CIRCULAIRE ECONOMIE; KETENSAMENWERKING!

Future Proof Plastics, 19 November 2018

Rolf van Beeck

PlasticsEurope
Association of Plastics Manufacturers

Plastic is fantastic!...

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They help to address many challenges in the world:

High Value Medical Applications

Protection of Beverages

Quality Materials for Higher Living Comfort

Increased Shelf Times of Food

Access to Clean Potable Water

Ligh Weight Parts for lower fuel consumption

…But we have a problem; The plastics waste challenge

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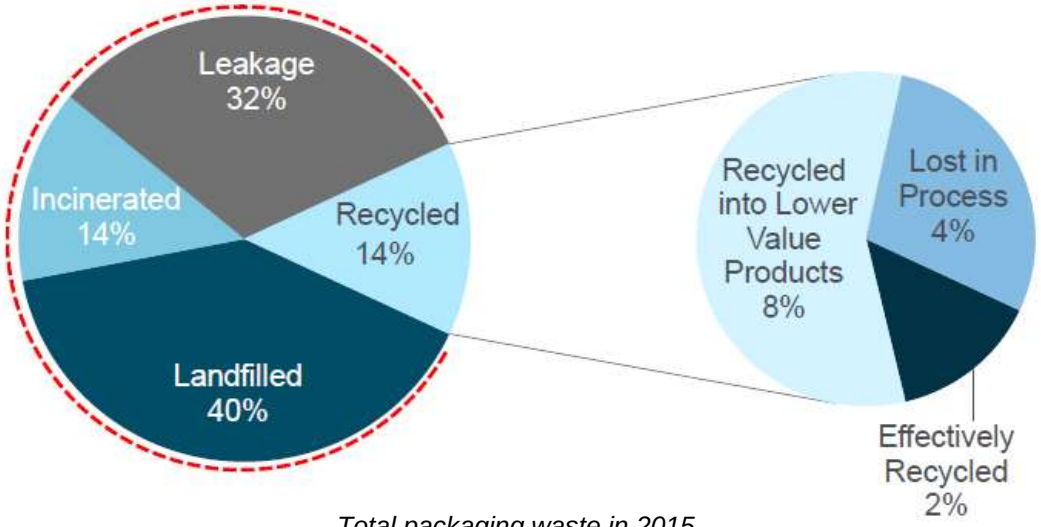
- **Roughly 1/3 of the ~400 million tons of plastics produced per year globally is used for packaging applications**
- **Only 14% of plastic packaging is recycled with the majority littered or ending up in landfills**

Global flow of plastic packaging waste
86% is disposed or littered



Total packaging waste in 2015

The Plastics industry needs to move from Linear to Circular

*Source: Citi Research, UN Environment Programme, World Economic Forum 2016

Key Factors in the Circular Economy

Legislation

European Commission

- **EU-Plastics Strategy January 2018**
- **Packaging Waste Directive (SUP) Proposal May 2018**

Source: EU Commission – Plastics Strategy Brochure

Market Conditions

Brand-owner and End-users

- ***World Economic Forum, Davos 2018:***
  11 companies committed to switch packaging to re-usable and recyclable or compostable materials by 2030
- Increasing awareness of sustainability on the end-user's side

