



ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

**HERAKLION2019**

**Scenario of the plastic waste  
recycling  
in Emilia Romagna Region (Italy)  
as effort for the recent European  
Strategy for plastics  
in a circular economy**

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7th International Conference on Sustainable Solid Waste Management  
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# Context: TRIS project

The activity is carried out within the action plan of the Interreg project **TRANSITION REGIONS TOWARDS INDUSTRIAL SYMBIOSIS**.

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DIPARTIMENTO DI INGEGNERIA CIVILE,  
CHIMICA, AMBIENTALE E DEI MATERIALI



by:

And supported by:



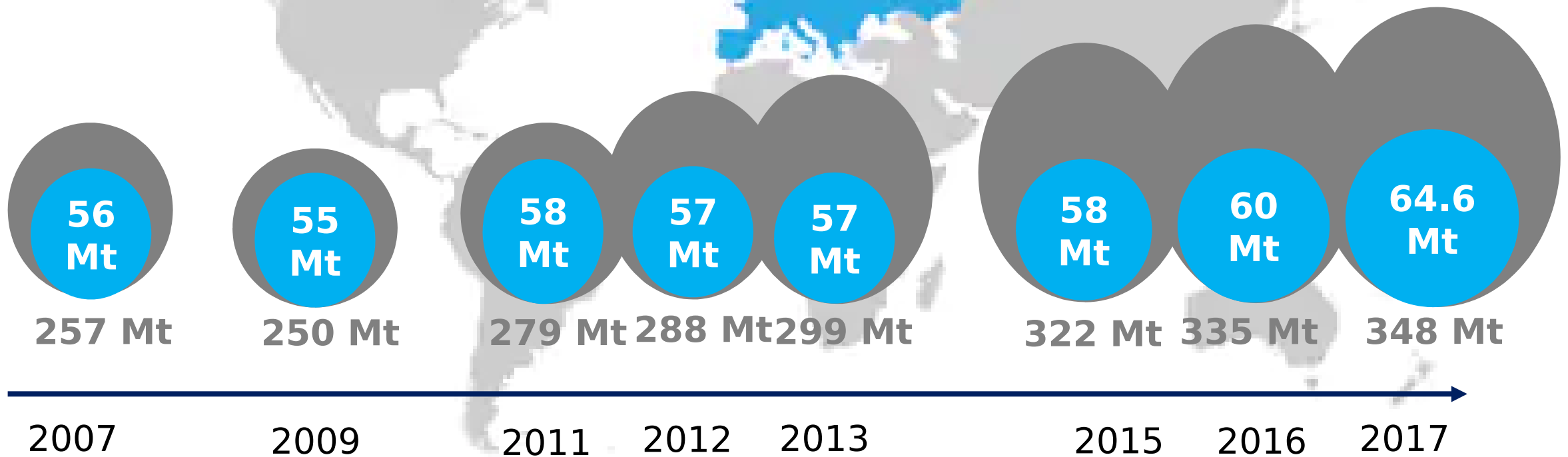
Consorzio Nazionale  
per la raccolta,  
il riciclo e il recupero  
degli imballaggi  
in plastica



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# Preface: The plastic value chain in a nutshell 1.4

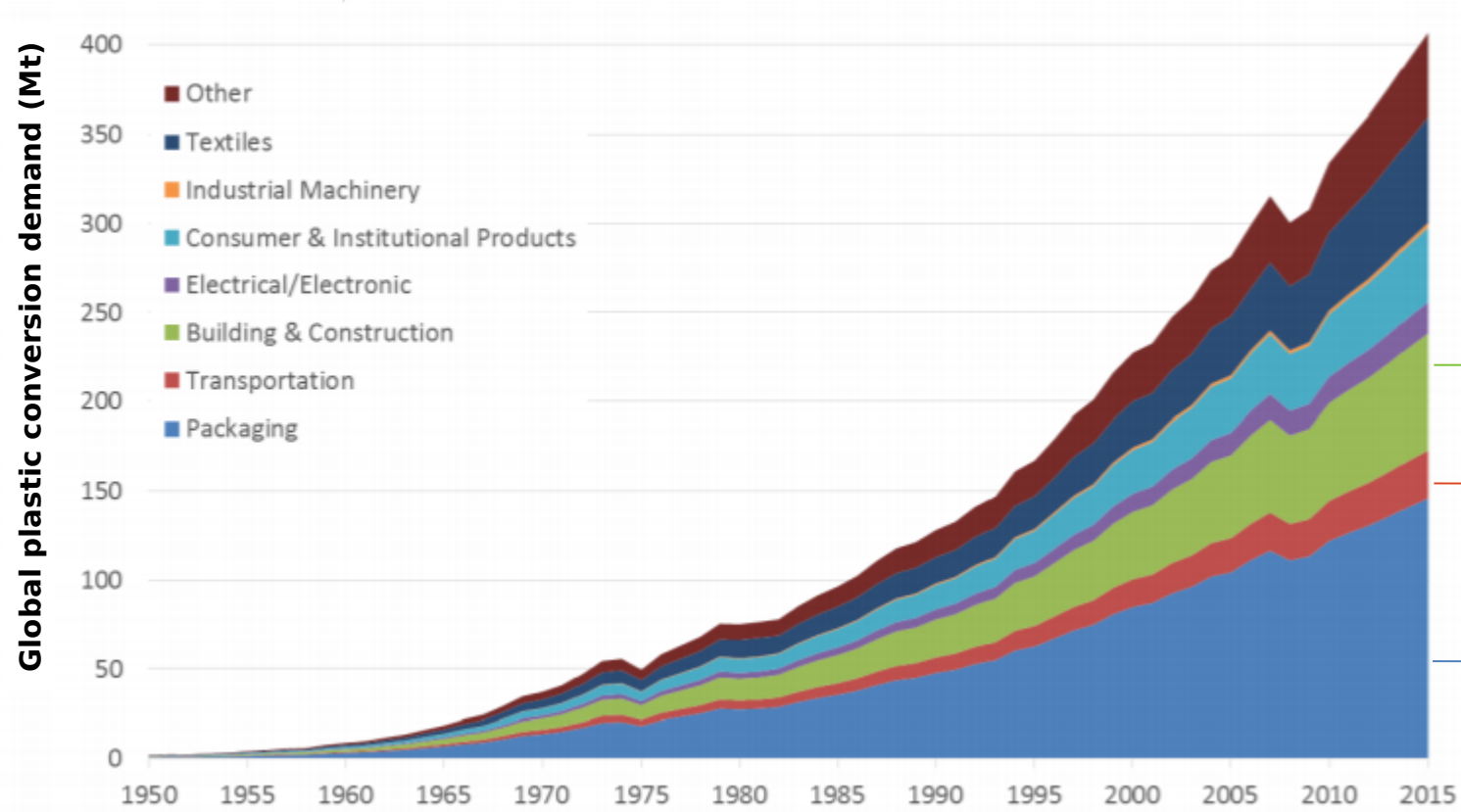
PLASTIC PRODUCTION



Source: PlasticsEurope (2007, 2009, 2011, 2012, 2013, 2015, 2016, 2017, 2018),  
The fact, 2007, 2009, 2011, 2012, 2013, 2015, 2016, 2017, 2018

