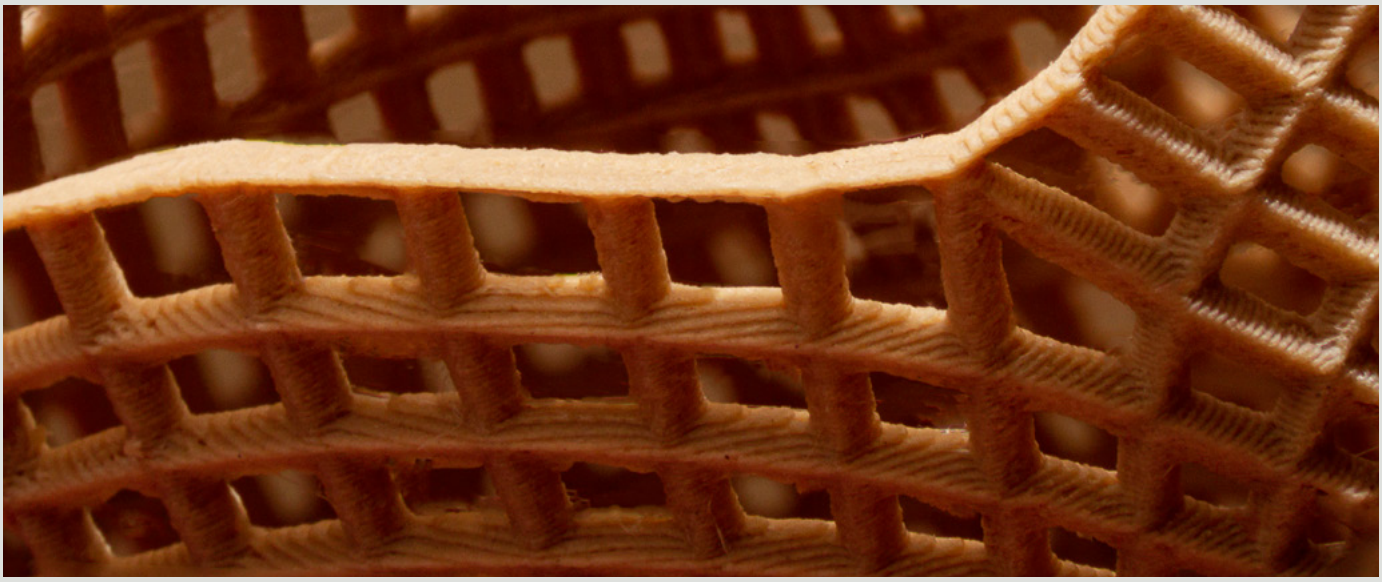
SULAPAC

Beyond plastic: Your roadmap to planet-friendly packaging

eBook



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Introduction

In today's marketplace, packaging is no longer just a protective barrier – it's a strategic element that directly influences consumer perceptions. Beyond protecting products during transportation, ensuring freshness, and enabling efficient storage, packaging has become a key part of a brand's identity. It helps products stand out on the shelf, builds consumer recognition, and communicates the brand's essence.

As environmental regulations tighten, companies now face the challenge of balancing all these packaging functions with sustainability concerns. Sustainable packaging is no longer a nice-to-have feature – it's a business imperative. But what exactly makes packaging sustainable?

This eBook dives into sustainable packaging from a material perspective, exploring the choices brands face when selecting materials. We showcase examples of sustainable innovations and discuss key topics such as consumer preferences, recyclability, and climate impact. By considering the full lifecycle of packaging, this guide helps your company make informed decisions that support both your sustainability and marketing goals.

The environmental cost of packaging

The growing waste crisis

Global waste generation has surged in recent decades, with no indication of slowing down. Over two billion metric tons of municipal solid waste (MSW) are generated worldwide every year, and the number is expected to reach 3.8 billion metric tons by 2050.[1]

Packaging waste makes up about a third[2] of all MSW in industrialized countries. With the rise of e-commerce and single-use packaging, the amount of packaging waste is expected to grow at a similar or even faster rate than overall MSW.

Despite the growing volume of packaging waste, recycling and reuse rates remain low, slowing progress toward a low-carbon circular economy.

Environmental and health concerns

Packaging also consumes vast amounts of virgin raw materials, with 40% of plastics and 50% of paper[3] used in the EU being destined for packaging.

Plastic waste is perhaps the most visible environmental issue. The plastics industry is the fastest-growing source of industrial greenhouse gas emissions and could account for a staggering 19%[4] of the global carbon budget by 2040.

The UN estimates that approximately 19-23 million tons[5] of plastic leak into our aquatic ecosystems each year, harming marine life and polluting water sources.

The WHO[6] has raised concerns about human exposure to microplastics found in drinking water, food, and air, while scientific studies have linked it to severe health concerns like atherosclerosis[7], Parkinson's disease[8] and cancer[9].

Immediate action needed

Time is running out. Immediate and sustainable changes in packaging are needed to prevent further damage to our ecosystem and build a more sustainable future.

The good news is that even small changes can have a big impact. For companies, sustainable packaging offers both environmental benefits and a competitive edge. Regulations such as the PPWR create a sense of urgency in terms of ensuring the recyclability and recycled content of the packaging, while the scientific community and consumer attitudes urge companies to look for better alternatives to conventional plastic.

The transformation of the packaging industry is inevitable, but the question is, who will lead the way?

Overcoming roadblocks to sustainable packaging

Adopting sustainable packaging is no easy feat for most companies. Packaging must first and foremost protect products, maintain their freshness, and provide a positive customer experience – and these functions cannot be compromised.

One of the biggest challenges is finding the right balance between cost, performance, and environmental impact. Eco-friendly packaging has traditionally been seen as more expensive and less functional than conventional options, making the switch harder for companies to justify.

