

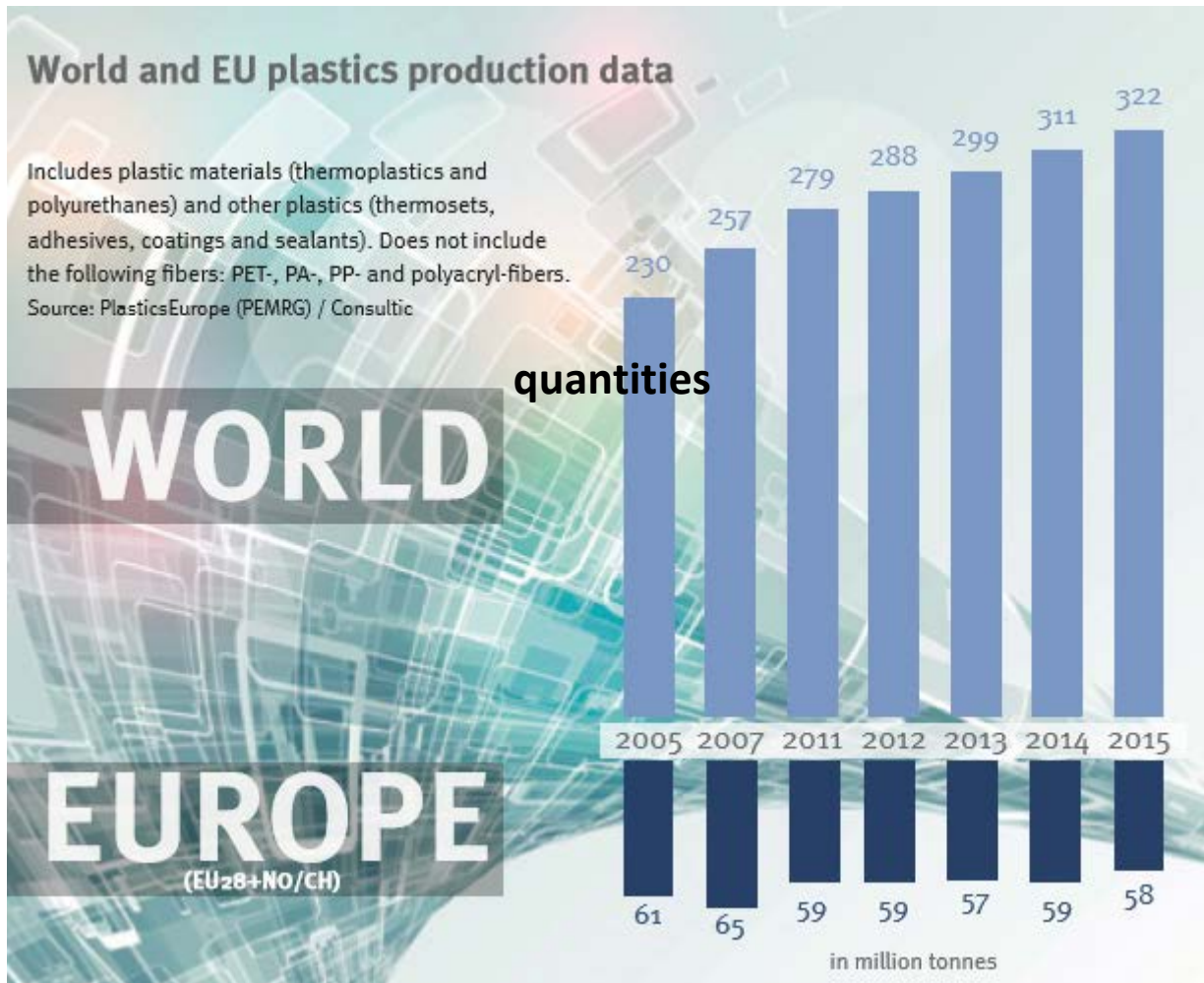
What are mixed plastics? Recycling potentials, quantities, qualities

Jean-Marc van Maren

Amsterdam, March 29, 2017



What is the volume plastics of virgin plastics?