# Preface: The plastic value chain in a nutshell 2.4

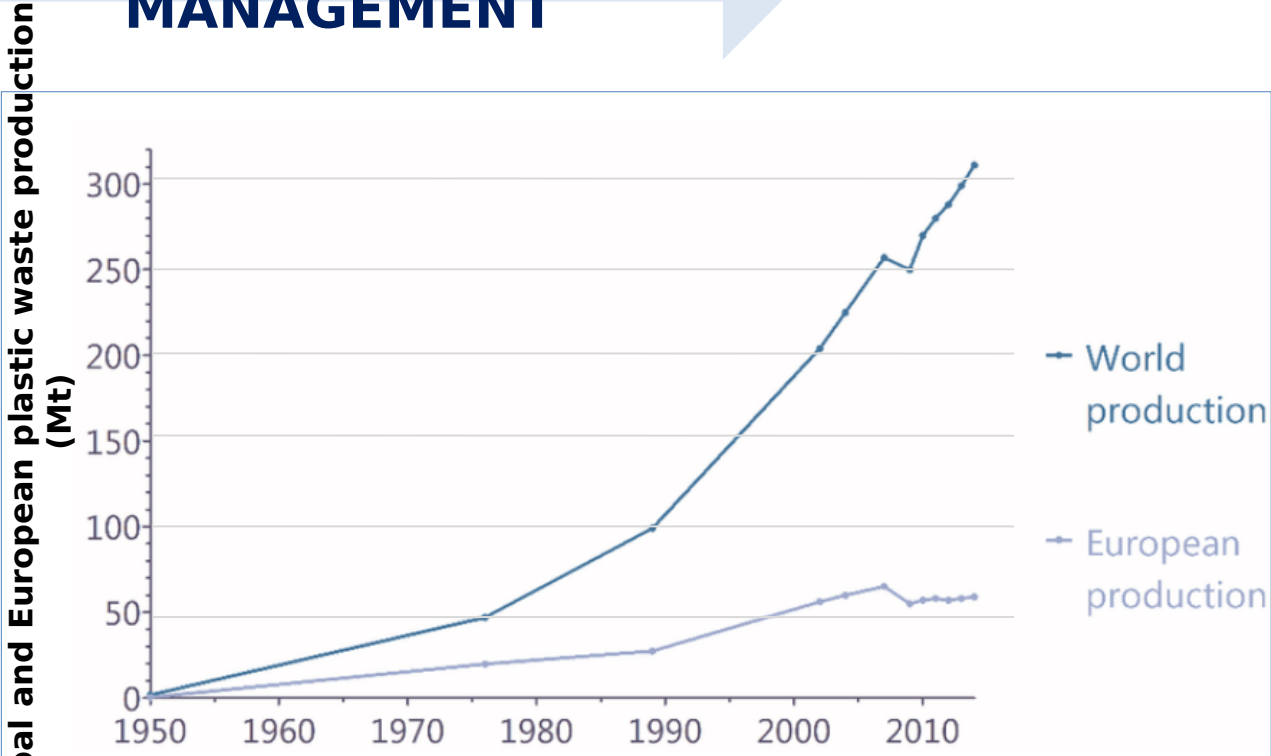
PLASTICS CONVERSION



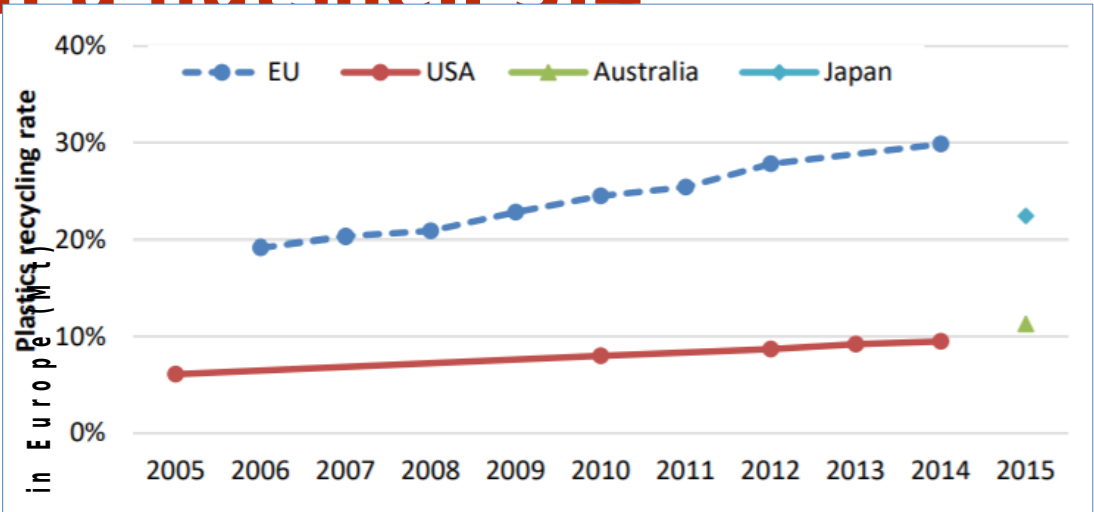
Source: Geyer et al. (2017), Production, use, and fate of all plastics ever made

# Preface: The plastic value chain in a nutshell 3.4

## PLASTIC WASTE MANAGEMENT

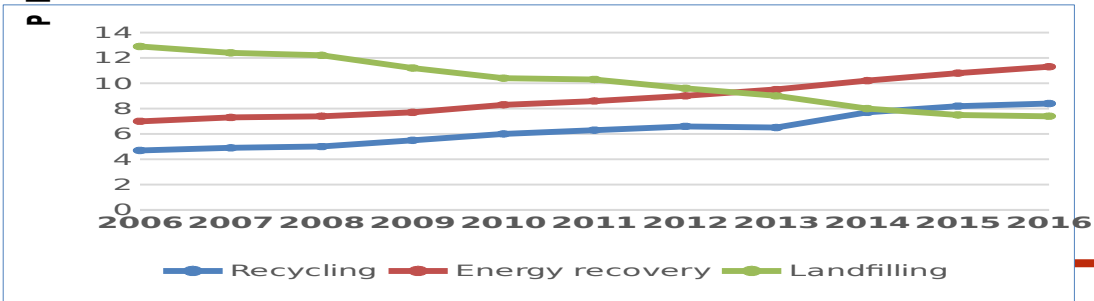


OECD (2018), Improving Plastics Management: Trends, policy responses, and the role of international co-operation and trade



OECD (2018), Improving Plastics Management: Trends, policy responses, and the role of international co-operation and trade

Source: OECD (2018), Improving Markets for Recycled Plastics: Trends, Prospects and Policy Responses

