

Design principles for circularity in our products

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Foreword

At Huhtamaki, we want to become the first choice in sustainable food packaging solutions and we believe that transitioning to a circular economy is the key to unlocking sustainability.

In this transition, the change starts with product design and innovation and is reflected throughout the entire life-cycle of our products.

This document sets the foundation to our technical design framework. These principles are the building blocks for the integration of circularity into the design of our products, within each business segment of Huhtamaki.

Design for circularity at Huhtamaki



Through its choice of materials, sourcing, design and manufacturing, Huhtamaki is focusing on making its ambition to become **the first choice in sustainable packaging solutions** a reality.

As a global sustainable packaging solution provider, we are committed to contributing to the transition from a linear to a circular economy, where products and materials are kept in circulation in a closed loop system. This change starts from our product design and affects the entire lifecycle of products. By transitioning to a circular economy, we will minimize the environmental impact and maximize value creation of our entire product lifecycle.

We believe that transitioning to a circular economy is key to unlocking sustainability. Our Design Principles focus on the product lifecycle from cradle to gate, during which we have direct influence. From gate to grave we work together with others to find the most sustainable end-of-life option.

Partnering across the entire value chain helps to develop sustainable, circular and low-carbon packaging solutions. We work to inspire our own supply chain to drive circularity and provide innovative materials and processes that can be incorporated into our products.

DID YOU KNOW THAT:

Packaging plays a fundamental role in protecting food, driving affordability and accessibility

About **one-third**¹ of food produced for human consumption is lost or wasted

Food systems generate up to **37%**² of global greenhouse gas emissions

8%³ of global greenhouse gas emissions come from food loss and waste

¹ FAO (Food and Agricultural Organization of the United Nations). 2011. *Global food losses and food waste – Extent, causes and prevention*. Rome, Italy: FAO.

² IPCC report 2021

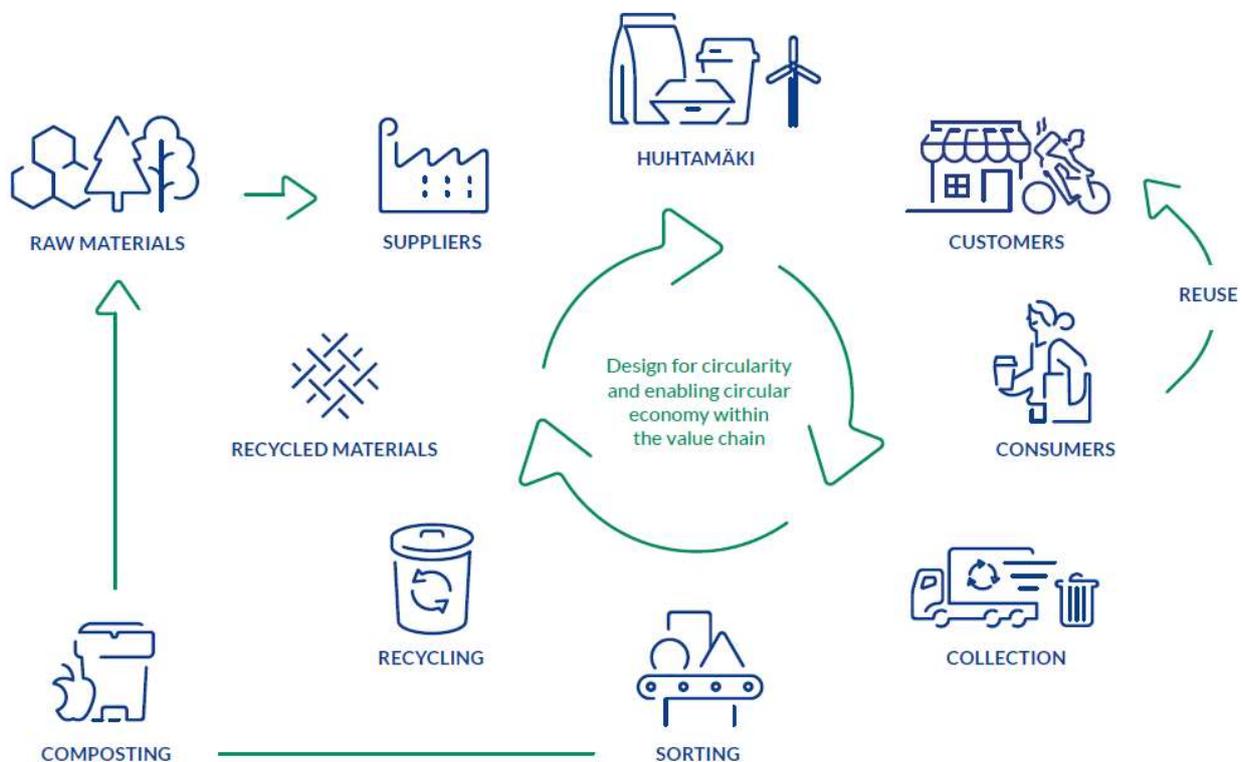
³ WRI, 2019 *There's No Time, or Food, to Waste*. <https://www.wri.org/insights/theres-no-time-or-food-waste>

