



The future of packaging in the circular economy

5 actions for long-term success

accenture

SAP

Contents

Foreword	3
Introduction	4
Insights	6
Circular is vital—today’s value chain needs a radical rethink	7
Plastic has moved from an inconsequential to critical business challenge	11
Token gestures won’t work—we need radical action and transparency	17
Actions	20
Embrace authenticity and transparency	22
Re-imagine packaging R&D	24
Invest in infrastructure and engage communities	27
Expand reuse and explore circular business models	29
Collaborate to scale	32
Conclusion	34
Appendix	35

Foreword

As we approach the midpoint of the Decade of Action, packaging, and in particular plastic packaging, continues to be a priority for consumer goods companies in their efforts to deliver both business and sustainability value.

Packaging ensures safe delivery and consumption of essential products to billions of people every day. However, it has also generated a lot of waste and pollution. If circular packaging solutions do not start to scale, by 2050 there could be more plastic than fish in the ocean.¹

It is a tremendously difficult problem to solve given the complexity of the packaging value chain and the frequent lack of acknowledgment of a circular business case. Current regulations along with increased stakeholder pressure add urgency and reinforce how interconnected sustainability and business efforts have become. Packaging is a waste challenge, a climate challenge, and a human health challenge.

Let's take an honest look at plastics packaging. What's working, and what's not working, in our efforts to transition to a circular economy? Where should the consumer goods industry 'double down'? What practical steps might be taken to reverse trends and bring resource consumption back within sustainable limits?

Drawing on our decades of experience collaborating for the success of our consumer goods clients and deep circular economy expertise, Accenture and SAP have conducted a current-state review of plastics packaging in the consumer goods industry. We view circular economy as the 'Swiss army knife' of solutions for this challenge, not only supporting better planetary outcomes, but also delivering significant business value. Our work has revealed five concrete actions for CEOs and their teams to ensure long-term success in circular packaging—including embracing authenticity and transparency, re-imagining packaging R&D, investing in infrastructure, expanding and exploring circular business models, and collaborating to scale.

We know that these opportunities are there for consumer goods companies that seize them. There has never been a better time to act—at speed, and at scale.

Wesley Spindler

Global Lead, Circular Economy
Managing Director, Sustainability Services
Accenture

Stephen Jamieson

Global Head of Circular
Economy Solutions
SAP



"Packaging is a waste challenge, a climate challenge, and a human health challenge."

Introduction

Much like reducing carbon emissions, businesses are increasingly aware of the need to transform the way they make, use, and dispose of plastics and packaging. In fact, 98% of consumer goods CEOs say that it is their role to make their business more sustainable.² The circular economy is a powerful tool to support consumer goods leaders in this ambition.

In contrast with a linear ‘take-make-waste’ economy, the principles of the circular economy offer a much-needed alternative as we seek to decouple growth from the consumption of resources and materials, creating new value chains that are regenerative by design. Businesses cannot afford to stand still and ignore the value embedded in circular. Shifting just 20% of plastic packaging to a reuse model, for example, is a USD 10+ billion business opportunity.³ In addition, circular represents untapped potential for improving the consumer experience and increasing brand loyalty.⁴

The circular transition represents exciting possibilities: from savings on single-use plastic taxes to large-scale implementations of new product categories from circular business models. It’s a striking example of sustainability impact embedding across multiple business processes throughout the entire value chain.

To equip CEOs to embrace this transition at scale, we’ve conducted a review of the state of plastics packaging in the consumer goods industry. This work revealed three distinct yet interrelated insights, illuminating what doesn’t work and why, and the growing expectations from stakeholders to find solutions that do work. These findings set up the “why” of the circular packaging challenge: how we got to where we are today. The five actions that follow describe “how” to make those solutions scalable for a future we imagine, one in which packaging becomes the catalyst for new forms of circular value.

Consumer goods companies cannot afford to stand still and ignore the value embedded in the circular economy.

Imagine a future...

Of authenticity and transparency
in impact measurement

Where nothing is designed to go
to waste

Where communities have the
infrastructure to manage all
plastics and packaging streams
in support of human health

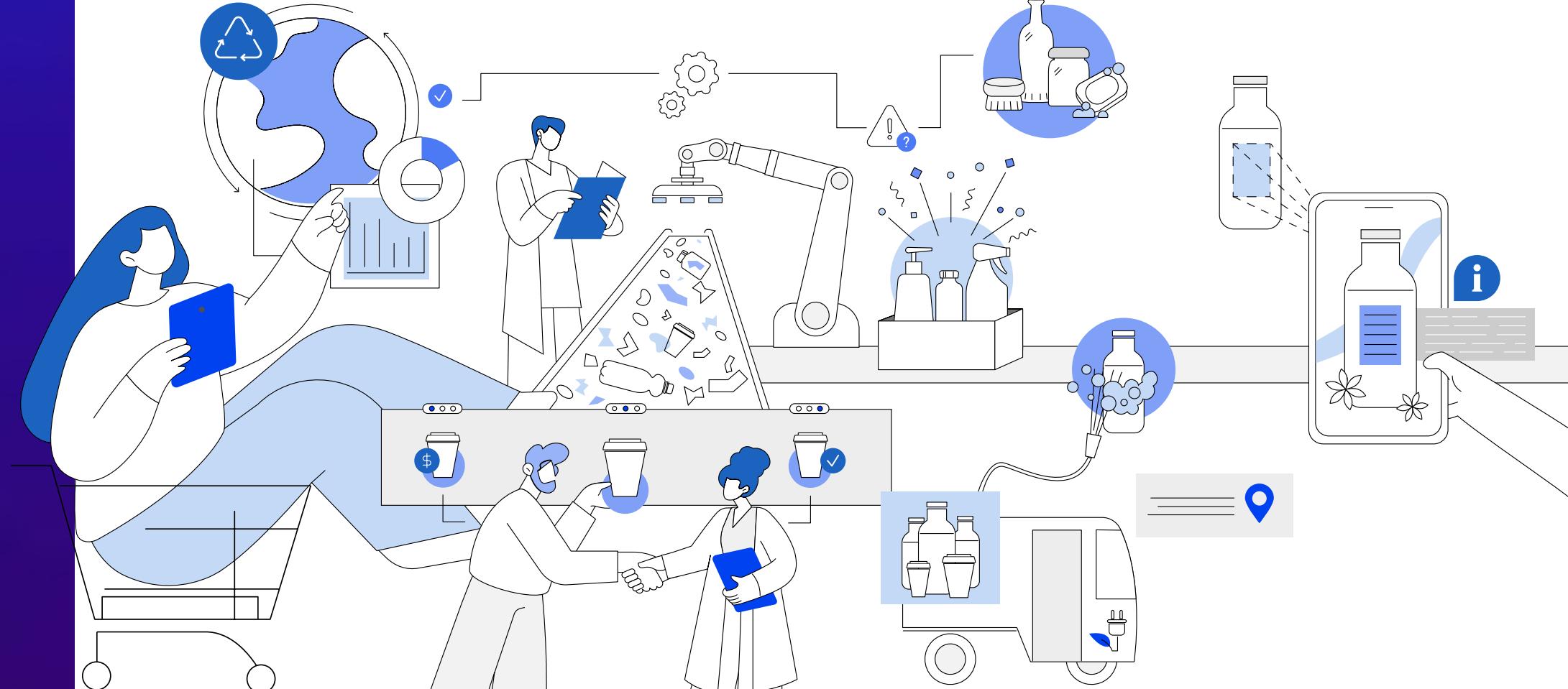
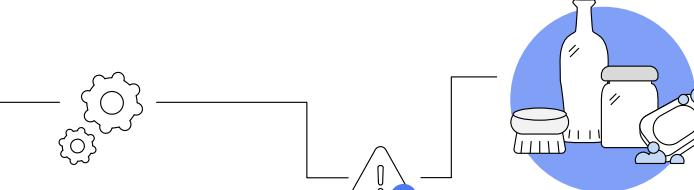
Where customers value digital
experiences over traditional brand
value in packaging

And invest in infrastructure and
engage communities

Five actions for long-term success

Re-imagine packaging R&D

Invest in infrastructure and engage communities



Embrace authenticity and transparency

Collaborate to scale

Explore and expand circular business models

Insights

What's working, and what's not working, in our efforts to transition to a circular economy?