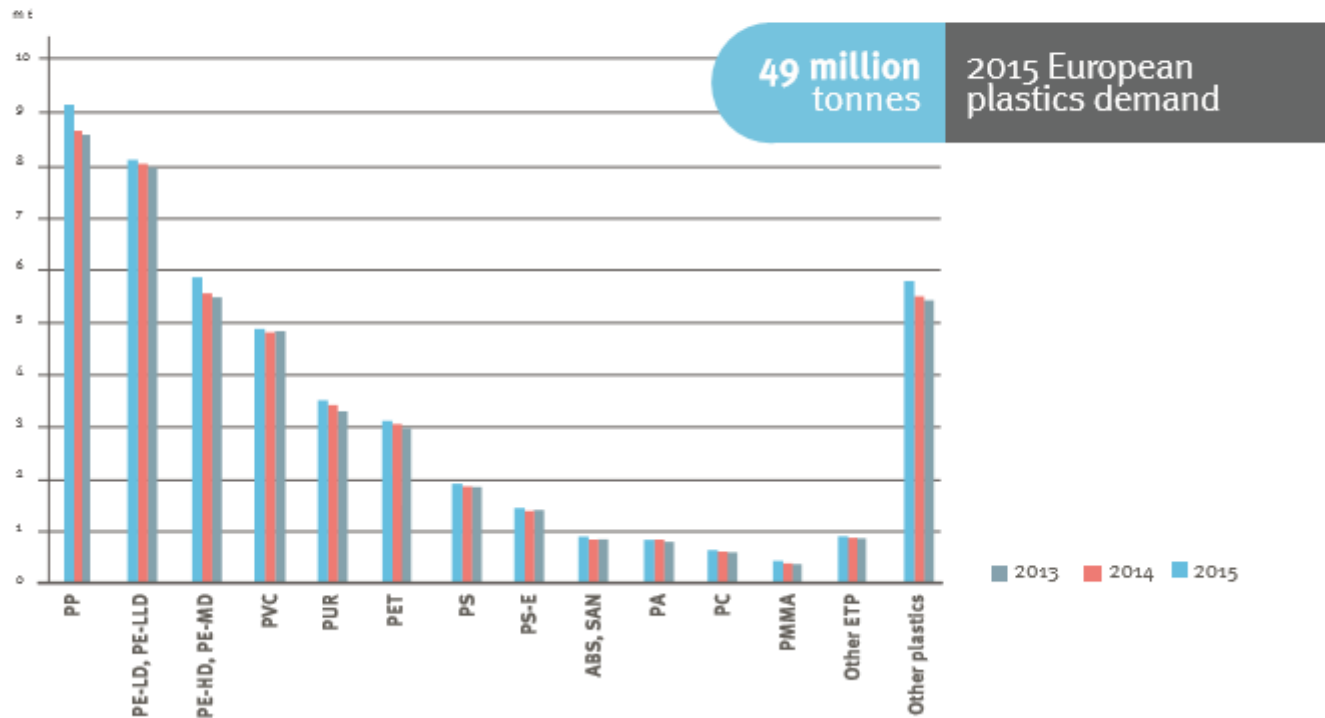


What are the types of plastics?

Plastic materials EU demand per polymer

European plastics demand includes plastic materials (thermoplastics and polyurethanes) and other plastics (thermosets, adhesives, coatings and sealants). Does not include the following fibers: PET-, PA-, PP- and polyacryl-fibers.

