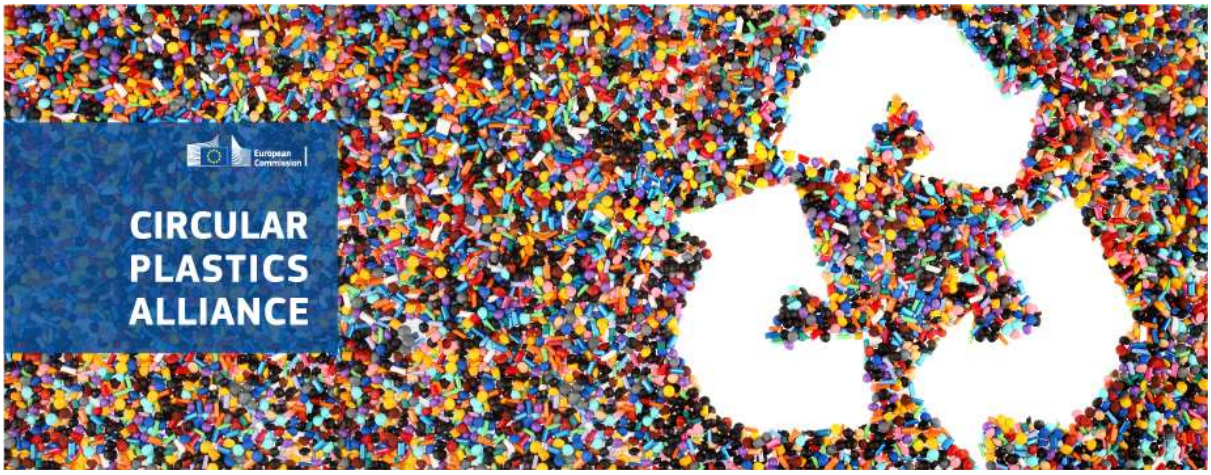

DESIGN FOR RECYCLING WORK PLAN

Updated final draft – Version Sept. 2021

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1. Introduction

The Circular Plastics Alliance[1] (CPA) is an initiative under the European Strategy for Plastics (2018), in particular under Annex III related to voluntary pledges by industry. The European Commission launched the Circular Plastics Alliance in December 2018 to help plastic value chains boost the EU market for recycled plastics to 10 million tonnes by 2025.
The Circular Plastics Alliance is committed to deliver on the circular economy for plastics and increase the use of recycled plastics into products and packaging to at least 10 million tonnes by 2025 (hereafter referred to as "the 10 million tonnes target").

The signatories of the Circular Plastics Alliance, i.e. over 270 organisations from the full plastics value chains, including companies, business organisations, academia, standardisation bodies and public authorities, are committed to work together, with the support of the European Commission.

To achieve the 10 million tonnes target, the Circular Plastics Alliance has committed to the actions described in Table 1.

Table 1 – Overview of the commitments for action by the Circular Plastics Alliance

Deadline by	March 2020	June 2020	January 2021	All along
Design	Work plan on design guidelines and standards		Overview of production of recycled plastics; identify untapped potential for more recycling; map investment needs in recycling facilities in each country	1) Develop, update or revise design guidelines 2) Contribute to update CEN and industry standards on recyclability
Collection & Sorting		State-of-play on collected and sorted plastic waste	Identify untapped potential for collection and sorting Map investments needs in collection and sorting facilities and infrastructures in each country	1) Participate in information and awareness raising campaigns 2) Work with all actors on effective framework for separate collection of all plastic waste 3) Develop standards to assess the quality of sorted plastic waste
Recycled content			Identify legal, economic and technical obstacles to more uptake of recycled plastics	1) Increase uptake to 10 million tonnes 2) Work with all actors to create the right conditions 3) Support the development or revision of standards and

[1] https://ec.europa.eu/growth/industry/policy/circular-plastics-alliance_en

				guidelines on the quality of plastics recycling and recycled plastics 4) Communicate the positive value of plastics in a circular economy
R&D and Investments	R&D agenda on circular plastics		Map investments needs in collection, sorting, recycling and converting of plastics, and list the barriers	
Monitoring			Set up a monitoring system covering: 1) collected and sorted waste 2) recycling inputs and outputs 3) converting inputs and outputs	

Extract from the declaration[2] of the Alliance (section on design for recycling)

"We commit to develop, update or revise design for recycling guidelines for all plastic products and ensure they are revised on a regular basis to take into account innovation.

