



Chemical Strategic Report Brochure

# Plastics Circularity

Plastic Waste Availability, Recycling Technologies, Policies,  
Impact on Virgin Resin Demand

Chemical Consulting

September 2023

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**S&P Global**

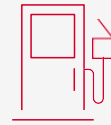
Commodity Insights

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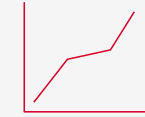


Our consulting service provides you with custom-built intelligence for a new era of energy. So we can answer your unique questions with equally unique solutions.

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Data & Services



Economics &  
Country Risk



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Agribusiness



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Operational Risk  
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Compliance



Automotive



ESG, Climate  
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Chemical



# Chemicals

Every industry, from agriculture to energy to retail, relies on chemicals at some stage in the production process. To stay ahead, you need a deeper understanding of market volatility, regulatory pressures, supply-chain disruption and shifting end user demand.

Our chemicals consultants have experience advising chemical producers, governments, financial institutions and technology providers operating at any point along the value chain, from commodity to specialty chemicals.

## We can help you with:

- ✓ Techno-economic and feasibility studies
- ✓ Plastics Circularity
- ✓ Market studies for commodity chemicals
- ✓ Transaction support
- ✓ Specialty chemicals studies
- ✓ Process technology

# Special Report on Recycling

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Introduction/background,  
methodology, conclusions

**2** **Global & Regional Virgin Polymer Markets**  
Virgin polymer markets focused on Polyethylene, Polypropylene and PET globally and in key regions

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Global and regional waste volumes and recycling rates as well as incentives to recycle

**4** **Recycling Technology Review**  
Status of mechanical and chemical recycling including feedstock requirements and current and upcoming capacities

**5** **Global & Regional Recycled Polymer Markets**  
Recycling Scenarios and analysis on supply, demand, carbon intensity and price premiums/discounts for major resins like PE, PP, PET.

**6** **Policy and Regulatory Landscape**  
Overview of regulations and certifications impacting the recycling industry

**7** **Challenges for stakeholders across plastic value chain**  
Feedstock availability, sustainability commitments, collaborations across the value chain

**8** **Key takeaways**  
Summary of key insights

### Regions and polymers covered

- North America
- Europe
- Indian Subcontinent
- Northeast Asia
- Southeast Asia
- HDPE
- LDPE
- LLDPE
- PP
- PET

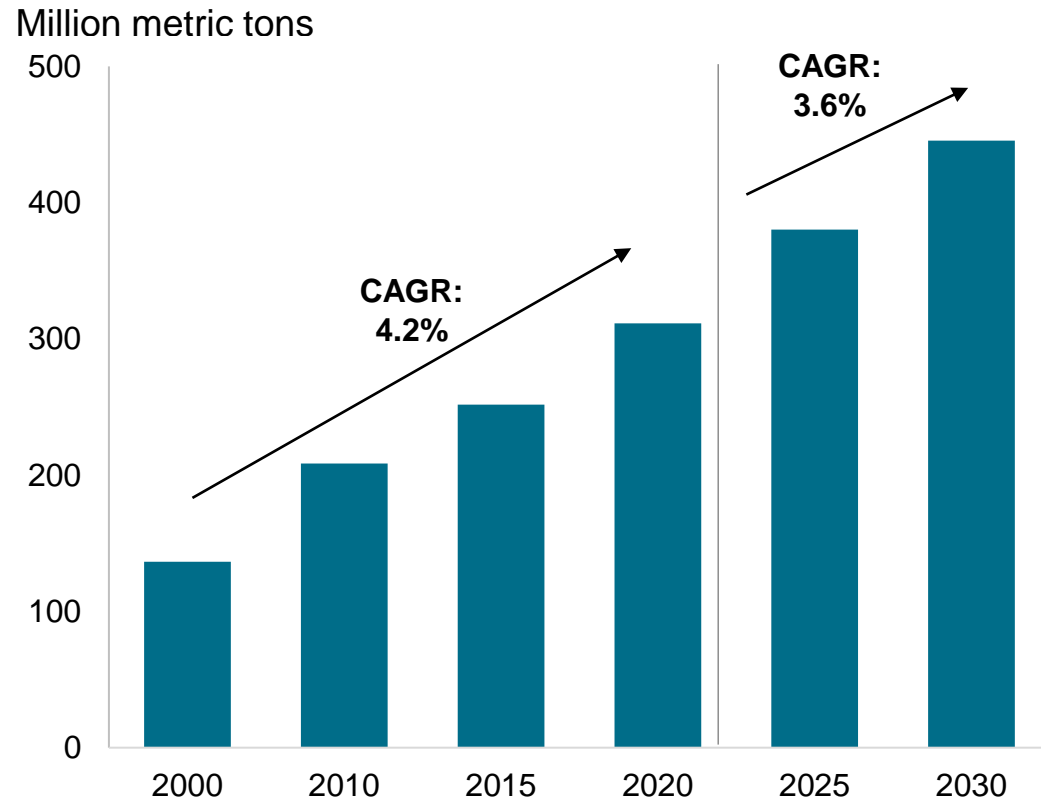
# Sustainability is key driver for companies along plastics value chain seeking to align their strategy closer to UN Sustainability Goals



