



# PET Depolymerization Recycling Status

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Co-Chair of the Depolymerization Recycling WG

- Depolymerisation WG Charter
- Chemical recycling : differentiation of technologies
- WG update
- Next regulatory works
- Industry Technology Readiness Level and highlights
- Next steps

14 companies



Axens  
SOLUTIONS



CARBIOS



GARBO  
your innovative partner



CUMAPOL  
POLYESTER UPGRADING



EASTMAN



gr&n  
ADVANCE YOUR RECYCLE



INEOS



ifp  
Energies nouvelles



INDORAMA  
VENTURES



loop  
INDUSTRIES



PLASTIC  
SENSE  
FOUNDATION  
recyclable PET trays



Plastipak



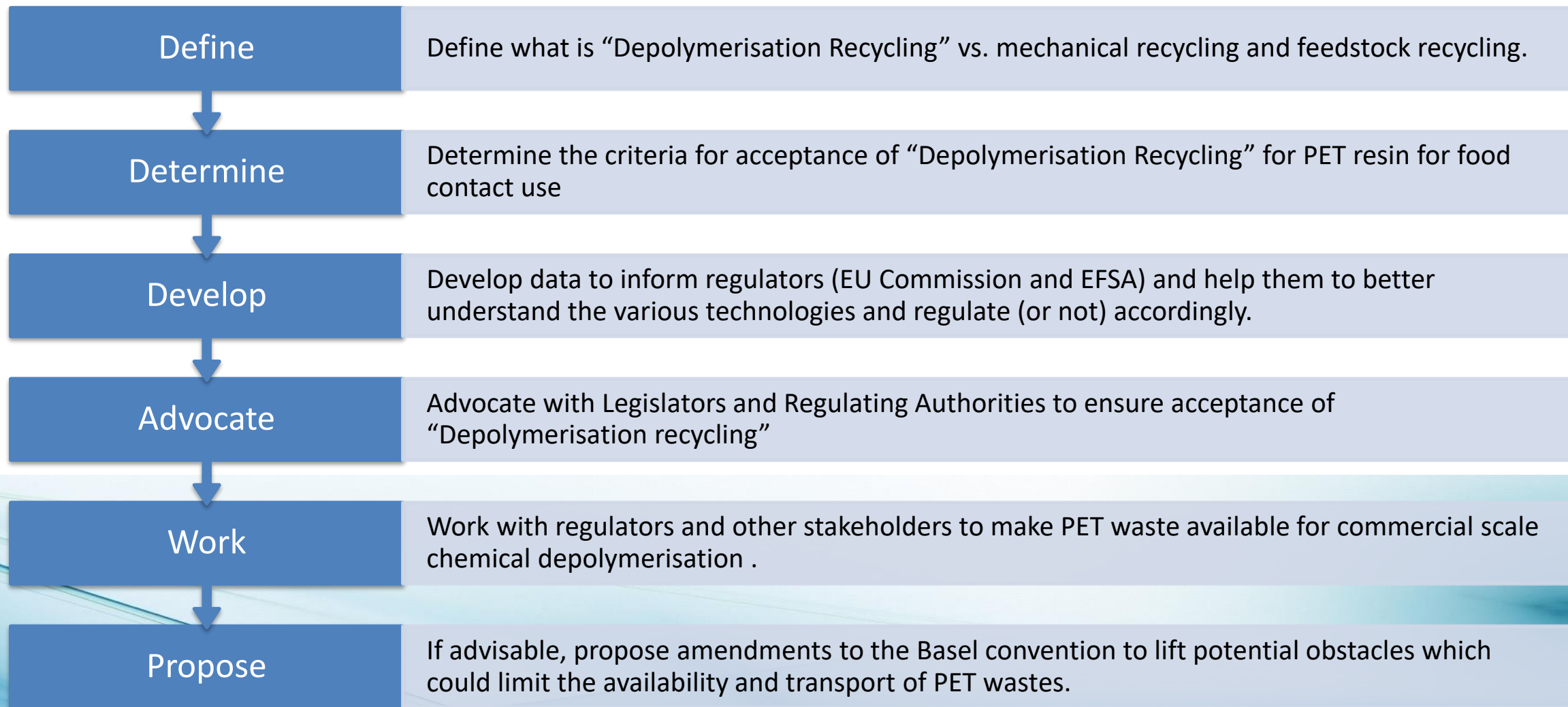
POSEIDON PLASTICS



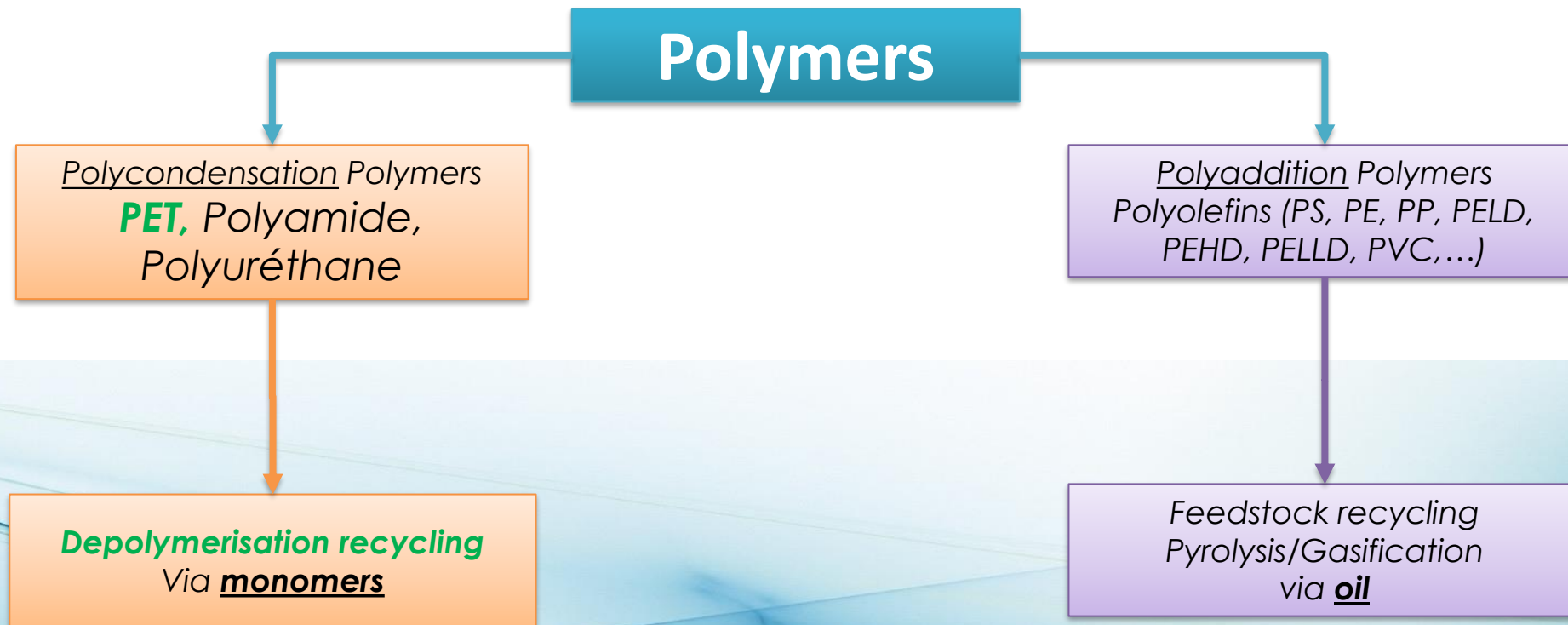
RITTEC  
UMWELTECHNIK

# Depolymerization Recycling WG Charter

Clear targets for successful work



## One name for 2 totally different processes



# Overview of recycling routes

## Mechanical recycling

Transparent PET  
(Packaging)



