

**Unpacking Sustainability: A Comparative Analysis of Policy and Regulations for Sustainable Packaging across North America and the European Union**

by

Britteny Lee Schalk

Dr. Jeremy Pare, Advisor

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## **Executive Summary**

The global environmental crisis, driven significantly by unsustainable packaging practices and growing waste streams, has necessitated a detailed examination of regulatory frameworks governing packaging sustainability. This Master's Project critically analyzes sustainable packaging regulations across North America and the European Union (EU), regions chosen due to their divergent approaches and distinct policy outcomes.

The central problem this analysis addresses is the variability and effectiveness of regulatory frameworks influencing sustainable packaging adoption. The project's significance lies in identifying policy strengths and weaknesses to inform future regulations, driving industry alignment, innovation, and ultimately, global sustainability progress.

The primary objectives of this study are to:

1. Compare sustainable packaging policies and regulatory mechanisms between North America and the EU.
2. Identify strengths, weaknesses, and opportunities within existing regulatory frameworks that organizations can leverage to harmonize their packaging strategies, drive compliance, and promote innovation in sustainable packaging.
3. Develop practical tools, specifically, a benchmarking framework that enables organizations to measure and enhance their regulatory compliance and sustainability practices.

A qualitative comparative policy analysis methodology underpins this research, systematically examining regulatory scope, stringency, enforcement, and incentive effectiveness.

Data collection integrates primary regulatory texts, secondary academic sources, industry reports, and stakeholder insights, allowing for a comprehensive summary of findings.

The analysis reveals significant regional contrasts. The EU employs rigorous and harmonized regulations, notably through the Packaging and Packaging Waste Regulation (PPWR) and robust EPR schemes, resulting in higher recycling rates and increased circular economy engagement. Conversely, North America's decentralized approach, primarily driven by state-level initiatives, demonstrates innovation in specific jurisdictions but faces challenges in achieving widespread, uniform effectiveness due to fragmented regulatory structures.

The study identifies best practices such as clearly defined sustainability targets, stringent enforcement measures, and strong economic incentives to enhance compliance and innovation. A key outcome is the creation of a benchmarking tool, enabling companies to align strategically with evolving global regulatory standards and best practices.

Broader ramifications of this work highlight the necessity for enhanced international collaboration and harmonization of packaging regulations, emphasizing cross-sector cooperation and consistent stakeholder engagement to maximize global impact.

In conclusion, achieving global sustainability goals requires stronger, more unified regulatory frameworks and proactive strategies to incentivize industry-wide adoption of sustainable packaging practices. Policymakers and industry leaders are encouraged to leverage these insights and tools to foster meaningful environmental progress and innovation in sustainable packaging on a global scale.

## **Foundation & Approach**

### **Background**

With a strong foundation in product development and sustainability, I bring a unique perspective to the comparative analysis of packaging regulations in North America and the European Union. Throughout, I have worked at the intersection of innovation, environmental responsibility, and regulatory compliance.

Additionally, my professional insights are complemented by personal passion. This passion has driven me to examine how industries and governments can work together to create impactful change. My experience working at various public companies has further solidified this commitment, as I observed how global corporations shape industry standards and lead initiatives to advance sustainable packaging and products.

These combined experiences position me to approach this analysis with both academic rigor and practical expertise. I am uniquely qualified to navigate the nuanced differences in regulatory frameworks, evaluate their effectiveness, and propose actionable recommendations that bridge packaging policy and practice. By leveraging my background, I aim to contribute meaningful insights to the field of sustainable packaging and support the development of attainable global strategies.

### **Introduction**

Packaging plays a critical role in modern supply chains, providing essential functions such as protecting products, facilitating transportation, and enhancing marketability (Pålsson, 2018). However, the environmental costs associated with packaging, ranging from resource depletion to waste accumulation have brought sustainability to the forefront of global policy discussions. As governments, industries, and consumers increasingly prioritize environmental

responsibility, regulations and incentives for sustainable packaging have become pivotal tools for driving change.

This analysis focuses on North America and Europe (European Union), two regions with distinct regulatory frameworks, market dynamics, and cultural attitudes toward sustainability. Europe has long been recognized as a global leader in environmental policy, with comprehensive measures such as the European Union's Packaging and Packaging Waste Directive (PPWD) shaping the landscape. In contrast, North America, led by the United States and Canada, features a more fragmented policy environment with varying approaches at the federal, state, and provincial levels.

By "unpacking" the diverse strategies employed across these regions, this analysis explores how regulations and policies are influencing the adoption of sustainable packaging practices across the industry.

## **Methodology**

This study employs a qualitative, comparative policy analysis framework to examine sustainable packaging regulations in North America and the European Union (EU). The methodology is designed to evaluate the differences in regulatory frameworks, the effectiveness of various incentives, and the influence of cultural, economic, and political factors. By exploring these dimensions, the analysis aims to identify the best practices and provide actionable recommendations for improving global sustainable packaging policies.

Data collection for this study relies on a combination of primary, secondary, and supplementary sources. Primary sources include regulatory texts and official documents, such as the European Union's Circular Economy Action Plan and the Packaging and Packaging Waste Directive, as well as North American regulations, including U.S. federal and state laws and

Canadian single-use plastics initiatives. Secondary sources include peer-reviewed academic journals and reports from organizations such as the Ellen MacArthur Foundation and the OECD. Supplementary data, such as interviews or surveys with stakeholders, including packaging designers, policymakers, and sustainability leaders, may provide additional insights into the practical implications of regulations and incentives.

It is not without mentioning that this analysis has certain limitations. It is restricted to publicly available data, which may not capture all nuances of implementation, and regional differences in the granularity and availability of data could pose challenges to comparability. In addition, this space is changing at a rapid pace, and this study is a moment in the journey of this path to sustainable packaging.

### **Definitions**

**Act:** A formal written law enacted by a legislative body. Once a proposed law passes through the necessary legislative procedures and approvals it becomes an Act. It serves as primary legislation and is binding and enforceable within the jurisdiction in which they are enacted (*Act vs. law - what's the difference?*).

**Biodegradable Packaging.** Packaging materials that can break down into natural elements such as carbon dioxide, water, and biomass through the action of microorganisms within a defined time frame under specific environmental conditions (*Is Biodegradable Plastic Good for the Environment? Exploring its Advantage and Disadvantage*).

**Circular Economy.** “An economic system aimed at minimizing waste and making the most of resources by,” (*The EU's Circular Economy Action Plan 2022*), maintaining products, materials, and resources in use for as long as possible through strategies like recycling, reuse, and remanufacturing.

**Compostable Packaging.** Packaging materials that can decompose into organic matter in composting conditions, leaving no toxic residue behind. Compostable materials must meet established standards such as ASTM D6400 or EN 13432 (Eckhaus, 2024).

**Directive.** An official instruction or order issued by an authority. Formal regulation or policy that must be followed by those under its jurisdiction (*Directive definition in American English | collins english dictionary*).

**European Union (EU).** “A political and economic union of 27 member states located primarily in Europe,” (*Countries in the EU and EEA 2015*), which have standardized regulatory frameworks governing packaging through initiatives such as the Packaging and Packaging Waste Directive (PPWD) and the Circular Economy Action Plan. Member States: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

**Extended Producer Responsibility (EPR).** A policy approach where producers are given “significant responsibility—financial and/or physical—for the treatment or disposal of post-consumer products,” (Wagner, 2018). EPR aims to incentivize producers to design more sustainable products and packaging.

**Greenwashing.** The practice of conveying a false or misleading impression about how environmentally friendly a product, service, or policy is. This is particularly relevant in evaluating the impact of corporate claims about sustainable packaging (Hayes, 2024).

**Law.** A system or rules created and enforced by governmental institutions to regulate behavior, maintain order, and administer justice within a society (Moyo et al., 2024).

**Lifecycle Analysis (LCA).** A methodological approach for assessing the environmental impact of a product or system throughout its entire lifecycle, from raw material extraction to disposal or recycling (*What is Life Cycle Thinking?* 2023).

**Policy.** A deliberate system of guidelines or principles adopted by an organization, government, or individual to guide decisions and achieve rational outcomes (Pollack Porter et al., 2018).

**Policy Effectiveness.** The extent to which a policy achieves its intended objectives, such as reducing packaging waste, increasing recycling rates, or driving innovation in sustainable materials (Tumu et al., 2023).

**Producer Responsibility Organizations (PROs).** Organizations formed by industries to manage the collection, recycling, and disposal of packaging waste under EPR schemes (*EPR Packaging Laws in Canada: Where are we now?* 2024).

**Recyclability.** The ability of a material or product to be collected, processed, and used in manufacturing new products (*Deep Dive: What does "Recyclable" mean?* 2024).

**Regulation.** An authoritative rule or directive issued by a governmental agency that has the force of law. These regulations are designed to control or govern conduct within the agency's jurisdiction (*Regulation* 2024).

**Regulatory Framework.** A structured set of laws, policies, and guidelines that govern the production, use, and disposal of packaging to achieve environmental, economic, or social objectives (Tumu et al., 2023).

**Single-Use Plastics.** Plastic materials are designed to be used once and discarded, commonly including items such as packaging, utensils, and straws. These products are a major target of global and regional regulations due to their environmental impact (Lindwall, 2024).

**Stakeholders.** All parties involved in or affected by sustainable packaging policies, including governments, manufacturers, consumers, environmental organizations, and waste management companies (Tumu et al., 2023).

**Sustainable Packaging.** Packaging that is designed, sourced, manufactured, and disposed of with minimal impact on the environment while meeting economic and functional requirements. It often incorporates principles of recyclability, biodegradability, and material efficiency (Colwell, 2024).

## **Regulatory Framework & Comparative Policy Analysis**

### **Regulatory Landscape Overview**

The global packaging regulatory landscape is evolving to address sustainability, waste management, and environmental impact, with key regions implementing distinct policies. These regulations collectively aim to reduce packaging waste, enhance recyclability, and encourage producers to take responsibility for the environmental footprint of their products, driving a shift toward a more sustainable global packaging system.

### **European Union**

#### ***Definition of Packaging***

The detailed definition of packaging is outlined in the Packaging and Packaging Waste Directive (94/62/EC), which describes packaging as any product “made of materials of any nature to be used for the containment, protection, handling, delivery, or presentation of goods, from raw materials to processed goods, from the producer to the user or consumer,” (*Revision of the Packaging and Packaging Waste Directive 2024*).