This impacts refinery operations, chemical producers, plastics producers, compounders, fabricators, waste collection, sorting and many more, not least major brand owners

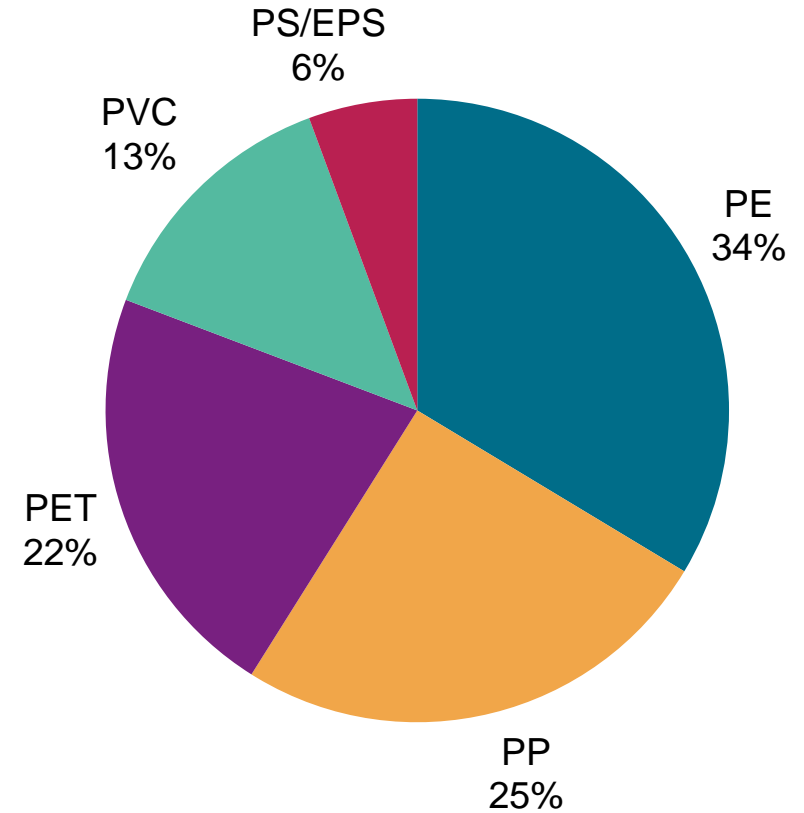
# Industry enjoyed continuous growth, driven by commodity polymers