Source: PlasticsEurope (PEMRG) / Consultic / myCeppi

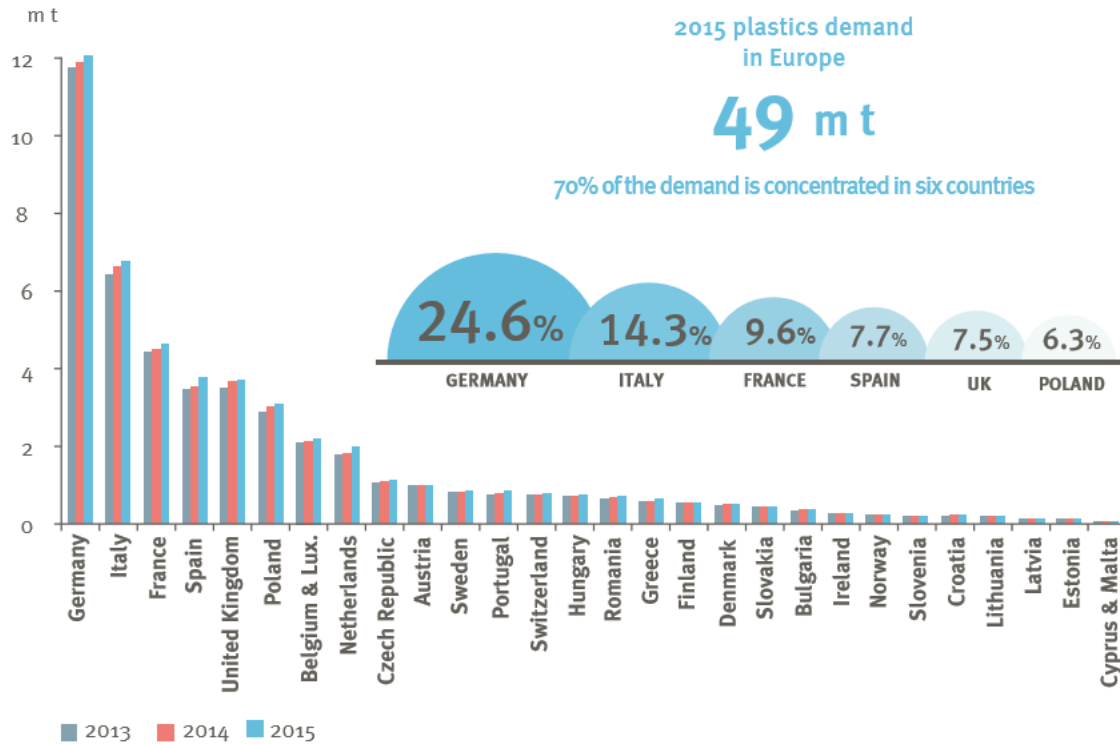


Who are the large users of plastics

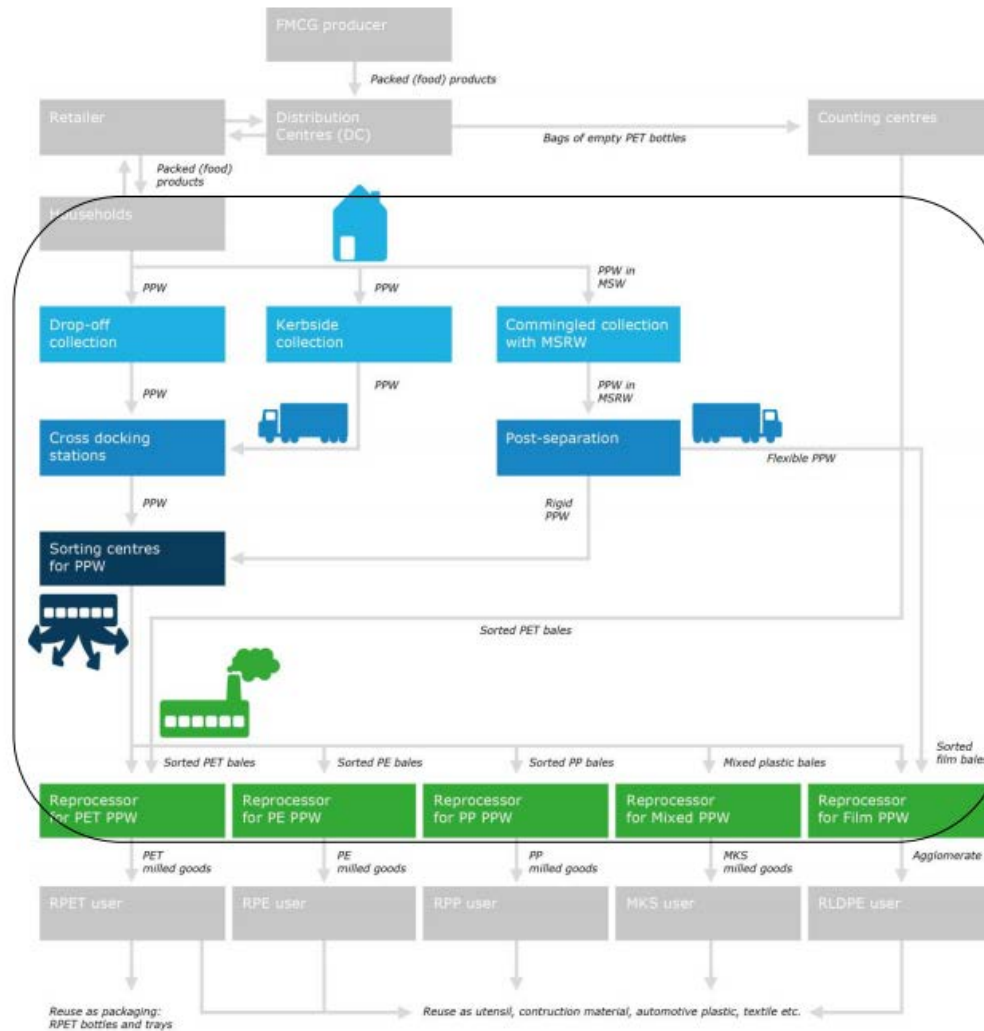
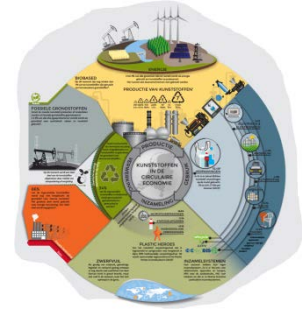
Plastic materials EU demand per country

