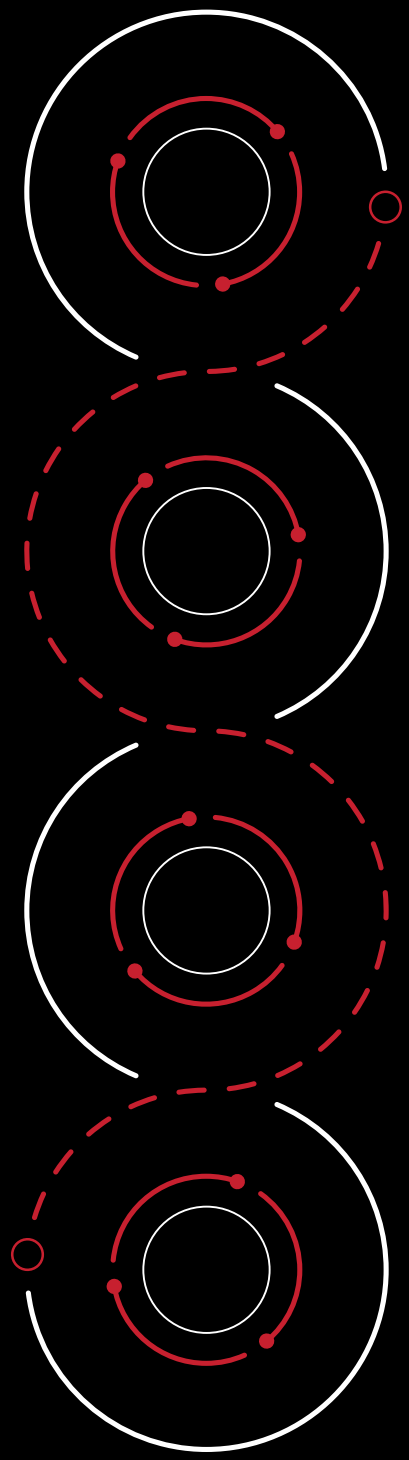
Extended Producer Responsibility (EPR) for Plastics Packaging

Gaps, challenges, and opportunities for policies in the United States



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For more information and the data related to the project, please visit: uh.edu/energy/epr.

01 Executive Summary

Extended Producer Responsibility (EPR) is a policy tool that assigns the responsibility to producers for managing the end-of-life impacts of the products they bring to market, encouraging innovation in sustainable product design and promoting a circular economy. Although EPR frameworks for packaging have existed in many regions of the world since the 1990s, progress in the U.S. has been slow and fragmented. It is only now that more states in the U.S. are adopting EPR policies for packaging. This white paper explores the gaps in the design and implementation of these policies and identifies best practices. We focus on plastics packaging, which remains a challenging material to reintroduce into the circular economy due to the complexity of sorting, multilayer design, and contamination challenges in the waste stream.

A comparative analysis of EPR policies for plastics packaging across different jurisdictions—including EU directives and specific policies of selected member states, Canada, the UK, and select U.S. states—highlighted similarities, differences, lessons learned in mature policy environments, and strategies for business implementation by producers operating in these markets. Using the data, we conducted interviews with stakeholders, including producers, brand owners, manufacturers, waste management service providers, recyclers, Producer Responsibility Organizations (PROs) representing niche industries, and trade associations to understand their perspectives on the regulatory, governance, business implementation, market adoption, and public awareness and buy-in challenges for EPR policies. The interviews were conducted under the Chatham House Rule, and the discussions were synthesized into this white paper.

We find that EPR is recognized as crucial for responsible end-of-life handling of waste. However, fragmented policy adoption and a lack of harmonization across states have led to differences in compliance requirements, reporting standards, and technology adoption across jurisdictions, creating a challenging business environment for producers. The absence of technology-neutral policies and the general lack of reliable oversight and transparency in policy implementation have further complicated the EPR landscape. Adding to these issues is the lack of clarity about who is considered a “producer”. While most EPR policies target brand owners, some states extend responsibility to manufacturers, importers, distributors, or even e-commerce platforms, creating confusion about compliance obligations and increasing risks of under-reporting, over-reporting, delays, and legal challenges. Infrastructure limitations further hinder policy implementation, mainly due to insufficient investment in recovery, sorting, and recycling systems, which

restrict the ability to manage growing waste streams effectively and at the necessary scale. Ongoing data and transparency issues stem from a lack of harmonization, inconsistent reporting requirements, and limited benchmarking, leading to poor traceability, reduced stakeholder and public trust, and difficulty in accurately evaluating system performance. Additionally, market barriers and ensuring consumer affordability worsen these challenges, as weak demand for recycled content and unclear cost allocation discourage innovation. Finally, low public awareness, combined with confusing curbside collection systems and limited consumer engagement, diminishes policy impact and slows progress toward the EPR goals.

EPR policies for plastics packaging in most of the U.S. are at a formative stage, where initial fragmented state policies risk long-term progress toward a circular economy. Worldwide, even mature EPR systems continue to face many of the challenges; however, policy reforms based on lessons learned have helped those systems adapt and evolve. The momentum for EPR policy adoption in the U.S., along with the early stage of implementation for the adopted legislation, provides an opportunity to align policies on transparency, scientific standards, and best practices. Stakeholder-informed frameworks that lower costs, meet consumer needs, and draw lessons from both the experiences of states in the U.S. and best practices from other countries are unique opportunities.

