

Unwrapped: Plastic packaging matters





Contents

Trends

- Packaging sustainability goals adjusted and deferred
- Historical packaging commitments and initiatives

Environmental concerns

- Will supply of recycled plastic meet demand in 2030?

Innovation

- Balancing strength and sustainability
- Advanced recycling progresses despite roadblocks

Legislation

- A new vote in favor for the PPWR
- Extended producer responsibility policies

Trends

Packaging sustainability commitments have evolved significantly over time, shaped by historical proclamations from brands and consumer packaged good (CPG) companies that have encountered barriers such as technological limitations, economic constraints and supply chain disruptions. These commitments have slowed and have begun shifting more toward a reduction in environmental impact. Despite good intentions, many companies have had to adjust their sustainability goals and packaging strategies by shifting the target date of the goals further into the future.



Packaging sustainability goals adjusted and deferred

Many companies are scaling back ESG objectives amid industry challenges. Packaging goals are a common part of these ESG goals and are therefore often among the objectives being adapted

ESG goals revisited

In recent years, many leading companies have set ambitious packaging sustainability goals as part of their broader Environmental, Social and Governance commitments. These goals aimed to address critical issues like plastic waste, resource consumption, and recycling inefficiencies.

But the journey toward achieving these targets has been fraught with challenges, leading to widespread adjustments and the reevaluation of original timelines. For example, in April, Unilever did just that, and reset their ESG packaging goals, among others. This evidences the **industry-wide struggle to meet packaging sustainability goals, address the factors driving these challenges, and reset the strategies moving forward.**

Ambitious beginnings

In the early 2010s, global companies across various sectors, from beverages to fast food, announced bold commitments to reduce their environmental footprint through sustainable packaging.

Key goals included:

- **Recyclability and reusability:** Aiming for 100% of packaging to be recyclable reusable or compostable, typically by 2025 (adopted from Ellen MacArthur)
- **Reduction in virgin plastic:** Significant reduction in the use of virgin plastic, often up to 50% reduction by 2030
- **Increased recycled content:** Incorporating higher percentages of recycled materials into packaging, with common targets around 25% by mid-2020s

These targets were copied across company websites.

Barriers to success

Despite the early optimism, several pervasive challenges have impeded progress:



Technical and material limitations: Developing packaging that is both sustainable and that meets functional requirements has proven complex. High-quality recycled materials can be scarce and costly.



Inconsistent infrastructure: The efficiency and availability of recycling facilities varies widely across regions, making it difficult for global companies to implement uniform solutions.



Economic pressure: The costs associated with sourcing sustainable materials, redesigning packaging materials and equipment, and setting up new supply chains are significant. Economic downturns and fluctuating material costs further complicate these efforts.



Consumer behaviour: Encouraging consumers to adopt sustainable practices such as recycling correctly or using reusable packaging has been progressing slowly. Seattle-based Tailwind Café recently abandoned their re-use model after struggling to make it convenient for customers, despite the city of Seattle encouraging businesses to offer reuse.

Packaging sustainability goals adjusted and deferred

The path toward sustainability is not linear, and will require companies to set achievable goals, increase collaboration, and make important investments in infrastructure

More adjustments and revisions across the industry

Many companies have revised their goals to be more achievable, often extending timelines and focusing on incremental progress. Back in April this year, Unilever announced it would scale down its ESG strategy, cutting down some targets like the reduction of virgin plastics by 50% by 2025 to 30% by 2026, among others. Other companies have followed, and among the changes the most common are:

- **Revised circularity goals:** Many companies have shifted their 100% recyclability targets from 2025 to 2030, acknowledging the need for more time to develop feasible solutions
- **Virgin plastic reduction:** targets for reducing virgin plastic use have been adjusted downward or split into intermediate goals. For instance, a 50% reduction by 2030 might be rephased as 25% by 2025, with a longer-term goal pending
- **Increased emphasis on collaboration:** Recognizing that systemic change requires collective action, companies are increasingly partnering with industry groups, governments, and non-profits to enhance recycling infrastructure and promote sustainable practices
- **Focus on innovation and pilot programs:** Companies are investing in research and development to create new materials and packaging designs. Pilot programs for reusable packaging and alternative materials are being tested in select markets.

