IPC

Centre Technique Industriel
de la Plasturgie et des Composites

Creating more circularity in the plastics industry: the example of plastic packaging

Arnaud LITTNER, R&D Deputy Director - IPC

Green Deal, Circular Economy and Industrial Ecology Symposium

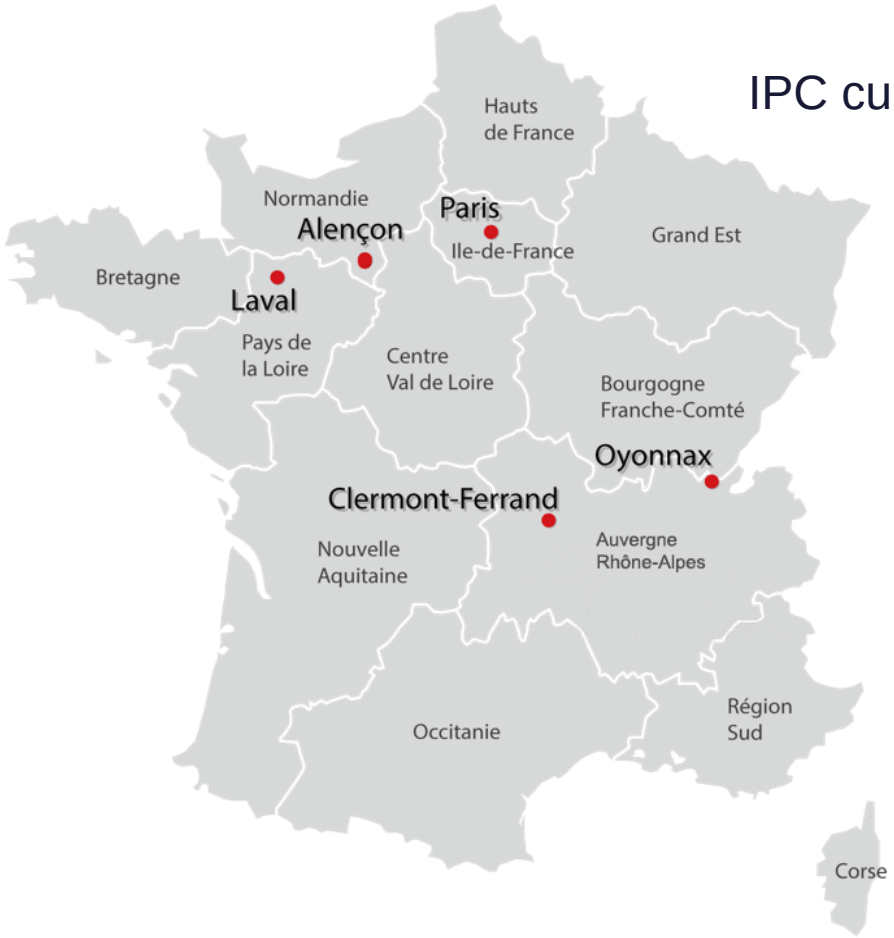
CLERMONT-FERRAND, DECEMBER 6TH, 2024

IPC, Innovation and expertise **Technical Center** to serve **Plastics and Composites** industry

DIRECTION GÉNÉRALE DES ENTREPRISES

IPC, **created Dec. 1st 2015,** reports to French Minister of Economy

SITES NEAR YOU



IPC currently has **5 sites** :

