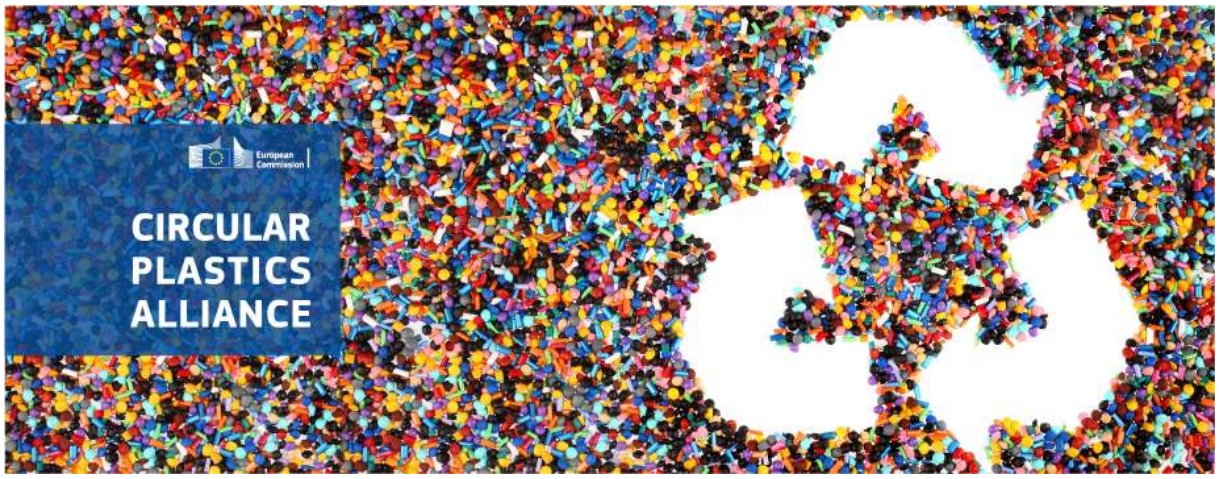

EXECUTIVE SUMMARY – STATE OF PLAY FOR COLLECTED AND SORTED PLASTIC WASTE IN EUROPE

Covering the following sectors: Agriculture, Automotive, Construction Electric &Electronic and Packaging

Abstract

This document highlights the key challenges identified in the state of plays for collected and sorted plastic waste in each of the sectors. It should be read in conjunction with the individual sector reports which provide a more in-depth analysis per sector.

CPA thematic coordinators for Collected and Sorted Waste

Contents

Glossary

Agri	Agricultural
ASR	Automotive Shredder Residue
ATF	Authorised Treatment Facility
B2B	Business to Business
DfR	Design for Recycling
Eco -design	The integration of environmental aspects into the product development process, by balancing ecological and economic requirements https://www.eea.europa.eu/help/glossary/eea-glossary/eco-design
EEE	Electronic and Electric Equipment
WEEE	Waste Electronic and Electric Equipment

1 Introduction

This document provides an overview of the state of play for collected and sorted plastic waste in Europe, covering the agricultural, automotive, construction, electronic & electric and packaging sectors. It is based on more detailed reports undertaken by the working groups in each sector, which are published as annexes to this document.

The focus for this summary is the common challenges with regard to data availability as well as achieving high levels of collection and sorting of plastic waste in Europe1. The geographical focus of this report corresponds to the geographical scope of the Circular Plastics Alliance, i.e. EU27 + UK.

2 Circular Plastics Alliance structure and the role of the state of play within this structure

The Circular Plastics Alliance (CPA) was launched in 2018 by the European Commission as a platform for industry to deliver on the circular economy for plastics and substantially increase the use of recycled plastics in new products. The specific aim of the CPA is to achieve at least 10 million tonnes of recycled plastics materials in products and packaging placed on the European market each year by 2025. More than 240 organisations and companies covering the full plastics value chain, including research organisations, producers, raw material suppliers, recyclers, standardisation bodies and public authorities have signed up to the CPA and are committed to working together to achieve this goal.

The CPA is arranged into 6 working groups, including 5 sectorial working groups, one for each of the following sectors: Agriculture, Automotive, Building and Construction, Electronic and Electric Equipment and Packaging. An additional, crosscutting working group is devoted to the set-up of a monitoring system to track the plastics recycling flows in Europe ("monitoring working group").

