



## **FIBER-BASED ALTERNATIVES TO OVERCOME THE PLASTIC CHALLENGE**

AIAC Annual Event 2019, Italy

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# Agenda

- ÅF Pöyry
- The plastic problem
- Driving forces & key measures to solve the plastic problem
- The vision: From fossil to bio
- Key take-aways

## ÅF PÖYRY: QUICK FACTS

- More than 16,000 employees
- Head office in Stockholm, Sweden
- Presence in 50 countries

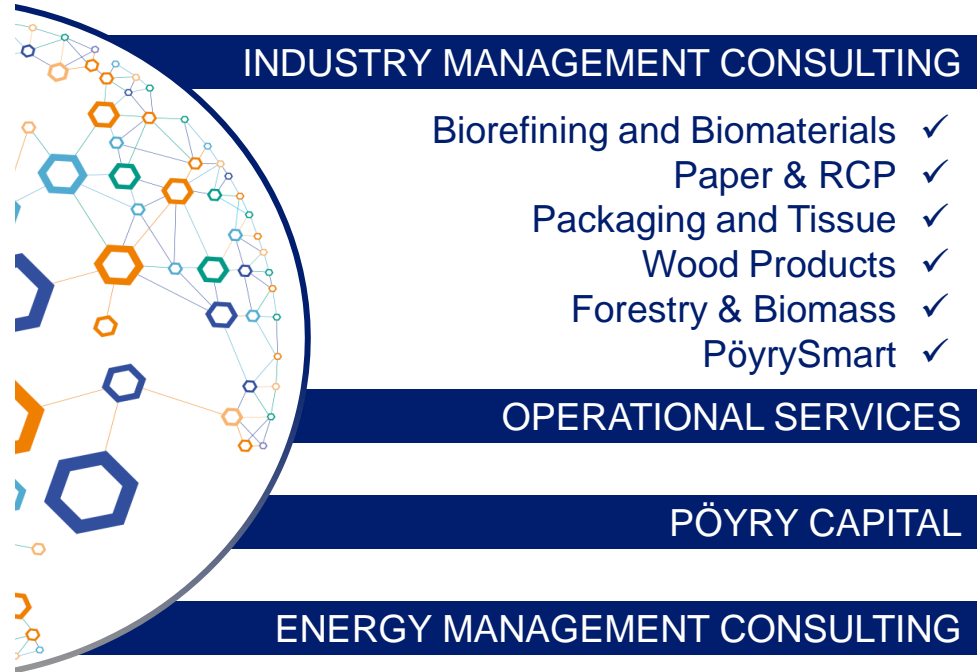
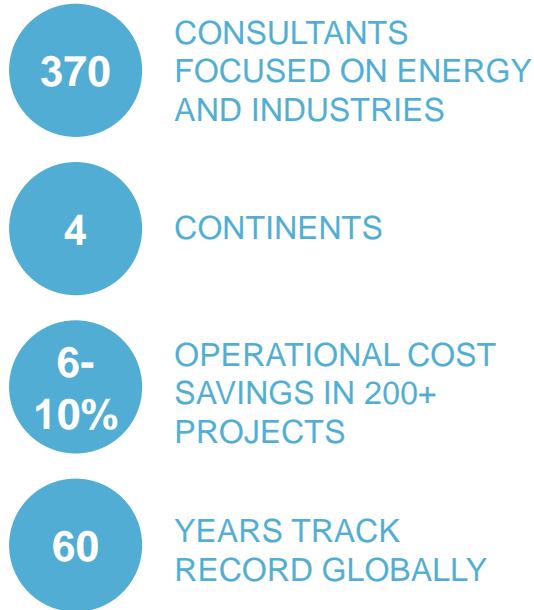
### Five divisions

- Infrastructure
- Industrial and Digital solutions
- Process Industries
- Energy
- Management consulting