Refining the definition of 'producer' and tailoring EPR policies and frameworks to sector-specific needs, allowing for better compliance and reporting, is a first step. Identifying exemptions for niche products that are unsuited to a one-size-fits-all approach is crucial. Infrastructure limitations can be addressed by driving large-scale investment in modern recycling infrastructure, alternative recovery pathways, and workforce development, supported by transparent reinvestment of EPR revenues and strengthened public–private partnerships. Formulating a system based on transparency, traceability, and accountability, and thereby harmonizing reporting standards across states, is an opportunity. Further, establishing interoperable data systems, supporting small- and mid-sized businesses to upgrade digital infrastructure, and ensuring that quasi-regulatory authorities operate with clear guidelines and open data sharing and management practices are important. The breadth of technologies for recycling considered in current EPR policies needs to be expanded beyond waste recovery to include removal and valorization. Market challenges can be addressed by simultaneously harmonizing reporting and fee structures across states to reduce duplication and improve compliance. This will create meaningful cost allocations, stronger market signals, and responsible end markets supported by certification and verification. It will also expand demand for post-consumer recycled content while reducing stigma around product quality. Building public trust and engagement requires long-term, strategic education campaigns as well as outreach efforts that use accessible tools and are customized for different communities. At the same time, investing in workforce training across the value chain and upskilling of talent is essential for the scaling of recycling systems.

02 Introduction

Extended Producer Responsibility (EPR) policies are a critical tool for supporting a circular economy and fostering environmental responsibility throughout a product's lifecycle.[1] In their current form and scope, EPR policies and legislation were first adopted in the EU through the Packaging and Packaging Waste Directive of 1994.[2] In the U.S., EPR policies led by states, predominantly directed at batteries and battery recycling, were adopted starting in 1991. The scope, design, and requirements of the policies have expanded over time to address electronics, paints, mattresses, mercury thermostats, batteries, pharmaceuticals, and fluorescent lighting.[3] Prior to these, federal legislation, as outlined in the Resource Conservation and Recovery Act of 1976 (RCRA), set national standards for waste management, enabled recycling markets, and federal procurement of recycled products, while supporting state programs through funding and technical assistance from the U.S. Environmental Protection Agency (EPA).[4] However, in 1992, an attempt to add EPR provisions for packaging to RCRA failed, stalling federal-level efforts to advance EPR.

Now, three decades later, some U.S. states have introduced bills to address EPR for paper and plastic packaging. So far, only seven states—California, Colorado, Maine, Maryland, Minnesota, Oregon, and Washington—have adopted statutory obligations for EPR for plastics packaging in the U.S.[5] Ten other states—Connecticut, Hawaii, Illinois, Massachusetts, Nebraska, New Jersey, New York, North Carolina, Rhode Island, and Tennessee—have proposed legislation for EPR for plastics packaging as of August 2025. Moreover, in June 2025, bipartisan sponsors introduced HB 4109, the Recycling and Composting Accountability Act, which would direct the EPA to assess the state of U.S. recycling and composting programs to identify opportunities for improvement.[6] The bill has been referred to the House Committee on Energy and Commerce, and it aims to build on plans previously outlined by the U.S. EPA in the National Recycling Strategy and the National Framework for Advancing the U.S. Recycling System.[7, 8]

Measurable progress on EPR is likely to remain stalled without coordination between policymakers, regulatory bodies, including Producer Responsibility Organizations (PROs), and other stakeholders in the waste management value chain, on understanding the complex nature of the challenges. Furthermore, EPR policies must understand and account for the technology, business, and societal solutions available to address the challenge at scale. In addition to the traditional stakeholders, many community-based organizations, non-profit organizations, trade unions, and environmental organizations, while outside the EPR value chain, can offer valuable expertise to debottleneck some of the societal challenges for EPR.

