Assessment of the Current Performances of Post-Consumer Plastic Packaging in Germany

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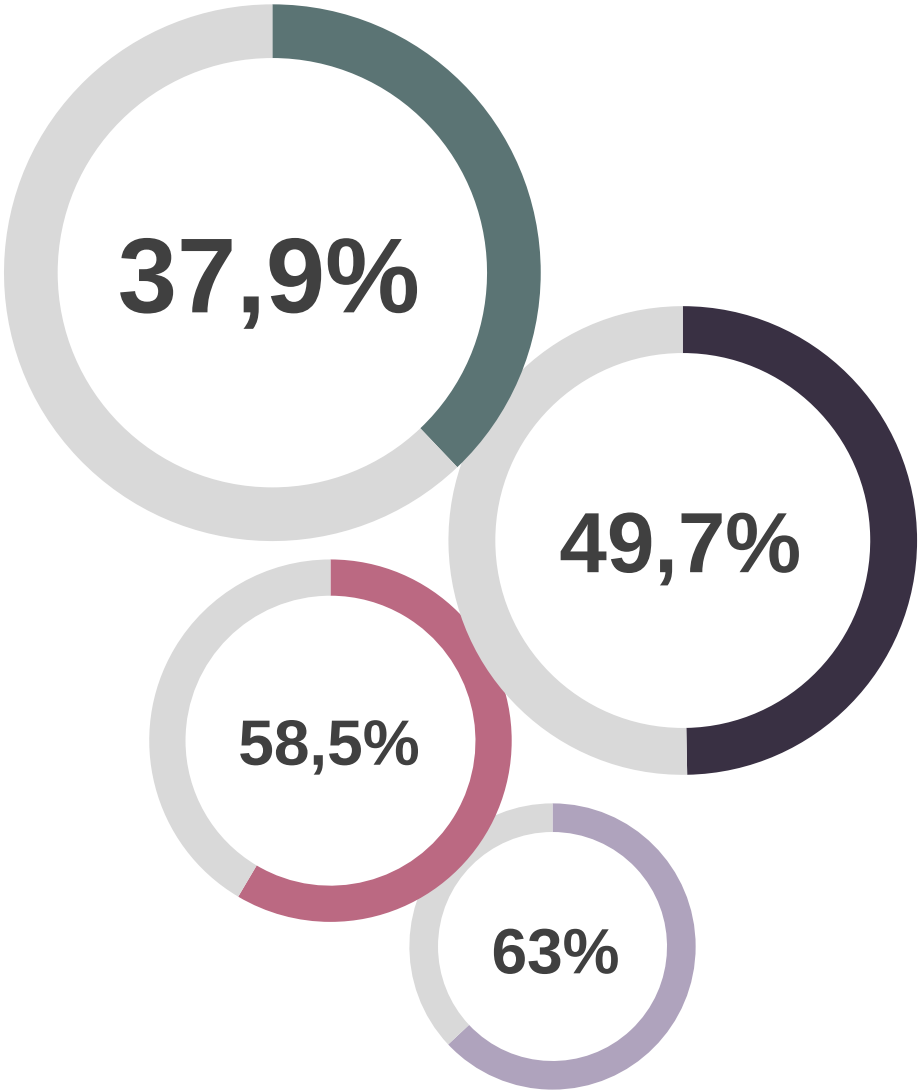
International Recycling Forum Wiesbaden

26. – 28.11.2019

Facts and figures[1]



In 2016,18,16 million tonnes of packaging waste was generated in DE (220,5 kg/ca).
Plastic packaging consumption was of 24,9 kg/ca.

37,9% Material recycling.

48,4% of the plastic packaging is recycled.

37,9% is recycled in DE and 10,6% outside DE.

49,7% Energy recycling.

58,5% Target 2019. 63% Target 2021.

Source: Umweltforschungsplan des Bundesministeriums für Umwelt, Naturschutz und nukleare Sicherheit (2018). *Aufkommen und Verwertung von Verpackungsabfällen in Deutschland im Jahr 2016*.