Insight 1

Circular is vital— today's value chain needs a radical rethink

The consumer goods industry is off track in addressing plastic packaging pollution. Packaging is the biggest contributor to plastic pollution and accounts for nearly 40% of global plastic demand that almost exclusively becomes waste.⁵ Like every other industry, consumer goods businesses are struggling to translate circular economy ambitions into concrete action. Globally, methodologies, frameworks and initiatives embraced by the plastic and packaging industry are failing to deliver long-term results.⁶ Their approaches generally prioritize reporting actuals from the front end of the value chain (i.e. material inputs) over disclosures associated with end-of-life solutions.

Plastic commitments are falling flat and, among the European food and drink companies, two-thirds of pledges to go greener on plastic have failed or been dropped.⁷ What's more, in their latest report the Ellen MacArthur Foundation shared the lack of progress being made by signatories to the UNEP Global Commitment. The report notes that most of the signatory organizations, representing 20% of all plastic packaging produced globally, will 'very likely' not achieve their target of 100% reusable, recyclable or compostable packaging by 2025. Collective virgin plastic use of FMCG (Fast-Moving Consumer Goods) has also returned to 2018 levels.⁸



Across the value chain, the confluence of three additional factors has led the industry to continue to fall short of a circular future.

We lack visibility into our supply chain

Like in most other industries, consumer goods companies lack end-to-end visibility of their packaging supply chain. They often lack data on upstream materials and downstream end-of-use treatment, highlighting the need for systematic tracking of the packaging portfolio from material to recycling and reuse.⁹ Limited visibility hinders transparent progress reporting, essential for decision-making and stakeholder accountability, and obstructs the adoption of circular material loops.¹⁰ To create this visibility, supplier engagement programs and end-user tracking technologies will be crucial in building upstream and downstream ecosystem collaboration.¹¹

We don't yet see our consumers as key suppliers

The role of consumers and the human impact at the end of a circular value chain is hugely undervalued. Consumers will become a business's most important supplier in a truly circular ecosystem. Today just 4-14% of plastic waste is processed into municipal recycling, clearly insufficient for consumer goods companies to achieve their recycling targets.¹² As companies face a demand for increased accountability on their resource use and Scope 3 impact (emissions from sources owned or controlled by other entities in the value chain), influencing the behavior and actions of consumers will be a key lever to creating a circular system.¹³

"A major challenge in circular packaging is supply chain changes. They can be very complex, very expensive and very slow."

Brian Bauer

Circular Economy & Institutional Partnerships, Algramo

Our waste management is not performing or operating efficiently

Recycling is crucial to meeting packaging commitments, but it's not applied effectively worldwide. The efficacy and transparency of recycling practices differs vastly around the world.¹⁴ For instance, the European Union (EU) publishes recycling rates on an annual basis while the latest comprehensive information in the US is from 2018.¹⁵

To be considered recyclable, packaging should not only be designed for recyclability but also able to be easily recycled at scale. Underperforming material recovery facilities (MRFs) cause inefficiencies and significant loss of material. Current sorting technology is effective at handling only approximately 30% of plastic packaging, while many smaller material recovery facilities still sort by hand.¹⁶ There is a lack of investment and know-how to improve operational efficiency of waste management. The recycling industry needs to accelerate its transformation towards consolidation and modernization at scale.¹⁶ Collaborative efforts can go a long way to incentivize material recovery facilities and support lower-income countries to develop better waste management infrastructures.¹⁷



Globally, waste management efficacy is low, with 22% of waste mismanaged.¹⁷

To realize a circular packaging future, it's crucial for consumer goods companies to take ownership in transforming the packaging value chain. The value chain of today is lacking data and resource loops to enable a circular tomorrow. Consumer goods companies must surmount these challenges, bringing together upstream and downstream actors in plastics packaging with concrete and tangible actions.

Transitioning to a circular packaging value chain requires integrating 3 core capabilities:



Source: Accenture

Insight 2

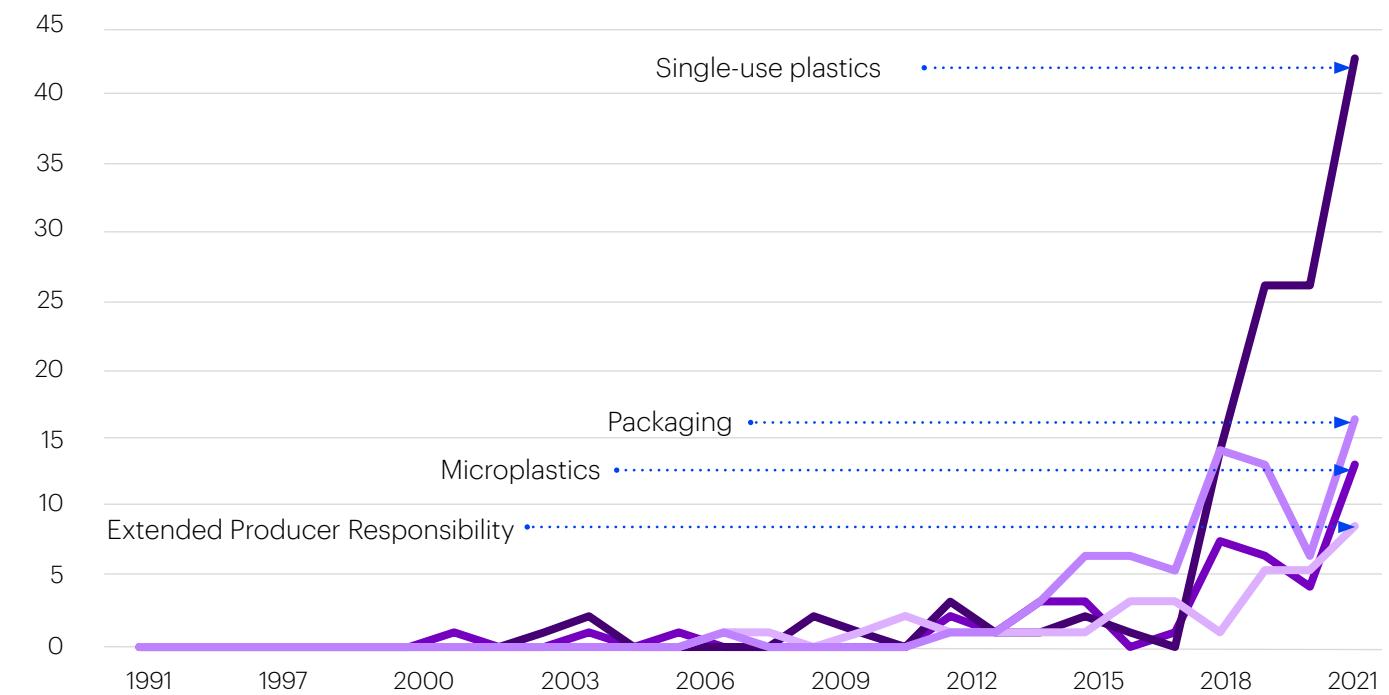
Plastic has moved from an inconsequential to critical business challenge

Regulators are just getting started

Solving the challenges in today's value chain becomes all the more urgent in the face of growing regulation around plastics and increased stakeholder pressure, not least because of the impact plastics pollution has on human health. Consumer goods leaders may feel both stunned and stretched by the plethora of packaging policies and the stringent regulatory landscape across the globe.

