

# Chemical Recycling: An Opportunity to Meet EU Circular Economy Ambitions

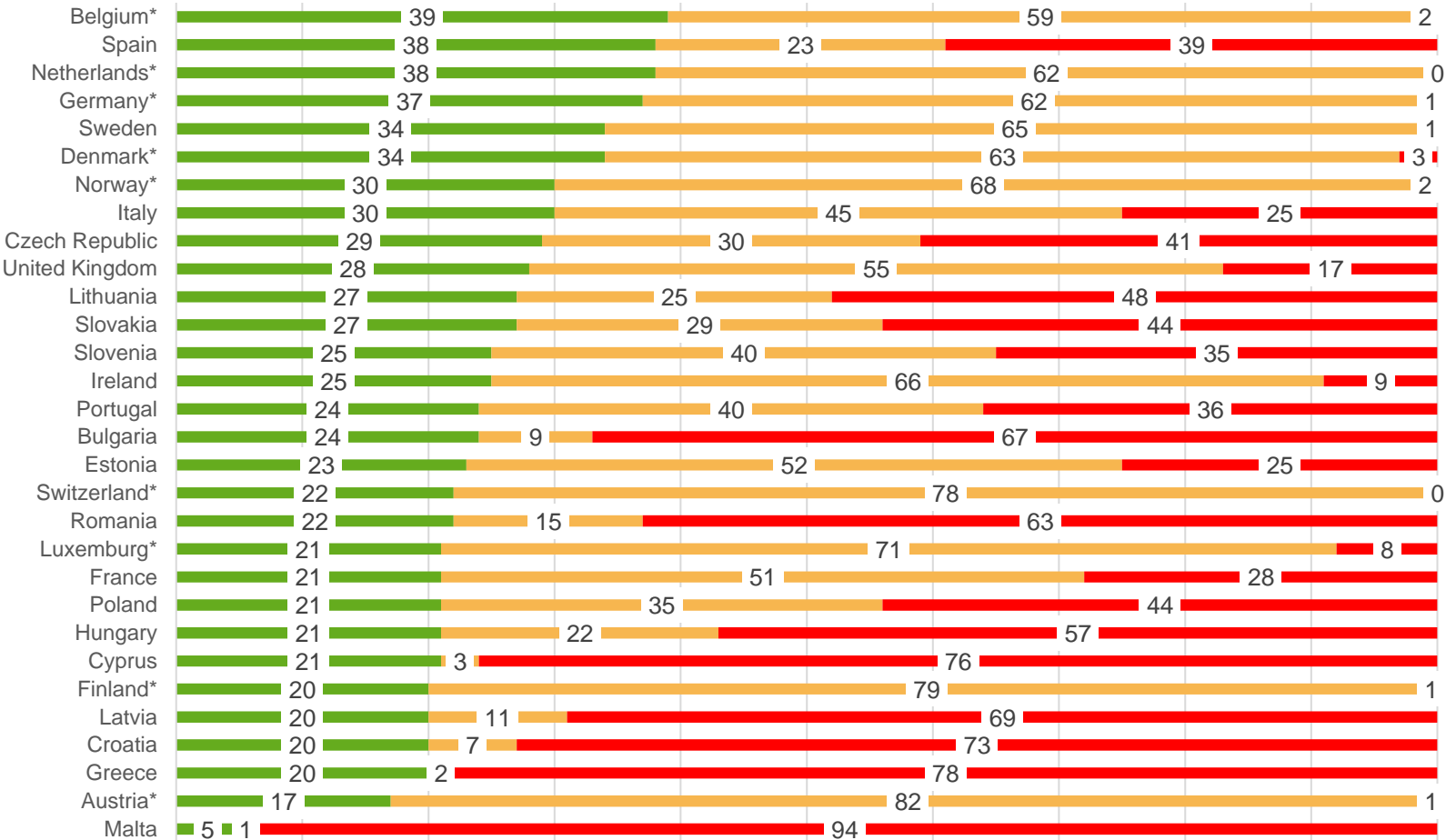
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# Ca. 70% of plastic waste is still incinerated or landfilled