## Global commodity polymer consumption



Source: S&P Commodity Insights

## 2022 consumption by polymers

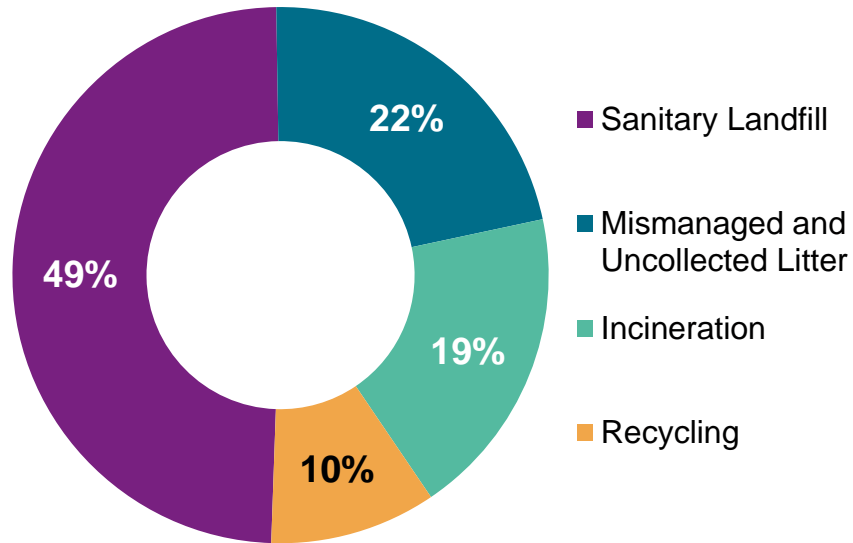


Source: S&P Commodity Insights

# The state of plastics use and its disposal

## Global Waste Volumes

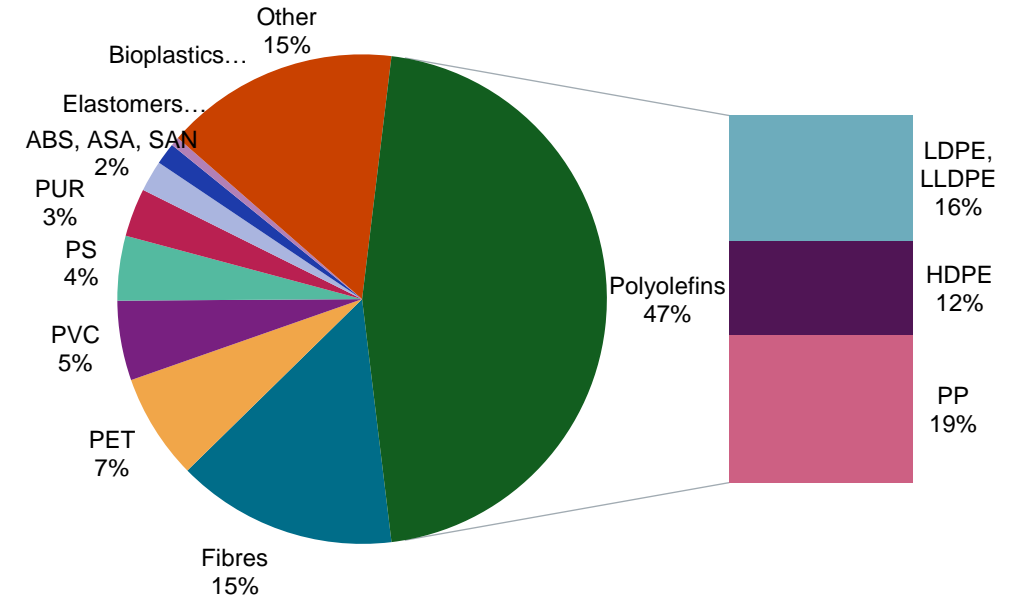
World: Plastic Waste by End-of-Life Fate in 2022



Source: S&P Global Commodity Insights based on data from OECD Global Plastics Outlook Database.  
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**Only 10%** of plastic waste is **recycled** globally.  
Another **19%** is **incinerated**, **49%** ends up in **landfill**

