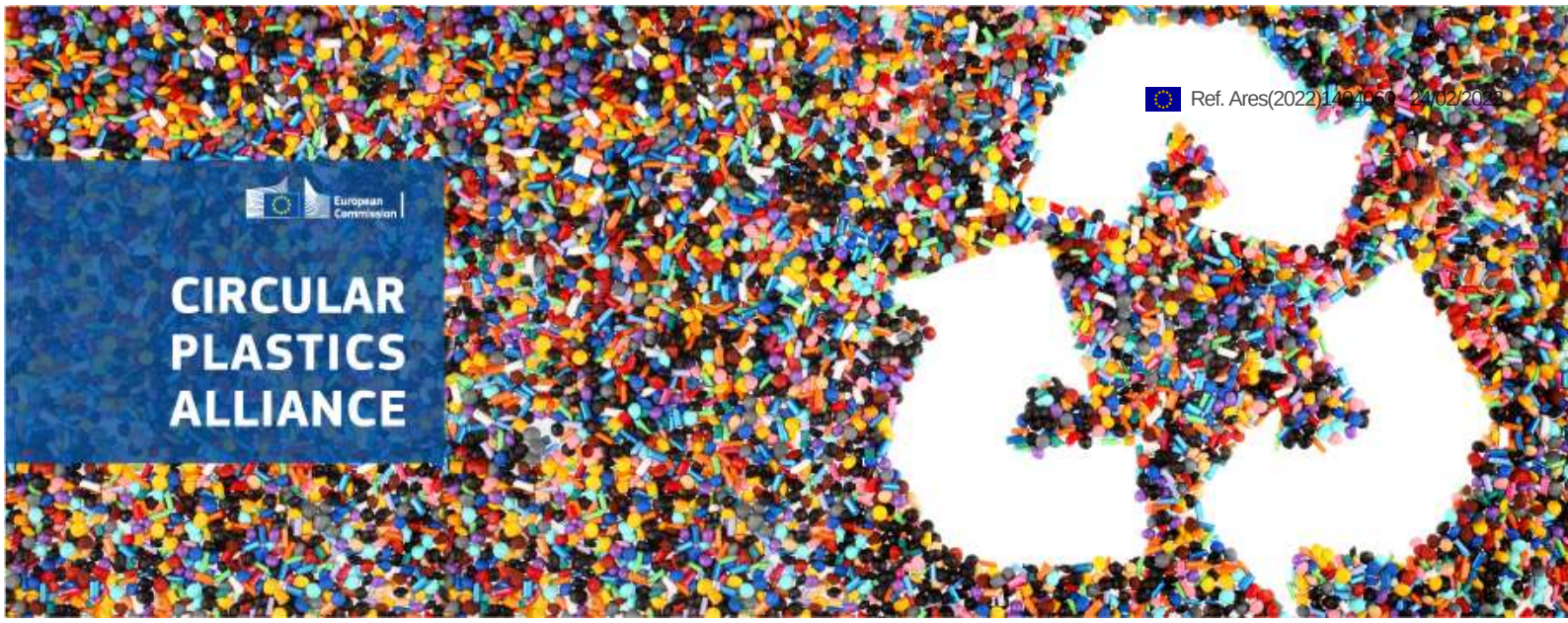

Supporting greater uptake of recycled plastics in Europe

Circular Plastics Alliance's assessment of the legal, economic and technical requirements and solutions

Executive summary

Introduction:

The Circular Plastics Alliance (CPA) was launched with the support of the European Commission in 2018 as a voluntary platform to deliver on the circular economy for plastics and increase the use of recycled plastics in products on the European market to 10 million tonnes by 2025.

In September 2019, actors all along the plastics value chains formalised this voluntary action with the signing of the CPA declaration. Under the theme of "Recycled Content" this declaration included the following commitment from all signatories:

"We commit to work with all relevant public and private actors across Europe to create effective conditions for the increased uptake of recycled plastics. We will identify the legal, economic and technical requirements ensuring more uptake of recycled plastics and report on these with solutions".

The many signatories of the CPA worked extensively on this topic within the five sectoral working groups (building & construction, packaging, EEE, automotive and agriculture) during 2020 and the first half of 2021. Upon review of this body of work it was clear that many commonalities that run across all major plastics markets, which resulted in this collective report from the Alliance.

In September 2021, the CPA released its untapped potential report[1]. The Alliance estimated that reaching its 10 million tonnes target by 2025 requires to substantially increase: from a 2020 baseline, sorting capacities from 12.5 million tonnes to 16.7 million tonnes, and recycling output capacities from 6.3million tonnes to 10 million tonnes. This scenario assumed that export of recycled plastics drastically decreases, if not ceasing altogether, and that the demand for recycled plastics in European products (i.e., recycled content) increases to ensure uptake of the full 10 million tonnes.

This report focuses on common requirements which occur across the major plastic using sectors (building & construction, packaging, EEE, automotive and agriculture), and solutions to increase uptake of recycled plastic. **It should be noted here that due to its mandate the CPA is not allowed to propose EU level policy solutions**. The report also includes an explanation of the different plastics processing techniques and how they incorporate recycled material to provide a broader audience with an understanding of the manufacturing processes involved.

