Global Plastics Flow 2018

Partner

In cooperation with Global Plastics Alliance (GPA)

October 2019

Partner

(BKV GmbH) A company of the German plastics industry, which provides facts and figures about resource efficiency and circularity of plastics
www.bkv-gmbh.de

(EUROMAP) Association for plastics and rubber machinery manufacturers in Europe
www.euromap.org

(GKV) Umbrella organisation for plastics processors associations in Germany
www.gkv.de

(GPA) Collaboration among plastics industry associations and allied industry associations around the world with focus on marine litter solutions
www.marinelittersolutions.com

(IK) German association for plastics packaging and films
www.kunststoffverpackungen.de

(K Fair) International fair for the plastics and rubber industry in Düsseldorf, Germany
www.k-online.de

(VDMA) German association representing the mechanical engineering industry
www.vdma.org

Background and motivation of the survey

The global plastics industry is working toward a more circular economy for plastics. Ending plastic waste is an urgent priority, leading stakeholders to improve existing and invest in new waste management and recovery solutions, address illegal dumping, and to deploy advanced technologies to generate valuable new materials from waste.

There is currently a relative lack of publicly available information on global plastic waste generation and disposition (e.g., “waste flows”). Better information would help support stakeholder investment, and help guide decision making to focus on areas of greatest need. Because investments and other interventions are undertaken at a national and sub-national level, this pilot survey has been undertaken in consultation with national representative with knowledge concerning local waste generation, collection, recycling, energy recovery and disposal of plastics waste in individual countries.

This survey presents national level responses, and then uses that information to make general global predictions on plastic waste flows. While this information can have directional benefit, it has important limitations to this methodology. First, plastic “leakage” into the environment varies greatly from country to country, and even within different parts of each country. Furthermore, regulations, economics and priorities for waste management vary greatly. Finally, as this is thought to be a first global survey, it is expected that subsequent analysis and measured data will result in more reliable iterations.

The Global Plastics Alliance (GPA) is pleased to have contributed to this initial “Global Plastics Flow” survey, and it welcomes feedback to improve global and national understanding.

Survey introduction

This pilot survey with data from 44 countries provides insights in the overall global plastics flow with focus on plastics waste management and treatment.

The survey provides a first attempt to collect data from individual countries together with national representatives and additional assessments about the regional plastics waste situation including waste generation, collection and treatment.

This survey includes and reflects...

- …data availability in the individual countries,
- …identification of relevant organizations able to deliver and share data, and
- …critical data reflection including the identification of data gaps.

This survey is intended to provide a basis on which to conduct further, more detailed analyses that will ultimately better inform strategies to end plastic waste in the environment, including investments in recycling and recovery. This information should be considered a starting point which stakeholders are invited to supplement and build upon to create better informed strategies for improving waste management.

Data collection and cooperation

This survey and analysis was carried out with the Global Plastics Alliance (GPA) – a collaboration among global plastics industry associations – and this survey includes responses from associations representing plastic material suppliers and/or converters in the United States, Canada, Colombia, Japan, Indonesia, Philippines and South Africa. In some cases this information was further elucidated by data from value chain stakeholders and the institutions listed below. The initial results were compiled and summarized by Conversio Market & Strategy GmbH, and when possible were compared with secondary sources (as described below). Neither Conversio nor the other parties have independently validated the underlying data.

In an initial stage, the following drivers and targets were captured:

- Strong cooperation with sponsors and associations or members of the GPA
- Evaluation analysis of existing data from GPA members and country representatives
- Identification of data gaps and data inaccuracies
- Research and checking of existing reports from institutions, associations, environmental agencies, NGOs, etc. (e.g. World Bank, International Solid Waste Association ISWA, World Wide Fund for Nature WWF) on world, continental and country basis
- Additional contact with institutions, associations, environmental agencies, NGOs etc., where necessary
- First attempt of framing continental plastics waste projections

Further aspects

- Elaboration of a common data basis to set targets and to track and document progress in different countries and waste management sectors including the incorporation of plastics conversion and consumption data as far as available on a secondary basis.

Multi-methodological approach

A multi-methodological research and information gathering process was chosen for the survey Global Post-Consumer Plastics Flow.