World: Plastic Waste by Polymer in 2022



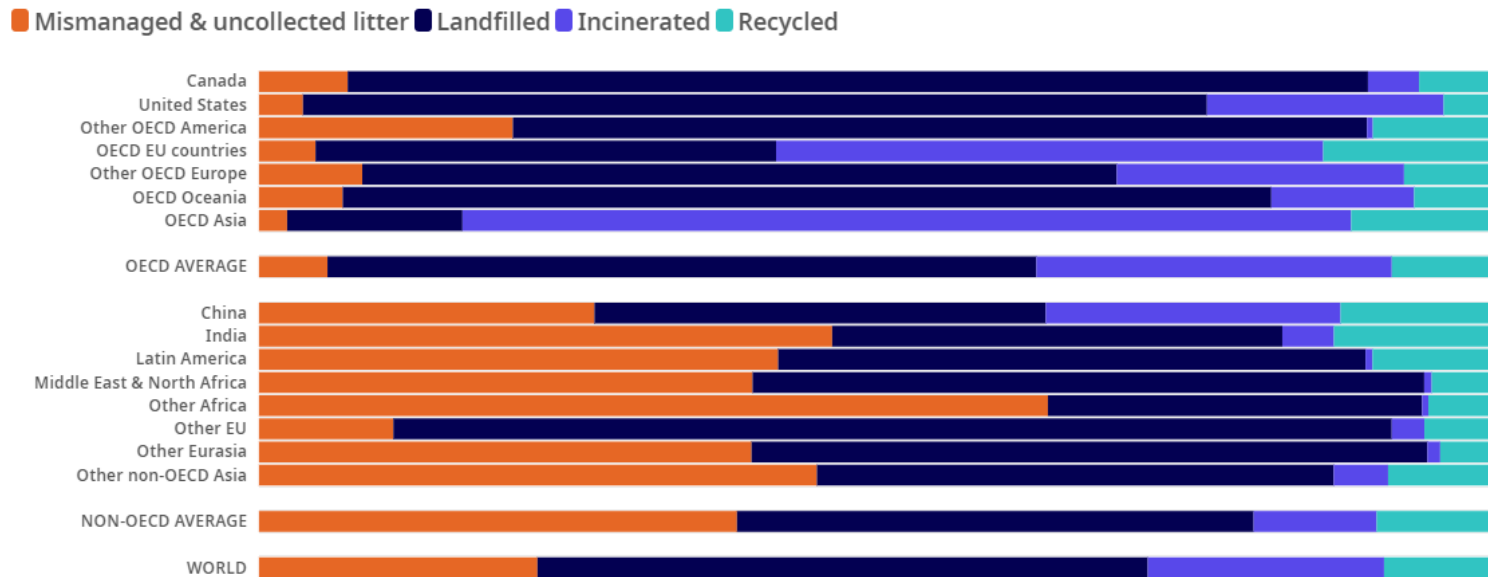
Source: S&P Global Commodity Insights based on data from OECD Global Plastics Outlook Database.  
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**Polyolefins** accounted about **47%** of the total plastic waste generated globally in 2022, with **PE and PP** constituting **28% and 19%** respectively.

# The state of plastics use and its disposal

## Regional Waste Volumes

Globally, **only 9% of plastic waste is recycled**, 22% is mismanaged with some ending up in terrestrial or aquatic environments



