Plasteax

Plasteax methodology

Overview of data sources and Plasteax modelling approach.

Model version 2.0 | 2023

This presentation is extracted from a series of methodological presentations that you can request by contacting us at contact@plasteax.earth.

GUIDING LINE

- What is Plasteax?
- Plasteax coverage and granularity
- Basic principles
- Data sources
- Modelling results
- Definitions

METHODOLOGY

The Plasteax methodology is built upon the ‘United Nations Environment Programme (2020) – National guidance for plastic pollution hotspotting and shaping action – Introduction report’ authored by Boucher J., M. Zgola, et al., published by the United Nations Environment Programme.

Using a top-down approach that leverages verified data sources for calculations and a bottom-up approach that incorporates information from peer-reviewed studies and field measurements, Plasteax is capable of generating specific data.

The Plasteax waste assessment methodology is in a state of continuous evolution. The team ensures the incorporation of the latest data and insights to continuously update the methodology.

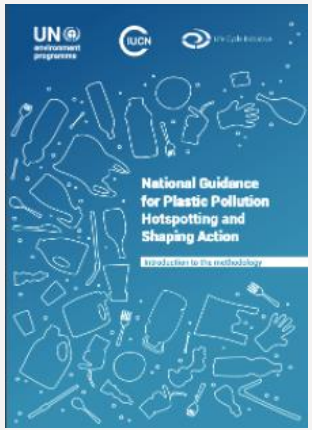
IUCN

UN environment programme

Life Cycle Initiative

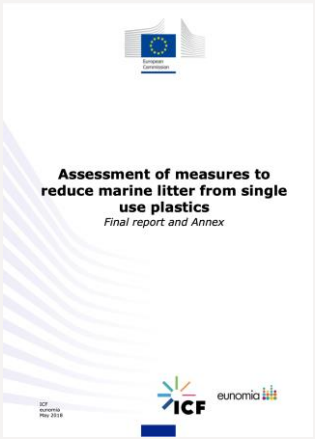
THE MODELLING, THE BASIS

IUCN/UNEP methodology for the general modelling

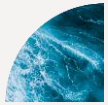


Plastic Leak project for the release rate

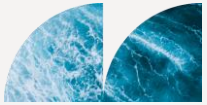
ICF, Eunomia for the littering



PLASTEAX DATASET: THE DIFFERENTIATORS

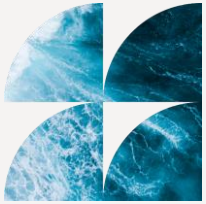


State of the art methodology and best available datasets



Fully mass balanced approach combining top-down modelling and bottom-up data collection allowing for a good level a redundancy and validation

Approach allowing full consistency of the datasets within a country and across countries



Data is provided with full support for their usage through the Plastic Footprint Network

Plasteax

A SERVICE PROVIDED BY EA – EARTH ACTION

EA - Earth Action is a mission-driven research consultancy. In addition to supporting organizations through a broad service offering, EA regularly works to identify and address critical sustainability knowledge gaps, developing the data and applying insights to create research trusted by scientists and actionable by all.

EA is particularly recognized for expertise and leadership in the field of plastic pollution, contributing novel research, perspectives, frameworks, and methodologies to help global organizations address the issue within their own realm and beyond.

Learn more

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PLASTEAX WASTE MANAGEMENT DATA

Plasteax database provides a comprehensive snapshot of the plastic situation, offering specific information on **various indicators** such as :

- Managed Waste (including incineration and sanitary landfill)
- Recycling
- Mismanaged Waste (including uncollected, dumped and littered)
- Leakage (direct) into ocean and waterways

Plasteax data offers highly specific data that can be tailored to individual countries, polymer types, applications, or any combination of these factors for different **scopes**:

- Sectors (Packaging, Textile)
- Polymer
- Category

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Plasteax

FROM PRIMARY MATERIAL TO WASTE

Import

In primary form or products

Production

In primary form or products

Export

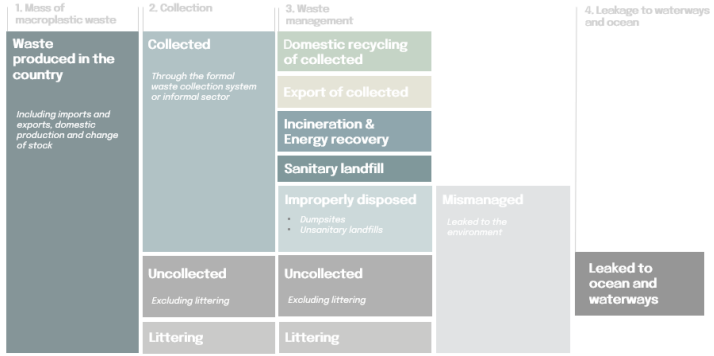
In primary form or products

Net input

Change in stock

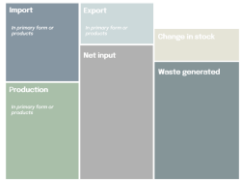
Waste generated

Production + (Import – Export) = Net Input



Plasteax

WASTE TO LEAKAGE



1. Mass of macroplastic waste

Waste produced in the country

Including imports and exports, domestic production and change of stock

2. Collection

Collected

Through the formal waste collection system or informal sector

Uncollected

Excluding littering

Littering

3. Waste management

Domestic recycling of collected

Export of collected

Incineration & Energy recovery

Sanitary landfill

Improperly disposed

- *Dumpsites*
- *Unsanitary landfills*

Uncollected

Excluding littering

Littering

Mismanaged

Leaked to the environment

4. Leakage to waterways and ocean

Leaked to ocean and waterways

MODELLING PHASES

Phase A consists in computing the **amount of waste generation** in the country, by sector and by polymer.

This is done by computing the net input by polymer (i.e. plastic consumption) in the year of interest using import, export and production of plastic by polymer.

Phase B consists in using information of municipal solid waste management to determine the **fate of plastic from the consumer packaging sector.**

Phase C determines waste generation and **waste management for the packaging sector by polymer & category**.

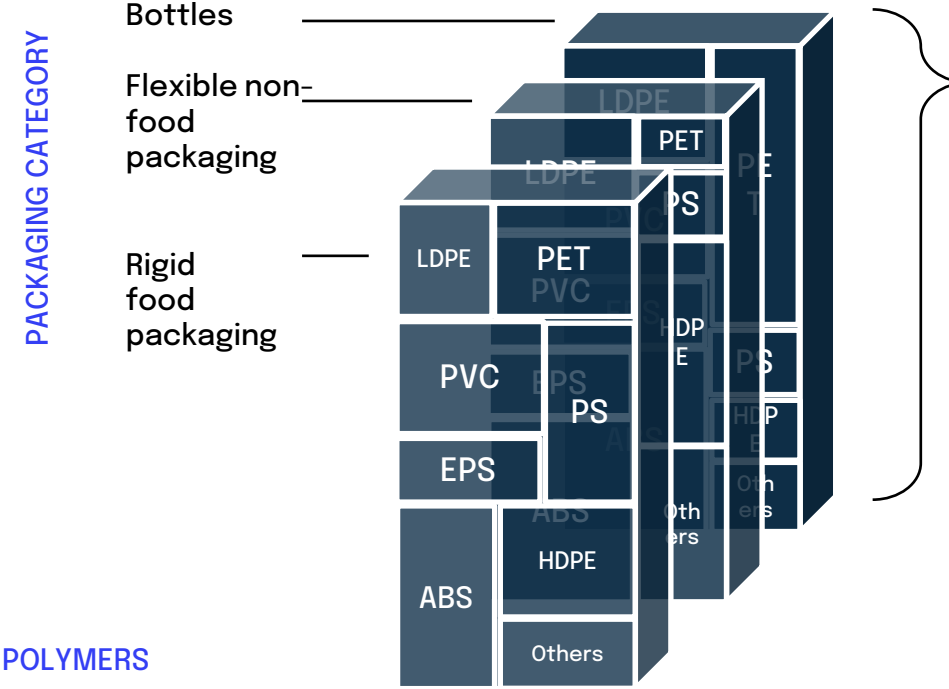
Phase D, analyses the **trade of waste**, giving insights on both import and exports, by polymer, sector and packaging category

Phase E, computes the **recycling** by sector and packaging polymer & category, starting from input on recycling capacity by polymer.