The complex journey toward sustainable packaging

The journey toward sustainable packaging is complex and fraught with challenges, leading to industry-wide adjustments of the original goals. While initial targets have proven difficult to meet on time, the ongoing efforts and strategic shifts reflect a deep commitment to packaging sustainability. By making more realistic goals, fostering collaboration, and supporting investment in infrastructure (through EPR fees, for example), the industry continues to make progress, even if the path isn't straightforward.

Broader implications and the path forward

The adjustment of company policies also impacts other parts of the industry:

<i>Systemic change</i>	<i>Consumer engagement</i>	<i>Realism in goal setting</i>
The challenges underscore the need for systemic change, including improvement in global recycling infrastructure, better material technology, and comprehensive policies supporting sustainability	Successful implementation of sustainable packaging also hinges on changing consumer behavior. Companies are increasingly focused on education and incentives to promote responsible consumption and disposal practices	Initial targets, while ambitious, may have been overly optimistic. Companies are now balancing ambition with realism, setting achievable intermediate milestones while maintaining long-term vision

Historical packaging commitments and initiatives

Packaging sustainability is commonly included in companies' ESG pledges. The promises include topics like reduction of virgin materials, a switch to more sustainable materials, and collaboration schemes with recyclers

Promises of more sustainable packaging

The number of commitments related to packaging sustainability by leading companies in the food and beverage sector have grown since 2014, although growth now seems to be slowing.

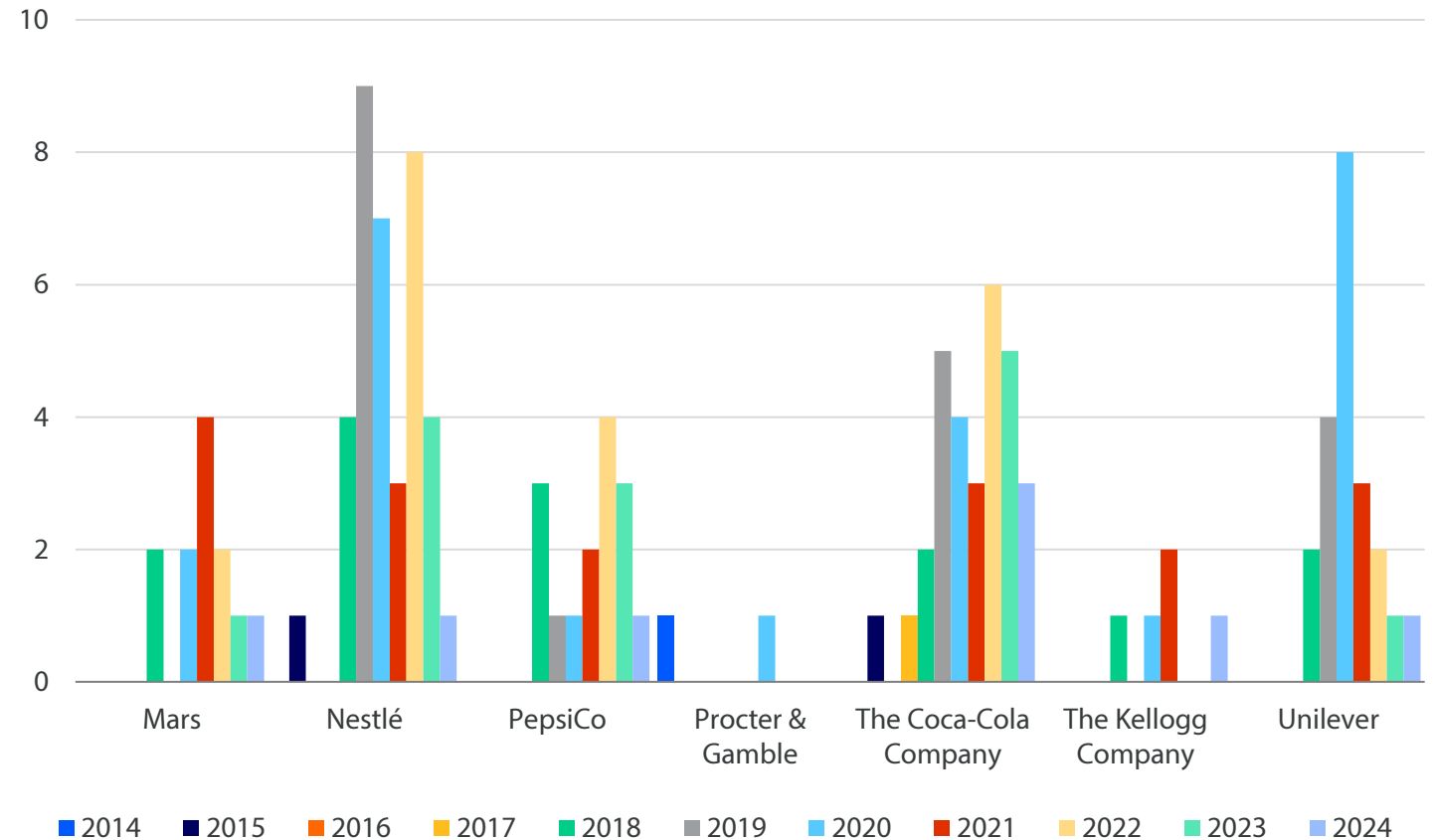
Plastic packaging is a common topic in these commitments, with the most common goals being:

- Reduction in the use of virgin materials
- Increase in use of recycled materials
- Commitment to make packaging recyclable
- Material substitution, commonly from flexible plastic/metal packaging to paper-based packaging
- Adoption of biobased materials and an increase in biodegradable and compostable packaging

As part of their ESG goals, companies also tend to become members or signatories of circular packaging associations and sustainable packaging pacts.

Even with the adjustment and derogation of the commitments, plastic will continue to be a major focus of companies trying to increase the sustainability of their packaging.

New packaging commitments and initiatives per company per year



Environmental concerns

Environmental concerns, further fueled by corporate pledges and impending state regulation in the US, are driving a rising demand for recycled plastic.

Meanwhile, Europe has taken a more unified approach, with the European Union enacting stringent regulations to ensure widespread use of recycled plastic across member states. This section delves into the contrasting regulatory landscapes and examines how these pressures are reshaping the plastics industry.



Rising demand for recycled plastic

Demand for recycled polymers is set to grow in the US and the EU, driven by more focus on circularity, company pledges, and stricter regulation. The growth in demand in the US will be mainly driven by company commitments

One goal, two stories: Recycled content in the US and the EU

Recycling and the use of recycled content in plastic packaging have been common topics around sustainability in plastic packaging in the US and the European Union. Demand for recycled content has grown in both regions and is expected to continue to do so in the coming years. This growth is mainly driven by state regulation and company pledges in the US, while in the European Union the main driver has been and will continue to be regulation at the EU level.

Company commitments in the US

The adoption of post-consumer recycled content (PCR) presents an intriguing paradox. Despite numerous companies pledging to incorporate it, many have yet to follow through due to factors such as cost, availability, and concerns about maintaining product quality. Many companies have over-extended themselves with their PCR commitments, prompting an industry-wide reset. This reset has shifted focus either toward carbon emissions reduction – a necessity – or extended packaging goals roughly five years into the future.

Nevertheless, progress has been made. Companies like Unilever exemplify success in this area, significantly increasing their PCR usage and expanding their supplier network from just two in 2016 to sixty in 2024. However, the value, scale, purity, and consistency of PCR resins have not yet reached the levels needed for higher adoption rates.

For a new resin source to be allowable under US FDA regulation, they must receive a “letter of no objection” (LNO) from the FDA. While Europe has been the largest regional market, accounting for over half of global PCR consumption, it will continue to be the driver, with the US close behind. The food and beverage sector accounted for over two-thirds of PCR consumption in 2021 and is expected to see additional demand for PCR in packaging through 2026, according to a 2021 Smithers study.