The CPA has committed to a number of actions for 4 main themes: design, research and development, collection and sorting, and recycled content. Each of the 5 sectorial working group has appointed thematic coordinators for each of the themes to ensure cohesion across the different sectors. The actions to be covered by all working groups across the themes are listed in Figure 2.

[1] The geographical focus of this report corresponds to the geographical scope of the Circular Plastics Alliance, i.e. EU27 + UK.

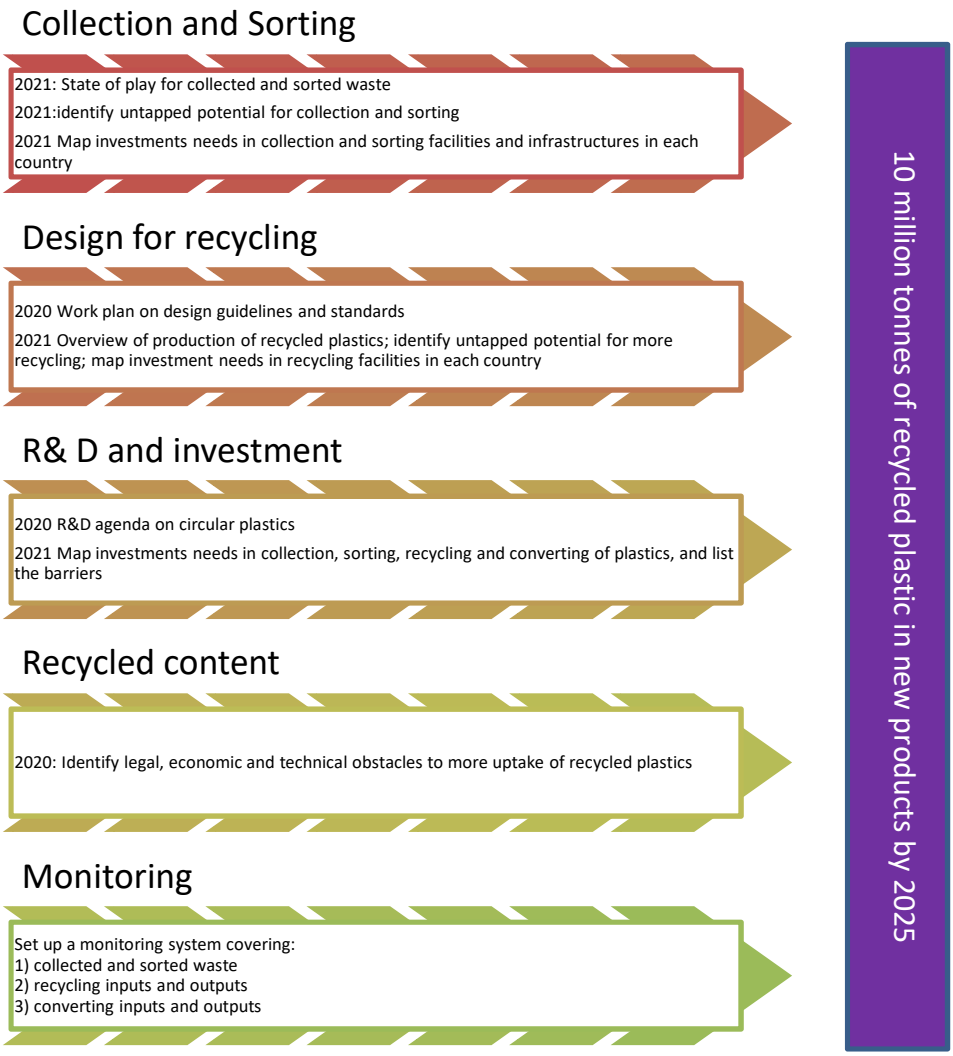

Figure 1 CPA deliverables as listed in the Declaration of the CPA signed on 20 September 2019

The work across the themes is designed to achieve the 10 million tonnes target and therefore each of the tasks should not be seen in isolation, but ultimately the outcomes should come together to reach the goal.

3 State of play for collected and sorted plastic waste in Europe

For the purposes of the work undertaken by the CPA, state of play for collected and sorted waste is defined as the current situation with regard to collecting and sorting plastic waste in Europe in the Agricultural, Automotive, Building and Construction, Packaging and Electronic and Electric Equipment sectors. It covers data availability and current collection and sorting practices across Europe. Each sector working group has produced a state of play for collected and sorted plastic waste in their respective sectors.