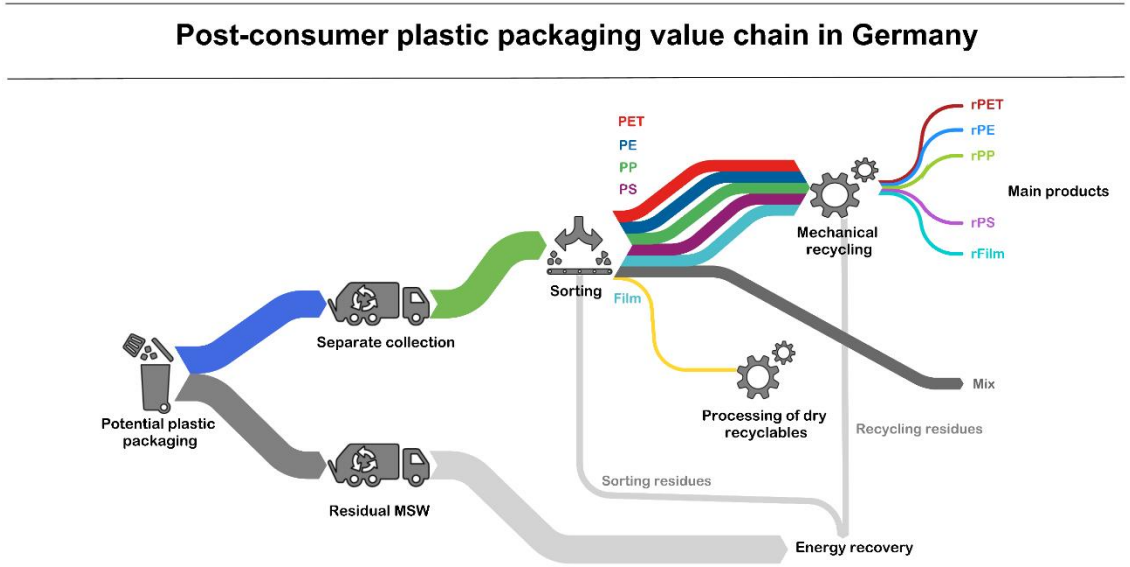
Aim and approach

Main aim

Circularity of plastic packaging waste in households in Germany

Methodological approach

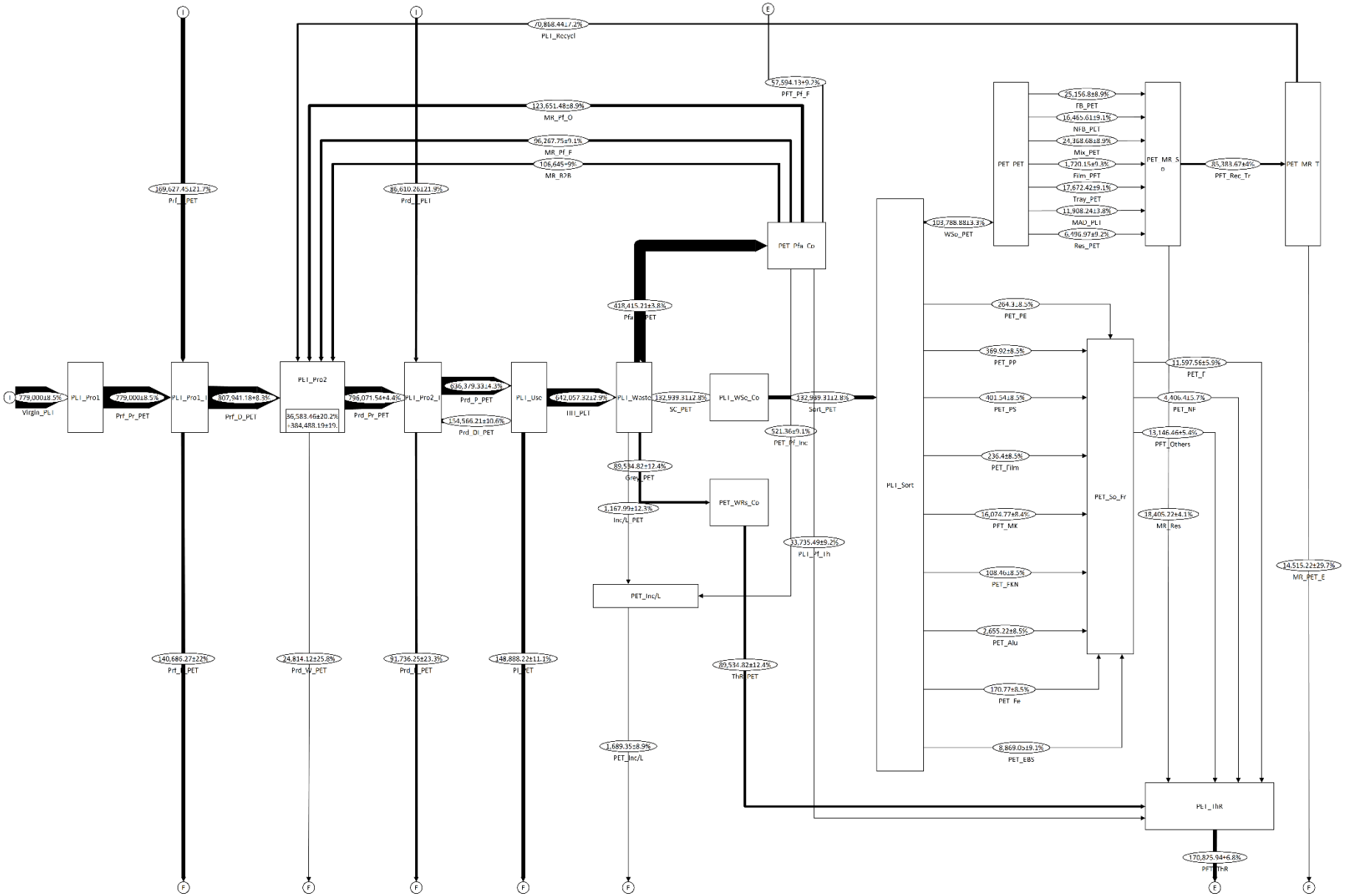
Material flow analysis



Post Consumer (PC) material performances

Material flows

Material flows through the chain



Material flows – data collection

17 Post-consumer plastic packaging types.

15

6 Post-consumer non-plastic packaging types;

5 Post-consumer non-packaging types;

4 Other material and residues.

1 Collected fraction. Sample of 200-300 kg for each sorting analysis.

11 Sorted fractions. Sample of ca. 50 kg for each sorted fraction and each sorting analysis.

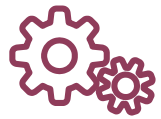
- PET food package clear
- PET food package coloured
- PE food package
- PP food package
- Mix food package
- PET non-food package
- PE non-food package
- PP non-food package
- Mix non-food package
- PET trays
- PP trays
- PE trays
- PS rigids
- EPS
- Carbon black
- Foils ≥ DIN A4
- Foils < DIN A4

- Non packaging plastics
- Packaging F-metals
- Packaging NF-metals
- Non Packaging F-metals
- Non Packaging NF-metals
- Packaging paper
- Non packaging paper
- Beverage cartons (FKN)
- Packaging composites
- Non packaging composites
- Glass
- Residues coarse
- Fine < 40 mm
- WEEE
- Batteries

Material flows – data sources

- Determination of attached moisture and dirt is a crucial step to define the net recycling yield.

- Secondary data implementation from four main sources:
  - Conversio (2018): *Stoffstrombild Kunststoffe in Deutschland 2017*.
  - Umweltbundesamt (2018). *Aufkommen und Verwertung von Verpackungsabfällen in Deutschland im Jahr 2016*.
  - PlasticsEurope (2019) *Plastics – the Facts 2019*.
  - GVM (2018). *Aufkommen und Verwertung von PET-Getränkeflaschen in Deutschland 2017*.