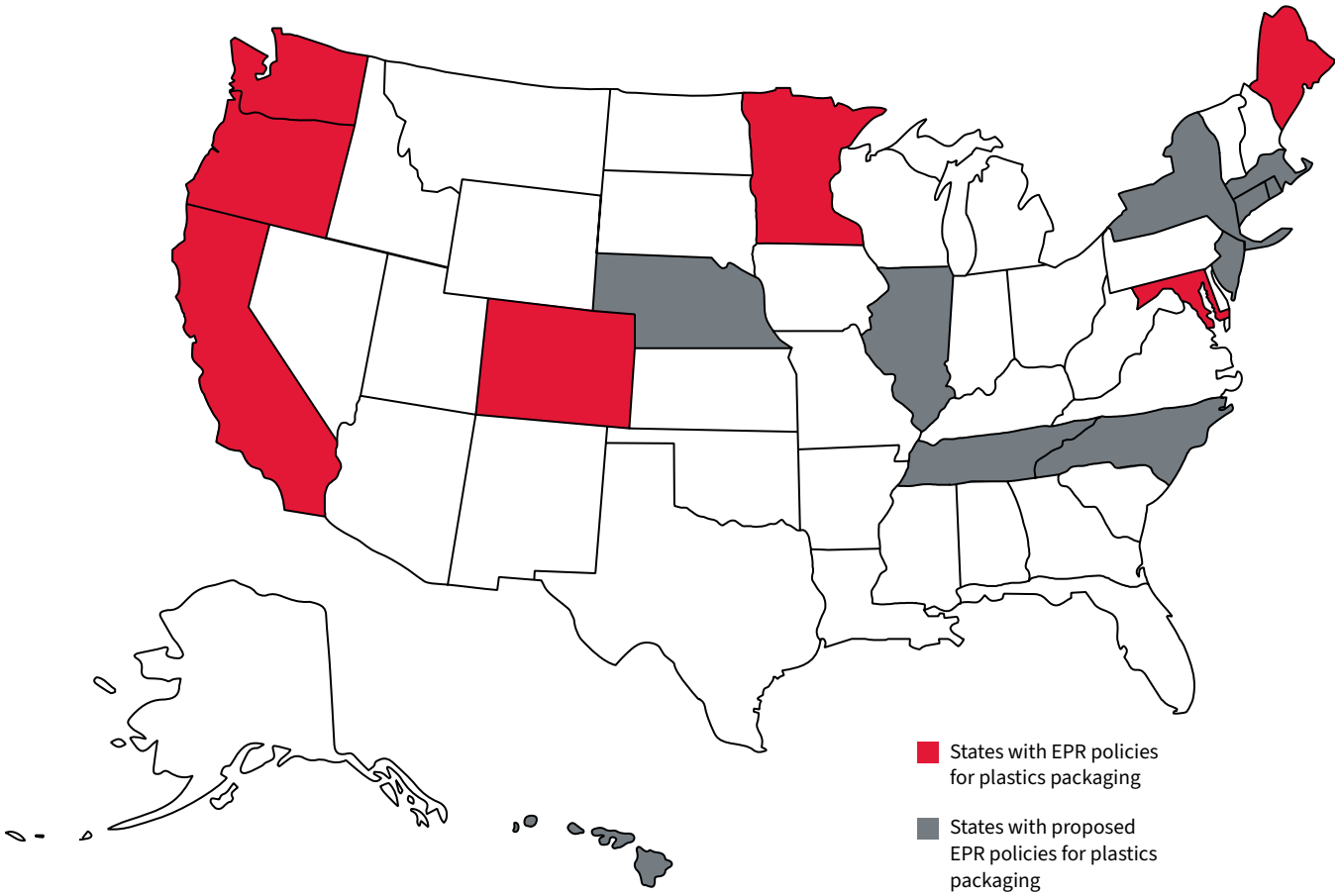


Figure 1. States that have implemented or proposed EPR policies for plastics packaging as of August 2025.

We have identified the following key gaps along the EPR value chain for plastics packaging, specifically in policy design, adoption, implementation, and stakeholder participation, through our analysis and interviews with industry and policy experts. These include regulatory, governance, business implementation, market adoption, and public awareness and buy-in challenges. At the same time, these factors can serve as opportunities for rethinking and reforming both established and nascent EPR policies and programs for plastics packaging in the U.S.

03 Regulatory, Governance, and Policy Challenges

3.1 **Fragmented policy frameworks**

3.2 **Mismatch between place-based adoption vs regional and global compliance requirements**

3.3 **Ambiguous definition of producers and their responsibilities**

3.1 **Fragmented policy frameworks**

Wide variations in EPR requirements across countries, including EU member states, Canada, and a handful of U.S. states, have led to confusion for producers, especially those operating in multiple international markets. While the fragmentation of policy frameworks is expected due to the decentralized nature of waste management implementation at local levels across various countries and jurisdictions, the resulting lack of harmonized policy is evident through business practices. For example, a producer in the EU is subject to a base EPR fee that is determined by factors such as material weight, the choice of material, and the recyclability factor of the material. In the UK, the base fee is calculated based on the producer's share of packaging waste management costs for the total packaging placed on the market.

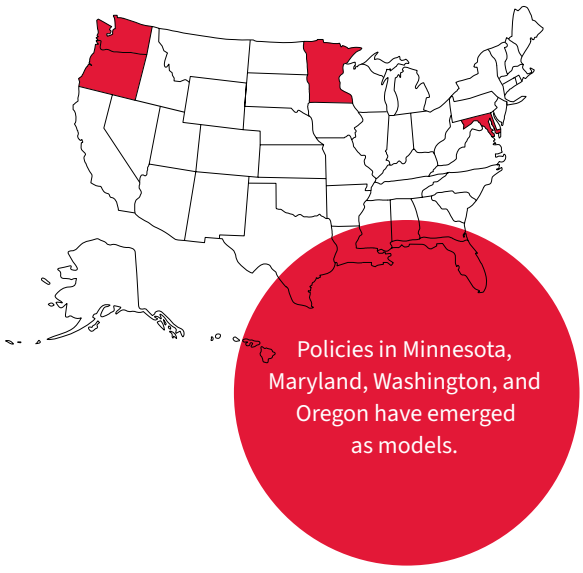
Even within the EU, discrepancies across national frameworks among member states create policy externalities, such as when a jurisdiction imports products produced in another, and the products reach their end of life there. Some member states, such as Germany and Austria, have competitive PROs, while others, like the Netherlands, have a single mandated organization; this affects market dynamics, fee structures, and the adoption of innovative technology differently. For example, the eco-modulated fees in France are based on the recyclability of the packaging, the quantity of individual components, and the clarity and completeness of information provided on the labeling, while in Germany, the fees are determined by recyclability, recycled content, and the outcomes of the compliance checks conducted by PROs. The differences in how fees are calculated and the multi-PRO system in both member states lead to a confusing and sometimes punitive policy environment for those operating in multiple markets. Similarly, in Canada, different provinces use varying definitions for recovery rates. The definition is based on the ratios of either recycled or collected waste volumes to either generated waste volumes or market supply.

> The demand and appetite for pragmatic and data-driven EPR policies are growing.

In the U.S., the lack of federal oversight and policy coordination, with states developing individual state-based EPR programs, leads to cross-state variability in EPR policies. Cross-state variability across the seven U.S. states that have adopted EPR policies for packaging has so far resulted in a confusing and unjustly punitive policy environment for producers, which may lead to non-compliance or underperformance, particularly for those operating in multiple markets. Additionally, there is no uniform definition of what recycling is or of recycled content across the states that have adopted EPR policies, which has created an environment of confusing and competing views.