Methodology

The states of play for each sector has been developed by carrying out surveys in different Member States, interviewing various stakeholders across the supply chain and undertaking desk-based research.

3.1 Definition of collection and sorting

The definitions of collected and sorted varies for each sector and is defined in Table 1

	Collected waste	Sorted waste
Agriculture	Waste collected through an existing scheme for collection and sorting ("selective" collection)	Pre-treatment: baling and/or shredding and cleaning
Construction	Includes all kinds of collection modes (separate, mixed)	Plastic waste sent to recycling
Automotive	Automotive: End-of-life vehicles sent to Authorised Treatment Facilities (ATFs)	Pre-treated waste sent to recyclers (inputs to recyclers). This includes shredding of automotive waste to obtain separate streams of metals, plastics etc.
WEEE	WEEE collected by official "channels" (excluding "informal" waste collection). Only figures from Producer Responsibility Organisations (PROs) are reported for the purpose of the present report.	Plastic flakes from WEEE pre-treatment plants sent as inputs to recyclers.
Packaging	All plastic packaging waste generated that is subsequently collected for recycling, energy recovery or disposal (incineration / landfill)	Plastic packaging waste delivered to a recycling facility whether or not is has passed through a sorting or interim treatment centre.

Table 1 Definition of collected and sorted waste for each sector

Each sector has different supply chains and the products have varying lifetimes. Each sector collects data in different ways and has different levels of data available, however all working groups have tried to establish:

- Data for volumes of waste collected and sorted – Overall and per polymer
- How waste is currently collected and sorted

- Challenges for collection and sorting

For more detailed insight and information on the collection and sorting of plastic waste across each sector, please consult the individual, sectorial reports.

4 Available data

Based on the research undertaken by the CPA for the state of play for collected and sorted plastic waste, it is estimated that a total of 21 million tonnes of plastic waste are collected in Europe annually from the products/ sectors represented in the CPA, which are the biggest plastics-using markets. (Reference dates covering 2016 -2019 depending on sector, see table 2). Out of this, 9.2 million tonnes of plastic waste are sorted for recycling (sent to recyclers as inputs), including 7.5 million tonnes to recyclers located in Europe (source: The Circular Economy - A European Overview, Plastics Europe 2019). These 7.5 million tonnes result in 5.2 million tonnes of recyclates produced in the EU. This reflects a yield of approximately 70%. In its Design Work plan, the CPA has estimated that to reach the 10 million tonnes target, assuming a 70% yield, at least 15 million tonnes of recyclable plastic waste should be sorted for recycling every year in Europe (source: CPA Design Work Plan). The CPA will investigate the untapped potential for more collection and sorting in Europe in a next report to be published in early 2021.

The summary of the current situation is shown in Table 2. Each working group has used different sources to gather the data, as indicated in the footnotes. The table refers to post-consumer waste and is based on estimates.

Table 2 Overview of collected and sorted waste per sector							
	Ref. year(s)	European Converters Plastic demand	Tonnes of plastic waste collected	Tonnes sorted for recycling	Percentage sorted for recycling	Tonnes of recyclate produced in the EU	Legislative framework in place
Agriculture[2]	2019	721.500[3]	756.000[4]	756.000[5]	100%	334.000	Waste Framework Directive (WFD) Landfill restrictions depending on Member State
Automotive[6]	2019	5.100.000	1.500.000	350.000	23%	150.000	ELV Directive
Building & Construction [7]	2018	10.137.600[8]	1.746.000	450.000	26%	340.000	WFD Landfill restrictions depending on Member State National regulations on mandatory pre demolition audits in some countries
Packaging[9]	2016-2019	20.428.800	16.119.000	6.955.000	43%	3.906.000	Packaging and Packaging Waste Directive
WEEE[10] (household only)	2016	1.749.030[11] [12]	752.500 [13]	717.000[14]	95%	560.000	WEEE Directive
Total		38.136.930	20.873.500	9.228.000	44%	5.290.000	

It should be noted that for construction, automotive and EEE products in particular, the quantities of plastics placed on the market in a given year do not correspond to the waste generated, as these

[2] Data based on Survey undertaken by AEP Europe on behalf of the CPA working group for agriculture EU28+2