Circular products start with design

At Huhtamaki, we integrate circularity principles into our product development and innovation process from choice of materials to post-consumer

Design decisions are crucial in creating smart and sustainable packaging. The Design Principles instruct us during the entire product lifecycle, from **material selection**, through to **product structure** and onto the **end-of-life options**.

The Design Principles for Circularity steer the assessments of our current product portfolio and help define whether a product is **designed to be recyclable, compostable or reusable**. Based on this, we have developed key performance indicators (KPIs) that will help monitor our progress when moving towards our 2030 ambition.



Overall structure of this document



The Design Principles support Huhtamaki's 2030 Strategy

Our ambition
First choice in sustainable food packaging solutions

>90%

of non-hazardous waste recycled or composted

100%

renewable electricity

Carbon-neutral production

and science-based emission targets

100%

of products designed to be recyclable, compostable or reusable

>80%

renewable or recycled raw material

100%

of fiber from recycled or certified sources

Design Principles for Circularity

Huhtamaki's Design Principles:

- Help embed circularity into product design
- Foster sustainable product innovations

Our golden rules

We identified a comprehensive set of rules to design for circularity. These characteristics are considered in all our packaging design and innovation to develop sustainable products.



Product characteristics

Quality and functionality: Protect the product

Optimized natural resource use: Design out waste

Recycled content: Maximize recycled material use

Product features: achieve better environmental improvement and benefits



Lifecycle approach

Lifecycle assessment: Reduce carbon and environmental footprints

Recycling: Promote materials that fit with recyclability requirements

Reuse and re-manufacture: Enable multiple cycles with maintained quality



Mindset and collaboration

Business models: Build circular value chains

Innovation: Use digitalization

Engagement: Collaborate with partners and stakeholders

Education: Communicate proactively on end-of-life options

Our guiding principles help us take informed decisions when designing our products through their entire lifecycle

The Design Principles for Circularity set the framework for our innovation and new product development with the goal of achieving circularity.



Material selection

How do we select materials for our products?



Product structure

What are the minimum structural design requirements?



End-of-life

What are the end-of-life design requirements?