#### ***History***

The European Union Green Deal (2019) serves as the overarching framework for sustainability, driving various regulatory initiatives aimed at fostering a circular economy and reducing environmental impact by 2050. It contains seven pillars: climate action, clean, affordable, and secure energy, circular economy, biodiversity, farm-to-fork strategy, pollution control, industry and innovation, and sustainable transport. Within this framework, the Circular Economy Action Plan (CEAP) guides policies such as the Packaging & Packaging Waste Regulation (2023), the Waste Framework Directive (2008/98/EC), the Eco-design Directive (2009/125/EC), and Regulation (EU) 2024/1781. Complementing these efforts, the EU Plastics

Strategy includes the Single-Use Plastics Directive (SUPD) to reduce plastic waste. Extended Producer Responsibility (EPR) schemes ensure manufacturers are accountable for product end-of-life management, while the REACH Regulation safeguards chemical safety in products, including packaging. The European Climate Law (2021) further reinforces climate goals.

Additionally, EU product compliance and safety regulations, such as Directive (EU) 2019/1020 on market surveillance and REACH for chemical oversight, ensure that products meet environmental and safety standards. Implementation and enforcement of these regulations are carried out by individual EU Member States.

### EU GREEN DEAL

Circular Economy Action Plan (CEAP)  
 → Packaging & Packaging Waste Regulation (2023)  
 → Waste Framework Directive (2008/98/EC)  
 → Eco-design Directive (2009/125/EC)  
 → Regulation EU (2024/1781)  
 EU Plastics Strategy  
 → Single-Use Plastics Directive (SUPD)  
 Extended Producer Responsibility (EPR) Schemes  
 REACH Regulation (Chemical Safety)  
 European Climate Law (2021) Regulation EU (2021/1119)

### EU PRODUCT COMPLIANCE & SAFETY

Directive EU (2019/1020) Market Surveillance and Compliance of Products  
 REACH Regulation (Product & Packaging Chemicals)  
 EU Member States (Implementation & Enforcement)

### *The European Green Deal*

“The European Green Deal is a comprehensive policy,” (*European Climate Law*), a framework adopted by the European Union “in December 2019 aimed at making Europe the world’s first climate-neutral continent by 2050,” (*European Climate Law*). It outlines a set of actions to reduce greenhouse gas emissions, promote sustainable growth, and protect biodiversity. The deal focuses on transitioning to a circular economy, “improving energy

efficiency, expanding the use of renewable energy,” (*European Climate Law*), and adopting sustainable practices across industries, including transportation, agriculture, and packaging. The European Green Deal also includes financial investments to support green technologies and ensure a just transition for workers and regions affected by the shift to a low-carbon economy.

The overarching goals include:

- No net emissions of greenhouse gases by 2050
- Economic growth decoupled from resource use
- No person and no place left behind

### ***CEAP 2030***

CEAP was adopted in March 2020. The goals of the CEAP 2030 include reducing waste, promoting recycling, sustainable product design, and supporting the EU towards a circular economy by 2030. It is to be noted that this does not translate straight into EU law but rather serves as an overarching strategy for countries to develop their laws and regulations as long as they remain in compliance. This particular strategy allows for a gradual shift toward achieving its circularity goals across all member states (*Circular Economy Action Plan*). The overarching goals include:

- Making sustainable products the norm in the EU
- Empower consumers and public buyers
- Focus on the sectors that use most resources and where the potential for circularity is high
- Ensure less waste
- Make circularity work for people, regions, and cities
- Lead global efforts on circular economy

**Impact of CEAP.** The CEAP has had a significant economic, environmental, and social impact since its implementation. Economically, it has boosted the EU circular economy market, projected to grow by €600 billion by 2030, while fostering innovation in business models, such as product-as-a-service and sharing platforms. Environmentally, CEAP aims to reduce waste generation by 50% by 2030, promote high-value recycling, and decrease reliance on virgin materials, contributing to the EU's climate neutrality goals. Socially, it strengthens consumer rights, enhances product durability and repairability, and encourages sustainable consumption habits, ultimately leading to cost savings and reduced environmental impact (*Questions and Answers on the Commission Communication*).

**Challenges in Implementation.** Challenges include regulatory compliance variations among Member States, industry resistance, and the need for behavioral shifts among consumers. Looking ahead, CEAP will continue evolving with stricter targets and new legislative proposals, driving the EU towards a fully circular economy by 2050.

### ***Packaging & Packaging Waste Regulation (2023)***

Initial regulation proposed by the Packaging and Packaging Waste Directive (94/62/EC) (PPWD) and now Packaging and Packaging Waste Regulation (2025/40) (PPWR) defines what kinds of packaging can be sold within the EU market, including overall waste management of the packaging and general prevention of the waste. PPWR came into force on February 11th, 2025, and is expecting Member states to be in compliance on or before August 12, 2026 (*Packaging waste*). The overarching goals include:

- Reduce packaging waste generation
- Ensure all packaging is recyclable by 2030

- Promote reuse and refillable packaging
- Increase the use of recycled content
- Strengthen extended producer responsibility (EPR)
- Improve consumer information & labeling

**Impact of PPWR.** Since the introduction of the PPWR in 2023, its impact has primarily been in the initial stages of implementation, with several notable preliminary effects.

There has been an increased awareness and adoption of sustainable packaging as businesses prioritize recyclable, compostable, and reusable materials in anticipation of regulatory changes. Companies have started to redesign their packaging and invest in eco-design to ensure compliance with future requirements, while strengthening EPR schemes has encouraged producers to rethink how their packaging is designed, focusing on recyclability and reuse. Consumers have also become more engaged, with efforts to educate them on sustainable packaging and proper disposal, enhancing recycling efficiency.

**Challenges in Implementation.** Challenges with enforcement and harmonization across different EU member states have led to some inconsistencies in regulatory application, and certain industries have faced short-term disruptions, especially those reliant on single-use plastics. Despite these challenges, this regulation has spurred innovation, and the market for sustainable packaging solutions is expected to grow, leading to long-term benefits as compliance deepens and the full scope of the regulation unfolds.

### ***Waste Framework Directive (2008/98/EC)***

The Waste Framework Directive (2008/98/EC) is the European Union's primary legislation on waste management, establishing key principles for handling waste to protect the

environment and human health. It introduces the waste hierarchy, prioritizing prevention, reuse, recycling, recovery, and disposal as a last resort (*Waste Framework Directive*). The overarching goals include:

- Extended Producer Responsibility (EPR)
- Polluter pays principle
- By-product status, clarifying when production residues are not considered waste
- Mandates separate collections of waste (e.g., paper, metal, plastic, and glass) to improve recycling rates
- Sets recovery targets for recycling and recovery of materials, including packaging waste

**Impact of Waste Framework Directive.** The Waste Framework Directive (2008/98/EC) has significantly influenced waste management practices across the European Union, leading to notable outcomes in recycling rates, landfill reduction, and producer responsibility. The Directive has been instrumental in promoting recycling across the EU. By 2020, the EU achieved an average recycling rate of 47% for municipal waste, with some countries exceeding 50%. The Directive has also contributed to a sharp reduction in landfill use across the EU. By 2018, the proportion of municipal waste sent to landfills had dropped by more than 25% since 2008. Many countries, such as Sweden, have virtually eliminated landfilling, instead prioritizing waste-to-energy processes, and recycling (*Waste Recycling in Europe 2021*).

**Challenges in Implementation.** While the Directive has contributed to positive outcomes, there have been challenges in its full implementation. Some member states continue to struggle with meeting the recycling targets, especially in countries with limited infrastructure. There is also a lack of uniform enforcement across the EU,

resulting in discrepancies in waste management practices and recycling rates among different regions (*Waste Framework Directive*).

### ***Eco-design Directive (2009/125/EC)***

The Eco-design Directive (2009/125/EC) establishes a framework for setting environmental requirements for energy-related products (ERPs) sold in the EU. It aims to improve energy efficiency and reduce environmental impacts throughout a product's lifecycle, from design to disposal. It primarily focuses on improving the environmental performance of products throughout their life cycle, with an emphasis on energy-using products. However, it also has significant implications for packaging about the design for sustainability approach (Zygierewicz, 2017). The overarching goals include:

- Encourage resource efficiency
- Requirements for specific products

**\*\***For packaging, this translates into requirements for packaging materials used in these products. For example, electronic product packaging must be designed to reduce waste, improve recyclability, and minimize environmental impact in terms of materials used.

**Impact of Eco-design Directive (2009/125/EC).** The Eco-design Directive (2009/125/EC) has significantly influenced the packaging industry by promoting sustainability and resource efficiency. It has led to reductions in packaging material use, encouraging manufacturers to design lightweight packaging that uses fewer raw materials, thereby contributing to lower resource consumption. Additionally, the directive has improved recyclability and reusability by encouraging the use of materials compatible with recycling processes. There has also been an increased focus on sustainable materials, with producers adopting biodegradable plastics, paper, and

recycled content, supporting the integration of post-consumer recycled materials into packaging. Furthermore, for packaging associated with energy-using products, the directive has led to the development of solutions that optimize energy use during production, reducing the carbon footprint of both production and transportation.

**Challenges in Implementation.** The implementation of the Eco-design Directive has faced several challenges. One significant issue is the lack of clear, detailed regulations specifically targeting packaging, leading to ambiguity in how manufacturers should address sustainability within their packaging lines. This lack of specificity has resulted in fragmented national regulations, with some EU member states having more stringent requirements for eco-friendly packaging, while others have yet to fully align with the goals of the Circular Economy. This inconsistency complicates the ability of businesses to meet packaging sustainability targets across the EU. Additionally, the development and adoption of new technologies for sustainable packaging can be slow and costly, “particularly for small and medium-sized enterprises (SMEs) that may lack the financial resources to,” (*Broaching Machine Market Size and Share Report, 2030*) invest in more sustainable production processes or transition to alternative materials. Lastly, consumer participation is crucial for the success of the directive, without sufficient consumer awareness and involvement in recycling, even the most innovative and sustainable packaging designs may not achieve their full environmental potential.

### ***Eco-design for Sustainable Products Regulation (EU) 2024/1781***

Regulation (EU) 2024/1781, known as the Eco-design for Sustainable Products Regulation (ESPR), was adopted by the European Parliament and the Council on June 13, 2024, and published in the Official Journal of the EU on June 28, 2024. The Regulation enhances the

previous Eco-design Directive (2009/125/EC) and establishes a comprehensive framework for setting eco-design requirements across a wide range of products, aiming to enhance their environmental sustainability throughout their entire lifecycle (*Regulation - EU - 2024/1781*).

These overarching goals include:

- Broader scope outside of energy-related products
- Mandates specific performance and information requirements
- Reducing negative environmental impacts throughout a product's lifecycle
- Manufacturers are required to provide detailed information on the environmental aspects of their products, including the presence of substances of concern, to facilitate informed decision-making by consumers and other stakeholders.
- Digital product passport to enhance transparency and traceability

**Impact of Eco-design for Sustainable Products Regulation (EU) 2024/1781.** The Eco-design for Sustainable Products Regulation (EU) 2024/1781 is still in its early stages of implementation, so specific data on its direct improvements is limited. However, some data from previous regulations, such as the Eco-design Directive (2009/125/EC), can provide insight into the expected outcomes and potential improvements in the long term. Packaging waste generation in the EU decreased by about 4% from 2008 to 2018 due to stricter regulations on design, recyclability, and materials (*Packaging waste*). According to a 2020 Eurobarometer survey, 77% of EU consumers indicated that they would prefer to buy products that are more durable, repairable, or recyclable, showing an increase in demand for products that comply with eco-design principles (*Making durable, repairable goods for consumers and tackling planned obsolescence* 2017). An increasing number of EU consumers are starting to prioritize sustainable packaging and energy-efficient

products, with 53% of EU consumers reporting they are more likely to purchase environmentally friendly products (Specright, 2023).