Source: OECD Global Plastics Outlook Database

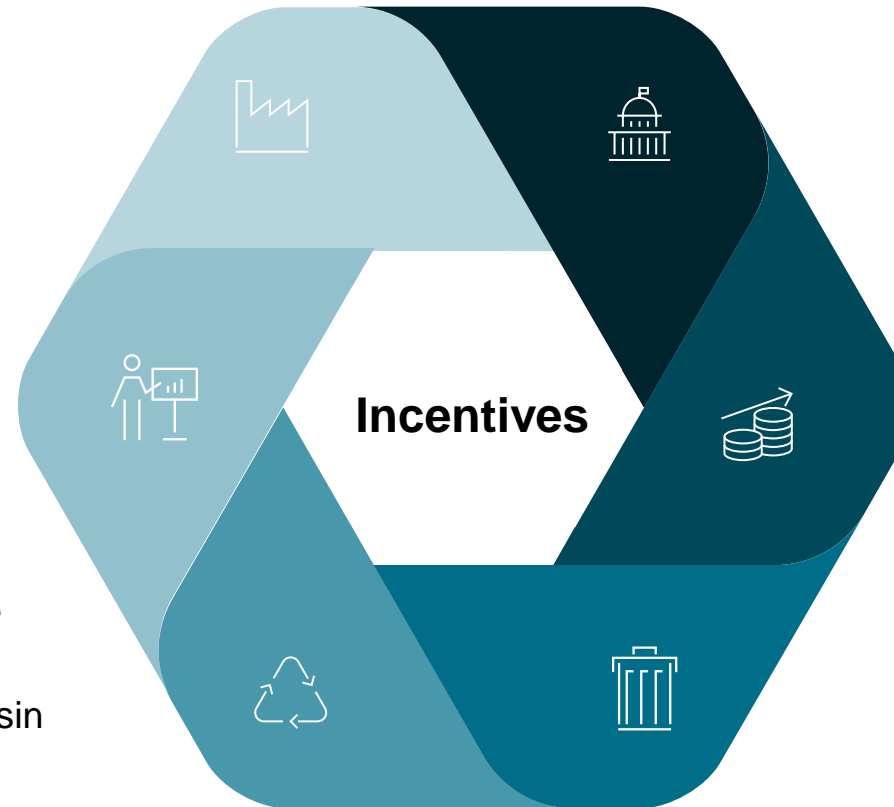
- The world is producing twice as much plastic waste as two decades ago, with the bulk of it ending up in landfill, incinerated or leaking into the environment, and only **9% successfully recycled**, another 19% is incinerated, 50% ends up in landfill and 22% goes into uncontrolled dumpsites.
- **Plastic consumption has quadrupled** over the past **30 years**, driven by growth in emerging markets.
- Global plastics production doubled from 2000 to 2019 to reach **460 million tonnes**. **Plastics** account for **3.4% of global greenhouse gas** emissions.