However, with the pressing demand for sustainable options, more affordable, high-performing alternatives have started to emerge. While transitioning to these new solutions may require some economic investment, businesses can now find sustainable materials that perform just as well as conventional packaging.

"Working with global luxury houses has taught us that sustainability advancements must be achieved without compromises. These high standards are reflected in our portfolio and the amazing products created by our customers, such as the Byredo perfume cap and the cosmetic pencil by Schwan Cosmetics, which in fact offers functional superiority over conventional plastic barrels."

Dr. Heidi Peltola,
Chief Product Officer at Sulapac.

The more companies adopt these new solutions, the more competitive pricing will become as the market continues to grow. In the ideal future, recycled and biobased content and other eco-design aspects could translate to significant cost savings for companies. Beyond the financial aspects, the environmental impact, waste reduction, and positive brand image make sustainable packaging a smart investment for companies looking to stay ahead in a competitive market.

What consumers really want

A frequently asked question is which packaging material consumers consider the most sustainable.

McKinsey & Company's research on packaging sustainability[10] reveals that compostable and plant-based packaging is favoured over other options in many countries. Paper packaging also ranks highly, especially in India and the UK, and plastic films made from renewable or compostable materials (see for example Woodly or Tipa Corporation) are well-regarded worldwide.

The same research reveals that consumers are willing to pay more for sustainable packaging in general, with higher-income groups more likely to pay a premium for eco-friendly options.

Trivium Packaging's study[11] found that 79% of consumers are looking for products in sustainable packaging. This is particularly true among Gen Z and Millennial consumers. Additionally, 80% of consumers say they'd be interested in buying products in refillable packaging to reduce their environmental impact.

In conclusion, as sustainability continues to shape consumer behavior, businesses have a clear opportunity to align their packaging strategies with growing environmental concerns. While preferences vary across regions, the overall trend is moving towards more sustainable options, with consumers at least theoretically willing to pay more for sustainable packaging.

Less is more:
Mastering material efficiency

One of the most obvious ways to reduce the environmental impact of packaging is by minimizing material use. Streamlined packaging designs with optimized shapes help lower carbon footprints, cut production costs, and reduce waste, making them essential for any sustainable packaging strategy.

Efficient packaging design also impacts transportation. Optimally designed packaging minimizes shipping space. This allows more products per shipment, cutting transportation costs and carbon emissions. On the other hand, secondary packaging and packaging inserts might be critical in keeping the primary packaging, and product, intact thus reducing the amount of damaged goods and unnecessary waste.

The efficiency of turning material into packaging, i.e. minimizing scrap on the production line, is also a crucial element in the material efficiency game. In thermoforming approximately 30% of the material becomes waste. Hence, it is fundamental that the waste material can be shredded and used to create new sheets.

Overall, packaging optimization[12] – focusing on material reduction, right-sizing, and efficiency of the production process – is key to reducing waste, cutting costs, and promoting sustainability in manufacturing.

Made from bio-based and compostable material, *Nissha's ecosense 50 ml Sulapac® cosmetics jar*[13] features a minimalist design and reduced material usage, contributing to a lower carbon footprint.

Refill, reuse, repeat:
Smarter packaging choices

Shifting to reusable and refillable packaging can be a highly effective way to reduce waste. Unlike single-use options, which are filling up landfills at an unprecedented rate, reusable packaging aims to minimize material consumption over time. It also helps boost customer loyalty.

Albéa's 50 ml refillable glass jar [14] is an example of reusable packaging developed in collaboration between Albéa Cosmetics & Fragrance, Verescence, and Sulapac. The glass base is made from 20% post-consumer recycled glass, and the lid is made of bio-based and eco-safe Sulapac.

Reusable packaging outperforms single-use packaging in several ways:

- **Waste reduction**—Less landfill waste
- **Lower carbon footprint**—Lower CO_2 emissions when the product is used multiple times
- **Resource conservation**—Fewer raw materials and less energy needed
- **Plastic pollution reduction**—Less plastic waste
- **Cost savings**—Often more cost-effective than single-use packaging after just a few uses
- **Brand appeal**—Enhances loyalty among eco-conscious consumers
- **Supports circular economy**—Promotes resource efficiency and reduces waste
- **Reduced transportation**—Fewer deliveries needed
- **Repeated purchases**—Driven by strategic pricing and good conscience

Another great reuse example are cups made of Sulapac Solid material that can be washed and reused at least 125 times. They have been featured in *SLUSH*[15] and tested by restaurant goers in *selected Burger King outlets*[16]. The material can be used as a drop-in solution in existing product lines and is available for brands and plastic converters globally.

"By collaborating with Sulapac we can mitigate the negative climate and environmental impacts related to single-use and oil-based plastic while advancing the circular bioeconomy."

Anna Koskinen, Sustainability and Communications Manager at Restel.