What the work of 3 years in the Circular Plastics Alliance has clearly demonstrated is that **the circular plastics economy is a system. One in which everyone has to work together to drive change, understanding that the actions of any one part of that system impact the system's ability to deliver as a whole. This renders collective work among private and public actors along the value chain essential to deliver the circular economy for plastics. The Circular Plastics Alliance has already driven great progress in this through identifying and working on the major components of the system**: design of plastic products to improve recyclability, collecting plastic when it becomes waste, sorting and recycling what is collected, monitoring progress and above all committing to use the recycled plastics. The more we improve, and in some places create, that system in Europe, the more recycled plastic will be used in products. Achieving a circular plastics reality requires action and commitment from us all, the plastics value chain, government at every level, civil society and individuals.

[1] https://ec.europa.eu/docsroom/documents/46956

Key conclusions and next steps:

Unlocking the potential for greater uptake of recycled plastics and reaching the 10Mt target of the CPA, primarily requires **a stable supply of suitable quality recyclates in sufficient quantities in the European market**.

To deliver this, **this alliance has identified 5 key requirements common to all 5 CPA sectors** (building & construction, packaging, automotive, agriculture and electrical and electronics):

1. Ensuring a stable supply of recyclates of suitable quality across the single market, with transparent and appropriate information on the quality of the recyclates,
2. Increasing the quantities of recyclates available in the single market,
3. Ensuring the (cost) competitiveness of recyclates vis-à-vis virgin equivalents,
4. Identifying and removing "legacy substances", and
5. Creating a predictable framework conducive to investments in circular plastics.

To overcome these requirements, **this alliance proposes a series of solutions, and calls on national authorities in charge of waste management to join this alliance** to work together on these with the plastics value chain:

- ✓ Step up public-private cooperation along the plastics value chain in all European countries, to build effective collection and recycling streams[2] and ensure a predictable framework for investments in circular plastics
- ✓ Increase collection and sorting of recyclable plastic waste in all European countries to deliver a stable, sufficient flow of sorted plastic waste to feed European recycling plants
- ✓ Develop or revise European standards on the quality of sorted waste and recycled plastic materials, taking into account specific requirements per intended applications or sectors, and the quality of the information provided (also for digital trading)
- ✓ Invest in collection, sorting and recycling capacities[3] to increase volumes and decrease costs of recycled plastics, while quality improves
- ✓ Support R&D and investments in advanced sorting technology, on-site testing of recycled materials, and innovative recycling[4]
- ✓ Ensure recyclability of plastic products, starting with the products prioritised by the CPA[5]
- ✓ Review quality marks, ecolabels and (national) product standards to lift existing barriers to the safe uptake of recycled materials
- ✓ Take local action to make recycling cheaper than landfilling and incineration, or ban landfilling
- ✓ Ensure an effective single market for plastic products, plastic waste and recycled plastic materials, e.g., common rules and quality standards, easy cross-border shipment of waste for recycling
- ✓ Agree on common rules in the single market for calculation and reporting of recycled content in final products and related environmental benefits (e.g., CO2), to communicate the value of recycled content beyond price

[2] See the CPA analysis of the state-of-play on collection and sorting at https://ec.europa.eu/docsroom/documents/43694

[3] See the CPA analysis of untapped potential at https://ec.europa.eu/docsroom/documents/46956

[4] See also the CPA R&D agenda at https://ec.europa.eu/docsroom/documents/43693

[5] See the CPA Design work plan at https://ec.europa.eu/docsroom/documents/47334

- ✓ Coordinate awareness raising action across Europe about proper disposal of plastic waste (consumers and professional end users).

Next Steps:

The Circular Plastics Alliance calls on all stakeholders, in particular national and regional authorities across Europe, to send their feedback or questions on this report by 18 March 2022 via the CPA secretariat GROW-ENV-RPLASTICS-PLEDGE@ec.europa.eu.

Based on feedback received and subsequent discussions, **the alliance will update its analysis on untapped potential and recycled content in early 2023**, and in particular report on new developments across the value chain and action taken and good practice examples by individual signatories. This update will also integrate any new data on actual quantities of recycled plastics used in European plastic products.

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Context

In this report recycled plastic refers to the definition as in the CPA monitoring system methodology established in September 2021: *"Plastic prepared by processing plastics waste for the original purpose or other purposes, but excluding, energy recovery and fuel production"*. It is a broad definition covering recycled plastic made from any waste stream (pre-consumer or post-consumer) and any recycling technology, in line with the EU's Waste Framework Directive.

As confirmed by the European Commission, the achievement of the 10Mt target by 2025 will take into account only recycled plastics from post-consumer origin, to the exception of recycled plastics reported under the Vinylplus voluntary commitment which has been accepted as a valid pledge under the European Plastics Strategy in 2018[6]. This reflects the scope of the baseline assessment made by the European Commission at the time of setting the 10MT target in the European Plastics Strategy. In practice, recycled plastics made from pre-consumer waste are also an important part of circular plastic system and are already extensively used by the 5 industry sectors of the CPA. This is why this report follows the scope of the CPA's monitoring system and considers recycled plastics from all waste sources.