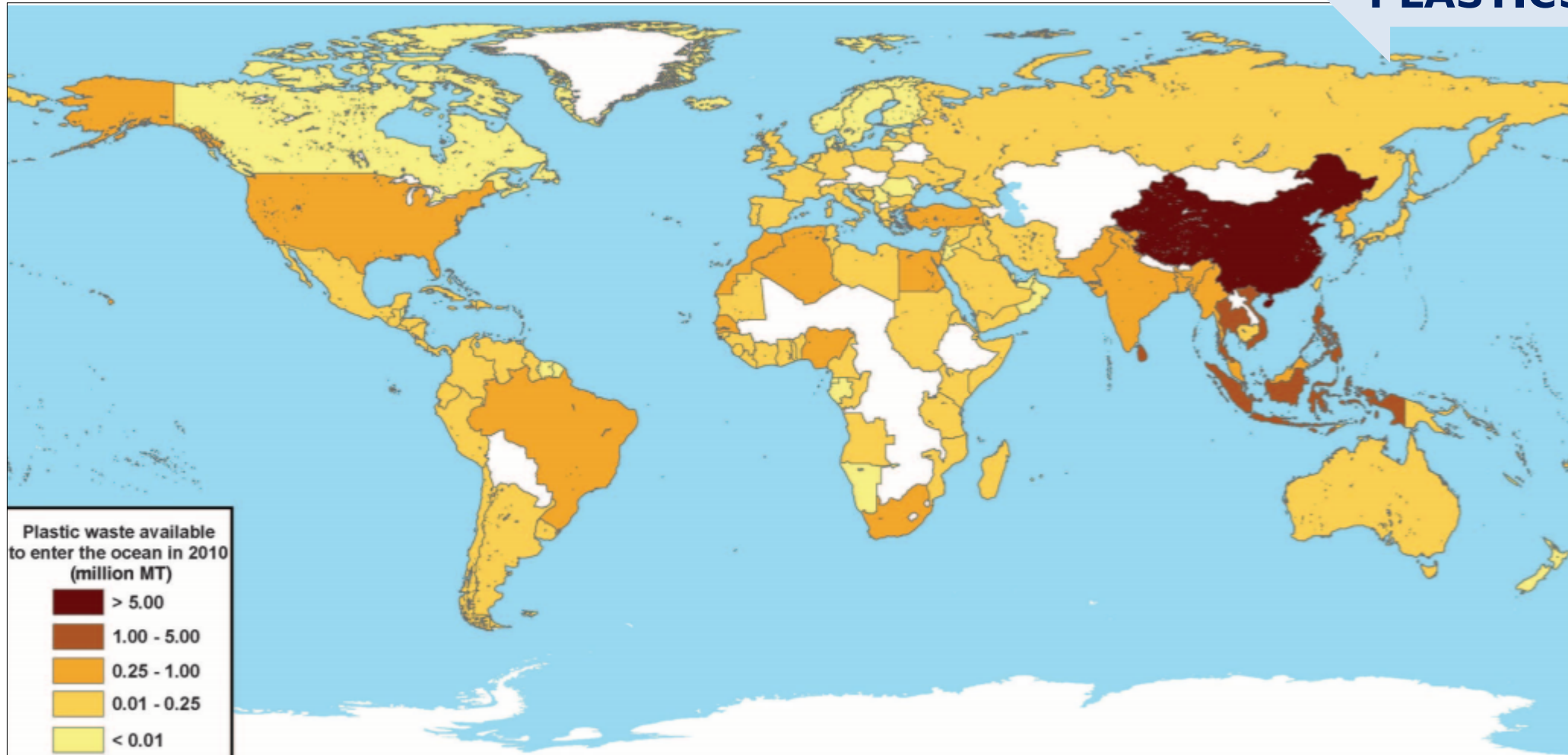


Source: PlasticsEurope (2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016)

# Preface: The plastic value chain in a nutshell 4.4

PLASTICS LEAKAGE

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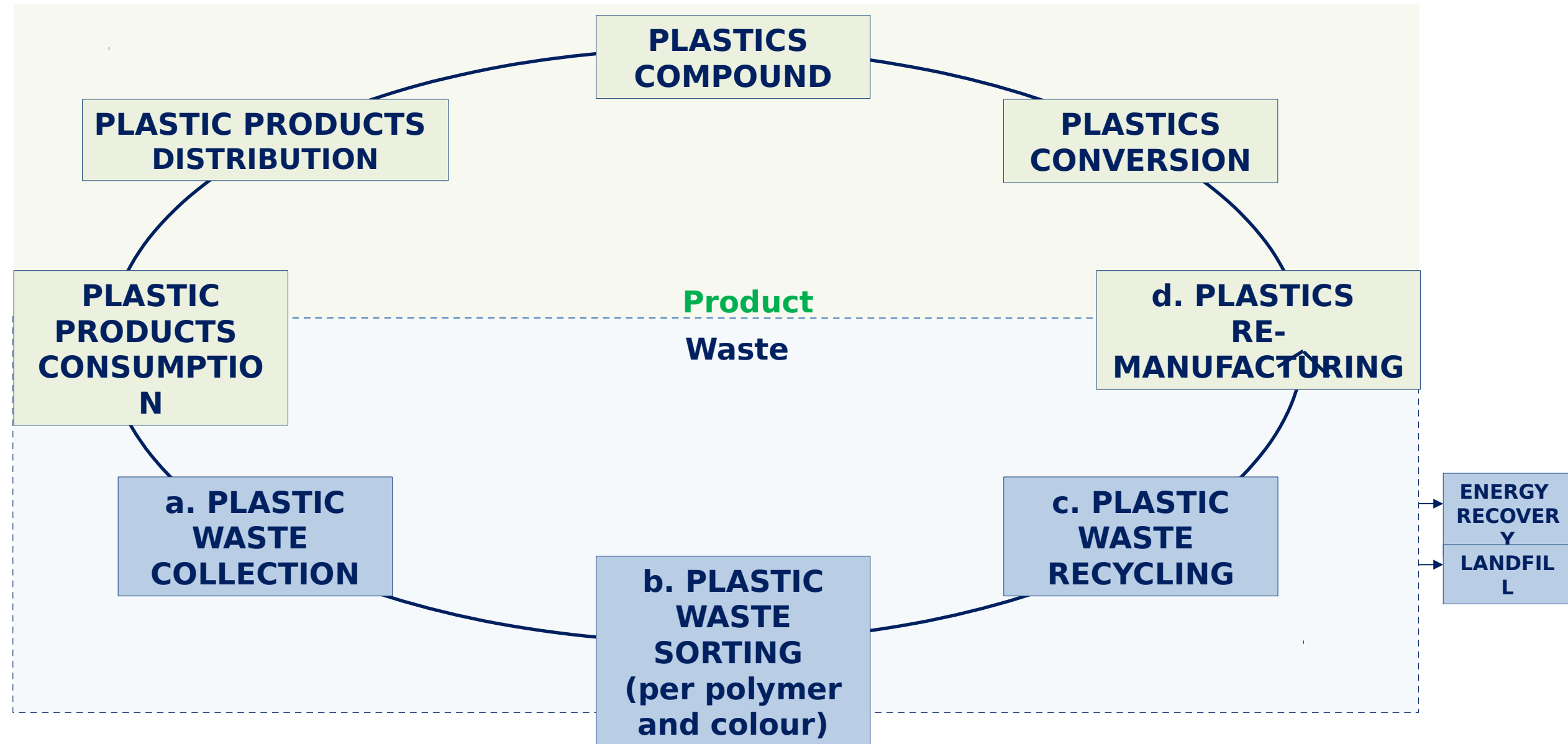


Source: Jambeck et al. (2015), Marine pollution. Plastic waste inputs from land into the ocean



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# Mission: Circularizing the plastic value chain



# The commitment of European Commission in the plastic fields

CIRCULAR ECONOMY PACKAGE			EUROPEAN STRATEGY	SUPs DIRECTIVE
COLLECTION	separate collection for hazardous household waste (by end 2022), bio-waste (by end 2023), textiles (by end 2025).		FOR PLASTICS IN A CIRCULAR ECONOMY	<ul style="list-style-type: none"><li>• 77% of such single-use plastic beverage bottles must be collected separately by 2025</li><li>• 90% of such single-use plastic beverage bottles must be collected separately by 2029</li></ul>
RECYCLING	<ul style="list-style-type: none"><li>• 65% of plastic packaging waste must be recycled by 2030;</li><li>• 70% of plastic packaging must be recycled by 2030</li></ul>		<ul style="list-style-type: none"><li>• More than half of plastics waste generated in Europe will be recycled by 2030</li><li>• Sorting and recycling capacity will increase fourfold since 2015 by 2030</li></ul>	
REMANUFACTURING			<ul style="list-style-type: none"><li>• All plastic packaging placed on the EU market must be reusable or recycled in a cost-effective manner by 2030</li><li>• Secondary plastic market will increase fourfold since 2015 by 2030</li></ul>	<ul style="list-style-type: none"><li>• 25% of recycled plastics must be included PET bottles by 2025</li><li>• 30% of recycled plastics must be included in PET bottles by 2030</li></ul>

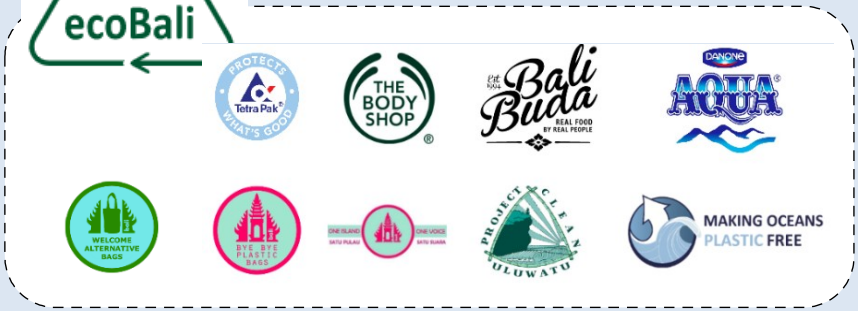
Additional target: binding target to reduce landfill to maximum of 10% of municipal waste by 2035.



