

2024 Packaging Innovations Trends Report



Insights into the new designs, materials, and consumer engagement strategies driving innovation in sustainable packaging

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GreenBlue is an environmental nonprofit dedicated to the sustainable use of materials in society. We bring together a diversity of stakeholders to encourage innovation and best practices to promote the creation of a more sustainable materials economy.

The Sustainable Packaging Coalition (SPC) is a membership-based collaborative that believes in the power of industry to make packaging more sustainable. We are the leading voice on sustainable packaging and we are passionate about the creation of packaging that is good for people + the environment. Our mission is to bring packaging sustainability stakeholders together to catalyze actionable improvements to packaging systems and lend an authoritative voice on issues related to packaging sustainability. The Sustainable Packaging Coalition is a trademark project of GreenBlue Org. A Project of Sustainable PACKAGING

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#### FOREWORD

It's an exciting - if tumultuous - time in the world of sustainable packaging. Five years after single-use straws captured the attention of millions around the world, the packaging value chain has been hard at work forging a new path forward. Although the pandemic disrupted supply chains and put longterm innovation projects on hold, many companies moved quickly to new materials and formats. Resin manufacturers have turned to biomaterials and recycled content, converters have designed more curbside recyclable packaging, and brands and retailers have stepped up to educate their customers about packaging and waste.



## We've been part of this change.

Since 2017, the Sustainable Packaging Coalition has organized an annual Innovator Awards program for our Member companies, highlighting meaningful contributions towards more sustainable packaging. The Awards celebrate the outstanding collaboration behind important advancements in packaging sustainability. They've educated the industry on efforts to improve packaging's environmental footprint and featured the partners - and even competitors working together to make change possible.



In this first-ever Innovation Trends Report, we call attention to the innovations we're seeing from both our Member companies and the international packaging community. By highlighting some of the most promising and exciting trends in the sustainable packaging space, we aim to inspire more companies to adopt these innovations. The ultimate goal? Nothing short of widespread systems change - shepherding our industry to a future state where all packaging respects people and the planet on its journey from raw material to the next product or packaging life waiting for it.

If you're curious about where to start in your own sustainable packaging journey, join the SPC community. Our Resources explain the fundamental principles of sustainable packaging and dive deeper into key areas like reusable packaging and chemical recycling, our Knowledge Library gives you and your team access to even more content on topics like life cycle assessment and fiber sourcing, and our <u>Collaboratives</u> offer ways to get involved to tackle a specific problem facing your packaging portfolio, today. Equipped with the knowledge, tools, and camaraderie needed for the sustainability journey, we hope our Members will forge ahead towards big change.

#### We hope these five trends don't stay trends for long.

Sustainable packaging leaders will be the first to capitalize on the impressive benefits of these materials and approaches, but these solutions deserve to rapidly become mainstream.



Olga Kachook Director - Sustainable Packaging Coalition, GreenBlue



Paul Nowak Executive Director, GreenBlue

# Trend 1: (\*\*\* The "paperization" of everything

It's not just about cardboard anymore - fiber is tackling new frontiers. Formats that were long considered to be plastics-only territory, like pouches, candy bar wrappers, blister packs, and berry punnets, are now increasingly available in 100% fiber-based alternatives, proving that we're in a new "paperization" era.

Why paper? Part of the appeal is where it comes from - trees are a renewable resource, unlike fossil fuels. Though forests need to be managed responsibly for this to be true, in many parts of the world, they are. Fiber certification and responsible sourcing best practices have been around for decades, and are more robust than any environmental or social certifications for the responsible manufacturing or sourcing of virgin plastic.

Equally important is how both consumers and legislators respond to paper. Brands <u>may find</u> that paper resonates better with consumers by having a more "earthy" look and feel, and is more readily associated with recyclable materials. If it ends up as litter or unmanaged waste, 100% fiber-based packaging doesn't contribute to ocean debris and microplastics. This is part of the reason why new packaging policies like eco-modulation within extended producer responsibility (EPR) tend to favor fiber-based packaging.

The biggest win for the climate comes from trees' ability to suck carbon from the atmosphere. Forests also play a critical role in <u>cooling the planet</u>, regulating local microclimates by providing shade and transpiring water. All told, conserving forests could cut <u>7 billion metric tons</u> of carbon dioxide each year. With the "paperization" trend driving demand for responsibly-sourced fiber, forests become an investment worth protecting.

As fiber-based alternatives hit their high barrier and performance targets, we can expect paper to continue to blaze new trails.

### Canopy | Atlantic Packaging and West Rock (SPC Members)

Canopy is an alternative to current PE shrink bundling film. In many cases, the shrink bundling film is the only component of the system which is not curbside recyclable - Canopy solves that problem. This project is a Joint Development between Atlantic Packaging and West Rock. Atlantic has developed a retrofit module that lives after the existing bundler which tightens and seals the paper around the bundle of goods. West Rock brings impressive paper technology to the partnership, with a sheet which is extensible and provides compliance to the rigorous shipping stresses bundles of goods face. Utilizing Canopy versus traditional shrink also allows the manufacturer to not require an energy consuming shrink oven to be heated.