**Challenges in Implementation.** Full implementation of eco-design standards across all product sectors is still in progress, and some products (e.g., certain types of packaging and textiles) may take time to meet these new standards. SMEs may face difficulties in adopting eco-design principles due to higher upfront costs, which may hinder the full-scale impact of the regulation. The recycling infrastructure across the EU is uneven, meaning some regions might struggle to meet the regulation's sustainability goals, affecting the overall success of the circular economy transition.

### ***EU Plastics Strategy***

The EU Plastics Strategy was adopted in January 2018 and includes a strategy aimed at reducing plastic waste, promoting sustainable alternatives, and enhancing recycling and reuse within the EU (*Plastics strategy*). The overarching goals include:

- Reduce plastic waste
- Increase plastic recycling & reuse
- Promote recycled content & sustainable alternatives
- Reduce marine litter & global impact
- Innovation & investment

### ***Single-Use Plastics Directive (SUPD) (2019/904)***

The Single-Use Plastics Directive (SUPD) (EU 2019/904) is a key piece of EU legislation aimed at reducing the environmental impact of single-use plastic products, particularly on marine ecosystems. It was adopted in June 2019 and came into effect in July 2021, targeting the most commonly found plastic waste items on European beaches (*Directive*

*(EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment).* The overarching goals include:

- Bans on certain single-use plastic items
- Reduction measures for other plastics
- Design requirements for plastic beverage bottles
- Recycled content targets:
  - 25% recycled plastic in PET bottles by 2025
  - 30% recycled plastic in all plastic bottles by 2030
- Extended Producer Responsibility (EPR)
- Separate Collection Targets
  - 90% collection rate for plastic bottles by 2029, with an interim target of 77% by 2025 (achieved through deposit return schemes or separate collection initiatives)
- Labeling Requirements
  - The presence of plastic in the product
  - Proper disposal methods
  - Environmental impact of littering these items

**Impact of SUPD.** The SUPD has had a significant impact on reducing the environmental footprint of single-use plastic items across Europe. One of the most notable outcomes of the SUPD has been a substantial reduction in the consumption of plastic products such as straws, cutlery, and plates. For instance, plastic straws and cutlery are set to be completely phased out across the EU by 2021, resulting in a forecasted reduction of about 3 million tons of plastic waste annually (Valdivia, 2019). Additionally, the directive has also focused on plastic beverage containers, leading to the introduction of deposit-return

schemes (DRS) in various EU member states, which has significantly increased the recycling rates of plastic bottles. Countries like Germany and Estonia that have implemented these systems have seen return rates for plastic bottles soar to over 90%, compared to the EU average of about 60% (Millette & Wilcox).

**Challenges in Implementation.** However, challenges remain, particularly in ensuring uniform implementation across EU member states. While some countries have successfully adopted and enforced the SUPD's provisions, others are still grappling with logistics, infrastructure, and public compliance. Moreover, the plastic packaging industry has faced criticism for not fully adapting to the SUPD's targets, especially with regard to the introduction of sustainable alternatives. Despite these hurdles, the SUPD has been pivotal in setting a precedent for other regions to follow in terms of reducing plastic pollution and moving toward more sustainable plastic use.

### ***Extended Producer Responsibility (EPR) Schemes***

Extended Producer Responsibility (EPR) is an environmental policy approach that makes producers financially and/or operationally responsible for managing the waste stage of their product's lifecycle. The goal is to shift the burden of waste management from taxpayers and municipalities to producers, incentivizing sustainable product design, improved recyclability, and reduced waste (SPC).

EPR schemes are regulated under several EU directives, including:

- Waste Framework Directive (2008/98/EC, amended by 2018/851)
- Packaging and Packaging Waste Directive (94/62/EC, amended by 2018/852)
- Single-Use Plastics Directive (2019/904)
- Batteries Regulation (EU 2023/1542)

- WEEE Directive (2012/19/EU) – Waste Electrical and Electronic Equipment

Under EPR, producers are responsible for:

1. Waste Management Costs – Collection, sorting, and recycling of their products.
2. Eco-Modulation of Fees – Fees are adjusted based on product design (e.g., higher fees for non-recyclable materials).
3. Product Design & Innovation – Encourages manufacturers to design products that are durable, recyclable, and contain recycled materials.
4. Public Awareness & Reporting – Producers must inform consumers about proper disposal methods and report data on waste collection and recycling rates.

**Impact of EPR.** EPR schemes reduce waste and increase recycling rates by ensuring that producers take responsibility for the end-of-life management of their products. They encourage sustainable product design by promoting the use of eco-friendly materials and modular, repairable products that extend lifespan and reduce environmental impact. By shifting fiscal responsibility from municipalities to producers, these programs alleviate the burden on public waste management systems while incentivizing businesses to invest in better recycling and recovery processes. Ultimately, EPR supports a circular economy by closing the materials loop, ensuring that valuable resources are reused and reintegrated into production rather than discarded as waste.

**Challenges in Implementation.** The implementation of EPR schemes across the EU faces several challenges that create inconsistencies in their effectiveness. One key issue is that the implementation of EPR varies by country, leading to disparities in how these schemes are applied and enforced. In some cases, producers may pass the costs of compliance onto consumers instead of redesigning products to reduce waste and increase

recyclability, which undermines the potential benefits of the schemes. Additionally, there is a need for improved enforcement and transparency in waste management to ensure that recycling targets are consistently met and that the schemes are truly achieving their sustainability goals. To address these challenges, the EU continues to strengthen EPR schemes aiming to ensure that producers take full responsibility for their products throughout their lifecycle, from production to post-consumer waste management.

### ***REACH Regulation (EC) 1907/2006 (Chemical Safety)***

The REACH Regulation (Registration, Evaluation, Authorization, and Restriction of Chemicals) is the EU's main chemical safety regulation, designed to “protect human health and the environment,” (*Regulation (EC) no 1907/2006 - registration, evaluation, authorisation and Restriction of Chemicals (REACH)*), while promoting innovation in the chemical industry. It applies to all chemical substances used in industrial processes, consumer products, packaging, electronics, and more (*Regulation (EC) no 1907/2006 - registration, evaluation, authorisation, and Restriction of Chemicals (REACH)*). The overarching goals are:

- The registration of chemicals
- Evaluation of substances
- Authorization for hazardous substances
- Restriction of dangerous chemicals

**Impact of REACH.** For companies, REACH compliance increases responsibility by requiring them to ensure the safety of chemicals before they are placed on the market. This comes with compliance costs, as businesses must invest in testing and regulatory processes to meet stringent safety standards. However, these regulations also act as an innovation incentive, encouraging the development of safer and more sustainable

chemical alternatives. For consumers, REACH compliance leads to safer products by reducing exposure to harmful chemicals in everyday items. Additionally, it enhances transparency, giving consumers the right to request information on hazardous substances in products through SVHC (Substances of Very High Concern) disclosure. It also supports the circular economy by ensuring that materials used in packaging are safe for recycling, reuse, and long-term sustainability.

**Challenges in Implementation.** The implementation of REACH presents several challenges for businesses and regulatory bodies. One of the biggest hurdles is the high compliance costs, as companies must invest heavily in testing, data collection, and regulatory processes, which can be particularly burdensome for SMEs. Additionally, the complex registration process requires extensive safety data and chemical dossiers, making compliance time-consuming and technically demanding, often requiring collaboration across the supply chain. Many substances also face data gaps, necessitating new testing that can be both expensive and ethically challenging, especially when animal testing is involved. Beyond the direct costs, supply chain disruptions pose another major challenge, as companies may struggle to obtain necessary safety data from suppliers, particularly those outside the EU who may be unfamiliar with REACH requirements.

### ***European Climate Law - Regulation (EU) 2021/1119***

The European Climate Law, adopted in June 2021, establishes a legally binding commitment for the EU to achieve climate neutrality by 2050 and strengthens the EU's 2030 climate targets. It is a cornerstone of the European Green Deal, ensuring that all EU policies align with climate objectives (*Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021* 2021). The overarching goals are:

- Legally binding climate neutrality target, net-zero greenhouse gas (GHG) emissions by 2050.
- 2030 Emission reduction target, cut emissions by at least 55% by 2030, compared to 1990 levels (the previous target was 40%).
- Climate action monitoring & adjustments
- Carbon budget & 2040 target
- Establishment of a European Scientific Advisory Board on climate change to provide independent assessments and recommendations.

**Monitoring Framework.** The monitoring framework associated with the European Climate Law (Regulation (EU) 2021/1119) is designed to track the EU's progress toward its climate neutrality goal. It includes several key components to ensure accountability and transparency. The European Commission is required to submit annual progress reports on the implementation of the climate goals, assessing whether the EU is on track to meet its 2030 and 2050 targets. These reports evaluate the progress of Member States in implementing their National Energy and Climate Plans (NECPs) and track emissions reductions across sectors like energy, transport, industry, and agriculture. Additionally, the framework monitors greenhouse gas emissions and climate-related trends to assess the effectiveness of EU-wide and national policies. Another crucial aspect of the framework is the European Climate Change Adaptation Framework, which tracks adaptation measures to climate change using tools like the European Climate Adaptation Platform (Climate-ADAPT). This ensures that both mitigation and adaptation efforts are integrated into the monitoring process. Member States are also required to submit national climate plans, which are assessed periodically to ensure alignment with the EU's

overall climate goals. The carbon budget system, introduced by the European Climate Law, further monitors cumulative emissions to ensure that the EU stays within the carbon limits necessary for achieving climate neutrality. Stakeholder engagement is another essential element, ensuring that the public, businesses, and civil society are involved in monitoring progress. The process emphasizes transparency, with reports made publicly available. Finally, the European Scientific Advisory Board on Climate Change (ESABCC) provides independent scientific advice on climate policy implementation and progress, ensuring that the EU's actions are based on the latest scientific evidence. This comprehensive framework helps align policies across Member States, ensuring the EU meets its climate targets while maintaining transparency and public accountability.