These guidelines should consider products' or packaging's functionalities, while taking into account impacts over the life cycle. We aim at improving the recyclability of plastic products in order to deliver the volumes and quality of recycled plastics necessary to meet the end market needs.

We commit to actively contribute to the update of CEN and industry standards on recyclability and related ones.

We commit to agree by 1/3/2020 on a work plan for the delivery of the necessary guidelines and standards.

We call for harmonised definitions of recyclability per product group to safeguard the Single Market.

***We commit to deliver by 1/1/2021 an overview of the current status of the production of recycled plastics in the EU, identify untapped potential for more recycling** and map the necessary investments in recycling facilities in each Member State to reach the 10 million tonnes target. We call for the support of the public authorities in Europe in this work."*

[2] https://ec.europa.eu/docsroom/documents/36361

The signatories of the CPA are confident that the Design-for-Recycling (DfR) Workplan will deliver the increase in momentum to achieve the10 million tonnes target by 2025, with better, safer, and more constant quality of recyclates. As the target is by 2025, the nature of DfR needs is shorter-term.

1) Develop, update or revise design guidelines

The first identified need is short-term and covers design guidelines that, with the existing technical conditions, allow easier collection, sorting or recycling, or increase the market or value of the recyclates. Such guidelines can be specific to a product group, a sector or a type of polymer. It can be for example guidelines on the use of single-polymer products instead of multiple, the type of ink, labelling or glue, the ability to prevent dust or soilage, etc…

2) Contribute to update CEN and industry standards on recyclability

The second identified need, on a longer term, is the translation of design guidelines agreed by the CPA into CEN and industry standards applicable to the fabrication of all new products. This should allow an improvement in the quality of recyclates, a decrease in losses during recycling, an easier separation or the elimination of substances that hinder recycling etc.

The translation of design guidelines into European Standards is a key deliverable of the CPA. The CPA will agree on design guidelines for priority plastic products. Their formalisation into standards, through a multi-stakeholder process within CEN, will create clarity and trustworthiness on recyclability claims.

2. The Design-for-Recycling Work plan

2.1 Objective: sufficiently recyclable plastic waste streams to achieve the 10 million tonnes target

The Design-for-Recycling Work plan aims to make plastic products or product parts recyclable. The objective is to ensure that a sufficient quantity of plastic waste is effectively recyclable and can then be absorbed as recyclates into products for the EU market.

To achieve the 10 million tonnes target by 2025, the CPA has estimated in its untapped potential report[3], that:

- 16.7 million tonnes of plastic waste should reach sorting centres by 2025 (from separate collection)
- 11.8 million tonnes of sorted plastic waste should reach the European recycling plants

This plastic waste collected and sorted should be recyclable to an adequate quality to meet end market needs.

[3] See the report ”Roadmap to the 10 million tonnes”

This is a realistic scenario, taking into account the unavoidable losses during the collection, sorting and recycling processes, *with existing technologies*, and *under the assumptions that the 16.7 million tonnes of recyclable plastic waste gets collected separately, sorted for recycling and most sorted waste is sent to recycling plants located in Europe (90% of sorted waste from packaging).*