# MANAGEMENT CONSULTING DIVISION

## Pöyry Management Consulting



## SOME VOCABULARY

- Plastic
- Bio-based plastic
- Microplastics
- Degradable
- Bio-degradable

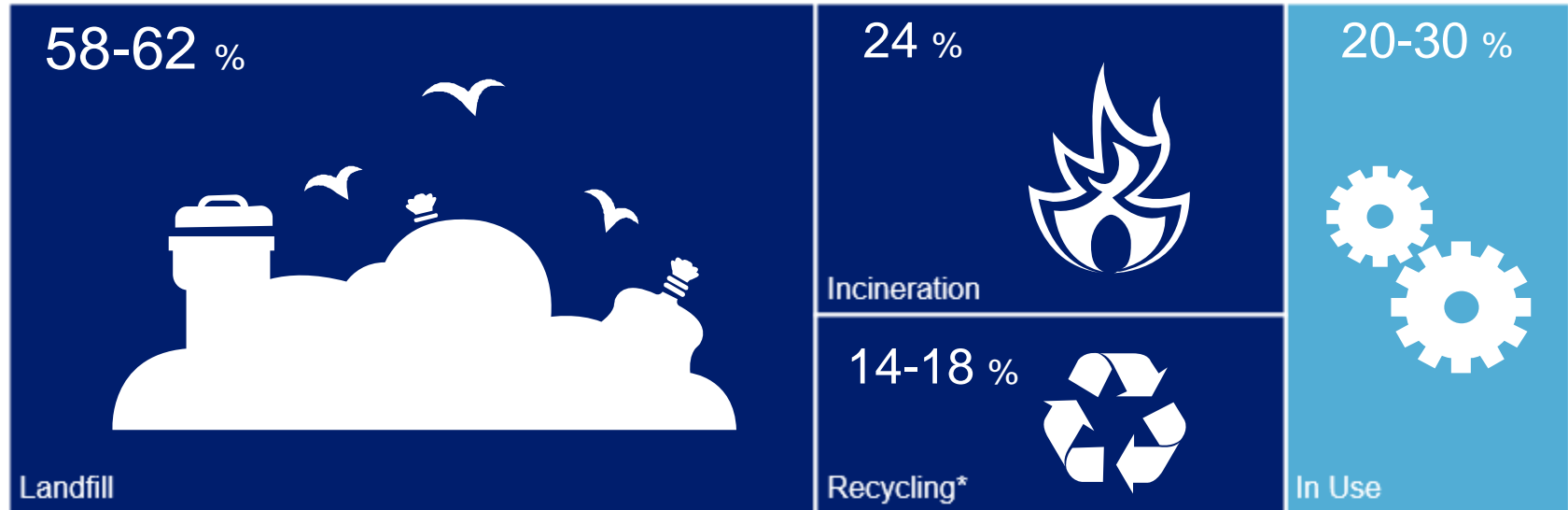




## UNDERLYING CAUSES OF THE PLASTIC PROBLEM

## PLASTIC PROBLEM: WHAT HAPPENS TO PLASTICS?

Current plastic production amounts to about 400 Mt, of which 3/4 end up as waste. The majority of this waste ends up in landfills, dumps or in the environment



\* Material collected for recycling. The actual amount of plastic being transformed into new products is smaller

Source: Pöyry, OECD, Geyer et al. (2017)

