

Driving Circular Economy with Adhesives & Coatings



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Henkel

| 1. The Circular Economy concept

*“A **circular economy** is a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops.”^[1]*

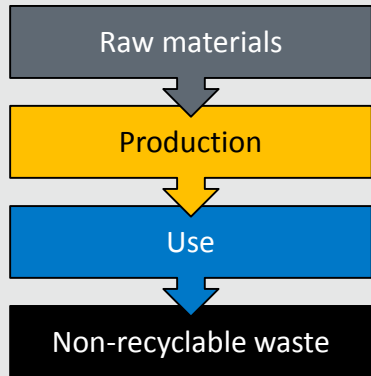
This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and **recycling**.

[1] Geissdoerfer et al., *Journal of Cleaner Production* **143**, 757–768.

| 1. The Circular Economy concept

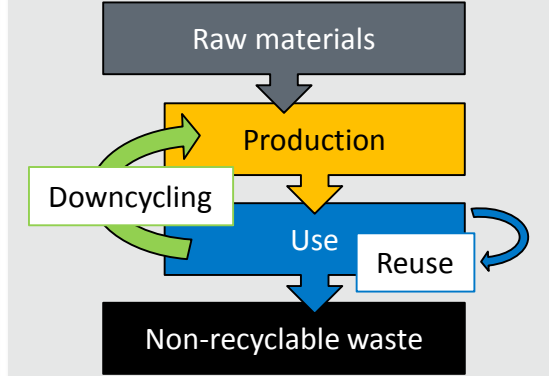
Linear economy

pre-1990s



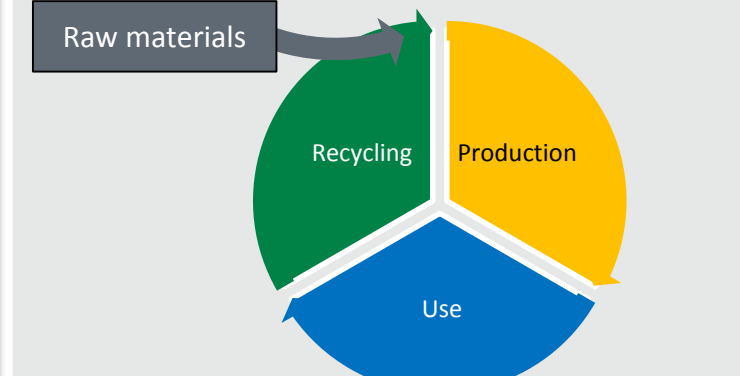
Reuse economy

1990s-today



Circular Economy

Today & the future



| 2. Increasing regulatory & NGO activity in the EU

European Commission



- “Circular Economy Package” adopted 2016
- “EU Plastics Strategy” review in 2017, new roadmap expected Dec
- New recycling quota to be set till end of 2017

New German “Verpackungsgesetz”



- German national law passed in Jan 2017
- 63% of plastics to be recycled in 2022

Ellen MacArthur Foundation



- “New Plastics Economy” Initiative launch in 2015
- “Catalyzing Action” launched at Davos summit, January 2017

| 3. The plastics challenge



Collection

Only material that is collected, can be recycled.

Sorting

Many different types of packaging exist that cannot be re-processed together.

Recycling

Components need to be compatible or separable to get high quality recyclates.

› **Recycling: Strong relationship to adhesives and coatings**

| 3. The plastics challenge

Cross-industrial cooperation to drive Circular Economy





Unseen is Unsold

...but do we need the complexity?