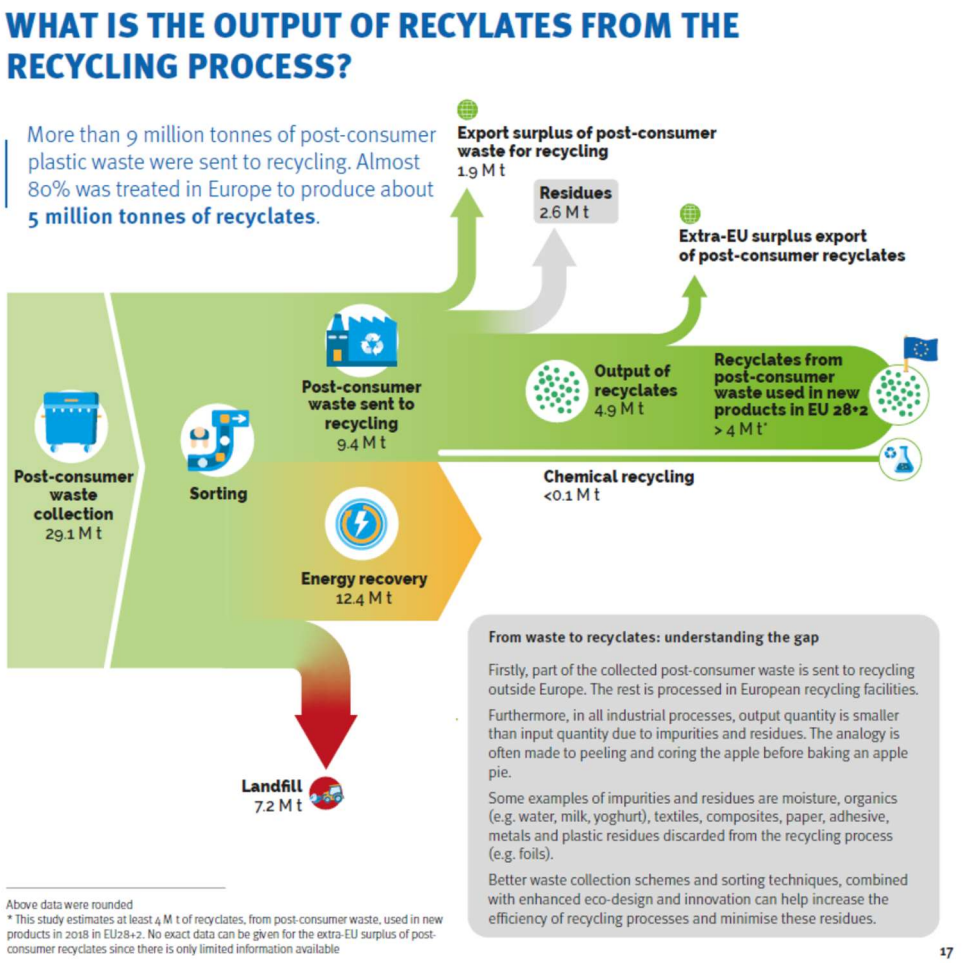
The CPA has updated its design work plan in accordance with the estimated scenario to reach the 10 million tonnes target. The updated design work plan includes a list of product categories that account for at least 18.4 million tonnes of plastic waste available for collection every year in Europe (waste generated per year, see the list of the priority products in figure 2). This includes: 15.7 million tonnes from the selected priority products in the packaging sector; 1.09 million tonnes in agriculture; and 1.7 million tonnes in construction[4].

Available data indicates that in 2018[5], **9.9 million tonnes of plastic waste arising from the CPA priority products (listed in Figure 2) were collected separately, out of 11.4 million tonnes**[6].

The CPA analysis has also clarified that the contribution to the 10 million tonnes target from longer lifetime products in the automotive, electronics and electrical equipment (EEE) and construction sectors will come from increased collection and sorting. Most waste collected from these sectors in 2025 will come from products placed on the market before 2021. Conversely, efforts on product design will improve the recyclability of collected plastic waste in these sectors only after 2025.
In the construction sector, work on design-for-recycling will focus on the priority products identified in the CPA design work plan (see figure 2).
For automotive and EEE, the CPA has decided to work on design-for-recycling not by priority product but by priority plastic material. This approach is estimated to have more untapped potential to increase the quantities of plastics recycled in these sectors (e.g. design of materials used in components and parts in view of their sorting and treatment through advanced technology, after shredding). For the EEE sector, the priority polymers in EEE applications are identified in Figure 2. For the automotive sector, the CPA will further report on the selected materials and the planned action before end 2021.

In 2018, out of 29.1 million tonnes of post-consumption plastic waste collected, 9.4 million tonnes were sent to recycling plants, of which 7.5 million tonnes inside the EU. This led to the production of 4.9 million tonnes of recyclates in Europe, of which 0.9 million tonnes where exported. Thus, 2.6 million tonnes were discarded residues[7], but data is missing on the proportion of recyclable plastic products included in this waste[8].

[4] This figure does not include the quantities of plastic waste generated from HDPE pipes as well as priority polymers in EEE applications as data is not yet available (but will be provided by end 2021).
[5] CPA analysis with the mass flow model develop by the Joint Research Centre of the Commission
[6] Source: Conversio Market & Strategy GmbH; PlasticsEurope; and estimates by the CPA Working groups
[7] Source: Conversio Market & Strategy GmbH; PlasticsEurope
[8] Some products with a high soilage rate are no more recycled due to recycling costs exceeding the plastic value



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

2.2 Governance

The objective of the Design work plan, as part of the overall strategy of the Alliance to boost recycled content in products, is to identify a sufficient quantity of "priority" product categories, which, if collected and sorted for recycling, will provide recycling plants with sufficient feedstock to deliver 10 million tonnes of quality recyclates, *with existing recycling technologies*.