[3] This figure includes only non-packaging plastic products used directly by farmers in their production activities, with agronomic effect

[4] Including soilage

[5] This figure includes 40% soilage rate. The plastics content is 443.950 tonnes

[6] Data based on Plastics Europe Report THE CIRCULAR ECONOMY FOR PLASTICS (2019)

[7] Data based on Plastics Europe Report The Circular Economy for Plastics (2019), tonnes of recyclates produced based on estimates and discussion with the consultancy Conversio, experts in this field

[8] Placed on the market data for a given year, bears no relevance to data for waste collected due to the long service life of the products

[9] PCEP (LDPE / LLDPE, HDPE, PP): PO Waste Collection and Recycling in European Countries 2016. Conversio for PlasticsEurope.;PETCORE: ICIS and PETCORE Europe Annual Survey on the European PET Recycle Industry 2017;SCS: Internal information 2017.EUMEPS: Survey carried out of EUMEP national members. Data relates to 2019.;Data relates to EU+2 (with the UK being within the EU at the time data was collected) other than PETCORE which relates to 28 of the countries in EU+2.

[10] Data based on Overview of the state-of-play on collected and sorted plastic waste (in tons) from WEEE in Europe during 2016.

[11] This figure refers to Household EEE

[12] Plastic content in 7.915.559 tonnes of household EEE put on the market

[13] Plastic content in household WEEE collected which is in total 3.405.582 tonnes

[14] Plastic flakes obtained from the treatment of WEEE collected

products have a very long service life, from 3-5 to 100 years in the case of pipes for example. This means that products arising as waste in 2019 were placed on the market several years or decades ago. The figure for plastics demand in construction, the sector which has the longest life products, from 20 to 100 years in some cases, highlights the impact improved collection and sorting as well as design for recycling could have on future recycling volumes.

The figures in Table 2 are based mainly on estimates. Generally, directly reported data is only available where:

- European directives stipulate the need for recording of plastic waste volumes, as is the case for packaging, and for the whole waste product in which the plastic is one of the materials such as in the automotive and EEE sectors.
- Industry has taken voluntary action and set up collection and recycling schemes, as for PVC in construction (Vinylplus initiative).

However even where directives require recording of waste volumes, such as the End of Life Vehicle Directive, as previously mentioned, the producer responsibility is focused on the whole product rather than on the polymer part of the product. There is no individual tracking of the polymers arising from automotive; therefore, estimates are generally based on the average percentage of plastic used in a given product. For the specific case of WEEE, analysis regarding the plastic content of different WEEE streams and the WEEE plastic downstream chain description are based on real data, because WEEE pre-treatment plants operating as European PRO's suppliers are obliged to report detailed information about their treatment performance.

In the agricultural sector, data is mainly available from the 9 countries[15] that have established voluntary national collection schemes for agricultural plastics. These collectively represent 62% of the total volume put onto the market. The schemes are often industry led initiatives between farmers, distributors and converters in a B2B relationship and they demonstrate remarkable efficiencies in leading to high volumes of collecting and sorting. Therefore, the data collected via the survey undertaken by the agricultural working group is based on the data provided by the schemes in place in these 9 countries, but data is missing for other European countries and there is also not one single reliable tool for gathering statistics on agricultural plastics. It should be noted that the data for tonnes of waste collected for agricultural plastics includes soilage content as after their useful life, agricultural plastics may be soiled with sand, soil, organics materials, water. Therefore, the process of collection must consider not only the used plastic but also its soilage content. The measurement of soilage is made, either as a "soilage coefficient" or as a "% rate of soilage". The total average soilage content for the agricultural plastics data in Table 2 is 40%

In construction there is no legislation demanding separate recording of plastic waste. Therefore, the data in the construction state of play for collected and sorted waste is based mainly on estimation from a report by the consultancy Conversio on behalf of Plastics Europe[16]. There is data available for PVC construction products for volumes sorted for recycling via the voluntary scheme Recovinyl[17], an

[15]Sweden, Ireland, France, Germany, Spain, UK, Holland, Belgium, and Finland

[16] https://www.plasticseurope.org/en/resources/publications/1899-circular-economy-plastics-european-overview

[17] www.recovinyl.com

initiative by VinylPlus[18], the PVC Industry commitment to sustainable development, which is operational in 16 European countries.