With investors now also focused on the plastics issue,¹⁹ and growing consumer preference for circular packaging²⁰ the pressure is mounting. But perhaps the greatest stakeholder pressure is coming from governments and regulators, for whom driving action on plastics and packaging has become a circular economy priority, with nearly 300 unique regulatory instruments now active globally.²¹

We have seen a hundred-fold increase in plastic policies since the 90s¹⁸



Source: Plastic Policy Inventory, Nicholas Institute for Energy, Environment & Sustainability

176

**Regulatory
instruments**
(bans)

69

**Information-
based instruments**
(education & outreach)

53

**Economic
instruments**
(fees or subsidies)

The United Nations' Global Plastics Treaty is moving forward and could lead towards an international legally binding agreement on plastics by 2025.²² Businesses must continue to seek opportunities for representation through entities like the Business Coalition for Global Plastics Treaty and leverage this treaty as a catalyst for change.²³

Regionally, the EU is setting a high bar and companies should prepare for regulations like the Packaging & Packaging Waste Directive (PPWD). Beyond the EU, other regulatory tools like Extended Producer Responsibility (EPR) schemes, plastic taxes, labeling requirements, and Deposit Refund Schemes are continuing to spread.²⁴ Country specific regulations will drive inconsistent reporting requirements, creating headaches for multinational businesses.

“We need to ensure that we live in circularity and that is what this legally binding treaty, agreement, framework, instrument should seek to do.”

Inger Andersen

Executive Director UN Environment Program

What does this mean for consumer goods companies?

Regional programs will accelerate change

The EU's Packaging & Packaging Waste Directive (PPWD) outlines stringent recycling targets and is propelling reuse and refill²⁵ solutions due to key proposed 2030 and 2040 targets for producers and final distributors across a wide range of food and beverage packaging, and transport packaging.

Anticipate widespread expansion of plastic taxes

Regulators often levy plastic taxes to drive businesses to transform upstream packaging and leverage eco-design principles. With taxes in place in the UK and Spain, and under discussion in Italy, expansion across the EU is expected as countries analyze how to cope with the financial impact of the plastic tax on the non-recycled plastic packaging waste by European Council (0.8 EUR/kg)²⁶ and ultimately pass on the cost to producers.

EPRs are evolving and moving towards full producer responsibility, eco-modulation, and harmonization

Full Producer Responsibility: Globally, EPR schemes are evolving towards “full EPR programs,” where producers cover the entire net operational costs of the system and manage the waste management operations through Producer Responsibility Organizations (PROs).²⁷

Eco-modulation: Some leading countries have adopted eco-modulated EPR schemes. Eco-modulation bases the EPR fees on environmental factors and policy objectives. This can include penalties for companies that use materials that are environmentally harmful and incentives for improved recyclability and light packaging.²⁸ In practice, these schemes drive an increase in the percentage of recycled content and compliance with design for recyclability and reusability. This both incentivizes and enables businesses to consider environmental aspects right from the design phase of the product development process.

Harmonization: Interoperability within regions is critical to ensure workable systems exist and environmental benefits are achieved.²⁹ This will take time but will ultimately help both governments and producers scale their efforts more efficiently.

Single Use Plastics Bans and Deposit Refund Schemes (DRS) will advance re-use and recovery

Bans and Deposit Refund Schemes may be the key to enabling an EPR. DRS incentivizes the return of end-of-use packaging products through a refundable deposit. DRS have been a key instrument to create awareness on circular packaging and help with the collection and sorting of used bottles/cans etc. and ultimately increased recycling rates. Major brands around the world have been effectively supporting returnable deposit schemes to promote the reusability and recyclability ecosystem.

Looking ahead, consumer goods companies will continue to face increased complexity as countries can and will continue to take different approaches to plastics and packaging regulations.

Plastic tax

UK: Emphasizing recycled plastic content in the packaging.³⁰

Spain (effective 2023), and Italy (under discussion): Focusing on reusable packaging and penalizing non-reusable or single-use plastics with non-recyclable content.³¹

Reuse and refill systems

France: Encouraging refill systems with a new requirement that by January 2030, 20% of the floor surface of large retail shops must be fitted with a refill system or single-use packaging free.³²

EPR: Eco-modulation

France: Incentivizing eco-design and rewarding packaging that meets sorting guidelines and penalizing packaging that interferes with the recycling processes, like multi-layer plastics.³³ Packaging made with post-consumer recycled content is rewarded with a fee reduction of up to 50%.³³

EPR: Full Producer Responsibility

Germany: Requiring companies/producers to pay fees to cover all expenses associated with waste management operations—from collection and sorting to the recycling of packaging waste.³⁴

UK: Implementing a full cost EPR scheme where producers will be required to pay an EPR fee towards collection, sorting, and recycling of packaging waste, previously borne by local authorities. The annual costs to plastics producers are estimated at £1.2 billion.²⁷

EPR: Harmonization

Canada: Aiming for harmonization across provinces in a proposed yet not fully established EPR as part of a broader EPR Canadian action plan.³³

UK: Promoting interoperability between the four nations—England, Wales, Scotland, and Northern Ireland—as key to sustaining environmental benefits.³⁵

Deposit or Container Refund Schemes

Australia: Launching, in the state of Victoria, a DRS in late 2023 in partnership with beverage producers which includes authorized collection points throughout the state for consumers to obtain their container refund.³⁶

UK: Piloting as part of a partnership between Burger King and Loop a deposit-based reusable and returnable packaging system to gain consumer insights and test a scalable solution for reusable packaging programs.³⁷

Single Use Plastics Ban

India: Implementing a ban on single use plastics at varying speeds across respective state governments and local pollution boards.³⁸

Spotlight on human health

Many believe that human health will be the ultimate catalyst for true change in plastics packaging.

Plastic & human health

The last few years have seen growing concern about the impact of plastic on human health, from extraction to disposal, amidst emerging evidence that plastic is accumulating not only in our environment but also in human bodies. To date there is a considerable lack of research and knowledge on the impact of plastic on human health. The high level of uncertainty, the lack of data and low traceability prevent researchers from establishing firm conclusions on the potential causal link. Across all entities, there is a consensus on the need for future research and a global treaty to address those concerns.³⁹



Key takeaway

Consumer goods companies should consider the growing body of research on the potential impacts of plastics on human health. When it comes to plastic and human health, three key points emerge:



Microplastics are raising concerns

In the last few years, the World Health Organization (WHO) has been shining a spotlight on the widespread dispersal of microplastics, raising concern regarding the exposure and effects on human health.⁴⁰ The size and shape of the particles can be a main indicator of potential toxicity and the smaller the particles, the more harmful they can be to human health.⁴¹ Scientists are starting to understand the effect of microplastics on human health as it passes between the brain and blood barrier.⁴²

To increase accountability, more research is needed that supports identifying the source of microplastics and we expect subsequent regulatory and legislative frameworks to drive change.



Research on plastics health impacts is growing

Many substances classified as hazardous according to the EU regulations,⁴³ are present in our everyday plastic packaging such as The per- and polyfluoroalkyl substances (PFAS), phthalates, heavy metals, and flame retardants.⁴⁴ In a recent report on plastic and human health, the Minderoo Foundation underscored the harmful human health effects of plastic chemicals on reproductive issues, brain health issues and chronic diseases, with children and plastic production workers being particularly vulnerable.⁴⁵

Consumer Goods Companies need to consider, with their upstream packaging value chain, the growing body of science on plastic toxicity into planning for circularity.



Circularity will play an important role

The circular economy could reduce the health risk of plastic packaging with initiatives such as increasing recycled content, end-of-life recycling rates and overall reuse.⁴⁶ As a concrete example, recycling instead of landfill or incineration leads to a 28% reduction in human health damage (stated as DALYs, or disability-adjusted life years).⁴⁶

It is time for companies to investigate circular packaging solutions as a lever to minimize the impact of packaging on human health.

