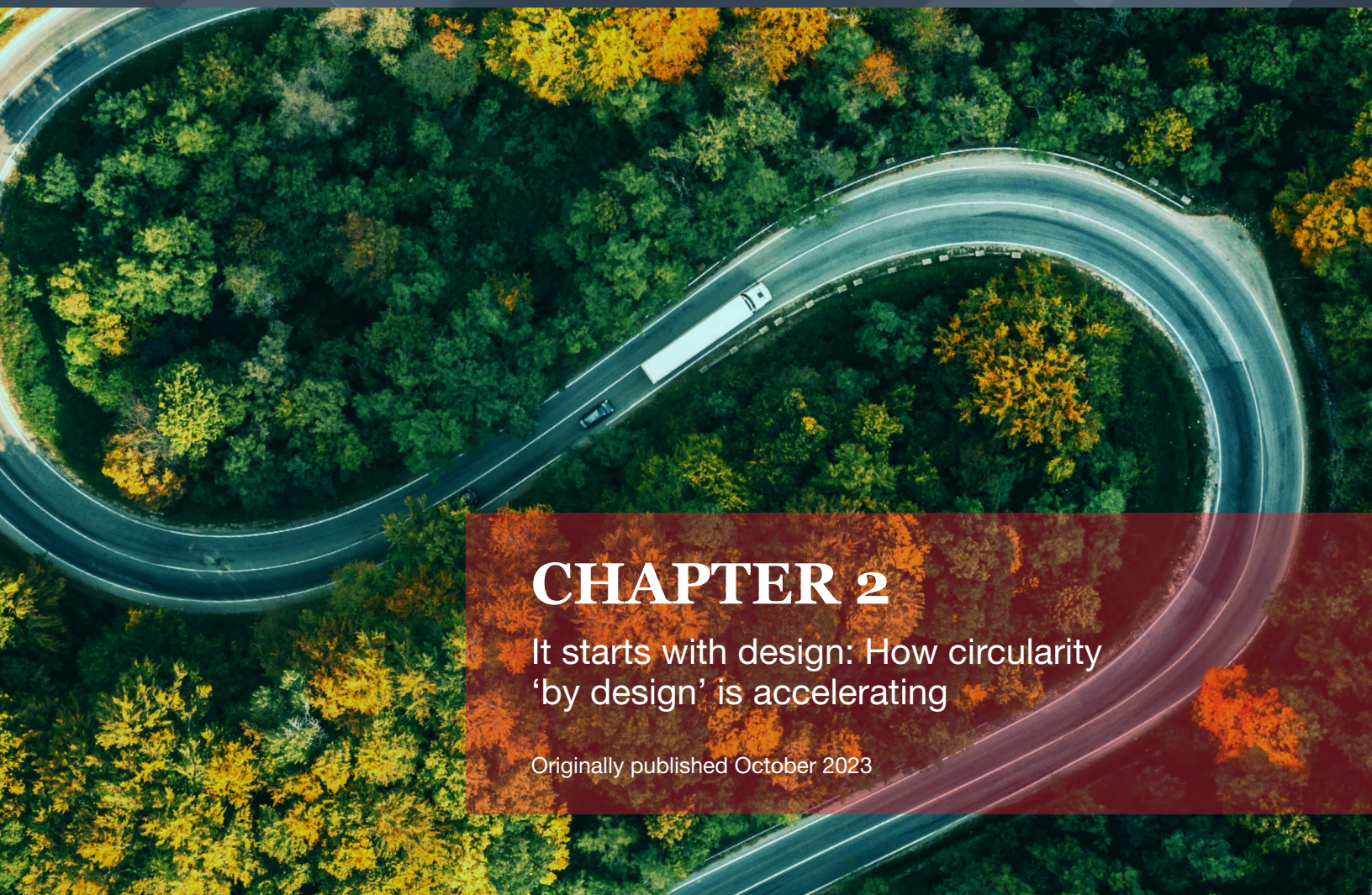
The materials ecosystem

Unlocking the value of waste

How connected systems and people are helping plastic waste reach its full potential



CHAPTER 2

It starts with design: How circularity ‘by design’ is accelerating

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How circularity "by design" is accelerating

To realize a circular economy — one where waste is designed out and materials are planned for one valuable application after another — the things we use must be designed to be recyclable and made from recycled content.

