Centre of Environmental Research
Waste Management, Circular Economy and Environmental Security

1.D Eco-design and behaviour of consumers

Environment - Environment for Life
12. – 14. 9. 2022

Plastic packaging generation from products of daily consumption

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Motivation

- The research is part of WP 1.D *Eco-design and behaviour of consumers*
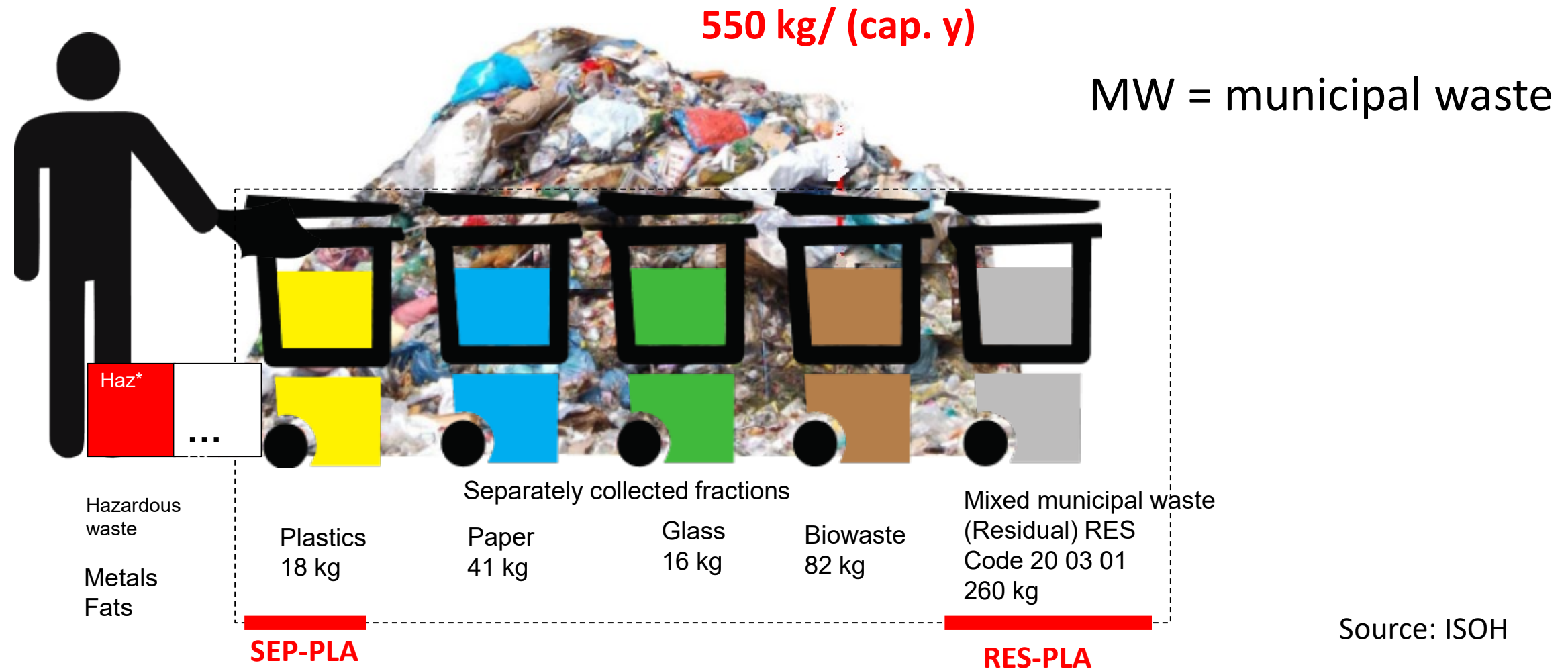
Goal:

- Monitor and understand the generation of post-consumer plastic waste, its composition and segments of markets, where it comes from.

- Contribute to more-sustainable design of packaging

- Help to overcome barriers against recycling

- Selected results of projects CEVOOH and TIRSMZP719 are presented

Program **Beta2**

T A
Č R

Production and collection of MW in the Czech Republic, 2020

550 kg/ (cap. y)

MW = municipal waste

Haz*

...