- **Oyonnax**
- **Alençon**
- **Laval**
- **Clermont-Ferrand**
- **Paris**

A 2023 turnover
of **€ 18 million**

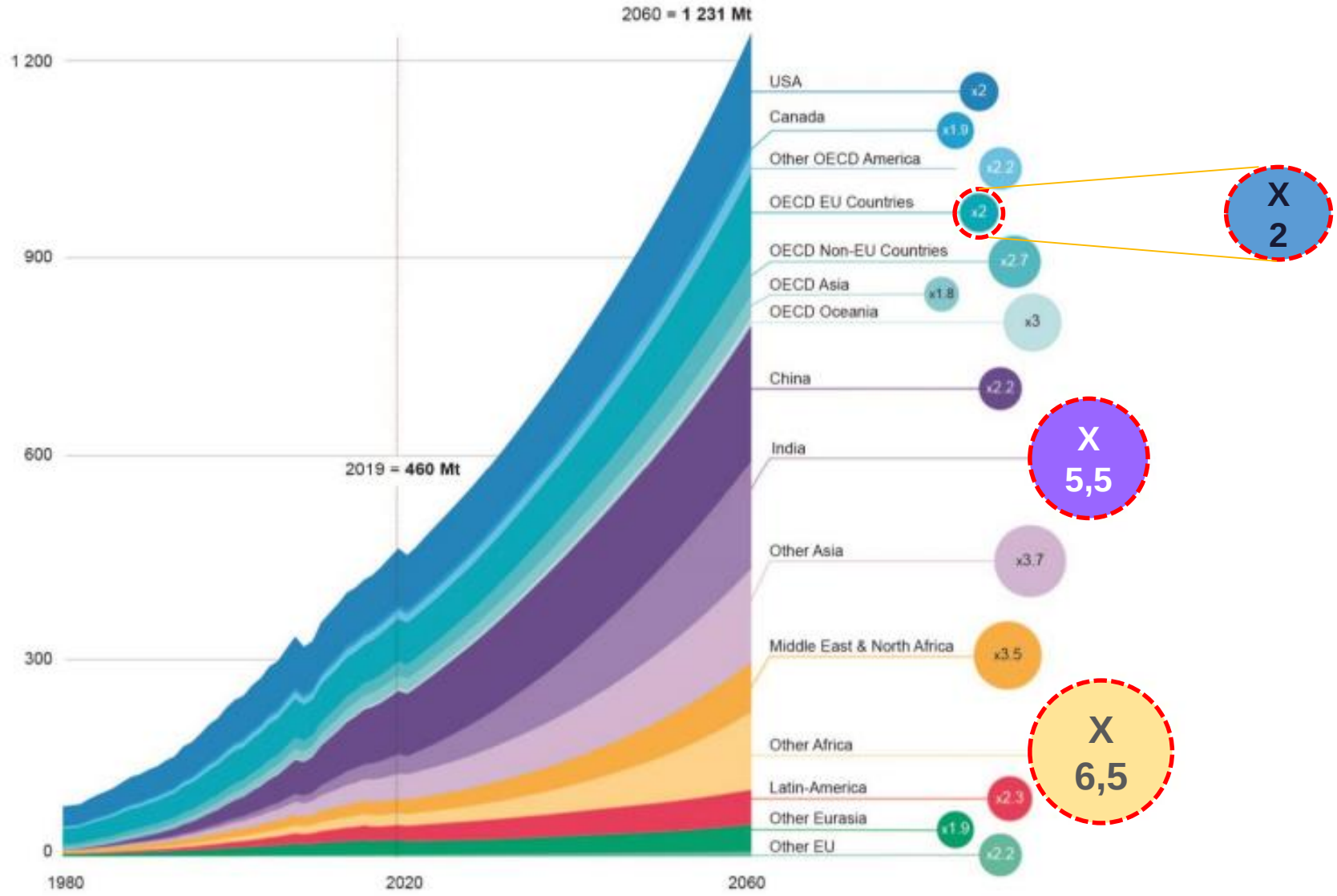
180 collaborators

3 strategic pillars

Circular Economy → Address environmental and societal stakes

- ❑ **Eco-design (reduction, reuse, repair, recycling)**
- ❑ **High quality Secondary Raw Materials (SRM)**
- ❑ **Low environmental impact materials for a resource independent industry**
- ❑ **Protection human health and natural ecosystems**

Global Plastic production at horizon 2060



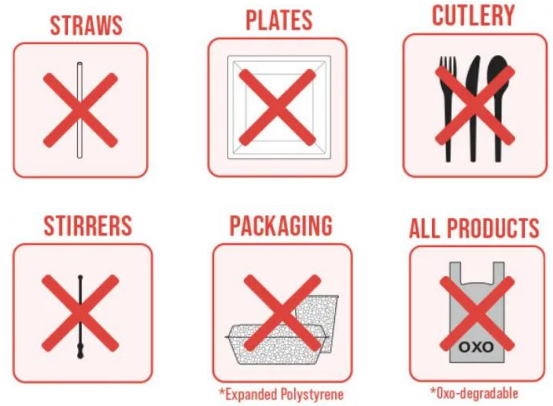
GLOBAL PLASTICS OUTLOOK © OECD 2022

EU Action Plans and Legislations

The EU Plastics Strategy (2018)

The Single Use Plastic Directive - SUPD (2019)