# PLASTIC PROBLEM: WHAT HAPPENS TO PLASTICS?

400 million  
tons/annum

- Population growth
- Increasing middle-class spending

Marine litter



Flooding



Microplastics



Waste management

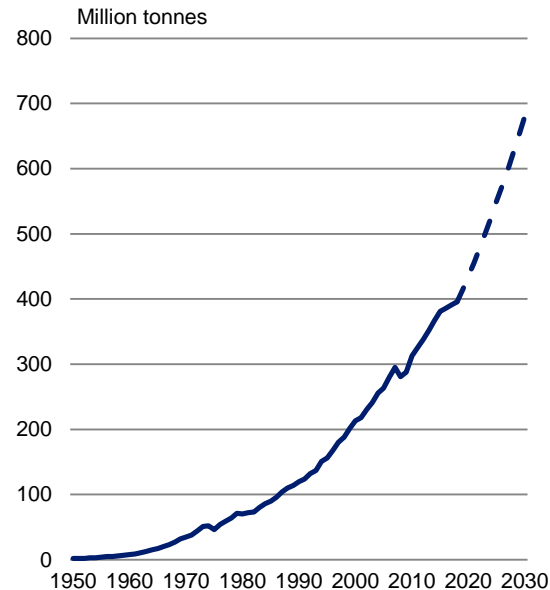


Source: Pöry, IUCN, OECD, Geyer et al. (2017)

# PLASTIC PROBLEM: USE IN FOOD AND BEVERAGE PACKAGING

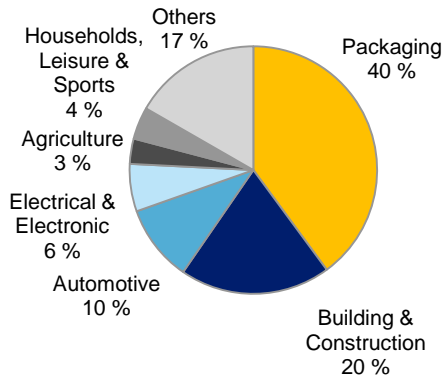
Global plastic use has increased exponentially since the 1950s reaching almost 400 Mt in 2018. Packaging is one of the most dominant end uses of plastics, especially in food and beverage

Global plastic production



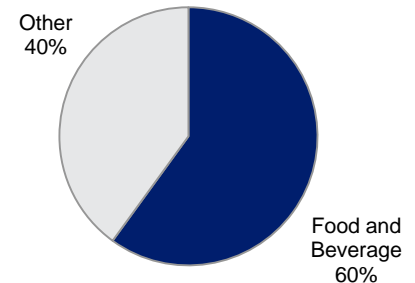
Main uses of plastics in Europe\*

Indicative



\*End use distribution of European plastics converter demand in 2017. Total 51.2 Mt

Plastic packaging by application

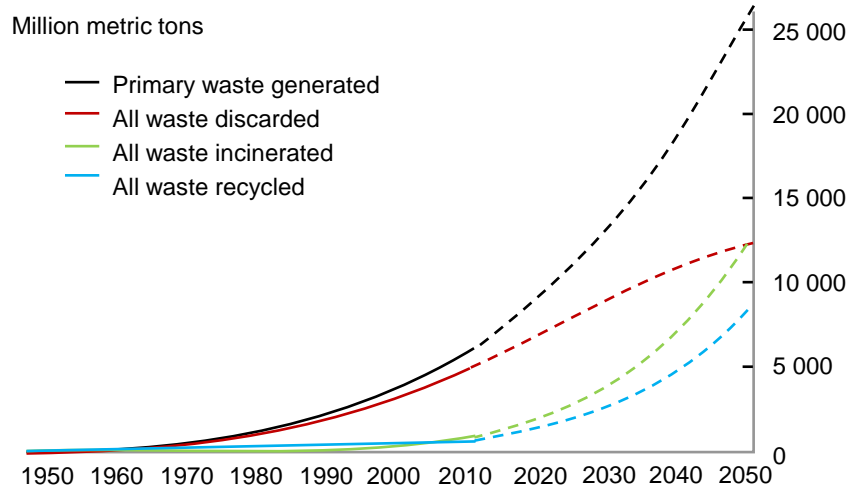


Source: Pöyry, UNEP, Geyer et al. (2017), Plastics Europe, Groh et al. (2018)

# PLASTIC PROBLEM: WASTE IN FOOD & BEVERAGE PACKAGING

Packaging accounts for 40% of plastic production but almost 60% of plastic waste formation