Hazardous waste

Metals
Fats

Separately collected fractions

Plastics
18 kg

Paper
41 kg

Glass
16 kg

Biowaste
82 kg

Mixed municipal waste (Residual) RES
Code 20 03 01
260 kg

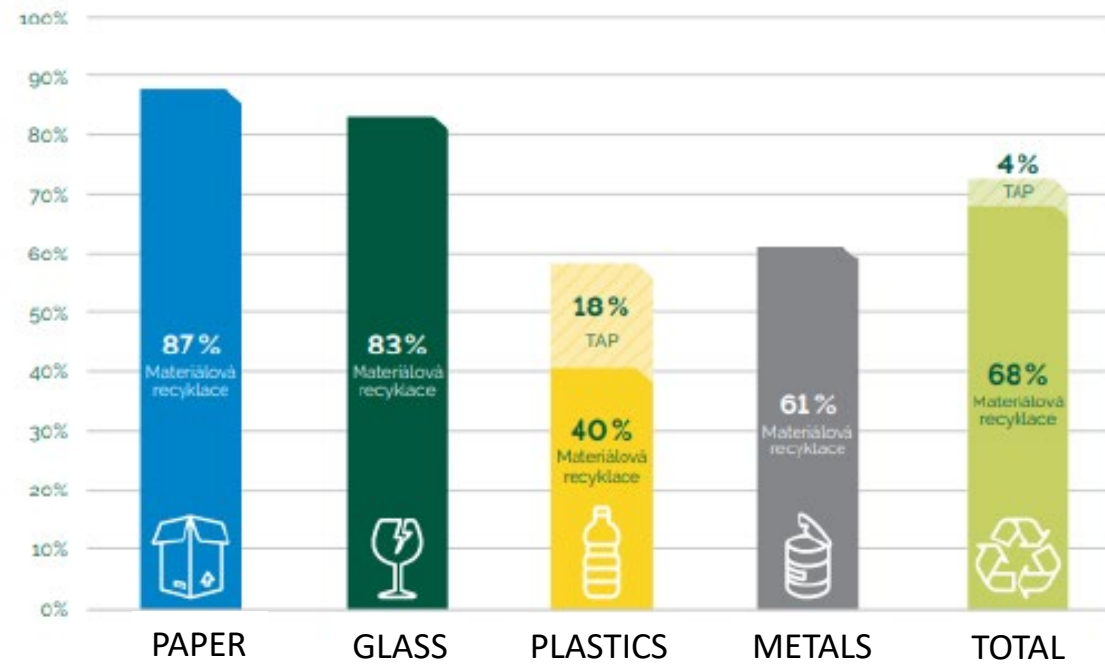**SEP-PLA**