New PCR sources approved by the FDA

This year alone, the FDA has “not objected” to several new sources for PCR and their usage applications, including:

- Borealis Borecycle M rHDPE & rPP
- Revolution LLDPE
- Dow & P&G partner on Dissolution rPE
- Pure Cycle Technologies Ultra-Pure rPP

Increasing the possible sources of PCR is likely to have a positive impact on the supply of recycled content, which remains challenging in the US. According to a report by McKinsey, between 2012 and 2022 the consumption of rPET grew around 4% per year, while its supply only grew 1% during the same timeframe. With company commitments, consumption could potentially grow up to 15% per year until 2030.

Without additional actions, this could potentially lead to a future supply-demand imbalance of rPET in the market. Systems such as extended producer responsibility (EPR) and [deposit refund schemes \(DRS\)](#) have proven effective in increasing the collection of high-quality plastic to recycle. Enhancements in collection and sorting, more recyclability in packaging, and higher collaboration within the value chain are also likely to help.

Projected access to recycled plastic in the European Union

Regulation is set to be the main driver behind the increase in demand for recycled content in the European Union. To meet projected demand, investment in collection and recycling infrastructure will be essential in the region

Capacity growth but sluggish demand

After Asia, the European Union is the second-largest producer of recycled plastics in the world. In 2022, recycled plastics represented 18% of total production in the region, and the volumes have steadily grown in the past years. Recycling capacity in the region has also grown substantially, with a 17% growth in 2021. Despite all these advances, the economic challenges of the past years have resulted in insufficient demand, preventing recyclers to operate at full capacity. The introduction of the recycled content targets in the Packaging and Packaging Waste Regulation could give some breathing space to recyclers. Mandating minimum amounts of recycled content for producers is likely to support higher adoption of recyclates.

Increased investment required to meet quotas

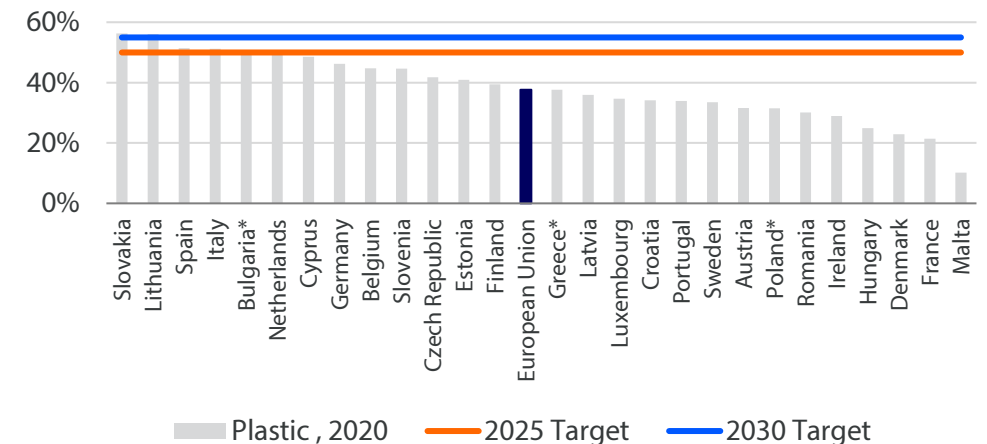
The ambitious targets set in the PPWR will need to be matched by ambitious investment in collection and recycling infrastructure in the region. To meet the targets, the volume of recycled plastic in Europe will need to grow more than three times by 2030 when compared to production in 2021.

Polypropylene and polyethylene are the polymers which require the largest increase – almost five times what it was in 2021. Recycled PET volumes will need to double to meet demand, especially food grade PET, which has one of the most ambitious targets of all – by 2040, 50% of the PET used to produce contact-sensitive packaging and 65% for single-use plastic bottles will need to come from recycled sources.

Considering this increase in demand for recyclates, the PPWR includes mandates for comprehensive collection and sorting infrastructure. Additionally, it includes provisions to grant priority access to recyclates to applications in which a higher circularity is achieved – for example, closed-loop bottle systems, where PET bottles become bottles again after recycling.