Learn more

For further insights and a better understanding of the modeling phases, feel free to reach out to our technical team at contact@plasteax.earth

BEHIND THE SCENE – THE COMPLEXITY



POLYMERS

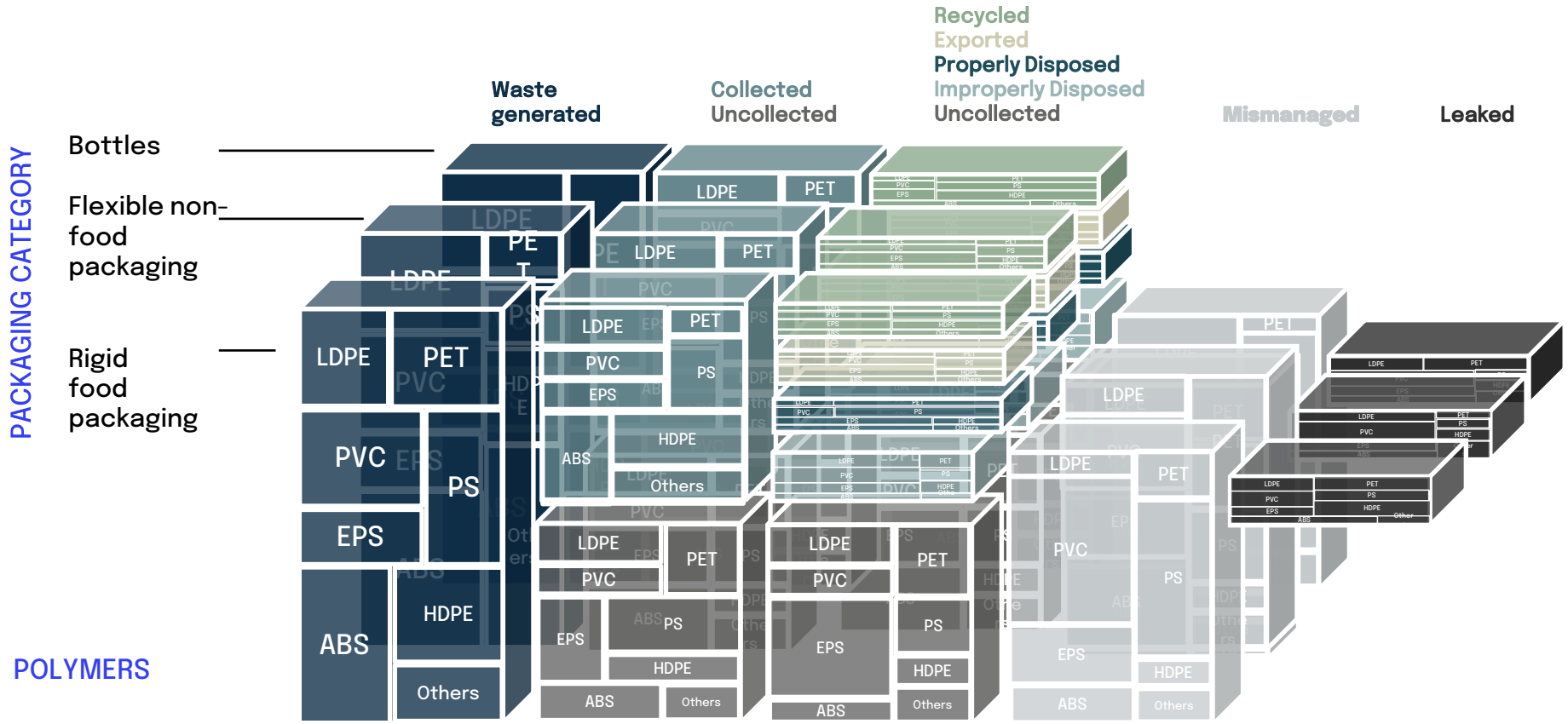
The PLASTEAX's approach is MULTI - dimensional

For each category the various polymers are differentiated.

