



Plastics from Waste Electrical and Electronic Equipment (WEEE)

The manual dismantling and larger scale tests were conducted to identify and characterize WEEE plastics. Feasibility of separation methods was also studied.

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Key figures:

- WEEE Plastics: 6% of the European Plastics demand
- Domestic WEEE generated in Finland: almost 120 kt/a (over 21 kg/inh.)
- Collected WEEE (official take-back systems): 65 kt/a
- Plastic content: 5-75 % of the total mass of the product

Dismantling tests:

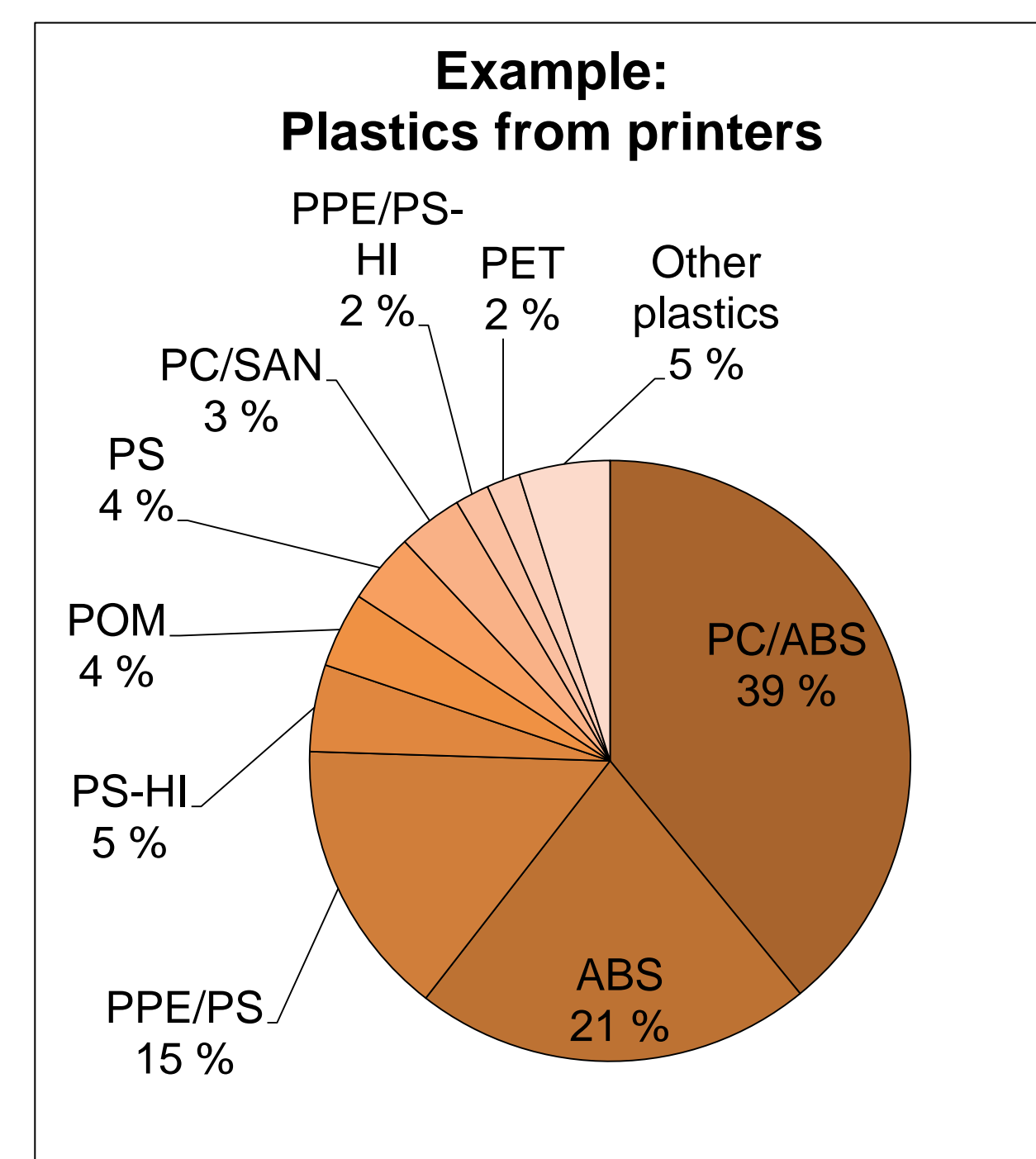
- Sample: 160 different small household appliances was manually dismantled and the polymer/plastic types and some additives were identified. Total weight of the dismantled plastic parts was over 150 kg.
- Methods: Portable Near Infra-Red (NIR) and X-Ray Fluorescence (XRF) scanners.
- Results: 28 different polymer types were found. When also the different additives concerned: over 50 different plastics were found.
- Example: One piece of equipment may consist of 15 different polymers, including five different types of ABS plastic.