More investment in waste collection, sorting, and recycling infrastructure, as well as increasing coverage, is essential to increase the circularity of plastic packaging and to support access to high-quality recycled content for producers, which will be key for the success of initiatives like the PPWR. The growth in use of recycled content in other sectors, like automotive, should be considered in these investments to reduce competition between industries.

Plastic recycling rates vs PPWR target per country



Compared to the other substrates considered by the PPWR, plastic recycling is the one that countries are lagging in the most regarding the 2025 and 2030 targets. Strong investment in collection and recycling infrastructure will be essential not only to reach the targets, but also to meet the expected increase in demand.

Innovation

Packaging innovation is key to addressing both cost savings and environmental impact. While lightweighting packaging isn't a new idea, it has allowed companies to reduce material usage and transportation costs all while minimizing their environmental footprint.

Additionally, advanced recycling technologies offer the potential to recycle a wider array of plastics more efficiently. However, scaling these innovations more broadly faces challenges, including legislative challenges, technological hurdles, economic viability, and the need for a robust infrastructure.

This section explores these innovative approaches, their progress, and the obstacles they must overcome to revolutionize the packaging industry.



Balancing strength and sustainability

Innovations in plastic reduction, and striking a balance

Lightweighting within limits

Lightweighting packaging has emerged as a strategic approach to reduce costs, minimize virgin material usage and reduce emissions. However, companies must balance these benefits against the risks of devaluing their brand and potential supply chain issues. Using advanced tools like finite element analysis (FEA) and predictive modeling, manufacturers can create packaging that is both lighter and more efficient without compromising structural integrity. However, there is often a threshold above which further reduction leads to tradeoffs. Even when weight savings appear possible, retooling costs, line efficiency, and consumer perception must also be considered.

Performance: Essential in packaging design

The bottom threshold for packaging performance should not be breached, as it can lead to damaged products, efficiency loss, and consumer dissatisfaction. To help package designers to hit the sweet spot of reduced material while maintaining critical design parameters, companies are using all the tools in their wheelhouse to not only push the boundaries of plastic reduction, but also reduce the need for development steps, once deemed critical in R&D organizations.

Companies like Mars, Coca-Cola, Pepsi, and Procter & Gamble have been using FEA for years to develop plastic parts. What's new is using these predictive models to simulate traditional R&D tests, that usually required pilot scale parts, which require molds, and capital to be committed before there's even a proof of concept. The new tools are not only increasing speed to market but are also reducing the need for more and more testing.

The move from lightweighting to right-weighting

When lightweighting efforts go too far, companies adopted the concept of "right weighting" to reinstate or distribute plastic to packaging's most vulnerable areas. Right-weighting involves finding an optimal balance of strength and rigidity to ensure consumer satisfaction, seamless supply chain integration and adequate shelf-life performance.

Historically, companies have purposely over-engineered packaging at launch to avoid issues that could impede product roll-outs. This conservative approach allows for future reductions in material use, removing unnecessary packaging incrementally. However, during periods of high inflation, like in 2022, companies were compelled to aggressively pursue every possible plastic reduction to manage costs.

A great example of hitting a bottom threshold within a design and having to pivot to further reduce packaging is Coca-Cola's recent PET bottle redesign. Initially their lightweighting efforts hit a barrier that compromised the bottle's performance. To address this, Coca-Cola undertook a comprehensive redesign of their preforms, and retooled 64 different bottle blowers, shredding 2.5g across their 12-, 16.9- and 20oz beverages bottles, eliminating the virgin plastic of roughly 800m bottles. This process required years of development, leveraging tools like finite element analysis, consumer trials, pilot trials, and extensive network collaboration.

Advanced recycling

Advanced recycling technologies are rapidly evolving to address the global plastic waste challenge, having made significant strides toward commercialization along a multi-year growth cycle.

Development cycle

A report by Closed Loop Partners suggests that within the industry of advanced recycling, there is an approximate 17-year trajectory for a company to enter growth mode. Carla Toth, SVP of Business Development at Nexus Circular notes, "There is no pre-existing roadmap or blueprint for advanced recycling facilities. Scaling requires ground-up development of the technology, business and operating system and supporting infrastructure."