Preliminary information based on the results from the “Plastics Industry Survey 2016” provided by the Global Plastics Alliance with complete survey responses from Turkey, the United States, Canada, Colombia, India, Japan, the Philippines, Thailand, Malaysia, South Africa and Ghana.
For EU28+2 countries, existing plastics flow analyses were used based on Conversio’s own databases and existing reports.

Additional information about plastics flow analyses were requested from the GPA country representatives for each participating country.

Additional secondary information was researched for each participating country as well as on a continental and world level.

Secondary information including

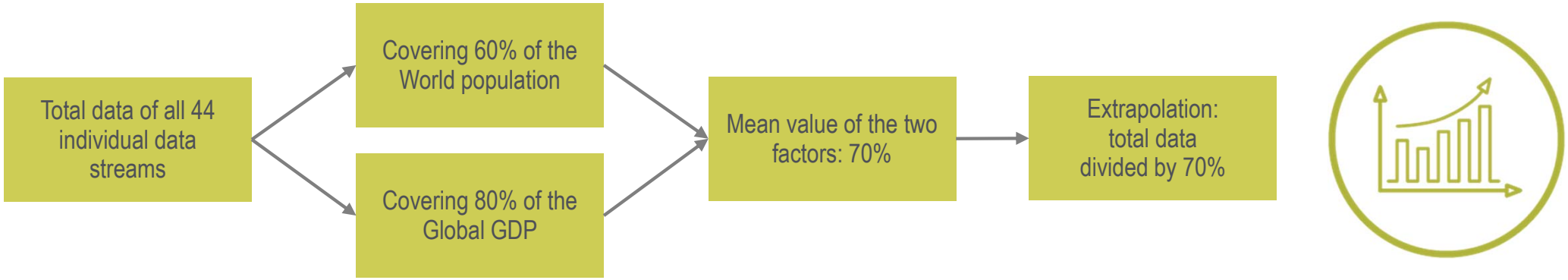
- Waste stream analyses on a country, continental and world level
- Data and statistics from stakeholders along the plastics value chain, environmental agencies and government authorities
- Reports from other consultancies and NGOs
- Analyses of peer-reviewed journals and reports
- Data and information from newspapers and information websites

Data extrapolation

The Global Post-Consumer Plastics Flow survey includes information about plastics from production to waste from 44 countries and regions, that altogether cover about 60% of the World population and around 80% of the Global GDP.

The accuracy for data extrapolation differs significantly among the different continents

- All extrapolations were realised using a correlation factor of population and GDP:



- For example, an extrapolation for Europe and Asia is more accurate, as data availability and robustness are better with a higher number of individual country data streams. For Latin America and Africa, data extrapolation accuracy is more limited as only a few country data streams were available. All continental extrapolations were subsequently slightly adjusted on the basis of secondary sources and a review by the project team and country representatives.
- The total data extrapolations for generated plastics waste on a world level (data extrapolation based on 44 individual data streams) and accumulated by continent (individual continental extrapolations) were satisfactory and almost identical.
- The overall extrapolation accuracy will improve as the number of individual data streams increases.