Insight 3

Token gestures won't work —we need radical action and transparency

With the stringent regulatory environment and stakeholder pressure, the consumer goods industry faces a clear choice. It can either continue to be part of the plastic packaging problem or it can lead the way in identifying and embracing viable solutions. The first step is recognizing what doesn't work, starting with the lack of transparency. Consumer goods companies have an opportunity to use their voices and acknowledge the facts. In the last decade, the world has produced approximately as much plastic as in the second half of the 20th century and production is still increasing at exponential rates.⁴⁷ Scientific experts argue that the anticipated Global Plastic Treaty should put a cap on global plastic production from virgin feedstock with targets, timetables, and national contributions.⁴⁸

As we approach the midpoint of the Decade of Action, it is urgent we pick up the momentum for change. By discussing past mistakes and learnings, business leaders can avoid repeating them and instead prioritize developing scalable solutions that can make a lasting impact.

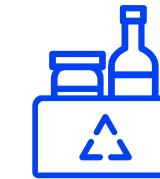


Consumers are offering clear signals

87%

of European citizens are concerned about the environmental impacts of plastics.⁴⁹

Despite recent challenges in the global economy, consumers' interest in zero-waste packaging alternatives is growing.⁵⁰ Accenture conducted a consumer desirability survey on consumer product and packaging preferences in early 2023. Our research shows that consumers expect brands to reduce unnecessary packaging, to eliminate single use products wherever possible and to offer refillable and/or reusable options.⁵¹



75%

Of French consumers say food and beverage and personal care and beauty industries have a responsibility to shift towards sustainable packaging



51%

Of US consumers expect food and beverage companies to offer reusable and/or refillable packaging

The heightened pressure from regulators to consumers shows no signs of slowing, and in fact could completely shift the packaging mindset. This isn't exactly a new idea. There are lessons in how we used to receive goods and services. Consider the classic milkman who delivered milk to people's homes in glass bottles which were then returned, washed, and reused. This commonsense approach to reuse can be reinvented today—better than we did it before.

Key takeaway

To move beyond pilot purgatory and drive meaningful change, corporates working to reduce plastic waste must embrace a mindset of learning from failures to address what doesn't work. Transparency, especially externally, on pilot successes, challenges and learnings will be required to move the needle as an industry. Given the scale of the challenge, there isn't enough time for each consumer goods company to learn the same lessons individually.

It's time to stop investing in low-impact solutions...

Recent research highlights that consumer goods companies are allocating their resources towards packaging solutions that have a minimal impact.⁵²

"Most of the effort of FMCGs goes into making packaging more recyclable and reducing packaging, which does not solve the fundamental problem."

Jo Chidley

Founder of Re

The longer we talk about recycling as the only solution, the less focus, investment, and government incentives are put in place for future innovations.

... and escape pilot purgatory

Pilots are essential proof points and necessary to test concepts before widespread introduction. Unfortunately, these are rarely designed with scaling in mind and often lack the necessary underlying infrastructure to support ongoing operations and supply chain integration.⁵³ Isolated pilots, running in parallel to linear business models, can become highly discouraging and expensive failures.⁵⁴

Through a review of 50 corporate communications on circular pilot programs between 2017 and 2023, **only two demonstrated transparent impact measurement and consistent progress updates. This would seem to indicate that 48 lacked the ability to scale.** In short, the overwhelming majority of pilots have not shown progress beyond the initial announcement, with no acknowledgement of cancelled pilots or shared learnings from those projects.⁵⁵

Actions

From an opaque broken value chain
to active, truthful collaborators



Today's value chain and operating environment is not sufficiently driving the transition towards a circular future, and consumer goods companies are trapped in a state of continuous testing without progress.

Based on the insights from our research, circular economy leaders at Accenture and SAP have identified five key actions to transform consumer goods companies and the industry from an opaque broken value chain to active, truthful collaborators. Strong functional ownership and clear governance and accountability are required to accelerate action. By taking these steps today, the industry will be in a strong position to build a more circular future.

01



Embrace authenticity and transparency

02



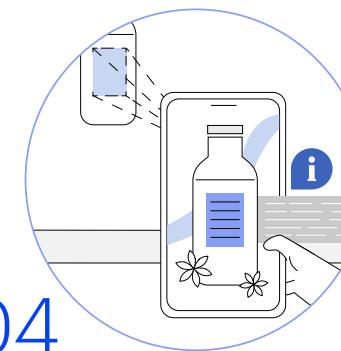
Re-imagine Packaging R&D

03



Invest in infrastructure and engage communities

04



Grow reuse and explore Circular Business Models

05



Collaborate to scale

Source: Accenture



Action 1

Embrace authenticity and transparency

Standardized sustainability reporting on plastics and the regulatory environment makes it impossible for companies to ignore the call to action. But before they can do so meaningfully, companies need to understand their actual impact—and to be honest about it. Beyond regulations, to successfully implement a circular economy for plastics, **companies must prioritize transparency and use data to authentically measure the real impact of new designs and innovative solutions. It's essential to consider the trade-offs between environmental impacts and business imperatives and acknowledge the challenges businesses face implementing circular solutions.** This can be done concurrently while working towards improvement, acknowledging along the way what doesn't work and taking human impacts as well as carbon impact into account. All-encompassing impact methodologies such as a Life Cycle Assessment can be a helpful tool. Third-party verification of reporting and performance will become increasingly important for credibility in ensuring expectations are met, and procurement and manufacturing specifications are addressed.



“What gets measured, gets done—and it is critically important to select the right KPIs.”

Ramona Liberoff

Platform for Accelerating the Circular Economy

In practice companies need to:

Demonstrate authenticity by acknowledging setbacks along with successes.

How? Set the foundation with baseline measurement and design the underlying data and infrastructure to ensure authentic and continuous reporting. To start, aim to capture all packaging data at a single point within the organization to develop a single source of truth. Then, consider powerful data foundations to generate end-to-end value chain visibility in real time. A digital twin, for example, leverages data to map physical material flows, uncover bottlenecks in the supply chain, and generate an authentic representation of a pilot's progress.⁵⁶

Embrace transparency and provide full disclosure on methodology and impact across all categories and geographies.

How? Leverage existing standards bodies and methodologies from International Organization for Standardization (ISO),⁵⁷ Global Reporting Initiative (GRI),⁵⁸ Climate Disclosure Standards Board (CDSB),⁵⁹ and others to aid public disclosures on packaging across material categories.⁶⁰ Demonstrate transparency towards the consumer by sharing relatable, relevant, and easily digestible information.¹⁴

Case study spotlight

Accenture and SAP enabled a multinational food-product company to standardize and automate its reporting on the new Spanish plastic tax by implementing SAP's Responsible Design and Production suite. The Spanish plastic tax intends to penalize producers of non-reusable or single-use plastics with non-recyclable content. SAP RDP helped the client simplify the packaging regulatory landscape and move from a reactive reporting approach to a proactive way of linking regulatory impacts and packaging design decisions. Customers can leverage SAP RDP to drive circular and sustainable design of products and packaging while ensuring regulatory compliance and minimizing business impact in one solution.



Action 2

Re-imagine packaging R&D

Our approach to design must change if we are to create new value through packaging innovation and move towards a future with less and less packaging. This act of reimagination is essential for the authenticity and transparency companies seek. Packaging of tomorrow needs to be purpose driven, with sustainability incorporated early in design, making consumer insights essential. The future of packaging will extend the product's definition, where for example the packaging itself becomes a part of the product, making choice and design of the related technologies and materials even more critical.

We have become used to overspecification, where a product's packaging is often designed for an extended shelf life and challenging transportation pathways. To overcome this barrier, we need to clarify these three questions: *What is your product's true shelf life? What do you demand from your packaging? What does your product need to do?* To start answering those questions, members of the Consumer Goods Forum Plastic Waste Coalition of Action have aligned on Golden Design Rules for packaging design to increase the circularity of their packaging such as removing problematic elements, reducing virgin plastic use and using on-pack recycling instructions, among others.⁶¹



Key takeaway

Adopting a Circular Design-to-Value philosophy encourages companies to identify sustainable design interventions while creating commercial value. This philosophy consists of three layers:

Leverage advanced technology and tools for packaging design

Metaverse technologies, and Artificial Intelligence (AI)-enabled design tools help companies explore a products' full lifecycle, conduct fast prototyping and testing, and optimize material usage.

