a fee. A producer fee-scheme is generally the preferred financial structure since alternate funding sources (i.e. funding from public budgets or from donations) do not necessarily provide the same degree of dedication and continuity.

While EPR schemes alone have the potential more fairly distribute end-of-life responsibility across the packaging value chain, their success is dependent on many interacting factors and effective coordination across various groups. There will be a great need for data collection, reporting, enforcement and collaboration across industry and government members. There will also be a need for increased efforts around consumer education to create buy-in across all stakeholder groups. To create synergies across these groups and to achieve the economic and environmental goals set out by EPR policies, these efforts can be bolstered using tools that also address consumer behavior such as a landfill tax, so that stewardship is mandated at each stage the packaging lifecycle. [34]

EPR FOR PACKAGING IN THE UNITED STATES

EPR bills are gaining momentum at both the federal and state level as society continues to reckon with the growing packaging crisis and municipalities continue to struggle managing waste under the United States’ fragmented recycling system. In the last two decades, more than 70 laws that mandate some form of producer responsibility have been enacted across the US. [35] Nearly a dozen EPR bills were introduced by state legislators across the US in 2021 alone. [36] Historically, EPR policies in the US have been used to regulate “problem” materials such as paint or electronics however, the list of products covered by these statutes continues to grow and many newer bills are now directly addressing packaging.

[33] Gupt, Y., & Sahay, S. (2015). Review of extended producer responsibility: A case study approach. *Waste Management & Research*, 33(7), 595-611. <https://doi.org/10.1177/0734242X15592275>

[34] Ibid.

[35] Nash, J., & Bosso, C. (2013). Extended producer responsibility in the U.S.: Full speed ahead? Harvard Kennedy School. Retrieved April 7, 2022, from <https://www.hks.harvard.edu/centers/mrcbg/publications/awp/awp10>

[36] Quinn, M. (2021, February 11). 2021 could be year for packaging EPR, nearly a dozen state bills in play. *Waste Dive*. Retrieved April 27, 2022, from <https://www.wastedive.com/news/2021-state-extended-producer-responsibility-recycling/594873/>

This signifies the growing pressure from various stakeholder groups on local governments and packaging producers to play an increased role in the management of packaging pollution. EPR for packaging policies present novel challenges since packaging is produced and sold at much larger scale than historically covered items like paint or electronics. The implications of EPR policies for packaging are quite large considering these policies will require an overhaul of the current waste management systems in place. However, the following early adopters of EPR for packaging policies in the US are creating early models that can be studied, analyzed, and evaluated for future application.

LD 1541 (HP 1146) - An Act To Support and Improve Municipal Recycling Programs and Save Taxpayer Money

On July 13, 2021, Maine became the first state to sign EPR legislation into law for plastic packaging materials. LD 1541 ultimately aims to address the massive amounts of packaging waste being managed in the state and the increasing costs of recycling. About 30-40% the waste being managed by Maine's municipalities comes from packaging and the Maine Department of Environmental Protection (DEP) estimates that it costs, on average, 67% more to recycle packaging than to send it to landfill. [37]

Under LD 1541, producers of plastic packaging products will be required to pay into a fund to help expand and support local recycling programs. Producer fees will be determined by the amount of waste generated and the degree of recyclability of said waste. These fees will be used to reimburse municipalities for eligible recycling and waste management costs, increase investment in local recycling infrastructure, and expand programs to educate Maine citizens on how to properly recycle.

Under this law, Maine's Department of Environmental Protection (DEP) will work with a stewardship organization (SO) to co-operate a program that financially and operationally supports local municipalities' recycling services. The primary role of the SO is to collect fees from producers of packaging based on the weight and type of materials. The law considers the financial standing of producers when determining these fees, allowing exemptions for smaller producers that earn less than \$2 million in gross revenue or sell less than one ton of packaging material to consumers in Maine. [38]

[37] (n.d.). (rep.). Maine Solid Waste Generation and Disposal Capacity Report for Calendar Years 2018 & 2019.