# Multi-stakeholder analysis



INDUSTRY



NGOs and CIVIL COMMUNITY



POLICY



# Challenge

**What's the role of regions  
in promoting  
a circular plastic economy?**



# Case study: Emilia Romagna Region (Italy)

## 1a Describing the context



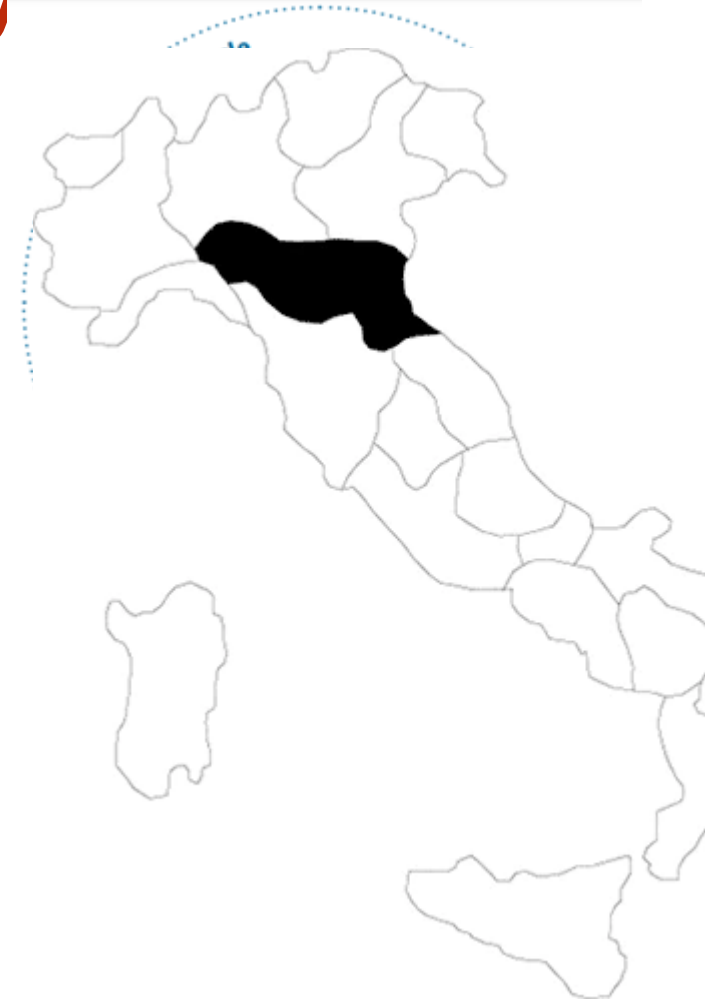
## 1b Setting priorities

Circular regional plastic value chain by valorizing the **local recycling industry**

## 1c Defining goals and strategy

**Alignment of regional policy framework to the European Strategy on plastics in a circular economy**

## 1d Planning and review



# Regulatory framework: regional policy on waste

## Regional law on circular economy

	Regional targets	European targets
Waste reduction	20-25% by 2020	-
Separate collection	73% by 2020	77% by 2025, 90% by 2030 (for PET beverage bottles)
Municipal waste recycling Plastic packaging waste	70% by 2020 65% by 2020	55% by 2025, 60% by 2030, 65% by 2035 (Calculation Method n.4) 55% by 2030
Landfilling	5% by 2020	10% by 2030