How? A circular-based design approach like Accenture's Circular Design Accelerator can identify design interventions while also creating commercial value like expected savings and emissions abatement. For a dairy product's packaging, we identified a 6% potential carbon emissions abatement from reducing the packaging thickness by 20% while creating net economic benefits.

Use smart, connected packaging to push and pull data downstream and upstream

Our previous research shows that only 16% of businesses are using smart packaging today. Yet when they do, businesses significantly outperform in customer relevance, operational resilience, and environmental and social responsibility.

How? Smart packaging uses QR codes or digital tags to enable businesses to build data-driven feedback loops across the product lifecycle and value chain. For product development, information is pulled upstream for timely and proactive responses to consumer needs and expectations. Information can also be pushed downstream, providing consumers with a richer and more interactive product experience.⁶²

Plan for and monitor material innovation

Material innovation has been identified as one of the key plastics and packaging impact areas to accelerate the Race to Zero,⁶³ with a potential 12-16% reduction in carbon emissions. Biodegradable and even edible packaging technologies, such as edible coatings that extend shelf-life for fresh fruits and vegetables,⁶² have broadened the horizon for new packaging materials.

How? Conduct a comprehensive evaluation of next-generation material by thoroughly examining its environmental impact across its entire life cycle. Also consider the practicality of the package's end-of-life options rather than solely focusing on technical feasibility. Engage design, innovation, and packaging research teams throughout the process and ensure procurement can determine a long-term circular sourcing strategy.

Enabling a Transition to Circular Business Models

Accenture supported Unilever to transition to circular business models for packaging, using refill models to deliver on better user experience. Accenture co-created with both the client and consumer insights to develop the refill product design. The deodorant product has a significantly lower environmental footprint, saving 342.9 tons of virgin plastic by 2023 and thus directly contributing to Unilever's commitment to ensure that 100% of plastic packaging is designed to be fully reusable, recyclable or compostable by 2025.⁶⁴ With a promise of 'buy once, refill for life', the refillable deodorant is made from super durable stainless steel and includes a lifetime guarantee.⁶⁵

Reduce

Reducing plastic waste per product from 50g to 0g.

Repurpose

Repurposing material in current waste streams from existing Unilever products to produce new ones.

Refill

Formulating a refill-driven offering that focuses on a holistic approach.

Relationship

Creating a high-quality object that provokes an emotional relationship and transforms overtime.





Action 3

Invest in infrastructure and engage communities

Innovative solutions require the infrastructure and community support to implement them. Consumer goods companies have historically left recycling responsibilities to the consumer, but society increasingly expects business to take an active role beyond the design and use of their packaging and to contribute to its collection, reuse, and recycling. In a European consumer survey, the vast majority of respondents (89%) believe that companies need to be held responsible for the packaging they place on the market and only use packaging that is fully recyclable.⁶⁶ Low collection rates, processing inefficiencies and price volatility are the main obstacles in today's waste management infrastructure.¹⁶

“It is one thing to design for recyclability, but we need the infrastructure for collection and that must occur in all markets”

Kane Jacker

Packaging Sustainability
Mondelez International



Key takeaway

Companies should think locally in a granular way to drive relevant solutions for the specific context, environment, and communities in which it operates. At the same time, business needs to invest globally in infrastructure to balance the recycled content supply and demand. How to do it varies across each stakeholder group.

Communities

In many countries, informal workers like waste pickers, are still significantly contributing to the collection, sorting, and recycling of plastics. Investment in infrastructure must support human rights, health and well-being,⁴⁵ and livelihood of those on the front line of the waste management effort.⁶⁷ Engaging local impacted communities and working towards informal sector inclusion is key to long-term success.

Municipalities & legislators

It is important that local government is engaged to invest in infrastructure and solutions, and to incentivize change. Working collaboratively is an important lever for engagement at the local level.⁶⁸

Collection & sorting systems

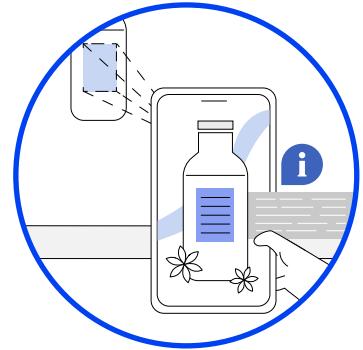
Implementation of alternative collection systems such as a Deposit Refund Scheme has great potential to increase recycling rates.¹⁶ A leading chemical company affirmed that “central to any collection are End Producer Responsibility and Deposit Refund Schemes.”¹⁶ Investment in AI and automated waste sorting, such as new innovations from AMP Robotics, can increase recycling performance by 10%, sorting recyclables at a rate of 80 items per minute with 99% accuracy, thus improving the value of the secondary resources generated from the recycled output.⁶⁹

Recycling infrastructure

Accelerated & coordinated investments in recycling infrastructure are key to reach the recycling target announced by consumer goods companies.⁷⁰ As an example, Circular Services, a newly launched recycling, and reuse infrastructure developer, is focused on driving coordinated investment with over \$700M USD to invest in the US.⁷¹

Case study spotlight

As an example, Danone is committed to increase the proportion of recycled plastic content in their packaging to 50% by 2025 and to specifically recover more plastic than is used from Indonesia. To reach this target, the company partnered with a leading local waste management company and Veolia to build one of the largest and most modern recycling centers. In the same region, they launched a nationwide campaign of recycling education and collaborate with local government to activate community awareness. In this long-term strategic and coordinated investment and infrastructure program, launched in 2018,⁷² Danone has engaged with all key stakeholders, from local communities to municipalities, to provide innovative recycling infrastructure.



Action 4

Expand and explore circular business models

Incorporating circular packaging is often seen as a strategic imperative yet companies face roadblocks in consumer adoption and market uncertainties. Fortunately, the business model for circularity is growing stronger as companies step up their innovation and commitment. **Shifting 20% of plastic packaging to a reuse model is in fact a USD 10+ billion business opportunity³ and represents untapped potential for improving the consumer experience and increasing brand loyalty.⁷³** The key considerations to expand reuse and explore circular business models are to de-risk your business model in stages, ensure a reasonable breakeven point, and find partners. Regarding consumer desirability, an Accenture survey demonstrates that there is a rising case for refillable and reusable packaging both in France and in the US: across industries over 81% of customers currently purchase or want to purchase goods with refillable and reusable packaging.⁵¹



In the United States, 1 in 2 personal care and beauty consumers already purchase reusable and refillable products



Across the United States and France, 1 in 3 food and beverage consumers is interested in purchasing products that come in reusable and refillable packaging

Key takeaway

Circular packaging is not a moonshot. It is attainable if companies take concerted steps to conduct user research, test and learn, create the business case, and collaborate across the value chain pre-competitively to scale.

How to do it?



Conduct user research to ensure a high adoption rate of the packaging solution.

It is crucial to understand established consumer behavior and their willingness to adopt new practices and ultimately be able to translate those into tangible packaging concepts.⁷⁴ Incorporate new consumer desirability data from Accenture to guide this innovation towards strong consumer adoption.



Develop a business case for circular packaging.

Circular systems present an opportunity for brands driving loyalty, offering a better user experience and consumer engagement and they can also drive economic opportunities. Ensure a feasible breakeven point in the cost and the environmental impact of the model. For example, Re is leveraging servitization to reach cost efficiency. Reusable packaging can cost three times more than its counterpart. Packaging as a service provides a lease structure at the same price as the virgin material and eliminates uncertainties for consumer goods companies.