Sorting, Washing  
and preparation



Mechanical  
Recycling



Transparent  
Polyester



## Depolymerisation recycling

Transparent/Coloured PET  
(Textiles, carpets, non food containers)



Sorting, Washing  
and preparation



Depolymerisation



Transparent  
Polyester



## Feedstock recycling Pyrolysis/Gasification

Mixed/non mixed plastic - Excludes PET



Sorting, Washing  
and preparation



Feedstock  
Recycling



Oil



Gas, Energy, Oil,  
and Plastic  
Production



???  
Multiple uses

### Differ on :

- Yields
- Raw Mats.
- LCA's

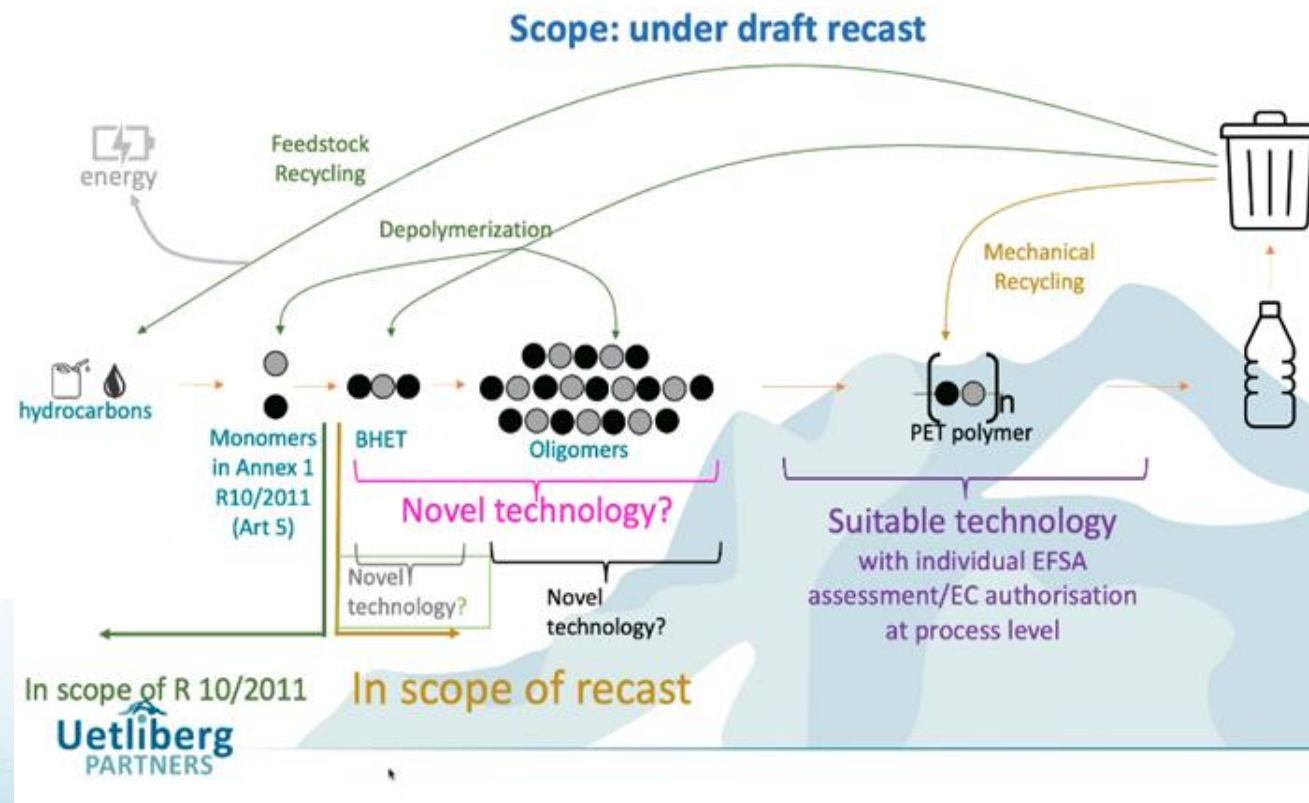
# Overview of recycling routes

	Feedstock Packaging	Feedstock Fibres	LCA	Yield	Food contact	Quality	Long term closed loop	Influence on Recycled content targets achievement
<b>Mechanical Recycling</b>	YES	NO	Most Favourable	>90% (PET to PET)	Yes, for some packaging only	Non Virgin	Maintained through limited number of cycles	Most Favourable
<b>Chemical Depolymerisation</b>	YES	YES	Favourable	>90% (PET to PET)	YES	Virgin	YES	Most favourable
<b>Pyrolysis Gasification</b>	YES	YES	Less Favourable	<70% (Plastic to oil)	YES	Virgin	YES	Less favourable

- The Depolymerisation WG has initiated:
  - Monomer NIAS evaluation program
  - TRL evaluation of the industry
  - General specification for monomers/oligomers
- Objective is to supply DG Santé with relevant data on recycled monomer quality and industry readiness with the objective to have the right regulation, at the right time, for commercial deployment → EC10/2011 and REACH
- No creation of new regulation → Time saving



- Revision (recast) of Reg. 282/2008 to position depolymerisation recycling and mechanical recycling (targets mainly PET).
  - Processes producing monomers listed under 10/2010 outside the scope of 2082/2008, no new regulation
  - Excludes pyrolysis processes.
  - Process producing BHET listed either:
    - under novel technology or
    - application for use under 10/2011
- Next steps for DG Santé is to establish regulation for Chemical Recycling, and possible revision of 10/2011