https://twitter.com/newplasticsecon/status/973838402591318016

Parallel Developments at Policy Makers, Brand-owners, NGOs and Industry

Plastics Future Gap with EU Directives

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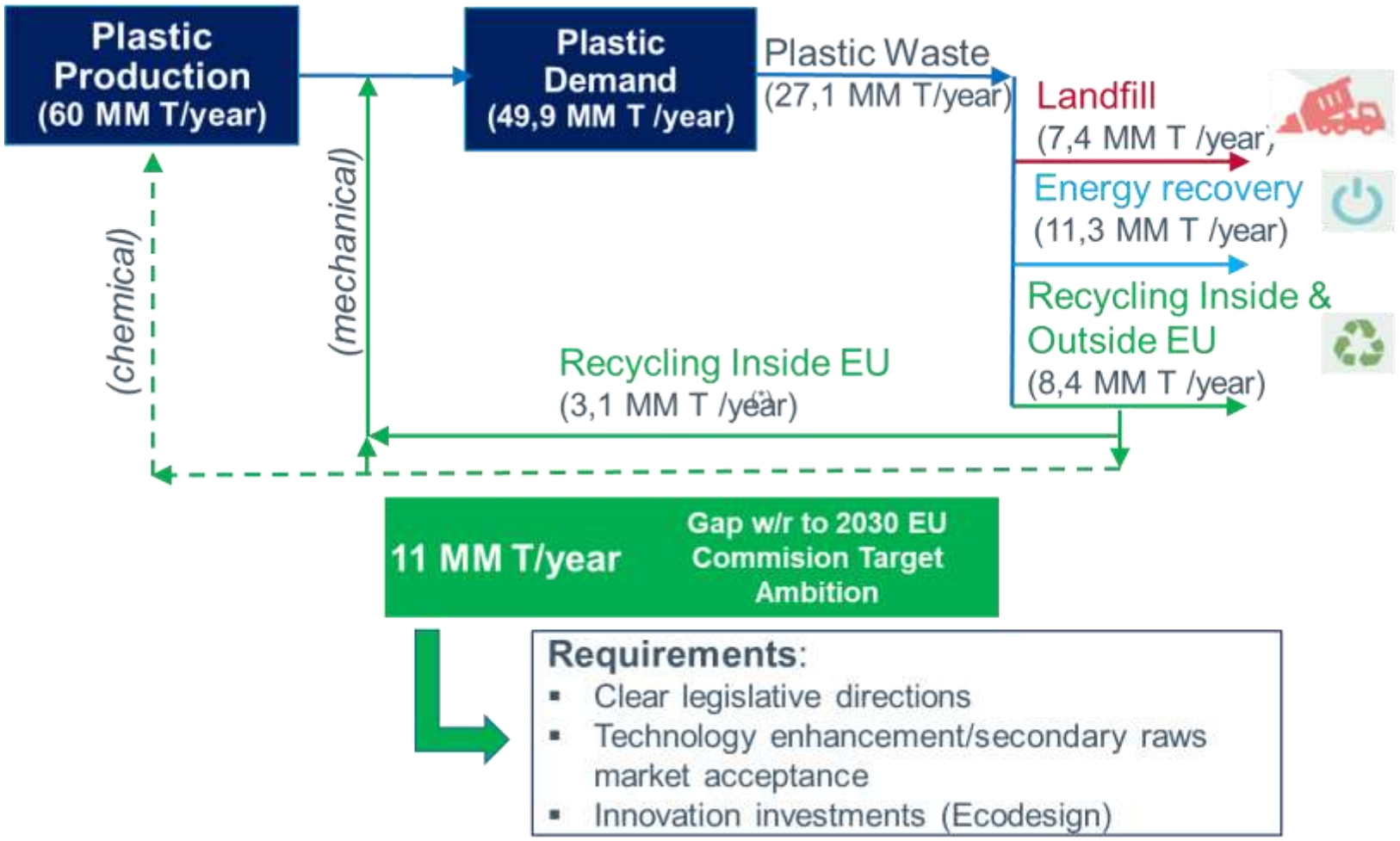
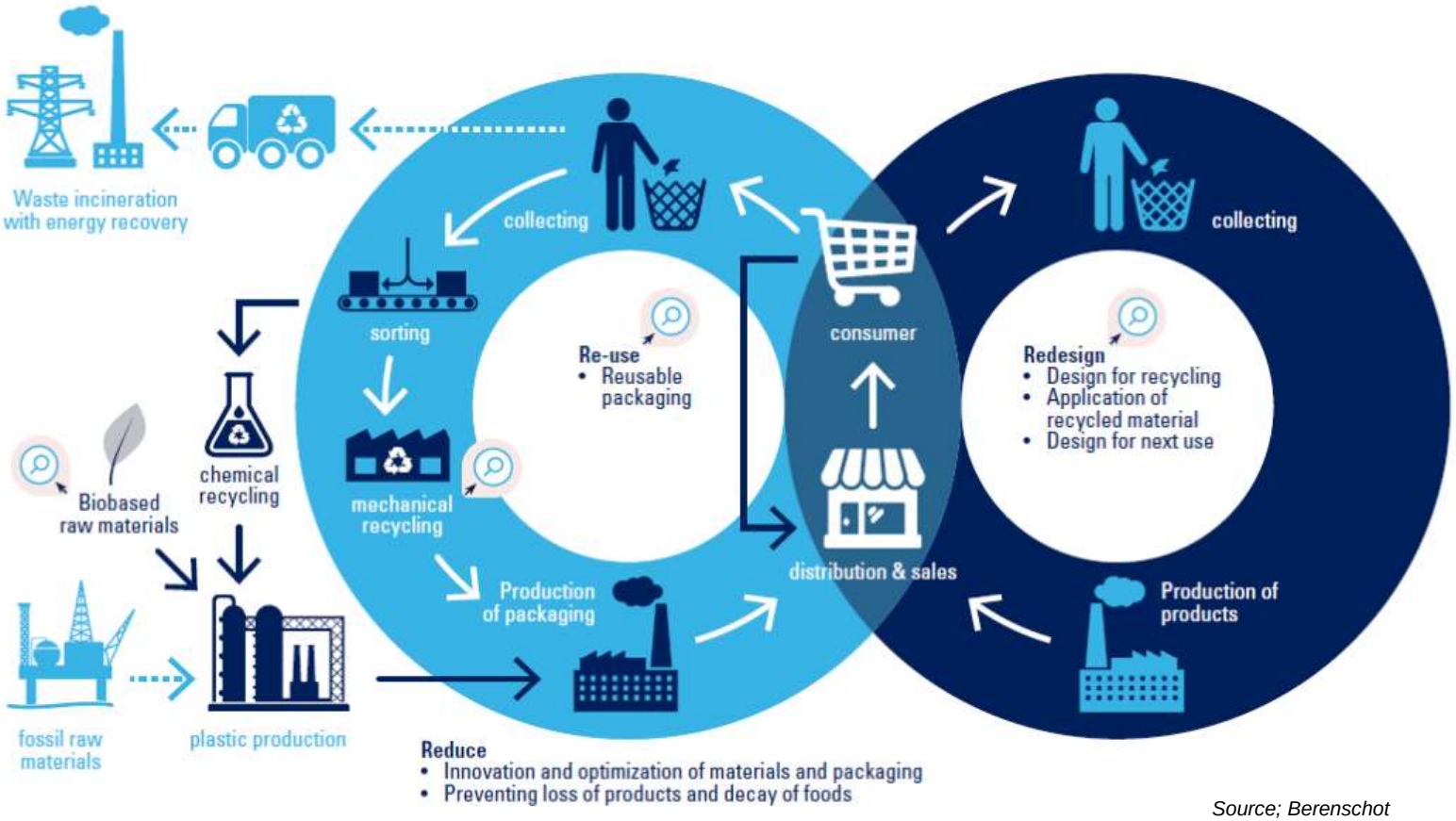