Use a test & learn approach to speed the process.

Leveraging rapid experimentation to unlock the most shared challenges instead of investing in high-pressure pilots. Each iteration of testing will lead to a refined methodology with higher probability of success. A test & learn approach allows to de-risk your business model.



Connect to advance progress.

To be effective, circular models require a systemic change involving all value chain actors. Consider Algramo, a technology-led innovator of refillable containers, which offers a collaborative platform to connect stakeholders.⁷⁵ Another example is Re, whose value proposition is a universal, professionally refillable, reusable packaging platform.⁷⁶

Take backs and reverse logistics are key to all circular packaging business models.

But they need to be cost effective, resource efficient and convenient.

How to do it? Here are the four elements for successful take-backs.

- Maximize utilization of existing transportation capacity by leveraging existing delivery routes to minimize carbon emissions and costs.
- Form win-win partnerships with existing entities across the value chain to de-risk the investment.
- Implement a data-enabled system for efficient tracking to measure the benefits.⁷⁷
- Make the takeback process desirable with incentivization of returns and as convenient as discarding the packaging. This will help drive consumer adoption and improve the overall effectiveness of the system.

Loop is capitalizing on the power of reverse vending machines. The machines mimic the way consumers buy, use, and dispose of packaging, making reuse as easy as throwing stuff out. Loop is placing reverse vending machines for deposit in retail stores, like Carrefour or Walmart, for convenient packaging return.⁷⁸



“There is a lot of space for packaging as a service. There is a call for shared infrastructure, for standardization of packaging and a need to make it accessible across multiple consumer groups.”

Food & Beverage Global Packaging VP



Action 5

Collaborate to scale

Collaboration is one of the critical and necessary components for circular packaging to gain traction. Consumer goods companies can join forces with partners across the value chain—such as packaging suppliers, retailers, end-consumers, waste managers and recyclers—to meaningfully advance goals, and to unlock shared risk and shared reward. There are also opportunities to partner noncompetitively with peers, co-investing in enablers such as recycling infrastructure.

Taking a collaborative approach has the potential to solve many of these pain points:

- Mitigate risk through shared upfront investment
- Leverage partner strengths to fully scale solutions and capture shared value
- Bring pilots to scale
- Unlock value for partners (and beyond) that could not be delivered independently
- Coordinate learning experiences and good practices

Engaging in intentional collaboration across downstream and upstream stakeholders can move the needle on meaningful action. Consumer goods companies need to join forces with partners such as packaging suppliers, retailers, end-consumers, waste managers and recyclers.⁴

In essence, we need pre-competitive collaboration, to create industry harmonization and make it simple for the consumer to do their part.⁵² Pre-competitive collaboration and value chain coordination at scale are two crucial steps.

“Everyone, including major recyclers, needs to align on objectives so that we can find solutions across the value chain and achieve our end goals.”

Chemical manufacturer in a partnership consortium¹⁶



How to do it? The primary areas of collaboration for a circular packaging value chain are:

Communities of practice on packaging

to organize forums for authentic and transparent exchange on circular innovation insights, challenges and learnings.⁷⁹

Standardization of design

to unlock the scale and robustness of the system. A standardized packaging format has the potential to minimize complexity and take the burden off of consumers. This requires engaging the largest players at the start.⁸⁰

Collective investment

to fund advanced infrastructures through partner value unlocked across the value chain. A crucial success factor is establishing equitable flow of value and investments among partners.¹⁶

Price and market stability

to drive overall market development via collaborative mechanisms that reduce price volatility. Define pricing and contract models across value chain stakeholders for long-term investments and stable trading relationships.¹⁶

Systemic approach

to connect the dots.⁸¹ Consider the capabilities of existing actors and the infrastructure that is in place compared to what is needed. As an example, Re has taken a systems approach for universal standardized packaging as a service. They are connecting key circular stakeholders and accelerating the transition to reuse.⁵¹

"We will need verticals to come together in a pre-competitive way."

Multinational food & beverages company in a partnership consortium¹⁶

Conclusion

A circular packaging future is within our grasp

Even as consumer goods leaders face a growing mountain of regulatory challenges and complexity, it's clear that progress is possible. There is a path forward to a sustainable packaging future.

Meaningful action starts with authenticity and transparency to drive credible solutions with tangible impact. We must embrace a collective mindset of learning from each other, sharing what works and what doesn't.

Re-imagining packaging R&D across the value chain through advanced design tools, smart packaging, and material innovation will step us forward. Coordinating investment with downstream stakeholders and expanding reuse and circular business models in a systemic way will foster the ecosystem change we need to see. The nature of this challenge makes a multi-stakeholder approach essential.

Through the right combination of these key actions, consumer goods companies are positioned to take a leading role and collaborate across their value chains and with their competitors to make meaningful impact on the future of packaging, moving past pilots to circularity at scale.



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Research methodology

Leveraging our human capital and resources

We conducted a deep-dive current-state review of plastic packaging based on stakeholder interviews, existing research, and market trends.

Drawing on experience

We also based our insights on decades of experience collaborating for the success of our consumer goods clients and our deep understanding of the circular economy.

Validating our observations

Once the insights and actions were defined, we put them to test with Accenture's own experts in circular economy, packaging, and materials among others.