Evidence from Expert Interviews

- Overall, cross-state variability in policies is expected to remain, as waste management is a local issue, and given the vertical division of power from federalism in the U.S. However, as more states adopt EPR policies in the future and impacts to business and consumers are felt across the U.S., it would be desirable for federal agencies like the EPA and/or the Federal Trade Commission (FTC) to provide direction, oversight, and guardrails.
- Policies in Minnesota, Maryland, Washington, and Oregon have emerged as models that have followed a needs-based, data-driven approach. For example, Oregon's policies include investment tracks that outline the best ways to integrate recyclable materials into the system and are not solely focused on achieving high recyclability. Similarly, California and Maine have reoriented their implementation of policy to reduce cost burdens for all stakeholders.
- While there is uncertainty about how these policies will impact packaging decisions, recyclability and cost modulation are expected to become more influential in the future.
- The fragmented approach creates uncertainty for producers and overlooks niche sectors, such as lubricants or refrigerants, which face unique recycling obstacles. Additionally, it presents B2C businesses with extra compliance hurdles and revenue losses compared to B2B businesses.



Opportunities for Action

- EPR policies now cover approximately 25% of the U.S. GDP across seven states, with California being the most significant market. While implementation is still in the early stages and none of the adopted policies have begun collection yet, there is a demand and appetite for pragmatic, data-driven policies.
- Even if policies are theoretically designed to increase efficiency, fairness, growth, and further societal goals, they often ultimately result in the costs being shifted to the consumers in some form. Therefore, policies must be based on comprehensive, methodologically sound, and transparent needs assessments that include cost–benefit analyses and highlight both upfront and downstream costs for all stakeholders. Most current policies do not consider customer needs, and integrating these needs into cost decisions, policy design, choices, outputs, and implementation will reveal the true impact on U.S. markets. After conducting cost and needs assessments, EPR frameworks will require financial motivation. The OECD's discussion of key principles regarding EPR emphasizes that these policies need a transparent process of collaboration and open sharing among key stakeholders throughout the entire value chain, along with establishing targets based on cost–benefit assessments and stakeholder consultation.[9]
- The policies must also focus on a singular goal of diverting materials from landfills and incineration towards valorized, circular, and sustainable goods. Any policy elements that expand beyond this core objective will further complicate the EPR landscape and ultimately increase costs that may be passed down to the public.
- Drawing lessons from Canada, which separates sectors like tires, carpets, paints, and chemicals from other packaging waste, can be beneficial for niche segments.
- Despite the current differences in state-level policies, the early stage of EPR policy adoption and diffusion in the U.S. offers an opportunity to assess how greater alignment can be achieved by sharing data and identifying best practices from the policy experiences gained across these states and other jurisdictions that have adopted these policies.
- The governance bodies responsible for EPR policy development and adoption must comprise a diverse set of knowledgeable stakeholders, solicit input from independent, non-advocacy groups, and be grounded in scientific, evidence-based knowledge.

3.2 **Mismatch between place-based adoption vs regional and global compliance requirements**

While geopolitical and trade pressures may lead to the adoption of EPR policies, as recently observed in Switzerland in response to EU regulations, achieving global alignment is challenging, as countries are driven by their own interests and economic competitiveness. The fragmented approach to EPR policy design, adoption, implementation, and compliance, as well as the systemic inertia within and across jurisdictions, has led to resistance from many stakeholders. Additionally, the political pressure to deliver policies at the lowest cost to the public, especially since the adoption of the National Sword Policy in China,[10] which restricted end-of-life markets for plastics, paper, and other mixed recyclables, has been compounded by the lack of public education and awareness about how EPR policies work.

Policy harmonization across states and integrated implementation strategies will be crucial for the success of EPR in the U.S.

Evidence from Expert Interviews

- Some stakeholders expressed concern over the lack of phased implementation and the burden of assessing applicability, obligations, and exemptions under different state policy regimes, with preferential policy treatment being extended to some industry segments and interest groups. One way this has been addressed in Colorado is by having multiple PROs. Petroleum and automotive brands in the state are being represented through an Individual Producer Plan (IPP) from the Lubricant Packaging Management Association (LPMA) in addition to the Circular Action Alliance (CAA). However, the Colorado Department of Public Health and Environment has not yet provided guidance on addressing potential overlaps between the two entities.[11]

- The popular misconception that EPR allocates costs to packaging is incorrect and needs to be rectified. The plastics product and plastics waste value chains are complex and involve many stakeholders, including consumers and government agencies. It is crucial to acknowledge that consumers are ultimately the ones who will likely bear the costs of EPR policies.

- Small- and medium-sized businesses are concerned about maintaining competitiveness and preventing job losses due to higher production costs and consumer prices.

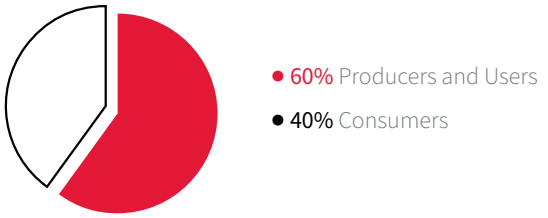
- The EU has adopted a centralized, top-down approach, issuing ambitious yet often challenging-to-implement directives that rely on both governance structures and individual citizen behavior. In contrast, the UK's system is more closely aligned with that of the U.S., with less jurisdictional complexity and variability. Lastly, provinces in Canada function much like independent countries, enabling needs-based implementation within each jurisdiction, but also focusing on cohesiveness and harmonization across provinces.