The recycling of plastics is an evolving industry and there is a wide range of recycling technologies available reflecting differences in waste collection systems, products and polymers. Broadly speaking recycling technologies can be split into four categories as reflected in updates to both European (prEN17615, publication in 2022) and International (ISO15270, revision initiated 2022) standards. The first three technologies, mechanical, physical and chemical recycling are all applicable in the context of this CPA report on increasing uptake of recycled plastics.

1) **Mechanical recycling;** processing of plastic waste into secondary raw materials or products without significantly changing the chemical structure of the material. It is noted that Plastics secondary raw material is a synonym of recyclate.

2) **Physical recycling;** process in which a plastic is subject to a series of purification steps to separate the target polymer/polymers from other polymers, additives and other materials such as fibres, fillers, colourants and contaminants, resulting in recovered polymers which remain largely unaffected by the process and can be reformulated into plastics. It is noted that this process may also enable the recovery of other valuable components from the waste plastic and that these technologies are today mostly solvent-based methods.

3) **Chemical recycling;** conversion of polymers into chemical substances by changing the chemical structure of plastic waste through processes such as cracking, pyrolysis, gasification or depolymerization excluding energy recovery and the production of materials that are to be used as fuels or for backfilling operations. It is noted that "feedstock recycling" is widely used as a synonym for "chemical recycling".

4) **Organic recycling;** composting or anaerobic digestion of biodegradable organic waste under controlled conditions using microorganisms to produce, in the presence of oxygen, stabilized organic residues, carbon dioxide and water or, in the absence of oxygen, stabilized organic residues, methane, carbon dioxide and water. It is noted that the term "biological recycling" is used synonymously, and landfill shall not be considered a form of organic recycling.

[6] https://ec.europa.eu/growth/content/european-strategy-plastics-voluntary-pledges_en

In all cases, recycling refers to the conversion of plastics waste into new products in line with the EU Waste Framework Directive[7]. It does not include the use of waste-derived feedstock as fuel or as means to produce energy.

4 ways recycled plastic can be used in the creation of new plastic products.

Plastics products are made using a wide range of techniques to convert the raw materials into different forms and shapes, providing the wide range of plastic products available on the market today. The list below is non-exhaustive and focuses primarily on the process for production of thermoplastics, which represent the majority of materials within scope of the CPA. At its most simple all thermoplastic manufacturing techniques take polymer pellets and additives, create from them a molten plastic using heat and pressure (a process known as extrusion), treat that molten plastic such that it cools into the desired flexible or rigid form. These are usable finished or semi-finished products, which may go on for further processing such as coating, decoration or assembly prior to becoming the product sold to a consumer. Most of the techniques described below are also possible with multiple input feeds, enabling more than one plastic type to be used in the creation of a finished or semi-finished product, this is known as co-extrusion. Co-extrusion techniques are very common for making a product which has a recycled plastic layer incorporated between two layers of virgin plastic.

The main converting techniques include:

- *Injection moulding* where molten plastics are injected into a mould and cooled in a controlled manner to take the desired shape e.g., preforms, caps, Lego bricks, fittings for pipe systems
- *Injection blow moulding* where a molten plastic is first injected into a mould, then in a second step inflated with air to a defined shape, with both steps taking place in one machine e.g., containers, jars,
- *Stretch blow moulding* where an already formed rigid plastic product can be blown into a new shape, e.g., the creation of bottles from a pre-form.
- *Profile and pipe extrusion,* where molten plastic is first injected into a mould and then pulled through calibers which cool the linear product with water resulting in a shaped profile or pipe ready for assembling or installation e.g., pipes, window profiles, building profiles.
- *Extrusion blow moulding*, where plastic is extruded as a parison (a hollow tube), this is then closed within a cooled mould and inflated with blown air to take the shape of the mould. e.g., bottles
- *Rotational moulding*, where the rotation of the mould allows for production of large plastic products e.g., ancillaries for pipe systems, fuel tanks, bins, traffic cones,
- *Cross-head extrusion*, where an adaptor is added to the extruder such that the molten plastic produces wires and cables which are then cooled to maintain shape
- *Blown film extrusion*, where molten plastic is delivered at a constant rate to through a circular die which can be set to give a tube of controlled diameter and wall thickness. The tube of molten plastic is inflated into a bubble by continuously blowing air inside. The

[7] In Waste Framework Directive "Recycling" means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

bubble is cooled then collapsed, flattened and wound up under constant tension to create a tubular film, this can be slit to create sheets of film.

