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EPR and DRS Based Municipal Solid Waste Analysis Seasonal Campaigns in Hungary

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Miskolc - Egyetemváros



Hungary has decided to introduce **Deposit Refund Systems (DRS)** for some plastic, metal and glass consumer packaging under the umbrella of existing **Extended Producer Responsibility (EPR) systems**.

Main characteristics of the municipal solid waste (MSW) analysis campaign carried out in the given season, the selection of average samples:

4 campaigns: 2022 autumn and winter, 2023 spring and summer

8 NUTS2 regions, same municipalities, same methodology

Number of averaged samples and city of a seasonal campaign (120 analyses – about 50 tonnes of MSW is sorted / campaign):

1. working group	2. working group	3. working group
Budapest (20 samples) <u>Pusztazámor</u> or HUHA	Western <u>Transdanubia</u> (15 samples) <u>Zalaegerszeg</u>	Northern Hungary (15 samples) Miskolc
Pest (10 samples) <u>Gödöllő</u>	Central <u>Transdanubia</u> (15 samples) <u>Székesfehérvár</u>	Northern Great Plain (15 samples) <u>Nyíregyháza</u>
	Southern <u>Transdanubia</u> (15 samples) <u>Pécs</u>	Southern Great Plan (15 samples) Szeged



NUTS 2 regions of Hungary

Sampled material streams:

- **RMSW** (residual municipal solid wastes from normal collection),
- **SMSW** (selectively collected municipal solid wastes from normal collection),
- **Illegal RMSW** (RMSW from illegal deposition),
- **Public Cleaning RMSW** (RMSW from public cleaning, such as street sweeping, public area waste bins and park care) and
- **Bulky RMSW** (bulky RMSW containing furniture, mattresses, etc...).

Three MSW campaigns (2022 autumn and winter, 2023 spring) have been carried out **when 360 averaged samples (about 160 tonnes)** were analysed.

Stratified sampling.

- Wet and dry compositions are measured.
- Selectively collected municipal solid wastes (SMSW) and residual (RMSW) wastes are sampled separately.
- Different sources of RMSWs, such as wastes from *normal public waste management*, from *illegal deposition* and from *public cleaning*, such as street sweeping, public area waste bins and park care are sampled separately.
- The source types of wastes such as **family house area, block of flats area and business organization origin** are separately investigated.
- Composition estimates are done for the eight NUTS2 EU regions of Hungary by weighted averaging. Weighing is done on the basis of the number of habitants of different magnitude settlement classes.
- The plastic composition of these materials HPE, LPE, PP, PS, PET, ABS, PVC, PLA and OTHER of the EPR plastic sub-categories was also measured by FTIR method.