**Impact of the European Climate Law.** The European Climate Law has a far-reaching impact on governments, businesses, and citizens by embedding climate neutrality into EU policies. For governments and policymakers, it ensures that all EU policies, including those related to transport, energy, and industry, align with climate goals. Additionally, it influences national policies by requiring all EU Member States to adopt national climate plans, ensuring a coordinated approach to reducing emissions. For businesses, the law creates a stable regulatory framework that encourages green investments, providing long-term certainty for companies transitioning to sustainable practices. It also accelerates the phase-out of fossil fuels and promotes the expansion of clean technologies, pushing industries toward innovation in renewable energy and low-carbon solutions. Citizens also benefit from the European Climate Law, as it leads to cleaner air, greater energy security, and job opportunities in the renewable energy sector. Furthermore, it encourages sustainable lifestyles by offering incentives for energy efficiency, low-carbon mobility,

and other environmentally friendly choices, making sustainability more accessible and rewarding for individuals.

**Challenges in Implementation.** The implementation of the European Climate Law comes with several challenges that governments, businesses, and citizens must navigate. One key challenge is policy coordination and enforcement, as ensuring all EU policies across sectors like transport, energy, and industry align with climate goals requires strong coordination between the European Commission, national governments, and local authorities. Political differences among Member States can slow progress and create inconsistencies in implementation. Additionally, the financial and economic costs of transitioning to a climate-neutral economy are significant, with countries and industries, particularly those reliant on fossil fuels, potentially struggling to secure funding or adjust business models. Another challenge is balancing economic growth with climate goals. Stricter regulations and carbon pricing may lead to higher costs, job losses, or reduced competitiveness, particularly if other regions do not implement similar climate policies. The law also needs to address social equity through a just transition to ensure that vulnerable communities and workers in high-emission industries are not left behind. Without sufficient social policies, there is a risk of economic disparities and job losses in sectors like fossil fuels. The transition also faces technological and infrastructure barriers, as the rapid expansion of clean energy, electrification, and sustainable transport requires large-scale upgrades to infrastructure, including grid capacity, charging networks, and renewable energy storage. Public and industry resistance can also impede progress, as some businesses may resist stricter regulations, and individuals may be reluctant to adopt sustainable lifestyles.

## **United States**

### ***Definition of Packaging***

United States Legislation does not specifically define packaging in its context. However, many cite packaging materials that come in contact with food, drugs, and cosmetics to prevent contamination or adverse reactions (*CFR - Code of Federal Regulations Title 21 – FDA | NSF* 2022).

### ***History***

In the U.S., packaging regulations are largely state-driven, with states like California, New York, and Oregon leading the way in plastic waste reduction and Extended Producer Responsibility (EPR) laws. At the federal level, packaging regulations like the Resource Conservation and Recovery Act and Toxic Substance Control Act mainly focus on hazardous waste management, rather than specific packaging sustainability goals. The FTC Green Guides and FDA regulations focus more on consumer protection and product labeling.

Unlike the EU, which has binding regulations, the U.S. often relies on voluntary industry initiatives (e.g., Sustainable Packaging Coalition and The Recycling Partnership) to drive corporate responsibility in packaging sustainability. These initiatives provide the industry with the best practices and support the shift towards more recyclable, biodegradable, and sustainable materials. States that have begun instituting legislation often serve as models for other regions in the U.S. and highlight the ever-fragmented landscape of sustainable packaging policies in North America.

The U.S. regulatory framework for packaging sustainability is still evolving, with a combination of state-driven laws, voluntary industry efforts, and federal oversight. While there are progressive state regulations, such as California's plastic bans and EPR laws, the lack of a

unified national policy creates challenges for businesses and local governments in achieving comprehensive packaging sustainability goals.

The U.S. has several sustainability goals set through regulations, policies, and executive actions. While there is no single overarching law, key sustainability objectives focus on climate change mitigation, waste reduction, energy efficiency, and circular economy principles (*What is a Circular Economy*).

### Federal Regulations

- Resource Conservation and Recovery Act (RCRA)
- Toxic Substances Control Act (TSCA)
- Clean Air Act (CAA)
- National Environmental Policy Act (NEPA)
- National Waste Prevention Strategy
- Food, Drug, and Cosmetic Act (FDCA)
- Executive Order 14057
- Save Our Seas Act 2.0
- U.S. Mexico-Canada Agreement (USMCA)

#### *Federal Regulations*

##### *Resource Conservation and Recovery Act (RCRA)*

Enacted in 1976, RCRA is a foundational federal law that governs the management of solid and hazardous waste, including packaging waste. It sets the framework for waste management systems, recycling programs, and disposal of hazardous materials. It provides guidelines for reducing solid waste generation, promoting reuse, and recycling, and enforcing safe disposal practices. It is enforced by the Environmental Protection Agency (EPA) (*EPA History: Resource Conservation and Recovery Act*).

Relevance to Packaging:

- Packaging waste is considered solid waste, and the EPA uses RCRA to regulate how packaging materials are handled at the end-of-life stage (e.g., recycling, landfilling).
- It incentivizes environmentally responsible practices in packaging waste management.

### ***Toxic Substances Control Act (TSCA)***

Enacted in 1976, the TSCA regulates the manufacturing, importation, use, and disposal of chemicals in the U.S. The law is designed to ensure that chemicals are safe for consumers and the environment. Under TSCA, the EPA can restrict or ban chemicals that pose an unreasonable risk to human health or the environment (*Summary of the Toxic Substances Control Act*).

Relevance to Packaging:

- Chemical safety assessments, to ensure chemicals used in packaging will not leach into food, drink, or other consumer products.
- Regulation of existing chemicals
- New chemicals intended for use in packaging must be reviewed by the EPA before they can be introduced into commerce.

### ***Clean Air Act (CAA)***

The CAA was first passed in 1963 and is considered a landmark in federal environmental laws in the U.S. It regulates air emissions from stationary and mobile sources to protect air quality and public health. The EPA sets National Ambient Air Quality Standards (NAAQS) for pollutants that can harm health or the environment, such as ozone and particulate matter (*Evolution of the Clean Air Act*).

Relevance to Packaging:

- Packaging production processes, especially those involving plastics, are subject to air quality standards to minimize environmental impacts.

- Recyclability of packaging can also affect how emissions and environmental impacts are managed.

### ***National Environmental Policy Act (NEPA)***

Enacted in 1970, NEPA requires “federal agencies to evaluate the environmental impacts of proposed major federal actions,” making (*What is the National Environmental Policy Act?*), before they are carried out. This is typically done through an Environmental Impact Statement (EIS) or an Environmental Assessment (EA), ensuring that environmental factors are considered in federal decision-making (*What is the National Environmental Policy Act?*).

Relevance to Packaging:

- Federal projects involving packaging (e.g., military packaging, government procurement) must comply with NEPA, ensuring that the environmental impacts of packaging are considered in decision-making.
- Life-cycle assessments (LCAs) of packaging materials can be encouraged to assess their environmental footprints.

### ***National Waste Prevention Strategy***

The National Recycling Strategy (2021) and the National Waste Prevention Strategy from the U.S. Environmental Protection Agency (EPA) share common goals of improving sustainability and reducing environmental impact, but they focus on various aspects of waste management (*National Recycling Strategy*). Below is a comparison between the two strategies:

- National Recycling Strategy (2021):
  - The focus of this strategy is primarily on improving the recycling systems in the U.S., to divert more materials from landfills and incinerators by increasing recycling rates.

- It emphasizes improving recycling infrastructure, increasing participation in recycling programs, fostering market demand for recycled materials, and improving the quality and efficiency of the recycling process.
- National Waste Prevention Strategy:
  - This strategy focuses on the prevention of waste generation in the first place. The main goal is to reduce the amount of waste created by industries and consumers before it even enters the recycling or disposal system.
  - It involves source reduction (designing products to use fewer resources and producing less waste), sustainable consumption (encouraging people to buy less or choose products with minimal packaging), and promoting longer product lifespans (e.g., through repairability or reuse).

Relevance to Packaging:

- The EPA sets guidelines for waste prevention and promotes packaging innovations that minimize environmental impacts, such as reducing packaging material use and encouraging recyclable alternatives.
- This strategy addresses packaging through source reduction by advocating for packaging minimalism, reuse, and reducing the environmental impact of packaging in the first place. It encourages businesses to rethink the necessity of packaging and promotes more sustainable, reusable packaging models.

***Federal Food, Drug, and Cosmetic Act (FDCA)***

Enacted in 1938, “the FDCA is a federal law that gives the Food and Drug Administration (FDA) authority to regulate food”, (Lam, 2023), drugs, medical devices, cosmetics, and packaging materials to ensure they are safe for public use. The FDCA includes

provisions for regulating food contact substances (e.g., materials used in food packaging) to prevent contamination and protect public health (Lam, 2023).

Relevance to Packaging:

- Food contact substances (FCS) are regulated, which include any materials, such as plastics, inks, or coatings, which come into contact with food.
- Food packaging approval process
- Regulation of chemical migration
- Good Manufacturing Practices
- Labeling requirements

***Federal Sustainability Plan (Executive Order 14057)***

Executive Order (EO) 14057, “Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability,” was signed in 2021. The directive itself was created to position the US as a leader in sustainability and included several environmental goals (*E.O. 14057 Implementing Instructions* 2022). The overarching goals include:

- Transition to 100% carbon pollution-free electricity (CFE) by 2030
- 100% Zero-emission vehicle acquisitions
- Net-zero emissions building portfolio by 2045
- Net-zero emissions from federal procurement
- Climate-resilient infrastructure and operations
- Climate and sustainability-focused federal workforce

Relevance to Packaging:

- Sustainable procurement goals by prioritizing the purchase of sustainable products and services.
- Reduction in greenhouse gas emissions
- Zero waste and circular economy
- Sustainability standards and reporting

As of January 2025, this EO has been revoked, but a lot of the framework that has been established is highly likely to influence future policies, as well as create influence in the corporate sustainability sector.

***Save Our Seas Act 2.0***

This is a significant piece of U.S. legislation aimed at addressing ocean plastic pollution and improving waste management systems to prevent plastic waste from entering the oceans. The act builds on the Save Our Seas Act of 2018 and extends efforts to reduce marine debris, enhance recycling infrastructure, and support global efforts to combat ocean plastic pollution (Allyn Stern, 2020). The overarching goals include:

- Improving U.S. waste management infrastructure
- International collaboration and global initiatives
- Expanded research and data collection
- Plastic waste reduction and reduction of single-use plastics

Relevance to Packaging:

- Encouraging better recycling of packaging materials
- Support for sustainable packaging

- Addressing single-use plastic packaging
- Circular economy for packaging

### ***US-Mexico-Canada Agreement (USMCA)***

The USMCA (formerly NAFTA) sets trade standards and environmental obligations between the U.S., Mexico, and Canada. Packaging regulations, particularly around plastics and waste management, are influenced by trade agreements like USMCA (*EPA's Role in International Trade Agreements*).