Opportunities for Action

- Stakeholders must focus on cross-sectoral and cross-industry collaborations. Comprehensive policies that support long-term design innovation and cost savings across the value chain must be prioritized.

- Policy harmonization will be crucial for the U.S., as waste management policies are typically implemented at the state and local levels. A top-down approach, such as the EU's, may not be feasible or effective in the U.S. At the same time, a bottom-up approach will be hindered if U.S. states continue to adopt policies that are not based on real policy needs or choose arbitrary policy elements merely to distinguish themselves from one another.

Survey[14]: Who should pay for collecting, sorting, and recycling plastics?



- Misinformation and a lack of public awareness must be addressed through strategic public education and awareness efforts for all stakeholders. The lack of a national directive, federal oversight, and differences in state policies will present a challenge for streamlining public awareness campaigns across states. This further underscores the need for harmonization across state policies. In 2023, the U.S. EPA announced 25 awardees who received $33 million in Recycling Education and Outreach (REO) grants to address consumer confusion.[12] A second round of funding for the grant was confirmed to be on track for disbursement in late 2025, following uncertainty over the grant program's future.[13]

- In this context, specifically addressing public awareness about who bears the cost of EPR is crucial. While public opinion in the U.S. shows that a majority of survey respondents believe that producers of plastic materials and users of plastic should pay for collecting, sorting, and recycling plastics, only 40% believe that consumers should pay. Additionally, support for new fees or taxes on plastic consumption is significantly lower than support for incentives such as using reusable bags or a nationwide container-refund program. This suggests that consumers may not fully understand or be willing to pay higher prices for the policies they support.[14]

- The creation of Alternative Collection Programs (ACPs) for industry groups that represent niche industry segments can lead to better representation and collaboration among all stakeholders, without providing preferential status to any group. For example, in Maine, ACPs enable producers of covered materials to establish their own collection and processing programs, provided the Department of Environmental Protection approves them. Such producers are not obligated to pay fees for the state's programs. Furthermore, in addition to exploring ACPs in Colorado, LPMA is also discussing alternatives in Oregon with the Department of Environmental Quality. In 2025, some members of the LPMA were exempt from obligations for high-density polyethylene (HDPE) materials.[15]

- More broadly, policymakers must seek to address the responsible end-of-life handling of waste at the lowest cost to society through technology-neutral, market-based EPR policies.

3.3 **Ambiguous definition of producers and their responsibilities**

EPR policies and programs typically define a "producer" as the entity that places the product into the market.[1] However, this definition is not consistently followed across jurisdictions, leading to ambiguity about assigning responsibility, understanding obligations, and measurement, reporting, and compliance by the producer. For example, while most EPR policies adopted by U.S. states are targeted at producers or brand owners, some states, such as Oregon and Maryland, also include manufacturers, licensees, importers, and distributors at physical locations and e-commerce platforms as responsible for EPR costs. These differences result in confusion about who must register and comply with the obligations, under-reporting or over-reporting by multiple actors, delays in compliance, statutory risks, and challenges for contracts and collaborations along the value chain. In its recent update to EPR policies, California attempted to broaden the definition of the consumer, rather than the producer, to be the end user of an item, or the last in the supply chain to acquire and use an item. However, this definition has created confusion for the obligations of retailers and distributors when they use materials covered by the legislation for their operations, which are not directly sold to consumers.

Refining the definition of "producer" and tailoring EPR policies and frameworks to sector-specific needs is a first step.

Evidence from Expert Interviews

- EPR regulations are a welcome measure for all industry stakeholders, but rushed implementation across states, without adequate need-based assessments and the lack of federal guidance, has led to a challenging and punitive environment for many stakeholders.
- Delineating the responsibilities of the 'brand owner' will bring clarity to the industry. The responsibilities of value chain actors who produce and manufacture goods outside the U.S., as well as importers, retailers, and distributors who sell those goods domestically, including on e-commerce platforms, must also be specified and streamlined across states.

Opportunities for Action

- The definition of a producer must be refined to distinguish them from manufacturers, brand owners, importers, retailers, and distributors along the value chain, clarifying regulatory expectations and ensuring effective compliance.
- Existing policies should be revised, and new policies should be developed to address the varying needs of different product segments, while accounting for their unique needs, uses, processes, and markets.
- For niche market segments, broad policies can create operational challenges. For instance, lubricants are naturally designed for recycling, and decades of advancements in safety requirements and innovations have established current best practices in their design. As a result, these segments should have access to special status and scientifically supported producer requirements, as has been done in Canada. Such products should be exempt from treatment under a one-size-fits-all product approach and be managed similarly to personal care products, farming materials, and medical waste, which are exempt from broad EPR policies due to biosafety concerns. In 2024, stakeholders representing medicine, medical, and healthcare devices successfully requested an exemption for their packaging under Maine's proposed EPR policies, citing patient safety, federal oversight, and regulatory duplication.[16]

04 Implementation Challenges

4.1 **Lack of infrastructure**

4.2 **Lack of data, traceability, and transparency**

4.3 **Roadblocks for advanced recycling technologies**

4.1 **Lack of infrastructure**

The primary motivation for adopting and implementing EPR policies was to address infrastructure challenges. However, the system has become excessively complex to navigate with its many producer cost obligations in the current policy landscape. Adding design limitations on top of that can prove to be prohibitive for innovation. Effective EPR requires significant upfront planning and investments in collection, sorting, and recycling infrastructure, and most policies in the U.S. have been implemented without sufficient attention to local infrastructural needs. As a result, stakeholders in states with these policies face mounting logistical, implementation, and punitive barriers, along with the risk of improper disposal and low material recovery throughout the value chain. In this context, inadequate infrastructure includes underfunded and poorly implemented collection systems, insufficient sorting and processing facilities, limited recycling and upcycling capacity, outdated technology, and a lack of equipment capable of handling various materials. For instance, even though California's EPR policies were adopted in 2022, the SB54 Advisory Board continues to highlight the lack of infrastructure as a significant bottleneck, highlighting the lack of investment, consumer access, public awareness, limited collaboration between local governments, and the overreliance on downstream recycling as contributing factors that need to be addressed.[17] Material Recovery Facilities (MRFs) in California are now facing labor expenses for adding sorters and capital costs for new equipment. Additionally, there is a need for physical space for the latest equipment. The SB54 Advisory Board has highlighted that each of these factors has resulted in increased operating expenses for new equipment and technology, as well as additional personnel.