This split by polymer and category is available at each level of the waste diagram

For more info:
www.plasticfootprint.earth

ATTENTION: These are NOT real information, the boxes are designed for explanatory purposes only



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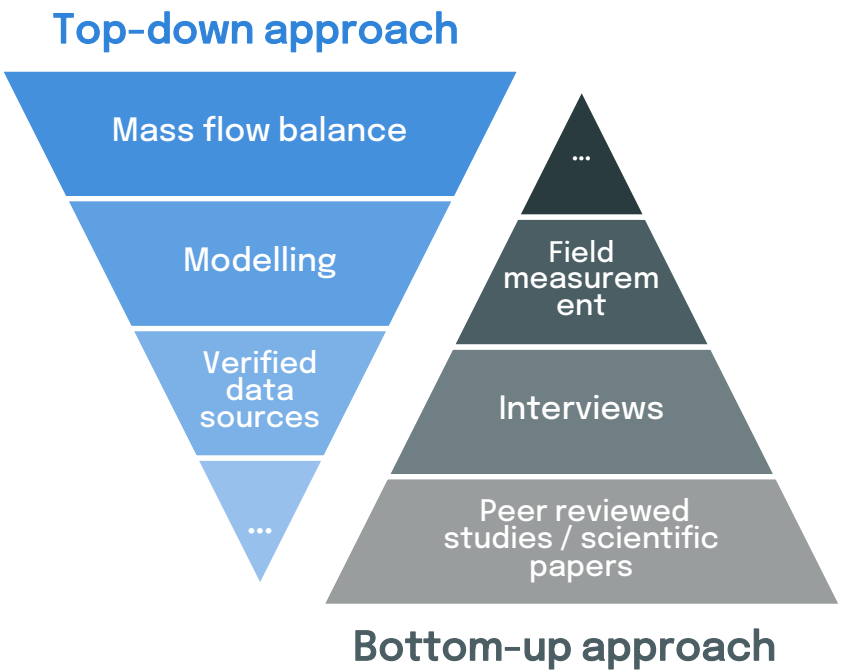
APPROACH TO DATA HARMONIZATION



Stress test for data harmonization

We review other available data sources and ensure that every potential difference with other databases can be explained.

1. If the discrepancy is due to **different definitions**, we harmonize the definition and redo the comparison.
2. If the discrepancy is due to **data quality issues such as temporality or geography**, we apply the data score evaluation system.
3. If the discrepancy is due to **uncertainty in the model inputs**, we conduct a second literature review focusing on the upstream part of the modelling and apply the adjusted input data to re-run the model.
4. **Review local stakeholders** such as local recyclers, waste management companies, or experts with relevant insights or field measurements.

Transparency is ensured: all sources are disclosed with the users.

Additional documentation for the methodology and data usage guidelines are available on our website https://www.plasteax.earth

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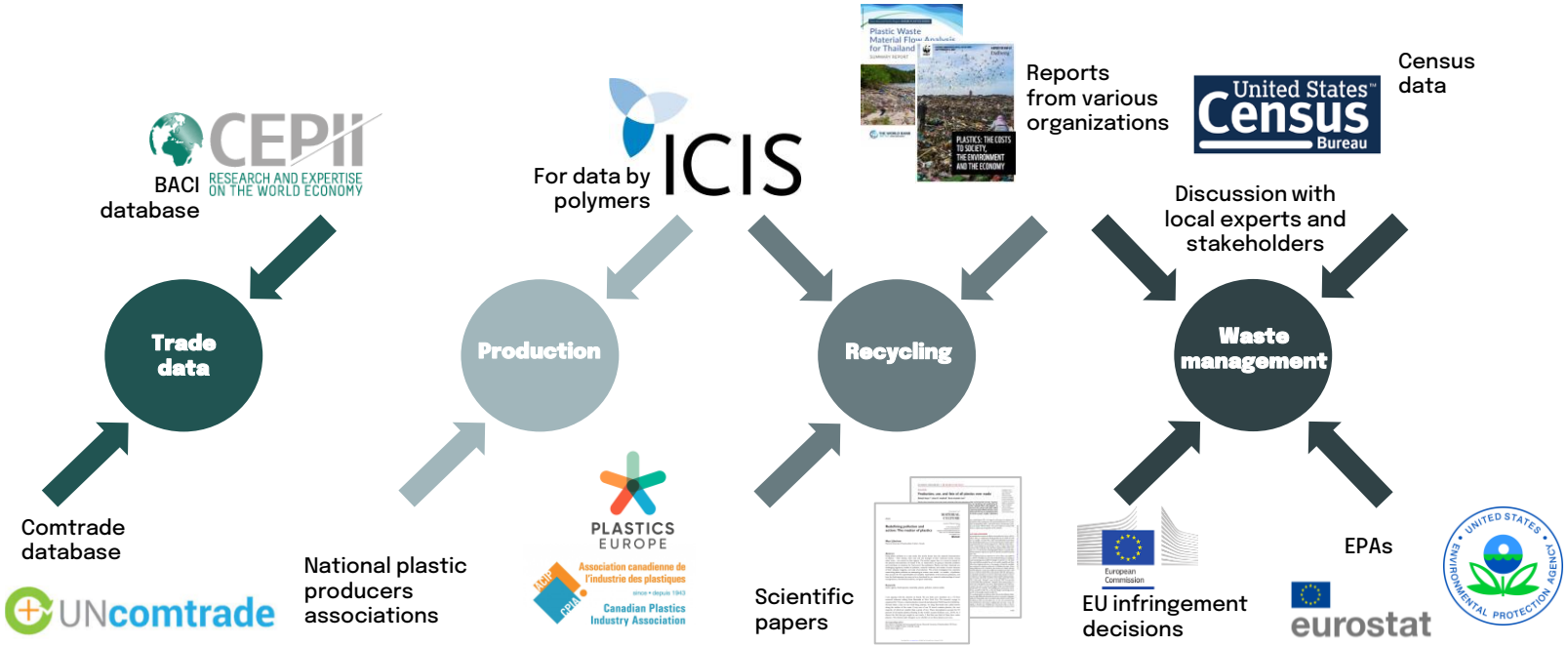
DATA SOURCES