| 3. The plastics challenge

A need to reassess plastic package design



plastic/paper lids



Metallized PP bags

Linear economy

High bio based (paper) content
good for carbon footprint

Thin alu coating instead of alu
foil good for carbon footprint

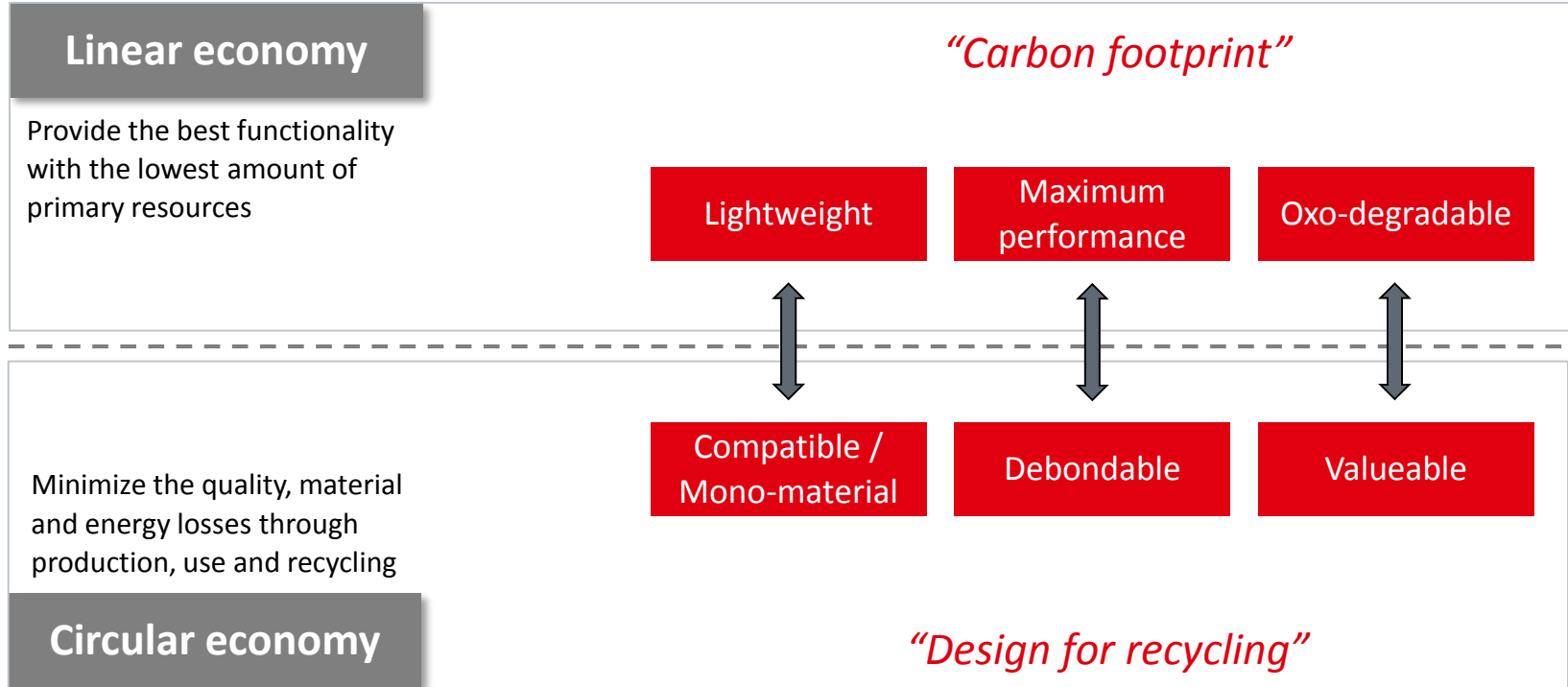
Circular economy

Problematic as paper prevents
any plastic recycling

Recyclate will be silver and can
not be used for film anymore

| 3. The plastics challenge

Changing design paradigms



3. The plastics challenge

Importance of compatibility

System of Re-use



Downcycling



Linear Use



| 4. Role of Adhesives & Coatings ...in a circular economy



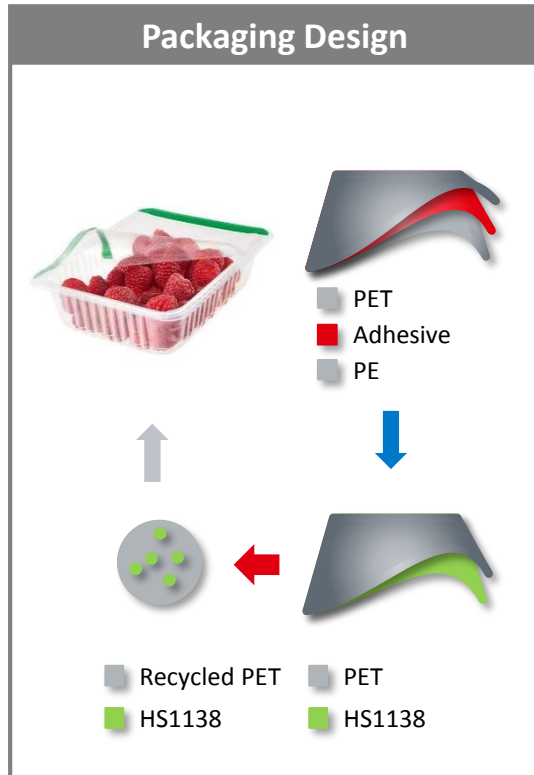
We develop adhesives for **compatible** packaging solutions.

We establish programs with different partners to **separate & recycle** layers.

We develop compatible coatings to **replace incompatible** layers.