Main challenges in advanced recycling



Regulatory environment: The legislative and regulatory headwinds are a significant challenge for companies to navigate. In the last few years, these headwinds have become more pronounced, with 25 US states still not recognizing AR as a recycling technology.



Feedstock variability: Managing the variability of plastic feedstock is one of the main challenges. The technology must be robust enough, or the sortation process thorough enough to handle material combinations which can change daily.



Supply chain development: Building a supply chain for used plastic feedstock is a significant hurdle. The infrastructure to provide the necessary volume for advanced recycling facilities at scale does not exist, necessitating the development of a new supply chain from scratch.



Investment needs: Advanced recycling requires substantial investment in R&D, facility construction, and supporting infrastructure development. A McKinsey report estimates USD 40bn would be required for the industry to truly reach maturity.

Future progress and outlook

Despite these challenges, advanced recycling is on track to start delivering results as expected within its development cycle. Nexus Circular, for example, is now operating its third generation (Gen-3) technology and process, producing at a much faster pace and maintaining an 82% production yield of pyrolysis oil (+13% process gas and 5% inert solid). This marks a step-change improvement in efficiency and output from when the company began at lab scale in 2008. The industry's progress is evident in efficiency gains and the increasing number of advanced recycling facilities being planned and constructed. The journey of advanced recycling has not been a straightforward path, but one marked by venturing into the unknown at each stage and overcoming new challenges.

While some dispute the broad spectrum of advanced recycling technologies, it's too early to dismiss their potential. There have been some significant improvements over mechanically recycled material, depending on the specific technology, which sets a high threshold of success. In our current linear economy, where we've become highly efficient at making cheap, disposable plastic, it's crucial to explore and support solutions that can help us transition to a circular economy. Closing doors on companies developing these solutions could hinder our ability to address the plastic crisis effectively.

The legislative and regulatory headwinds are intensifying as of late, creating an adversarial environment. This environment does not incentivize or reward the necessary investment in R&D or technology exploration that is needed to move chemical recycling forward. However, the industry's resilience and innovation continue to drive progress, making it a critical component in the global effort to manage plastic waste sustainably.

Advanced recycling's role in the circular economy

The need for clarity in regulation related to advanced recycling is important for its future, both to clear up its position in the plastics value chain and to stimulate investment in the technology

Regulation is critical for advanced recycling

In the burgeoning field of advanced recycling, the role of regulation is pivotal to shaping its trajectory toward becoming a mainstream solution. Globally, legislation varies – which presents a significant challenge to navigate.

On the supportive side, several jurisdictions have implemented policies that encourage the adoption of advanced recycling technologies. For instance, some regions offer tax incentives or subsidies to companies investing in these technologies, fostering a conducive environment for development and growth. Such measures not only stimulate investment but also promote R&D aimed at improving efficiency and scalability.

However, in many cases, regulatory frameworks tend to be more one-sided, often hindering rather than helping the progression of advanced recycling. Complex and inconsistent regulation across different jurisdictions can create barriers to entry for new technologies and discourage investment. Requirements related to waste classification, quality standards for recycled materials, and permitting processes often vary widely, complicating efforts to scale operations efficiently.

Recent news

- **US:** On May 17, Governor Jared Polis vetoed a bill that would have disincentivized advanced recycling in Colorado. The bill, SB24-150, would have characterized some advanced recycling technologies as incineration or waste disposal, not a recycling technology. Polis wrote in his veto letter: “While I share the proponents’ concerns about the air quality impacts of any project or technology, it is not appropriate to speculatively disincentivize critical pathways that could be important to Colorado’s efforts on climate action.”
- **US:** As of March 25, half of the states in the US are open to advanced recycling. With unanimous bipartisan support in both chambers, Wyoming became the 25th state to adopt legislation ensuring that advanced recycling facilities are transparently and properly regulated as manufacturing operations. This applies a regulatory framework for advanced recycling facilities and welcomes future investment in Wyoming.
- **European Union:** In 2020, the EU Commission stated it would take a decision in 2021 on the legal status of advanced recycling based on its cradle-to-grave life cycle impact, yet this decision never came. The proposed redraft of the Packaging & Packaging Waste Regulation may shed some additional light on the future of the technology, with chemical recycling likely fitting into the definition of material recycling set by the regulation.