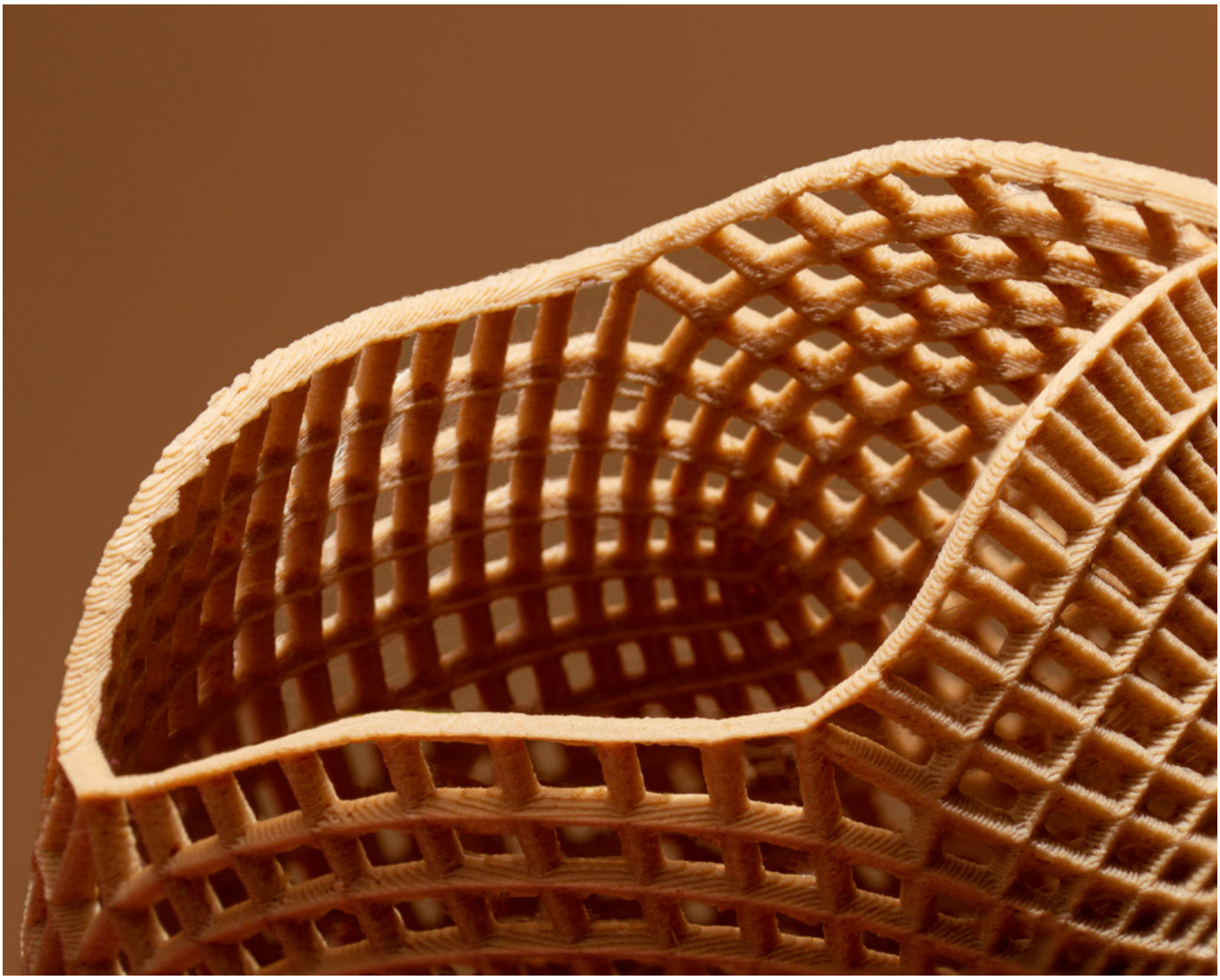
Burt's Bees x *Above & Beyond*[17] Beeswax Lip Balm with reusable Sulapac® case and compostable refill pods also made of Sulapac.

Prototyping with 3D printing: The fast track to sustainable packaging

In the packaging industry, prototyping is an essential phase that bridges concept development and mass production. While it allows for testing and refinement, it can also involve significant material waste, time, and costs. After all, creating something new often requires trial and error.

The emergence of 3D printing technology, combined with biodegradable and environmentally friendly materials, is revolutionizing this process.

3D printing is ideal for creating complex, low-quantity designs. It can produce prototypes faster than traditional methods like casting or machining. It also minimizes material waste, making it a more environmentally friendly solution. The environmental benefits can be further amplified by using bio-based and eco-safe materials.



GEHR, a global leader in thermoplastic semi-finished products, introduced the world's first 3D filament for professional 3D printing made from sustainable Sulapac® material.[18] This wood-based and industrially compostable filament can be used for prototyping, among other applications.

"We saw a clear demand in the market for a sustainable wood filament, which meets our very strict quality requirements and can be used in food contact applications."

Giorgio Müller, Sales and Marketing Director, GEHR

From source to shelf:
Understanding material journeys

The materials used in packaging have a huge impact on sustainability. By opting for responsibly sourced, renewable, or recycled materials, businesses can significantly reduce their environmental footprint. Let's take a closer look at why material origin matters and how it affects overall sustainability.

Fossil vs. renewable materials

Fossil-based conventional plastics are derived from non-renewable resources like crude oil and natural gas. Their production and disposal significantly contribute to greenhouse gas emissions[19], pollution[20], and long-term environmental damage[21].

In contrast, renewable materials are sourced from natural, replenishable resources such as wood, agricultural by-products, or algae. These materials can reduce dependence on fossil fuels and decrease carbon footprints.

The third group of raw materials typically used in packaging are non-fossil, non-renewable materials like aluminum, steel and glass, which are energy-intensive and problematic from biodiversity perspective due to mining involved. Recycling has the potential to significantly lower the environmental impacts of the materials in this group. However, aluminium is often paired with plastic coating while the high weight of glass increases transportation emissions and costs.

Virgin vs. recycled materials

The use of virgin materials should be limited in order to reduce energy consumption, and save natural resources; to minimize oil drilling, mining, or the use of cultivated land.

Instead, prioritize second generation feedstock (such as agricultural or forestry side streams) or recycled content sourced from post-consumer or post-industrial waste.

Recycled materials can offer several environmental benefits:

- **Lower carbon footprint—Recycling typically requires less energy than producing goods from virgin materials, reducing carbon emissions.**
- **Waste reduction—Recycling helps divert plastic, paper, and other materials from ending up in landfills and oceans.**
- **Resource conservation—By relying less on raw material extraction, recycling helps preserve natural resources.**

Overcoming recycling challenges

The challenge is that not all materials can be recycled without a loss in quality. For example, recycled plastic is usually no longer suitable for direct contact with food after repeated recycling. Recycling plastics also releases significant quantities of microplastics into the environment.[22]

So, it matters what you recycle.