References

1. WWF, "Will there be more plastic than fish in the sea?," 2023, <https://www.wwf.org.uk/myfootprint/challenges/will-there-be-more-plastic-fish-sea>
2. Accenture, "How supply chain sustainability helps unlock resilience and growth," March 2023, <https://www.accenture.com/fi-en/insights/supply-chain-operations/supply-chains-key-unlocking-net-zero-emissions>
3. Ellen Mac Arthur Foundation, "Reuse – rethink packaging," 2021, <https://ellenmacarthurfoundation.org/reuse-rethinking-packaging>
4. Circle Economy, "Will you be my partner? Collaborations in the circular economy," May 2020, <https://www.circle-economy.com/resources/will-you-be-my-partner-collaborations-in-the-circular-economy>
5. Plastic Europe, "Plastic the facts 2021," 2021, Plastics - the Facts 2021 (plasticseurope.org)
6. WBCSD, Enabling Corporate Plastic Disclosure," 2022, <https://www.wbcsd.org/contentwbc/download/15363/224535/1>
7. Deutsche Welle, "European food firms break plastics promises," 2022, <https://www.dw.com/en/european-food-companies-break-their-plastics-promises/a-62622509>
8. Ellen Mac Arthur Foundation, "The Global Commitment Report 2022," 2022, <https://ellenmacarthurfoundation.org/global-commitment-2022/overview>
9. Accenture, 'Reinventing packaging,' 2022, <https://www.accenture.com/us-en/insights/industry-x/reinventing-packaging>
10. Ellen Mac Arthur Foundation, "Reuse – rethink packaging," 2021, <https://ellenmacarthurfoundation.org/reuse-rethinking-packaging>
11. Accenture, "Can you see your Scope 3?," Dec 2022, <https://www.accenture.com/content/dam/accenture/final/accenture-com/document/Accenture-Visibility-Into-Scope3-Emissions-Report.pdf#zoom=40>
12. OECD, "Towards a more resource-efficient and circular economy," 2021, <https://www.oecd.org/environment/waste/OECD-G20-Towards-a-more-Resource-Efficient-and-Circular-Economy.pdf>
13. Accenture, "Our Human Moment," 2022, <https://www.accenture.com/us-en/about/events/ces>
14. OECD, "Towards a more resource-efficient and circular economy," 2021, <https://www.oecd.org/environment/waste/OECD-G20-Towards-a-more-Resource-Efficient-and-Circular-Economy.pdf>
15. WEF, "How is the growing plastic waste problem impacting America?," 2022, <https://www.weforum.org/agenda/2022/05/plastic-waste-generation-new-highs-us-report/>
16. From a collaborative Accenture project on recycled plastic
17. OECD, "Global Plastic Outlook," 2022, <https://www.oecd.org/newsroom/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm>
18. Nicholas Institute for Energy, Environment & Sustainability, "Plastic Policy Inventory," 2023, <https://nicholasinstitute.duke.edu/plastics-policy-inventory/search?f%5B0%5D=keyword%3AMicroplastics>
19. Morningstar, "Investors Fight Against Plastic Packaging," Apr 2022, <https://www.morningstar.com/articles/1087887/investors-fight-against-plastic-packaging>, As You Show, "Empowering shareholders to change corporations for good," 2023, <https://www.asyousow.org/>
20. Shorr, "The 2022 Sustainable Packaging Consumer Report," July 2022, <https://www.shorr.com/resources/blog/the-2022-sustainable-packaging-consumer-report/>, Meyers, "Sustainable Packaging Trends for 2023 and beyond," Nov 2022, <https://www.meyers.com/meyers-blog/sustainable-packaging-trends/>
21. Duke University Nicholas Institute, "Annual Trends in Plastic Policy: A Brief," 2020 https://nicholasinstitute.duke.edu/sites/default/files/publications/Annual-Trends-in-Plastics-Policy-A-Brief_2.pdf
22. UNEP, "What you need to know about the plastic pollution resolution," 2022, <https://www.unep.org/news-and-stories/story/what-you-need-know-about-plastic-pollution-resolution>
23. UNEP, "Integrate Extended Producer Responsibility within the International Plastics Treaty," Nov 2022 https://apps1.unep.org/resolutions/uploads/integrate_epr_within_the_international_treaty_on_plastics_pollution_1.pdf
24. UNEP, "Plastics treaty progress puts spotlight on circular economy," Jan 2023, <https://www.unep.org/news-and-stories/story/plastic-treaty-progress-puts-spotlight-circular-economy>
25. Packaging & Packaging Waste Directive <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:l21207>
26. European Commission, "Plastics own resource," 2021, https://commission.europa.eu/strategy-and-policy/eu-budget/long-term-eu-budget/2021-2027/revenue/own-resources/plastics-own-resource_en
27. Gov. UK, "Businesses urged to get ready for reforms to cut packaging waste," Feb 2023, <https://www.gov.uk/government/news/businesses-urged-to-get-ready-for-reforms-to-cut-packaging-waste>
28. Consumer Goods Forum, "Guiding principles for the eco modulation of EPR Fees, 2022, <https://www.theconsumergoodsforum.com/wp-content/uploads/2022/02/Guiding-Principles-for-the-Ecomodulation-of-EPR-Fees-February-2022.pdf>
29. Packaging Insights, "The UK's EPR conundrum: Harmonizing, financing and raising industry awareness," February 2023, <https://www.packaginginsights.com/news/the-uks-epr-conundrum-harmonizing-financing-and-raising-industry-awareness.html>
30. Gov.UK, "Plastic Packaging Tax," Nov 2021, <https://www.gov.uk/guidance/check-if-you-need-to-register-for-plastic-packaging-tax#:~:text=Packaging%20should%20only%20contain%20recycled.tonne%20from%201%20April%202023>
31. Spanish treasury, "Special tax on non-reusable plastic containers," 2023 <https://sede.agenciatributaria.gob.es/Sede/impuestos-especiales-medioambientales/impuesto-especial-sobre-envases-plastico-reutilizables.html>

32. LegiFrance, "LOI n° 2021-1104 du 22 août 2021 portant lutte contre le dérèglement climatique et renforcement de la résilience face à ses effets (1)", 22 August 2021, <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000043956924>
33. OECD, "Modulated fees for extended producer responsibility schemes," Oct 2021 [https://one.oecd.org/document/ENV/WKP\(2021\)16/En/pdf](https://one.oecd.org/document/ENV/WKP(2021)16/En/pdf)
34. Prevent, "EPR Tool Box – Germany Country Report," 2020 <https://prevent-waste.net/wp-content/uploads/2020/09/Germany.pdf>
35. Packaging Insights, "The UK's EPR conundrum: Harmonizing, financing and raising industry awareness," February 2023, <https://www.packaginginsights.com/news/the-uks-epr-conundrum-harmonizing-financing-and-raising-industry-awareness.html>
36. Energy Matters, "Container Deposit Scheme in Victoria 2023: New And Simple Method For Recycling Drink Containers," April 2023, <https://www.energymatters.com.au/renewable-news/container-deposit-scheme-in-victoria-2023-new-and-simple-method-for-recycling-drink-containers/>
37. RBI, "Packaging & Recycling," 2020 <https://www.rbi.com/English/sustainability/packaging-and-recycling/default.aspx>
38. India Ministry of Environment, Forest, and Climate Change, "Ban on identified Single Use Plastic Items from 1st July 2022," June 2022, <https://pib.gov.in/PressReleasePage.aspx?PRID=1837518>
39. Melissa Davey, The Guardian, "Plastics cause wide-ranging health issues from cancer to birth defects, landmark study finds," Mar 2023, <https://www.theguardian.com/environment/2023/mar/29/plastics-cause-wide-ranging-health-issues-from-cancer-to-birth-defects-landmark-study-finds>
40. WHO, "Microplastics in drinking water," 2019, <https://apps.who.int/iris/bitstream/handle/10665/326499/9789241516198-eng.pdf?ua=1>, WHO, "Dietary and inhalation exposure to nano- and microplastic particles and potential implications for human health," 2022, <https://www.who.int/publications/item/9789240054608>
41. Health Care Without Harm, "Measuring and reducing plastics in the healthcare sector," 2021, https://noharm-europe.org/sites/default/files/documents-files/6886/2021-09-23_Measuring-and-reducing-plastics-in-the-healthcare-sector.pdf
42. SCCWRP, "Risk-based management framework for microplastics in aquatic ecosystems," 2022, <https://microplastics.springeropen.com/articles/10.1186/s43591-022-00033-3>
43. Regulation E.C. No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending regulation (EC) No 1907/2006. Off. J. Eur. Union. 2008;2008b L:353, https://www.cirs-ck.com/Uploads/file/20171207/1512632679_83244.pdf
44. International Journal of Environmental Research and Public Health, "A detailed review study on potential effect of microplastics and additives of concern on human health," 2020, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7068600/>
45. Minderoo Foundation, "Plastics & Human Health," 2023, <https://www.minderoo.org/plastics-and-human-health/#:~:text=Everyday%20exposure%20to%20plastic%20chemicals,as%20obesity%2C%20diabetes%20and%20dermatitis>
46. Journal of Cleaner Production, "Human health effects of recycling and reusing food sector consumer plastics: a systematic review and meta-analysis of life cycle assessments," 2023, <https://www.sciencedirect.com/science/article/pii/S0959652623007254>
47. Our World in Data, "Global plastics production," 2022, <https://ourworldindata.org/grapher/global-plastics-production>
48. Science magazine, "A global plastic treaty must cap production," 2022, <https://www.science.org/doi/10.1126/science.abq0082>
49. European Comission, "Special Eurobarometer 468: Attitudes of European citizens towards the environment", 2017, https://data.europa.eu/data/datasets/s2156_88_1_468_eng?locale=en
50. WEF, SAP, Qualtrics, "The climate progress survey: business & consumer worries & hopes", 2022, https://www3.weforum.org/docs/SAP_WEF_Sustainability_Report.pdf
51. Accenture, Circular Insights Bank, Consumer study, France (n=1000) and US (n=1000), March 2023
52. Break Free from Plastic, "Missing the Mark," June 2022, <https://www.breakfreefromplastic.org/2021/06/22/missing-the-mark-ipr/>
53. Interview with Sian Sutherland, 2023
54. Accenture Research, Circular Business Models
55. Accenture Research analysis of press releases for pilot programs from the top six consumer goods companies between 2017 and 2023
56. Accenture, "Can you see your Scope 3?," Dec 2022, <https://www.accenture.com/content/dam/accenture/final/accenture-com/document/Accenture-Visibility-Into-Scope3-Emissions-Report.pdf#zoom=40>
57. International Organization for Standardization
58. Global Reporting Initiative
59. Climate Disclosure Standards Board
60. PACE, "Corporate circular target-setting guidance, 2023, https://pacecircular.org/sites/default/files/2023-02/FV_CEIC_Target%20activation%20guides_17.02.23.pdf
61. Consumer Goods Forum, Plastics Golden Design Rules," 2021, <https://www.theconsumergoodsforum.com/wp-content/uploads/2021/07/2021-Plastics-All-Golden-Design-Rules-One-Pager.pdf>
62. Ellen Mac Arthur Foundation, "Upstream Innovation," Nov 2020, <https://ellenmacarthurfoundation.org/upstream-innovation/overview>
63. Race to Zero is a campaign that aggregates several Net Zero Partner initiatives, such as the Science Based Targets initiative (SBTi) Business Ambition for 1.5oC, The Climate Pledge and B Corporation <https://climatechampions.unfccc.int/>