Legislation

Legislation plays a crucial role in shaping the future of packaging. Europe's Packaging and Packaging Waste Regulation (PPWR) has recently taken a significant step forward with its latest vote in the European Parliament, setting the stage for further developments in late 2024 and early 2025.

Meanwhile, both the US and Europe are seeing the growing introduction of extended producer responsibility (EPR) schemes, which hold manufacturers accountable for the entire life cycle of their products. This section examines the latest legislative advancements, the next steps for PPWR and the impact of EPR schemes on the industry.



A new vote for the Packaging and Packaging Waste Regulation

A new vote in favor of the EU's PPWR in the European Parliament brings the regulation closer to reality. With the publication of the revised draft, the requirements are clearer, and finalization is expected in 2025

Another step forward for the Packaging and Packaging Waste Regulation

On April 24, the European Parliament approved the latest version of the Packaging and Packaging Waste Regulation (PPWR), bringing it closer to completion. The latest draft was published. Some of the requirements are shown below:

Recycled content in plastic packaging			Substances of concern and PFAS		Bio-based feedstock in plastic packaging		Reuse and refill targets		
This version of the regulation sets the requirements for recycled content in plastic packaging. The targets are the following:			<ul style="list-style-type: none"> The PPWR explicitly sets restrictions for the intentional use of PFAS in food contact packaging It also sets restrictions for other substances 		<ul style="list-style-type: none"> The proposal requires lawmakers to evaluate the feasibility of setting up sustainability criteria and goals to encourage the use of plastic packaging made from plant-based materials This evaluation should also determine if this material can replace recycled content and count toward the recycled content requirements This evaluation is planned to take place three years after the PPWR becomes effective 		The requirements for reuse and refill are:		
	2030	2040						2030	2040
PET contact-sensitive packaging	30%	50%					Transport packaging (excl. cardboard)	65%	70%
Contact-sensitive packaging other than PET	10%	25%					Grouped packaging (excl. cardboard)	50%	55%
Single-use plastic beverage bottles	30%	65%					Beverages (excl. wine and dairy)	25%	30%
Other plastic packaging	35%	65%					The hospitality sector should allow consumers to bring their own containers for take-away food and drinks filled at the point of sale. They should also offer 10% of their products in reusable format by 2030.		
			Deposit refund schemes (DRS)						
			<ul style="list-style-type: none"> Countries must achieve 90% separate collection of SUP and metal beverage containers by 2029, possibly through a DRS Exemptions exist for countries that reach a separate collection of >80% weight by 2026 and have a plan for 2029 						

This vote by the parliament brings the PPWR closer to reality. The elections of the European Parliament have resulted in a postponement of the adoption of the PPWR, and the finalization of the regulatory process is expected in early 2025. The publication of the latest draft gives players in the industry a clearer idea about the final requirements that can be expected, and they would do good to prepare for its entry into force.

Extended producer responsibility schemes are gaining traction

EPR schemes are one of the tools used in circularity efforts to increase the participation of producers in the life cycle of their products. Their adoption has been steadily increasing for packaging applications

What is extended producer responsibility (EPR)?

EPR schemes are economic instruments aimed at generating income and incentivizing producers to collect and recycle the material they sell at the end-of-use stage. The concept of EPR was developed in the 1990s and has been increasingly embraced by producers and governments in recent years, covering various industries. EPR schemes are common for electronics, packaging, vehicles, and tires.

EPR can be financial, where producers are responsible for paying fees to support the collection of their material with the actual collection done by the public sector, or operational, in which producers are responsible for the physical collection of the material and its further processing.

EPR can be voluntary or mandatory. In voluntary schemes, companies of certain industries make pledges as a group or become signatories of pacts. In contrast, mandatory schemes are set by governments, and producers are mandated by law to comply with the requirements established. Historically, mandatory schemes have proven to be more successful than voluntary ones.

How does EPR change (plastic) packaging?