[38] Nichols, S. (2021, October 21). Support of LD 1541, an act to support and improve municipal recycling programs and save taxpayer money. Natural Resources Council of Maine. Retrieved April 4, 2022, from <https://www.nrcm.org/testimony/support-ld-1541-municipal-recycling-programs-save-taxpayer-money/>

In a public hearing prior to the bill’s passage, numerous testimonies in support of LD1541 demonstrated the power of multi-stakeholder advocacy with representation from small local business owners, municipal staff, local elected officials, local recycling committee volunteers, solid waste professionals and transfer station managers, state lawmakers, non-profit & religious institutions, taxpayers; middle & high school students, undergraduate and graduate school students; and University of Maine faculty. [39]

SB 582 - Recycling Modernization Act

Oregon legislature passed the Recycling Modernization Act (Senate Bill 582) on August 6th, 2021 (effective January 1, 2022) with the goal to “make recycling easier for the public to use, expand access to recycling services, upgrade the facilities that sort recyclables, and create environmental benefits while reducing social and environmental harms, such as plastic pollution.”[40] Under this law, producers of plastic and paper packaging are also required to pay fees into a fund that will be used to support local recycling programs. These fees are determined by the types of materials used and the volume sold in the state, with increased fees for non-recyclable materials and those with more significant environmental and social impacts.

Under SB 582, packaging producers are required to become a member of and pay fees to a producer responsibility organization (PRO). The PROs are responsible for collecting all relevant data from producers and ensure proper end-markets for their products. Before beginning this process, the PROs must submit an EPR plan to Oregon’s Department of Environmental Quality (DEQ) by March 31, 2024 to begin implementation by July 1, 2025. Section 6 of SB 582 lays out the requirements for this plan which must include a roadmap for supporting the collection and recycling of covered products, details on how the PRO will meet the plastic recycling goal, how producers and recyclers will maximize the use of existing infrastructure, what incentives to PROs will provide to producer members in motivate environmentally responsible design, ensuring that materials are properly managed post-processing, and improving collection opportunities. [41] These plans will be subject to review by the DEQ, the public, and a newly formed Oregon Recycling System Advisory Council to ensure multi-stakeholder input and oversight.

The bill also clearly delineates what packaging products are “covered” under the scope of the law (i.e. which products are subject to the law’s mandates). The respective “producers” of these products are clearly stated so that there is no confusion around who

[39] How EPR for packaging became law in Maine. Natural Resources Council of Maine. (2022, February 24). Retrieved April 4, 2022, from <https://www.nrcm.org/programs/sustainability/extended-producer-responsibility-packaging/how-epr-packaging-became-law-maine/>

[40] Plastic pollution and recycling modernization act. Department of Environmental Quality : Plastic Pollution and Recycling Modernization Act : Recycling : State of Oregon. (n.d.). Retrieved April 7, 2022, from <https://www.oregon.gov/deq/recycling/Pages/Modernizing-Oregons-Recycling-System.aspx>

[41] Summary of producer obligations and definitions - oregon.gov. (n.d.). Retrieved April 6, 2022, from <https://www.oregon.gov/deq/recycling/Documents/RMAProducerObligationsSummary.pdf>

is fiscally responsible for the fees. For example, for packaged items sold via physical retail sale (i.e. in a grocery store), the obliged producer is typically the manufacturer of the packaged item, not the actual packaging material. However, for food service ware, the obliged producer is the entity that first sells the food service ware into the state – which is typically the manufacturer of the food ware itself. For packaged items sold via remote sale (i.e. online), the obligated producer of the packaging used for shipping (i.e. Amazon) must also communicate with the producer of the sold “covered” product (i.e. Hefty) so that Hefty is aware of its own compliance obligations. The shipper (i.e. Amazon) must also notify the PRO that to Hefty belongs. [42] Clearly outlining responsibility for different types of packaging and appointing respective producers is important in creating a legal framework that will enable true accountability and ownership – the very essence of EPR.

H.R. 2238S. 984 - Break Free From Plastic Pollution Act

In March of 2021, the Break Free from Plastic Pollution Act was reintroduced to Congress by Senator Jeff Merkley (D-OR) and Representative Alan Lowenthal (D-CA). This bill is a prominent piece of EPR legislation for packaging and is the first of its kind to be considered at the federal level. The amended act includes various updates from the 2020 version that propose more stringent regulations around plastic production and an accelerated timeline. This comprehensive federal bill outlines mandates and incentives that aim to reduce the production of various products and materials (including plastics) and increase nationwide capacity for collection, recycling, and/or composting. To do this, the bill places fiscal responsibility on certain packaging producers (i.e. producers of packaging, paper, single-use products, beverage containers, or food service products) to support the collection and management of these products at end-of-life. Additionally, the bill sets a minimum threshold of products that must be reused, recycled, or composted and establishes a mandated percentage of recycled content that must be included in beverage containers. The bill also seeks to ban a variety of single-use products such as plastic utensils.