> "Ideally packaging is made of a material that combines recycled content with bio-based origin. By opting for recyclable biodegradable bioplastics one can further reduce the carbon footprint and ensure that no permanent microplastics are released in the process. Moreover, the food contact quality is maintained."
>
> **Laura Tirkkonen-Rajasalo**, Co-Founder and Chief Compliance Officer at Sulapac.

Sulapac's bio-based and biodegradable materials offer the best of both worlds, combining recycled content with renewable materials. Biopolymers used as the main raw material can be recycled time and again without losing their food-contact quality. (Technology exists, large-scale infrastructure still under development).

The lifecycle of packaging: How every stage impacts our planet

Packaging is the biggest application for plastic with nearly 40 % of plastic demand coming from the production of plastic packaging[23]. Plastic plays a major role in global greenhouse gas emissions accounting for 4% of total emissions[24]. Approximately 99% of plastic is made from fossil fuels. This contributes to the accumulation of CO_2 in the atmosphere, accelerating the pace of climate change.

The total carbon footprint of packaging is shaped by various stages: the materials used, the manufacturing process, transportation, and disposal.

Material choices

When comparing materials, one should consider the environmental impacts throughout the value chain. For example, metals and plastics have a high carbon footprint due to their energy-intensive production processes[20]. The upstream of the conventional plastic value chain also encompasses huge environmental risks in the form of oil spills. Mining can have a large negative impact on biodiversity on a more local scale while bioplastics have their own land-use related impacts.

Going downstream one should take into account the different end-of-life scenarios. Leakage and landfills are the reality for most packaging[25], so understanding how your packaging impacts the environment in the least desirable EoL-cases is essential.

Life Cycle Assessment (LCA) is a widely used method for evaluating the environmental impacts of materials across their entire life cycle – from raw material extraction to disposal. However, it has several critical limitations, particularly in capturing the full environmental and health consequences of microplastics[26].

Manufacturing

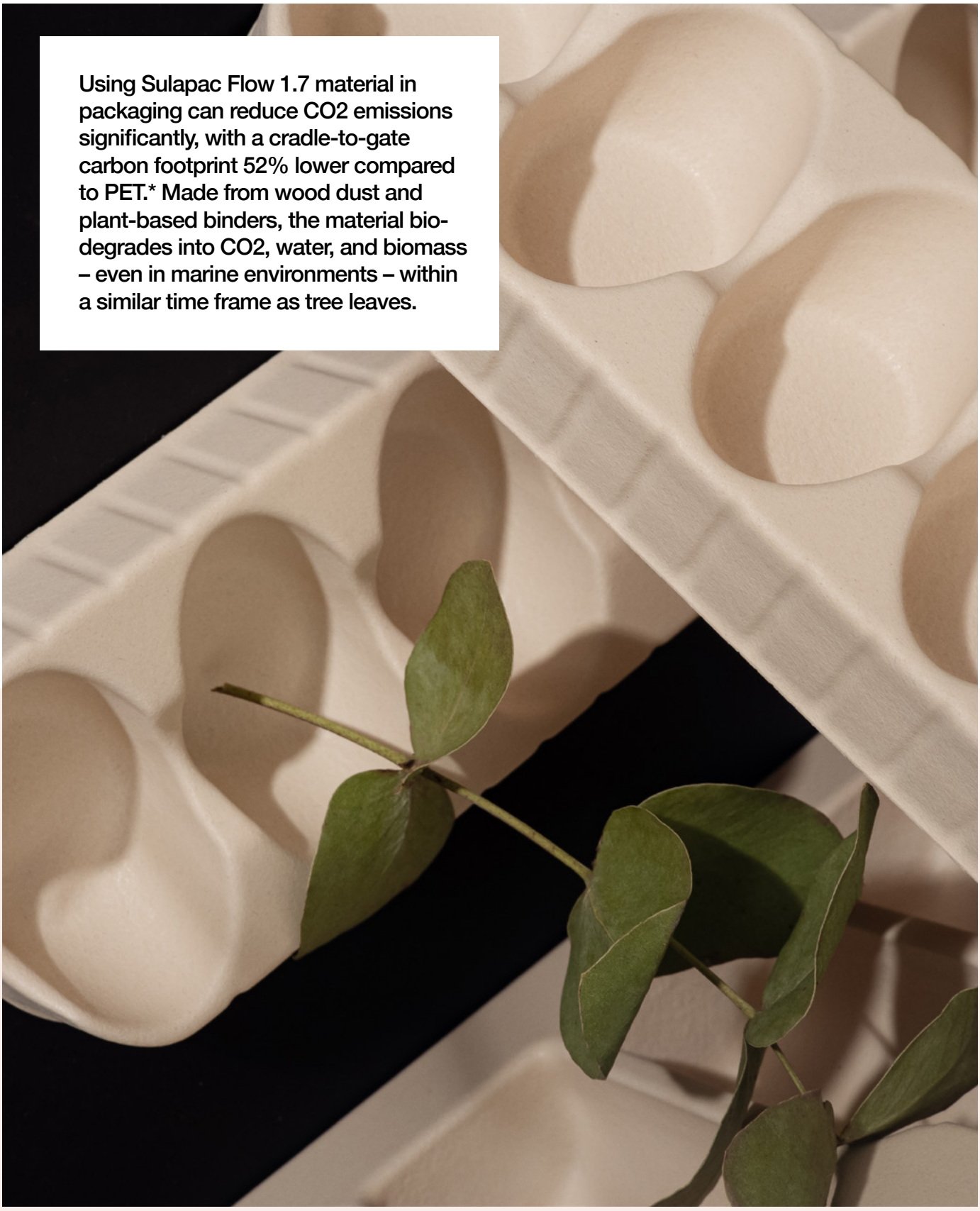
Packaging production consumes energy and generates waste. When selecting the material, find out whether the waste generated during production can be reused. Production speed is not only important for economic reasons – it can also impact emissions.