European plastic demand includes plastic materials (thermoplastics and polyurethanes) and other plastics (thermosets, adhesives, coatings and sealants). Does not include the following fibers: PET-, PA-, PP- and polyacryl-fibers.

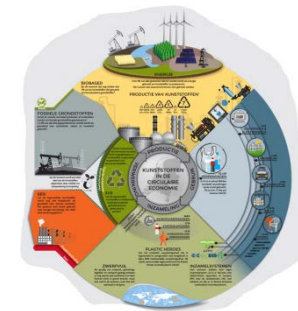
Source: PlasticsEurope (PEMRG) / Consultic / myCeppi



Collection and sorting systems in the Netherlands



Recycling potentials, quantities, qualities in the Netherlands



Product type / material type	PET	PE	PP	PVC	PS	Total
Bottles	3.26%	1.29%	0.02%		0.02%	4.59%
Flasks	1.73%	3.65%	0.62%	0.09%		6.09%
Rigids	6.29%	0.86%	7.48%	0.38%	1.20%	16.21%
Flexibles	0.07%	36.01%	4.41%	0.11%	0.04%	40.64%
Laminated flexibles	0.26%	2.53%	1.21%	0.00%		4.00%
Non-packaging plastics	1.47%	5.29%	5.01%	1.84%	1.00%	14.61%
Undesired plastic packaging*		0.03%	0.01%	0.09%	0.60%	0.73%
Residual plastics**						13.14%
Total	13.08%	49.65%	18.75%	2.51%	2.87%	100.00%

The objects were first sorted by NIR and secondly manually. The percentages have been calculated from weights of the sorted fractions including attached moisture and dirt.

** Residual plastics are mostly: black coloured packages and a small amount of PC, PLA objects.

* Undesired plastics are: kit-tubes (PE), chewing gum and drug strips (PP, PVC) and expanded PS objects.

Recycling potentials, quantities, qualities in the Netherlands

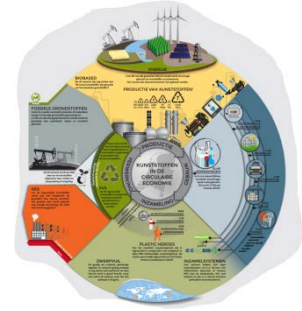
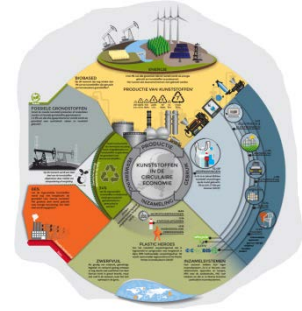


Table 11: Sorting division of post-consumer plastic packaging waste up to 2014 and estimated for 2015, recovered masses % (w gross/ w gross) (Thoden van Velzen 2014).