RES-PLA

Source: ISOH

SEP-PLA Forecasted amount, source: TiramisO
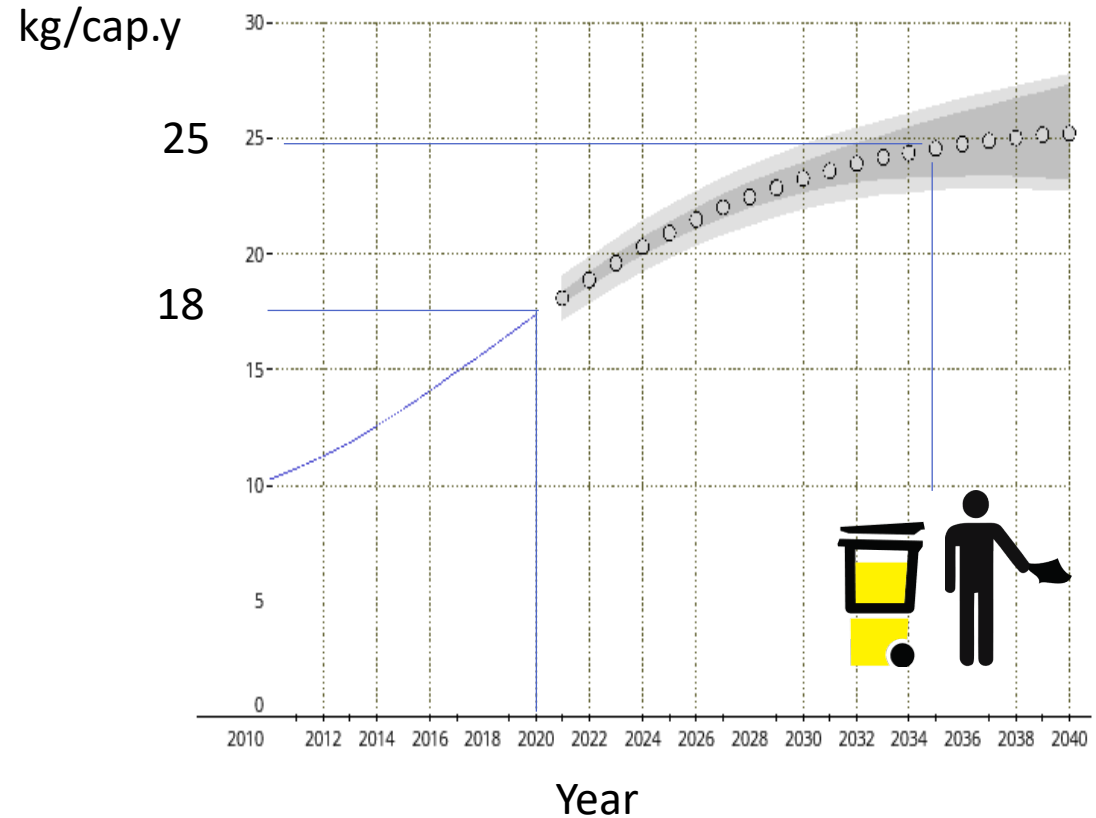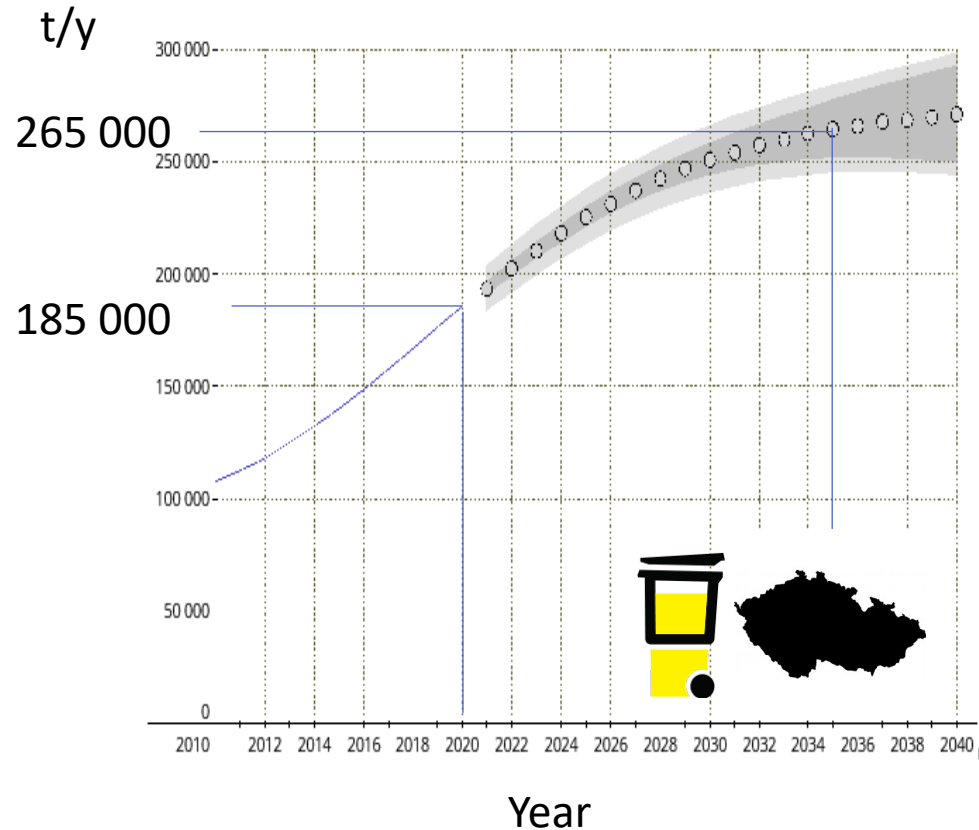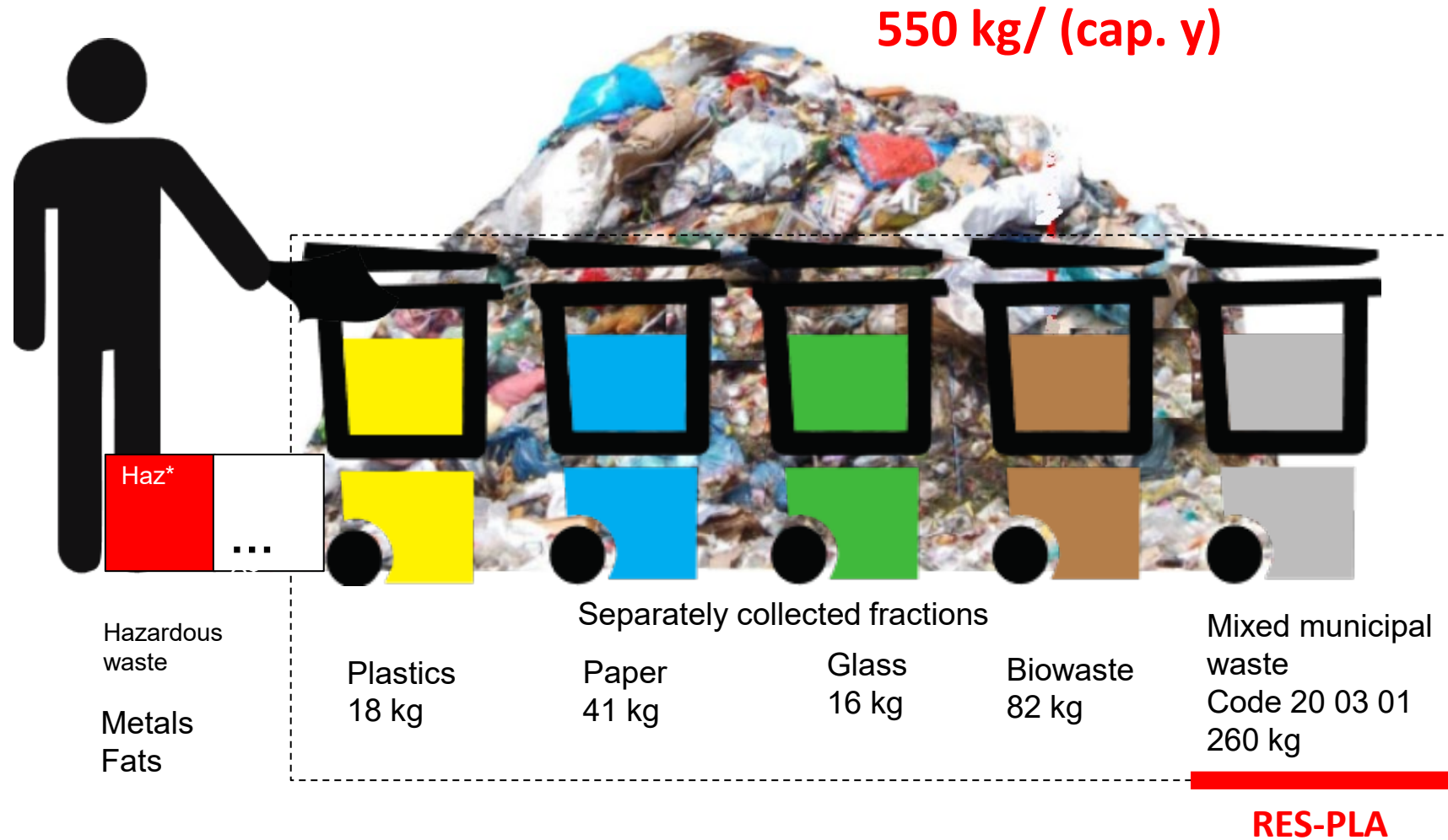