# Moving from linear to circular

## *Incentives to recycle*

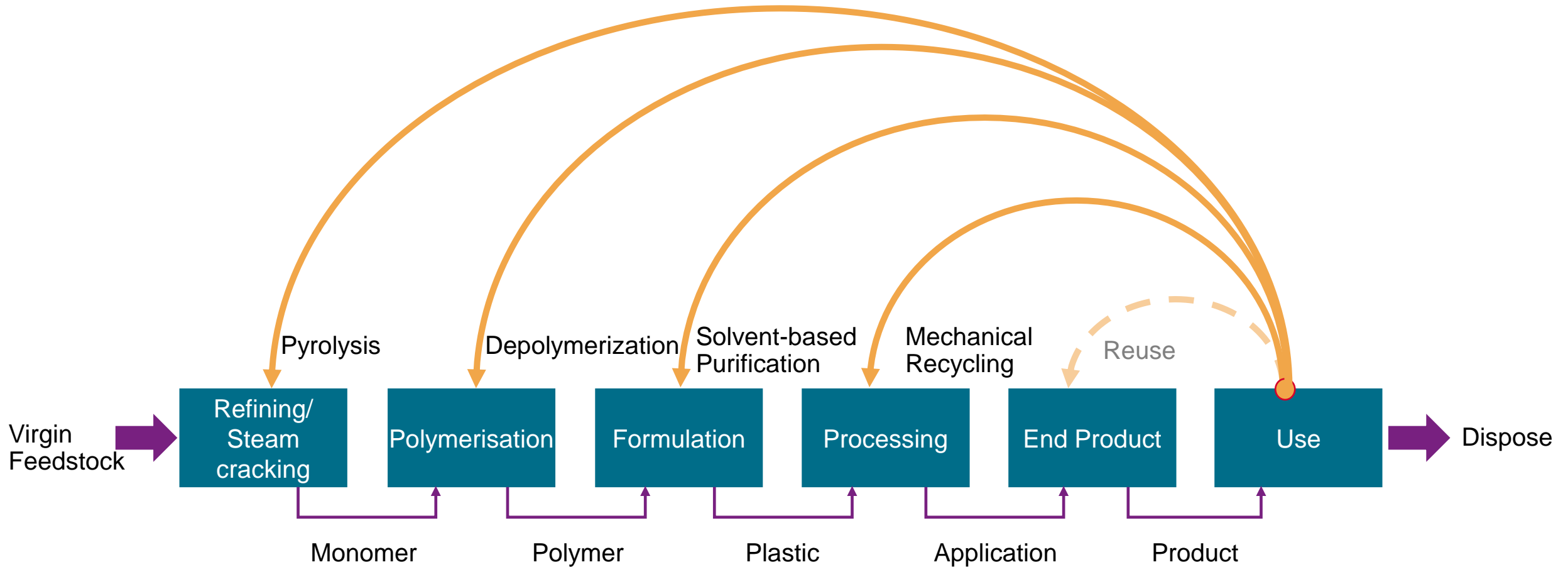
-  **Back up supply**  
Supplement virgin resin supply during possible shortages
-  **Market opportunity**  
Displace virgin resin in applications that do not require high-quality resin
-  **Competitive advantage**  
Gain marketing/advertising benefits from use of recycled resin



-  **Compliance**  
Satisfy any legislated recycle-content mandates
-  **Economic**  
Tax credit programs in different regions
-  **Waste management**  
Offset higher alternative disposal cost

# Plastics Recycling

Covers a range of technologies, at different stages of the value chain

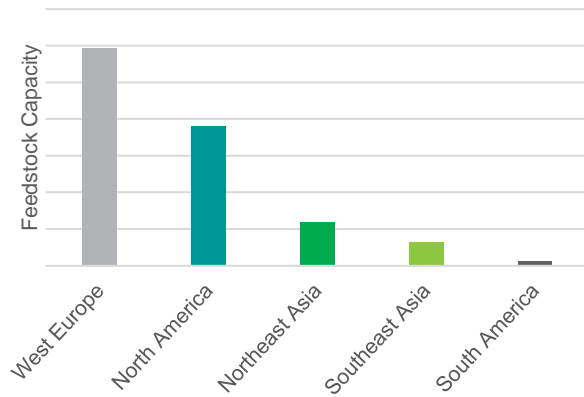


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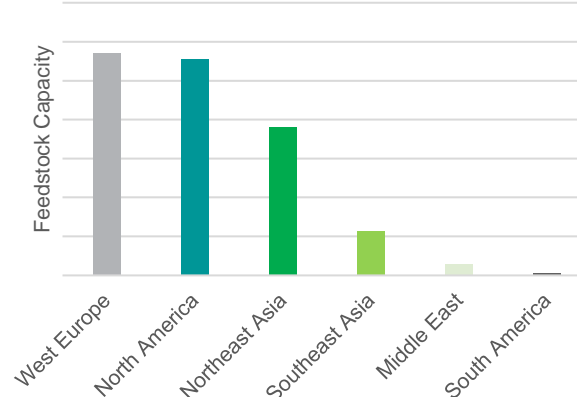
# Technology

## Increasing stakeholder interest to invest in chemical recycling

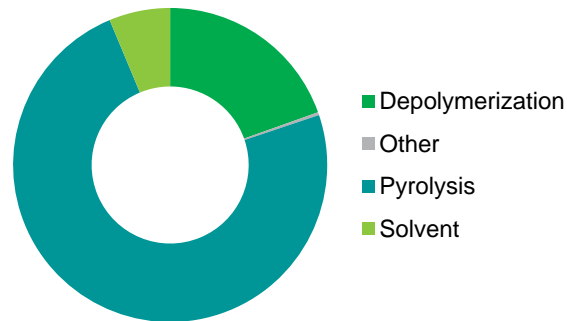
Estimated chemical recycling capacity by 2023<sup>1</sup>