A good work plan requires coordination and crosslinks between:

- plastics-using market segments, i.e. the working groups of the Alliance. For example, packaging, which accounts for over 60% of plastic waste[9], will be a major generator of recyclable plastic waste by 2025. Depending on the characteristics of the demand (end

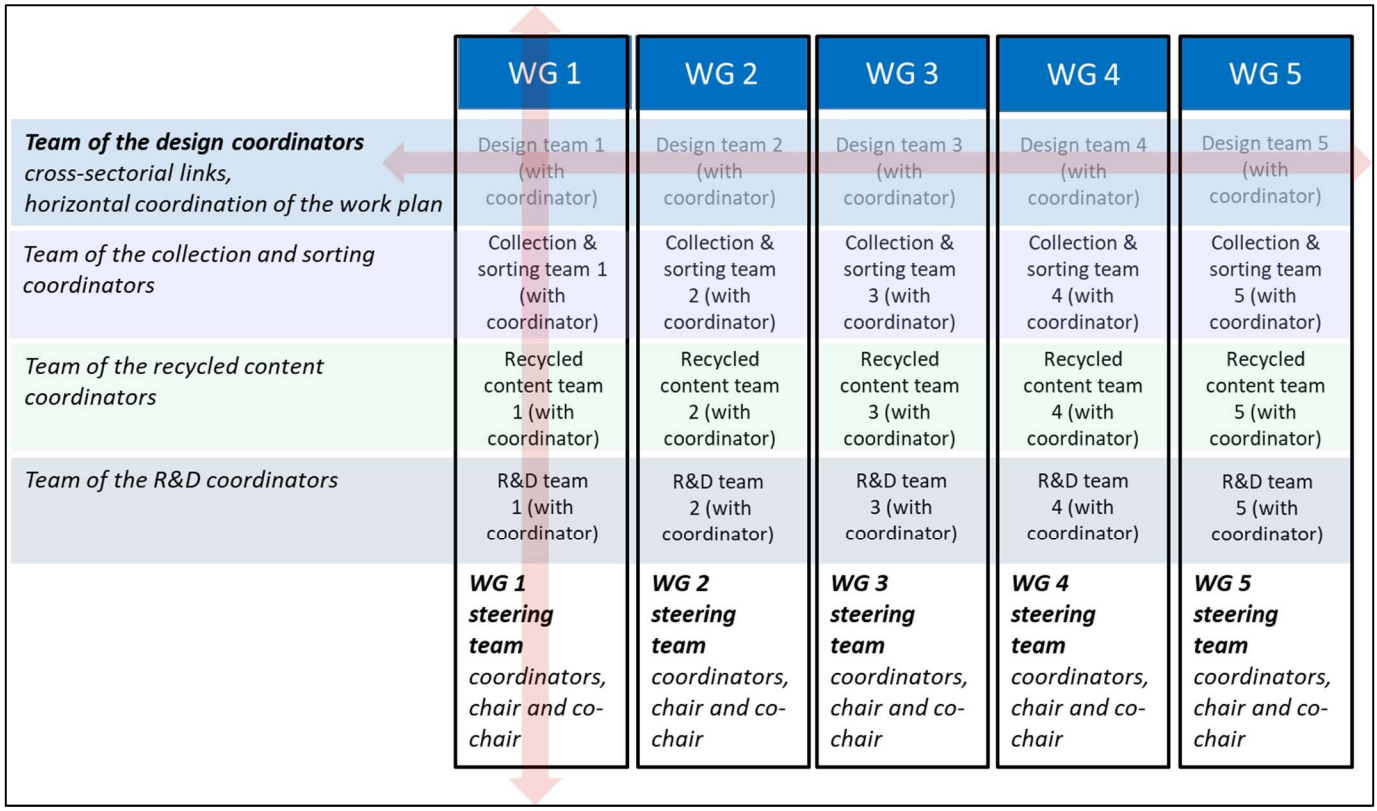
[9] Including only 42% sent to recycling (Conversio Market & Strategy GmbH)

market applications), some of this packaging waste will be recycled into packaging, some will go into other sectors. From an economic and technical perspective, it is paramount to understand the matching between recyclability standards and end market applications.

- Topics, beyond product design: topics like new recycling technology, improved collection and sorting infrastructure and practices, quality requirements for recycled plastics to find their way into products etc., influence the parameters of the supply and demand for plastic recyclates in each sector and thus product design.

The governance of the Alliance is a matrix, allowing to explore these crosslinks between sectors and topics (see Figure 1).