How to close the gap in the plastics industry?

(*) Source : " COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS" – 16/01/2018

Closing the loop



Source; Berenschot

***Re*Think; new ways of thinking are required to move to a Circular Economy**

Mechanical Recycling is one part of the solution

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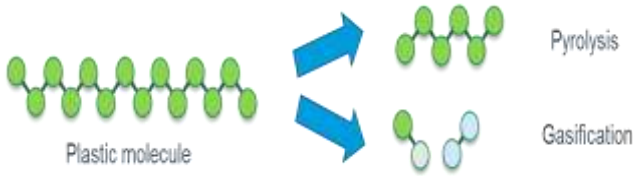
- Mechanical Recycling is growing due to good economics and CO2 balance
  - Mechanically recycled polymers are suitable for many applications similar to virgin plastics
- Chemical Recycling can lead to same quality as virgin polymers
  - for many other applications polymers need to be chemically recycled to achieve very high cleanliness and physical-mechanical properties.
- Energy Recovery from plastic waste
  - Processes need to be acceptable from environmental as well as economical point of view
  - better CO2 balance than energy from coal or oil



Chemical Recycling Is Complementary To Mechanical Recycling Increasing The Circularity

*Re*Think initiatives

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Re-use
Stimulating the use of returnable packaging and other reusable packaging

Renew
Promotion biobased; taking advantage of the Netherlands' good starting position

Reduce
Let the market do its work, and stimulate if so required

Redesign
Encouraging the design for next use and the application of recycled plastic

Recycling: Collection
Increase response

Recycling: Separating
Increasing the quality and volume of mono-flows. Reducing the volume of the mixed flow

Recycling: Recovery – mechanical
Increase the quality of recycled plastic – more mono-flows. Implementing process improvements

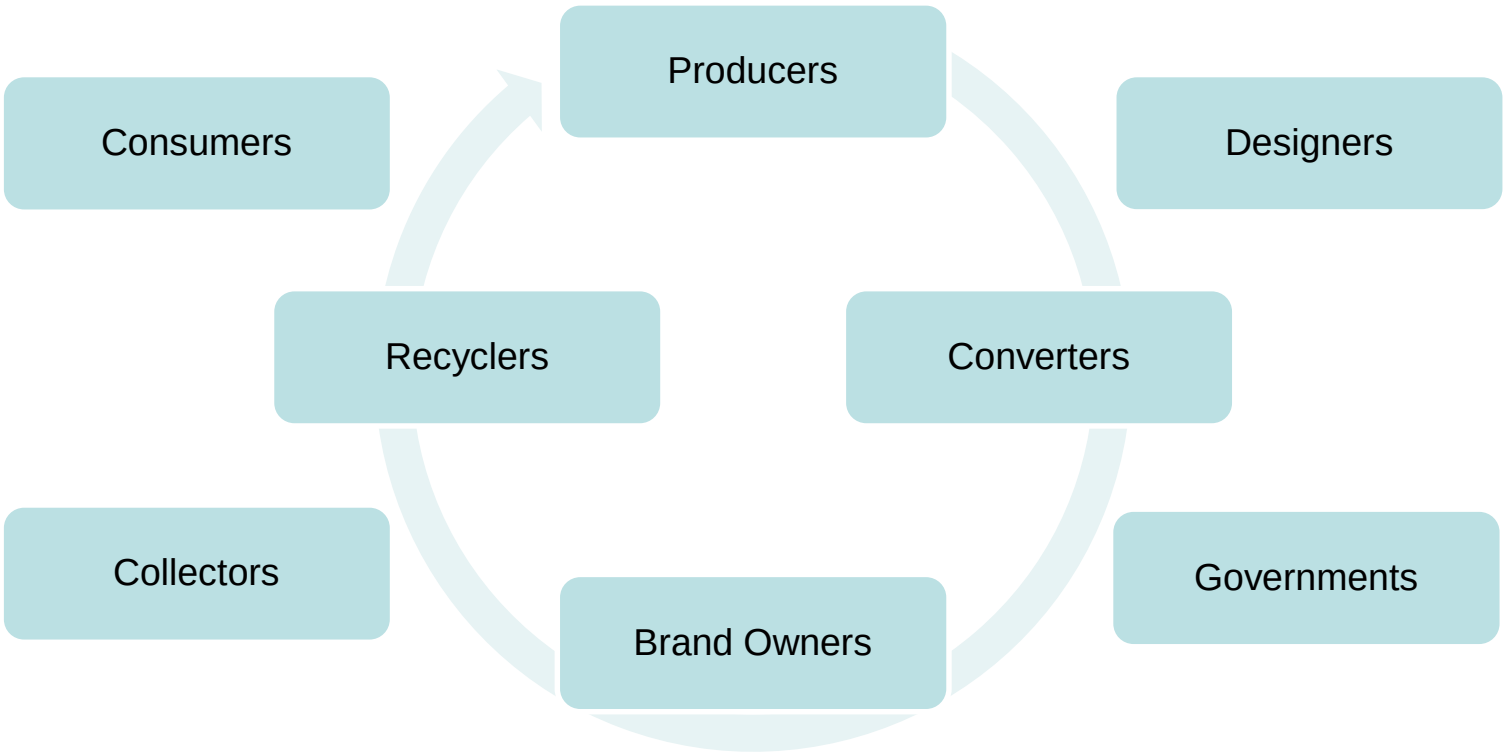
Recycling: Recovery – chemical
Investigating potential and business case studies