# Trend 2: Ocean-based Feedstocks redefine biobased packaging

What's sucking up carbon, growing like a weed, and more renewable than fossil fuels? Seaweed has taken center stage as one of the most exciting new materials for packaging. Also known as kelp or algae, there are thousands of species of seaweed: scientists put the estimate at 10,000 or more, each with their own unique growing regions and properties. This gives seaweed the potential to be harvested and modified for a versatile range of packaging applications.

It's not just seaweed. Other ocean-derived materials making their way into packaging include chitin (a polymer derived from the exoskeleton of crustaceans like shrimp) and simpler forms of algae. These feedstocks are already being recruited for all manner of films, foams, coatings, pellets, and polymers.

In the UK, seaweed manufacturer Notpla not only won the Prince William-led Earthshot prize, but it was also <u>recently named</u> the "first and only" plastic-free material under the EU's Directive on Single-Use Plastics. Because its material is naturally occurring and has not been chemically modified, Notpla has showcased how packaging can be both high-performing and an integrated part of nature. Notpla's partnership with delivery provider Just Eat showcases seaweed's potential as a drop-in solution for some of the most common packaging applications like takeout containers.

The benefits for the planet are impressive. Ocean-based feedstocks are found around the world, can be harvested without depletion, grow rapidly without requiring land, freshwater, or synthetic fertilizers, and don't pose problems like microplastics during disposal. Seaweed farms are already part of the climate change solution - Project Drawdown has <u>estimated</u> that expanding sustainable seaweed farming could sequester an additional 2.50–4.72 gigatons of carbon dioxide while generating valuable biomass feedstocks.

Ocean-based feedstocks are poised to step in for fossil-fuel based plastics as versatile solutions that redefine what it means to be plastic-free.

#### Home Compostable Seaweed, as seen in Retail Box Windows | Sway and EcoEnclose (SPC Members)

Plastic windows represent a significant portion of globally used flexible films, a market valued at \$65.85 billion in 2023. Together, nextgeneration material startup Sway and sustainable packaging supply leader EcoEnclose are reimagining windowed packaging. Their new collaboration, launched in December 2023, features Sway's home compostable seaweed windows and EcoEnclose's 100% recycled content kraft paper in a collection of truly impactful retail boxes. Clear, durable, and food safe, Sway seaweed windows offer an easy swap for traditional plastic windows, while being USDA certified as 100% Biobased. These windows are derived primarily from seaweed – a regenerative ocean crop that replenishes ecosystems as it grows. After use, Sway windows won't pollute; instead, they decompose rapidly and naturally in home or industrial compost.

## ECOENCLOSE SWAY

Image from EcoEnclose

## Trend 3: Machine learning's mission: getting recyclable materials to their next home

Packaging designs have grown increasingly complex, and the latest artificial intelligence (AI) tools can help us keep up. Machine learning (using datasets and models to train machines to perform tasks that would otherwise only be possible for humans) is now being integrated with sortation robots to get cleaner, higher-value streams of recyclable material. The waste tech industry and companies like Tomra, ZenRobotics, Recycleeye, and EverestLabs are increasingly building solutions to make sense of disposed packaging materials.

Machine learning is also helping to screen out non-recyclable material at recycling facilities, as well as material that needs to be recovered in a different way - for example, food and <u>compostable materials</u> that should instead be sent to composting facilities, or textiles that can be processed through chemical recycling technologies.

Better sortation is just the beginning. Machine learning can also unlock important opportunities for chain-of-custody certification, serving as a key proofpoint that recyclability-challenged packaging formats (or a particular brands' packaging) are, in fact, getting recycled. As more companies explore <u>digital watermarking</u>, a package's ease of recyclability can be linked to a slew of product attributes, including brand, SKU, material composition and more.

The circularity win is clear - by more easily and accurately identifying recyclable packaging at material recovery facilities (MRFs), we can increase their true recycling rates and get more value out of the packaging materials we already have, rather than extracting new ones. Packaging that was previously unrecognizable at material recovery facilities (MRFs) (and was screened out and sent to landfills) is now sold to reprocessors, who are turning this material into new packaging and products.

Al has earned a reputation for shaking up industries, and packaging will be no exception.

## AMP Vac | AMP (SPC Member)

AMP Vac is the waste and recycling industry's first artificial intelligence (AI)-powered automation system for plastic film removal and recovery. Vac reliably and consistently identifies film and flexible objects, then uses an automated vacuum tube to capture and remove the material, depositing it in a configurable location. The recycling industry lacks infrastructure for the identification and separation of film and flexible packaging, and these materials jam materials recovery facility (MRF) equipment not designed to manage it. Even 2-3% film in overall MRF streams can be unmanageable to remove manually, often damaging equipment, necessitating downtime, and hindering recovery of recyclables. AMP is developing Vac to target and recover film and flexible packaging for baling and selling, which will ultimately reduce the waste generated by these materials and help to create a more circular economy for this ubiquitous packaging type.



Image from AMP Robotics



# Trend 4: Analog + digital = the best of both worlds for recyclability labeling

Recycling faces a uniquely modern communication problem - consumers want more information, but we're not always sure what to make of it.