> Strengthened public–private partnerships can help align resources and incentives without overburdening specific groups of stakeholders.

Evidence from Expert Interviews

- Due to the lack of infrastructure, current collection, recycling, and waste disposal efforts are strategically focused on targeting high-return, low-risk materials, such as PET bottles and HDPE milk jugs.
- Upgrading infrastructure is crucial for meeting circular economy targets and must be complemented by innovation and adaptable packaging design.
- Curbside collection is often ineffective for specific materials, such as lubricant packaging or the caps of toothpaste tubes, which require alternative recovery solutions. The disparate nature and relevance of these products underscore the limitations of a one-size-fits-all approach.
- Anticipated investments in response to the EPR policies implemented in the U.S. so far are likely to focus primarily on modernizing MRFs, expanding curbside collection programs, and incorporating advanced technologies such as optical sorting coupled with artificial intelligence (AI).
- Given the lack of infrastructure and the wide range of products that are subject to legal obligations, some stakeholders worry that states may also be using the fines from hard-to-recycle or currently unrecyclable materials to continue funding their ongoing municipal recycling programs, support partisan narratives, and avoid raising taxes, ultimately leading to some segments being labeled as polluters, environmentally irresponsible, and resistant to change. Since none of the programs have officially begun collection and recycling under the new EPR regimes, it is challenging to quantify what share of the fees will be directed towards existing recycling programs vs infrastructural upgrades and new programs at this stage.

Curbside collection is often ineffective for specific materials, such as lubricant packaging or the caps of toothpaste tubes.

Opportunities for Action

- Forward-looking and at-scale investments are urgently needed to expand and modernize MRFs, incorporate AI and optical sorting, and build capacity for handling harder-to-recycle materials, undertake infrastructural expansions, and provide workforce development and training opportunities to enhance human capacity.
- Investment must also be made to research, develop, and deploy alternative recovery pathways for niche products that curbside collection cannot handle effectively. This will also incentivize producers to design adaptable, modular, and recyclable packaging that reduces downstream strain on infrastructure and revenue streams, potentially leading to improved regional collaboration across states to harmonize investments, reduce duplication, and achieve economies of scale.
- Public–private partnerships must be strengthened to enable producers, PROs, municipalities, and technology providers to collaborate and align resources and incentives without overly burdening specific parts of the infrastructure or certain stakeholders. It must be ensured that any revenues collected from penalties and fines are reinvested transparently into infrastructure upgrades and R&D rather than being directed to municipal operating budgets. d in the U.S. so far are likely to focus primarily on modernizing MRFs, expanding curbside collection programs, and incorporating advanced technologies such as optical sorting coupled with artificial intelligence (AI).
- Similar to the REO grants, the U.S. EPA announced 59 awardees who received a total of $60 million in Solid Waste Infrastructure for Recycling (SWIFR) grants in 2023 to address outdated recycling infrastructure.[14] Another round of fund disbursement is confirmed for late 2025, following some uncertainty about the program's future earlier in the year.[15]

4.2 **Lack of data, traceability, and transparency**

With fragmented and incompatible policy regimes, EPR frameworks face challenges stemming from the lack of unified data measurement, collection, reporting, and verification. Many small- and mid-sized businesses rely on manual data collection processes and lack the resources to transition to more sophisticated data collection methods. For instance, in California, the data on store drop-off is not consistently included in datasets and has therefore not been accurately integrated in the assessment of material recovery rates so far.[17] These data and infrastructure limitations may also extend to regulatory and government stakeholders responsible for coordinating data collection and reporting. This might have downstream effects on verification, auditing, public disclosure, and data sharing, leading to a lack of public trust. EPR frameworks are also hindered by a lack of transparency in the methodologies used to determine EPR fees, making them appear arbitrary or borrowed from other jurisdictions without a needs-based assessment that addresses local policy demand, leading to a lack of producer trust. In some cases, data challenges and a lack of traceability and transparency can result in free riding and double counting, thereby limiting program evaluation and subsequent policy changes.

Interoperable data registries can serve as a shareable resource amongst stakeholders across jurisdictions.

Evidence from Expert Interviews

- With each state developing its own reporting system, EPR in the U.S. could have incompatible datasets, which will prevent performance comparison across jurisdictions when collection begins in states. Even for companies without an international footprint, domestic operations across multiple states will be challenged by compliance requirements with different formats, deadlines, fee structures, and incentive criteria. Without a central register like the EU's, it is also more challenging to track producers across jurisdictions, identify free-riders, or evaluate overall progress. The disaggregated nature of these systems creates gaps across the value chain, undermines trust among producers and the public, and makes it difficult to assess the effectiveness of EPR programs.
- The provision of quasi-regulatory authority to some stakeholders in some states has signaled the early selection of winners and losers without disclosure of the rationale or provision of supporting data or methodology for these policy choices.