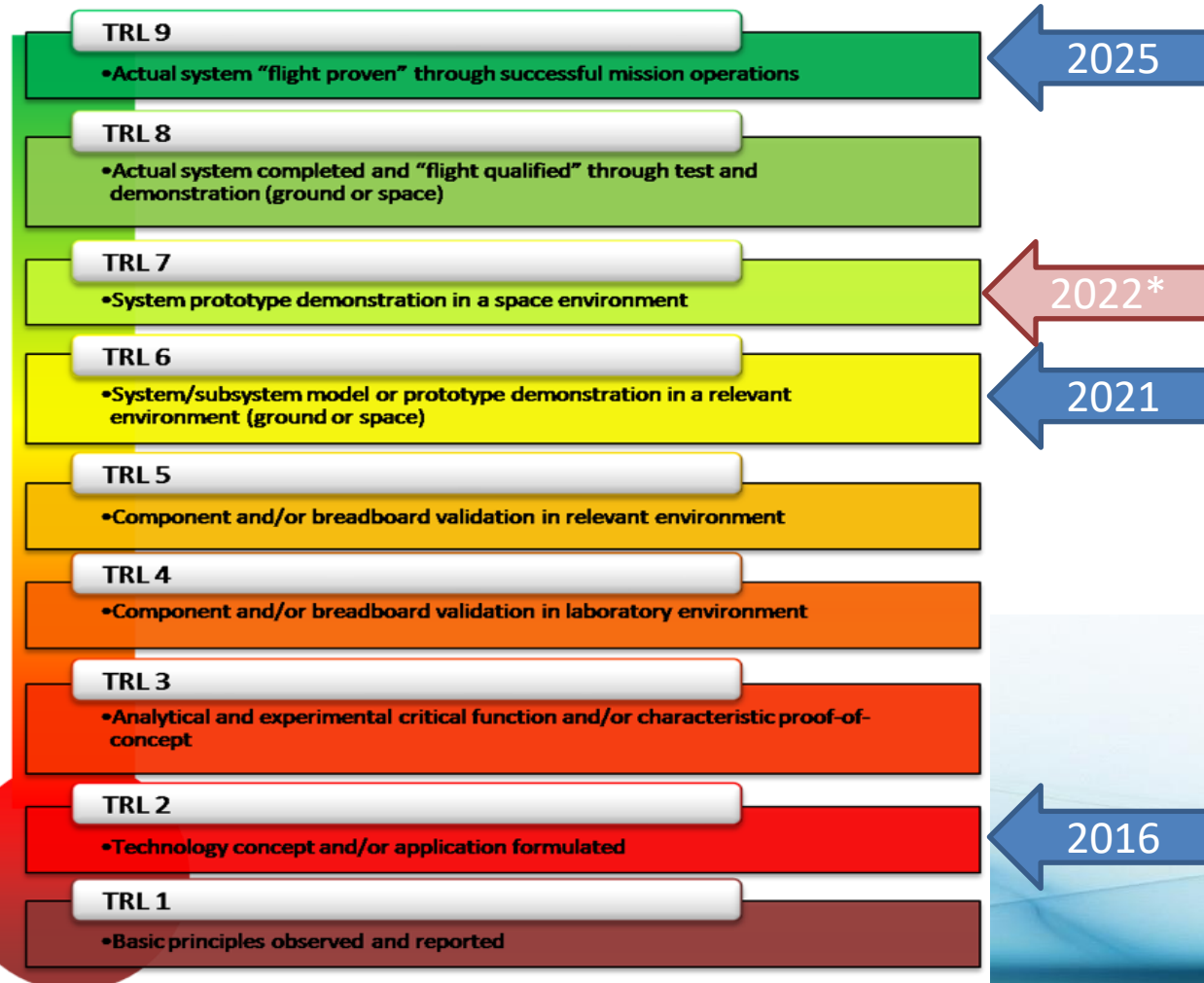


- Pursue the work:
  - Monomer NIAS evaluation program
  - TRL follow-up
- New : BHET SIG creation, to fulfill obligations under ‘Novel Technology’
  - Dossiers for EFSA and EC 10/2011 registration
  - Data collection
  - Consortium of participants to share work and costs
  - Avoid conflicting and confusing data sent to EFSA/EC

- We recognise that there is a lot of confusion between depolymerisation recycling and Pyrolysis/Gasification recovery:
  - Same generic name : ‘chemical recycling’
  - Lack of information regarding yield, raw materials, process, final products, LCA’s and TRL
  - NGO’s, EC and other stakeholders ‘affected’.
- Restart from “0” : explain the basics
  - PETCORE Depolymerisation WG position paper : read it, spread it

# Technology Readiness Level of the sector

Industry supports EU driving circularity



- The industry is evolving quick
  - 4 majors industrial announcement (all in France)
- Supported by investment (est. €1bn)
- Commercial scale will support independance from oil
- Sector targets to be dimensioned to supply enough material to the market

- [Eastman](#): **160 kta unit**. "Eastman [has] the capability to take hard-to-recycle polyester waste and sort, depolymerise and produce recycled PET at a single location".