- *Cast film or sheet extrusion,* where one or multiple layers of molten plastic are extruded through a wide, narrow slit forming one or multiple layers which are uniformly cooled over a roller or rollers creating a sheet or film. The film or sheet can be used for thermoforming (see below) into the desired shape (see thermoforming). It is also possible to orient the polymer chains during the cooling step to add extra technical properties to the film.
- *Extrusion coating*, where molten plastic is used as an adhesive to bond two materials together. The molten plastic is released through slits in a constant speed to form a web of polymer laminating a sheet of material (which might be plastic or another material such as paper), e.g., very thin multilayer films or coated board
- *Thermoforming*, where heat and pressure are applied to a sheet of plastic such that it conforms to the shape of the mould.
- *Foaming,* where the plastic material expanded through different techniques in order to obtain a very light material, with a defined foam cell structure, and formed into the desired shape.
- Plastics are also *spun into fibres* for woven and non-woven products such as textiles, ropes, face masks and other personal protective equipment.

The quality and consistency of the plastic needed to make a finished or semi-finished article varies with the converting technique, the thickness of the final product (films are more technically demanding than rigids) and the properties of the polymer being used.

Within all these techniques for making plastic products there are 4 ways in which recycled plastic might be incorporated.

1. The product is made using only recycled plastic as input material, normally with a small amount of virgin plastic to provide additives to get the best quality material for the product. Additives can help stabilise the plastic, improve its processability during manufacture, add colour etc.
2. The product can be made using a mix of recycled and virgin plastics. This can be done in two ways; the recycled plastic and virgin plastic pellets are physically mixed at the start of the converting process or a blended material from a polymer producer is used (e.g., polymer pellets made with a certain amount of recycled plastic)
3. The product is made in a multi-layer structure (known as co-extrusion) where different layers are made from virgin, recycled or blend plastic to form one finished or semi-finished product.
4. The recycled plastic is used as a filler in the production of a plastic product

Uptake of post-consumer recycled plastic

According to the PlasticsEurope study "The Circular Economy for Plastics – A European Overview" in 2018 at least 4 million tonnes of post-consumer thermoplastic recyclates were used in products in the EU, Norway and Switzerland. The study focused on recyclates from post-consumer waste only and therefore does not reflect the total usage of recycled plastic in products in Europe. It is however a good indicator of the situation at the start of the work of the CPA.

At the time of publication very little data at a European level regarding the recycling or uptake of recyclates from pre-consumer waste had been identified and as such it is not included in this report. In future, the CPA's monitoring system will provide a good indicator of the scale and uptake of recycled plastic from pre-consumer waste and from post-consumer waste, as it has been designed to monitor these two streams independently.

As can be seen in image 1 (below) the 4MT of post-consumer recyclates used in 2018 were taken up across all sectors of the economy. It should be noted that pre-consumer recyclates can be a significant input for some sectors such as the automotive industry.