## Cumulative plastic waste generation

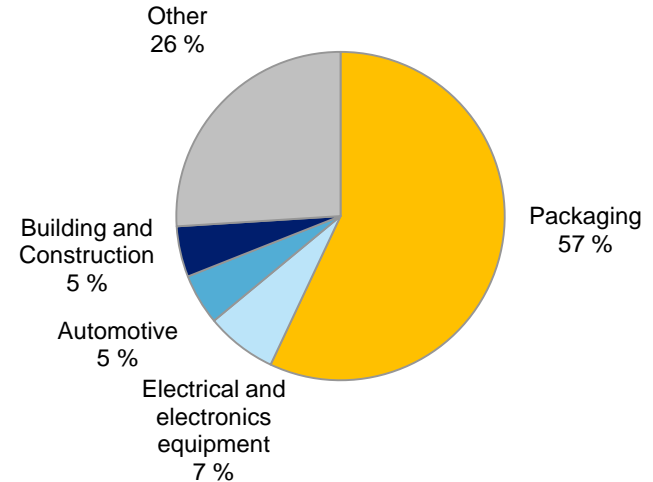


Between 1950 and 2015, cumulative plastic waste generation was 6300 Mt

Solid lines show historical data from 1950 to 2015; dashed lines show projections of historical trends to 2050.

Source: Pöyry estimates, Geyer et al. (2017)

## Waste generation by industry today



~300 Mt of plastic waste was generated in 2017

# DRIVING FORCES: SOLVING THE PLASTIC ISSUE

## Influencers

- Governments
- Municipalities
- Retailers
- Brand owners
- Consumers

## Enablers

- Investors
- Producers
- Designers
- Technology developers
- Material scientists



1

### Initiatives

- Consumer initiatives concerning plastic debris and plastic-free food and beverage packages
- Aiming at influencing key players within the industry to act on the plastic problem



2

### Laws & regulations

- Increasing number of laws and regulations on plastic waste management and the use of selected single-use plastics items



3

### Commitments

- Retailers and brand owners sustainability commitments



## DRIVING FORCES: CONSUMER INITIATIVES

Concerned citizens have been actively pushing industries to join forces in the war against plastics. Cleaning plastic debris or offering plastic-free packaging alternatives are some recent concrete actions.

- **The Ocean Cleanup** was founded in 2013 by Boyan Slat
- A passive U-shaped system which collects plastic debris using currents
- Aiming at removing 50% of the Great Pacific Garbage Patch within five years' time
- **A Plastic Planet**, is a grassroots non-profit movement launched in January 2017
- Targeting to reduce using conventional plastics in food and beverage packaging
- Their first public campaign involves securing a Plastic Free Aisle in supermarkets, firstly introduced in Ekoplaza in Amsterdam



A  
PLASTIC  
PLANET

PLASTIC  
FREE™

## DRIVING FORCES: LAWS AND REGULATIONS

Increasing number of laws and regulations have globally targeted at fighting against the plastic waste problem. Particularly marine litter, single-use plastics and plastic bans have attracted a great level of media attention



# DRIVING FORCES: BRAND OWNERS' SUSTAINABILITY COMMITMENTS



Leading brand owners are mainly focusing their sustainability efforts on plastics recycling. However, several brands also aim at substituting plastic packaging with bio-based alternatives



*"to have 100% of plastic packaging reusable, recyclable or compostable and increase the recycled plastic content in packaging to at least 25% by 2025"*



*"to double the recycled content, recyclability and compostability and reusability of cups and packaging by 2022"*



*"Our packaging will be fully recyclable by 2025.  
All paper and board used will be 100% sustainable by 2025.  
We will halve packaging weight by 2025."*



*"to eliminate plastic packaging from all own-brand products by 2023"*

# KEY MEASURES: SOLUTIONS TO PLASTIC WASTE PROBLEM



## 1 Reduction

- Reduction of packaging material
- Reduced use of single-use plastic items



## 2 Re-use

- Most food and beverage packages are single-use
- Re-use is challenging due to e.g. purity issues

**RePack**  
originalrepack.com

**Loop**



## 3 Recycling

- Improved recycling technologies & recycling rates, chemical recycling
- Recyclability of packaging
- Plastic bottle deposit – potentially also being applied to other types of packages; regional and cultural differences!