- The majority of the amount is post-consumer plastics packaging waste (see later)

Recycling rate of plastics

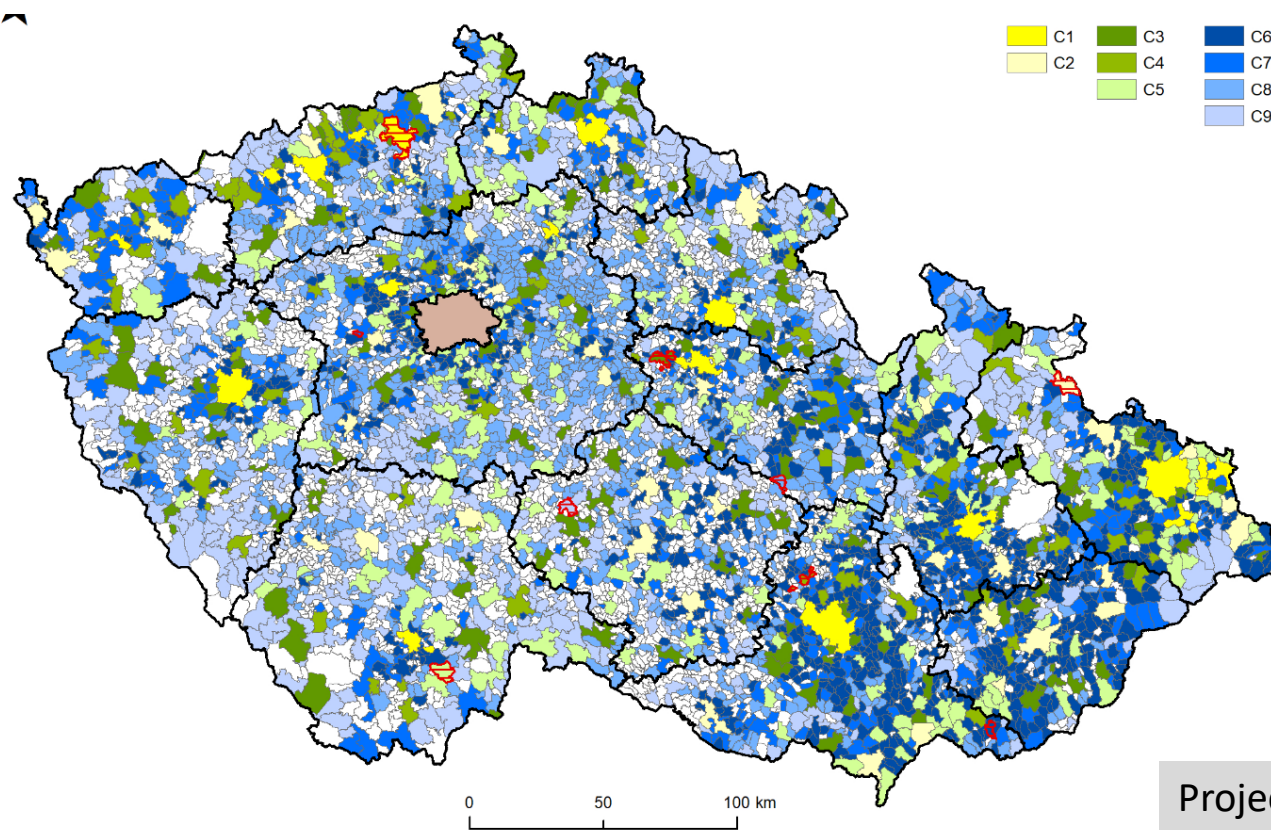Source: EKO-KOM

Compostion of RES

550 kg/ (cap. y)

Hazardous waste

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RES-PLA

Clusters of municipalities

- 10 clusters of similar municipalities have been calculated...

Identified clusters

- Capital city Prague
- Regional centres.
- Micro-regional centres - larger.
- Micro-regional centres - average.
- Micro-regional centres - average.
- Cities with prevailing individual housing.
- Villages with higher population densities.
- Villages with higher population densities and higher commutation rates.
- Villages with lower population densities and higher tourism

... and for each of the clusters, one representant is selected. Here composition analyses have been carried out.

Composition Analysis Methodology

New national comprehensive Methodology for Municipal waste composition analysis
Authors: Brno University of Technology
Approved by Ministry of Environment of the CZE, Published: 12/2021
https://www.mzp.cz/cz/metodika_stanoveni_sko_ko (in Czech only)

- Based on the recommendations from the EU/EC *Solid Waste Analysis-tool project* (SWA-tool)
- Point samples (from containers)
- Minimum waste handling before sampling
- Stratified random sampling
- Number of strata, number of samples

Sampling plan was created according to the European standard EN 14899
Characterization of waste - Sampling of waste materials - Framework for the preparation and application of a sampling plan

Mixed municipal waste (20 03 01)