Circularity based on **Re-use, Repair & Recycling**



EU GREEN DEAL

The European Industrial Stategy

The Circular Economy Action Plan

The Chemicals Strategy for Sustainability

The Zero Pollution Action Plan

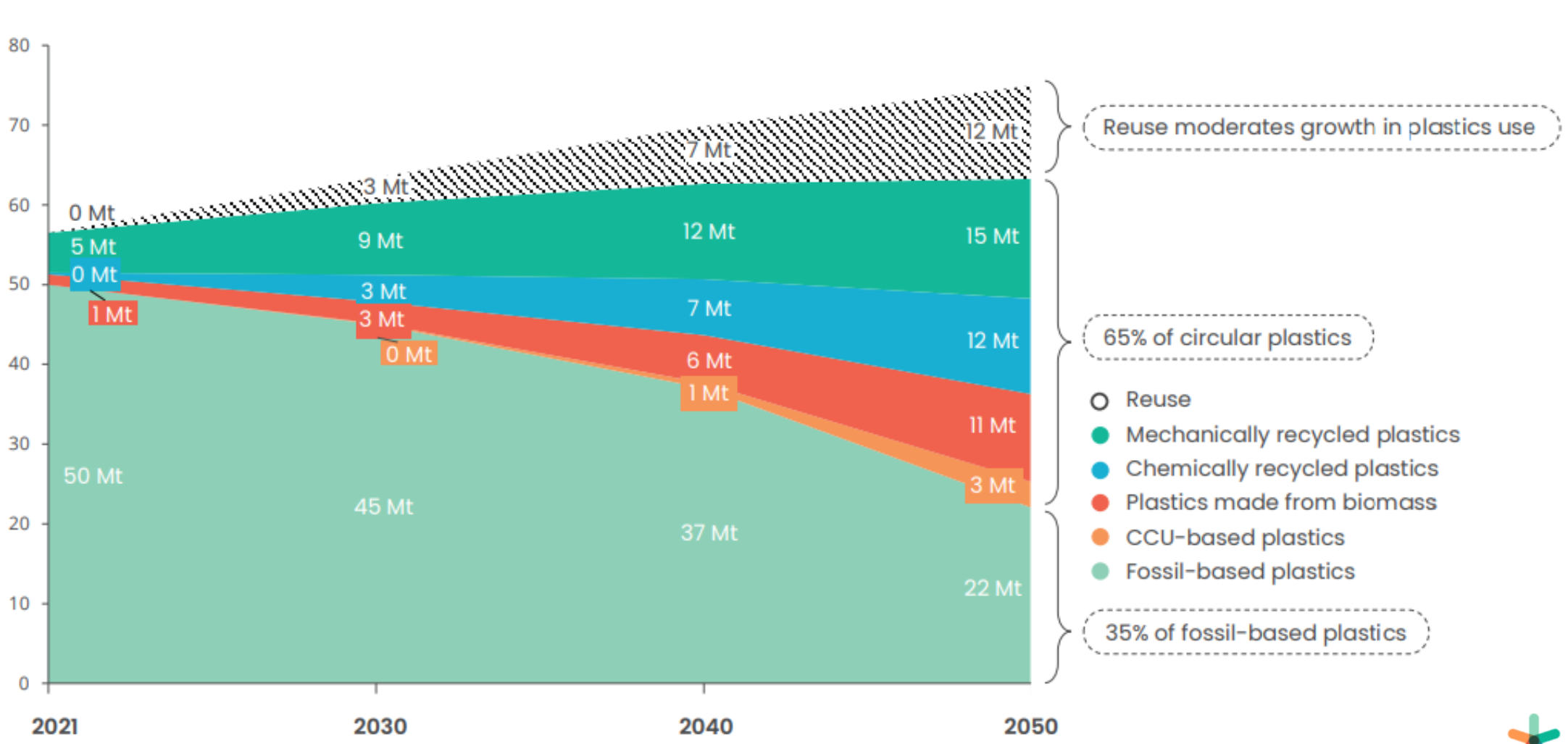
Recycled plastic in contact with foods Regulation 2022/1616

Packaging and Packaging Waste Regulation - PPWR

Initiative for a circular automotive sector

Ecodesign for Sustainable Products Regulation

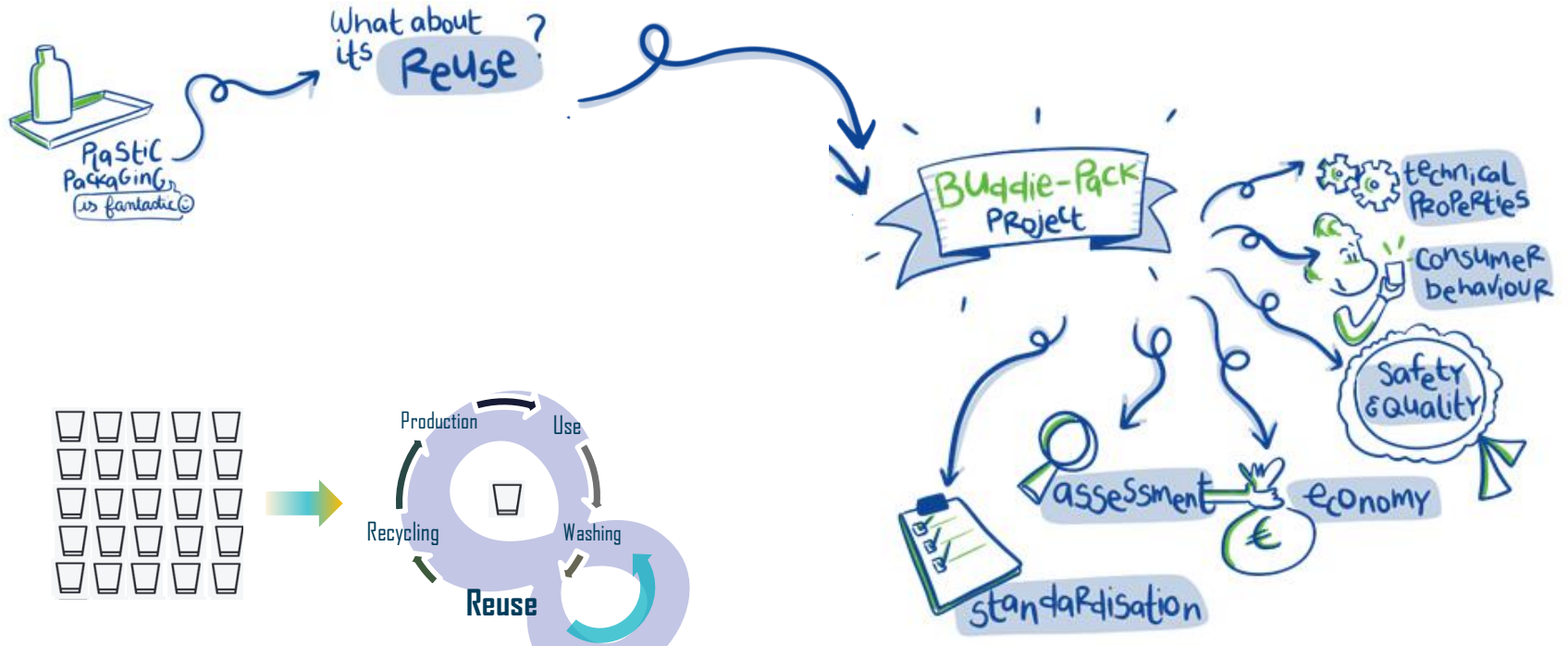
Plastic production in the EU at horizon 2050