The Break Free from Plastic Pollution Act also places a large emphasis on social justice, including many provisions that aim to better protect the communities that are disproportionately impacted by the plastic packaging value chain. The bill requires plastic production and incineration facilities to establish and submit clear initiatives that will reduce potential environmental impacts on surrounding communities and to deliver this information to “applicable frontline communities” through public hearings and printed notices published in the communities’ predominant languages.

[42] Summary of producer obligations and definitions - oregon.gov. (n.d.). Retrieved April 6, 2022, from <https://www.oregon.gov/deq/recycling/Documents/RMAProducerObligationsSummary.pdf>

The Break Free from Plastic Act is recognized as “the most comprehensive set of policy solutions to the plastic pollution crisis ever introduced in Congress.” [43] Its passage would establish a set of national standards for EPR, laying the groundwork for a unified approach to mandated producer responsibility and creating standardization across America’s recycling systems.

THE STAKEHOLDER SYSTEM

Considering the many stakeholder groups that will be impacted by EPR policies for packaging, it’s likely that there will be varying degrees of reception across the packaging value chain. As with most policies, stakeholders’ support (or lack thereof) will be determined by their own interests and motivations. Key stakeholder groups impacted by EPR for packaging policies include the packaging “producers” that create and sell products that fall under the legislative scope which might include manufacturers, sellers, and importers as well as the retailers where these products are sold. The PROs that coordinate the collection, treatment, and recycling activities on behalf of producers are impacted by the legal obligations they are required to meet and, in many cases, bear the brunt of the physical and logistical burdens imposed by EPR laws. Both public and private waste management entities (also referred to as “recyclers”) oversee waste collection, transport, treatment, and recycling of waste on behalf of the PROs, so effective collaboration between the two will be needed to form solid partnerships. Local governments and municipalities will be held responsible for the ongoing enforcement of EPR legislation and the oversight of varying stakeholders. Trade associations, industry groups, and NGOs will represent interests of a given sector to ensure that the policies developed are done in a way that balances multiple interests. And lastly, consumers can either contribute to or detract from the success of EPR policy by adjusting their own behaviors to advance EPR goals around reducing waste.

INDUSTRY OPPOSITION

Because the network of packaging stakeholders is vast and the nature of EPR policy is complex, adoption of EPR policy for packaging in the United States has (up until recently) been slow. And for those state legislators that have brought packaging EPR bills to the table, many have faced resistance. The impacts of EPR policy on those producing and selling plastic packaging materials are perhaps the most direct and thus, the producers of these products are some of the most resistant.

[43] 5 Gyres Institute. (n.d.). Better Policies Create Change - Bfppa. 5Gyres.org. Retrieved April 7, 2022, from <https://www.5gyres.org/bffppa>

Oregon's SB 582 bill faced strong opposition from industry groups such as the American Forest and Paper Association. These industry opponents argued that the implications of EPR legislation will ultimately impact consumers who will bear the added costs in the form of higher prices.

Similarly during an early hearing for California's SB 54, organizations representing the interests of farming, agriculture, consumer goods (i.e. pet food and personal care), household products and restaurants joined the Plastics Industry Association, the American Institute for Packaging and the Environment, and the Flexible Packaging Association to voice unified opposition. [44] Opponents expressed concerns that SB54 falls short of recognizing the practical value plastics have over other materials (i.e. durability) and that EPR policies in general fail to consider the trade-offs producers will face when transitioning to alternate materials.