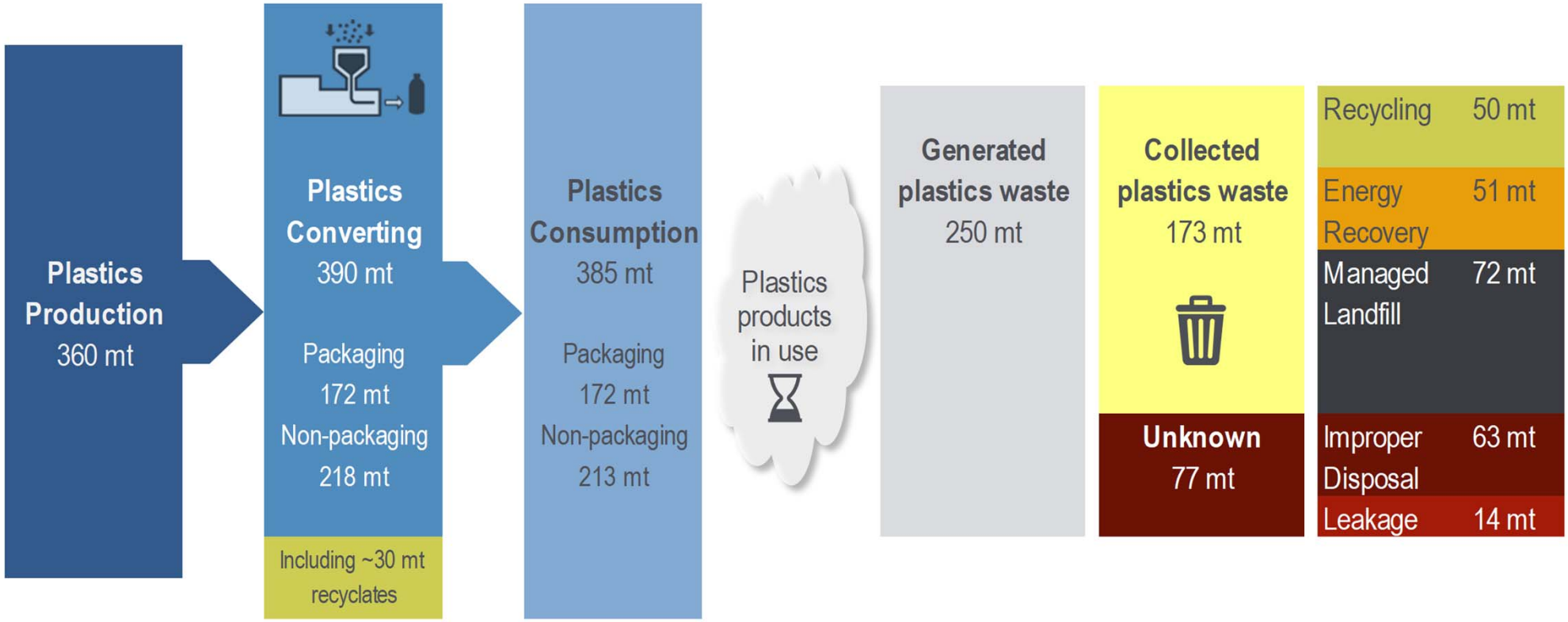
Analysed countries

EU28 countries + Norway and Switzerland
Turkey
United States
Canada
Brazil
Colombia

China
India
Japan
Indonesia
Philippines
Thailand
Malaysia
South Africa
Ghana

Preliminary results of the survey Global Plastics Flow 2018

Linear global plastics flow chart from plastics production to plastics waste 2018