## Regional plan on waste management

## Permanent table on by-products valorization

Regional list of by-products

## Permanent forum “Chiudi il cerchio”

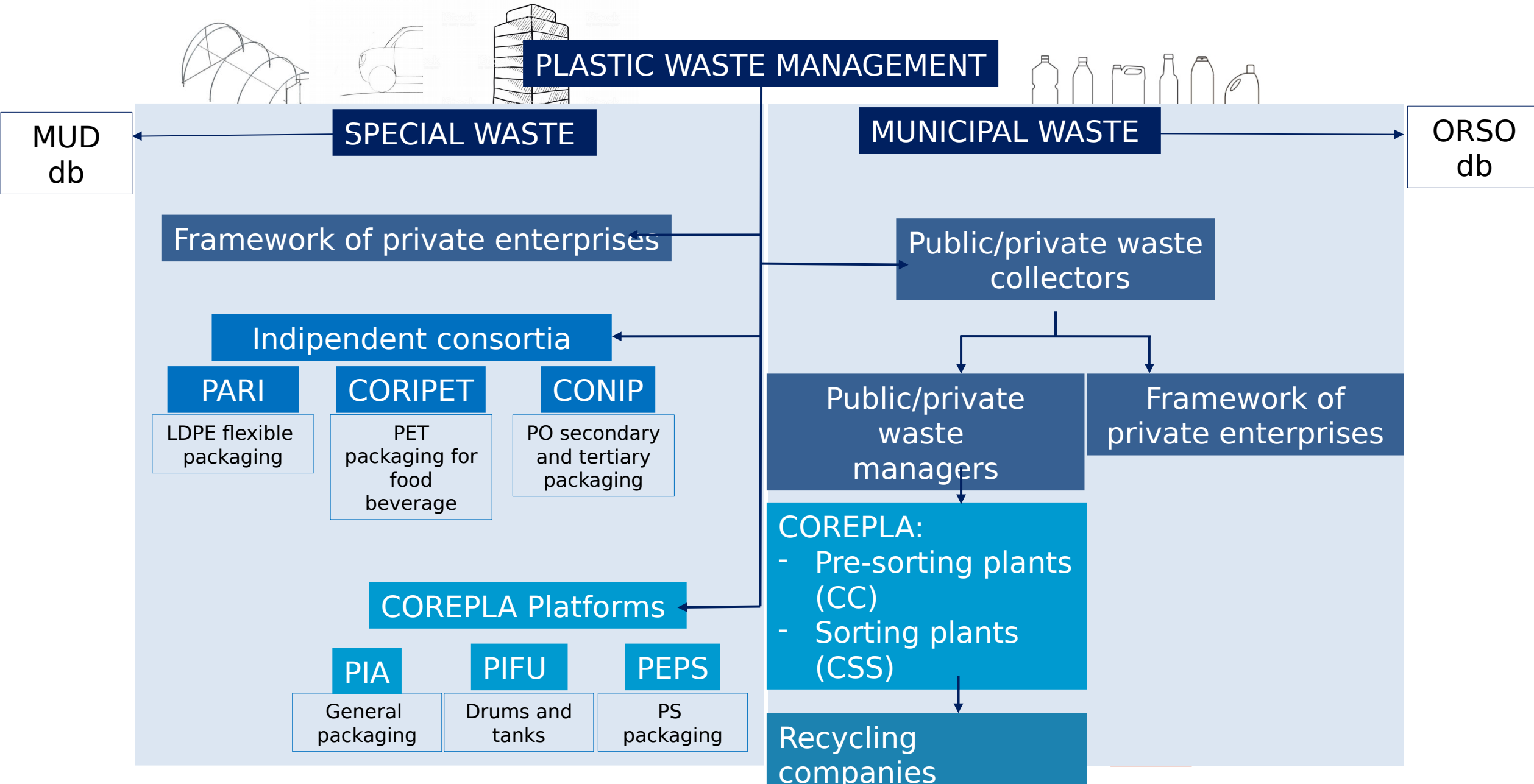


Living lab on circular economy and industrial symbiosis

# Material framework: plastics in regional waste streams

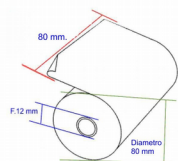
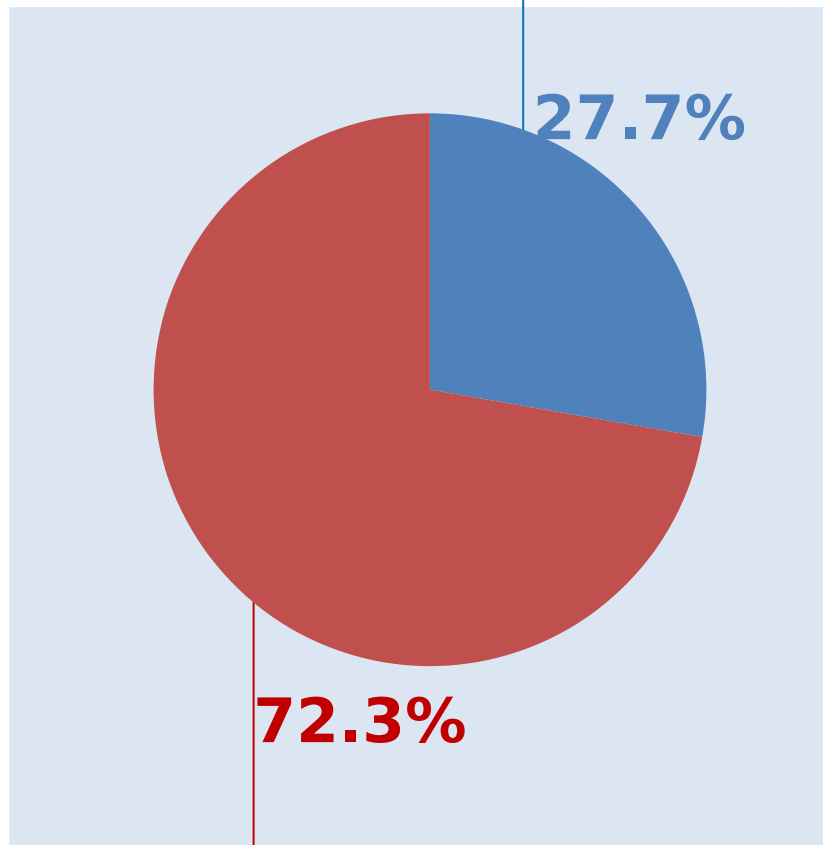


# Material framework: plastics waste management

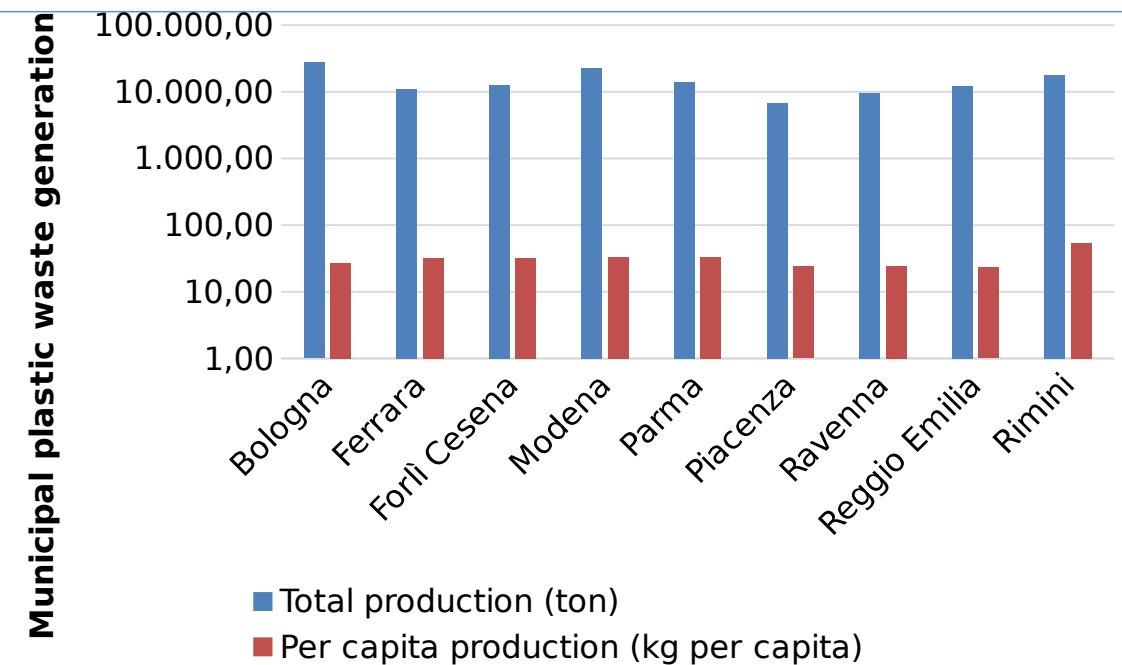
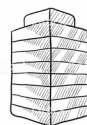