PLASTICS EUROPE
Enabling a sustainable future

BUDDIE-PACK

SUSTAINABLE REUSABLE PLASTIC PACKAGING IN MASS MARKET APPLICATIONS

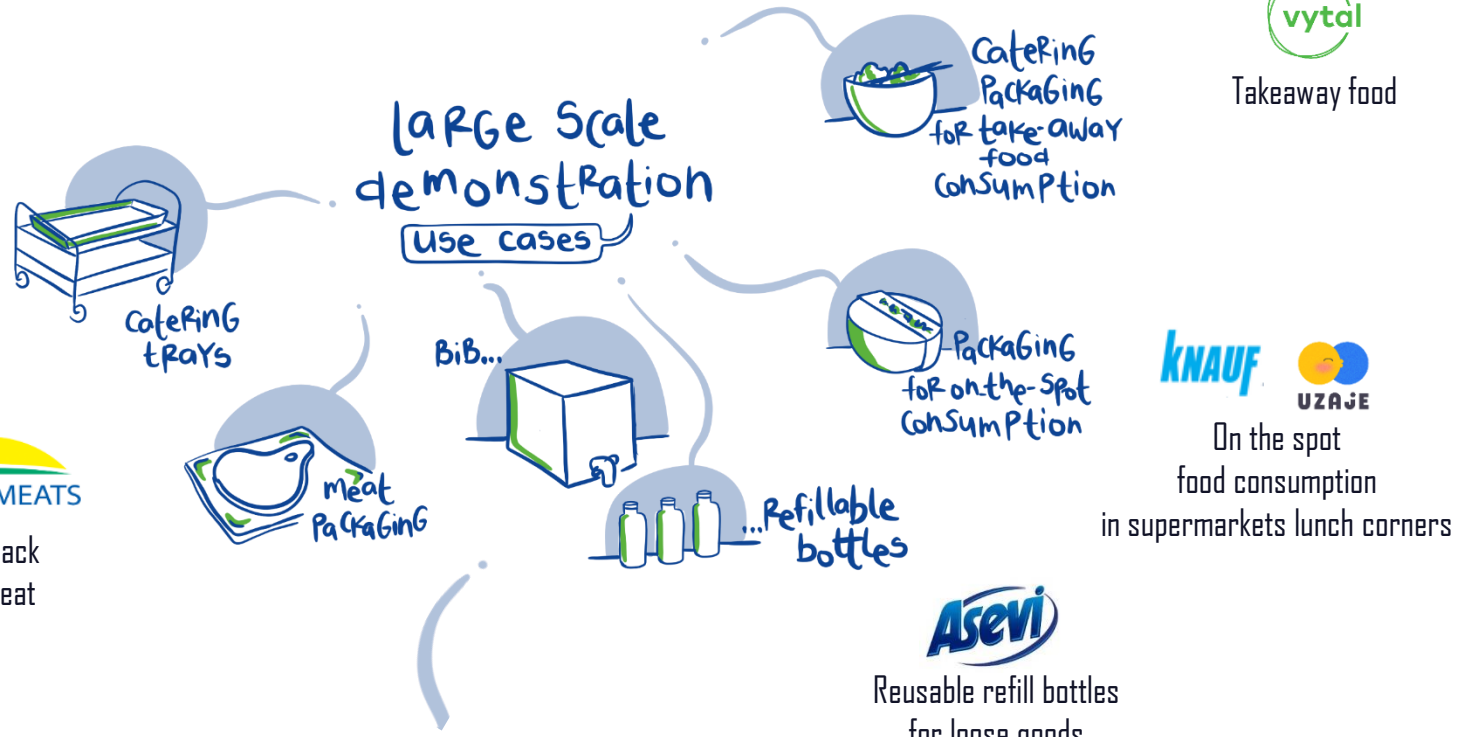


This project has received funding from the European Union's funding programme Horizon Europe research and innovation programme under grant agreement n° 101059923.

Use Cases and markets

ausolan

Food consumption
in professional premises



vytal

Takeaway food

DAWN MEATS

Skin pack
for meat

KNAUF UZAJE

On the spot
food consumption
in supermarkets lunch corners

Asevi

Reusable refill bottles
for loose goods

Smurfit Kappa

BiB as refill station
for home care loose goods
& humanitarian missions

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First success: designs and packaging prototyping

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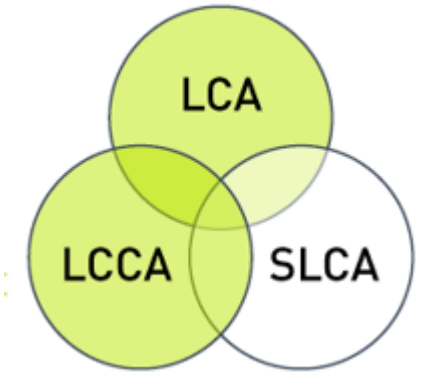
Method for sustainability assessment