MSW characterization in France



A little page of history

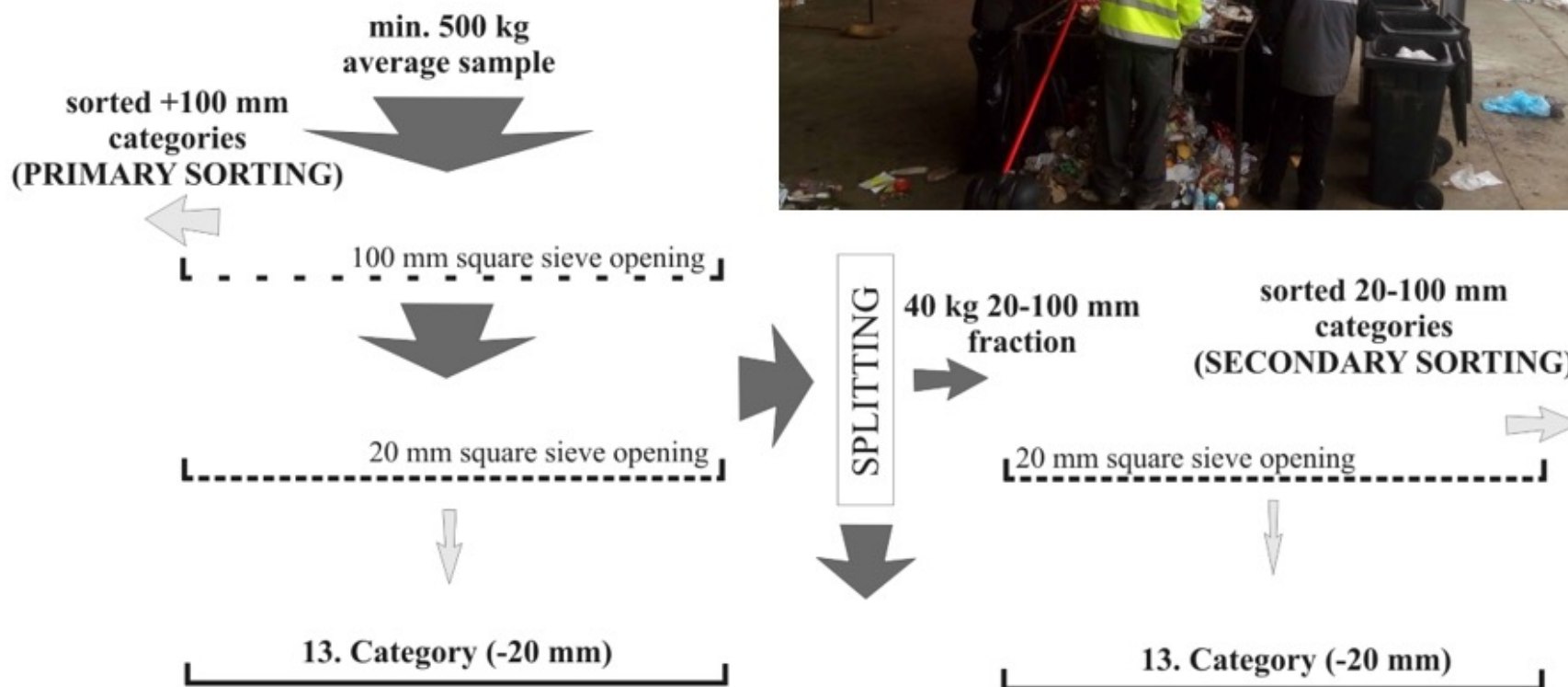
- 1993: MODECOM™ (French MSW characterization methodology).
 - Characterization made on the collection vehicle.
 - Mass of sample: 500 kg.
- 1993: First national campaign of MSW characterization in France, based upon MODECOM™
- 1994-1997: Development of selective collection schedules.
- 1997: Adaptation of the MODECOM™ methodology for the selective collection.



Ph. WAVRER: New MSW sampling and characterization methodologies. The dry product method. **RELIABLE DATA FOR WASTE MANAGEMENT.**
September 25-26, 2008, Vienna, Austria

Fundament of sampling: **waste collecting vehicle!**

Sample preparation of the 500 kg average sample:



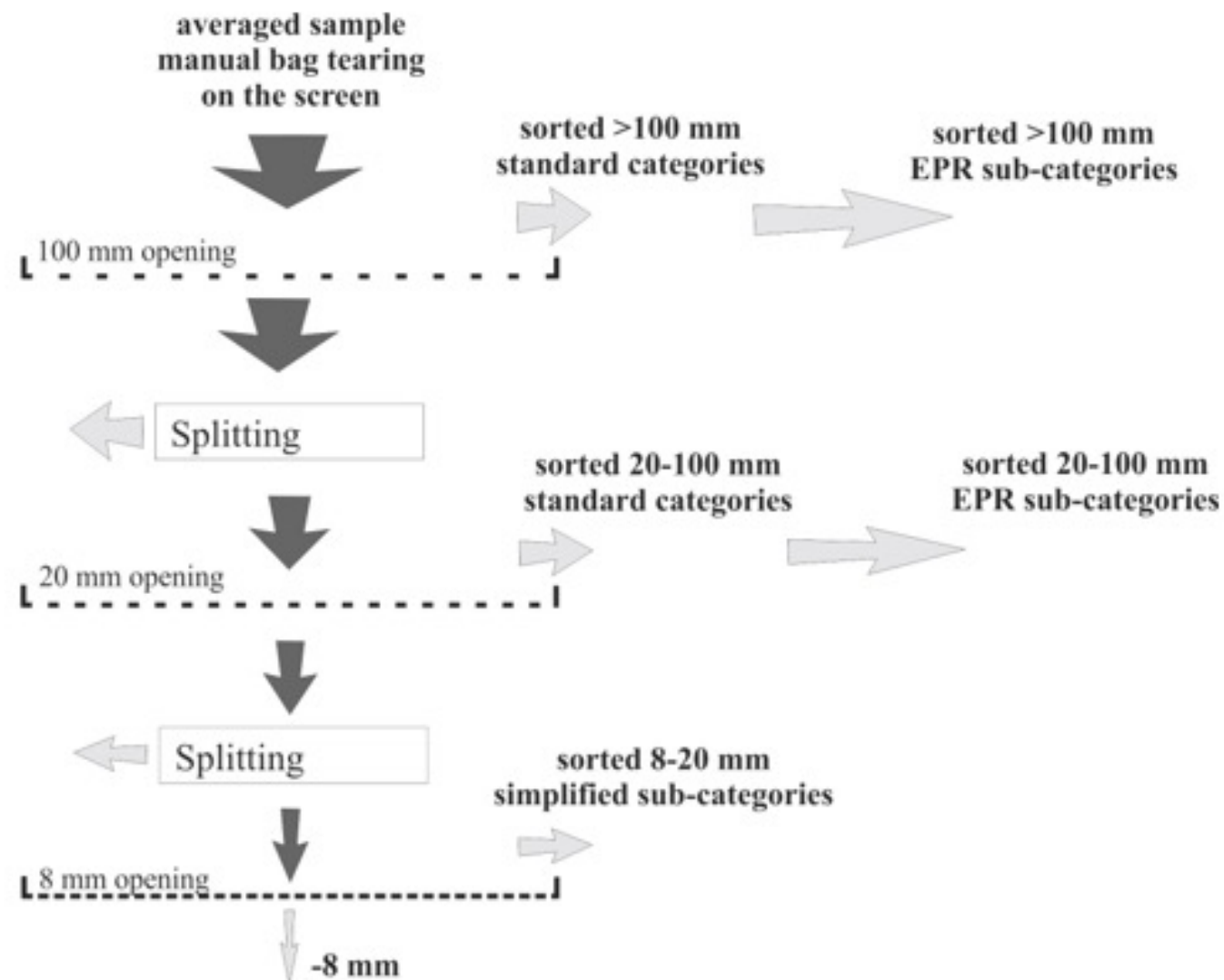
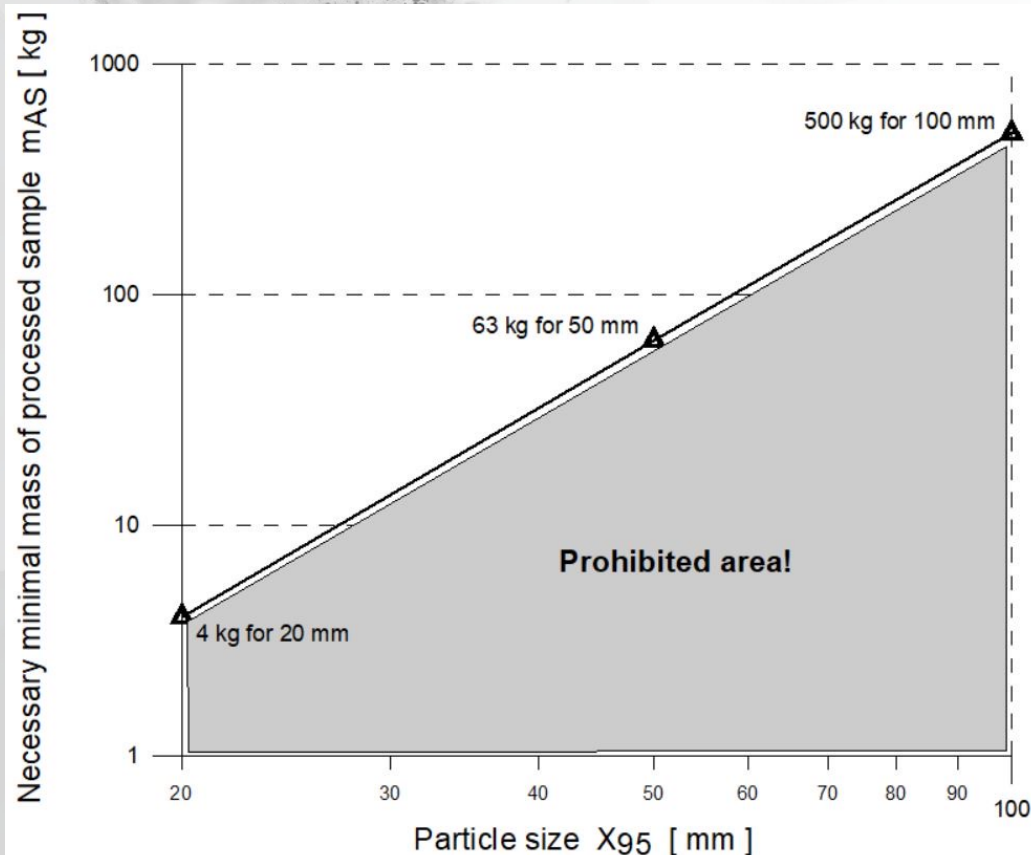


Figure 1. The general flow sheet of the averaged sample processing.