There is official data available from Eurostat on plastic waste from various sectors, however it is not broken down by polymer or product type and the data appears to be inconsistent. A good example of this is the data collected via Eurostat on plastics waste from Construction shown in Figure 2. And similar examples of lack of reliable data can be found in the other sectors.

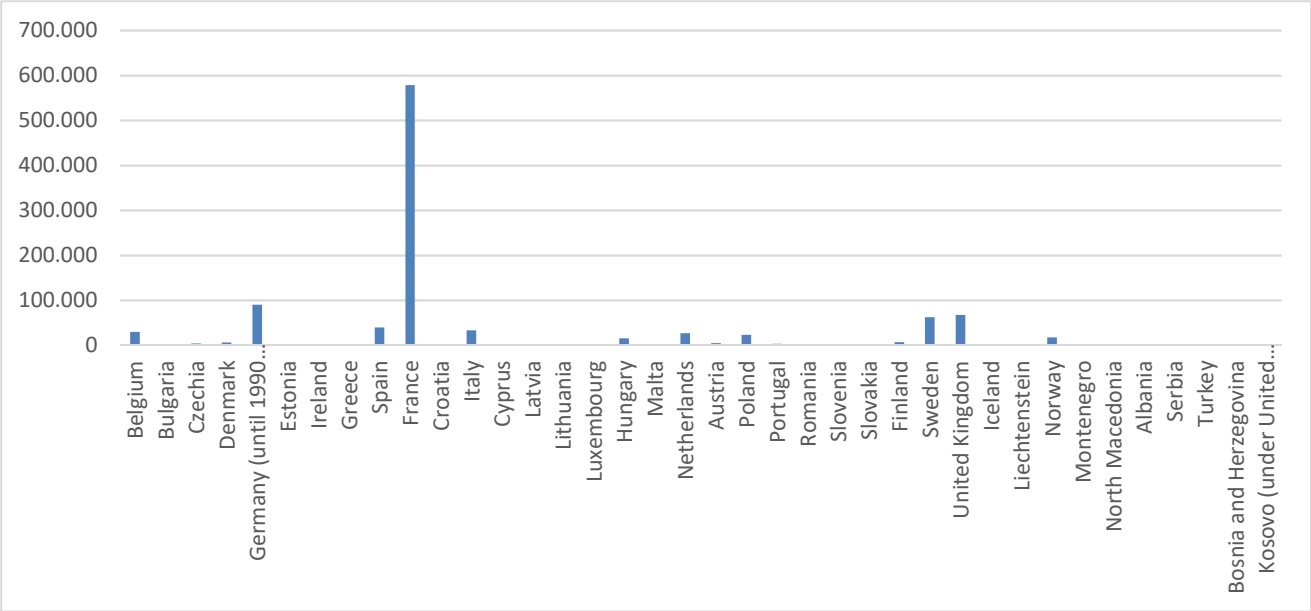

Figure 2Eurostat Plastics Waste from Construction 2016 per EU 28 country

As shown in Figure 2, there appear to be inconsistencies in reporting as some Member States do not report any volumes or only very small volumes and France reports nearly 580 kt., which is more than half of the total collected across Europe according to Eurostat figures

The 2017 Deloitte report commissioned by the European Commission[19] finds that there is a large variation in the methods applied in data reporting at Member State level, which means that it is difficult to carry out a quantitative assessment of plastic waste arising per Member State based solely on this data.

Given the current limitations in data availability, the CPA will establish a monitoring system that will trace the collection, sorting and recycling of plastic waste, as well as the use of recycled plastics. This system aims at improving in particular the information available on collected and sorted plastic waste per polymer type and market segment. It should however be noted that, in an initial phase, the CPA monitoring system will gather data directly from recyclers and converters to monitor recyclers' inputs (sorted waste), recyclers' output, converters' inputs (recyclates) as well as outputs, but it will have to rely on estimates and statistics for collected plastic waste and inputs to sorting centres. The CPA has run a survey on collected plastic waste among its signatories, and based on this investigation, concluded that it is currently not feasible to gather consistent, comparable data from waste collectors and sorting centres across Europe due to the very diverse organisation of the

[18] www.vinylplus.eu

[19] Resource Efficient Use of Mixed Wastes Improving management of construction and demolition waste Final report October 2017

collection and sorting schemes locally. In this context, the CPA calls on Member States' authorities to help gather comparable, consistent data on collected waste across Europe.