Plastics flow from production to recycling

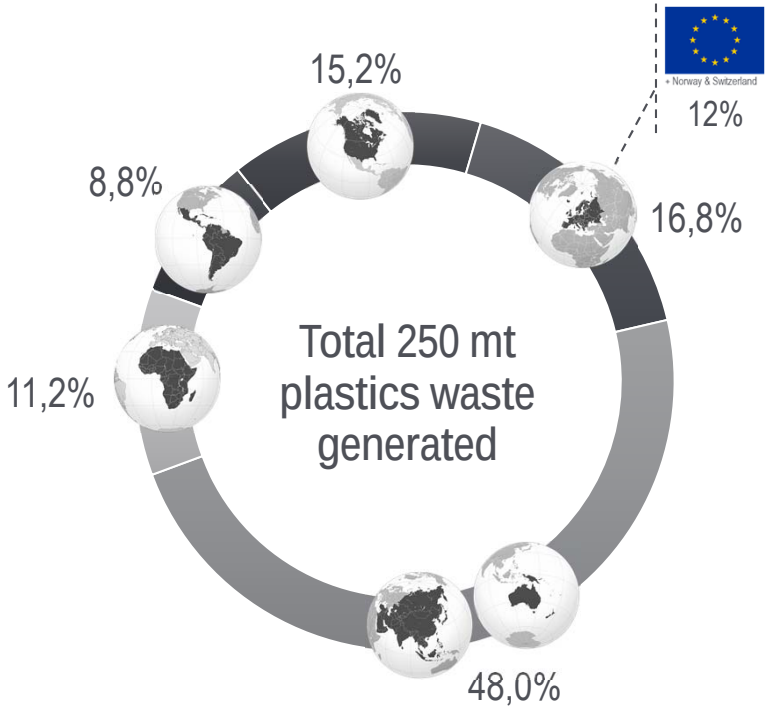
Global plastics waste chart 2018

Plastics waste as part of total waste	Generated		Collected for treatment						Treatment						Unknown			
	Total		Total		Thereof Formal		Thereof Informal		Recycling		Energy Recovery		Managed Landfill		Improper Disposal		Leakage	
Applications	mt	*share*	mt	*share*	mt	*share*	mt	*share*	mt	*share*	mt	*share*	mt	*share*	mt	*share*	mt	*share*
Packaging	~143	*57%*	~102	*71%*	~72	*71%*	~30	*29%*	~37	*26%*	~28	*20%*	~37	*26%*	~32	*23%*	~9	*6%*
Non-packaging	~107	*43%*	~71	*66%*	~51	*72%*	~20	*28%*	~13	*12%*	~23	*22%*	~35	*33%*	~30	*28%*	~5	*5%*
Σ	~250	*100%*	~173	*69%*	~123	*71%*	~50	*29%*	~50	*20%*	~51	*20%*	~72	*29%*	~63	*25%*	~14	*6%*

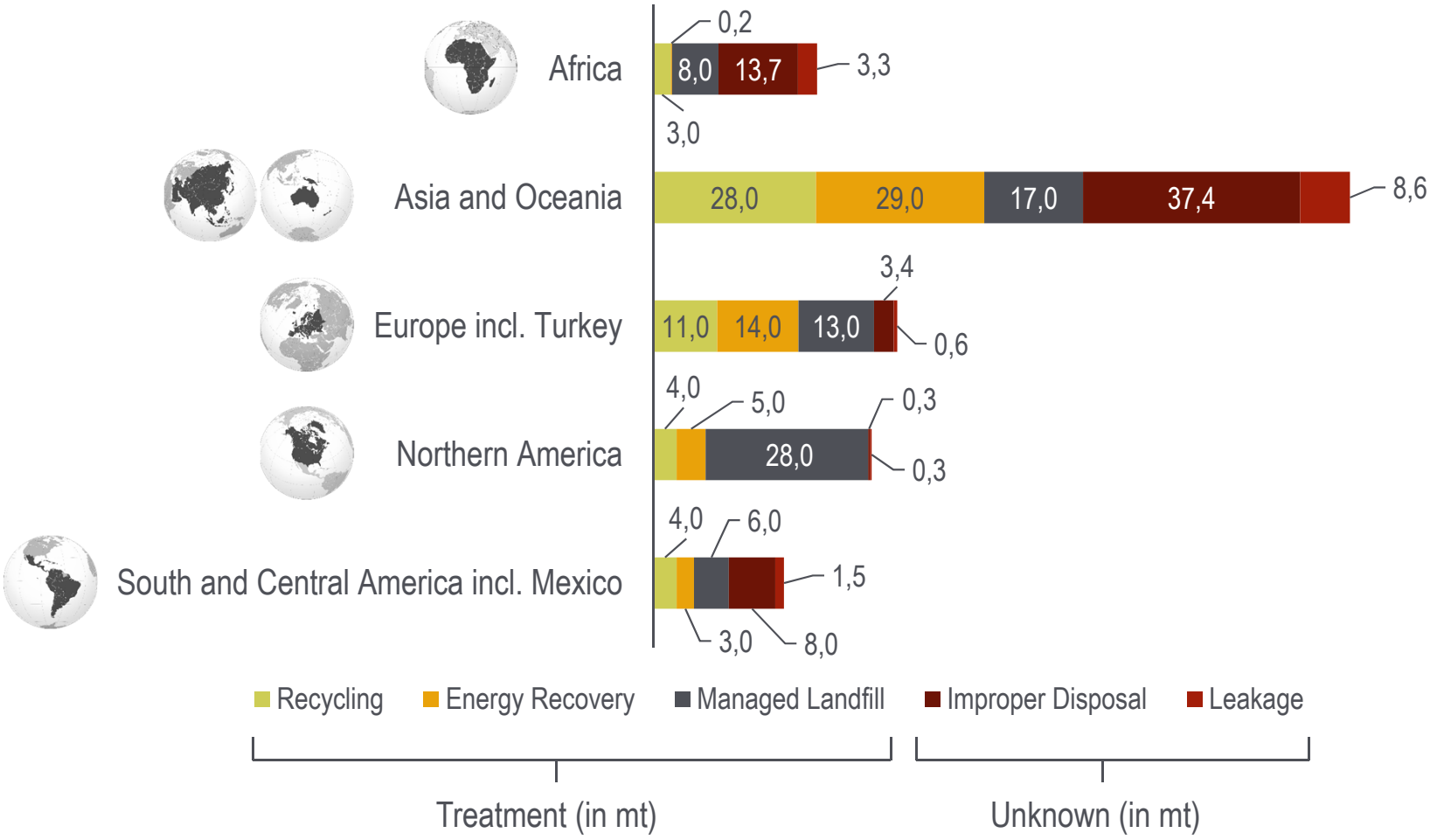
- Around 250 mt of plastics waste were generated worldwide in 2018. 173 mt of plastics waste were collected for waste treatment and 77 mt of plastics waste remained unknown.
- Over 100 mt of plastics waste were recovered worldwide, of which around 50 mt of plastics waste were collected for recycling. Assuming a process loss of ~40%, around 30 mt of plastics were recycled. Energy recovery of plastics waste accounted for 51 mt in total.
- 72 mt of plastics waste were disposed of in sanitary landfills or controlled dumpsites. Another 63 mt of plastics waste were improperly disposed of and plastics waste leakage accounted for around 14 mt in total (30% of the material is still unknown).