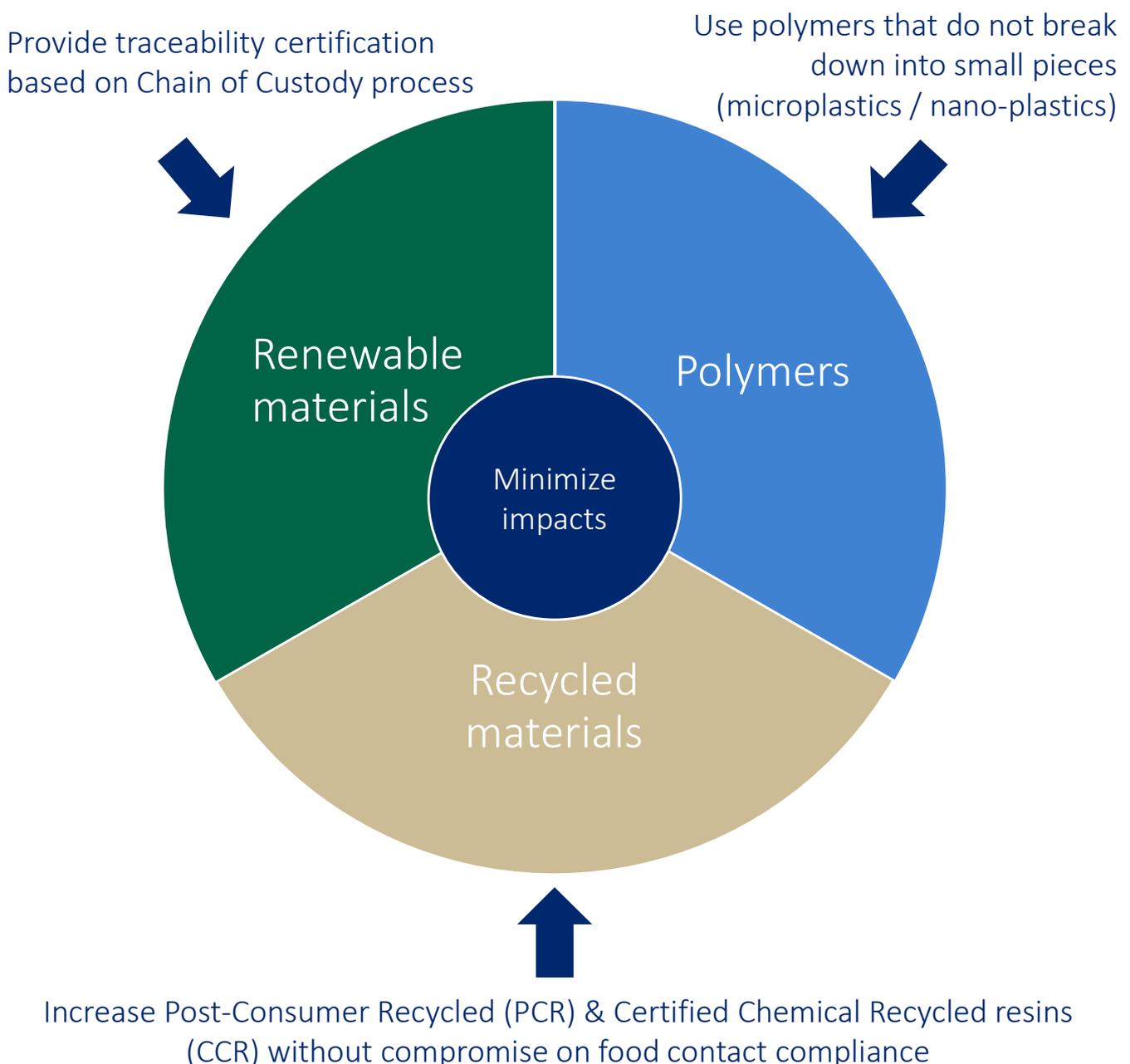
Designing for circularity does not compromise on the following key product characteristics:

- Product **safety**;
- Product **functionality and technical requirements**, e.g., breakage, quality, food loss prevention;
- Product **environmental performance**;
- Product related **social aspects**, including human rights.

Guiding principles for material selection

Main materials

We are guided by our goal which is to minimize the environmental and social impacts of materials we use. The main materials we use are renewable materials, recycled materials and polymers. Responsible sourcing of these materials is ensured by requesting detailed information on the origin of materials.



Guiding principles for material selection

Additional components

We support the continued development of innovative alternatives to existing chemicals when using additional components, such as additives, dyes and adhesives. Huhtamaki is committed to protecting the environment and public health including the restriction and the substitution of potentially hazardous high impact chemicals, globally. We aim to minimize the consumption of chemicals in our products and production and to reduce the environmental impact of our business, across all our operations.



Additives to improve packaging characteristics

- Use additives that allow uninterrupted recycling



Colors and inks

- Use transparent and light colors
- Minimize dyeing
- Use compliant printing inks

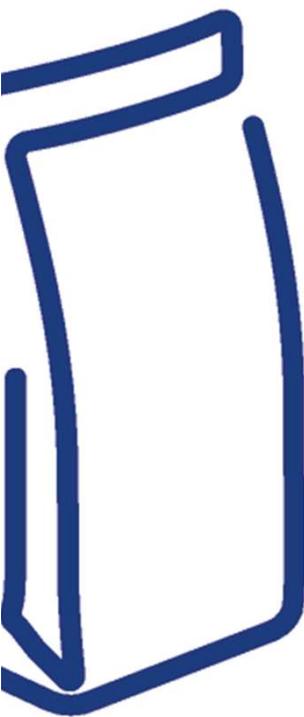


Adhesives as binding agents

- Use adhesives approved for direct and indirect food contact
- Use adhesives that do not interfere with sorting and recycling

Guiding principles for product structure

We design our products using a set of guiding principles in order to achieve circularity in product structure.