Relevance to Packaging:

- Environmental and sustainability standards helping align packaging regulations across North American markets.
- Promoting conservation in timber consumption
- Pushing for utilization of regionally sourced materials

### ***State Legislation***

#### ***Extended Producer Responsibility (EPR) Laws***

As mentioned above in European Law, these EPR Laws also require manufacturers in the US to take responsibility for the lifecycle of their packaging, including the collection, recycling, and disposal of packaging materials once they are no longer in use.

States that have current or forthcoming EPR schemes include:

- California: Plastic Pollution Prevention and Packaging Producer Responsibility Act (SB54)
- Maine: Packaging Stewardship and Recycling Program
- New York State: Extended Producer Responsibility (EPR) for Packaging Legislation (Proposed)

- Colorado: Extended Producer Responsibility (EPR) for Packaging and Paper Products Law
- Vermont: Extended Producer Responsibility (EPR) for Packaging Law
- Maryland: Extended Producer Responsibility (EPR) for Packaging Law (Proposed)
- Massachusetts: Extended Producer Responsibility (EPR) for Packaging Law (Proposed)
- Minnesota: Extended Producer Responsibility (EPR) for Packaging (Proposed)
- Washington: Waste Reduction, Recycling, and Packaging Extended Producer Responsibility (EPR) Bill (Proposed)

### ***Packaging Waste and Recycling Laws***

State laws focused on increasing recycling rates, reducing packaging waste, and mandating specific recycling systems for packaging materials. These can include mandatory recycling programs, deposit return schemes, and bans on non-recyclable packaging.

States that have current or forthcoming packaging waste and recycling laws include:

- California: Integrated Waste Management Act (AB 939)
- California: Senate Bill 343
- Maine: Statewide Waste Diversion Program
- Maine: Bottle Bill
- Colorado: Recycling Modernization Law
- Colorado: Statewide Waste Diversion Goals
- Vermont: Waste Reduction and Diversion Plan
- Vermont: Food Waste and Packaging Waste Reduction Initiatives
- Maryland: Waste Diversion and Recycling Program

- Massachusetts: Plastic Bag Ban Law
- Massachusetts: Expanded Bottle Deposit Law
- Minnesota: Waste Management Act
- Minnesota: Recycling and Resource Management Program
- Rhode Island: Recycling and Waste Management Program
- Washington: Plastic Packaging Reduction and Recycling Act
- New York State: Environmental Protection Fund (EPF) for Recycling Infrastructure  
(Proposed)
- Minnesota: Green Chemistry and Sustainable Packaging Program (Proposed)

### ***Single-Use Plastic and Material Bans***

Laws banning or restricting the use of single-use plastics or specific packaging materials, such as polystyrene foam, plastic bags, and straws.

States that have current or forthcoming single-use plastic and material bans include:

- California: Recycling and Plastic Pollution Reduction Act (SB 54)
- Maine: Plastic Pollution Reduction and Recycling Act (Proposed)
- New York City: Plastic Waste Reduction Laws
- Washington: Single-Use Plastic Product Ban
- Washington: Plastic Waste Reduction and Recycling Act
- Washington: Plastic Pollution Reduction Plan
- Colorado: Plastic Pollution Reduction Act
- Vermont: Plastic Waste Reduction and Pollution Prevention Law
- Hawaii: Plastic Waste Reduction and Recycling Bill

- Maryland: Foam Food Container Ban
- Massachusetts: Single-Use Plastics and Packaging Reduction Initiative
- Minnesota: Plastic Waste Reduction Policies
- Rhode Island: Plastic Waste Reduction Act

### **Straws**

- Hawaii: Plastic Straw Law
- Maryland: Plastic Straw Law
- Rhode Island: Single-Use Plastic Straw Restrictions

### **Polystyrene Foam**

- Maine: Expanded Polystyrene Foam Ban
- Hawaii: Expanded Polystyrene Foam Ban
- Massachusetts: Polystyrene Foam Ban Law
- Minnesota: Expanded Polystyrene Foam Ban
- Rhode Island: Foam Food ware Ban

### **Plastic Bags**

- New York State: Plastic Bag Waste Reduction Act
- Maine: Single-Use Plastic Bag Reduction Law
- Vermont: Single-Use Plastic Bag Ban
- Maryland: Plastic Bag Reduction Law
- Hawaii: Plastic Bag Ban

### ***Circular Economy Initiatives***

State laws support the circular economy by promoting the reuse, repair, and recycling of packaging, closing the loop on material waste, and encouraging businesses to design packaging that can be reused or remanufactured.

States that have current or forthcoming circular economy initiatives include:

- Colorado: Circular Economy Strategy
- Hawaii: Zero Waste Initiative
- Rhode Island: Sustainable Materials Management (SMM) Program

### ***Consumer Transparency and Labeling Laws***

Laws require businesses to provide clear labeling of packaging materials to inform consumers about recyclability, sustainability, or the presence of harmful chemicals in products and packaging.

States that have current or forthcoming laws:

- California: Assembly Bill 660 (AB 660) Food Date Labeling Reform
- California: Safe Cosmetics Act of 2005 (Senate Bill 484)
- Vermont: Genetically Engineered Food Labeling Act (Act 120)
- Connecticut: An Act Concerning Genetically Engineered Food (House Bill 6527)
- Maine: An Act to Protect Maine Consumers' Right to Know About Genetically Engineered Food (LD 718)

### ***Packaging Material Reduction Laws***

Laws focused on reducing the amount of packaging used in products to minimize waste generation, such as requirements to reduce excess packaging or packaging thickness.

States that have current or forthcoming packaging material reduction laws include:

- California: Plastic Pollution Prevention and Packaging Producer Responsibility Act (SB 54)
- Colorado: Management of Plastic Products (HB21-1162)
- Maine: An Act to Support and Improve Municipal Recycling Programs and Save Taxpayer Money (LD 1541)
- Minnesota: Packaging Waste and Cost Reduction Act
- New Jersey: Packaging Reduction and Recycling Infrastructure Act
- Oregon: Plastic Pollution and Recycling Modernization Act (SB 582)

## **Canada**

### ***Definition of Packaging***

Under the Consumer Packaging and Labelling Act a "container," refers to any “receptacle, package, wrapper, or confining band in which a product is offered for sale,” (*Government of Canada* 2022). This definition explicitly excludes package liners, shipping containers, or any outer wrapping or box not customarily displayed to the consumer.

### ***History***

Canada has a multi-layered legislative framework for packaging that includes federal, provincial/territorial, and municipal regulations. The key areas of legislation focus on labeling, safety, waste management, environmental responsibility, and plastics reduction (*Complete Guide to Canadian Packaging Standards: Key Regulations & Requirements* 2025). Here's a breakdown of the main legislation and regulatory initiatives in Canada related to packaging.

## ***Federal Legislation***

### ***Consumer Packaging and Labelling Act (CPLA)***

The Consumer Packaging and Labelling Act (CPLA) is designed to ensure that consumers receive accurate and meaningful information about prepackaged products. Administered by the Competition Bureau and the Canadian Food Inspection Agency, the CPLA mandates standardized labeling requirements including bilingual product identity declarations, net quantity disclosures, and manufacturer details. By prohibiting false or misleading representations and prescribing clear rules for label presentation and packaging practices, the Act plays a vital role in promoting transparency, preventing deceptive marketing, and supporting informed purchasing decisions in the Canadian marketplace (*Consumer Packaging and Labelling Act* 2019). The overarching goals include:

- Single-use plastics prohibition regulations
- Prohibits manufacture, import, and sale of certain single-use plastics (e.g., checkout bags, cutlery, straws, food service ware).
- This applies to prepackaged consumer products
- Requires accurate labeling of identity, quantity, and manufacturer/distributor

### ***Food and Drugs Act (FDA) & Food and Drug Regulations (FDR)***

The FDA is a federal statute that governs the importation, exportation, manufacture, sale, and advertising of food, drugs, cosmetics, and medical devices. Its primary objective is to protect public health by prohibiting the sale of unsafe or misleading products. The Act defines key terms such as food, drug, cosmetic, and device, and outlines general prohibitions against adulterated or misbranded products. It also grants the Minister of Health authority to enforce compliance,

including conducting inspections, seizing non-compliant products, and issuing recalls (*Classification of Products Under the Food and Drugs Act 2024*).

Relevance to packaging:

- Material safety and composition
- Labeling requirements
- Tamper evidence and safety features
- Durability and stability
- Traceability and identification
- Eco-design trends

### ***Canadian Environmental Protection Act (CEPA)***

The Canadian Environmental Protection Act of 1999 is Canada's principal federal environmental legislation, designed to prevent pollution and protect both the environment and human health. It provides a comprehensive framework for managing toxic substances, controlling pollution, and promoting sustainable development across various sectors (*Overview of Canadian Environmental Protection Act 2017*).

Relevance to packaging:

- Toxic substance restrictions
- Chemical substance assessments
- Pollution prevention planning
- Single-use plastics and waste minimization

## ***Provincial/Territorial Legislation***

### ***Extended Producer Responsibility***

As in both the EU and US EPR schemes are established to shift the burden of waste management from municipalities and taxpayers to producers. In Canada, the following are established schemes:

- British Columbia: Recycling Regulation (BC Reg. 449/2004)
- Ontario: Blue Box Regulation (O. Reg. 391/21)
- Quebec: Environment Quality Act (Bill 65, 2020)
- Alberta: Extended Producer Responsibility Regulation (Alta. Reg 194/2022)
- Saskatchewan: The Household Packaging and Paper Stewardship Program (E-10.22 Reg 9)
- Manitoba: Packaging and Printed Paper Stewardship Regulation (Man. Reg. 195/2008)
- New Brunswick: Designated Materials Regulation (N.B. Reg. 2024-37)
- Nova Scotia: Extended Producer Responsibility for Packaging, Paper Products, and Packaging-Like Products (N.S. Reg. 139/2023)
- Yukon: Packaging and Printed Paper

## **Mexico**

### ***Definition of Packaging***

While there is not a singular, universally applied legal definition of "packaging" across all Mexican legislation, the term generally refers to any material used to contain, protect, handle, deliver, or present goods. The specific definitions and requirements of packaging vary depending on the product category and the applicable regulations (*Rules of Origin*).

## ***History***

Mexico has implemented several legislative measures to promote sustainability and address climate change. These packaging laws are managed through a hybrid legal structure, where federal laws provide an overarching framework, but states and municipalities play a critical role in implementation and enforcement (*Mexican Justice System*).

## ***Federal Legislation***

### ***General Law for the Prevention and Integral Management of Wastes (LGPGIR)***

The General Law for the Prevention and Integral Management of Wastes (Ley General para la Prevención y Gestión Integral de los Residuos, or LGPGIR) is a cornerstone of Mexico's federal environmental legislation, enacted in 2003 to establish a comprehensive framework for waste management across the country. The law aims to reduce waste generation, promote "reuse and recycling, and ensure the environmentally sound disposal of residual waste," (Procuraduria Federal de Protección al Ambiente, 2016). It categorizes waste into three types: urban solid waste, special management waste, and hazardous waste. Each with specific guidelines for management and responsibility. Under LGPGIR, producers and importers are increasingly accountable for the life cycle of their products, aligning with extended producer responsibility (EPR) principles. The law also encourages the development of state and municipal programs for waste prevention and management, reflecting Mexico's federal structure while setting national standards. Through this legislation, Mexico seeks to protect human health and the environment by transitioning toward more sustainable and circular waste practices (Procuraduria Federal de Protección al Ambiente, 2016).