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MODELLING RESULTS

Country	France

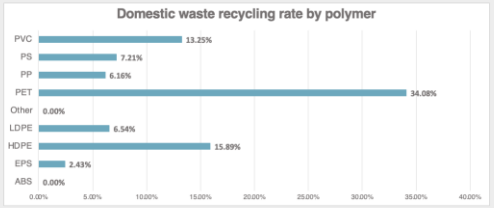
Row Labels	Waste produced in the country (kt)	Domestic recycling of collected	Waste export	Incineration & Energy recovery	Sanitary landfill	Improperly disposed	Littering	Uncollected (excl. Littering)	Collected	Mismanaged (incl. Littering)	Leaked to Ocean and Waterways
All polymers	2010.07	15.52%	12.30%	47.24%	21.07%	0.00%	3.87%	0.00%	96.13%	**3.87%**	0.39%

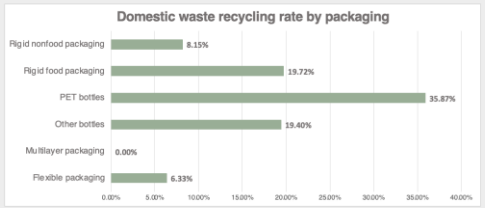
Row Labels	Waste produced in the country (kt)	Recycling	Waste export	Incineration & Energy recovery	Sanitary landfill	Improperly disposed	Littering	Uncollected (excl. Littering)	Collected	Mismanaged (incl. Littering)	Leaked to Ocean and Waterways
ABS	0.845	0.00%	14.56%	58.74%	26.20%	0.00%	0.50%	0.00%	99.50%	**0.50%**	0.05%
EPS	30.807	2.43%	14.21%	56.81%	25.34%	0.00%	1.22%	0.00%	98.78%	**1.22%**	0.12%
HDPE	299.595	15.89%	12.25%	47.68%	21.26%	0.00%	2.92%	0.00%	97.08%	**2.92%**	0.29%
LDPE	549.268	6.54%	13.61%	52.72%	23.51%	0.00%	3.63%	0.00%	96.37%	**3.63%**	0.37%
Other	31.469	0.00%	14.56%	56.76%	25.31%	0.00%	3.36%	0.00%	96.64%	**3.36%**	0.34%
PET	565.165	34.08%	9.60%	35.22%	15.71%	0.00%	5.40%	0.00%	94.60%	**5.40%**	0.52%
PP	408.547	6.16%	13.66%	53.10%	23.68%	0.00%	3.39%	0.00%	96.61%	**3.39%**	0.35%
PS	108.865	7.21%	13.51%	52.93%	23.61%	0.00%	2.74%	0.00%	97.26%	**2.74%**	0.26%
PVC	15.509	13.25%	12.63%	49.65%	22.14%	0.00%	2.34%	0.00%	97.66%	**2.34%**	0.23%