**JAMES CROPPER**  
EST. 1845



**VEOLIA**



## 4 Substitution

- Switch from plastics to alternative materials, e.g. fibre

**Iceland**

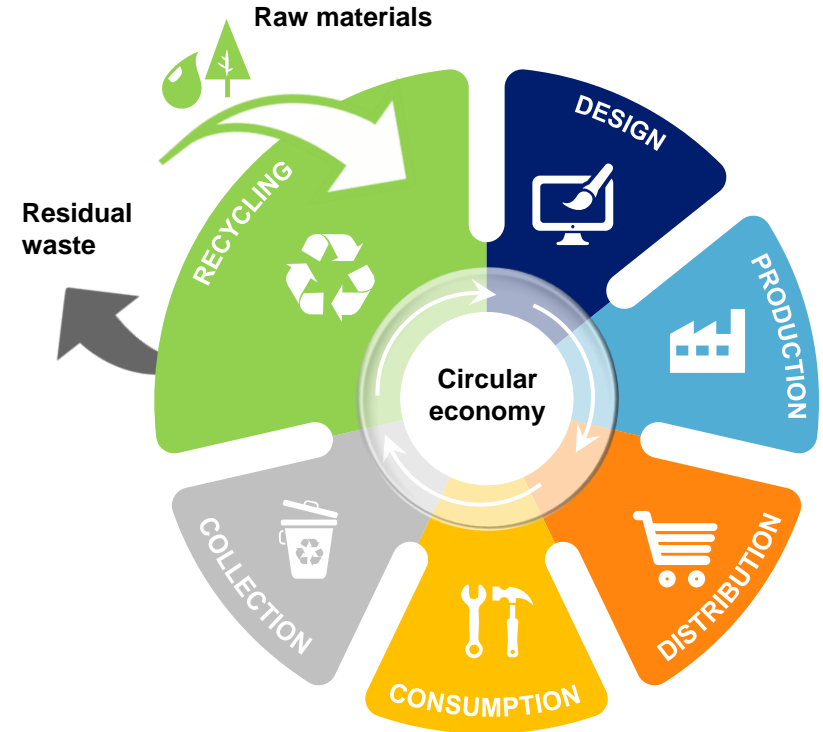




## KEY MEASURES: RECYCLING

**Improved collection and recycling of plastic waste is the key to reduce environmental burden and dependency on fossil feedstock**

- Recycling rates are estimated to be 14–18% globally
- Current recycling is mainly open loop mechanical recycling of sorted high-quality plastics
- Higher recycling rate requires improved collection and development of chemical recycling of low-quality mixed plastics (closed loop recycling)
- Even with higher plastic recycling rates there is still a market need for fibre based solutions





# KEY MEASURES: SUBSTITUTION

**Fibre and bio-based plastics solutions can offer improved environmental performance of food packaging, yet, they do not solve plastic waste problem**



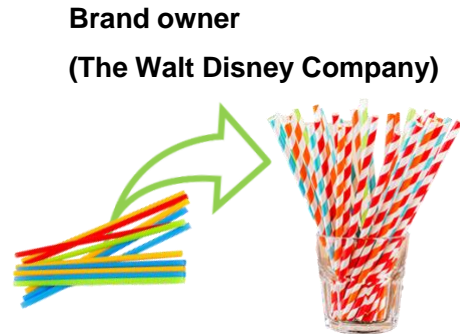
## **Fibre based solutions**

- Many commercially available fibre-based solutions exist
- Generally not 100% fiber based and degradable in nature; need for barrier coatings made of plastics
- Technical breakthrough in bio-based barriers not yet achieved; on-going research and development, e.g. Kotkamills and CH Polymers
- Recyclability depends on region and country