- **Break-Even-Point** (BEP) = minimum number of uses after which a reusable packaging performs better than a single use equivalent

- Sensitivity analysis of the BEP :
  - guidelines to design **reusable packaging**
  - guidelines to design **reuse schemes**

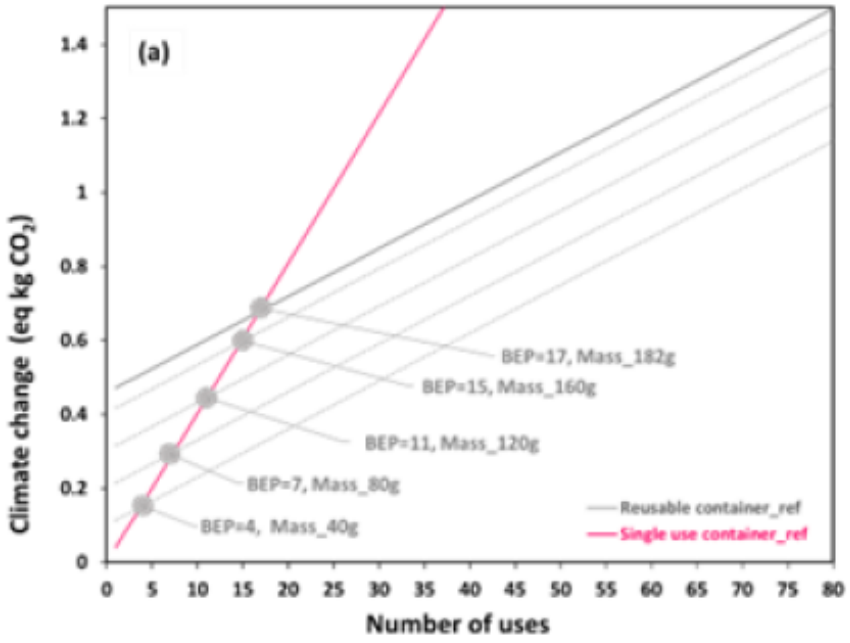
Deliverable 7.1:
Definition of goal & scope, assessment methodology

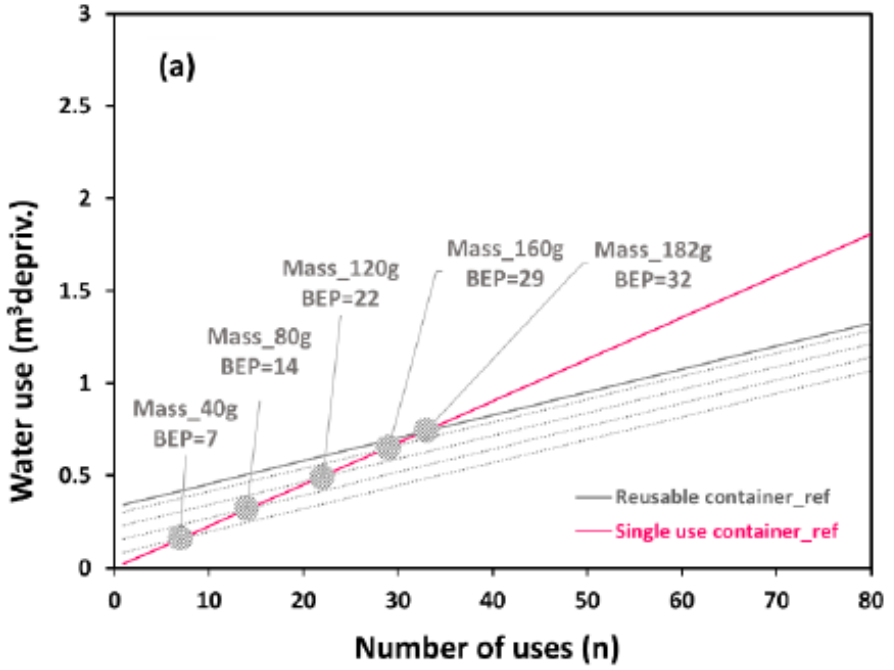
Case study example: Take-away food containers

Climate Change: 17 uses
Water use: 32 uses

Packaging mass
Packaging material
Washing energy mix
End-of-Life scenario
Consumer transportation

Samples	Packaging unit	Material	Weight
	Reusable bowl + lid	PP	182 g
	Disposable container + lid	Corrugated paper, PET	32 g