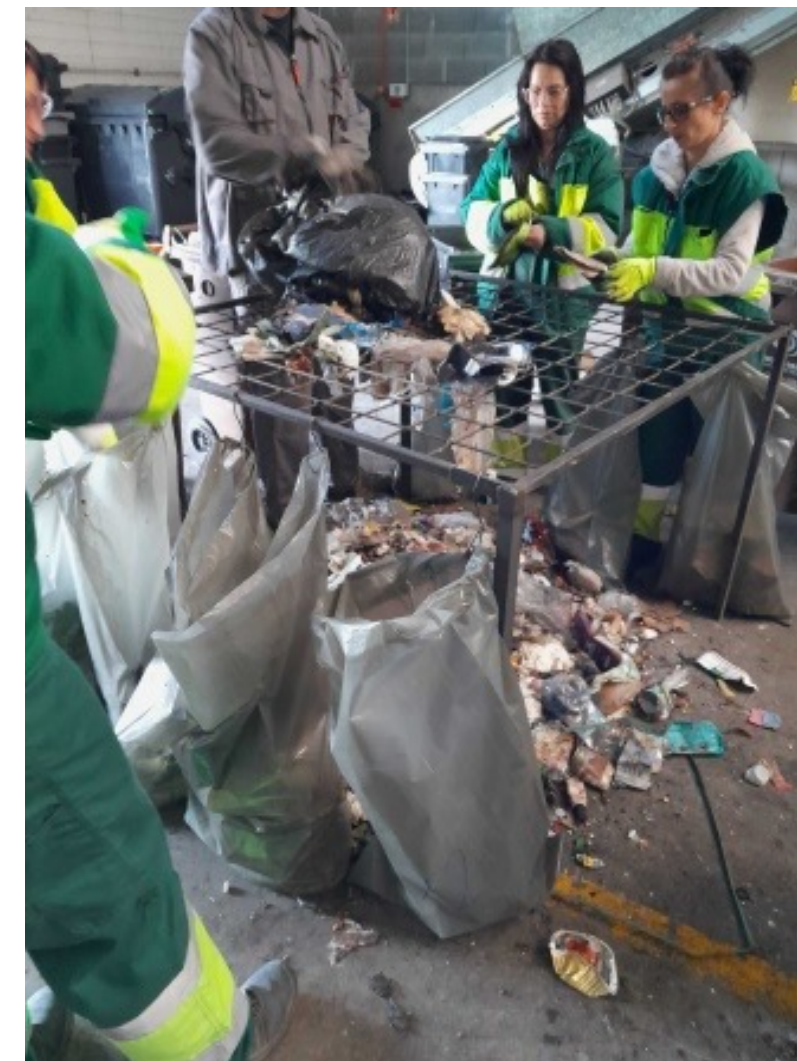
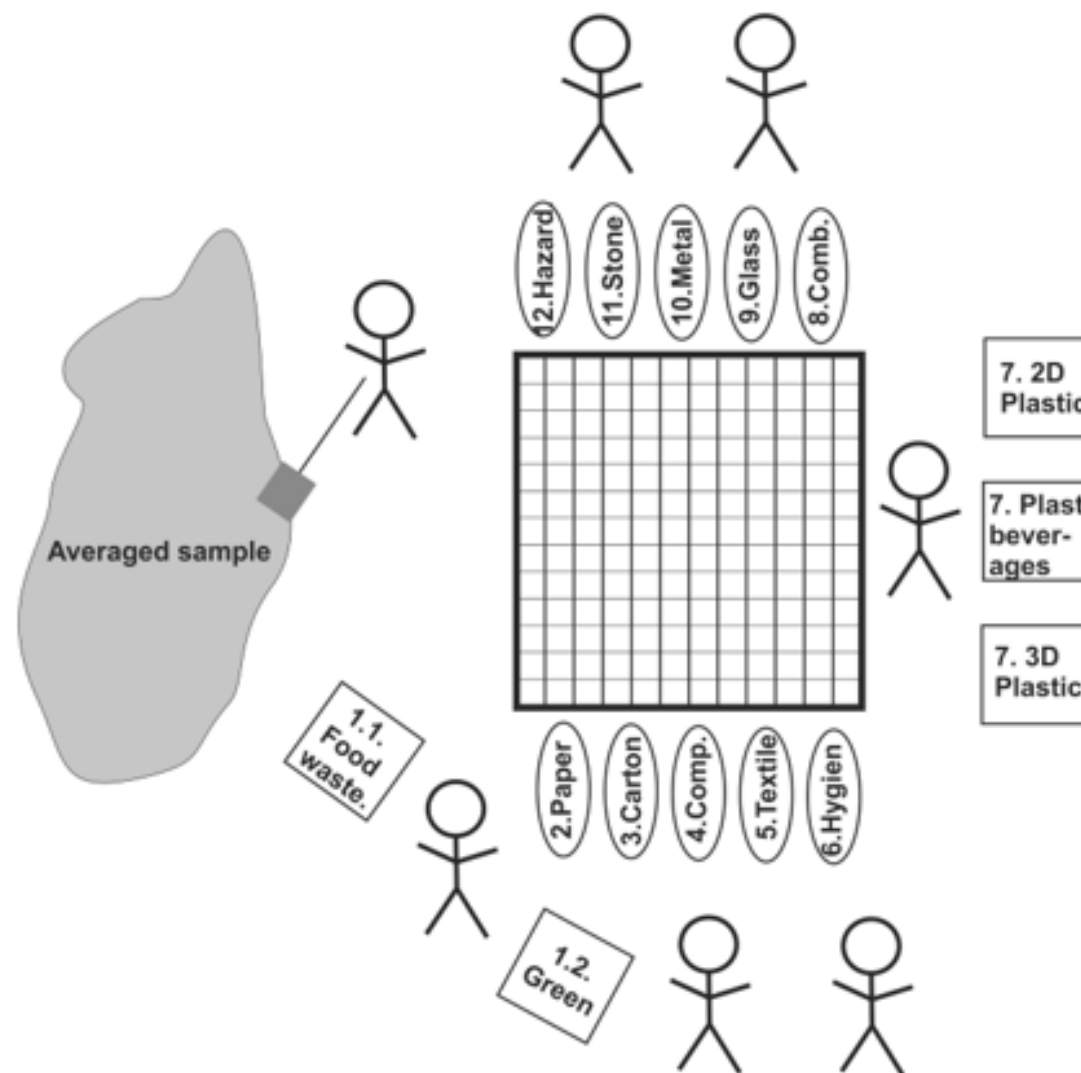