Design is indispensable to supporting whole markets in transforming materials use for less environmental impact, like automotive lightweighting, resulting in lower carbon output and higher energy efficiency.

The Ellen MacArthur Foundation has described the circular economy as a "design challenge," and this definitely applies to plastics circularity. It's why more than 500 organizations have signed on to the Ellen MacArthur Foundation's New Plastics Economy, committing to making 100% of their plastic packaging reusable, recyclable or compostable by 2025.[7]

Developing packaging has always been a balancing act. Consumer packaged goods (CPG) brand owners and other manufacturers must consider tradeoffs between cost and performance while ensuring that product integrity remains intact. Other factors include safety, distribution and material availability.

Who we're designing for has shifted from individuals to a system of connected people and processes. Recyclers, brand owners and others share a common goal: Design products and processes to minimize waste from the beginning and keep materials in use for as long as possible.

How do we balance all these variables and still meet targets to enable recyclability and use of recycled content for packaging?

It's a tall order, but today's innovators are boldly pushing design to meet new standards. Here, we examine how design for circularity is evolving as a critical lever of the materials ecosystem.

Connections:

The design toolbox expands alongside commitments to circularity

What makes design "groundbreaking" is now intrinsically tied to how well the design enables the product to be considered sustainable by consumers. That's true for organizations as diverse as footwear companies and food manufacturers.

What's driving this? To start: consumer demand and sustainability commitments by brands and regulations.

An increasing number of companies are innovating to overcome design challenges that meet the sustainable packaging mandates and public commitments made by these organizations. Design for packaging can step up to meet this new normal, and it requires everyone along the value chain to transform. Examples include:

- Materials science companies are innovating more circular materials options for plastics. Examples include high- and low-density polyethylene resins for mono-material films and materials created from renewable waste such as used cooking oil and plant waste.
- Packaging converters are exploring how they evolve to generate growth and new partnership opportunities that support customers (brands and retailers) as they revise their packaging portfolios by designing recyclable structures and embedding recycled content into those structures.
- New design models are enabling a shift away from disposable to reusable. Unilever, a Dow value chain partner, highlights that refill and reuse innovations are promising but also are "in their early days," tied to how the international legally binding instrument to end plastic pollution advances the acceptance and acceleration of reusable and refillable packaging.[8]

Influences:

Extended producer responsibility legislation brings new value to design

Many companies are already redesigning packaging and other products to make them more sustainable, and Extended Producer Responsibility (EPR) policies change how this benefits each organization's bottom line. The status of EPR policies and how they work vary by country.

In Europe, for example, companies that create easily recycled packaging will pay lower EPR fees on those products.

"It rewards redesign and stops the notion that the sustainable option is always more expensive," said David Carroll, director of external affairs for the trade association Plastics Europe, at the recent Sustainability Next Summit, hosted by Dow and *Fast Company*.[9]

The Circular Economy for Flexible Packaging (CEFLEX) sees EPR systems based on circularity principles and empowered by clear legislation as essential to realizing the circular economy for plastic packaging. The CEFLEX initiative is a collaboration of European companies, associations and organizations representing the entire value chain of flexible packaging.

"At CEFLEX we would like to see EPR systems evolve to be a key coordinating factor in allocating plastic waste with preferred recyclers, based on optimizing cost, environmental impact and end market demand for these materials. Appropriate and transparent EPR fees based on actual costs will encourage best practice," said Graham Houlder, managing director at CEFLEX.