More straightforward processes are crucial to enhance traceability, transparency, and accountability.

Opportunities for Action

- Harmonizing reporting standards across states would reduce fragmentation, lead to improved compliance, and enable meaningful performance comparisons for EPR frameworks, helping to identify policy lessons and scalable best practices.
- If a centralized data management system is infeasible (especially without greater federal oversight), an interoperable data registry can serve as a shareable resource among all stakeholders and jurisdictions.
- Small- and mid-sized businesses must be supported in transitioning away from manual data collection processes. This requires investing in digital infrastructure, providing technical assistance, and building capacity.
- The calculations of EPR fees and incentives should be based on locally relevant, needs-based assessments rather than arbitrary formulae or those borrowed from other countries without adjustments for the U.S. context.
- More straightforward guidelines and processes for verification, auditing, and disclosure are crucial to enhance traceability, transparency, and accountability.
- Quasi-regulatory authorities must operate with transparent methodologies and open data to avoid perceptions of arbitrary decision-making. Concurrently, the Circular Action Alliance (CAA), which is the first non-profit PRO in the U.S. operating in multiple states, maintains that there has been confusion regarding the roles of policymakers, regulators, and the CAA, and that they are not responsible for policy design or enforcement. Instead, their role is to help producers comply with the regulations by providing services such as registration, reporting, and fee collection.[18]
- In 2022, a 21-month pilot program in Atlanta, Georgia, was conducted by the National Lubricant Container Recycling Coalition (NLCRC).[19] The results highlighted that a combination of collection centers, including auto service centers, community centers, and retail stores, was most effective in driving collection and recycling rates. The coordination between entities at each of these locations, and waste haulers and recyclers, allowed customers flexibility and easily accessible locations for participation in the program. The success of the program offered actionable insights for replication and scaling in other locations, especially in cities that are similar in demographics and market dynamics.

4.3 **Roadblocks for advanced recycling technologies**

Although advanced recycling is not prohibited outright in the policies adopted so far, it has faced regulatory and cost hurdles in some states, while others have unintentionally disincentivized its adoption at a commercial scale. Other states, such as Massachusetts, Vermont, and Rhode Island, have considered outright bans, citing concerns for public health and safety. This has further fragmented the policy landscape for EPR in the U.S. Some of these concerns have now been escalated to legal challenges as California's attorney general and environmental groups sued ExxonMobil for misleading the public about its advanced recycling efforts, while the company responded with a countersuit in Texas, asserting that the case unfairly attacks its technology and the company's workforce.

In Washington, proposed legislation aims to address post-consumer recycled content requirements for plastics and regulate 'alternative recycling processes' that do not rely on mechanical means. However, the bills exclude combustion, fuel production, or any form of waste-to-energy conversion processes.[20]

Plastics and plastic waste streams are complex; expanded recycling options must be considered in scalable technologies, without which, consumers are likely to bear the responsibility and costs of EPR policies.

Evidence from Expert Interviews

- Many believe that the opposition to advanced recycling is based on unscientific claims of high toxins, high emissions, higher energy intensity, or arises from NIMBYism.
- Curbside recycling cannot be scaled without advanced recycling methods. It is an imperative technology for the future of EPR and, more broadly, a circular economy.

Dedicated funding must be provided for R&D to support and develop safer processes that can be harmonized across jurisdictions.

Opportunities for Action

- Benchmarking studies are needed to guide the scope of waste reduction in plastic packaging. These benchmarks require consideration of feedstocks that can be treated, final product streams that can be obtained, and current challenges and bottlenecks for each technology, with special emphasis on the scalability of the systems.
- States must adopt clear, consistent definitions of advanced recycling to reduce regulatory uncertainty and avoid conflating waste-to-energy or incineration with recycling. Additionally, any legislation should be based on scientific and standardized mass-balance principles. At the same time, the adoption of such a policy will require stronger oversight and independent scientific assessments.
- The popular belief that EPR allocates costs to packaging is false and needs to be rectified. The plastics product and plastics waste value chains are complex and involve many stakeholders, including consumers and government agencies. It is crucial to acknowledge that consumers are ultimately the ones who will likely bear the costs of EPR policies.
- Public health and environmental impacts in communities must be central to these developments, with mandatory community input, health impact assessments, and permit reviews to prevent further burdening marginalized communities where these facilities are often located.
- Dialogue and collaboration among all industry, regulators, environmental stakeholders, and impacted or likely to be impacted communities is necessary for technology innovation and adoption, identifying policy best practices, and avoiding unintended consequences.
- Dedicated funding must be provided for R&D to support scaling innovative technologies, improving efficiency, and developing safer, lower-emission processes that can be harmonized across jurisdictions.
- Life cycle analyses that take the variety of recycling processes, product and emissions allocations, product displacement, and the associated cost models into account need to be conducted.
- Preselecting and predetermining technology winners and losers must be avoided to widen the scope of recycling with benchmarked technologies for place-based, population-based, and investment-focused choices.

05 Market Challenges

5.1 **Cost and burden allocation**

5.2 **Enabling responsible end-use and markets**

5.1 **Cost and burden allocation**

As highlighted in previous sections, the EPR landscape in the U.S. is further complicated by fragmented and developing policies, resulting in administrative, business, and societal complexity and uncertainty. With each state setting its own rules and aiming for a unique thumbprint on EPR policies, producers lack a standardized baseline for estimating costs and are forced to calculate obligations by jurisdiction, resulting in duplication and a higher risk of error. As policies are still being developed, regulatory obligations and fee structures may shift during implementation, which makes it even more challenging to predict long-term financial risks and exposure, and strategize on product innovation and design.