Figure 2. Expedient arrangement of primary (standard) sorting.

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CHANIA2023

10th International Conference
on Sustainable Solid Waste Management
21-24 JUNE 2023
chania2023.uest.gr

Appendix

1. BIOLOGICALLY DECOMPOSABLE WASTE

- 1.1. *Food waste* (without bones)
- 1.2. *Green waste* (yard and garden green wastes, flowers, leaves, hedge cuttings, etc.)
- 1.3. *Cooking oil and fat* (bottles containing cooking oil and fat, in which the weight of the content is greater than the packaging))

2. PAPER

- 2.1. *Packaging paper* (paper packaging)
- 2.2. *Office paper* (office paper, e.g. printer paper))
- 2.3. *Advertising paper* (advertising papers, those newspapers whose purpose is clearly to advertise products)
- 2.4. *Non-EPR paper* (other types of paper, color and black-and-white newspapers, envelopes, etc.)

3. CARTON

- 3.1. *Packaging cardboard* (packaging cardboard, pasta and egg boxes, yogurt cartons, corrugated packaging cartons, etc.)
- 3.2. *Non-EPR carton* (non-packaging cartons, e.g. cardboard used for painting, etc.)

4. COMPOSITE

- 4.1. *3D composite packaging* (associated layered beverage cartons, e.g. TetraBrik, milk and fruit juice composite packaging)
- 4.2. *2D composite packaging* (other foil-like multilayer packaging materials, e.g. nuts, chips, etc.)