Transportation

Check the possibilities for local (or as close as possible) production and material sourcing to minimize emissions from transportation. Also bear in mind that a poorly designed packaging can lead to excessive use of materials, wasted space, and increased shipping costs.

End-of-Life

An estimated 85% of packaging ends up in landfills or as unregulated waste[25] while the remainder is either incinerated or in the best scenario recycled. However, recycling often means downcycling where materials are used to produce lower value products rather than fully recovered. Although advancements are happening, it is important to assess the state of the waste-management system in the target market.



Using Sulapac Flow 1.7 material in packaging can reduce CO2 emissions significantly, with a cradle-to-gate carbon footprint 52% lower compared to PET.* Made from wood dust and plant-based binders, the material biodegrades into CO2, water, and biomass – even in marine environments – within a similar time frame as tree leaves.

*The cradle-to-gate CFP for Sulapac Flow 1.7 is 1,26 kg CO2eq/kg based on a Sulapac CFP calculation tool v2.0 developed by an independent LCA consultancy. The average carbon footprint for PET, 2,6 kg CO2eq/kg, is derived from upper and lower CFP values from 3rd party literature review of various LCA databases and scientific literature. Please note that this comparison is not critically reviewed and should not be used in consumer communication as such.

Built to last or built to biodegrade —or both?

When selecting packaging, one of the crucial factors to consider is its durability. How long is the packaging intended to last? Will it be used over a long period of time, or will it be discarded quickly after serving its purpose?

Long-lasting packaging

For high-value or delicate items, such as electronics or luxury goods, durable packaging ensures protection through transport, storage, and display. Packaging that can withstand wear and tear, moisture, and handling ensures that the product remains intact and undamaged.

Short-lived packaging

Many short-lived products, especially in food, beverage, and cosmetics, require packaging that serves a temporary purpose – protecting items during transit or while on the shelf. Since these items are discarded quickly, selecting materials that are recyclable, compostable, or biodegradable is essential to minimizing environmental impact.

Balancing durability and sustainability

Packaging must strike a balance between protection and sustainability: overly durable packaging for temporary products wastes resources, while inadequate packaging increases the risk of product damage.

Aligning packaging durability with the product's purpose ensures an eco-friendly approach without compromising integrity.

The future of packaging depends on innovative solutions that seamlessly combine durability and sustainability. Advances in materials science are unlocking new possibilities, including biodegradable materials that can be reused repeatedly.

Biodegradable doesn't have to mean weak. Packaging inserts made from Sulapac Flow 1.7 have passed the various durability tests by customers.

Packaging safety during use

During the use phase, packaging not only serves its protective function but also interacts directly with consumers. It's essential to consider safety risks during the use phase, such as chemical leaching and material durability.

Chemical leaching and safety risks

Certain packaging materials, particularly conventional plastics, can leach harmful chemicals such as BPA or phthalates into products, especially when exposed to heat, moisture, or light. Such chemicals can pose health risks, particularly when in contact with food or beverages.

"Chemical safety has always been a priority for us, both from environmental and user perspective. We collaborate with third party laboratories like Measurlabs to ensure compliance with the EU and FDA food contact regulations but we also conduct broad range of tests that go beyond legislative requirements to provide our customers packaging materials that truly are safe for people and the planet."

Laura Tirkkonen-Rajasalo, Co-Founder and Chief Compliance Officer at Sulapac.

Impact strength

In the context of quick service restaurants, take-away food containers, events and sports arenas, plastic packaging is often chosen over glass or porcelain for safety reasons to avoid shards. Whether you lean into reusable alternatives or single-use, bear in mind that conventional plastic – or plastic-coated cardboard – are not the only options available.

Material	Origin	Microplastic release	Recyclability	Biodegradibility	Dishwasher safety	Microwave safety
Sulapac Solid	Bio-based	No permanent microplastics	Can be recycled indefinitely	Biodegradable	Withstands up to 130°C	Yes, but microwave not recommended with greasy foods (can lead to cracking)
Polypropylene (PP)	Fossil-based / bio-based	Yes, permanent microplastics	Yes, but loses its food contact safety	Non-biodegradable	Often labelled as dishwasher safe	Microwave not recommend-ed (can release harmful chemicals)
Polycarbon-ate (PC)	Fossil-based	Yes, permanent microplastics	Yes, but quality degrades fast	Non-biodegradable	Withstands up to 120°–140°C	Not microwave-safe (can release BPA)
HDPE	Fossil-based	Yes, permanent microplastics	Yes, but loses its food contact safety	Non-biodegradable	Often labelled as dishwasher safe	Microwave not recommend-ed (can release harmful chemicals)
Melamine	Fossil-based	Yes, permanent microplastics	Limited recycling	Non-biodegradable	Hand wash often recommended	Not microwave-safe (can release harmful chemicals)
Aluminum	Bauxite	No microplastics	Can be recycled indefinitely	Non-biodegradable	Bare aluminium not dishwasher safe	Not microwave-safe

A comparison of some commonly used materials in reusable cups and tableware versus Sulapac Solid injection molding material.

End-of-life impact and disposal

It is estimated that only around 9 percent[27] of all the plastic waste generated globally is recycled, with the majority ending up in landfills, incinerators or leaking into nature. A report by OECD[28] estimates that the global production and use of plastics will reach 736 million tons by 2040, while recycled plastics continue to make up only 6% of all plastic production.

By 2040, mismanaged waste and plastic leakage into the environment are expected to rise by 47% and 50% respectively, compared to 2020 levels.