Tackling plastic pollution is a key element of the European Green Deal, a roadmap which outlines the European Union's (E.U.) ambition to net zero by 2050. As part of the Green Deal, the plastic value chains face regulations aiming at circularity in several markets like packaging and automotive, specifically on sustainable packaging through the Packaging and Packaging Waste Regulation (PPWR). Under the latest European Commission proposal, E.U. member states must reduce packaging waste per capita by 15% by 2040, in comparison with 2018 levels.[10] Additionally, the proposed conditions by 2030 include:

- targets for the amount of reusable packaging used in certain sectors
- use of mandatory recycled content across plastic packaging
- mandatory recyclability for all packaging based on design for recycling criteria
- mandatory eco-modulated packaging EPR fees based on recyclability for all packages

At Dow, we see these proposed changes as positive, reflecting a sensible way forward for the industry. However, in order to reach the recycled content targets outlined in the PPWR, the industry and value chain needs policymakers to introduce the right framework to truly enable the transition to a circular economy. Establishing EPR or alike policies at the local or national level are necessary to ensure that waste management systems function appropriately and are economically self-sustaining. This is a necessary piece to enable the circularity of plastics. The plastic pollution instrument should require countries to establish such policies and provide flexibility for implementation at the local and/or national level as determined by each country. Because there are varying degrees of success of EPR policies where they exist around the world, it is important for the agreement to define common principles for the design of effective policies. We see the following as critical to the policy design:

- *Addresses the Problem:* Funds are dedicated to waste infrastructure and management and are sufficient to cover the full costs. The overall program is administered in an efficient way, and consumers know how they can manage their waste.
- *Flexible:* Industry can do what they do best – innovate to find the most effective and efficient way to meet our legal responsibilities while adhering to harmonized reporting requirements and standardized definitions.
- *Fair:* Accountability and enforcement are key aspects of the system. It also discourages free-riders (imports) and is applied equally to all products in the category (for example, paper, glass, plastic, and aluminum packaging).

Gaps:

The value of strong design is dependent on how we recycle

Today, we are designing in a time of rapid change in which the circular economy and the linear economy coexist. This means tensions exist between the old model and the emerging one.

Consider how some customers benefit from newer flexible pouch designs with a film structure that's recyclable. This packaging approach can mean less weight, less materials use and a reduction in carbon emissions. But to consider only the material efficiency without considering what happens to the flexible packaging at its end-of-life overlooks the complete picture.

One example from the U.S.: While many have the ability to return monolayer polyethylene (PE) film to retail stores, commonly called "store drop-off," this option is less convenient than curbside recycling — and access to curbside plastic film recycling is currently limited in communities. The technical recyclability of a package does not equate to it being recycled.

While solid progress is being made through sustainable packaging goals, 2025 targets are expected to be missed by some companies. The prospect of not meeting all 2025 targets reinforces the urgency for businesses to accelerate action, particularly around reuse, recyclable and circular flexible packaging, and decoupling business growth from packaging use.

"Today, there is not enough recycled plastic for companies to meet mandates or their public commitments. It's out there — but the materials ecosystem is not efficiently accessing it, yet. We need products and packaging to be made from recyclables and designed for the circular economy."

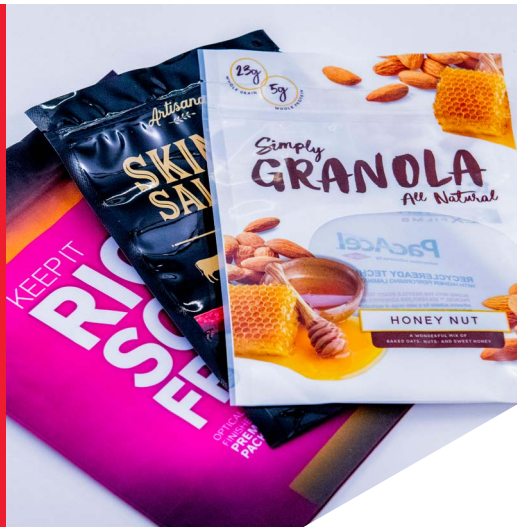
— Brent Bell,
Vice President of Recycling, WM