- 3rd material waste stream (ca. 10%) after organic (ca. 45%) and paper (ca. 15%)
- 26.9% recycled, 49.6% incinerated, 23.5% landfilled
- +22.5% increase in recycling in 2018-2022
- 4 countries with post-consumer plastics waste recycling rates exceeding 35%

Post-consumer plastic waste treatment in %  
EU27+3 countries 2022



The above data are rounded estimations. 2022 waste treatment data were calculated according to the new methodology under Directive (EU) 2018/852.  
Source: Plastics Europe "The Circular Economy for Plastics – A European Analysis", 3/2024

■ Recycling ■ Energy recovery ■ Landfill

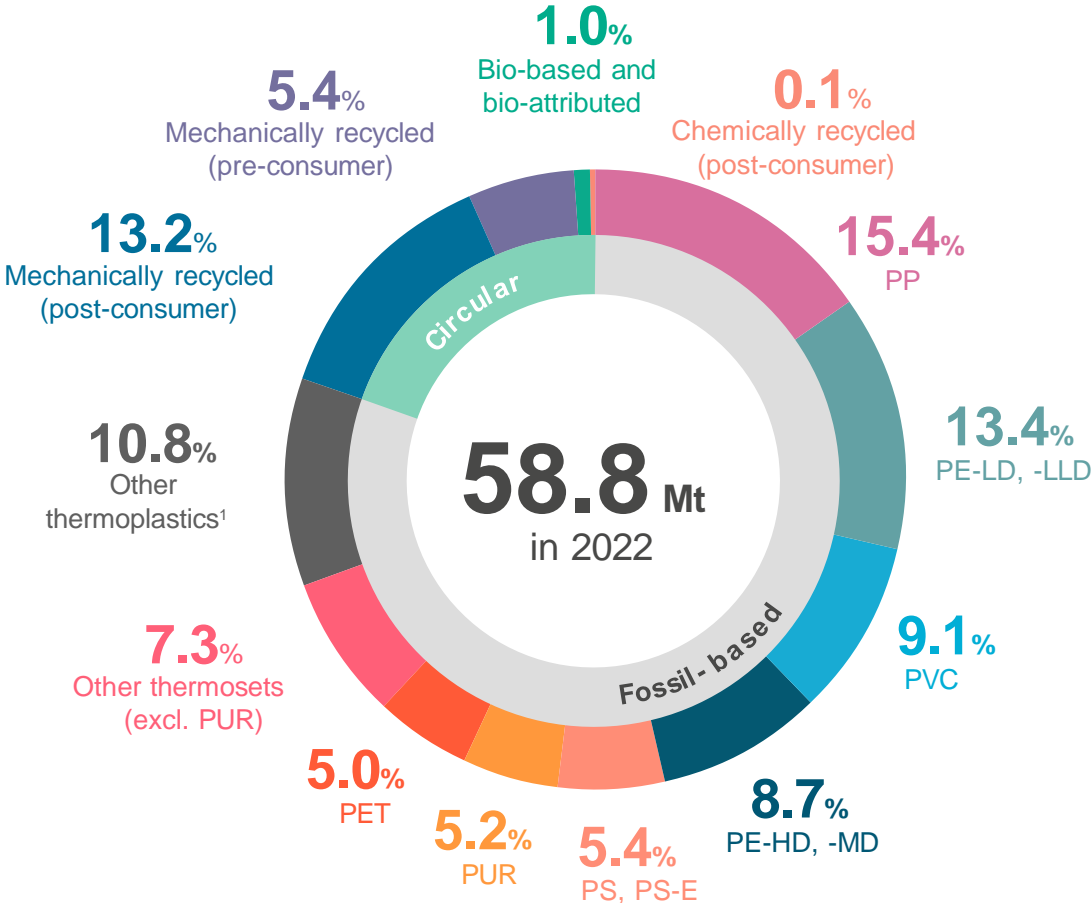
\*Countries with landfill bans



# Only 20% of plastics production in Europe is circular\*

- 11.7 Mt of circular plastics produced (i.e., 19.7% of the European plastics production)
- Highest share of recycled materials (18.6%) from mechanical recycling (pre- and post-consumer)
- Almost negligible amount from chemical recycling