Estimated added capacity between 2024-2030<sup>1</sup>



Incoming Technology share (2024-2030)<sup>1</sup>



- Trending partnerships in chemical recycling, as a complementary solution to mechanical recycling when the latter proves to be inefficient in the case of difficult-to-recycle plastics or improperly sorted, multilayered, or heavily contaminated waste.
- In the last five years, chemical recycling has increased, stimulated by an overall surge in demand for circular polymers and sustainability within industry, as well as consumer demands.
- West Europe and North America are currently regions for this technology with suppliers such as Encina and Brightmark announcing capacities of over 100 kta, reaching the commercial scale.
- S&P Global sees an important increase in the next 7 years in Asia, specially in China and Korea as plant announced capacities reach the 200 kta mark.
- Growth expected in solvent based and depolymerization technologies with PP and PET as majorly processed polymers. Some of the key developers include PureCycle, Eastman and Loop Industries

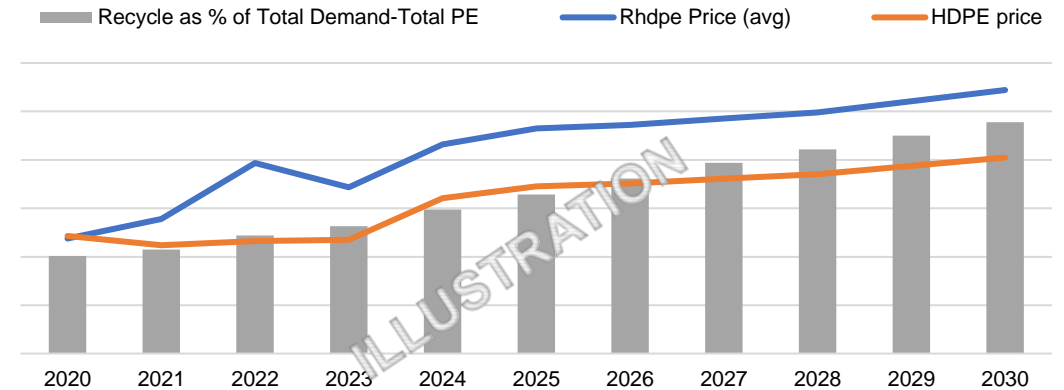
<sup>1</sup> As announced by technology developers and partners. Could vary depending on put offs and cancellations. Capacity represents incoming waste

# Price development

## Historical and forecast mechanical to virgin Polyethylene (PE) HDPE

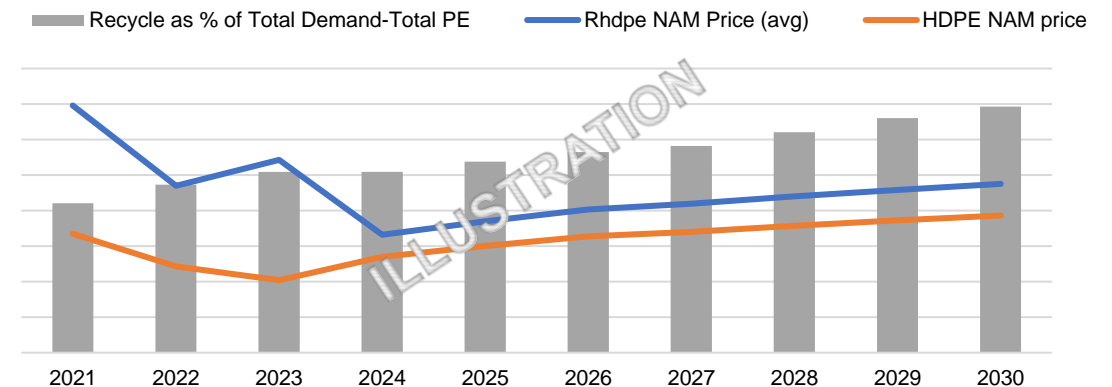
- In general, prices for recycled resins in Europe tend to track the virgin material.
- Comparing the regions, Europe outpace the recycle demand over the total resin demand as there is a strong push and solid legislation toward the addition of more recycle content.
- In North America prices for recycled HDPE are expected to remain above virgin due to an upsurge in corporate sustainability requirements.
- The market value of recycle HDPE might suffer downward pressure from the excess supply of virgin HDPE. Global supply difficulties over the last year have significantly impacted import-export operations, growing freight costs and reducing the supply of PCR bales, which has driven up the cost of production