Relevance to Packaging:

- Reinforces extended producer responsibility (EPR)

- Provides categorization of packaging waste
- Encourages sustainability design principles in packaging
- Reporting and compliance structures

### ***General Law on Climate Change (GLCC)***

Enacted in 2012, the GLCC establishes a comprehensive framework for mitigating and adapting to climate change. The overarching goals include:

- Emission reduction targets to reduce greenhouse gas emissions by 30% by 2020 and 50% by 2050.
- Renewable energy generation that at least 35% of electricity be generated from clean energy sources by 2024.

### ***General Law on Circular Economy***

The General Law on Circular Economy (Ley General de Economía Circular, LGEC), enacted in 2021, establishes a legal framework to transition Mexico toward a more sustainable, resource-efficient economic model. Focused on reducing waste and maximizing the value of materials throughout their life cycle, the law promotes practices such as reuse, repair, remanufacturing, and recycling across all sectors (*General Law on Circular Economy 2021*).

Relevance to Packaging:

- Encourages the design of recyclable, reusable, or compostable packaging
- Reinforces extended producer responsibility (EPR)
- Mandates participation in sector-specific circular economy programs that set measurable sustainability goals.

## Comparison of Different Regulatory Frameworks

This section compares the strengths and weaknesses of packaging regulations across various regions and countries, evaluating them against key criteria that assess their effectiveness in promoting sustainable packaging practices. These criteria include stringency, enforceability, flexibility, success in meeting goals, industry impact, and consumer impact.

- **Stringency** examines how ambitious the regulations are in setting requirements for recyclability, material reduction, and waste management.
- **Enforceability** considers how well regulations are monitored and whether penalties for non-compliance are meaningful.
- **Flexibility** assesses whether businesses have options for different compliance pathways or must adhere to a single, mandated approach.
- **Success in meeting goals** looks at whether regulations have led to measurable progress in waste reduction and circularity.
- **Industry impact** explores how regulations drive innovation, cost implications, and operational changes for companies.
- **Consumer impact** evaluates how regulations influence consumer behavior, from packaging choices to recycling participation.

The specific regulations selected for this comparison include: the EU Packaging Waste Directive (PPWD & PPWR), EU Extended Producer Responsibility (EPR), US Federal Packaging Regulations, California's Plastic Ban & EPR, and Other State Regulations (e.g., Maine, Oregon EPR). These were chosen due to their significant influence on packaging practices, innovation, and industry adaptation. These regulatory frameworks are representative of

both the broader global push toward sustainability and the specific regional strategies that have been implemented to address packaging waste, recyclability, and environmental impact.

By evaluating these regulations using the highlighted criteria, this section offers a comparison of how different regions approach sustainable packaging and makes highlighting the outcomes and emerging trends driven by these diverse regulatory frameworks clearer.

**Table 1**

*Comparison of Packaging Regulations: EU vs. US and State vs. Federal Regulation*

	EU Packaging Waste Directive (PPWD & PPWR)	EU Extended Producer Responsibility (EPR)	US Federal Packaging Regulations	California's Plastic Ban & EPR	Other State Regulations (e.g., Maine, Oregon EPR)
<b>Stringency</b>	High – Strict targets on recyclability, reuse, and waste reduction. Bans on single-use plastics.	High – Requires producers to finance collection, sorting, and recycling of packaging waste, with specific material targets.	Low – No federal mandates for packaging sustainability. Guidelines exist but lack enforcement power.	Very High – Bans on plastic bags, straws, and microplastics. Requires 65% of plastic packaging to be recyclable by 2032.	Moderate to High – Some states enforce EPR laws and bans, but effectiveness varies.
<b>Enforceability</b>	Strong – Mandatory compliance with clear penalties and harmonized regulations across EU countries.	Strong – Producers must comply with fees, reporting, and recycling targets, with penalties for non-compliance.	Weak – Lack of federal enforcement means voluntary industry participation.	Strong – State agencies enforce compliance, with penalties for non-compliance.	Moderate – Some states have penalties, but enforcement varies.
<b>Flexibility</b>	Moderate – EU-wide framework allows some national adaptation, but businesses face strict deadlines.	Moderate – Producers can choose methods to meet recycling targets, but compliance is non-negotiable.	High – Companies have more freedom in packaging choices but at the cost of sustainability.	Low – Strict bans and mandated EPR programs with limited flexibility.	Moderate – State-level policies vary, allowing for flexibility in implementation.

<b>Success in Meeting Goals</b>	High – EU has the highest recycling rates globally (average 64%), and packaging waste per capita is decreasing in some nations.	High – EPR schemes have increased recycling rates and shifted fiscal responsibility from taxpayers to producers.	Low – U.S. recycling rates are below 30%, and packaging waste per capita is among the highest in the world.	High – California has reduced single-use plastics significantly and is a leader in EPR.	Varied – Maine, Oregon, and Washington show promise with EPR, but impact is still developing.
<b>Industry Impact</b>	Significant – Forces companies to redesign packaging and shift toward a circular economy.	Significant – Increases producer accountability, requiring packaging redesign and material shifts.	Minimal – Companies can largely self-regulate and set voluntary sustainability goals.	High – Businesses must comply with bans and EPR, leading to packaging redesign and material shifts.	Moderate to High – Industries must comply with new EPR laws, impacting product costs and packaging choices.
<b>Consumer Impact</b>	Positive – Clear labeling, improved recycling systems, and better product sustainability.	Positive – Enhances recycling infrastructure, provides clearer labeling, and reduces packaging waste.	Neutral/Negative – Confusion due to lack of national standards, and greenwashing is a common issue.	Positive – Consumers see reduced plastic waste and more sustainable options.	Mixed – Some states have strong infrastructure, while others struggle with implementation.
<b>Challenges</b>	Compliance costs for businesses, potential trade barriers, and enforcement gaps in some member states.	High compliance costs, complex reporting requirements, and potential resistance from producers.	Fragmented state regulations create inconsistency; lack of federal enforcement limits impact.	Opposition from plastic and retail industries; enforcement requires strong state oversight.	Varying levels of industry pushback and enforcement challenges.

### ***Key Conclusions***

Per this analysis, it has highlighted that EU regulations are leading the charge in promoting sustainable packaging by providing comprehensive, enforceable frameworks that accelerate progress. In contrast, U.S. federal regulations, which lack similar stringency, have prompted individual states, such as California, to introduce more aggressive measures like plastic bans and EPR programs. While these state-specific policies show promise in advancing

sustainability, they also present challenges for businesses due to the patchwork nature of compliance across different regions. This fragmented regulatory environment, seen in states like California, Maine, and Oregon, can create inconsistencies and add complexity to the operational processes of companies that must navigate varying standards.

## **Packaging Trends**

Packaging regulations are increasingly shaping the way businesses approach product packaging, driving significant trends in the industry. As governments and regulatory bodies implement stricter sustainability standards, companies are adapting by innovating their packaging practices to meet new requirements. These shifts are not only promoting environmental responsibility but are also influencing economic and operational strategies across sectors. From the adoption of sustainable materials to the rise of reusable packaging models, the impact of these regulations is broad and multifaceted. This section explores key trends in packaging that have emerged as a direct result of regulatory frameworks, highlighting the evolution of design, materials, and consumer behavior in response to these changing standards.

### ***Shift Towards Sustainable Materials***

There has been a noticeable increase in the use of recyclable, biodegradable, and compostable materials in response to growing environmental concerns and regulatory pressures. Companies are adopting these alternatives to traditional packaging materials, not only to meet regulatory requirements but also to align with consumer demand for more sustainable options. These materials are designed to reduce the environmental footprint of packaging, offering a more sustainable solution to waste management.

The growth in plant-based and renewable packaging options has also been a key trend, driven by the push for sustainable packaging solutions. Materials like bioplastics, made from

renewable resources such as corn and sugarcane, are gaining traction as alternatives to petroleum-based plastics. These plant-based materials offer the potential for reduced carbon emissions and less environmental harm throughout their lifecycle. Furthermore, there has been a significant reduction in the use of single-use plastics, largely driven by stringent regulations aimed at curbing plastic waste. As governments around the world impose bans or taxes on single-use plastics, companies are accelerating their shift toward sustainable packaging to comply with regulations and reduce their environmental impact. This shift reflects a broader movement toward circular economy principles, where packaging is designed to be reused, recycled, or composted, minimizing waste, and promoting sustainability.

### **Figure 1**

#### **Biobased Packaging Materials**



*(How compostable are bioplastics in packaging? 2024)*

#### ***Design for Recyclability***

There has been a growing emphasis on designing packaging that is easier to recycle or reuse, as companies and regulators focus on improving waste management and reducing environmental impact. One of the key strategies has been simplifying packaging materials to ensure they can be more efficiently processed in recycling systems. This includes using materials

that are widely accepted in existing recycling streams, reducing contamination, and making it easier for consumers to properly sort and dispose of packaging.

To further improve recycling rates, there has been a push for the standardization of materials across different packaging categories. Standardizing materials, such as using consistent types of plastic or paper, ensures that recycling systems can more easily process and sort packaging. This reduces the complexity of the recycling process, allowing for better recovery of valuable materials and increasing the overall efficiency of recycling programs. Additionally, design changes are being made to improve the sorting and processing of packaging in recycling streams, such as using clear labeling, removing multi-material combinations, and eliminating non-recyclable components. These changes are intended to ensure that packaging is both easier for consumers to recycle and more effectively handled by recycling facilities, ultimately contributing to a more circular economy.

## Figure 2

### Recyclable Packaging



(Peek, 2025)

### ***Minimalist Packaging***

Reducing packaging size and weight is a strategy to minimize waste and lower environmental impact. By using smaller and lighter packaging, companies not only reduce the amount of material required but also lower the carbon footprint associated with production, transportation, and disposal. This approach aligns with the broader goals of waste reduction and resource efficiency, helping to limit the environmental burden of excessive packaging.

**Figure 3**

Minimal Beverage Packaging



*(33 examples of extraordinary minimalist packaging Designs 2016)*

### ***Increased Adoption of Reusable Packaging Models***

There has been a notable rise in the adoption of reusable and refillable packaging systems as businesses seek more sustainable alternatives to single-use packaging. Reusable packaging allows products to be packaged in containers that can be returned, refilled, and reused multiple times, significantly reducing waste and the need for new materials. This shift is not only driven by consumer demand for more eco-friendly options but also by increasing regulatory pressure to reduce packaging waste and promote sustainable practices.