Post-consumer plastics waste generation by region 2018

Region	Quantity in mt	Share in %
Africa	28	11.2
Asia and Oceania	120	48
Europe and Turkey	42	16.8
Northern America	38	15.2
South and Central America, incl. Mexico	22	8.8
Total	250	100



Post-consumer plastics waste generation and treatment by region 2018



Management summary (1/3)

About the survey

- The results of this study using existing plastics flow analyses from 44 countries worldwide covering 60% of the world's population and 80% of the world's GDP and with additional support from country representatives of the plastics industry as well as extensive secondary research is the very first attempt made by the plastics industry to track total global post-consumer plastics flow from plastics production to plastics waste.
- This study gives a detailed overview of post-consumer plastics flow with a focus on plastics waste generation, collection and treatment. Furthermore, plastics waste leakage as part of poorly managed or unknown waste is also described.

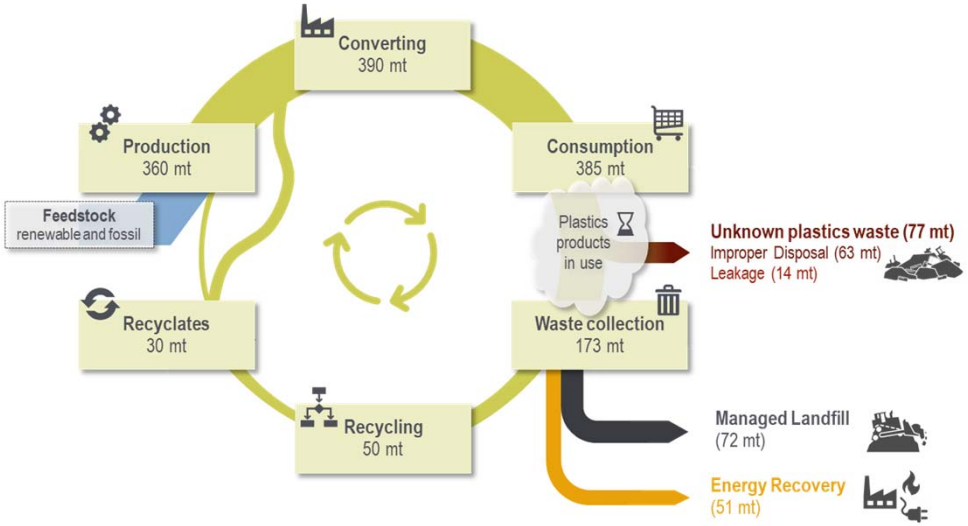
Data availability and quality

- The data availability and data quality differ significantly from country to country. Almost every developed country has a national statistical office that collects and harmonises data on the plastics in general and on municipal solid waste (MSW) including plastics. However, not all existing waste streams are statistically covered even in these countries.
- Data modelling and information collection from different additional sources are often necessary in order to obtain a complete picture.
- Data availability and data quality in less developed or emerging countries are even more difficult. In many Latin American, African, Asian and Eastern European countries, important data flows about plastics do not often exist. Scientific articles, information brochures and analyses from plastics associations together with newspaper articles are often the only available data sources that can be used.
- This study tries to keep data corrections to a minimum and focuses on harmonising data streams based on kg per capita (e.g. plastics waste generated) and GDP per capita.
- Overall data accuracy will improve significantly with globally harmonised definitions and more countries contributing with individual data streams to an extrapolation of global plastics flow.