### Average HDPE Europe-forecast



Source: S&P Global Commodity Insights  
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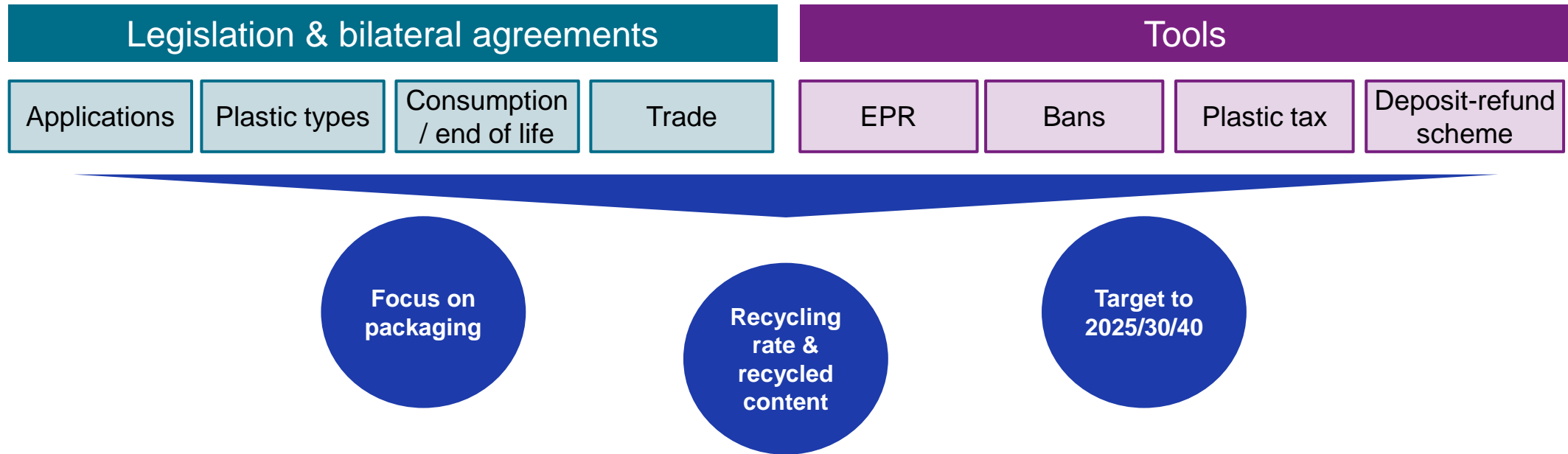
### Average HDPE NAM-forecast



Source: S&P Global Commodity Insights  
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# Policy

*Pressure has picked up on the plastics industry to mitigate the negative impact of plastic consumption on the environment*



- Legislation focused primarily on applications rather than type of plastics with aim to reduce either consumption into these applications or promote end of life and plastics circularity.
- Regulation centered around trade and plastics' waste trade that can be beneficial but also counterproductive to promote recycling.
- Tools have been set in place to support legislation such as bans on certain applications, deposit schemes (that improve collection/sorting and mechanical recycling), and EPR and plastic tax schemes that drive financing

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