5 Key collection and sorting challenges

Common challenges were found in the analysis of the current collection and sorting of plastic waste, including:

1) **A significant gap between the quantities of plastic and plastic-containing products placed on the European market each year and the plastic waste collected in that same year**. This is due to three main factors:
    a. **The long lifetime of certain products.**
    EEE and automotive products can have an average life span of 5 to 15 years, while product design and composition evolves continuously. In construction, products tend to have a lifespan from 20 up to 100 years. In construction for example, the plastic waste generated in a year depends not on the sales of construction products in that same year, but rather on the demolition rate. For the packaging and agricultural sectors, there is however a more direct correlation between quantities placed on the market in a given year and the waste generated in that same year.
    b. The fact that **some waste generated is not collected and/or not recorded** as having been collected.
    For EEE and automotive, a significant part of the waste generated in a given year is not recorded ("unknown" waste management) because it is managed by informal channels. In construction, a significant share of plastic waste is not collected separately, but as part of mixed demolition waste which is landfilled or incinerated. **This issue will be examined in the CPA's next report on the untapped potential for more collection of plastic waste (early 2021)**.
    c. **The market dynamics (exports/imports).**
    Exports and imports of different plastic-containing products are paramount in the decoupling of plastic products placed on the EU market from the plastic waste collected. Not only in terms of quantity but also relating to the type of polymer. This is especially relevant in those sectors in which plastics are just one of the many elements that shape the final product and that independently of intra- or extra-EU production will end up mixed in EU shredders (Automotive, EEE).

2) **A part of the plastic waste is not recyclable with state-of-the-art technology and infrastructure**. This calls for technology improvement as well as product design improvement. The CPA has published an R&D agenda describing priority R&D needs (see section 6 below). The CPA is committed to improve the design-for-recycling of 19 priority product categories as described in its Design Work Plan (see section 7 below).
    a) **Legacy additives**

The long product lifecycle in EEE, automotive and construction means that the products that arise in the waste stream today may contain so-called legacy additives such as stabilisers, plasticisers or flame retardants which were allowed in products when they were placed on the

market several years or decades ago but are no longer allowed today. This means that based on the technologies currently available, if those cannot completely remove the legacy materials, science-based compromises will have to be achieved in order to foster recycling while we move to a toxic-free environment (e.g. encapsulation of recycled plastics containing legacy substances in product-specific applications with no risk for human health or the environment); while giving the time for the development of new technologies (e.g. chemical recycling) to completely remove undesired chemicals from waste.

b) **Purification**

For example, new technology is necessary to increase the purity percentage of sorted plastic waste. In the WEEE and automotive sector for example, the high heterogeneity of the polymers used, the variety of colours combined with the similar density of the polymers makes the sorting/separation of the various polymers difficult.

c) **Eco-design**

To eliminate the least performing products and tackle the issue of recyclability from design stage (see section 7 below)

3) **Part of the recyclable plastic waste is not sorted for recycling.** This can be due to a lack of investment in suitable infrastructure and equipment, as well as economic barriers including a lack of demand for recycled plastics. For example, in the automotive sector, it is technically feasible to sort and recycle large volumes of plastic waste from shredding residues, but this requires advanced technology that is not yet widespread across the Member States. In addition, the quality of the source-separated streams is of great importance. When it comes to municipal packaging waste for example awareness raising and education of the public is vital. As a next step in early 2021, **the CPA will further investigate the untapped potential to collect and sort recyclable plastics in Europe and estimate the necessary investments, as well as identify the challenges to make these investments, including the lack of demand for recycled technical plastics.**

6 R & D needed to improve collection and sorting

The CPA will take action to address such needs as described in its R& D agenda. Table 3 shows how the specific needs identified in the initial R&D workplan will address the various issues identified in the state of play for collected and sorted waste.