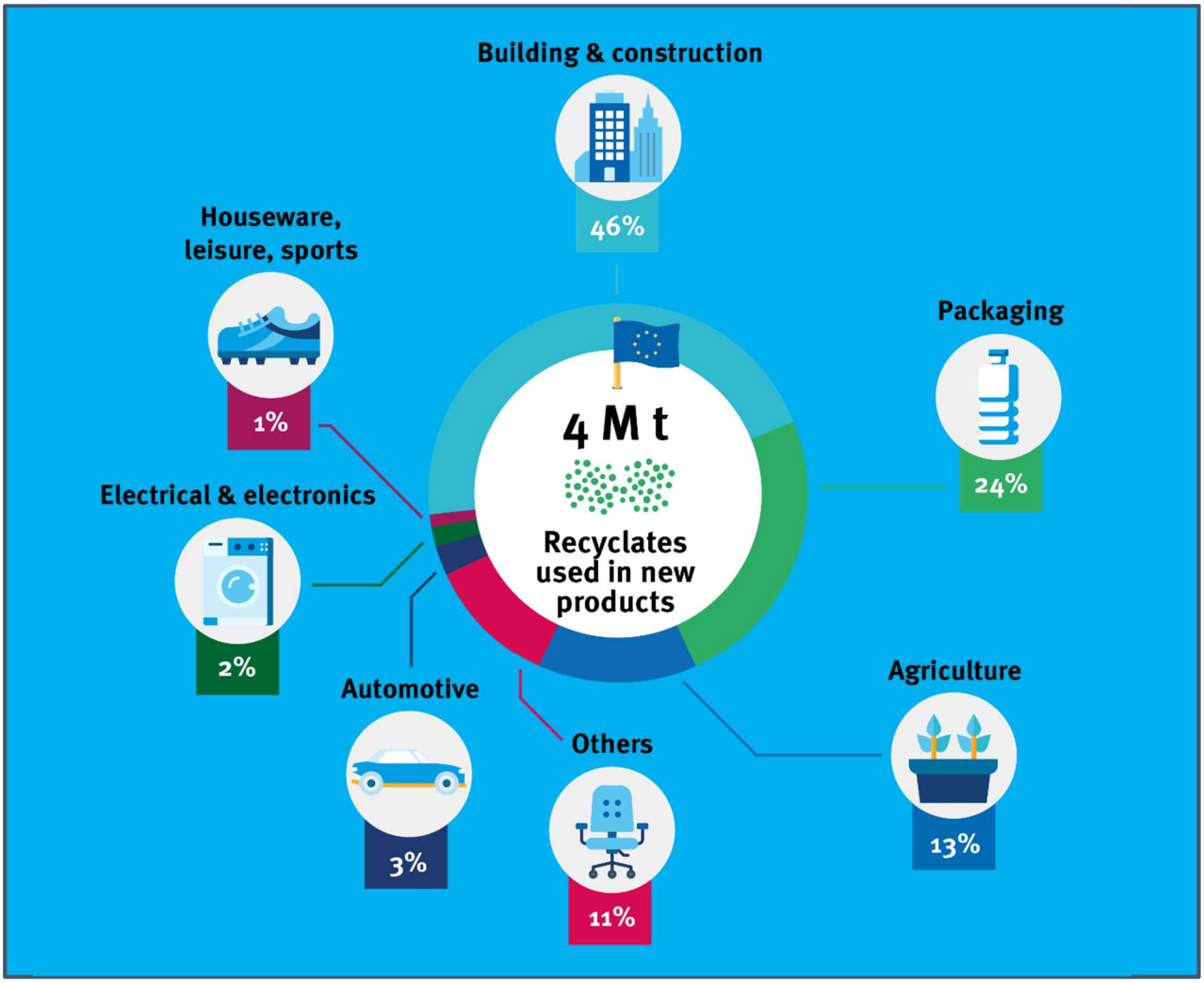


Image 1: Overview of sectors using recyclates from post-consumer waste in new products in EU, UK, Norway and Switzerland. Source: "The Circular Economy of Plastics – A European Overview", Plastic Europe, 2019

According to the study the products commonly using post-consumer recyclates in 2018 included:

Building & construction: pipes (non-pressure applications mainly sewage, stormwater and soil & waste pipes), windows and other construction profiles, flooring, road construction products such as cones, insulation and profile boards.

Packaging products and applications: Bubble wrap, transport and shipping foils, pallets and IBCs, packaging tapes, garbage bags, buckets and barrels, cleaning product packaging, beverage bottles

Agriculture and Gardening applications: Rain barrels, composters, hoses, irrigation pipes, raised beds, flowerpots, bowls and baskets, cultivation trays, foils and films (coverings and silage)

Automotive: “under the hood” applications, handles, bumpers, exterior rear-view mirrors, warning lights, safety triangles,

Electrical and Electronics: cable casings, coffee machines, vacuum cleaners and drill housings.

Other: folding boxes, sports shoes, back packs,

The study also gives an overview of the uptake of recycled plastic as a percentage of total plastic usage in each sector, as portrayed in image 2 below.