Similar concerns were echoed by the Plastics Industry Association's Chief Economist who asserted that the Break Free from Plastics Pollution Act puts "the over \$7.0 billion capital expenditure spending in plastics material and resin manufacturing in serious jeopardy," posing "serious danger" to America's manufacturing sector. [45] Several other plastic industry groups have also voiced opposition to the bill, including the American Chemistry Council (ACC). While some plastic industry members support the idea of producer fee schemes, many oppose the bill's calls for a temporary freeze on permitting for new plastics production facilities, asserting it will stifle innovation. [46]

MATERIAL TRADEOFFS

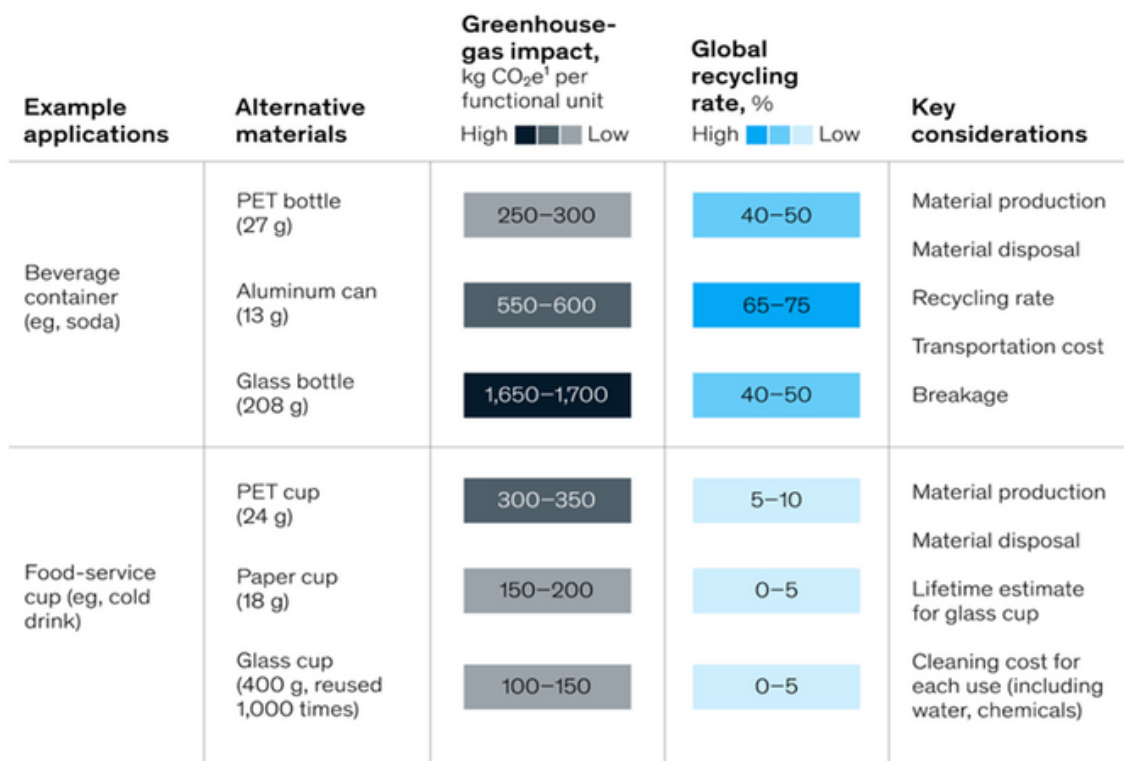
Often, EPR policies for packaging regulate plastic packaging products with the goal of reducing plastic production and usage and increasing recycling rates. While these goals are grounded in concerns around the impacts of plastic pollution, they might fail to consider the tradeoffs when substituting plastics with other materials. If the goal of EPR policies is to encourage producers to move away from plastics and towards more renewable packaging material options, a comparison of the full lifecycle impacts of these materials must be considered. While EPR for packaging policies may achieve a reduction in plastic pollution, there may be other, unintended environmental impacts as a result.

[44] Lam, M. (1970, January 24). 'you can't recycle your way out': California's plastic problem and what we can do about it. KQED. Retrieved April 4, 2022, from <https://www.kqed.org/news/11901288/you-cant-recycle-your-way-out-californias-plastic-problem-and-what-to-do-about-it>

[45] Valentic, S. (2021, March 29). EPR debate heats up as break free from Plastic Pollution Act enters Congress. Waste360. Retrieved April 6, 2022, from <https://www.waste360.com/legislation-regulation/epr-debate-heats-break-free-plastic-pollution-act-enters-congress>

[46] Quinn, M. (2021, March 25). Break free from Plastic Pollution Act reintroduced, plastics industry ramps up opposition. Waste Dive. Retrieved April 7, 2022, from <https://www.wastedive.com/news/break-free-from-plastic-pollution-act-reintroduced/597338/>