Product design

Design for **high quality and durable** packaging

Design packaging **fit for purpose**, without excessive use of packaging

Avoid the separation of small parts

Design with **resealable** application to maintain product quality and allow multiple uses

Ensure packaging allows **efficient and low-carbon transportation**



Product construction

Use **mono-materials** or material combinations that permit recycling

Optimize the quantities need for each component, reduce the overall use of materials and resources

Limit substances to improve recyclability

Ensure the **lowest needed weight** and material thickness

Certifications

Provide food safety compliance certification and environmental claims

Guiding principles for product end-of-life



End-of-life

Collection

Use materials compatible with collection and recovery systems
Ensure sufficient consumer information and ease of use for collection

Sorting

Support easy, automatic sorting and selection
Use near-infrared detectable colors – impairs sorting
Promote the use of chemical tracers, digital watermarks, QR codes

Recycling

Select materials suitable for recycling and aim for good quality output

Confirm recyclability with certification



Composting

When recycling is not possible, composting is the preferred end-of-life option

Confirm compostability with certification tests



Reuse

Ensure clear consumer communication and safety of the reuse solution

Comply with product safety standards and regulations



Circularity is part of our product development

Our innovation focuses on developing smart, sustainable packaging solutions to address the needs of society. We are driving the transition towards a low-carbon circular economy by using renewable natural resources and minimizing our environmental footprint. We promote sustainable end-of-use for packaging by designing for circularity.

Case 1: blueloop PE pouch



Huhtamaki's blueloop platform ensures that circular design principles are integrated into our flexible packaging products. As part of blueloop, Huhtamaki has designed a metallized polyethylene (PE) pouch that enables reduced raw material use and improved recyclability. To achieve full product circularity, we substituted a multi-materials structure with a mono-material structure. The blueloop metallized PE pouch has minimized layers. It has been validated for full recyclability based on industry standards and independent testing authorities.

Case 2: Fiber Sundae cup and lid



We work closely with our customers when designing new products. Huhtamaki's Sundae cup and lid was developed in collaboration with Havi and Mc Donald's with the aim of using only renewable materials. The Sundae cup is 100% fiber-based and plastic-free without any polymer coating or lining. The material used is sustainably sourced European virgin fiber that is FSC/PEFC certified. All raw materials are compliant with legal requirements and the circular design ensures that the product can be sustainably recovered at end of life. The Sundae cup can be fully recycled in paper or cardboard waste streams in most geographies.

For details, contact communications@huhtamaki.com

Appendix: Definitions and waste hierarchy of our products

Key words and definitions

Recycle-ready: A package is considered recyclable if its main packaging components, together representing >90% of the entire packaging weight, are recyclable, and if the remaining minor components are compatible with the recycling process and do not hinder the recyclability of the main components.

Compostable: Compostable material will break down into and decompose or otherwise become part of usable compost in a set of time frame and under pre-defined conditions in an appropriate composting facility, or in a home compost pile or device.

Re-usable: A re-usable packaging is designed to accomplish within its lifecycle a certain number of trips, rotations or uses for the same purpose for which it was designed, in normally predictable conditions of use.

Circular Economy: Raw materials, energy and other natural resources are used in an efficient and responsible way, products and materials are kept in use in a closed loop system as long as possible, by the means of recycling, composting or reusing, and waste and pollution are designed out. Circular economy contributes to regenerate natural systems by using responsibly sourced renewable materials.

Product design in circularity: According to the European Commission 80% of a product environmental impact occurs at design stage. Product design can allow improvement in material selection, design for longer lifecycle and better end-of-life option, Integrating circularity into product development can ultimately lower product environmental impact.