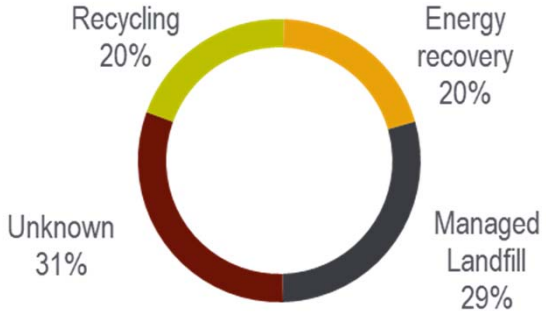
Management summary (2/3)

Results at a glance

- The results of this study show that, based on a global extra-polation, around 360 mt of virgin plastics were produced, 390 mt plastics (including 30 mt recyclates) were converted plastics products and around 385 mt plastics products were consumed or put on the market.



- Around 250 mt of plastics waste were generated and 63 mt of plastics waste were disposed of under improper conditions (i.e. unsanitary landfills, improper burning or burial of waste).
- Around 14 mt of plastics waste leaked into the environment (i.e. dispersion of plastics waste caused by flooding, wind or individual mismanagement).
- About 173 mt of plastics waste were collected either formally by municipal or privately organised and contracted waste collection and management services or informally by waste pickers, organised groups or smaller companies. In less developed countries, informally collected plastics waste contributes a high share to overall plastics recycling (e.g. India). Waste pickers usually collect plastics directly from the source, e.g. through door-to-door collection or recovery of marketable plastics fractions from dumpsites.
- The quantity of plastic waste sorted for recycling was 50 mt, or about 20%. 51 mt (20%) were accounted for by energy recovery and 72 mt (29%) went to landfill.[1)]



1) Challenging is the prevention of double counting (e.g. formally collected and statistically recorded waste for disposal on dumpsites and afterwards informally collected plastics for recovery from these dumpsites).

Management summary (3/3)

- The recovery of marketable plastics fractions for recycling is a profitable business for many people in Latin America, Africa and Asia.
- Separately collected waste streams accounted for the minor share of all plastics waste collected. In addition, separately collected waste streams have been replaced with mixed waste streams in wealthy countries such as the United States or Canada. Deposit schemes, e.g. for PET bottles, are only established in a few countries.
- Overall, around 50 mt tons of plastics were collected or sorted for recycling. Assuming a process loss of 40%, global output-based plastics recycling had a volume of around 30 mt.
- Energy recovery of plastics waste accounted for around 51 mt in total. Asian countries in particular are currently investing in energy from waste solutions, including municipal solid waste incineration (MSWI) plants. China has in recent years extensively expanded its waste incineration capacities to cope with the increasing volumes of domestically generated MSW, including plastics.
- The disposal of plastics waste in sanitary landfills and in controlled dumpsites accounted for around 72 mt in total. A clear distinction between improper disposal and 'safe' disposal is not always possible due to ambiguous data or varying definitions.

Trade in waste

- Nevertheless, high volumes of waste exports for recycling from developed countries to emerging countries with improper waste management and recycling infrastructures could be identified. Developed countries need to invest in robust domestic recovery and recycling solutions to cope with their own waste.
- Destinations for waste exports for recycling from developed countries to Asian countries have changed since the implementation of the Chinese import ban on different waste types including unsorted packaging waste. Other Asian countries became new destinations for waste imports. Some of these countries are already sending waste back to the countries of origin.

Final Key Messages

Avoiding environmental littering, pushing forward with a circular economy –
Plastics industry creates transparency for global plastic flows

- A total of 250 million tonnes of post-consumer plastic waste worldwide
  - Collected: 173 million tonnes
    - Collected/sorted for recycling 50 million tonnes
    - Energy recovery 51 million tonnes
    - Managed landfill 72 million tonnes
  - Disposed of inappropriately 63 million tonnes and dumped irresponsibly 14 million tonnes

Therefore:

- Plastics must be considered as a valuable resource.
- Circular economy has top priority in fight against marine litter.
- Creating a functional waste management at a global basis is essential.