## **Bio-based plastics**

- Bio-based plastics account for <1% of the total plastic food packaging market
- Eco-friendly feedstock alternative; yet not necessarily biodegradable in nature
- Mainly 1G feedstock; processes using 2G feedstocks are being developed

# KEY MEASURES: SUBSTITUTION CASE EXAMPLES

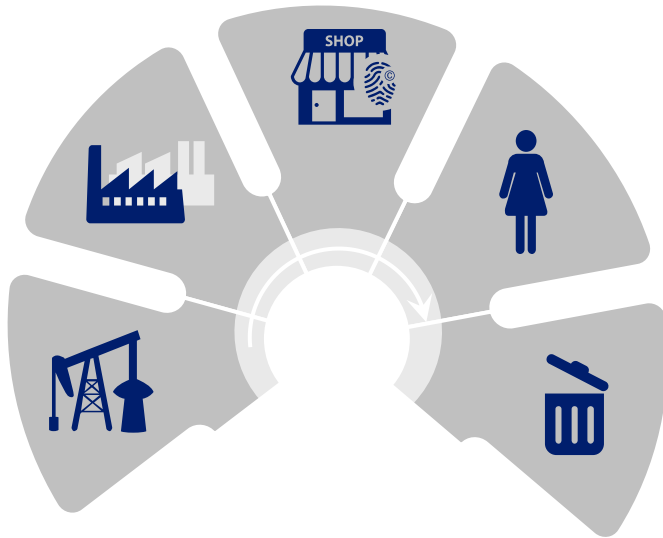


Note: Pictures of plastic solutions, drinking straws and coffee cups are general packaging pictures and do not refer to any specific brand owner

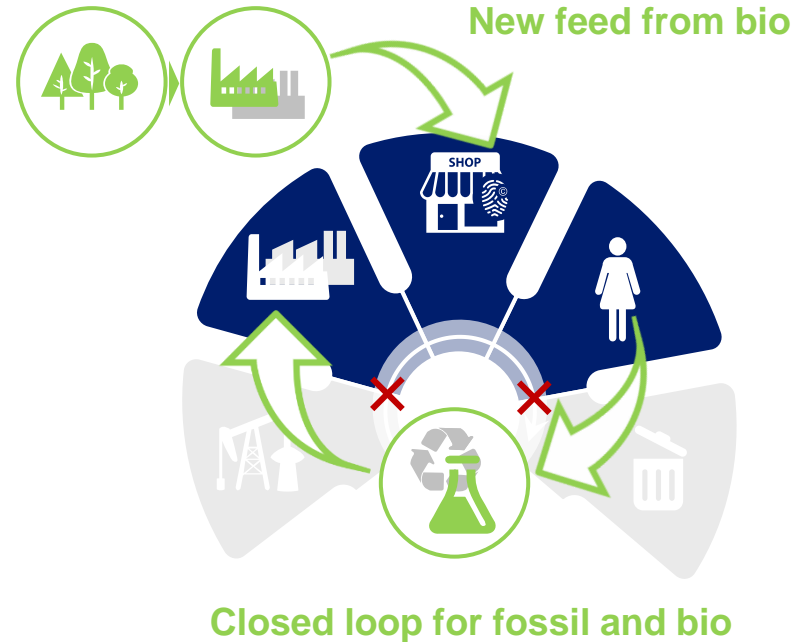
# VISION: SYSTEMIC CHANGE COMBINING RECYCLING & SUBSTITUTION (1/2)

Moving from a linear to circular business model offers a green future for plastics – new feed comes from renewable resources