Parent population

Sampling plan implementation

Representative samples
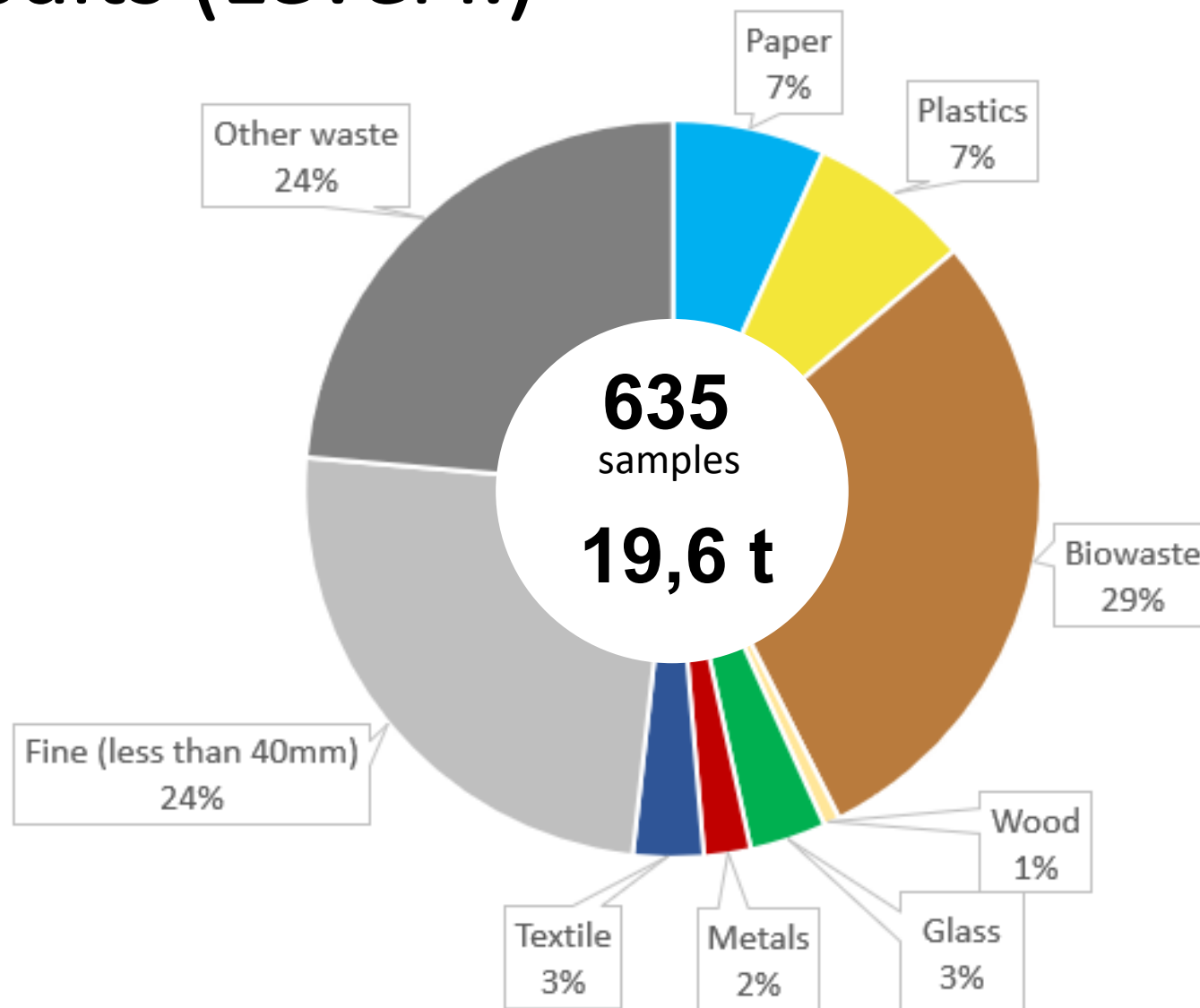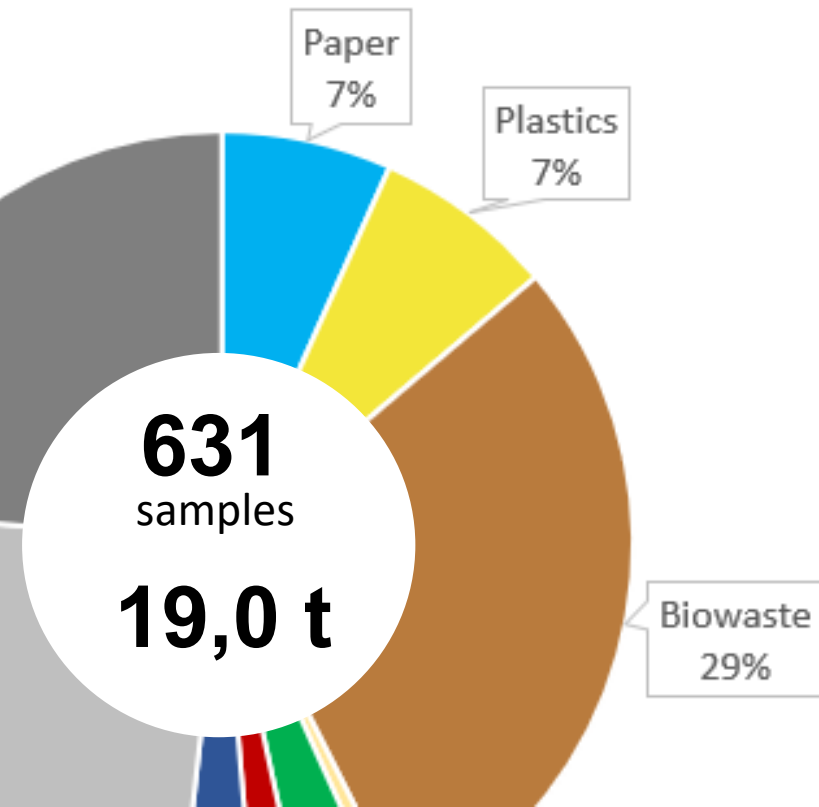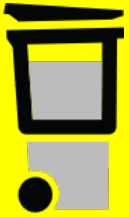
Characterisation

Recyclables content in residual waste

Characterization results (Level I.)

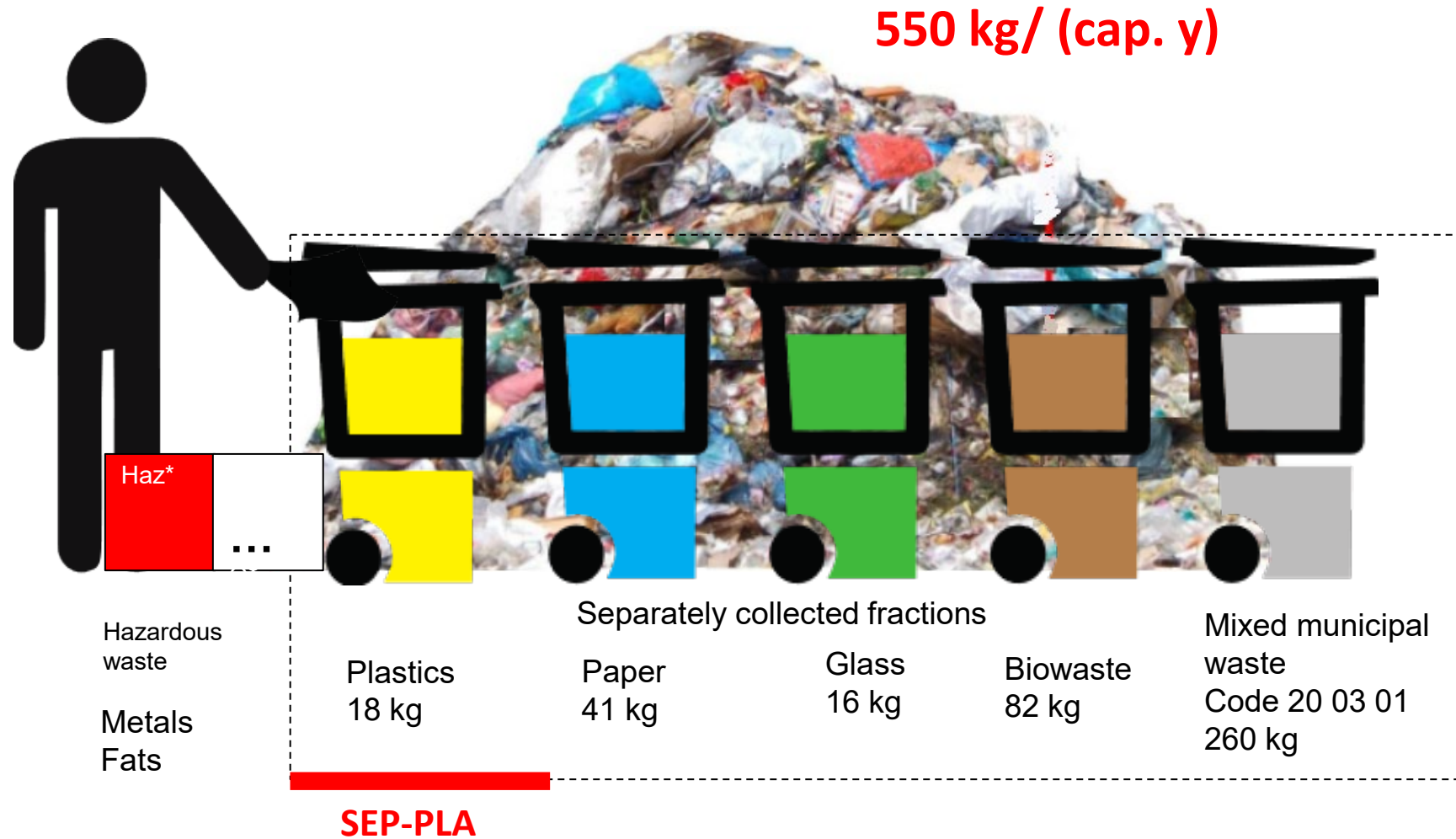- Average composition of residual waste in the CZE
- 10 localities
- 2019-2022