**Figure 4****Loop Brand Refillable Products**

(Peters, 2021)

***Innovation in Packaging Materials***

Materials such as mushroom-based packaging, seaweed, and edible packaging are emerging as innovative solutions that offer biodegradable or even compostable alternatives to traditional plastic. These materials are gaining attention due to their potential to break down naturally without leaving harmful residues, addressing the growing concern over plastic pollution. Additionally, innovations like water-soluble packaging leave no waste behind, and packaging made from recycled or upcycled waste materials helps reduce the demand for virgin resources and minimizes landfill waste. These alternatives provide exciting possibilities for reducing packaging waste and closing the loop in material use.

**Figure 5**

## Seaweed Material Packaging



(Could seaweed replace plastic packaging? 2024)

***Digitalization and Smart Packaging***

The use of digital tools to track and manage the packaging lifecycle has become increasingly essential as businesses and regulators focus on improving sustainability and waste management. Digital technologies such as RFID (Radio Frequency Identification), QR codes, and blockchain are being employed to enhance the transparency and traceability of packaging systems. These tools enable real-time tracking of packaging materials, allowing companies to monitor the entire lifecycle, from production and transportation to disposal and recycling. By providing detailed data, these technologies help improve recycling rates, ensure compliance with packaging regulations, and facilitate the efficient management of packaging waste.

**Figure 6**

Smart Meat Freshness Packaging



*(The Complete Guide to Smart Packaging)*

**Figure 7**

Interactive Smart Packaging



*(The growing trend of smart packaging 2019)*

### ***Shift to Localized Packaging***

There has been a significant increase in the development of region-specific packaging solutions as businesses adapt to local regulations and consumer preferences. These tailored packaging options are designed to comply with varying regulations across different regions while also appealing to local consumer needs and cultural expectations. For instance, some regions may have stricter waste management laws or preferences for certain types of packaging materials, prompting companies to develop packaging solutions that align with these specific requirements. This localized approach ensures compliance and helps companies strengthen their market position by meeting consumer demands for sustainable and responsible packaging.

Another trend is the growing demand for packaging that can be customized to reduce transport-related carbon footprints. By optimizing the size, weight, and material of packaging for specific regions, businesses can minimize transportation emissions and reduce their overall environmental impact. Customized packaging solutions help to streamline logistics, improve efficiency, and ensure that products are shipped with less waste and lower energy consumption.

### ***Consumer Education and Behavior Changes***

Packaging regulations play a crucial role in shaping consumer understanding and behavior toward recycling and sustainability. By mandating clear labeling, standardized recycling symbols, and guidelines for disposal, these regulations provide consumers with the information they need to make informed decisions about packaging waste. Over time, as these regulations become more widespread, they help educate the public on the importance of proper waste management and the environmental impacts of packaging, fostering a culture of sustainability. This increased awareness often translates into greater consumer participation in recycling programs and more mindful consumption patterns.

The impact of packaging regulations on consumer expectations for eco-friendly products has also been significant. As regulations demand more sustainable packaging options, consumers have become more attuned to the environmental credentials of the products they purchase. Shoppers increasingly expect brands to adopt eco-friendly packaging solutions, such as recyclable, biodegradable, or reusable materials and are more likely to choose products that align with their values. Packaging regulations not only set the standard for what is acceptable but also shape consumer expectations by driving brands to prioritize sustainability in their packaging choices.

## **Policy in Practice: Benchmarking Success & Driving Sustainable Change**

### **Impact Assessment on Packaging**

Packaging sustainability policies are shaped by four interconnected dimensions: environmental, economic, political, and cultural. These elements influence how regulations are developed, implemented, and enforced across different regions.

Examining the key implications of packaging through these lenses, we can consider how environmental concerns shape resource use and waste. How economic factors drive costs and market dynamics. How political forces influence regulatory frameworks and industry standards, and how cultural values impact consumer behavior and societal expectations.

#### ***Environmental***

Understanding the environmental impacts of packaging helps to reveal how even small design decisions can have far-reaching effects on the planet. When packaging uses fewer resources, like water, energy, and raw materials it helps reduce pressure on natural ecosystems and lowers pollution from extraction and manufacturing. Designing packaging that generates less waste means less material ends up in landfills, incinerators, or littering the environment and harming wildlife.

Improvements in recyclability and reusability support a circular economy, where materials are kept in use longer, reducing the need to produce new ones. This minimizes pollution, conserves energy, and decreases the amount of waste that escapes into nature. Lastly, reducing carbon emissions tied to packaging, through better design, lighter materials, and more efficient transportation directly contributes to mitigating climate change. In short, smarter packaging choices lead to healthier ecosystems, fewer greenhouse gas emissions, and a more sustainable relationship with the materials we use every day.

### ***Economic***

An economic impact assessment of packaging evaluates how packaging choices affect a company's financial performance and market position. Key considerations include material and production costs, where decisions around lightweighting, material substitution, or recyclability can influence manufacturing efficiency and raw material expenses. Packaging also affects distribution costs. More compact or durable designs can reduce shipping volumes and damage rates, leading to cost savings across the supply chain. Additionally, packaging plays a strategic role in branding and consumer perception, with sustainable or innovative formats often commanding premium shelf appeal and supporting product differentiation. At the end of a package's life, companies may incur costs related to waste management, recycling, or participation in recovery programs. As sustainability expectations rise, the financial risks of non-compliance, such as fines or reputational damage, must also be considered. Altogether, assessing the economic impacts of packaging helps businesses identify cost-saving opportunities, manage risk, and deliver long-term value to stakeholders.

### ***Political***

A political impact assessment of packaging examines how packaging practices align with evolving government policies, regulations, and public expectations. It considers the regulatory landscape across different markets, evaluating current or emerging laws such as bans on specific materials, mandatory recycled content, or EPR schemes that affect packaging design, production, and distribution. It also assesses the risk of non-compliance, which can lead to fines, legal liability, or restricted market access. As global attention on environmental issues grows, packaging is increasingly shaped by political pressure from governments, advocacy groups, and citizens demanding sustainable solutions. Trade policies, cross-border regulations, and

geopolitical tensions can further impact packaging supply chains and material sourcing. Companies must also consider how their involvement in policy development through lobbying or collaboration can shape both risk and opportunity. Altogether, a political assessment helps businesses anticipate regulatory shifts, manage compliance risks, and engage strategically in the policy-making process.

### ***Cultural***

A cultural impact assessment of packaging explores how packaging interacts with social values, consumer behavior, and local traditions. It considers how cultural norms shape consumer expectations around convenience, waste, and sustainability, influencing how packaging is designed, used, and disposed of. Packaging must be aesthetically aligned with cultural preferences, ensuring that design elements such as colors, symbols, and messaging resonate with local identities and avoid potential cultural missteps. Additionally, cultural attitudes toward environmental consciousness can vary. While some societies emphasize recycling and minimal waste, others may still be developing these practices. Packaging that supports inclusivity, such as multilingual labeling or ergonomic design for diverse age groups, can foster greater acceptance. Ultimately, packaging is not only a functional tool but also a reflection of changing cultural trends and values, from sustainability movements to shifts in lifestyle and consumption patterns.

### ***Key Conclusions***

In conclusion, the success of packaging sustainability policies relies on the careful integration of environmental, economic, political, and cultural considerations. By examining these factors, this assessment highlights how packaging decisions shape sustainability outcomes, influence market dynamics, and guide regulatory compliance. The insights provided here

empower businesses and policymakers to make well-rounded, informed choices that support long-term sustainability goals and drive responsible innovation in packaging.

### **Packaging Sustainability Benchmarking**

By utilizing visual tools, a company can communicate its progress in packaging sustainability clearly and effectively. A dashboard integrating multiple metrics (e.g., compliance, packaging reduction, recycling rates) along with a timeline, circular economy diagram, and impact reduction charts can make the company's efforts transparent, engaging, and measurable.

Specifically, the creation of a radar chart allows an organization to assess performance across several key categories simultaneously, providing a clear view of how well a company is doing in each area and where there may be room for improvement. The axes represent key categories, and each axis is scaled from 0% (no progress) to 100% (full achievement of goals). Each category contains a data point that shows how much progress has been made in each area. These values can be utilized to benchmark performance against target values or even industry standards.

#### ***Advantages of Using a Radar Chart:***

- **Visual clarity:** It makes it easy to compare different sustainability metrics and identify which areas are stronger or need more effort.
- **Progress tracking:** Helps visualize progress toward meeting sustainability goals and regulations.
- **Identifying gaps:** Pinpoints areas where improvements are needed or where strategic changes should be made.

#### ***Key Categories (Axes of the Radar Chart):***

1. **Recyclability:** Percentage of packaging that is recyclable or compostable

2. Plastic reduction: Reduction in the use of single-use plastics or harmful materials
3. Sustainable materials: Use of renewable, biodegradable, or recycled materials
4. EPR compliance: Compliance with Extended Producer Responsibility regulations
5. Circular economy integration: Adoption of circular economy principles (reuse, refill, or closed-loop systems)
6. Carbon footprint reduction: Reduction in carbon emissions associated with packaging materials and processes
7. Waste diversion rate: Percentage of packaging waste diverted from landfills (recycled, reused, or composted)

### *Sample Scenario*

Here is the radar chart showing the progress in various areas of packaging sustainability for the two companies. Let's assume the following assessment in each category.

**Table 2**  
*Sample Scenario*

Category	Percentage (%)	
	Entry	Mature
Recyclability	20	80
Plastic Reduction	10	90
Sustainable Materials	45	55
EPR Compliance	50	90
Circular Economy Integration	30	70
Carbon Footprint Reduction	15	85
Waste Diversion Rate	40	60

For the entry company, their values on the radar chart are lower and more concentrated toward the center. This doesn't mean they're failing, it means they're early on in their journey.