Conventional plastic degrades into microplastics that remain in the environment permanently, posing a growing threat to ecosystems, the communities that depend on them and human health in general. That's why all packaging must be designed with its end-of-life impact in mind. Here are key factors to consider:

Recycling

Packaging should be made from easily recyclable materials. Monomaterial packaging—made from a single type of material—is the easiest to recycle. If there are components made of different materials make sure they can be easily separated and that their respective recycling / disposal method is clearly communicated.

If the packaging enters a market region where waste sorting and recycling are non-existent, and waste mismanagement highly likely, this should be taken into account in the design phase.

Composting

Compostable materials break down naturally, reducing landfill waste. However, composting is only effective when the right infrastructure is available. It should also be clearly communicated in the packaging whether the packaging is only suitable for industrial composting or it can be also disposed of in home compost. Choosing a material certified as compostable is also valuable from the eco-safety perspective: materials tested according to EN 13432 or ASTM D6400 have no eco-toxic impacts on ecosystems.

Landfilling

Even with recycling and composting options, much packaging still ends up in landfills or incinerators. Landfilling leads to long-term pollution and produces significant methane emissions when organic materials decompose.

When landfilled, conventional plastic eventually starts degrading due to combination of stress factors such as UV light and mechanical stress creating microplastics that easily spread to the environment. Furthermore, conventional plastic packaging may leak toxic chemical compounds, such as phthalates and bisphenol A, which can contaminate groundwater.

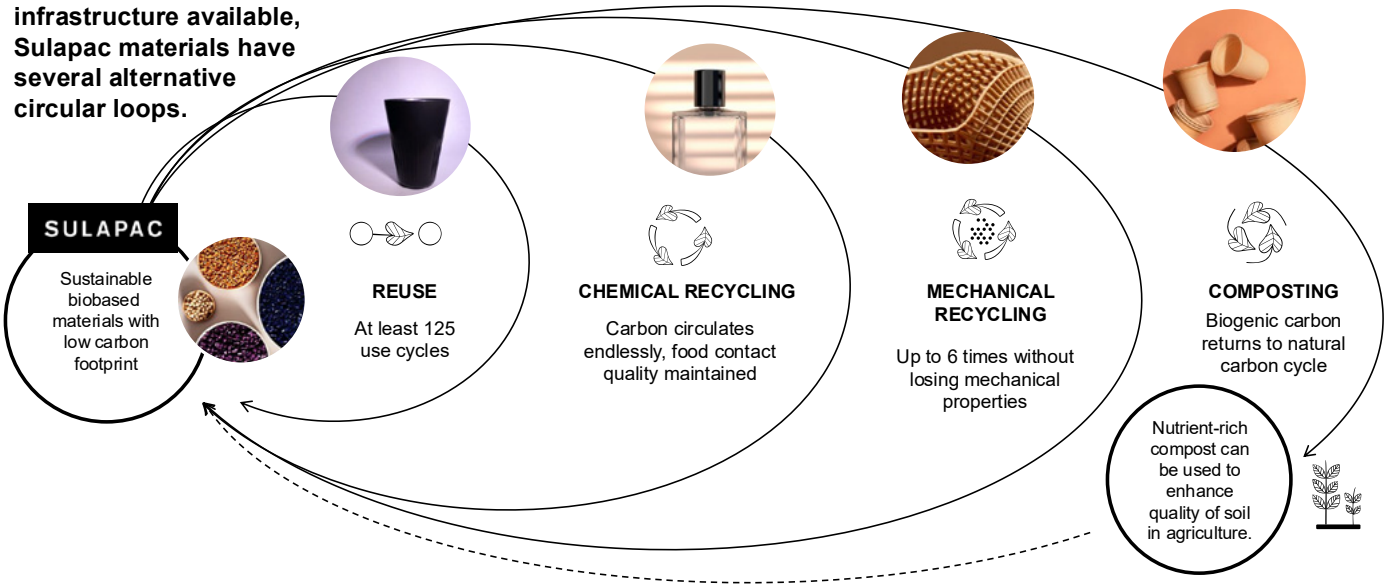
Glass and aluminium are relatively harmless, but of course, tremendous waste of resources if landfilled.

Incineration

Incineration emits CO_2 and also wastes valuable resources that could otherwise be reused. Moreover, when conventional plastic is incinerated, the resulting ash can contain microplastics and toxic residues[29]. This makes the ash hazardous waste, which is difficult and costly to manage.

Several sustainable End-of-Life options

Depending on the application and infrastructure available, Sulapac materials have several alternative circular loops.