Industry initiatives

- Producers in Mechanical Recycling
- Brand owners 100% Recycable
- Converters using Recycled
- Designers; ECO design
- …

But what is really needed…

Value Chain Cooperation



…Is the key to success in a Circular Economy

PCEP Context

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- European Plastics Industry value chain collaboration to drive Europe's Polyolefins-based packaging recycling efforts.
- The platform is a multi-stakeholder group that seeks to identify the barriers and opportunities to increase Europe's polyolefins recycling and work towards ensuring the supply of high quality recycled polyolefins for the European market.
- The Polyolefins industry is currently conducting in-depth stakeholder discussions and a thorough analysis of Europe's polyolefin recycling rates.
- PCEP is an independent legal entity with its own General manager

Commitment

- Announce before end of 2018 an ambitious industry-wide 2030 roadmap to reach 60% recycling and reuse of the collected Polyolefin (PO) packaging.
- Work collaboratively with all relevant stakeholders in Europe to have more than 75% of all PO packaging readily designed-for-recycling by 2030.
- Work collaboratively with all relevant stakeholders of the waste management value chain in Europe, including municipalities and collection schemes, with the aim to collect all PO packaging, to sort them to produce a high quality/value feedstock for the PO value chain.
- Prepare an annual reporting system and invite the EU legislators to challenge and scrutinise PCEP progress on a yearly basis.

Plastics

The Material for the 21st Century

Circular Economy Drivers

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Legislative Drivers

European Commission

- ***2018 EU Plastics Strategy***
- **Packaging Waste Directives**

By 2030: 100% Plastic packaging is either reusable or can be recycled in a cost-effective manner & more than half of plastics waste generated in Europe is recycled

Market Drivers

Retailers, brand owners & consumers

- ***World Economic Forum Davos 2018:*** 11 companies working towards using 100% reusable, recyclable or compostable packaging by 2030
- Evolving consumer consciousness concerning waste and recycling

By 2025 LIDL: Ensure all packaging is widely recyclable, reusable, refillable or renewable
By 2030 P&G: Doubling use of recycled resin in plastic packaging

Legislators, brand owners and consumers are driving circularity

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Forecast evolution of recycled contents in packaging

2014

- **Total collection rate: 37%**
- **EU Recycling rate: 13%**

Plastic Waste (kt) 16,700 → Sorting (kt) 6,200 → Recycling in EU (kt) 2,580 →

705	kt	Packaging
535	kt	Construction
140	kt	Automotive
65	kt	EEE
120	kt	Fibres
580	kt	Others
430	kt	Incineration

2025

- **Total collection rate: 74%**
- **EU recycling rate: 55%**

Plastic Waste (kt) 21,680 → Sorting (kt) 16,030 → Recycling in EU (kt) 12,535 →

7,105	kt	Packaging
1,490	kt	Construction
390	kt	Automotive
240	kt	EEE
120	kt	Fibres
2,525	kt	Others
2,090	kt	Incineration