RES, CZE, residual

Pie chart: 635 samples, 19,6 t

- Other waste 24%
- Paper 7%
- Plastics 7%
- Biowaste 29%
- Wood 1%
- Glass 3%
- Metals 2%
- Textile 3%
- Fine (less than 40mm) 24%

Characterization results (Level II. and III.)

631 samples

19,0 t

Level I.	Level II.	Level III.
Plastics in residual municipal waste **6,7 %**	**Packaging 6,3 %**	**Foils 3,7 %**
		3D Rigid 1,7 %
		PET transparent 0,4 %
		PET coloured 0,2 %
		PS 0,1 %
		Other 0,05 %
	Non-packaging 0,4 %	

From 9/2022 the characterizaton will continue within CEVOOH project, with special focus on plastics packaging in RES and SEP-PLA

Investigation of SEP-PLA (CEVOOH)

550 kg/ (cap. y)

Haz*

...

Hazardous
waste

Metals
Fats

SEP-PLA

Plastics
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Paper
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Separately collected fractions

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Methodology for SEP-PLA characterisation
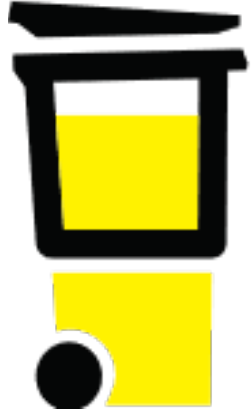
	Level I.	Level II.	Level III.
	Plastics separately collected	**Packaging**	Foils
			3D Plastics (Rigid)
			PET transparent
			PET coloured
			PS
		Non-packaging	
	Composites and bewarage cartons	**Tetrapack**	
		Other	
	Impurities		

- Phase 1
  - Similar breakdown as for residual waste
  - New fractions according to typical content of the bin
- Phase 2
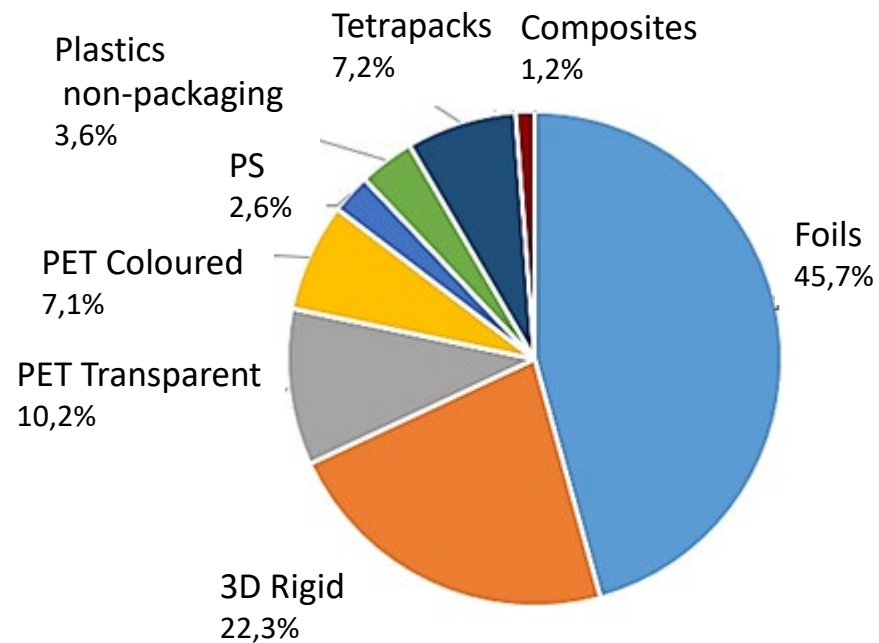 - Detailed information about labelling, origin and package type

Phase 2.