# Plastic waste generation

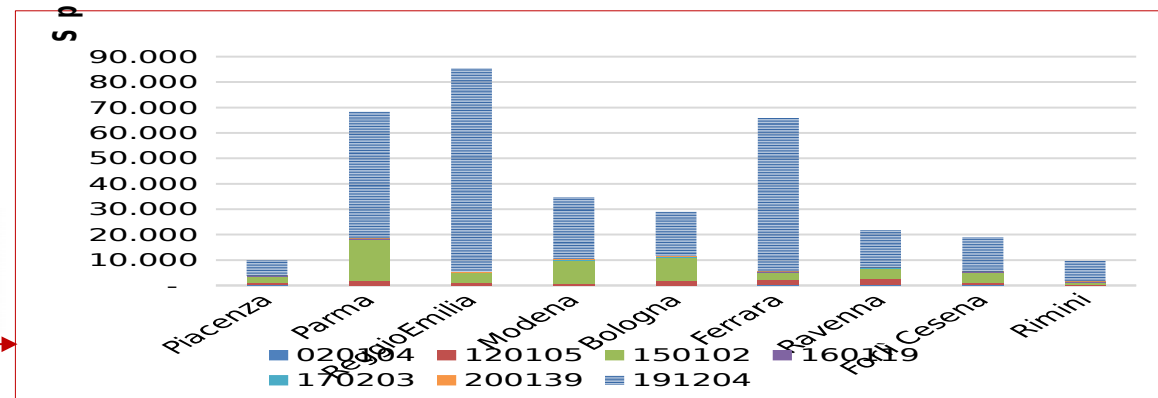
## Municipal waste



## Special wa



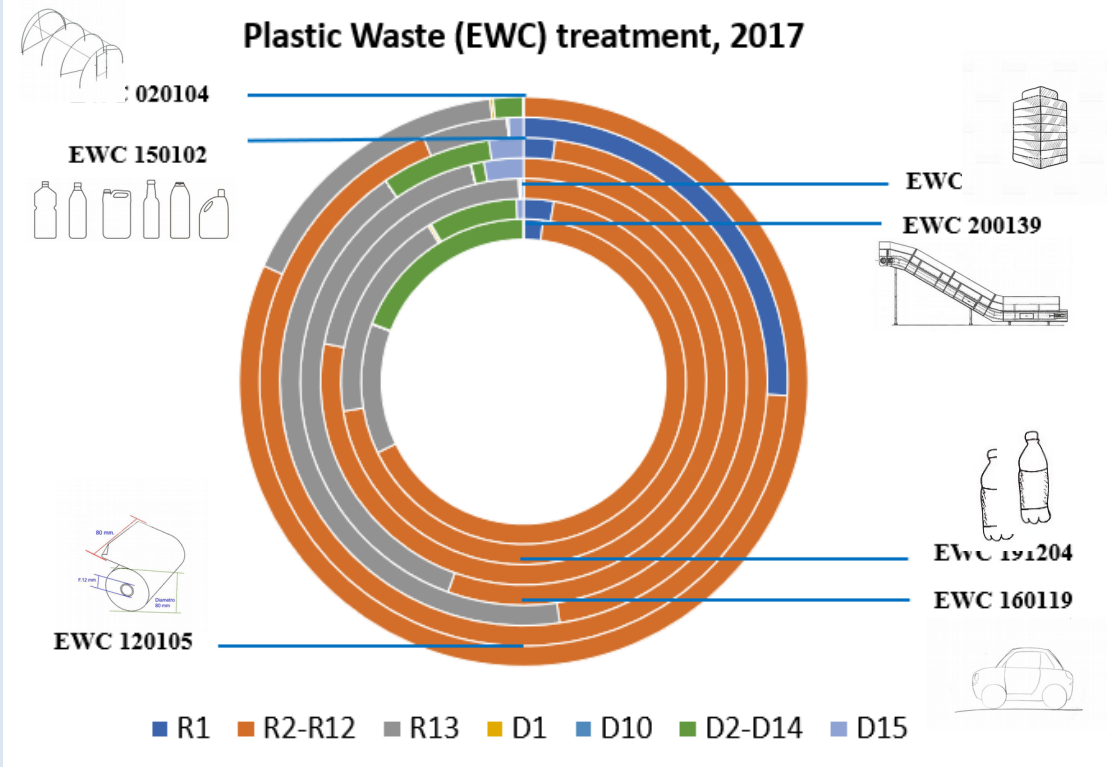
## Special plastic waste



# Plastic waste treatment

The performance of plastic waste recycling depends on:

- **Recycling infrastructure**
- **Type of plastic materials and applications**



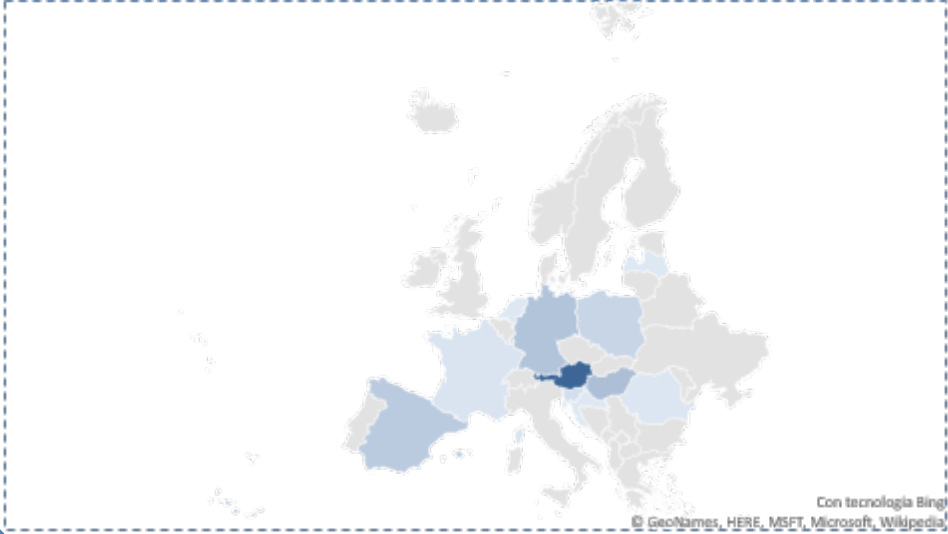
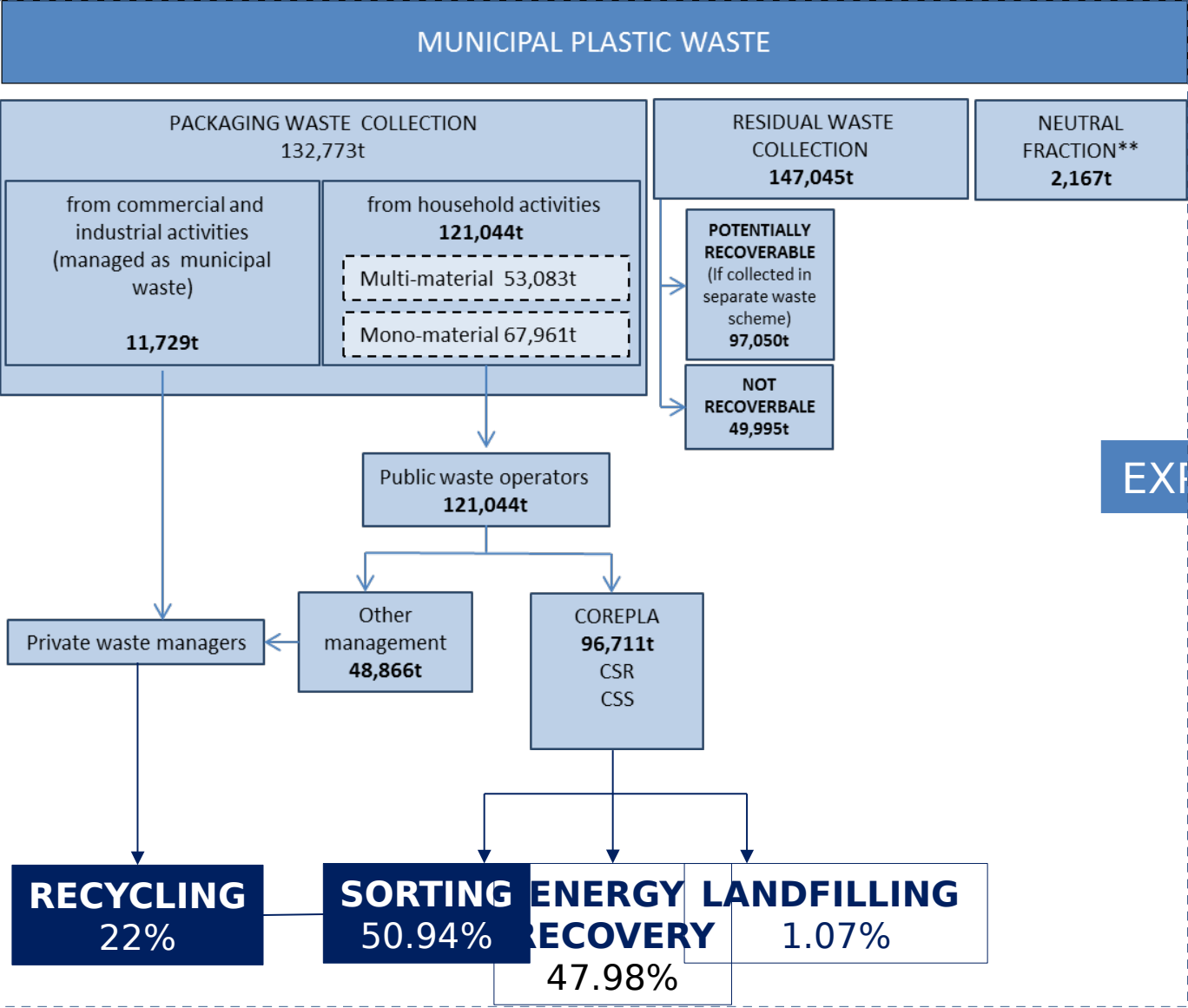
TYPE OF WASTE STREAM	EWC	POLYMERIC COMPOSITION
PACKAGING	120105, 150102	<b>PET, HDPE, LDPE, PP</b>
AUTOMOTIVE	160119	<b>PA, ABS, PP</b>
B&C	170203	<b>PVC, HDPE</b>
AGRICULTURE	020104	<b>LDPE, EVA</b>
PLASTIC MANUFACTURING/RECYCLING	200139, 191204	<b>All</b>