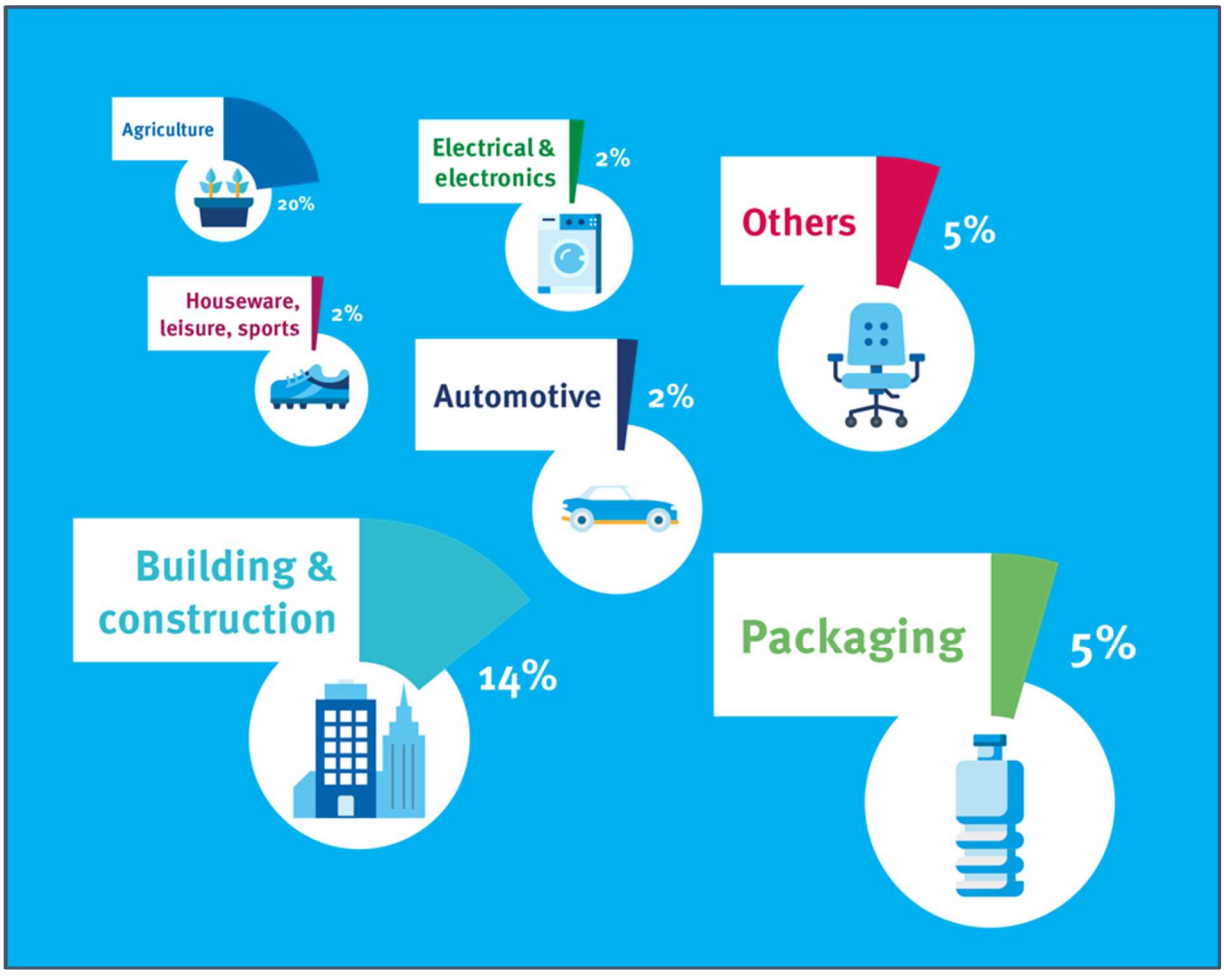


Image 2: Overview of share of recyclates from post-consumer waste used in new products per sector in EU, UK, Norway and Switzerland. Source: “The Circular Economy of Plastics – A European Overview”, Plastic Europe, 2019

Legal, technical and economic requirements to increase uptake of recycled plastics

Having evaluated many legal, technical or economic requirements for increasing the uptake of recycled plastics, the CPA's 5 Working Groups arrived at the following common themes.

1. Recycled plastics need to be available at the quality required for the specific application, with a consistent and secure supply to support manufacture of the entire production-span of the product in competitive conditions.

Currently many CPA signatories wishing to use more recycled plastic find they face a limited availability of the material in the quality they require and or a lack of stability of supply.

There are several aspects to be addressed here:

1) the quality needed is application/product specific, reflecting the combination of properties needed with the legal and compliance framework.

2) the uptake of recycled content is often prohibited by the law, policy, standards or quality marks set up to support that product market.

3) there is often limited knowledge about what the recyclate is made from (the waste origin) and what it is best used for.

4) the waste available to produce recycled plastic can change significantly over time, in terms of composition, quality and quantity.

The quality of the recycled plastic required is specific to the application or product being produced. Quality is a function of properties required (mechanical strength, stability throughout use phase - which itself can vary from weeks to decades -, processability, colour, odour, noise protection, energy efficiency, durability, hygiene, fire safety etc) and the legal/compliance framework.

The legal framework differs within sectors, for example in packaging the requirements to protect fresh food or pharmaceuticals differ greatly from those for transporting dangerous goods or storing products in transit. In the automotive sector these requirements are specific to every part of the vehicle, such as safety requirements for relevant parts (e.g., airbag covers which might splinter in case of an accident and injure passengers). In construction, while all products must meet the basic requirements of the construction products regulation, requirements differ greatly between categories of products based on function such as pressure, design life (longevity), food contact, insulation/conductivity of electricity. It should be remembered that rules for safety of recycled content in food contact materials apply across packaging, EEE and building and construction.

The length of time that supply needs to remain secure and consistent also varies with the application being made, for example a car may be in production for 7 years with each vehicle (i.e., its constituent parts) needing to be identical in its specifications. In addition to this timeframe, there is a need to secure supply for spare parts with the original specifications. Spare parts to enable 'repair-as-produced' are an essential part of extending the lifetime of consumer goods, such as vehicles.

It is important to note that both quality and security of supply are directly linked to the realities of what becomes waste at any given time and what is collected. If it is not collected and sorted, it will not become recycled content. Waste collection is set by national and local authorities with variations between and often within countries. There are further variations as to what plastics are available in

a waste stream, reflecting seasons as well as urban vs rural lifestyles. Security of supply may also be seriously impacted as new rules about new legacy additives are implemented, this is mostly true for waste streams containing longer-life products such as in building and construction, automotive and EEE.

Solutions:

A key solution is to evaluate the qualities being required for products/applications so as to provide an overview and encourage the matching of recyclate quality with the quality demanded. There is cross-sectoral overlap where products in different sectors will have the same quality demands. For example, there is a legal requirement for food contact approved recycled across packaging, construction (e.g., drinking water pipes), and electronics (e.g., household appliances).

The quality requested for a given application should be reconsidered to support the use of recycled plastics, wherever possible in line with legal requirements. All actors need to look at plastic production and use from a perspective of encouraging final product specifiers to adopt a circular economy mindset, using maximum possible recycled content and also designing for recyclability at end of life.