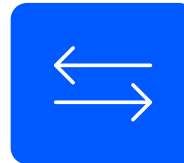
- Packaging's end-of-life management costs will shift from taxes to brand marketing organizations
- New fees, linked to individual package sustainability metrics
- Increasing margin pressure: Single-use plastics still in the bullseye
- Creates an improved supply of post-consumer plastic, including food-grade resin

The introduction of EPR policies inevitably challenges margins across the value chain and brings with it the potential to impact consumer pricing.

Impacts of the introduction of EPR policies



Cost shifting. The end-of-life management of products stops being the responsibility only of the public sector. Producers and consumers take an active role here.



Transparency. With EPR, there is increased transparency of the material and financial flows. It is easier to know where materials end up and what the money is used for.



Separate waste collection. In some cases, the introduction of EPR has led to increases in the separate collection of the material involved in the scheme.



Higher recycling rates. As a result of higher collection rates, EPRs support higher recycling rates.

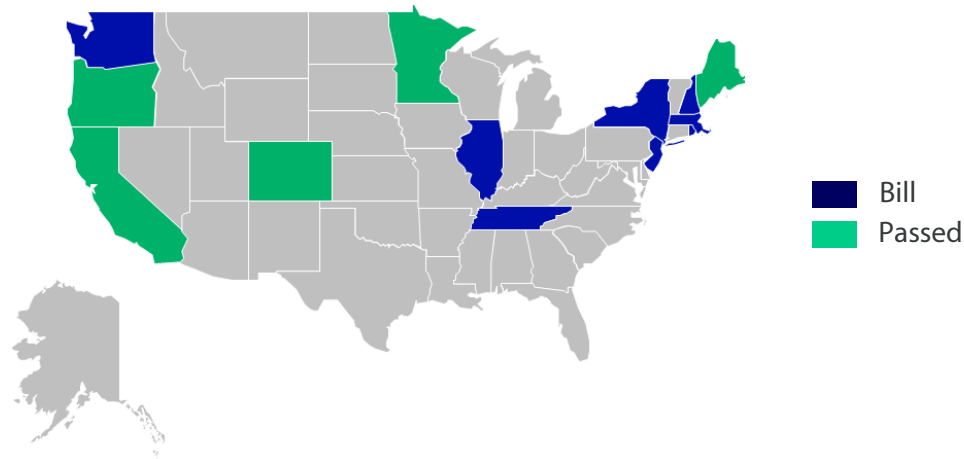


Recyclability and reusability. EPR schemes incentivize packaging producers to make their packaging more easily recyclable, to make the end-of-life management easier.

EPR schemes in Europe and the US

EPR is becoming more popular around the world. In the US, Minnesota became the fifth state to approve it, while in the EU, EPR is an important part of the PPWR

EPR in the US



Minnesota became the fifth state to approve EPR packaging law in the US, mandating that by February 1, 2031, producers cover at least 90% of net recycling costs. This comes at nearly the same time as Maryland and Illinois have passed needs assessments to have a better understanding of the current state of packaging waste management, as well as help map a pathway toward legislation. The progress of EPR sweeping the country isn't slowing.

July 1, 2024, was the deadline (unless there's an exemption) for obligated producers to register with the Producer Responsibility Organization (PRO), Circular Action Alliance, which is the PRO for California, Colorado and Oregon.

EPR in the European Union



In the European Union, the introduction of EPR schemes for packaging are considered within the PPWR. Among its considerations, **producers will benefit from ecomodulation of their fees based on their degree of compliance with the requirements in the PPWR.**

Additional to the requirements of the PPWR, most EU member states have EPR schemes in place for packaging, including France and Germany, or are in the process of introducing them, as is the case for Denmark.

EPR in the United Kingdom



In the United Kingdom, an EPR proposal was presented in 2022 for packaging producers, as a revision of the previous Producer Responsibility Obligations set for packagers. On top of the EPR-related fees set by this regulation, it includes:

- Ecomodulation of fees for higher recyclability of packaging
- Criteria for data collection and reporting

The data collection began in 2023, some fee payments began in 2024, and **the law is expected to be fully implemented by 2027.**



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