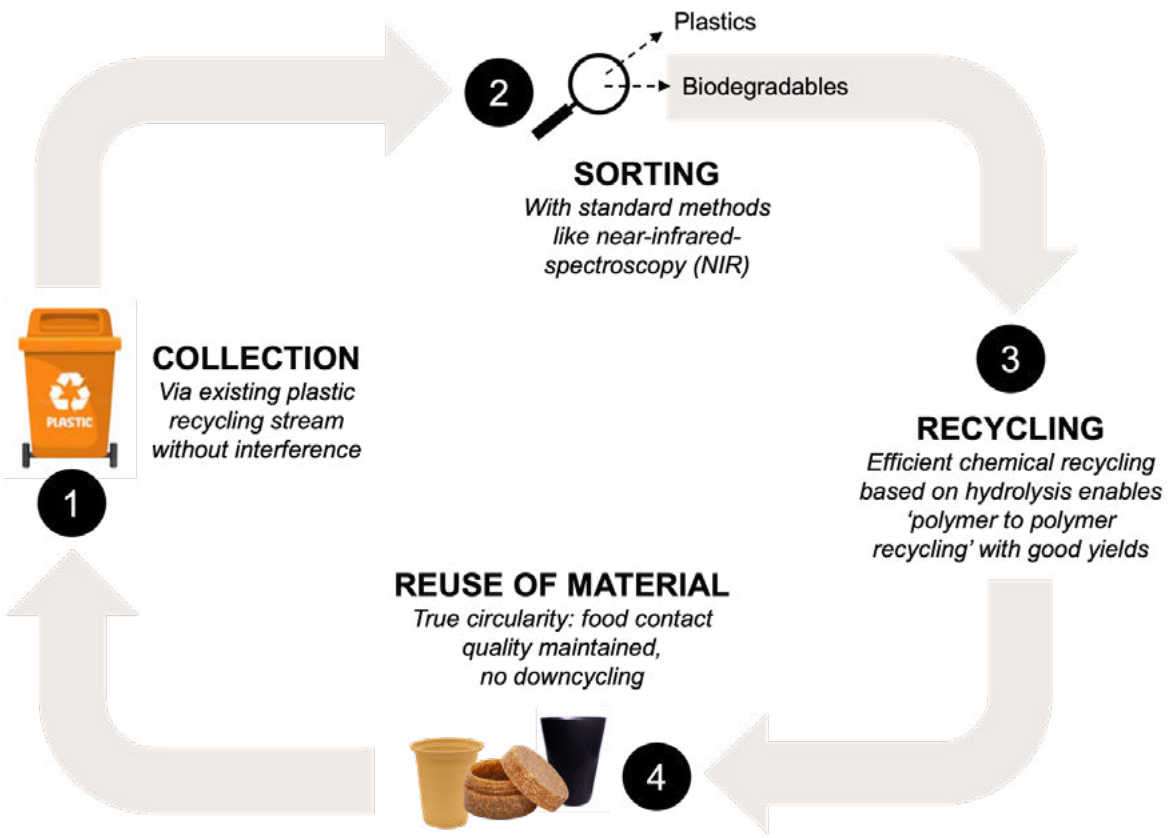
Leakage issues

Leakage can occur during the production, use, and waste management phases. In manufacturing, certain packaging materials may escape or spill, especially if facilities lack the proper containment or recycling protocols. On the disposal side, ineffective waste management systems can cause packaging materials to leak into the environment, further contributing to pollution. Consumer indifference cannot be entirely overlooked either – littering still occurs far too often.

"Replacing conventional plastic with bio based biodegradable materials and establishing an effective recycling system for this material group is the key for a cleaner future; It enables us to cut our dependency on oil, eliminate microplastic pollution and tackle global warming."

Laura Tirkkonen-Rajasalo,
Co-founder and Chief Compliance Officer at Sulapac

Circular by design: Ideally, packaging made of Sulapac and similar biobased biodegradable materials would get sorted out from mixed plastic waste and sent to a chemical recycling facility equipped with the right technology, such as hydrolysis reactors or depolymerization units**,** capable of breaking the materials down into their original monomers, which can then be repolymerized into new packaging products.



1. Sulapac materials can be collected through existing plastic recycling streams and sorted efficiently with standard methods like near-infrared (NIR) technology.

2. After being sorted, the biodegradable materials are sent to recycling facilities for chemical recycling.

3. Hydrolysis is a gentle, water-based process that breaks the materials down into monomers, the building blocks of polymers.

4. The purified monomers can then be processed back into biopolymers which are used as raw materials in new packaging without sacrificing the packaging safety or quality.

"With selected Sulapac materials there are recycling pilots on-going and the next step will be scaling up the processes. We are working for example with TripleW to recycle cups made of Sulapac Solid that have been used by our customers."

Dr. Heidi Peltola,
Chief Product Officer at Sulapac.

Conventional materials vs. new sustainable materials

When switching to sustainable packaging, companies face a crucial decision: whether to prioritize materials that are already recyclable or to invest in new, innovative materials that will become recyclable at scale in the future. This question becomes particularly challenging considering the fact that even packaging compatible with the current recycling infrastructure is rarely recycled in practice.

Recyclable today

Conventional recyclable materials, such as PET, glass, and paper, are currently widely accepted in recycling systems. These materials have an established infrastructure for collection, sorting, and processing, helping reduce waste.

However, even with a well-established recycling system, there are significant challenges. As mentioned earlier, when plastic is recycled it may contribute to the growing problem of microplastic pollution. Recycled plastics also rarely meet safety standards for direct food contact.

Manufacturers also say that the inconsistency of rPET poses challenges in sheet extrusion, limiting the use cases of recycled plastic.

Innovative sustainable materials for the future

New bio-based and biodegradable materials offer promising potential. While they may not yet have the same widespread recycling infrastructure as conventional materials, the future looks bright for them to achieve recyclability at scale. Across the EU, there is a growing push to support these materials, recognizing them as key solutions for a circular economy. In addition, the PPWR mandates that EU member states facilitate the recycling of materials that meet specific recyclability criteria.

"As part of the European Committee for Standardization (CEN) working groups we are participating in the development of Design for Recycling (DfR) guidelines for packaging – including packaging made of biocomposites like Sulapac. DfR guidelines are an essential implementation tool for the Packaging and Packaging Waste Regulation as they will provide the technical criteria to determine whether packaging is recyclable in practice."

Laura Tirkkonen-Rajasalo, Chief Compliance Officer and Co-founder of Sulapac.

Based on compliance with DfR criteria packaging will also be assigned a Recyclability Performance Grade which will be affecting the Extended Producer Responsibility (EPR) fees from 2030 onwards; Better designed packaging pays less.

The next chapter of packaging: Innovations to watch

In recent years, new bio-based packaging alternatives have emerged as promising solutions to reduce our reliance on conventional plastic. Here's a closer look at some key innovations:

Mushroom-based packaging

Made from agricultural waste and mycelium (mushroom roots), mushroom packaging[30] is a biodegradable and compostable alternative to non-biodegradable materials such as polystyrene foam. As a material, it is highly durable, versatile and easy to mould into different shapes and sizes. The material decomposes naturally in just 30 to 90 days. It can be used in the packaging of a wide range of products, such as electronics and cosmetics.