Industry, local authorities and civil society groups should work together to review standards, quality marks and eco-labels for products to ensure that they are based on performance of the material both in processing and in the use stage and not origin or polymer purity. This will remove barriers to recycled plastics creating a level playing field with virgin plastics. For example, the UN rules on transport of dangerous goods have recently been revised to allow the use of recycled plastic where the performance requirements can be met. Product standards should also be harmonised at European level, to remove country differences in requirements and create a common single market.

Another solution, which CPA signatories are already acting on, is to prepare inputs for the **creation or revision of European standards to characterise waste and recyclates**, in cooperation with authorities and civil society. (See below:

The CPA's recommendation on new European standards to enhance the circularity of plastics and drive greater use of recycled plastic in products). A common framework for describing waste and recycled plastics will accelerate the secondary raw materials market, enhancing data and building trust in the ability to source a secure supply of consistent quality material. This is particularly necessary as recyclates are commonly sold in much smaller batches than virgin or blend polymers requiring converters to source material from multiple suppliers to secure the quantity needed.

The work on characterising waste will also enable a greater monitoring of the type of waste from which recyclates are made, supporting increased transparency in the value chain which may be further enhanced by certification, verification schemes or auditing. Audited data is a corner stone of the CPA's monitoring system for recycling and uptake of recycled plastics.

Linked to this characterisation aspect is a need for private and public **investment in the research and development of new on-site real-time testing capabilities** to support recyclers and manufacturers to generate data in an affordable manner. This is particularly important in applications where there is potential for the waste stream to contain legacy substances (see items CPA3 and CPA7 under the CPA deliverable on Research & Development).

Public and private investment is also needed for new and improved, sorting and recycling technologies to enable the recovery of plastics that cannot be recovered today and to deliver the full range of qualities required to replace virgin resource with recycled plastic.

A critical role for national authorities is to rapidly implement, in a coherent and harmonised manner, policy updates from recent years in particular the circular economy updates to waste legislation adopted in 2018. A single European market for plastic products, waste and secondary raw materials is a key enabler for producing quality recyclates with secure supply.

CPA signatories will continue to showcase best practice examples of using recycled content and recycling technologies to help make today's best in class tomorrow's common practice. We will also continue to collaborate to demonstrate what is possible, share expertise and innovation. Showcasing best practice will also encourage consumer acceptance of recycled content.

CPA signatories have a role to lead the way in demonstrating and encouraging the use of as much recycled content as is possible across products, and to support the creation of the infrastructure required to supply the needed qualities consistently. This can only succeed with the support from local and national authorities to enhance and/or implement the waste management system (through investment in separate collection, sorting and expanded recycling capacity) and ensure the waste is not lost to incineration or landfill but gets to plastics recyclers.

2. Addressing competitiveness between virgin and recycled plastics; acknowledging differing cost structures and carbon footprint.

Establishing cost competitiveness between virgin and recycled plastics would support the increased use of recycled plastics. The costs of recycled plastics are to a large extent fixed by the waste collection and sorting system, including the relatively high costs of transporting plastic waste which is by nature lightweight but bulky. The costs of virgin polymers fluctuate due to supply/demand and raw material cost fluctuation. Depending on where the relationship stands this price difference can impede or support the uptake of recycled plastics. It is also important that pricing consider and reflect the carbon footprint, and overall environmental sustainability, of using virgin or recycled plastics.

Solutions

Action from (local) authorities is needed to help ensure that recycling of plastic is cheaper than the costs for incineration and landfill for all waste streams. The use of modulated EPR fees for packaging is a good example of a tool to drive this. CPA signatories encourage authorities to ban the landfilling of recyclable plastics as early as possible.

Public and private investments for new and improved, sorting and recycling capacity, should benefit the entire value chain (including companies purchasing recyclates) and this should contribute to provide more competitive price for secondary raw material.

Strengthening the ability of the company placing the finished product on the market to know the total recycled plastic in their end product, along with the beneficial LCA impact of the use of recycled plastics would help create additional value beyond price for recycled plastics. Companies, civil society and local authorities should work together to create harmonised labelling and standards to communicate this important environmental benefit to consumers so that the recognition of this value is matched by willingness to pay a potentially increased cost for circular plastics.

Public organisations should lead by example and prioritise plastic products with higher recycled content via procurement policies.

A harmonised measurement methodology for recycled plastics would be particularly helpful for complex supply chains that bring together many semi-finished products into one final product (e.g., automotive and electronics) including recyclates coming from countries outside the EU. The CPA monitoring system will help establish the big picture of use of recycled plastics on a polymer and sectoral level, however a means for companies to accurately evaluate their recycled plastics usage would support greater public commitments driving further demand.

CPA signatories will engage in the ongoing discussions on measuring recycled content and on mass balance of waste-derived feedstock, noting the benefits in harmonisation of existing and new certification schemes (in particular to recognise international sourcing).