- Only for packaging plastics
- Weighing of individual pieces, sorting according to Numbering and abbreviation system for plastics
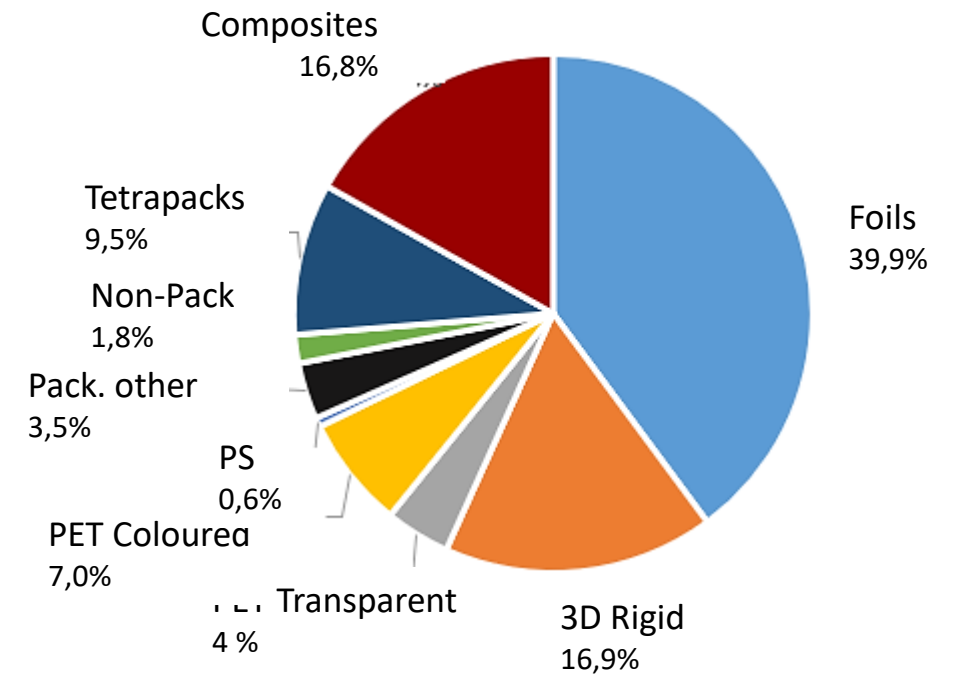

97/129/EC: Commission Decision, Annex I.
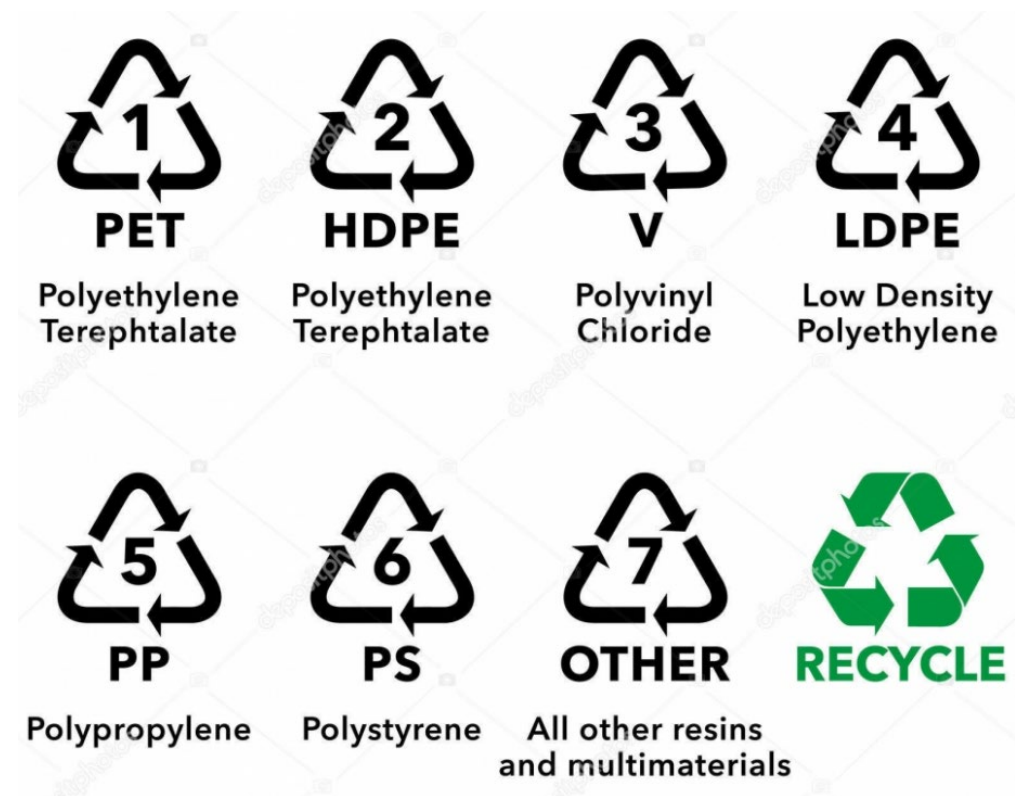
Comparison SEP-PLA and RES
(one locality, 5/2022)

SEP-PLA

RES

SEP-PLA pie chart:
- Foils 45,7%
- 3D Rigid 22,3%
- PET Transparent 10,2%
- PET Coloured 7,1%
- PS 2,6%
- Plastics non-packaging 3,6%
- Tetrapacks 7,2%
- Composites 1,2%

RES pie chart:
- Foils 39,9%
- Composites 16,8%
- Tetrapacks 9,5%
- Non-Pack 1,8%
- Pack. other 3,5%
- PS 0,6%
- PET Coloured 7,0%
- PET Transparent 4 %
- 3D Rigid 16,9%

Additional information

Materials

- TETRAPAK 9%
- INÉ, 7 2%
- PS, 6 0%
- neuvedené, PP, 5 5%
- PP, 5 6%
- LDPE, 4 0%
- HDPE, 2 10%
- neuvedené, PET, 1 0%
- PET, 1 68%

Market segments

- Fruits&Vegetables 2%
- Other 1%
- Chemists&Beauty 16%
- Health 1%
- Meat&Fish 5%
- Smoked meat&Delicatessen 1%
- Dairy&Frozen 16%
- Long shelf-life 2%
- Beverages 56%