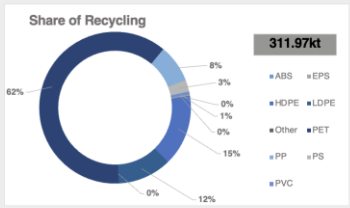
Row Labels	Waste produced in the country (kt)	Domestic recycling of collected	Export of collected	Incineration & Energy recovery	Sanitary landfill	Improperly disposed	Littering	Uncollected (excl. Littering)	Collected	Mismanaged (incl. Littering)	Leaked to Ocean and Waterways
Flexible packaging	661.895	6.33%	13.64%	52.52%	23.42%	0.00%	4.09%	0.00%	95.91%	**4.09%**	0.39%
Multilayer packaging	73.979	0.00%	14.56%	54.84%	24.45%	0.00%	6.15%	0.00%	93.85%	**6.15%**	0.95%
Other bottles	170.468	19.40%	11.74%	46.97%	20.95%	0.00%	0.94%	0.00%	99.06%	**0.94%**	0.09%
PET bottles	388.551	35.87%	9.34%	33.74%	15.05%	0.00%	6.00%	0.00%	94.00%	**6.00%**	0.58%
Rigid food packaging	340.061	19.72%	11.69%	43.99%	19.62%	0.00%	4.98%	0.00%	95.02%	**4.98%**	0.48%
Rigid nonfood packagi	375.116	8.15%	13.38%	53.47%	23.84%	0.00%	1.16%	0.00%	98.84%	**1.16%**	0.11%

VIZUALIZING THE RESULTS

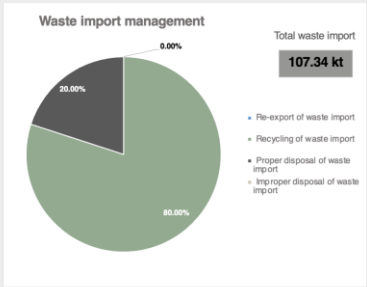
Domestic waste recycling

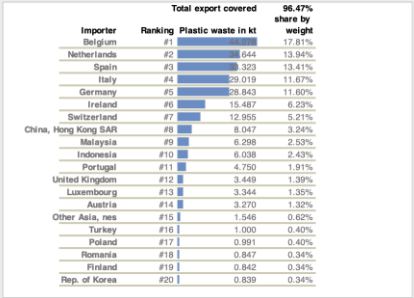






Waste import and export





Importer	Ranking	Total export covered Plastic waste in kt	96.47% share by weight
Belgium	#1	44.277	17.81%
Netherlands	#2	34.644	13.94%
Spain	#3	33.323	13.41%
Italy	#4	29.019	11.67%
Germany	#5	28.843	11.60%
Ireland	#6	15.487	6.23%
Switzerland	#7	12.955	5.21%
China, Hong Kong SAR	#8	8.047	3.24%
Malaysia	#9	6.298	2.53%
Indonesia	#10	6.038	2.43%
Portugal	#11	4.750	1.91%
United Kingdom	#12	3.449	1.39%
Luxembourg	#13	3.344	1.35%
Austria	#14	3.270	1.32%
Other Asia, nes	#15	1.546	0.62%
Turkey	#16	1.000	0.40%
Poland	#17	0.991	0.40%
Romania	#18	0.847	0.34%
Finland	#19	0.842	0.34%
Rep. of Korea	#20	0.839	0.34%

VIZUALIZING THE RESULTS

Domestic waste management overview

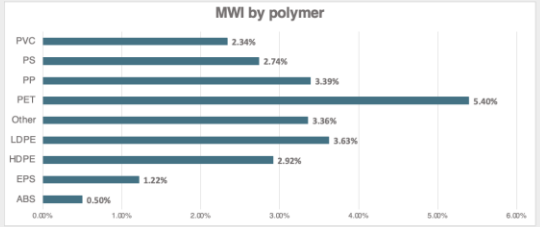
Mismanaged Waste Index (MWI) by packaging category x polymer

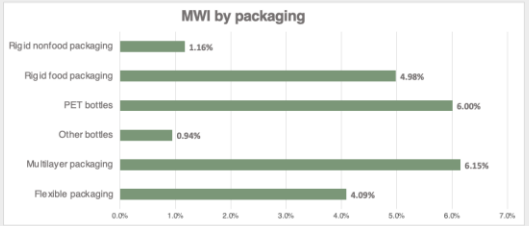
Mismanaged Waste Index (MWI) for all polymer, all packaging