Seaweed-based packaging

Seaweed-based packaging[30] is another new, sustainable alternative. Biodegradable and compostable, and sometimes even edible, it's a fast-growing resource that doesn't require freshwater, fertilizers, or pesticides. It also absorbs carbon dioxide as it grows. While still in its early stages, it has strong potential to replace plastic for example in coatings, especially in the food and beverage industry.

Bio-composites

Bio-composites are a versatile material group ranging from primarily fossil-based and non-biodegradable materials to fully bio-based and biodegradable solutions. While maximizing the bio-based content – and hence reducing reliance on fossil-based feedstocks – is valuable as such, one should also consider the chemical structure of the material as it defines whether the material has the potential to biodegrade or not. Even bio-based bio-composites can be non-biodegradable and thus, contribute to the accumulation of microplastics.

Biobased & Biodegradable – the only sustainable solution

"Adding a hint of natural fillers into fossil-based and non-biodegradable polymer matrix may result in a more sustainable appearance, but it doesn't necessarily make a material a sustainable option.

Joona Kontinen, PhD candidate in Polymer Chemistry and Growth & Innovations Manager at Sulapac.

Sulapac's materials are bio-based biodegradable bio-composites that can be used in various applications, including thermoformed packaging, cosmetics and supplement packaging, reusable tableware and takeaway packaging. The materials can be consumed by naturally occurring microbes, ensuring they do not bioaccumulate in food chains.

Optimizing manufacturing efficiency and scalability

Sustainable packaging solutions must not only address environmental concerns but also ensure large-scale production. Energy efficiency and scalability are key to their widespread adoption.

Materials like bio-based bio-composites may require less energy to produce compared to conventional plastics. Using renewable energy and optimizing production processes can further reduce their environmental impact.

Additionally, the hydrolysis-based chemical recycling process of bio-based biodegradable materials consumes less energy than the chemical recycling of conventional plastic.

It is also worth evaluating whether these materials can be integrated into existing production systems. Processability during the converting stage is an important aspect to consider: if a material is ill-suited for the converting process—resulting in significant scrap or substandard pieces—its potential environmental value becomes diluted.

Sulapac materials can be used on existing manufacturing lines to replace conventional plastics. The granules can be processed with traditional plastic converting machinery and technologies, including thermoforming, injection molding and extrusion. As a result, no major investments in machinery are required.

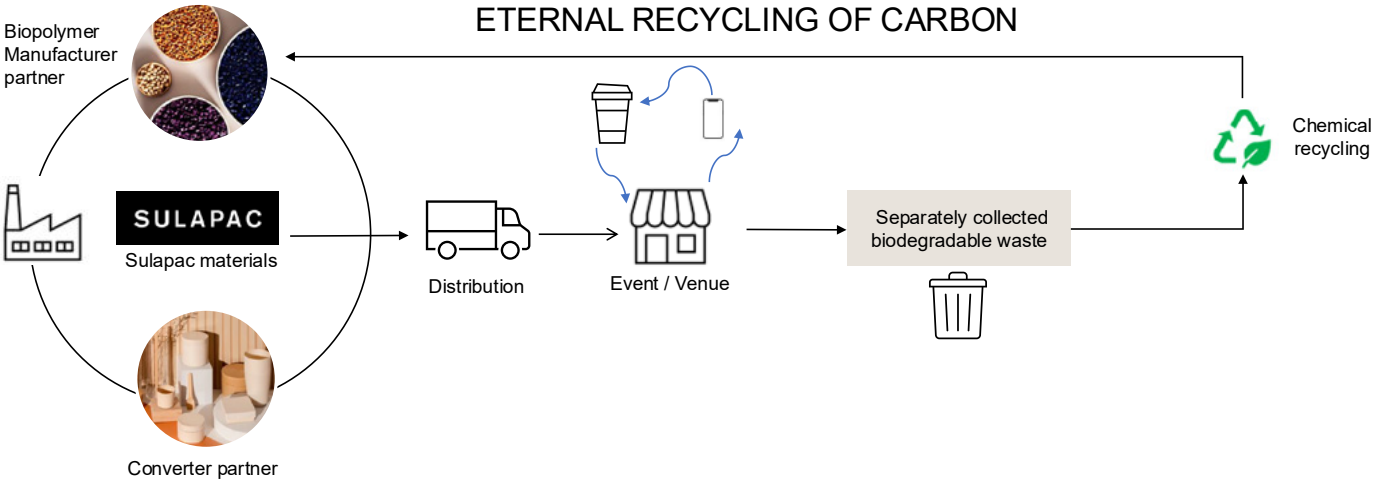
A holistic approach to packaging sustainability

The key to truly sustainable packaging lies not simply in choosing the right materials but in ensuring that all stages of production, use, and disposal align with circular economy principles.

By considering the full lifecycle of packaging—from production to manufacturing and disposal—companies can minimize waste, lower their carbon footprint, and move closer to true circularity in packaging.

As consumers, businesses, and manufacturers, we each play a role in this transformation. We at Sulapac are committed in helping companies across industries to adopt innovative, sustainable packaging solutions that pave the way for a circular, waste-free future.

Closed Loop Model allows easy collection



With selected customers Sulapac is piloting a closed loop model facilitating the chemical recycling of reusable cups made of Sulapac Solid material. By selecting reusable packaging made of 100% bio-based Sulapac Solid, companies can tackle the global plastic waste problem, reduce their CO2 emissions, and preserve natural resources.

Would you like to learn more about how your business can switch to sustainable packaging? Our experts would be happy to guide you through the best solutions and latest regulations.

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