This makes a clear case for putting recyclability information directly on-pack. 78% of consumers <u>look for recyclability information</u> on the package itself, and 82% of consumers trust that the recycling information on a product label is accurate. At the same time, "analog" on-pack labeling is limited by the amount of printable space on a package, and represents a package's recyclability at a static point in time. Packaging policy, which varies state-by-state, is also starting to impact what can be labeled "recyclable", and the symbols and wording that can be used. What if there was a way to share more real-time, localized, nuanced information?

That's where digital comes in. QR codes offer the opportunity to get more specific, giving consumers immediate access to recyclability instructions for their unique location. It removes the barriers of not knowing where to go to find recycling information, or not understanding exactly what local guidelines really mean. In Italy and France, <u>new</u> <u>environmental labeling laws</u> incentivize information being provided via QR codes, since information online can more easily keep up with changing packaging regulation. But QR codes can go unused by <u>certain age groups</u> and populations, often because of the extra steps involved.

For the best of both worlds, early adopters are leveraging GreenBlue's How2Recycle® label and The Recycling Partnership's Recycle Check QR code programs together on product packaging. <u>General Mills</u> will feature Recycle Check with the How2Recycle® label on its Pillsbury Frozen Pie Crust packaging, allowing consumers to check local recycling availability for all package components by scanning a single link. Because aluminum pie trays are only accepted in approximately 40 percent of residential curbside collection programs, the QR code label provides clarity on where the item is accepted for recycling. The combined forces of the two labeling systems means more packaging getting designed to be recycled, as well as recycled in practice by consumers, thanks to prominent, actionable information about how to recycle the package.

#### Joint On-Pack Recyclability Labeling | General Mills and Danone (SPC Members)

GreenBlue's How2Recycle program, along with The Recycling Partnership (TRP), worked together with SPC members General Mills and Danone to pilot a new dynamic packaging label feature called Recycle Check. Recycle Check draws from TRP's National Recycling Database to allow almost any community's residents to scan a QR code to "check locally" for recyclability information using Recycle Check's database of recyclability information by zip code. The feature can be used with plastic, paper, metal or glass packaging, and furthers How2Recycle's goal of using a dynamic labeling system. This pilot features the How2Recycle label alongside the Recycle Check QR code. Look for the labels on General Mills' Pillsbury frozen pie crust packaging, Horizon Organic Milk cartons, and even more packaging coming this year.





Image from Pillsbury





# Trend 5: Pilots are out, a city-scale approach to reuse is in

In the last few years, brands have learned a lot piloting new reusable and refillable packaging. Getting high consumer participation - and high return rates - has proven challenging despite widespread interest in these formats, and many brands and retailers are wondering what's next. Recently, a new approach is starting to take hold. Cities are becoming the best drivers of reuse, offering infrastructure and solutions across sectors that build economies of scale and make it easier for consumers to engage.

Take, for example, the work of the organization <u>Perpetual</u>. Perpetual is engaging four smaller U.S. cities - Ann Arbor, Galveston, Hilo, and Savannah - to design and implement city-scale open-loop reusable foodware systems. Their work involves mobilizing funding from public and private sources for shared reuse infrastructure and assets, outlining how individual reuse service providers will collaborate within the system, and developing a cost-sharing model for participating businesses.

Where does reuse fit in the bigger effort to tackle climate change? The Ellen MacArthur Foundation's <u>latest report</u> outlines how scaling reuse is the biggest opportunity to reduce virgin material use in packaging: By 2040, moving from single use to reuse models could reduce the total annual amount of plastic leaking into the ocean by over 20%... in the System Change scenario reducing GHG emissions and water use by 35 to 70%, and material use by 45 to 75% for selected applications.

Key to unlocking these impressive reductions is packaging standardization and shared infrastructure. Moving away from bespoke designs to "pooled packaging" that uses a shared structural design makes it possible for many brands to tap into a standardized return system. At the same time, shared infrastructure enables economies of scale, making it easier and more efficient to sort, clean, and fill a variety of container and product types, often with shorter transportation distances.

Approaching reuse at the city scale expands what's possible - and cost-effective - for companies to do with reusable packaging.

#### Reuse Seattle | Seattle Public Utilities (SPC Member)

Reuse Seattle is a network of service providers that offers reusable food and beverage container solutions to Seattle businesses and communities. A City of Seattle initiative led by Seattle Public Utilities, it is working towards a network of reuse systems for food and beverage containers at Seattle institutions, venues, businesses, and communities. This program enables not just reusable containers but also shared collection, transportation, washing and digital infrastructures across business types.

### Jarbot Reusable Packaging System | Orora Packaging Solutions (SPC Member)

For reusable packaging to take off on the city-level, it is beneficial for companies to move to shared packaging assets with standardized elements. The Jarbot reusable packaging system was designed to solve for the reverse logistics costs that have presented challenges for reuse systems to scale. The modular nestable parts can deliver packaging for thousands of SKUs across a broad range of categories. They more easily store and ship greater volumes of packaging units back to cleaning warehouses and manufacturing facilities with greater efficiency and less cost.



Seattle Public Utilities



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