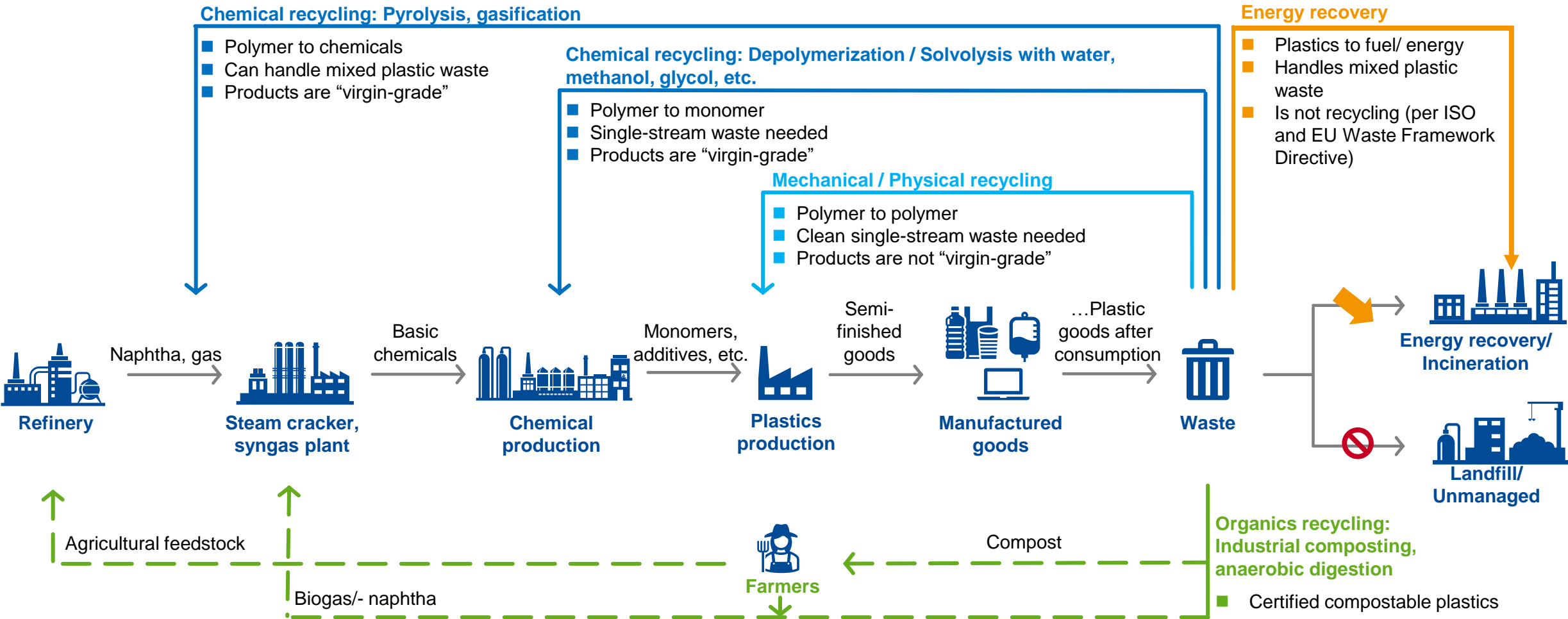
European circular plastics production 2022



\* Circular feedstock: recycled, bio-based or carbon-captured

Source: Plastics Europe "The Circular Economy for Plastics – A European Analysis", 3/2024