- [Loop Industries](#): **70 kta unit**. " Loop Industries owns patented and proprietary technology that depolymerises no and low-value waste PET plastic and polyester fibre, including plastic bottles and packaging, carpets and textiles of any color, transparency or condition" [...] to its base building blocks (monomers)"
- [Carbios](#): **50 kta unit**. "The goal is to build and operate in France the world's first industrial-scale enzymatic [depolymerisation] PET bio-recycling plant"
- [Axens](#): **80 kta unit**. "Rewind<sup>®</sup> PET process [...] involves an optimized - glycolysis based - PET depolymerisation combined with specific purification steps aiming at removing all organic and inorganic compounds present in waste PET, including colorants and pigments. The product is a purified BHET (BHET: Bis(2-HydroxyEthyl) Terephthalate) monomer.



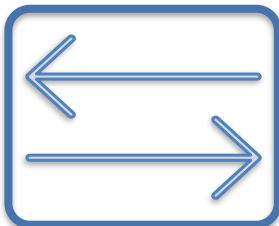
Meet JRC for the Chemical recycling

Meet DG Santé

→ Keep up the educational work that has started



BHET SIG participants to sign cooperation agreement and start working with a 3<sup>rd</sup> party for EFSA application.



Exchange with other PETCORE Europe WG's to structure feed stock supply chain for monomer recycling



Continue data collection on yield and LCA and demonstrate Depolymerisation Recycling has its place



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