## Current status

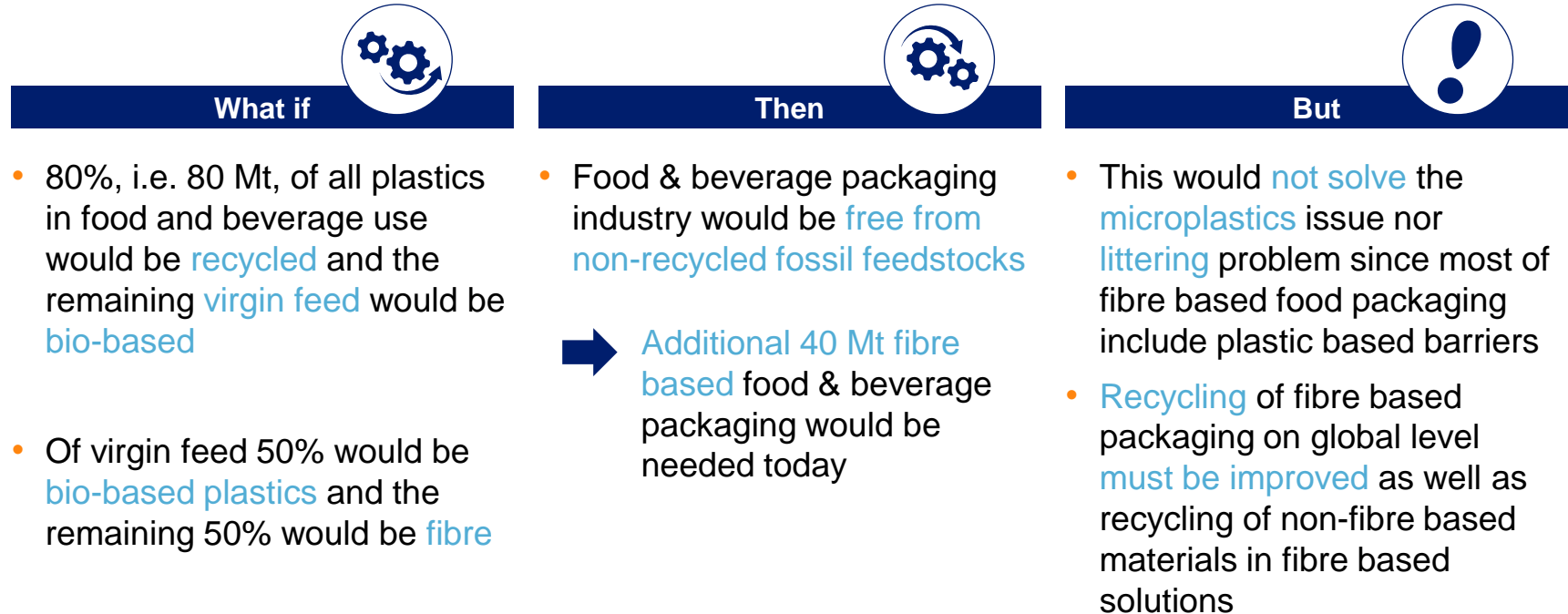


## In the future



## VISION: SYSTEMIC CHANGE COMBINING RECYCLING & SUBSTITUTION (2/2)

Although addressing the issue of using fossil feedstock in plastic food and beverage packaging production, there is still significant potential for fibre even after significant increase in recycling



## KEY TAKE-AWAYS



- Plastics production increased exponentially since 1950s; packaging the largest end use
- 75% of plastic produced ends up as waste; single-use plastics in F&B packaging a major issue
- Consumers, brands and governments are acting to solve the plastic waste problem
- Reduction and re-use are primary measures to fight the plastic waste problem, followed by recycling and substitution
- Fibre-based food packaging solutions exist; yet plastics are needed for barrier
- Shift from linear to circular business model; a green future for plastics, i.e. new feed comes from renewable resources



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