Table 3 Specific R&D needs addressing the collection and sorting challenge (source: CPA R&D agenda)

Sector	Challenges identified in state of play	Specific needs highlighted by the R&D Agenda that will help to tackle these challenges	R&D response
Agriculture	Heavily soiled waste streams. Beyond good practices implemented by the farmer, the agri-plastic waste quality increase depends on technology used at farm to make a waste a resource. R&D must be mobilized to provide solutions reducing waste at source such as heavily soiled products.	Need to increase recycled content in their plastic agri products, increase collection and sorting, and improve the efficiency of the cleaning step to increase the recycling as well as the quality of the recyclates following harsh weather conditions.	CPA5: Improved recycled material properties
Automotive	Automotive shredder residue(ASR) mixed heterogenous material, difficult to sort plastics out of the waste stream.	Automotive and EEE groups identified the need for plastic separation to recycle ELV and WEEE plastics, and not only the metals.	CPA6: Better separation of different plastics
Construction Products	Long service life, potential presence of legacy additives, now restricted under REACH	Construction products have the longest service life of up to 50 or 100 years and therefore are likely to contain substances with legal restriction. To prevent there is a need to develop efficient tracking, automated analysis and sorting systems.	CPA4: Develop and standardise methods for traceability CPA7: Detect and separate substances in waste
Packaging and EE	Heavily contaminated waste streams,	The Packaging and EEE groups insist on the need to create more food-contact recycled content by developing detection and separation technologies to remove the contamination from the stream and ensure isolation	CPA7: Detect and separate substances in waste
Packaging	Laminated mixed polymer products	Packaging group identified a need for delamination technologies to overcome the challenges to recycle multi-materials or multi-layers packaging.	CPA6: Better separation of different plastics

7 Design for Recycling

Part of the collected plastic waste is not recyclable, with current technologies, which calls for - next to innovation in technology and infrastructure as discussed in section 6 - better design-for-recycling for a series of plastic products.

Part of the waste collected is not designed for recycling with state-of-the-art technology and infrastructure. **To improve this, the CPA has prioritised 19 plastic product categories for better design for recycling, as indicated in its Design Work Plan**. Product categories will be added to the list in early 2021. Figures showing the current levels of collection and sorting for 16 of these priority products are provided in **Error! Reference source not found.**, based on data taken from the mass flow model developed by Joint Research Centre of the Commission (JRC) for the CPA, as well as from the survey undertaken by APE Europe on behalf of the CPA agriculture working group. Data is currently not available for all the priority products and the availability of the data for the remaining products will be investigated further by the group in view of the next report. The lack of data underlines again the importance of the monitoring system being set up by the CPA.

If the 19 priority products, once designed for recycling, are all properly collected and sorted in Europe, it is expected that the subsequent production of recycled plastics should reach 10 million tonnes (under the assumption of a 70% overall yield, see Design Work Plan).

The CPA is working with CEN to identify existing standards and guidelines and establish a standardisation programme covering not only design for recycling guidelines but also the quality of sorted plastic waste, the quality of recycled plastics, as well as the integration of recycled plastics.

As a next step, the CPA thematic coordinators for collected and sorted waste will investigate the achievable collection and sorting rates for all priority products identified in the Design Work Plan, taking into account state-of-the-art technology and infrastructure, as part of the report on the untapped potential of collected and sorted waste which will be available in 2021.

Table 4 – state of play on waste collection and sorting for 16 priority products (out of the 20 priority products included in the Design Work Plan of the CPA)					
	Sector-relevant polymers	**Sector-relevant products**	**Waste generated (kt)**	**Collected (kt)**	**Sorted (kt)**
Agri (data from European Survey 2019)	LDPE	**Mulching films**	249	199[20]	66[21]
	LDPE	**silage sheets**	181.5	90.75[20]	60.5[21]
	HDPE	**Net wraps**	80.5	39.98[20]	37.25[21]
	PP	**Twines**	104	60[20]	40[21]
Construction (JRC Mass flow)	PVC	**Window profiles**	700	700	595
	HDPE	**Pipes**	169	169	38
	EPS	**Insulation**	140	140	13
Automotive (JRC Mass flow)	PP	**Bumpers**	290	229	229
Packaging (JRC Mass flow)	LDPE	**Flexible packaging**	4,940	1,899	1,067
	PET	**Beverage bottles**	3,440	2,000	1,780
	HDPE	**Necked bottles for milk and detergents**	2,207	972	508
	PP	**Food containers**	1,554	593	297
	PET	**Trays**	900	540	162
	PS	**Cups (FFS), Trays and dairy packaging**	842	673.6	118
	EPS	**Packaging (insulation)**	149	95	48
	EPS	**White goods packaging (protection)**	239	183	102
	Total		16,185	8,583	5,346

[20] Including soilage

[21] Excluding soilage