McKinsey, a global consulting firm, developed a science-based methodology that makes a connection between waste leakage elimination, circularity, and the carbon impact of packaging by quantifying the entire direct- and indirect-carbon impact from end to end of the packaging value chain. Figure 4. highlights some of McKinsey’s findings for different types of packaging. The data indicates that in some instances, an increase in recyclability might come at the expense of increased greenhouse gas emissions, as is the case when comparing a plastic PET bottle versus glass or aluminum alternatives. If priority is shifted from recyclability and leakage (i.e. pollution) and placed on carbon impact, PET (polyethylene terephthalate) plastic bottles appear to be the more “sustainable” option. To quantify, aluminum cans and glass packaging have two to six times the direct and indirect carbon footprint when compared with PET plastic. [47] This is attributed to carbon-intensive production processes and the impact that the heavier weight of these materials has on transportation.



¹Carbon dioxide equivalent.
Source: Can Manufacturers Institute; EPA WARM; European PET Bottle Platform; Glass Packaging Institute

Figure 3. Performance trade-offs across different packaging materials
Source: McKinsey

This study, and many others like it, underscore the importance of using data to inform policy mandates around packaging. Although society has placed a large focus on reducing the impacts of plastic production and pollution, legislators should take a more nuanced approach when determining sustainable packaging alternatives by exploring material tradeoffs. Incorporating life cycle assessments into the policy development process will allow EPR policy mandates and recommendations to be informed by data that considers a variety of environmental impacts in addition to plastic pollution.

REGRESSIVE IMPACTS

Other opponents have expressed concerns around the potential regressive effects of EPR policies if the costs of producer fees are displaced onto consumers in the form of higher product prices. An increase in product costs for packaged necessities such as groceries would disproportionately impact lower income households given that lower income groups make up the largest percentage of consumers of packaged goods (by absolute percentage). [48] Coupled with inflation, the economic hardships imposed by EPR policy could be quite severe. To evaluate the potential regressive impacts of EPR policy, York University undertook a study to examine how the implementation of packaging fees under might affect consumer purchasing and cost of living using the Maine EPR model. The study analyzed the pricing of a “basket of goods” made up of commonly used packaged products. While the “basket of goods” varied depending on region and income, the university observed increased costs by 4-6% or an additional \$31.94 to \$43.74 per month for the average family of four in Maine. [49] This study demonstrates that even though the goal of extended producer responsibility policy might be for producers to absorb the costs of end-of-life waste management, the reality is that EPR laws may become a form of regressive policy if producers pass these costs to the consumer.

BALANCING STAKEHOLDER INTERESTS

To create a framework for EPR policy that is both equitable and effective, legislators must strike a balance between stakeholder interests by developing policies that carefully weigh the environmental, social, and economic impacts on all stakeholders involved. To do this for packaging-specific policy, legislators should:

[48] Lakhani, C. (n.d.). (rep.). Modeling impact on consumer packaged goods pricing resulting from the adoption of Extended Producer Responsibility for Packaging in Maine (pp. 14–16).
[49] Ibid.

THE ROLE OF EPR IN A PLASTIC FREE FUTURE

Encourage or mandate the internalization of EPR costs by producers so that these costs are not passed onto consumers in the form of higher prices. Internalization of these costs will help drive a transition towards more planet-friendly product design and disposal by motivating producers to find ways to reduce or eliminate the need for these fees. This is perhaps one of the most challenging aspects of creating a successful EPR program as it would require unprecedented government intervention on pricing.

Encourage and reward material innovation by offering modulated fees based on improvements such as increased recyclability, circularity, or composability.

Leverage LCA data during the policy development process to ensure all material tradeoffs are being analyzed and considered when making policy recommendations and mandates around “sustainable” packaging materials.

Outline clear ownership to ensure that responsibility is distributed equitably across the packaging value chain, enabling accountability.

If employed, EPR policies can be a powerful vehicle to drive environmental and social impact, but a nuanced approach must be taken throughout the policy development process to ensure the overarching goals of EPR are successfully met. There is no one-size-fits all application of EPR so policies must be crafted with local and regional contexts in mind. Although the concept of EPR is being increasingly embraced across regions and stakeholder groups, there are still strong areas of opposition. These voices must also be heard, considered, and addressed to ensure that EPR policies are just. Early adopters of EPR such as Maine and Oregon should be studied to better understand and evaluate the factors that contribute to the success or limitations of such policies and used as benchmarks for future EPR policy discussions.