Figure 1: crosslinks across CPA working groups and thematic teams



In this governance model, **the working groups are the primary responsible** for establishing and approving the Design work plan for their sector. The design coordinators provide methodological guidance and coordinate across the working groups to consolidate the data and inputs and ensure consistency.

To drive the operational work on design guidelines and standards, the Working groups have created **product teams for each priority product category** identified in the Design Workplan.

2.3 Definitions

For the purpose of this work plan:

- a "product category" is defined as the combination of a market-relevant product or product part and a plastic material (e.g. a PET bottle, a HDPE bottle, a PP container, a PP automotive bumper, a PVC window profile etc.).
- a "guideline" is defined as a document containing guidance on product design-for-recycling or related after-use or test protocols that is not an EN standard issued by CEN-CENELEC (or a national standardisation body)
- a "standard" is defined as a document issued by CEN-CENELEC (or a national standardisation body) containing guidance on product design-for-recycling or related after-use or test protocols. It is a technical document designed to be used as a rule, guideline or definition. It is a consensus-built, repeatable way of doing something.

2.4 Selection of the product categories

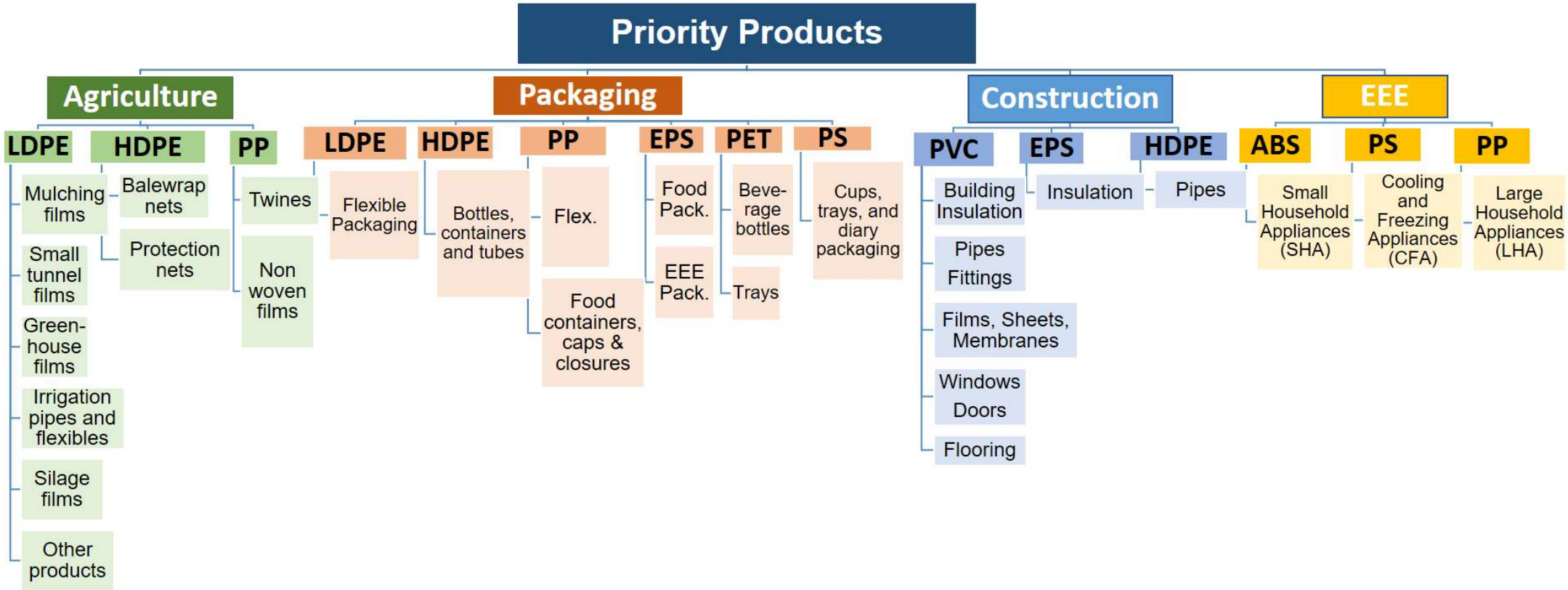
Selection of the priority product categories

The following criteria were used to select the "priority" product categories for this work plan:

1. Quantities put on the EU market (in tonnage/year);
2. Quantities collected and sorted for recycling (tonnage/year), actual and potential;
3. End-use market applications to absorb the recyclates (tonnage/year), actual and potential;
4. Product design's importance to match the needs of the end-use market applications;
5. Whether design-for-recycling guidelines or standards under consideration fall into one of the following cases
    - Suitable guidelines or standards exist and are implemented (high market penetration) but there is a need for more collection and sorting;
    - Suitable guidelines or standards exist but need further implementation/ promotion;
    - Suitable guidelines or standards exist, but need review/revision/update or streamlining/selection; or
    - Suitable guidelines or standards do not exist, but can and should be developed for existing or new recycling technologies by 2025.