Source: Deloitte Sustainability Blueprint for plastic packaging waste: Quality sorting and recycling – Final Report 2017

suez lyondellbasell

Marine Litter

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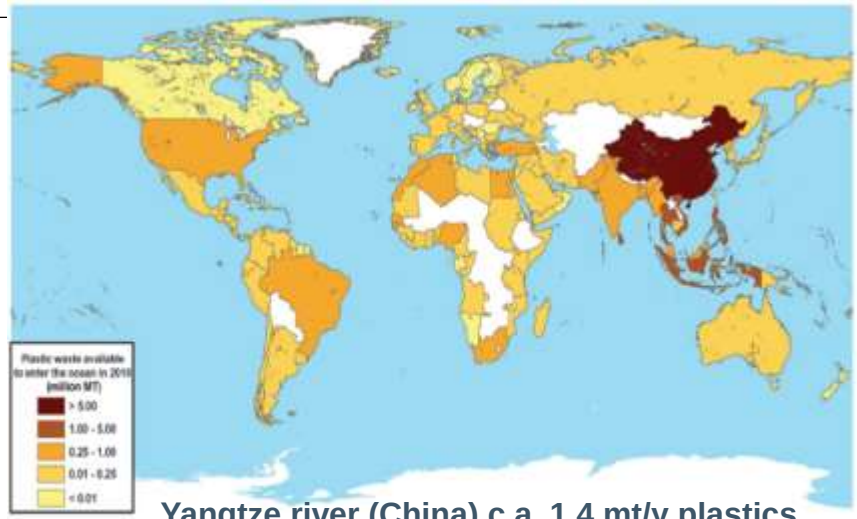
- Plastic waste in the oceans is a threat; 80% comes from mainland, 50% comes from Asia
- May 2018 - EU commission proposed a target to strongly reduce the single use plastics (take away food containers)
- LYB is actively advocating on Marine Litter with EU parliament and member states, and support initiatives of *World Plastic Council, Plastics Europe, Cefic, Plastic Industry Association,* as well as *Americal Chemistry Council* (chaired by Bob Patel)
- Operation Clean Sweep® - LYB is voluntary committed since 2014 to achieve **ZERO Pellet Loss** target in our manufacturing operations



Yangtze river (China) c.a. 1,4 mt/y plastics

Fig. 1. Global map with each country shaded according to the estimated mass of mismanaged plastic waste [millions of metric tons (MT)] generated in 2010 by populations living within 50 km of the coast. We considered 192 countries. Countries not included in the study are shaded white.

*Source: Jambeck study

Primary Source

Single Use Plastics

Closing the loop

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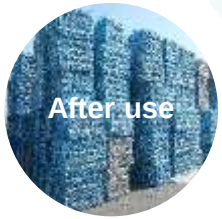
Marine litter

Landfill

Energy recovery

Incineration

Export



Molecular recycling

Mechanical recycling

Use phase

Re-Use

Working on many areas to increase circularity

Plastic waste in the environment

- **~8 million metric tons of plastic** is entering the ocean every year
- Although plastics are part of the Great Pacific Garbage Patch, **the majority of the patch lost or abandoned fishing gear**
- ~88% to 94% of all plastics currently entering the ocean **come from just 10 rivers**
- More than **1/4 of the world's population lacks access** to basic waste collection
- **Industry is taking action**

Top 10 marine debris items collected on beaches and waterways globally

Rank	Item	% of Total Debris
1	Cigarettes	12%
2	Food Wrappers	8%
3	Plastic Beverage Bottles	8%
4	Plastic Bottle Caps	5%
5	Plastic Grocery Bags	4%
6	Other Plastic Bags	4%
7	Straws and Stirrers	3%
8	Plastic Take Out Containers	3%
9	Plastic Lids	3%
10	Foam Take Out Containers	3%
	Total	52%