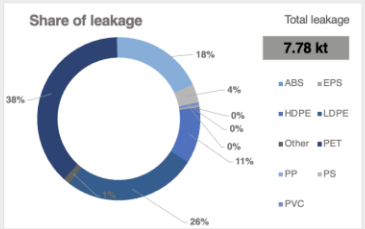
3.87%

Sum of Mismanaged (incl. Littering)	Column Labels								
Row Labels	ABS	EPS	HDPE	LDPE	Other	PET	PP	PS	PVC
Flexible packaging			4.82%	3.51%	4.09%	4.19%	6.15%		5.51%
Multilayer packaging			6.15%	6.15%	6.15%		6.15%		6.15%
Other bottles			0.50%	0.50%	0.94%	0.50%	3.25%		0.50%
PET bottles						6.00%			
Rigid food packaging		4.98%	4.98%	4.98%	4.98%	4.98%	4.98%		4.98%
Rigid nonfood packaging	0.50%	0.50%	0.50%	0.50%	1.16%		0.50%	2.74%	0.50%

Mismanagement and leakage







DATA SOURCES AND QUALITY SCORE

Country	Input Data	Data Source "Author (Year). Title"	Reliability	Temporal correlation	Geographical correlation	Granularity	Avg Score	Quality Score
Argentina	Collection	*The World Bank (2015). Diagnóstico de la Gestión Integral de Residuos Sólidos Urbanos en la Argentina; Elliott et al. (2018). Assessment of measures to reduce*	2	2	3	1	2	**B**
Argentina	Waste management	*IDB (2010). Regional evaluation on urban solid waste management in latin*	1	1	1	1	1	**A**
Argentina	Recycling	*ICIS (2021). Data on worldwide plastic production.*	2	1	1	1	1.25	**A**
Argentina	Primary production	*ICIS (2021). Data on worldwide plastic production.*	1	1	1	1	1	**A**
Argentina	Trade import/export	*Gaulier, G., & Zignago, S. (2010). Baci: international trade database at the product-level (the 1994-2007 version).*	2	1	1	2	1.5	**B**
Australia	Trade import/export	*Gaulier, G., & Zignago, S. (2010). Baci: international trade database at the product-level (the 1994-2007 version)*	2	1	1	2	1.5	**B**
Australia	Primary production	*ICIS (2021). Data on worldwide plastic production.*	1	1	1	1	1	**A**
Australia	Recycling	*ICIS (2021). Data on worldwide plastic production; Blue environment (2020). National Waste Report 2020 - prepared for Department of Agriculture, Water and the Environment*	1	1	1	1	1	**A**
Australia	Collection	*Blue environment (2020). National Waste Report 2020 - prepared for Department of Agriculture, Water and the Environment*	1	1	1	2	1.25	**A**
Australia	Waste management	*Blue environment (2020). National Waste Report 2020 - prepared for Department of Agriculture, Water and the Environment*	1	1	1	2	1.25	**A**
Austria	Trade import/export	*Gaulier, G., & Zignago, S. (2010). Baci: international trade database at the product-level (the 1994-2007 version).*	2	1	1	2	1.5	**B**
Austria	Primary production	*ICIS (2021). Data on worldwide plastic production.*	2	1	1	1	1.25	**A**
Austria	Recycling	*ICIS (2021). Data on worldwide plastic production.; Eunomia (2020). PET market*	2	1	1	1	1.25	**A**
Austria	Collection	*Eurostat (extracted Oct. 2021) waste generation and treatment database; Elliott et al. (2018). Assessment of measures to reduce marine litter from single use*	3	1	2	2	2	**B**
Austria	Waste management	*Eurostat (extracted Oct. 2021) waste generation and treatment database.*	3	1	1	2	1.75	**B**

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DEFINITIONS

ADDED STOCK

Plastic put on the market on a given year that is not becoming waste within the same year. This part of the plastic input is considered as plastic stock for the given year as it will become waste in another year (e.g. plastic used in construction or automotive). Similarly, though, there will be plastic that was put on the market in previous year and that will become waste in the chosen year. The difference between these two quantities is the added stock.

EXPORT

Export of any plastic by the country, in any form, be it primary polymer, plastic product, or plastic embedded in a product (plastic share in cars or phones). It does not include export of plastic waste.