# A range of recycling technologies will lead to a successful circularity



# Chemical recycling complements mechanical recycling by targeting complex materials

Segregated waste streams

Mixed waste streams

## MECHANICAL RECYCLING



Packaging waste  
(PET, PP, PE, EPS)

## SOLVENT-BASED RECYCLING



Mixed plastic waste\*

## CHEMICAL RECYCLING



Textile waste



Old mattresses



Insulation material  
from houses



Engineering plastics in  
automotive



Automotive Shredder  
Residue



Foams in  
car interior



Insulation material  
in appliances



Scrap tires



Mixed  
plastic waste

\* E.g., PET, PE, PP, PVC, PC, elastic fiber (polyTHF), TPU, (E)PS

# Plastics Europe members announced 2021 planned capacities and investments for chemical recycling in Europe

44 projects in Europe by  
19 companies



Planned capacities to be installed in 13 EU countries



From 1.2Mt in 2025 to 3.4 Mt in 2030



From €2.6 bn in 2025 to €7.2 bn in 2030

Mass-balance approach needed in 95% of the projects

80% of the planned capacities are conversion to feedstock (pyrolysis, gasification)



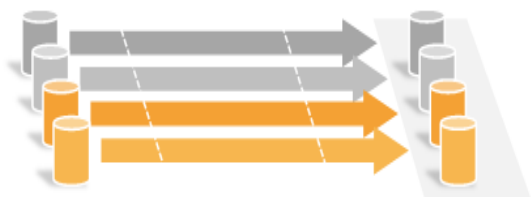
20% of the projects plan to use waste supplied from outside EU



# Various chain of custody models (ISO 22095) as an option to increase circular feedstocks

Physical content of material with sustainable characteristics

## Identity preserved / Segregated



- Characteristics are maintained throughout the supply chain.
- Single source



- Characteristics are maintained from input to output.

## Controlled blending



- Materials with different characteristics are mixed
- Known proportion of the characteristics in the final output.

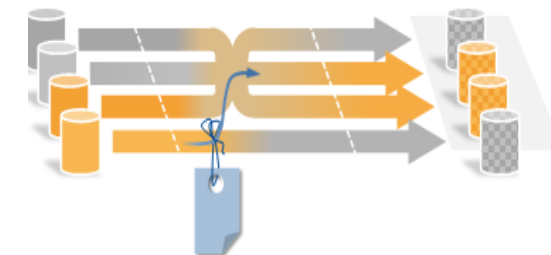
Attribution of sustainable characteristics

## Mass balance approach



- Materials with different characteristics are mixed.
- Proportions only match on average and vary across outputs.

## Book & claim



- Administrative flow is not necessarily connected to the physical flow.
- Highest flexibility in allocation of properties

Credibility via third-party certification required

Environmental impact

# Chemical recycling is a chance for EU to keep pace in the global run

- **All carbon sources**—from recycling, biomass and CCU—are needed to de-fossilize industry processes and increase circularity.
- There is huge and untapped potential to use waste as a resource. Together with mechanical recycling, chemical recycling offers **a chance to bring the missing 70% of the European plastic waste back in the loop.**
- Legislation should provide **investment security** as building capacities takes several years if not decades.  
**Technology-open recycling approach**—including mechanical/ physical, chemical, and organic recycling—is key to every legislative framework on circular economy (provisions on recycling, recycled content, reduction of greenhouse emissions, Extended Producer Responsibility, end-of-waste criteria, etc.).
- **Mass balance (MB)** is central to any calculations, allocations, and attributions in the waste management and product use.  
MB rules should be **flexible** to embrace the breadth of circular solutions (e.g., by reaping on existing chemical production capacities).  
BUT any claiming should be based on facts and credible verification and certification.
- There is a vital need to **foster innovation** in sustainable design, production and consumption patterns as well as further advancements in sorting, mechanical, chemical, and organic recycling in Europe.





We create chemistry