Type/Shape of packaging

- Punnets 6%
- Cartons 9%
- Trays 2%
- Other 14%
- Boxes 2%
- Cups 2%
- PET bottles 62%
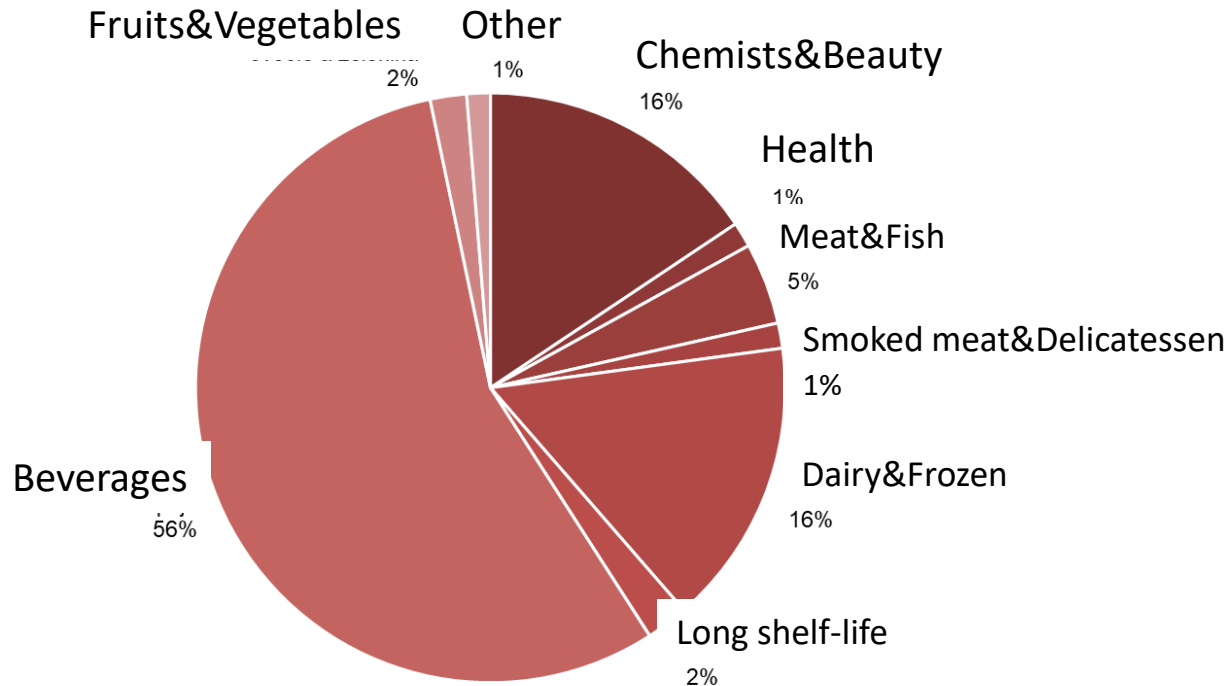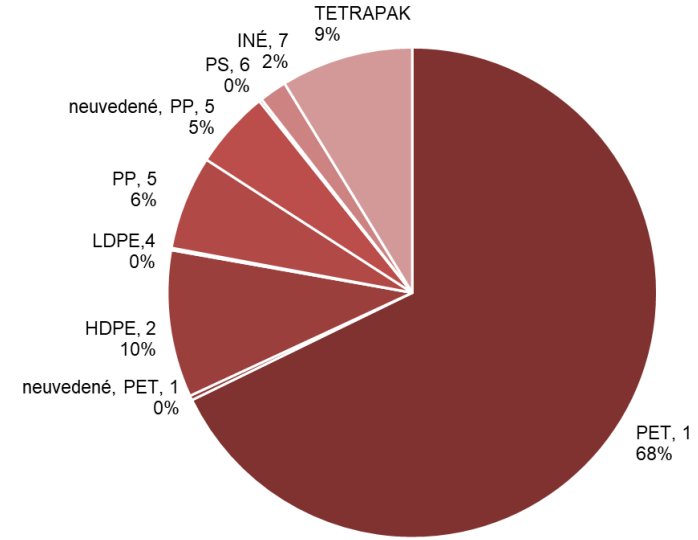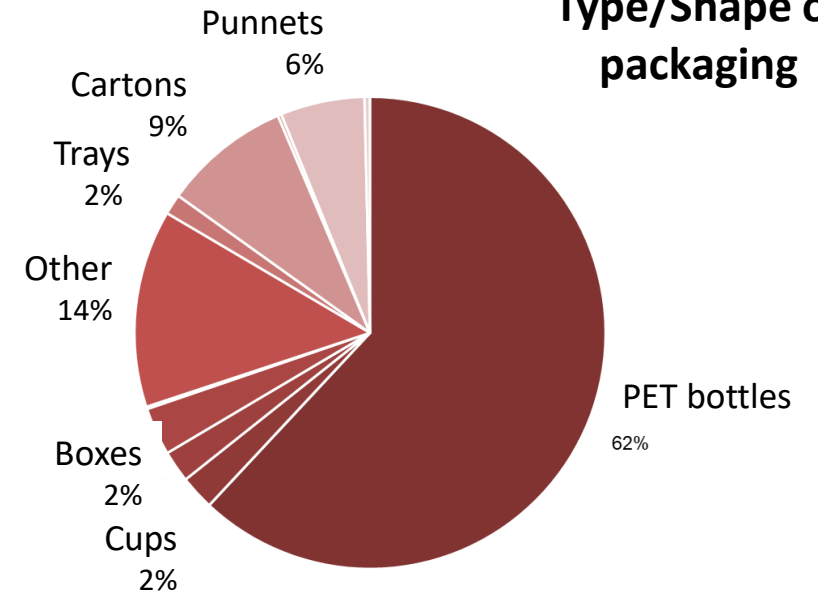
Conclusions

- Extensive residual solid waste characterisation was caried out in the CZE

- Plastics were sorted into several cathegories

- New methodology for residual waste testing (TIRSMZP719 project) and separately collected plastics (CEVOOH) was proposed

- Trial testing of plastics with detailed information gathering

- Comparison between RES and SEP-PLA

- The work will continue within CEVOOH project