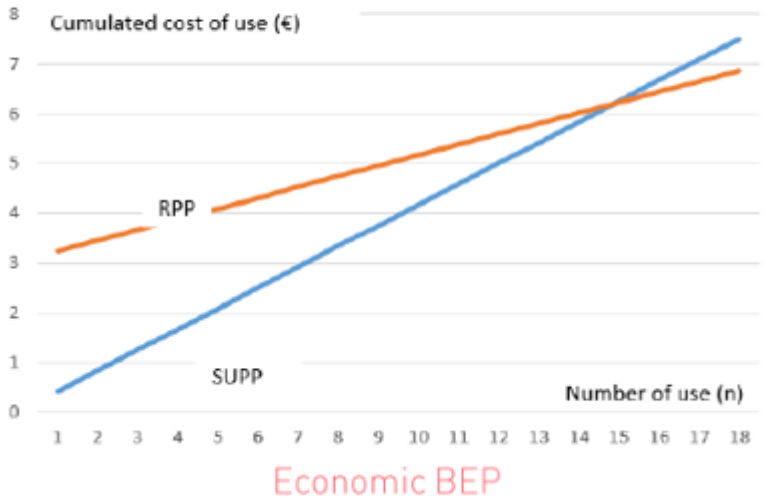




Case study example: Take-away food containers

- **LCCA Results**

Baseline BEP: 15 uses



Economic BEP

Single use cost		
Purchase price)	0.410 €	per item
Transport	0.002 €	per item
EoL	0.005 €	per item
Total	0.417 €	per item

Reusable cost		
Targeted reuse cycles	20	
Purchase price	3.140 €	per item
Transport	0.018 €	per item
EoL	-0.125 €	per item
Cleaning (OPEX +CAPEX per product)	0.213 €	per cycle
Transport for cleaning	0 €	per cycle
Total fixed	3.034 €	per item
Total variable	0.213 €	per cycle

Deliverable 7.2: Screening studies

Remaining challenges

- Validate/improve **consumer acceptance** (Social and Human Sciences)

sustainability

Sustainability **2024**, *16*, 1322. https://doi.org/10.3390/su16031322

MDPI

Article

Does Providing Information about Cleaning Increase People's Willingness to (Re)Use Bowls That Show Signs of Previous Use?

Sophie L. Pott [1], Harriet M. Baird [1], Saima Eman [1,2], Anda-Bianca Ciocirlan [1], Katie Foster [1], Georgia Green [1], Magdalena Grobien [1] and Thomas L. Webb [1,*]

- Demonstrate at **large scale**, test the whole value chain

This project has received funding from the European Union's funding programme Horizon Europe research and innovation programme under grant agreement n° 101059923.

ACHIEVING HIGH QUALITY MECHANICAL RECYCLING

The CPA has the ambitious target that by 2025 at least 10 million tonnes of recycled plastics should find their way into products each year

In 2022, 7.7 Mt of recycled plastics entered the EU production

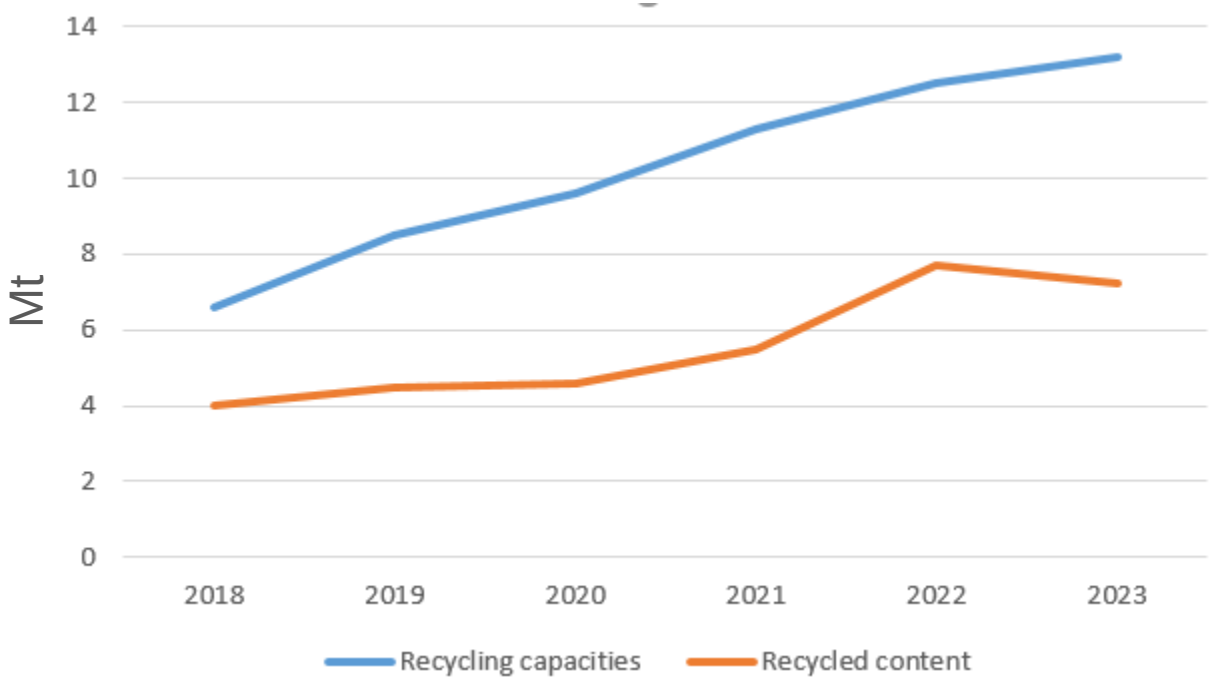
… But only 7,1 Mt in 2023

PLASTICS EUROPE

Recycling capacities vs. Recycled content

- **Recycling content** not growing at the same pace as recycling facilities

- Lack of **demand** for EU-recycled plastics:
  - **Price** of recycled plastics vs price of virgin plastics
  - **Quality** issues / recyled plastics not in line with technical aspecifications