PC material performances

Assessing the limits of PC material

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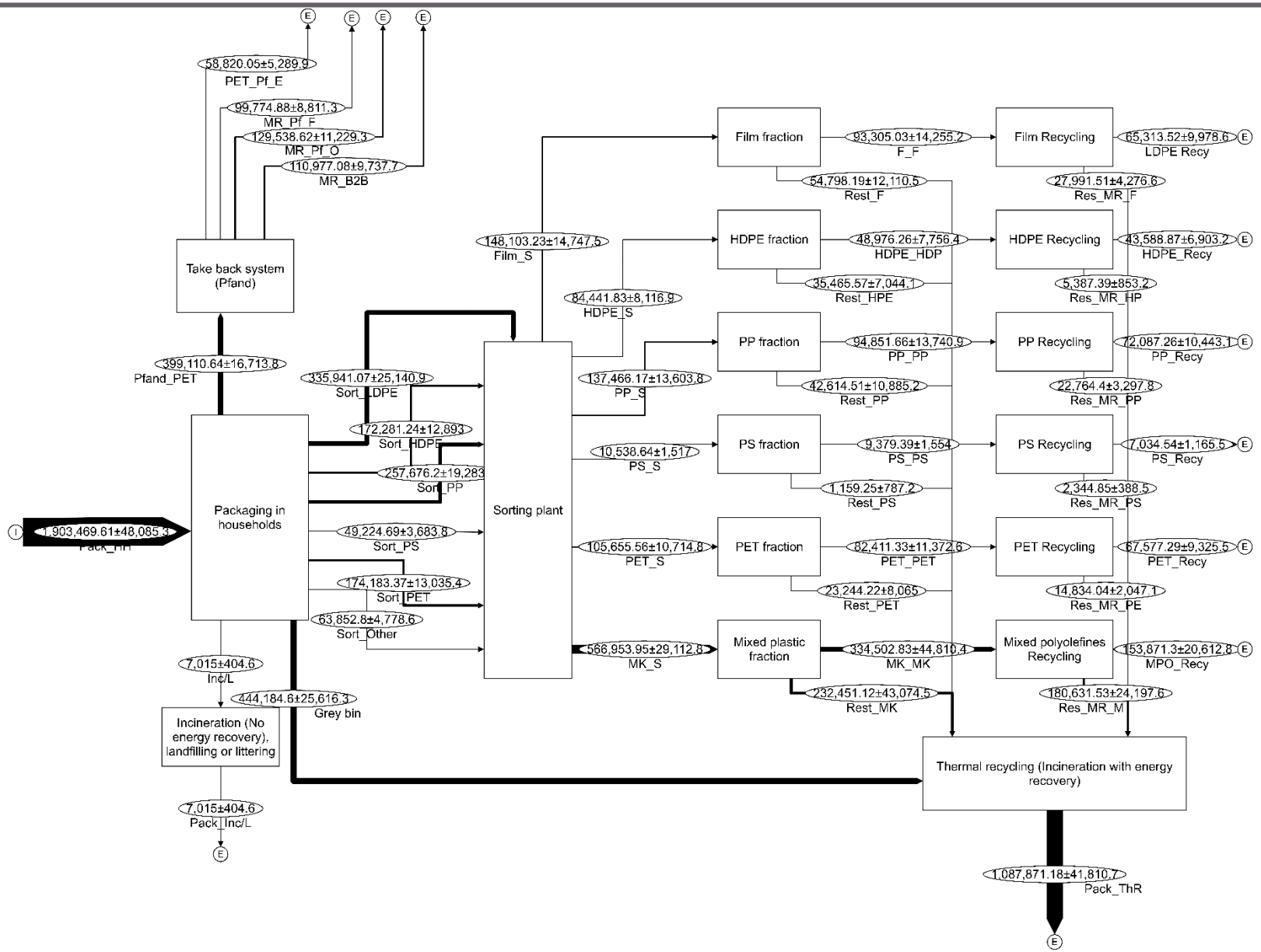
Comparison between PC material from different sources and virgin material

- Polymer structure
- Contaminants
- Mechanical performance and ageing

Key results

Material flows - overview



Material flows – key results

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Hamburg University of Technology

Separate collection efficiency

Packaging in households [t]	1.903.470 ± 2,5%
Separately collected [t]	1.452.270 ± 2,8%

Packaging design

Input in sorting facility		Output fraction	
LDPE	335.941	148.103	Film
HDPE	172.281	84.442	HDPE
PP	257.676	137.466	PP
PS	49.225	10.539	PS
PET	174.183	105.656	PET
Other polymers	63.853	566.954	MK

Material flows – key results

TUHH
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Separate collection efficiency

Packaging in households [t]	1.903.470 ± 2,5%
Separately collected [t]	1.452.270 ± 2,8%

Sorting efficiency

	FILM		PE-HD		PP		PS		PET		MPO	
	Average	Uncertainty	Average	Uncertainty	Average	Uncertainty	Average	Uncertainty	Average	Uncertainty	Average	Uncertainty
Material in sorting plant [t]	148.103	14747	84.442	8117	137.466	13604	10.539	1517	105.656	10715	566.954	29113
Target material in bale	**63%**	11%	**58%**	11%	**69%**	12%	**89%**	20%	**78%**	13%	**59%**	8%
Contamination in bale	37%	9%	42%	4%	31%	8%	11%	8%	22%	8%	41%	8%

Material performances – contamination

Full adaptability of recyclate from PC plastics to new products, with respect to consumer´s health and workers safety.

- Inorganic contaminants (titanium dioxide, metal oxides, etc.)
- Organic contaminants, originating from high processing temperatures.

Conclusions

- Evaluation of the PC plastic packaging performed in quantitative and qualitative terms.
- Material flow analysis assembles the whole plastic packaging value chain and reporting uncertainties should become best practice.
- Long way to achieving full circularity of the plastic packaging and responsibility is shared among all stakeholders involved.
- Ability of the PC material to fully substitute virgin one has to be still thoroughly assessed in all its aspects.
- Bright horizon: a common perspective is key to circularity.

Thank you for your attention

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