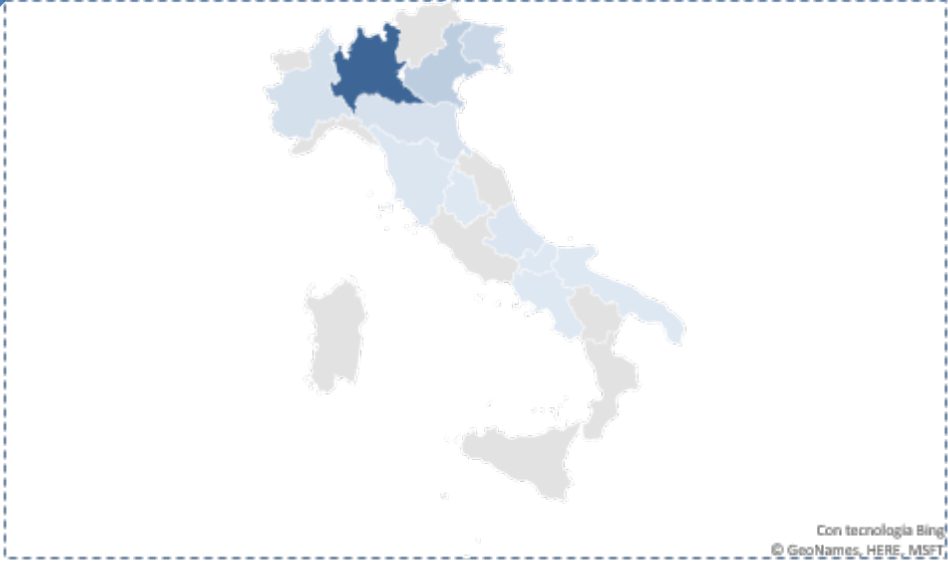


# Municipal plastic waste management: COREPLA

to Europe

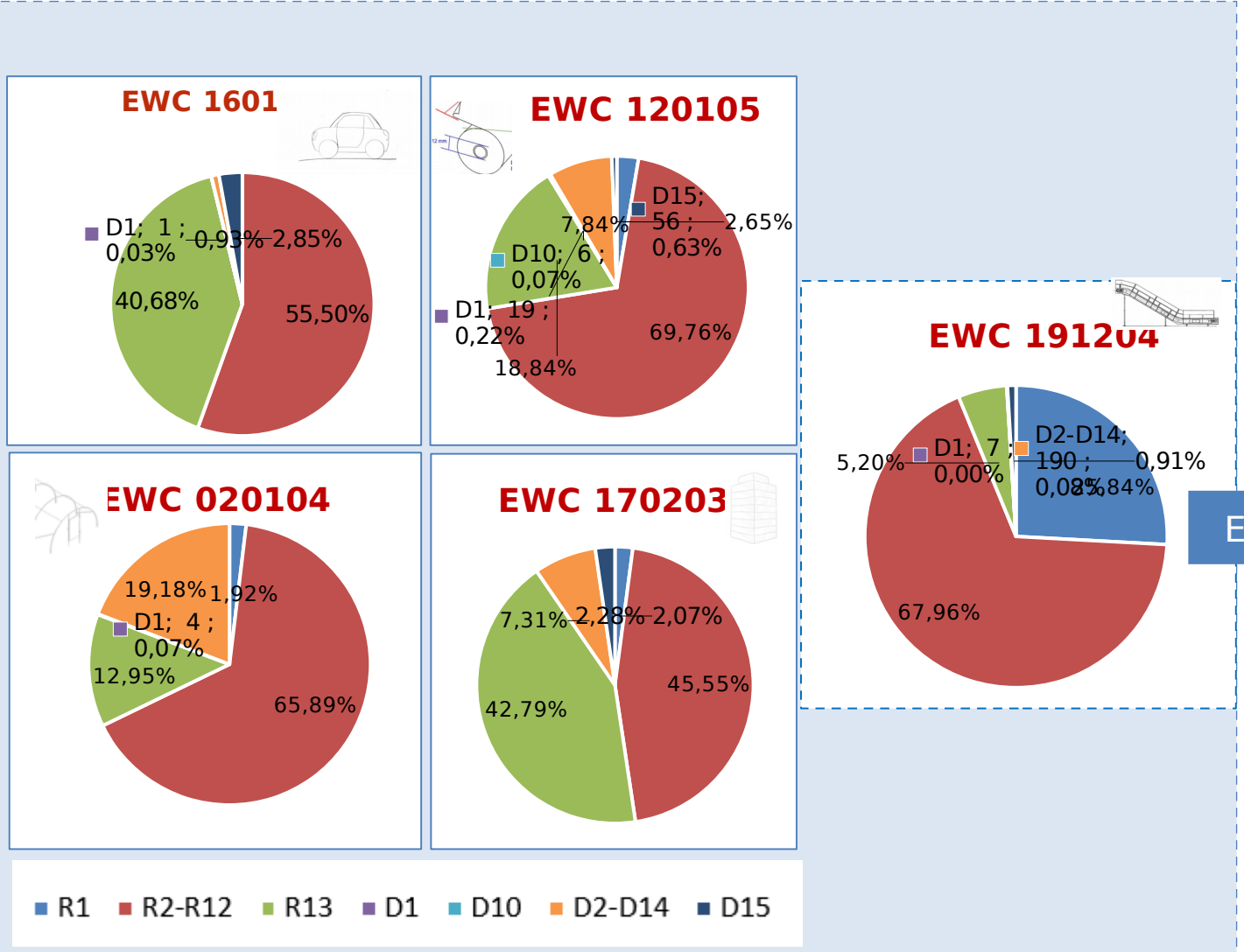


to other Italian regions



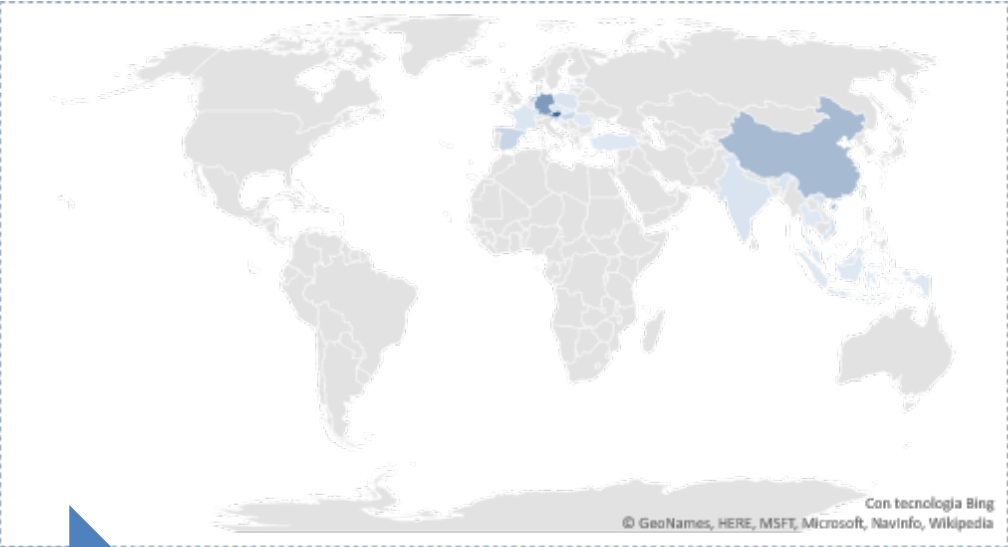
Plastic packaging recycling target (Directive 98/2008): **22,5 %** by weight, counting exclusively material that is recycled back into plastics