Based on the criteria above, the list of the priority product categories is as described in Figure 2.

Figure 2: priority product categories selected in the CPA work plan on design-for-recycling



The automotive and EEE sectors prioritise specific plastic materials in product components or parts that are used through the sector, in order to maximize the impact of future design guidelines. The EEE sector is looking at four guidelines already under development: PolyCE, Plast2bCleaned, NonTox and Ecosystem eco-design guidelines.

According to the CPA analysis[10], **the 26 priority product categories in 3 of the 5 CPA sectors (namely: agriculture, packaging and construction) generate in total 18.4 M tonnes of plastic waste in Europe per year** (out of a total of 29.1), **of which 9.9 M tonnes are collected separately (out of a total of 11.4)** and 3.9 are turned into recyclates in Europe (out of 4.9).

The CPA analysis is thus that the 10 million tonnes target can be achieved with these 26 priority products, assuming that

- At least 16.7 million tonnes of plastic waste are separately collected and sorted for recycling in Europe (against 9.9 M tonnes currently);
- Most sorted plastic waste is sent to European recycling plants (e.g. 90% sorted waste from packaging) and a high share of recycled plastics produced in Europe are also used in Europe (e.g. 82% of recycled plastics originating from packaging sector); and
- the ratio between the "sorted waste sent to recycling" (i.e. waste arriving at the recycling plants) and the "recyclates" (i.e. outputs after the recycling operations) slightly improves from 78% in 2020 to 80% in 2025, also thanks to **design standards.**

In this context, it is important to ensure that if the design guidelines or standards do not produce the desired recycling yields, R&D and Investments will be mobilised to find new product design and technology solutions.

The working groups of the Alliance, with the support of the Joint Research Centre (JRC) of the European Commission, have been collecting data to generate a mass flow model (i.e. Sankey diagram) which describes the plastic materials flows in Europe from waste generation to recycling. This model covers the 5 plastic-using sectors of the CPA (i.e. packaging, automotive, construction, electronic and electrical equipment, and agriculture).

This mass flow model helps the CPA to (not exhaustive list)

- Simulate/monitor the impact of design guidelines or standards on the actual recycling of the priority product categories, also taking into account the impact of improved collection and sorting.
- Understand the mismatch, if any, between quantities of plastic products put on the European market and the supply and demand of recyclates for end market applications.
- Identify material flows that require innovation in design or recycling technology as a matter of priority (also informing the implementation of the R&D agenda)

[10] using the mass flow model developed by the Joint Research Centre of the European Commission (JRC)

2.5 Work done by the CPA for each priority product category

The potential of a product category to generate recyclates for end market applications is directly governed by

1. The quantities of products put on the European market;
2. The recyclability of the products, hence the recyclability of the waste generated, based on the applicable design guidelines or standards; and
3. The quantities of plastic products collected (once waste) and (properly) sorted for recycling.

For each priority product category included in the work plan, **the working groups of the Circular Plastics Alliance assess the existing design guidelines and the needs for updating, revising or creating European standards** according to

- perceived effectiveness of existing guidelines and standards– qualitative assessment and ranking
- level of market penetration and uptake
- If available, validation requirements (including test protocols; self-assessed vs. external body certification)

The Circular Plastics Alliance adopts the following stepwise approach for each priority product category included in the work plan:

1. Investigate and quantify the uptake of recycled plastics which can be achieved with the current quantities of waste collected and sorted for recycling if we maximize efforts on design-for-recycling of the products and the absorption commitments by end markets ("low hanging fruit").
2. Investigate and quantify the potential for improving intra-EU recycling of the plastic waste currently being collected for recycling, *under the assumption that plastic waste currently being sent outside the EU for recycling is unlikely to return in the form of new plastic products put on the EU market* ("medium hanging fruit")
3. Investigate and quantify the potential for improving/increasing the collection and sorting of plastic waste in the EU, bringing it to the next level. This is the "highest hanging fruit".