Larger scale tests:

- Two different mixed WEEE plastic samples, over 100 kg each.
- Methods: Near Infra-Red Spectroscopy (NIR) and X-Ray Transmittance spectroscopy (XRT). Commercial scale separation lines.
- Results: Almost half of the plastics in each sample remained unidentified. Most of the identified plastics were styrene based.

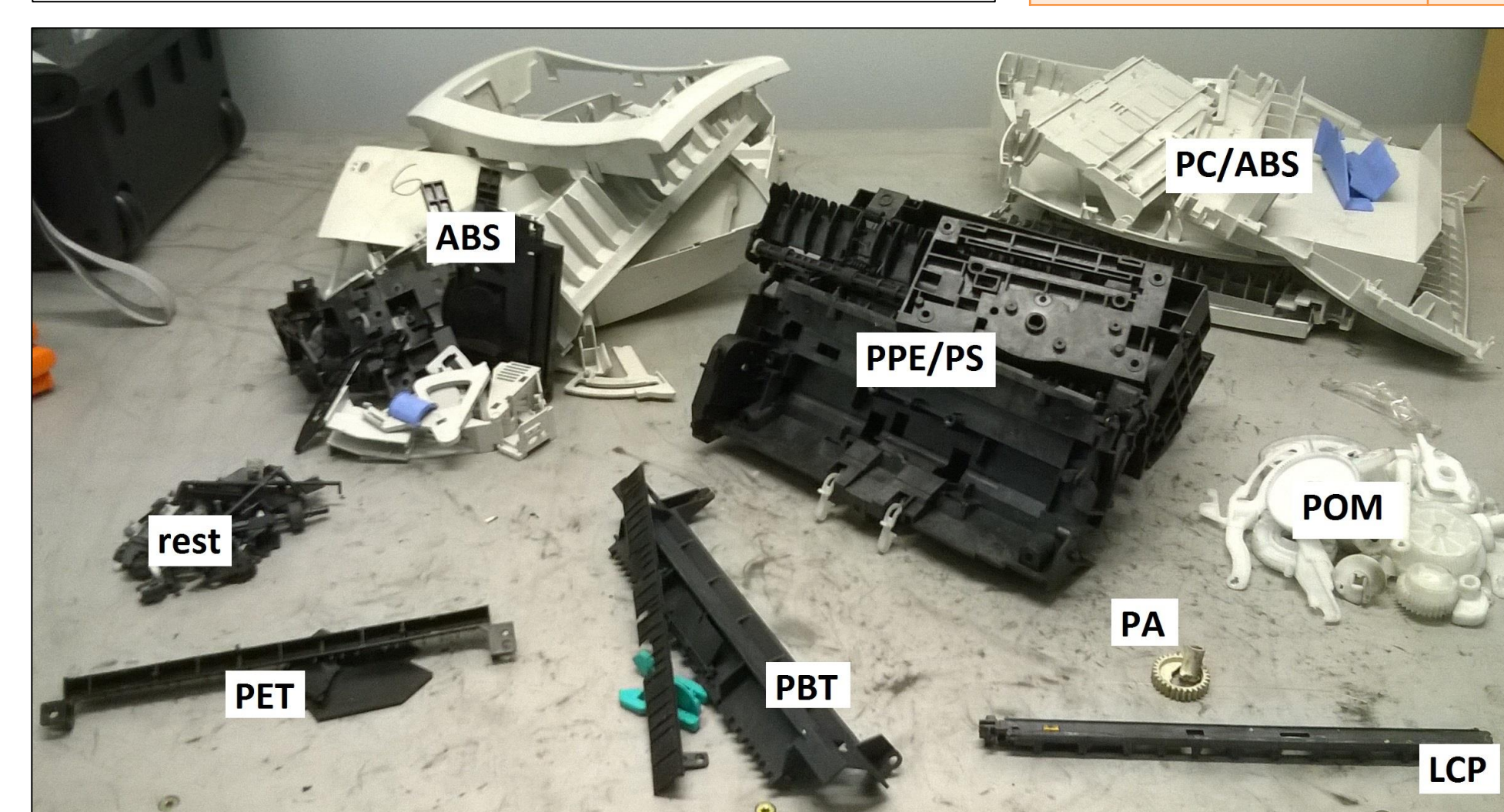
Challenges in WEEE Plastics recycling:

- Range of plastics & materials attached to them
 - Immiscibility of different polymers
 - Contaminations, blends, coatings & hybrid materials
- Feasibility of separation methods
 - Sensor based method (NIR):
 - Black and transparent plastics remain unidentified
 - Multilayers, coatings and blends
 - Methods based on density:
 - Uncertainties in accuracy and added value



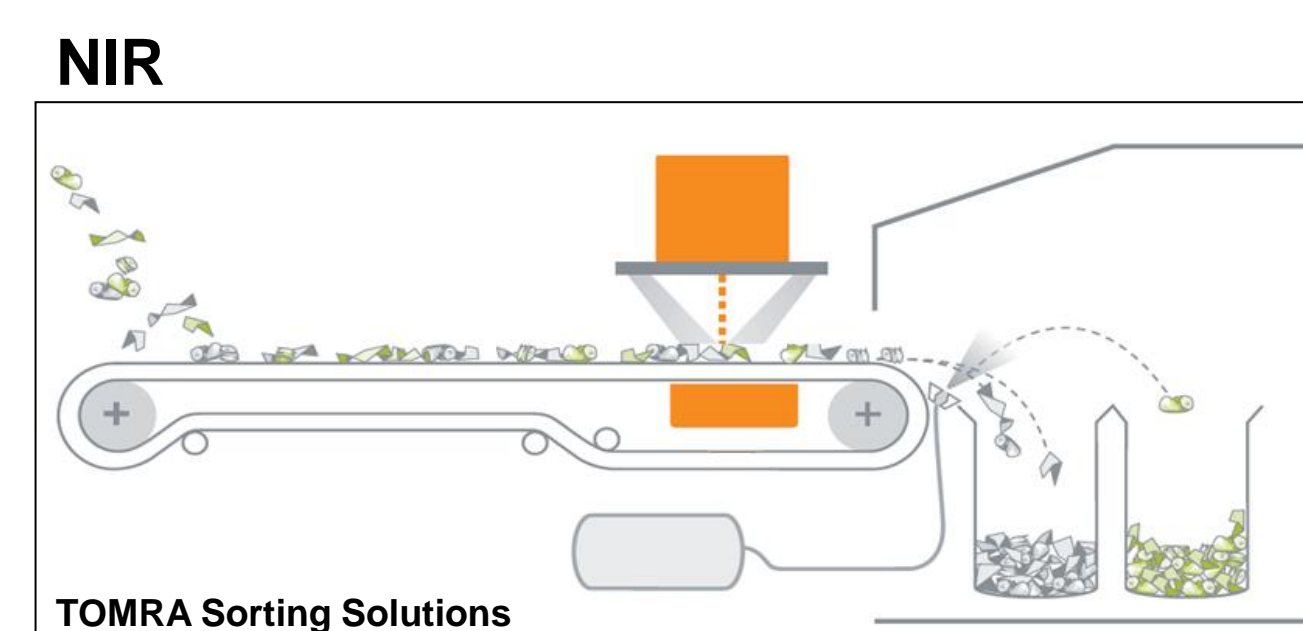
Example: Plastics from printers

	Average	Range
Percentage of plastics in the whole product (%)	48	[34, 56]
Amount of plastics in one product (g)	4355	[1070, 7190]
Number of different plastics in one product	12	[7, 19]
Flame retardants	Yes	
Year of manufacturing	2003	[1992, 2010]



All plastic parts from one of the dismantled printers

Sample: 10 different household printers.
Total amount of studied printer plastics: 43,5 kg
Number of different plastics in the whole sample: 20



Sample for NIR: Mixed WEEE Plastics