5. TEXTILE

- 5.1. *Textile packaging material* (nets for fruits and vegetables, etc.)
- 5.2. *Clothing* (clothes and rags - natural fibres, e.g. wool, cotton, linen, etc. and artificial fibres, e.g. stockings, etc.)
- 5.3. *Home textile* (carpet, blanket, curtain, etc.)
- 5.4. *Non-EPR textile* (car textile, gurtai, etc.)

6. HYGIENIC WASTE

6.1. *SUP towel* (wet SUP towel)

6.2. *Non-EPR hygiene* (other hygiene textiles, diapers, menstrual pads, cotton tampons, tissues, household paper, etc.)

7. PLASTIC

7.1. *2D packaging* (plastic advertising bag, 2D plastic packaging materials, films, biodegradable 2D packaging made of PLA)

7.2. *2D non-packaging* (2D-shaped plastic foils, e.g. for agricultural purposes – ground cover foils, tent foils, balloons, etc.)

7.3. *Plastic DRS beverage bottle* (PET or other plastic bottles, soft drink, mineral water, and beer bottles in the future subject to DRS, except bottles of milk and drinkable dairy products)

7.4. *Plastic non-DRS beverage bottle* (PET or other plastic bottles of milk and drinkable dairy products)

7.5. *3D packaging plastic* (HD-PE and other plastic bottles, detergent and other bottles, glasses and plates, food containers, etc.)

7.6. *3D non-packaging plastic* (non-packaging 3D-sized plastic particles, e.g. toys, tools, ear picks, balloon sticks, plastic-straw-mixing sticks, etc.)

8. UNCLASSIFIED COMBUSTIBLE WASTE

8.1. *Wooden packaging* (wooden and natural-based packaging materials, cork stoppers, wooden caps)

8.2. *Wooden furniture*

8.3. *Tire*

8.4. *Belt and shoes* (clothing accessories)

8.5. *Non-EPR combustible* (boards not classified in the preceding categories, leather, rubber (not tires), bone, sponge, etc.)

9. GLASSES

9.1. *DRS glass* (in the future DRS glass beverage bottles)

9.2. *Packaging glass* (other glass packaging materials, e.g. preserves, jam, milk and drinkable milk products, etc.)

9.3. *Non-EPR glass* (flat glass and other non-packaging glass)

10. METAL

10.1. *DRS metal Fe* (in the future, Fe beverage cans, soft drink, mineral water, and beer iron metal beverage cans subject to DRS, excluding milk and drinkable milk products)

10.2. *DRS metal Al* (in the future, Al beverage cans under DRS (soft drink, mineral water, beer aluminium beverage cans, excluding milk and drinkable milk products)

10.3. *Fe packaging and spray* (other Fe packaging materials and Fe spray bottles, glass packaging Fe cap separately, Fe spray, etc.)

10.4. *Al packaging and spray* (other Al packaging materials and Al spray bottles, e.g. aluminium foil, yoghurt cap separately, glass packaging Al cap separately, Al spray, etc.)

10.5. *Non-EPR metal* (other metal waste, e.g. cast objects, pins, sockets, etc.)

11. UNCLASSIFIED NON-COMBUSTIBLE WASTE (INERT)

(other unclassified non-combustible waste, e.g. inert materials not classified in other categories (rubble, stone, ash, ceramics, etc.)

12. HAZARDOUS WASTE

12.1. *Battery pack* (dry and wet batteries and accumulators)

12.2. *Hazardous packaging* (packaging contaminated with pesticides, paints, varnishes or solvents, pharmaceutical packaging with or without drug residue (without the outer paper box), etc.)

12.3. *Hazardous non-packaging* (special waste from healthcare, syringes, perfusion bags, etc.)

13. SMALL PARTICLE SIZE WASTE (FINE FRACTION) (< 20 MM)

- 13.1. 8-20 mm plastic
- 13.2. 8-20 mm paper
- 13.3. 8-20 mm metal
- 13.4. 8-20 mm SUP filter (smoke filter for cigarettes separately)
- 13.5. 8-20 mm bio (biodegradable fine particles)
- 13.6. 8-20 mm other
- 13.7. 0-8 mm waste

14. OTHER (SHOULD NOT BE IN THE MSW)

- 14.1. WEEE (waste of electrical and electronic equipment)
- 14.2. Other (Everything that could not be classified in the previous ones, e.g. lubricating oil, soap and detergent, body care, animal carcasses, etc.)



Thank You for the attention!