Product	2014	2015
PET, DKR 328-1	6-8%	7%
PE, DKR 329	6-9%	8%
PP, DKR 324	6-8%	10%
Film, DKR 310	14-17%	21%
Mix, DKR 350	38-41%	39%
Metals	0-1%	-
Sorting residues	23-26%	15%

Estimating the Dutch quantities



NETHERLANDS		2016 Plastic recycling		258.000	NETHERLANDS		2025 Plastic recycling		500.000
Type	Quality			258.000 tons	Type	Quality			500.000 tons
PET	328-1	7%		18.060	PET	328-1	7%		35.000
PE	329	8%		20.640	PE	329	8%		40.000
PP	324	10%		25.800	PP	324	10%		50.000
F310	310	21%		54.180	F310	310	21%		105.000
MK350	350	39%		100.620	MK350	350	39%		195.000
Metals	340	-			Metals	340	-		
Sorting residu		15%		38.700	Sorting residu		15%		75.000
	total	100%		258.000		total	100%		500.000

Estimations input volume based on RETHINK information brochure made by PlasticsEurope and NRK

What are the quantities today in Europe?

Plastics waste treatment in EU28+2

In 2014, 25.8 million tonnes of post-consumer plastics waste ended up in the official waste streams. 69.2% was recovered through recycling and energy recovery processes while 30.8% still went to landfill.

Within the different plastic applications, plastic packaging reached the highest recycling rate with 39.5%* and represented more than 80% of the total recycled quantities.

Source: Consultic

Recycling

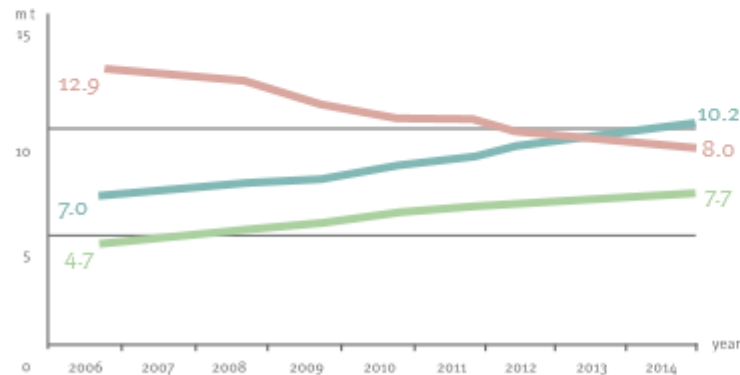
29.7%

Energy recovery 39.5%

Landfill

30.8%

2006-2014 waste treatment evolution:



+ 64 %

Recycling

+ 46 %

Energy recovery

- 38 %

Landfill

The annual average of post-consumer plastics waste generation from 2006 to 2014 is 25 million tonnes

*Based on in-put quantities into recycling facilities.

Estimations about the European quantities applying German/Dutch specifications

EUROPE	2016	Plastic recycling	7.700.000
EU28+2			
Type	Quality	7.700.000 tons	
PET	328-1	7%	539.000
PE	329	8%	616.000
PP	324	10%	770.000
F310	310	21%	1.617.000
MK350	350	39%	3.003.000
Metals	340	-	
Sorting residu		15%	1.155.000
	total	100%	7.700.000

EUROPE	2025	Plastic recycling	15.000.000
EU28+2			
Type	Quality	15.000.000 tons	
PET	328-1	7%	1.050.000
PE	329	8%	1.200.000
PP	324	10%	1.500.000
F310	310	21%	3.150.000
MK350	350	39%	5.850.000
Metals	340	-	
Sorting residu		15%	2.250.000
	total	100%	15.000.000

Estimations about the mixed plastics European quantities applying German/Dutch specifications

EUROPE		2016	MK350	3.003.000
EU28+2				
Type	Quality	3.003.000 tons		
PET	MPET	19%		570.570
PE	329	8%		240.240
PP	324	10%		300.300
F310	310	15%		450.450
MK350	350	18%		540.540
Metals	340			
Sorting residu		30%		900.900
	total	100%		3.003.000

EUROPE		2025	MK350	5.850.000
EU28+2				
Type	Quality	5.850.000 tons		
PET	MPET	19%		1.111.500
PE	329	8%		468.000
PP	324	10%		585.000
F310	310	15%		877.500
MK350	350	18%		1.053.000
Metals	340			
Sorting residu		30%		1.755.000
	total	100%		5.850.000



Mixed plastics is most significant volume and urgently requires european coordination with harmonized regulations on waste collection and sorting specifications including transparent calculation methodology for recycling.