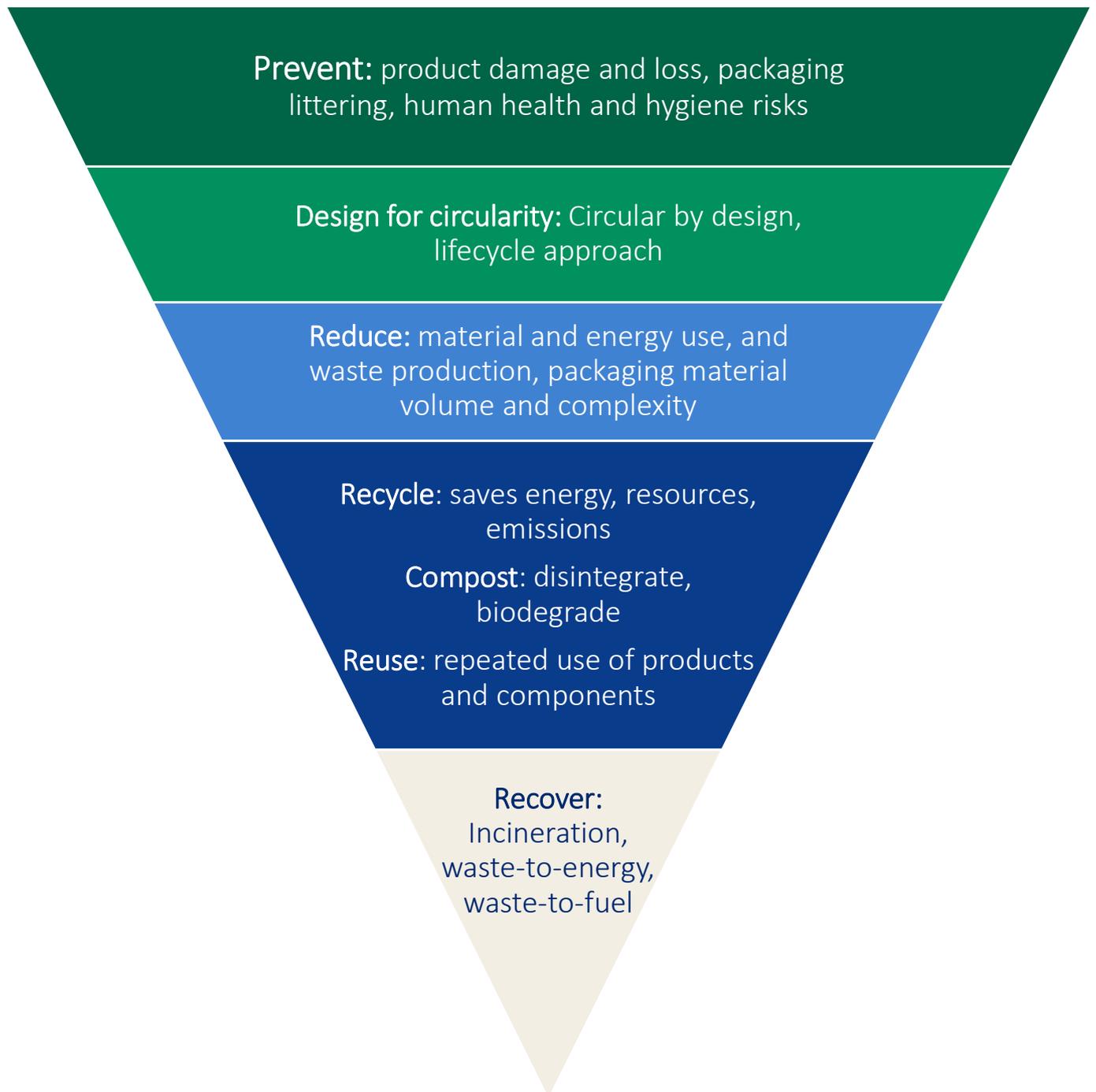
Renewable materials: Renewable materials are from natural resources, such as trees, crops and other organisms products replenish over time. Packaging from renewable materials does not contain materials from fossil-fuel resources.

Recycled plastic: Recycled content can be a viable option without compromise on the food grade and food quality of the final product. Circular certified food grade resins are made by taking mixed used plastics and putting them through a chemical recycling process.

Unnecessary and problematic plastics: Plastic packaging can be problematic if it is difficult to collect, recycle or compost; hinders the recovery of other materials, or can potentially cause pollution or litter problem. Unnecessary plastic packaging is avoidable or reusable options exist or it can be reduced or substituted with renewable materials.

Biodegradable: After material falls apart into small pieces during composting, the biodegradation process starts. It needs a set of time frame and predefined conditions with leaving no heavy metals or fluorine in the compost. At Huhtamaki we do not refer our packaging as biodegradable, as it can be misleading and a cause for potential littering.

Waste hierarchy of our products



Huhtamaki does not consider landfill as a part of Circular Economy. Pollution and littering are never amongst the intended end-of-life treatments for our products.

We believe waste is a valuable secondary resource material and will work to shift to regenerative sustainable systems.

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