Aligning EPR policies with customer and market needs will improve cost allocation and fine-tune market signals.

Evidence from Expert Interviews

- As highlighted earlier, the current frameworks are not grounded in customer needs, and it is only when cost pressures become more visible and immediate that the distributive effects of the cost and burden allocation will be fully understood.
- Many noted that EPR in the U.S. remains in its early and unsettled stage, with much progress to be made in the near and medium term.

Opportunities for Action

- Harmonizing reporting and fee structures across states would reduce duplication, improve compliance, and provide stakeholders with a unified and more transparent baseline for estimating costs, modeling long-term risks, and making informed decisions about product innovation.
- Aligning EPR frameworks with customer needs will make cost allocations more meaningful and provide stronger market signals to drive innovation and stakeholder engagement.

5.2 **Enabling responsible end-use and markets**

EPR is hindered by persistently low demand for materials made with post-consumer recycled content or stigmas surrounding recycled content, which constrain demand and uptake. While EPR policies have the potential to stimulate demand and strengthen end markets, these markets are still in their early stages of development worldwide. For instance, waste recycling and processing stakeholders, as well as regulators in California, believe that the absence of local end-use markets and infrastructure to enable those markets is a significant challenge. These stakeholders believe that, in addition to not communicating the true cost of recycling to consumers in the state, policymakers have created barriers to siting new infrastructure that could lower costs and enable local as well as proximal end-use markets.[19]

Evidence from Expert Interviews

- Of restorative, regenerative, and recoverable materials, the focus in the adopted policies in the U.S. is on the first two elements. Experts cautioned that intent without implementation is harmful, which is why at-scale implementation will also need to consider recovery.
- At the same time, there is a significant economic opportunity in converting fossil-derived feedstocks into recycled materials; however, this will require policies that level the playing field and support cost-effective pathways.
- Producers need time, investment, and regulatory flexibility to innovate and scale new solutions, without being forced into tradeoffs that undermine packaging quality or result in losing hard-earned gains in design, performance, safety, and consumer appeal.

Opportunities for Action

- Policy must address the need to expand demand for post-consumer recycled content and reduce the stigma around compromised quality. This must be met by robust infrastructure and the explicit integration of recovery into EPR frameworks, which will help build responsible and viable end markets through investment in innovation, R&D, and public–private partnerships.
- A bottom-up, collaborative approach, which utilizes coordinated development, grants, long-term contracts, and a single data reporting system established through local and regional collaboration for new infrastructure, is a prerequisite for a viable and responsible end-use market. States like Maine and California have also considered responsible end market (REM) certification systems through third parties to verify recycled content and ensure transparency and accuracy. In Oregon, the adopted EPR policies have outlined management strategies for responsible end markets. Additionally, standard methodologies for verification have been proposed in the state, and the state plans to consult with PROs, market entities, and trade associations to test the methodologies.[21]

Maine and California have considered responsible end market (REM) certification systems through third parties.

06 Public Education and Awareness, and Buy-in Challenges

6.1 **Understanding the consumer's role and burden and addressing public awareness and education**

6.1 Understanding the consumer's role and burden and addressing public awareness and education

As observed across several EU member states, efforts to increase public awareness have led to greater civic engagement, trust, and participation. A variety of strategies have been adopted, including clearly communicating information about how the EPR system works, why consumers are central stakeholders, and what is expected of them. Similarly, the addition of QR codes as digital product passports for enhanced traceability and for workforce upskilling and training opportunities for administrative staff and employees of waste management organizations has been undertaken. However, there is a significant lack of such education, outreach, and awareness efforts in the U.S., which results in reduced participation, engagement, and buy-in, or even misinformation or policy opposition. This is in spite of the fact that most recently adopted policies require producers to fund public outreach and education as part of their producer responsibility plans. For example, the SB54 Advisory Committee recently highlighted that many Californians misunderstand that all plastics are recyclable and cautioned that when low public awareness is combined with misinformation or misleading recyclability claims, citizens' trust in EPR policies and systems is eroded.[19]

Integrating digital tools to enhance public knowledge and engagement will require tailoring them to consumer demographics and levels of public knowledge and acceptance.

Evidence from Expert Interviews

- Experts repeatedly underscored that public education and awareness about EPR, including among policymakers, are dismal.
- Infrastructural limitations, barriers to access, and the prevailing belief that curbside recycling is ineffective in the U.S. contribute to public dissatisfaction, misinformation, and, in some cases, opposition toward the use of taxpayers' and ratepayers' contributions for EPR.

Public education and awareness must address the basics of how EPR systems work, why consumers are central stakeholders, and their role in EPR.

Opportunities for Action

- Public education and awareness must address the basics of how EPR systems work, why consumers are central stakeholders, and their role in EPR. The responsibilities and costs of outreach and education, including targeted outreach to both consumers and policymakers, must be shared equitably by government and industry stakeholders.
- While public education on environmental and civic responsibility is fundamentally different in the EU and the U.S., tools like QR codes as digital product passports may enhance public knowledge and engagement. However, understanding consumer demographics and disparities in access or level of comfort toward using new technologies will be critical for the success of such digital tools.
- Educational campaigns must be strategic, long-term, and must clearly address information on what can and cannot be recycled, reused, composted, incinerated, and landfilled. Best practices from public awareness for road safety, for example, have highlighted that highly visible multimedia campaigns, with material that can be adopted or translated as per community needs, are the most effective.[22]
- Policymakers and industry stakeholders must also invest in workforce training and upskilling as more states adopt EPR policies and new recycling technologies are commercialized.

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