2.6 Role of CEN-CENELEC

Where the Circular Plastics Alliance will determine optimal design-for-recycling guidelines and standards (non-CEN), the objective is to translate these into EN standards (CEN-CENELEC).

Based on the discussions and aims of the CPA, two types of deliverables are suggested:

- European Standards (EN), which is a result of a transparent, open and consensual development process with national commitment. The development of a European Standard includes a public enquiry accompanied by a weighted vote of CEN National Members, a Formal vote ('weighted vote') of CEN National Members and final ratification. The Formal Vote may be optional depending on the outcome of the Public Enquiry and associated vote. The European Standard is announced at national level, published or endorsed as an identical national standard, and every conflicting national standard is withdrawn.
- Technical Specification (TS), serves as an apt deliverable for topics where 'appropriate' consensus/transparent solution is needed to serve market within which there is no immediate need for national implementation and withdrawal of conflicting national standards. A Technical Specification can be transformed into a European Standard (EN) and thus may serve as a CEN 'pre-standard'. This pre-standardization role is further acknowledged through the possibility of allowing the existence of 'competing' Technical Specifications, which permits CEN to test two (or more) solutions to a specific market need: with experience, the preferred solution could then be transformed into a European Standard.

Participation to CEN and CENELEC technical committees by CPA participants to be organised via the national delegation principle, wherein National Standardization Bodies (NSBs) in case of CEN and National Committees (NCs) in case of CENELEC, delegate experts who voluntarily decide to participate in technical discussions leading to the adoption of European Standards and other CEN deliverables.

Regulation EU 1025/2012, recognizes CEN and CENELEC as European Standardization Organisations (ESOs). Under this status, the European Commission asks for specific actions from the ESOs to support and complement European policy objectives, such as developing ENs, TSs or performing pre-normative or co-normative work (link). The European Commission sets the content and deadlines for these specific actions in coordination with the Standardization Request Ad-Hoc Group (SRAHG). A similar SRAHG, titled 'Plastics recycling and recycled plastics' has been established by CEN-CENELEC to contribute to the activities of the CPA and facilitate the preparatory work in view of a planned standardisation request by the European Commission on 'Plastics recycling and recycled plastics".

CPA Design-for-Recycling Workplan: milestones

Milestones	
Establish work plan - DONE	March-20
Select of priority products - first wave - DONE	March-20
Select standardization route (ISO or/and CEN) - DONE	March-20
JRC Recommendations on design guidelines and standards - DONE	30/4/2020
Identify existing CEN, CLC TC's and existing deliverables that could be used or revised (standards (EN), technical specifications (TS), technical reports (TR) - DONE	31/8/2020
Inputs from the questionnaire circulated in CPA Preliminary results on standardization needs DONE	31/8/2020
Input from CEN/TCs - what is limiting or supporting uptake of recyclates, what further activities are planned - DONE	1/9/2020
Ask SRAHG members to contact CEN/TCs for their experts to join DPT representatives - DONE	23/9/2020
CEN/TCs experts take part in DPTs	ASAP but no limits of time
Communications on expectations ready for DPTs (email)	30/9/2020
Creation of Dedicated Product Teams (DPT's)	1/11/2020
Deliver facts to the SRAHG i.e. standardisation needs including a gap analysis	15/1/2021
WG Chairs and Thematic coordinators - consistency check and send needs to SRAHG	31/1/2021
SR AHG finalizes gap analysis: what is not yet addressed by CEN/TCs to support circular plastics input for Standardisation Request	15/2/2021
CEN/TCs review and confirm Inputs on SR (list of standards)	15/4/2021
SR AHG evaluates Feedback of TCs and communication with TCs	30/6/2021
SR AHG sends inputs for SR to DG Grow (list of standards)	30/6/2021
1st Draft SR from DG Grow to CEN and CENELEC	31/8/2021
Elaboration of comments on SR in SRAHG and TCs	31/10/2021
Send 1st Draft commented to DG Grow	31/10/2021
Final Standardisation Request submitted to CEN and CENELEC	30/11/2021
Acceptance of SR by CEN and CENELEC	31/12/2021