These lower scores typically reflect:

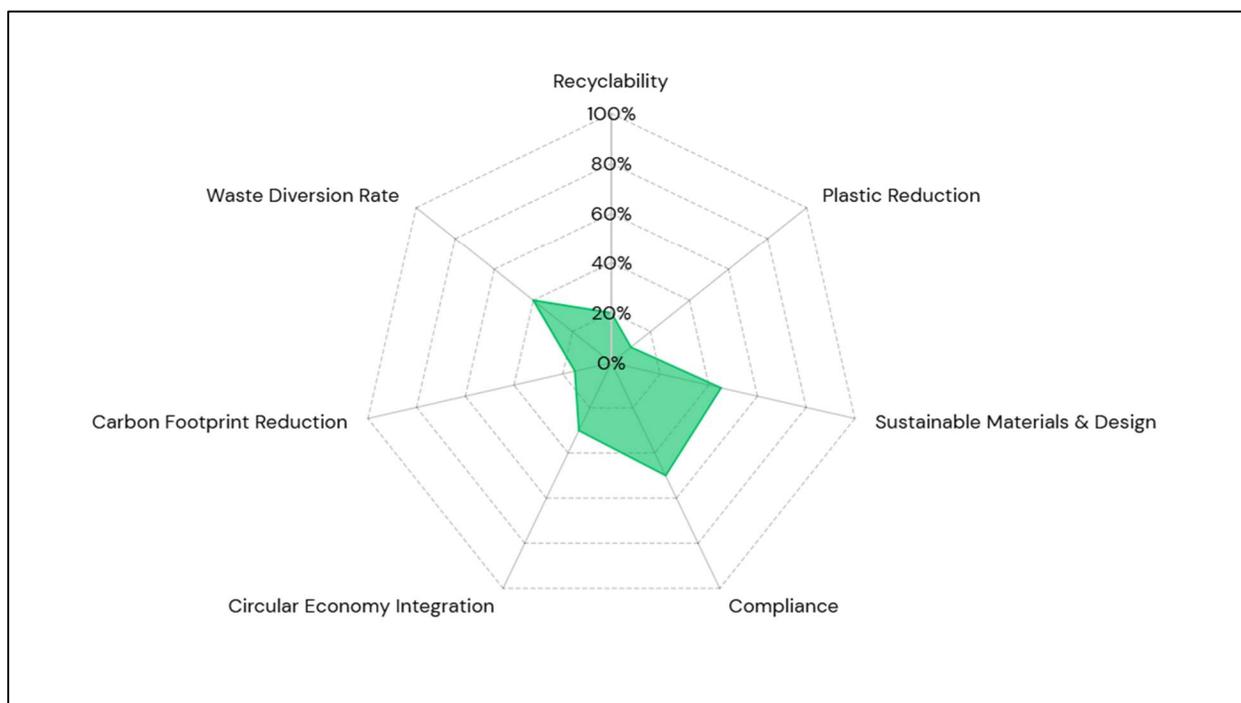
- A limited understanding/or response to emerging regulations

- Minimal use of recycled or renewable materials
- Lack of cross-functional collaboration between packaging, sustainability, and compliance teams
- A sustainability strategy that may be more reactive than proactive

But here's the opportunity, by identifying where they fall short, this organization now has a clear roadmap for growth. The radar chart visualizes not only where they are but where they could go.

**Figure 8**

Entry Organization Rader Chart



Now, if we shift our attention to a more mature organization, we'll notice a broader, more outward-reaching shape across the radar. These higher values indicate a company that:

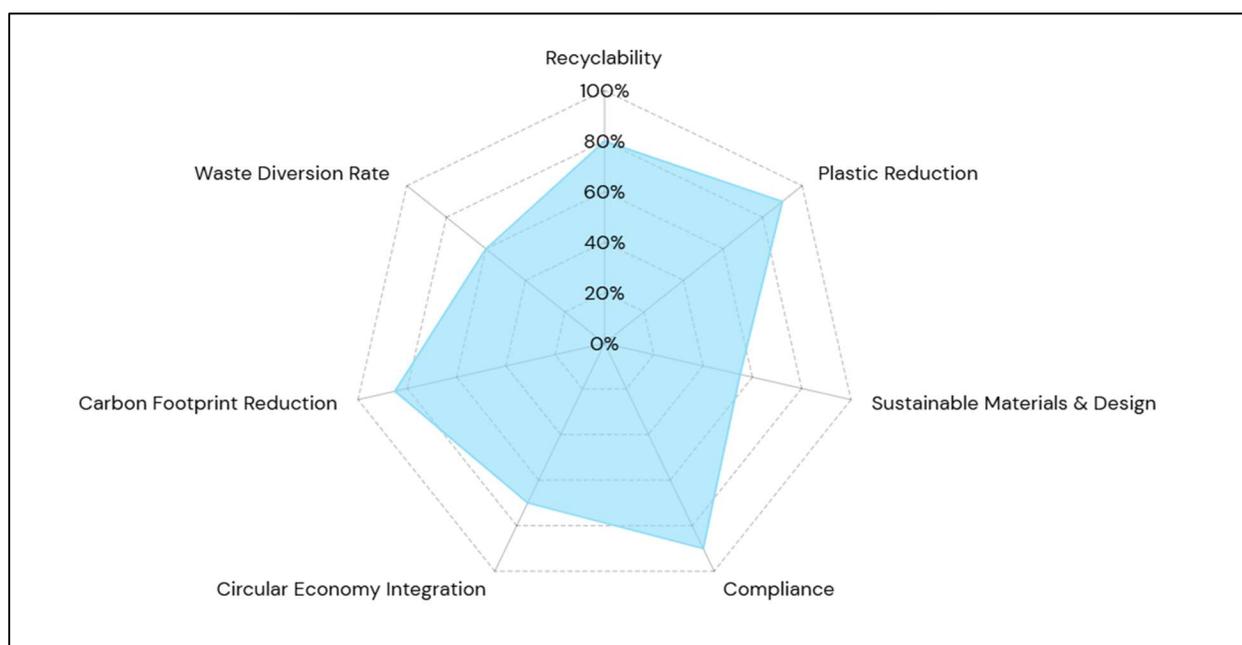
- Has embedded sustainability into its core packaging strategy

- Actively engages in policy shaping and anticipates regulatory trends
- Invests in innovative materials and end-of-life solutions
- Tracks performance against science-based environmental targets

This level of maturity reflects intentional integration, not just meeting the minimum, but driving toward leadership in the sustainable packaging space.

### Figure 9

Mature Organization Radar Chart



### Strategy Recommendations

In conjunction with the utilization of the radar benchmarking tool, companies that need to plan for compliance with packaging regulations and EPR laws should adopt a comprehensive strategy that addresses multiple key areas of operations.

***Understand Current and Upcoming Regulations:***

- Stay informed: Continuously monitor federal, state, and international regulations related to packaging, plastics bans, EPR schemes, and circular economy goals.
- Engage with industry associations: Join organizations such as the Sustainable Packaging Coalition (SPC) or the U.S. Plastics Pact to stay up-to-date on best practices and changes in regulations.

***Conduct a Packaging Audit:***

- Evaluate packaging materials: Assess all packaging materials (plastics, paper, glass, etc.) used, focusing on those subjected to regulation (e.g., plastics, non-recyclable materials).
- Determine the lifecycle: Understand the lifecycle of the products' packaging, from production to disposal or recycling.
- Assess impact: Evaluate the environmental impact of your packaging materials and identify which materials or processes may soon be restricted or penalized under EPR laws or plastics bans.

***Establish EPR Compliance Framework:***

- Identify product categories affected by EPR: Some states require companies to fund or manage the collection and recycling of their products at end-of-life.
- Pay EPR fees: Ensure your company has a process in order to comply with these financial obligations.
- Track packaging data: Accurately track packaging volumes, material types, and the quantities of packaging sold in different regions to comply with EPR reporting requirements.

***Reduce Single-Use Plastics:***

- Phase out harmful plastics: Comply with state and local plastic bans by replacing single-use plastics (e.g., straws, bags, containers) with sustainable alternatives such as biodegradable materials or recyclable plastics.
- Transition to recyclable or compostable materials: Shift to packaging that is more easily recyclable or compostable, as required by many plastics bans.
- Implement design for recycling: Follow the guidelines provided by the Plastic Pact and other initiatives to ensure your packaging is recyclable or reusable.

***Invest in Packaging Innovation:***

- Research and development: Invest in R&D to innovate packaging solutions that align with sustainability goals, like incorporating recycled content, reducing material usage, or improving material recyclability.
- Adopt circular economy principles: Integrate circular economy practices into your packaging design, where packaging is reused, refurbished, or recycled into new products, reducing waste and reliance on virgin materials.

***Build Strong Relationships with Suppliers and Partners:***

- Collaborate on sustainable packaging solutions: Work with your suppliers to source sustainable materials that align with compliance requirements.
- Ensure transparency in the supply chain: Establish transparency in your supply chain to verify the recyclability or compostability of materials and ensure compliance with EPR laws.

***Engage Consumers and Provide Clear Instructions:***

- Consumer education: Educate consumers about how to dispose of or recycle your products responsibly. Use clear labeling to inform consumers about whether packaging is recyclable, compostable, or reusable.
- Encourage participation in recycling programs: Partner with municipalities or organizations that provide recycling services and encourage consumers to participate in those programs.

***Prepare for Reporting and Auditing:***

- Documentation and reporting: Set up systems to capture, track, and report packaging data, ensuring compliance with local and international regulations.
- Regular audits: Conduct internal audits to ensure your packaging compliance strategy is effective, and to identify any areas of non-compliance or improvement.

***Engage in Advocacy:***

- Participate in policy discussions: Stay actively engaged in policy development around packaging regulations.

***Continuous Improvement:***

- **Track performance and set targets:** Set specific sustainability goals for packaging reduction, recycling rates, and use of renewable materials.
- **Innovate and evolve:** As regulations evolve, continuously innovate your packaging strategy to stay ahead of compliance requirements and meet circular economy goals.

By taking a proactive approach to regulatory compliance and packaging sustainability, companies can not only meet legal obligations but also demonstrate leadership in environmental responsibility and contribute to broader sustainability efforts.

## Conclusion

This project set out to unpack the complexities of sustainable packaging regulations across North America and the European Union, offering a comparative lens on regulatory scope, enforcement mechanisms, and policy outcomes. Through this detailed analysis, it becomes clear that while both regions share common sustainability goals, they diverge significantly in regulatory design, implementation, and impact. The European Union has demonstrated leadership through comprehensive, enforceable frameworks such as the PPWR and well-established EPR schemes. These policies, grounded in circular economy principles, have fostered greater material recovery, incentivized design innovation, and aligned stakeholders across sectors. In contrast, North America's decentralized, state-led approach has spurred innovation in isolated jurisdictions but remains hindered by fragmentation, inconsistent enforcement, and slower nationwide adoption of sustainable practices.

The findings underscore that effective packaging regulation must balance environmental imperatives with economic feasibility, political will, and cultural alignment. This is not merely a legislative exercise but a systems challenge that requires harmonized efforts from policymakers, industry leaders, and consumers alike. By introducing a benchmarking framework, this project provides a practical tool to evaluate regulatory alignment, identify gaps, and support continuous improvement in packaging sustainability strategies. These visual tools empower organizations to assess performance transparently and benchmark progress against evolving global standards.

As environmental concerns grow more urgent, the role of packaging policy in driving sustainable systems change cannot be overstated. Regulatory frameworks must evolve to not only set ambitious targets but also ensure equitable enforcement and enable innovation. Global collaboration, adaptive governance, and inclusive stakeholder engagement are essential to

advancing a circular economy and achieving scalable impact. Ultimately, this research calls on governments, industries, and civil society to move beyond compliance and toward a shared vision of sustainability, where packaging systems are not just regulated but reimagined for a regenerative future.

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