64. Unilever, "Rethink plastic packaging," 2023, <https://www.unilever.com/planet-and-society/waste-free-world/rethinking-plastic-packaging/#:~:text=than%2010%20markets.-,Better%20plastic,is%20recyclable%2C%20reusable%20or%20compostable>
65. Dove, "Dove Refillable Deodorant Lifetime Guarantee," 2023, <https://www.dove.com/us/en/stories/tips-and-how-to/sweating-tips/dove-refillable-deodorant-lifetime-guarantee.html>
66. Every Can Counts, "Recycling Habits and attitude in Europe 2022," Oct 2022, https://everycancounts.eu/wp-content/uploads/2022/05/ECC-CONSUMER-SURVEY-REPORT_-May-2022.pdf
67. UN Environment program, "Plastic Treaty progress puts spotlight on circular economy," 2023, <https://www.unep.org/news-and-stories/story/plastic-treaty-progress-puts-spotlight-circular-economy>
68. UN Global Compact, "Transitioning to a Circular Economy – Packaging," 2023, <https://www.unglobalcompact.org.uk/transitioning-to-a-circular-economy/>
69. Ellen Mac Arthur Foundation, "Artificial intelligence for recycling: AMP Robotics," 2022, <https://ellenmacarthurfoundation.org/circular-examples/artificial-intelligence-for-recycling-amp-robotics>
70. Ellen Mac Arthur Foundation, "Global Commitment Report 2022," 2022, <https://ellenmacarthurfoundation.org/global-commitment-2022/overview>
71. Closed Loop Partners, "Closed Loop Partners and Brookfield Partner to Launch Circular Services, the Leading Developer of Circular Economy Infrastructure in the United States," November 2022, <https://www.closedlooppartners.com/closed-loop-partners-and-brookfield-partner-to-launch-circular-services-the-leading-developer-of-circular-economy-infrastructure-in-the-united-states/>
72. Danone Aqua, Press releases, 2018 & 2021, <https://aqua.co.id/en/danone-aqua-bijakberplastik-1>, <https://aqua.co.id/en/danone-aqua-and-veolia-indonesia-inaugurate-the-most-modern-and-largest-plastic-recycling-facility-in-indonesia>
73. Circle Economy, "Will you be my partner? Collaborations in the circular economy," May 2020, <https://www.circle-economy.com/resources/will-you-be-my-partner-collaborations-in-the-circular-economy>
74. Based on Accenture experience designing and launching take-back programs globally
75. Algramo, "Algramo," 2023, <https://algramo.com/en/>
76. Re, "Re re world," 2023, <https://www.rereworld.com/>
77. Based on Accenture experience designing and launching take-back programs globally
78. Loop, "Explore Loop Carrefour," 2022, <https://exploreloop.com/Carrefour/>
79. KIVD, "Community of Practice Reusable Packaging, 2021, <https://kidv.nl/community-of-practice-reusable-packaging>
80. Rethink Plastic Alliance, "Packaging Reuse Systems," 2021, https://rethinkplasticalliance.eu/wp-content/uploads/2021/07/Packaging-Reuse-Systems_Study_Final_July2021corr.pdf
81. Accenture, "The Circulars Accelerators – Re," 2022, <https://thecirculars.org/>
82. Ellen Mac Arthur Foundation, "What is a circular economy?," 2023, <https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview#:~:text=timescales.%20and%20materials.-,A%20circular%20economy.the%20consumption%20of%20finite%20resources>
83. Stockholm Resilience center, "Planetary boundaries," 2023 <https://www.stockholmresilience.org/research/planetary-boundaries.html>
84. Environmental Protection Agency, "Scope 1 and Scope 2 inventory guidance," 2022, <https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance>
85. PRO Europe, "Packaging recovery organization," 2023, <https://www.pro-e.org/>
86. National Ocean Service, "What are microplastics?," 2023, <https://oceanservice.noaa.gov/facts/microplastics.html#:~:text=Plastic%20is%20the%20most%20prevalent,%20are%20called%20%E2%80%9Cmicroplastics.%E2%80%9D>
87. Accenture, "Digital twins enhance business operations," May 2022, <https://www.accenture.com/us-en/blogs/intelligent-operations-blog/supercharge-business-operations#:~:text=A%20digital%20twin%20is%20a,will%20respond%20to%20different%20variables>
88. Accenture, Circular Design Accelerator, 2023
89. Accenture, "Metaverse continuum set to redefine how the world operates," Mar 2022, <https://www.accenture.com/us-en/blogs/intelligent-operations-blog/metaverse-continuum-set-to-redefine-how-the-world-operates#:~:text=Accenture%20sees%20the%20metaverse%20as,such%20as%205G%20and%20cloud>
90. Accenture, Transforming the ordinary with smart connected packaging," Nov 2021, <https://www.accenture.com/us-en/blogs/industry-digitization/transforming-the-ordinary-with-smart-connected-packaging>
91. Accenture Labs, 2023

Glossary

Circular economy: The circular economy is a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution.⁸²

Planetary boundaries: The planetary boundaries concept presents a set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come.⁸³

Scope 1 emissions: are direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles).⁸⁴

Scope 2 emissions: are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.⁸⁴

Scope 3 emissions: are the result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly impacts in its value chain. Scope 3 emissions include all sources not within an organization's Scope 1 and 2 boundaries. The Scope 3 emissions for one organization are the Scope 1 and 2 emissions of another organization.⁸⁴

Producer responsibility organization: A producer responsibility organization (PRO) takes responsibility for the collection and processing on behalf of its members itself or commissions third parties for these operational tasks. To cover the cost of the operational tasks, members pay a yearly fee.⁸⁵

Eco-modulation: Eco-modulation is the concept of penalizing companies for the use of materials that are harmful for the environment, while rewarding them for using materials that are "better" for the environment.²⁷

Microplastics: Microplastics are small plastic pieces less than five millimeters long which can be harmful to our ocean and aquatic life.⁸⁶

Digital twin: A digital twin is a virtual duplicate of a physical object, process, or system, which can be used to predict how those elements will respond to different variables.⁸⁷

Sustainable design to value: Meet target cost and margin with sustainable products and services.⁸⁸

Metaverse: Accenture sees the metaverse as an evolving and expanding continuum of technologies, including for example, virtual reality (VR); augmented reality (AR); apps driving new experiences; design tools and digital assets—underpinned by connectivity technology such as 5G and cloud.⁸⁹

Smart packaging: Smart connected products are electro-mechanical products with features like processors, embedded systems, screens and interfaces, companion apps and cloud platforms.⁹⁰

Computational organic photodetectors (OPDs): Computational OPDs can detect environmental characteristics like package orientation, vibrations, drops, light exposure, etc., and allow for vision-based inventory management by intelligently recognizing changes in ambient light intensity, and can be powered by solar energy harvested from the environment and stored in the paper battery.⁹¹

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