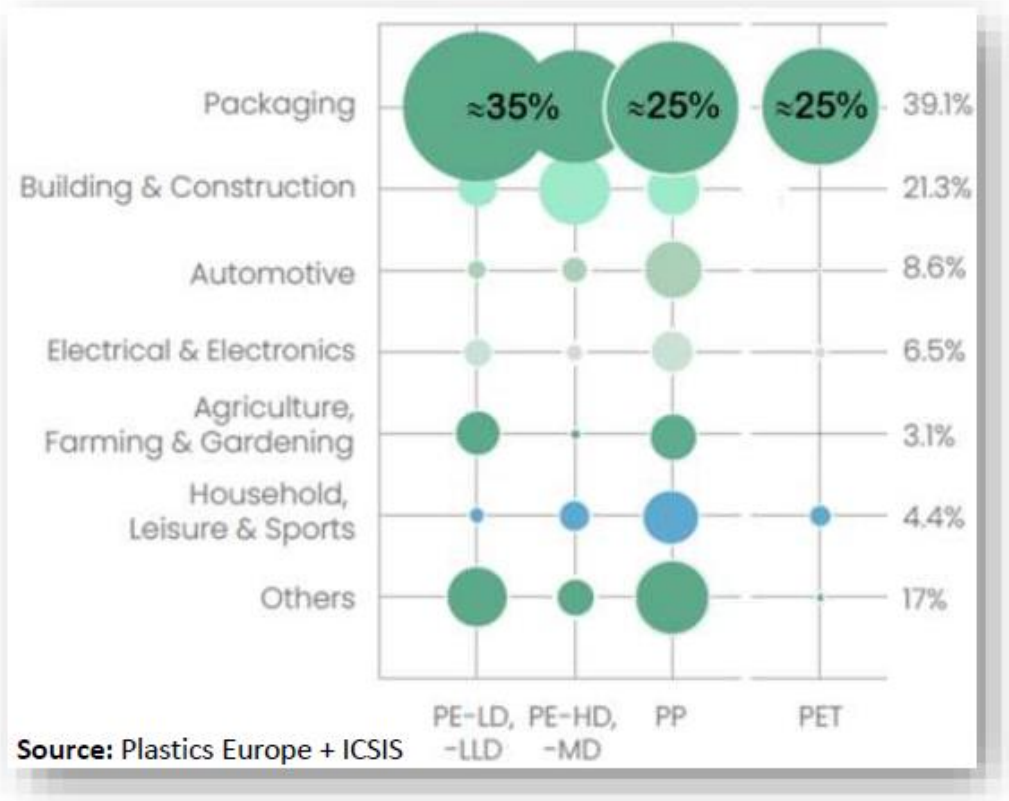


Source: Plastics Europe and Plastic Recyclers Europe

EU Packaging and Packaging Waste Regulation (PPWR)

Article 7: Minimum recycled content in plastic packaging

	2030	2040
% in contact sensitive packaging, *except single use beverage bottles*, made from PET	30 %	50 %
% in contact sensitive packaging made from plastic materials other than PET	10 %	25 %
% in single use plastic beverage bottles	30 %	65 %
% in plastic packaging other than those referred above	35 %	65 %
Exceptions	- Médicaments humains - Médicament vétérinaires - Dispositifs médicaux - Emballages compostables - Matières dangereuses	



EU demand for food contact PO: 9.6 Mt/year

Demand of food contact rPO in 2030 ≈ 1 Mt/year
Demand of food contact rPO in 24040 ≈ 2.5 Mt/year

SUCCESS: Circular-by-design packaging with balanced functionality and recyclability Capri Sun' Use case

Use case:
Non-recyclable multi-layer flexible pouch

Objective:
development of a single-material, barrier, **and recyclable, structure**