*Source: Citi Research, Ocean Conservancy International Coastal Cleanup 2018 Report

…But we have a problem; addressing plastics end of life

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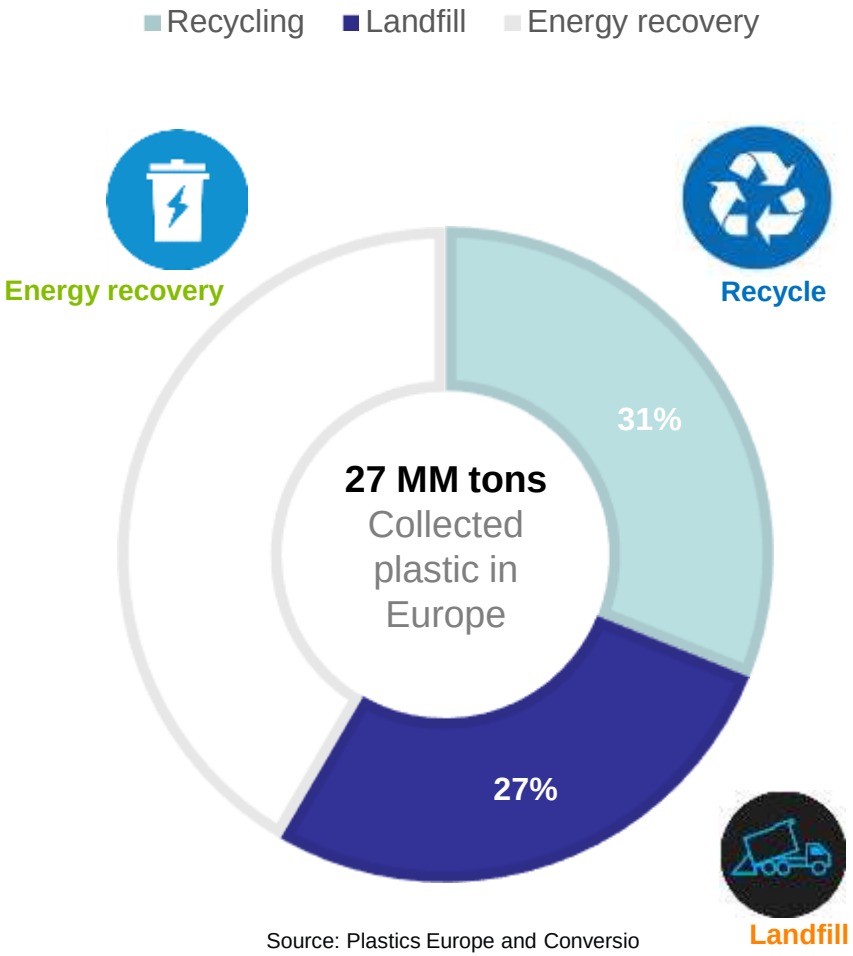
Addressing Plastics end-of-life

- Landfilling must be avoided, plastic is simply too valuable
- Recycling is part of a larger solutions set, including mechanical and chemical recycling
- Need to keep energy valorization until better alternative is economically available



Source: Plastics Europe and Conversio

Using waste as a resource is key to becoming more resource efficient

Needs

- Innovation is at the heart of this initiative and will require both public and private support to be successful.

- The following priority areas of work have been identified:
  - Development of packaging design guidelines and assessment protocols according to the principles of the Circular Economy.
  - Innovation to increase the recyclability of flexible and rigid packaging.
  - EU wide quality standards for sorted plastics, harmonisation of tests methods for recycled plastic materials and certification of plastic recycling operations.
  - Innovation & development of end-use markets to encourage demand for recycled plastics.
  - Stimulating innovation to improve recycling, conversion technologies and reuse.
  - Drive the research and development of new technologies to convert non-mechanically recyclable plastics into feedstock for the production of new materials.

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