IMPORT

Import of any plastic in the country, in any form, be it primary polymer, plastic product, or plastic embedded in a product (plastic share in cars or phones). It does not include import of plastic waste.

DEFINITIONS

PRODUCTION

Polymer production either from primary virgin source or secondary source (recycled plastic from previous year). It does not include the manufacturing of final products in the country, as this would lead to double counting.

WASTE EXPORT

Plastic waste collected in the country and exported abroad. It does not include the re-export of imported waste.

WASTE GENERATED

Country domestic plastic waste generation computed as: Production + Import – Export – Added stock.

WASTE IMPORT

Import of plastic waste from other countries.

DEFINITIONS

Collected	Waste fraction that is not collected, either by the formal or the informal sector. It includes behavioural littering
Collection rate	Ratio between the plastic waste collected and generated. Waste Collected includes Waste export, Recycling, Properly disposed and Improperly disposed.
Uncollected	Waste fraction that is not collected, either by the formal or the informal sector. It includes behavioural littering.
Recycling	Domestic recycling of waste generated in the country. It does not include recycling of imported waste nor waste collected for recycling in the country that is exported abroad.
Properly disposed	Waste fraction that is disposed in a waste management system where no leakage is expected to occur, such as an incineration facility or a sanitary landfill. We define a sanitary landfill as a particular area where large quantities of waste are deliberately disposed in a controlled manner (e.g. waste being covered on a daily basis, as well as the bottom of the landfill designed in a way to prevent waste from leaching out).
Sanitary landfill	The sanitary landfill is a method of disposing waste on land without disturbing the environment and public health
Incineration & Energy recovery	Incineration with energy recovery refers to incineration processes where the energy created in the combustion process is harnessed for re-use, for example for power generation. Incineration without energy recovery means the heat generated by combustion is dissipated in the environment.
Improperly disposed	Waste fraction that is disposed in a waste management system where leakage is expected to occur, such as a dumpsite or an unsanitary landfill. A dumpsite is a particular area where large quantities of waste are deliberately disposed in an uncontrolled manner and can be the result of both the formal and informal sectors. A landfill is considered as unsanitary when waste management quality standards are not met, thus entailing a potential for leakage.
Mismanaged	It is defined as the sum of uncollected and improperly managed waste.
Mismanaged Waste Index (MWI)	It is defined as the sum of uncollected and improperly managed waste, divided by the waste generated.
Leakage	Plastic that is released to rivers, lakes and oceans.

DEFINITIONS – POLYMERS

HDPE
High-density polyethylene (e.g., milk containers, shampoo bottles).

LDPE
Low-density polyethylene (e.g., bags, container lids).

PET
Polyethylene terephthalate (e.g., bottles, food wrapping).

POLYESTER
In this study Polyester includes polyester fibres, polyester films and polyester engineered resins.

PP
Polypropylene (e.g., hot food containers, sanitary pad liners).

PS
Polystyrene (e.g., food containers, disposable cups).

EPS
Expanded polystyrene (e.g., food containers, cushioning).

PVC
Polyvinyl chloride (e.g., construction pipes, toys, detergent bottles).

Synthetic Rubber
Used to manufacture tyres.

ABS
Acrylonitrile butadiene styrene (used for rigid non-food packaging)

Other
Any other type of plastic.

DEFINITIONS – APPLICATIONS

Plasteax provides information for a selected numbers of applications. A wide range of application ca be developed on demand.

BOTTLES
Containers used for storing liquids made out of different polymers and might include all applications (technical, cosmetics, etc.)

PET POTTLES
Containers for drinking purposes made of PET.

FLEXIBLE PACKAGING
All the packaging that is capable of bending easily without breaking.

RIGID FOOD PACKAGING
All the packaging that are unable to bend or be forced out of shape, food grade.

RIGID NON-FOOD PACKAGING
All the packaging that are unable to bend or be forced out of shape, not food grade.

MULTI-LAYER PACKAGING
All the packaging that contain several thermoplastic polymer layers to provide a combination of moisture-and oxygen-barrier, and mechanical properties.

TEXTILES
Textile fabrics containing various polymer types are considered.

HOUSEHOLD, LEISURE, SPORT
Objects containing various plastic polymers such as toys, sanitary towels, diapers, tooth brushes,

PLASTEA*X* is a data platform dedicated to plastic environmental analytics which discloses plastic waste management and plastic leakage metrics
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