Material selection and development of innovative structures

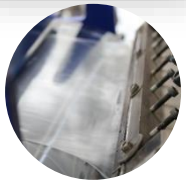
Recyclability and sorting assessment

RecyClass™


Optical Sorting


Pre-treatment


Extrusion to pellets


Extrusion to film

Environmental impact assessment

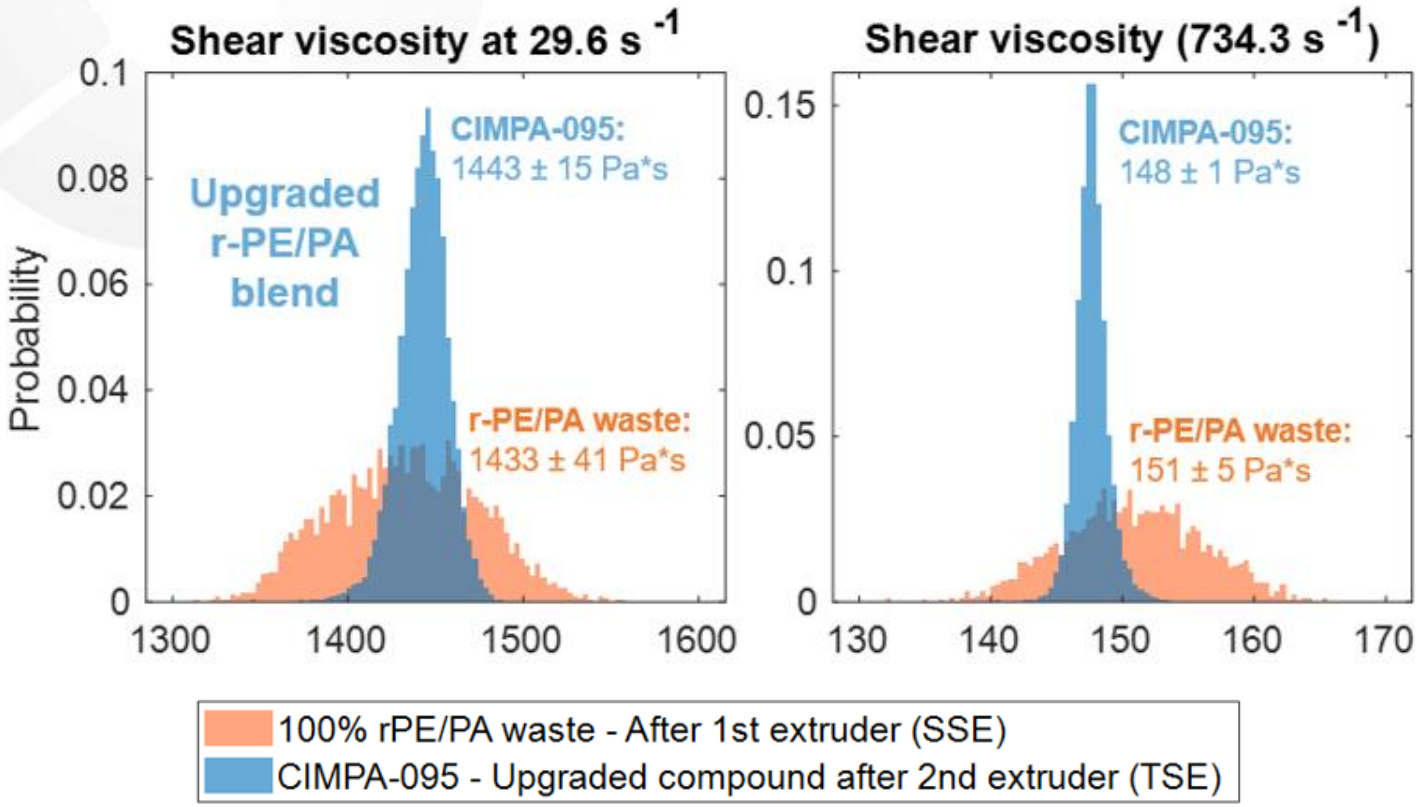
LCA
Life cycle Analysis

Evaluation of barrier, mechanical, and other performance aspects

SUCCESS: Stabilizing Secondary Raw Materials (SRM) properties

CIMPA project, Grant Agreement N° 101003864

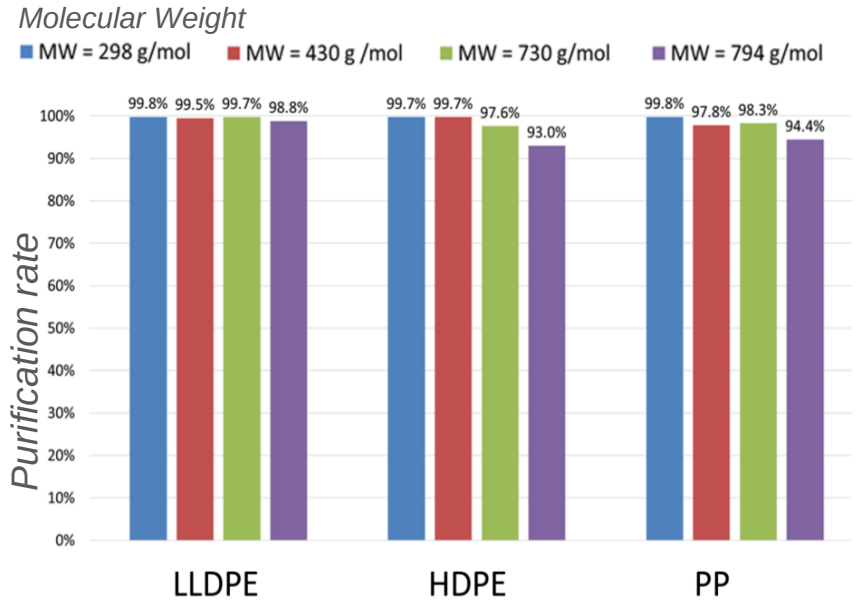
- ✓ Major **bottleneck** of SRM: properties variability
- ✓ Creates **trust** within the value chain and creates **new market opportunities** for recycled plastics



SUCCESS: Food contact compliant decontamination of polyolefins by scCO2

PPWR : by 2030, integration of 10% of SRM into food contact packaging other than PET

- Demonstration of the decontamination of post consumer packaging by scCO2 compliant with food contact (Regulation 2022/1616)
- **Creation of a start-up**
- **2026: Industrial demonstrator with a capacity of 20 kt/year**



Remaining challenges

- Up-scaling
- Making solutions accepted by EU agencies (e.g. EFSA … data must be produced, shared …)
- Building / strengthening value chains

INDUSTRIAL TECHNICAL CENTER FOR PLASTICS AND COMPOSITES

THANK YOU FOR YOUR ATTENTION !

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