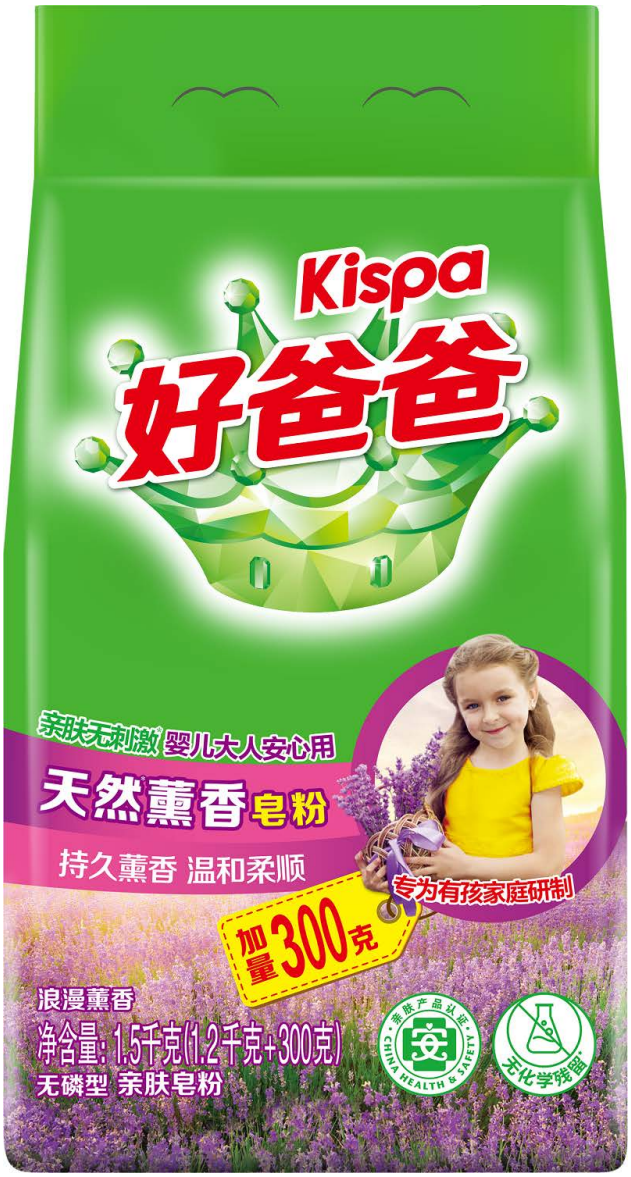
Key takeaways

- Investment in recyclability can directionally align with policies, including EPR, as they evolve.
- Design innovations — including for recyclable flexible and film-based packaging — are necessary to nudge stronger recycling options and transition more plastic packaging into recyclable structures.
- Refill and reuse models also need to be part of the solution to enable more sustainable consumption.

Maximizing the value of waste materials

The full value we can reap from waste — to reuse it in new products — is dependent on design. A study conducted at the China Packaging Design and Innovation Center found that the front-end design for recycling determines 80–90% of the recovery value of plastic packaging; that is, the recovery rate of plastic packaging wastes and the quality of recycled products depend not only on the recycling technologies but also on the front-end design for enabling recyclability.[11]





UNLOCKING
the value of waste

Closing the loop with Liby

Liby, a leading home and personal care brand in China, is a strong example of a brand accelerating the transition to sustainable packaging, including through China's first recyclable packaging for laundry pods in 2020.

Liby's packaging for various products – including for laundry pods, liquid detergent, powder detergent, and dish wash tablets – is enabled by Dow's INNATE™ TF Polyethylene Resins for Tenter Frame Biaxial Orientation and earned the first "Double E" (easy-to-collect and easy-to regenerate) label in China. This label helps consumers distinguish recyclable packaging from other packaging. This Dow-enabled packaging is officially certified in China for its ability to reduce carbon emissions by 35% compared to traditional unrecyclable packaging materials, supporting brand owners in achieving their carbon reduction goals.

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