Specific DfR Needs: AGRICULTURE

Plastics are widely employed in agriculture (plasticulture) as they increase significantly the production in quality and yield. The vast majority of these plastics are films and nets, made of thick mono-polymers. The issue is to maintain their intrinsic ability to recycling and integration during use and collection. DfR guideline are needed to improve the quality of collected used plastic, at the farm, during collection and in pre-treatment facilities.
Considering the specific need in agriculture of an improvement in collection and recycling, all products are considered as priority ones, even is their volumes limited in comparison with other sectors. The biggest segments of priority products in agriculture are films, first for mulching representing a high volume already collected, but now sent to landfill due to their soilage rate that does not meet the increasing recyclers expectations and second for breeding that can now benefit from new cleaning technics.
Second segment of priority products are nets usedfor crops protection and forage collection. Those last ones are not already recycled, but will be able to it thanks to innovative cleaning technics currently in development.
A third segment of products covers the irrigation applications, ranging from LDPE thin wall dripping lines to HDPE thick wall pressure pipes. Pressure pipes are common to the building an construction sector, reason why agriculture will cover only products specifics to farming.
The last segment covers PP products, namely twines and non-woven films, where collection should increase, in addition non-woven products are facing cleaning challenges at removal and recycling.

Specific DfR Needs – CONSTRUCTION

Among others, the main polymer types commonly used in building & construction are PVC, polyolefins and polystyrene. For some product families, mechanical recycling capacities are already in place, for others chemical recycling solutions are under development or need to be explored. At the same time, construction products are specific with their long lifetime of 5-100 years, which shifts their availability into the future. The re recyclability of construction products as pre-condition to increase recycled content, however, can be solved and realised at short-term by design-for-recycling. Recyclability is therefore a key requirement of design-for-recycling guidelines, applicable to construction products.
Also, the short and mid-term product recyclability and therefore uptake of r-content will be influenced by the future regulatory environment on legacy additives, waste classification, and others (e.g. REACH, CLP, waste, etc.).

A clear distinction should be made between intentionally added substances, which can be addressed, and legacy substances in recycled materials which cannot be removed economically on the basis of current technology. There is a need for pragmatic solutions that encourage the continuation and development of recycling for waste containing legacy additives while ensuring appropriate protection of human health and the environment.

In the short term, recycling quantities that are available on the market today should be taken up into today's B&C applications that are technically allowing it. Priority products were identified in large-scale applications such as non-pressure pipes, films & sheets as well as windows & doors. To this end, design guidelines should allow for a maximum uptake of recyclate.

In the medium term, new products placed on the markets should be designed in a way allowing for recyclability at their end-of-life. To this end, priority segments and products were defined in the fields of non-pressure pipes, films and sheets, PVC windows & doors, flooring, building cables and building insulation. A more elaborated disclosure of 2nd wave priority products is planned for January 2021.

Specific DfR Needs: ELECTRICAL AND ELECTRONIC EQUIPMENT

EEE (under the scope of the CPA signatories) contributes to circularity through the WEEE compliance schemes, which channel secondary raw materials including plastics back into many manufacturing material flows. Material flows within the EEE sector are mostly open loops and part of multiple circular flows. Due to long lifetime of the EEE products (range between 5-20 years) any changes in design for recycling are unlikely to have an impact on the 10 million tonnes target as products designed today will only reach their end of life well beyond 2025. The bulk of the potential to increase recyclability of the plastic products in scope for EEE is in collection and sorting. Due to leakage in WEEE flows many appliances do not reach recycling facilities meeting EN treatment standards. This contributes to a great loss of potential secondary raw materials across the EU.

EEE manufacturers (under the scope of the CPA signatories) produce 'products with some plastic components.' Therefore, the sector is advancing in circularity that considers other materials as well as plastics. In addition, the EEE sector is comprised of hundreds of different product categories with a very large variation in design and use of plastic.

Design for recycling in the EEE-sector is underpinned by a wide set of standards and existing guidelines that cover the recyclability of the EEE products. Many of the standards are relatively new or recently updated. EEE is advanced in guidelines, which could be benchmarked easily in other sectors. Further awareness raising of the existing standards and guidelines will also help facilitate further links between designers and recyclers.

Specific DfR Needs: PACKAGING

The rigid Packaging sector relevant polymers PET, HDPE, PS, PP and the corresponding highlighted sector relevant products (bottles, trays, caps) are generally available as mono-material products. Design efforts are needed to ensure polymers can be correctly sorted and contaminants (e.g. labels) can be effectively removed during the recycling process.

Logistic LDPE packaging is mostly mono-material. Flexible packaging as sector relevant product linked to the sector relevant polymers LDPE and PP, is in general not available in the

waste streams as a mono-material film today. Food packaging is often multi-material to enable food preservation and guarantee shelf life along the value chain. CPA and relevant D4R guidelines will address with appropriate further analysis how far the percentage of mono-material flexible packaging for food packaging can be increased without unintended consequences like increasing food waste.