4. Role of Adhesives & Coatings

Reduction of incompatible layers



- Characteristics**
- Compatible with recycling process
 - Good blending into base plastics
 - Technical experience
 - Low Odor
 - No discoloration
 - Transparency
 - Lamination is needed

| 4. Role of Adhesives & Coatings ...in a circular economy



We develop adhesives for **compatible** packaging solutions.

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4. Role of Adhesives & Coatings

Layer Separation



Henkel example

The advertisement features a green circular logo at the top. Below it, the text reads 'Designed for Recycling.' followed by 'Henkel and Saperatec: Together towards the circular economy'. A paragraph states: 'Henkel and Saperatec announce their cooperation to make aluminum foil containing flexible packaging a part of the circular economy. Henkel adhesives have been approved as the first in the market as fully compatible with Saperatec's innovative separation technology.' The Saperatec logo is at the bottom left, and the Henkel logo is at the bottom right. The background shows crumpled aluminum foil.

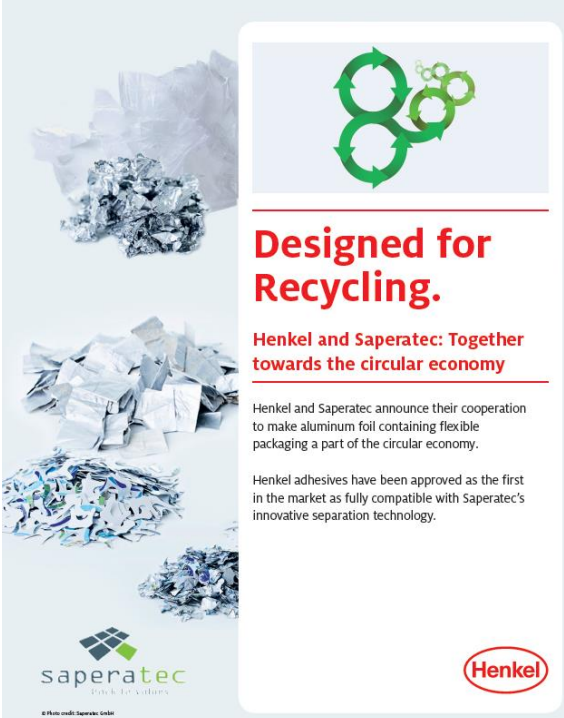
i.e. Saperatec cooperation with qualified adhesive solutions

- Characteristics**
- Compatible with recycling process
 - Good blending into base plastics
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 - Low Odor
 - No discoloration
 - Transparency
 - Lamination is needed
 - Validated performance in debonding process

| 4. Role of Adhesives & Coatings

Layer Separation

- Saperatec's innovative technology allows for separation of layers without material decomposition.
- Aluminum foil containing laminates with certain LOCTITE LIOFOL adhesives can be separated into individual layers with Saperatec's proprietary technology.
- PE, PET & Aluminum can be recirculated to the economy as high quality materials in various applications.



Designed for Recycling.

Henkel and Saperatec: Together towards the circular economy

Henkel and Saperatec announce their cooperation to make aluminum foil containing flexible packaging a part of the circular economy.

Henkel adhesives have been approved as the first in the market as fully compatible with Saperatec's innovative separation technology.

saperatec
back to nature

Henkel

© Photo credit: Saperatec GmbH

| 4. Role of Adhesives & Coatings ...in a circular economy

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4. Role of Adhesives & Coatings

Compatibility of Adhesives

Packaging Design



The diagram illustrates a packaging design process. At the top left, there are three clear plastic bags filled with different types of cereal. To the right is a cross-section of a standard laminate structure: a grey layer labeled 'PE', a red layer labeled 'Adhesive', and another grey layer labeled 'PE'. A downward-pointing arrow indicates a transition to a more sustainable design. Below the arrow, a hand is shown holding white, irregularly shaped granules labeled 'Recycled PE'. To the right of the hand is a circular diagram with five red dots, labeled 'Adhesive'.

- PE
- Adhesive
- PE

↓

- Recycled PE
- Adhesive

Henkel example



Two white pouches of cereal packaging are shown. The pouch on the left is partially filled with cereal. The pouch on the right is empty and features a large graphic of a globe with a recycling symbol. Text on the pouches includes 'THE FULL PE LAMINATE' and '100% RECYCLED INTO A VALUABLE SECOND LIFE'.

i.e. Full-PE Laminate with proven adhesive solution

Characteristics

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| Key points



- Political commitment and NGO pressure to convert the European market to a Circular Economy
- Circular thinking will change our understanding of sustainable design!
- **The opportunity to differentiate with new sustainable solutions is now!**

Thank you.