# Industrial plastic waste management

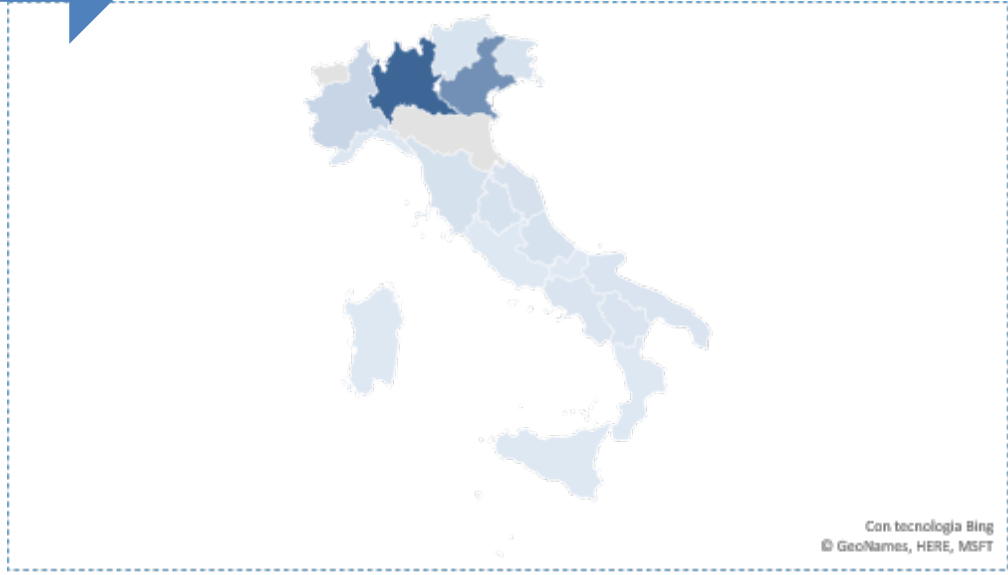


INDUSTRIAL PLASTIC WASTE

to global countries



to other Italian regions



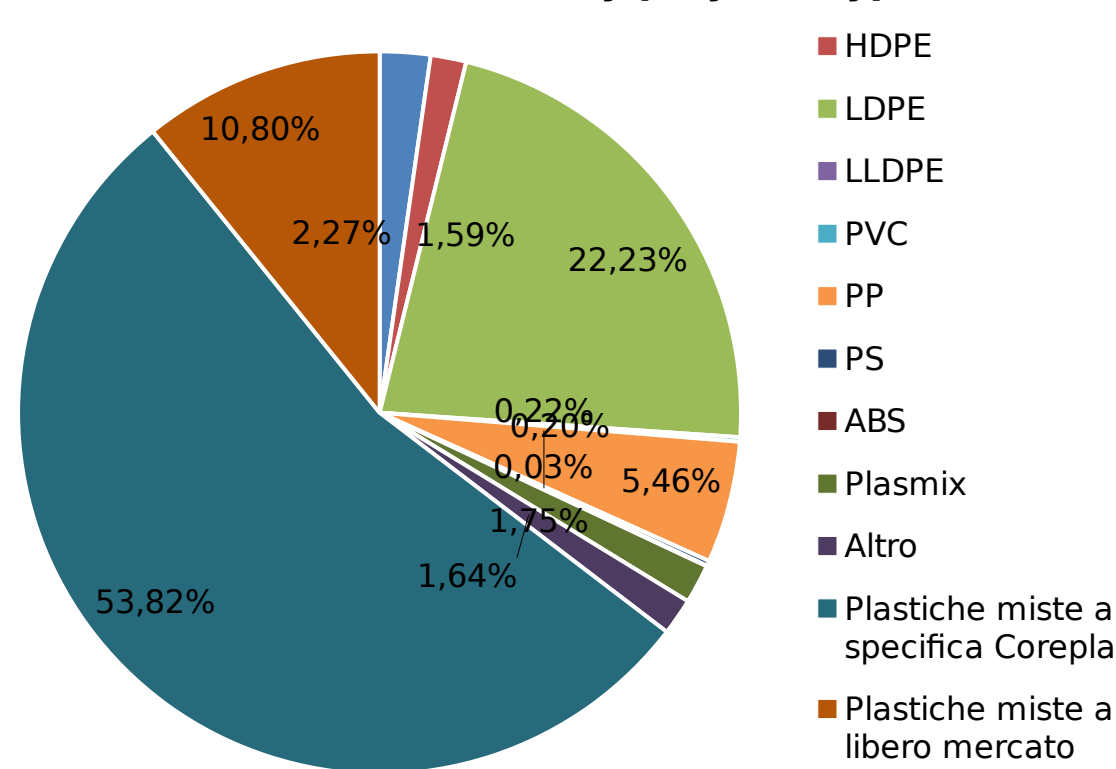
# Secondary plastic manufacturing

Investigation at:

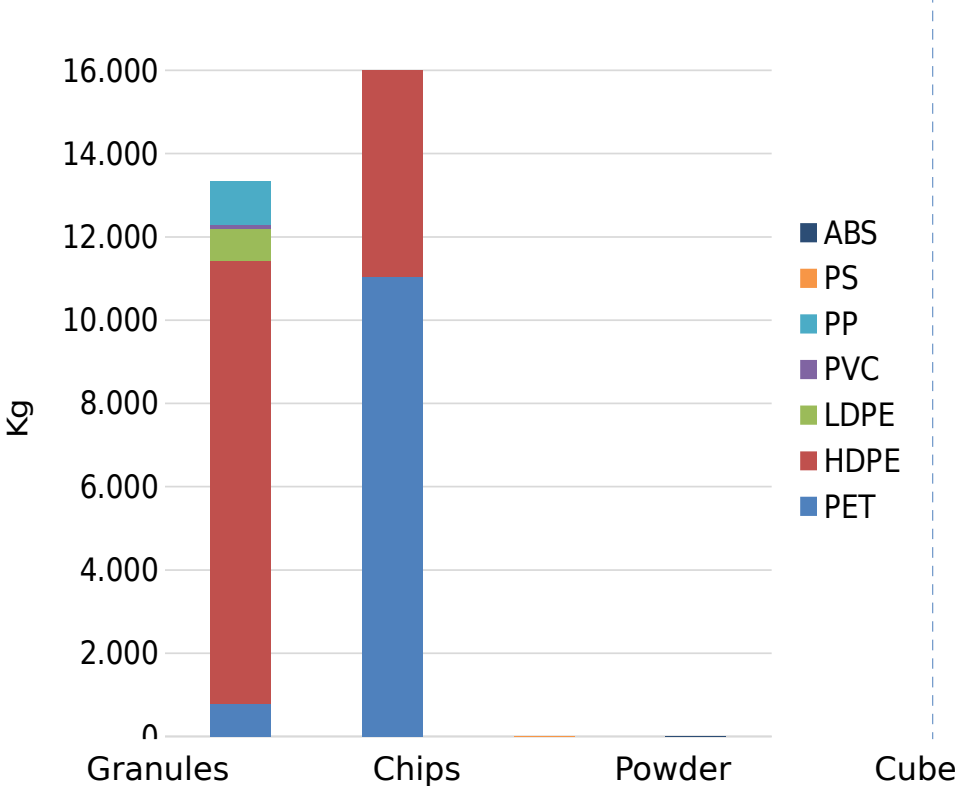
Regional sorting plants

Regional recycling plants

Plastic waste sorted by polymer type



Secondary plastics by polymer type and shape



# Conclusion: Towards the Strategy on plastics for circular economy

## QUALITATIVE

**Packaging waste:** Reducing municipal waste (**DRS, PAYT**)

Increasing awareness on plastics users (including consumers)

Promoting **servitization** and **design for recycling**

Recovering plastics from unseparated waste stream

**C&D waste:** Improving **selective demolition**

**Automotive waste:** Promoting the use of recycles and the **design for disassembly**

**Agriculture:** Promoting **biocompostable plastics** and efficient collection

Investing in local recycling infrastructure

## QUANTITATIVE

**Monitoring industrial plastic waste**

**Harmonizing data collection and target calculation** on waste recycling

(Met. 4)

Introducing value-based circularity indicators





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**THANK YOU FOR THE ATTENTION!**

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