3. Addressing legacy substances and thermosets

European legislation which identifies hazardous substances (REACH and RoHS) is regularly updating the list of substances which should be treated in a controlled loop or substituted. Compliance with these rules is an additional challenge for recycled content made from waste streams where legacy substances are likely, in particular for longer life products where there is a higher chance that a substance used when placed on the market may have been deemed hazardous by the time the product becomes waste. To encourage greater use of recycled plastic from these waste streams it is important that all actors support a risk-based approach and support the development of safe uses of these recycled plastics. Innovation and investment in advances in recycling technologies, particularly in chemical recycling, and on-site testing for physical recycling, as mentioned before, will also help to increase the confidence in use of recycled plastic created from these waste streams.

Industry and authorities should work together to establish chain of custody solutions to enhance traceability and transparency along the plastics value chain. As an example, in the construction and automotive sectors information is made available to the waste management and recycling sector via

the Substances of Concern In articles as such or in complex objects (Products), or SCIP database[8], set up under the EU's Waste Framework Directive. In EEE, this traceability is already established through legislative requirements and I4R database. Another solution would be for industry to further develop use of the digital product passports to collect and provide information on substances used within a product. Note that for long service life products as in construction products, the contribution to a circular economy will only become visible in a number of decades.

Thermosets, as opposed to thermoplastics, may not be physically recycled and reprocessed into a form that substitutes for virgin thermosets. It is therefore important for all actors to value the cascade recycling model that recognises the use of these materials as a filler in other recycled plastic.

The CPA notes that advances and investment in chemical recycling will address both these challenges, legacy substance as well as thermosets.

4. Establishing quantity of recycled plastics on the European market: generating enough of a given polymer in a given location to make recycling economically viable

One of the greatest requirements to increasing use of recycled plastics, is to increase the volume of recycled plastic produced in Europe and available to the European market. Recycling plastics in an economically viable manner, requires the supply of a given plastic type or polymer in sufficient quantities and quality at a given location to enable recycling at competitive prices. A mature recycled plastics market will see increasing competition between locations and applications, which will also be influenced by the local regulatory framework such as mandatory recycled content levels for products and applications, taxes and subsidies dependent on recycled content rates.

As the CPA's Roadmap to 10MT and State of Play on Collection & Sorting demonstrate there is a significant need for investment in collection, sorting and recycling infrastructure across Europe. This investment should also be forward looking beyond the CPA's focus of 2025 to waste streams that may contain low volumes of plastics today but will see a steady increase in plastics content in the future reflecting the long-life of the products placed on the market.

Solutions:

Industry should plan for material recovery in the design phase, considering how to generate the cleanest possible polymer stream for function, separability of materials, compatibility with collection systems etc. to drive high quality waste streams that will reflect in higher quality recycled content (see CPA work on design for recycling).

Industry, authorities and civil society should work together to standardise waste categorisation and qualities, generating a common EU standard for classifying plastic waste streams at the different stages of collection and sorting (see below CPA standardisation recommendations).

Further improvements and solutions to reach the 10Mt recycled content target require determined public-private collaboration, involving the plastics value chain as well as national and local authorities across Europe. The alliance renews its call on national authorities in charge of waste management to join the alliance and work on practical solutions to create the conditions for a sharp increase in the uptake of recycled plastics by 2025:

[8] https://echa.europa.eu/fr/scip

- Industry, national and local authorities can take action together to create an effective single market for plastic waste in Europe, removing barriers to intra-EU trade in plastic waste destined for recycling and connecting sources of collected plastics with recyclers. To minimise the transport footprint of recycling, local authorities should consider that the closest geographical facility capable of producing the highest quality recyclate may not be in the same country. Where possible, the development of streams of waste separated at the origin (for instance from the agriculture and building sectors) should be encouraged.

- Private and public investment should be committed to advancing sorting technologies to make the best in class more available and cheaper. There are many advances in sorting technologies under development and coming to market that will enable the separation of waste by polymer and by product (e.g., separating food contact from non-food contact). The more available and affordable technologies such as AI, digital watermarking, density separation and colour sorting become at material recovery facilities and in the pre-sorting stage at recyclers, the more improvement will be seen in recycling yields and avoiding loss of valuable plastics and smaller volume polymers. In the automotive sector advanced recycling technologies such as post-shredder technologies for sorting polymers are highly effective and should be widely encouraged as an investment option to ensure implementation at all recycling facilities.

- Private and public investment is needed to ensure the appropriate level of collection, sorting and recycling infrastructure to process the expected plastic waste arising across Europe. Authorities and organisations raising funds through financial measures linked to plastics should ensure such measures drive investment back into the circular plastic infrastructure. In packaging and agriculture EPR schemes with a harmonised approach to fee modulation and transparency of cost effectiveness are very effective in funding the needed infrastructure.

- Engaging the final user in awareness raising programmes improves the accurate identification of materials into separate collection systems. For household waste this could involve simple, consistent communications from trusted messengers across Europe on the benefits of accurate separation of wastes to generate high quality recycled content with the corresponding environmental benefit. In agriculture this would focus on cleaning as well as separate collection to reduce contamination of these end-of-life plastics. In the construction sector it could be industry training programmes to help the workforce correctly identify and separate plastic materials during renovation or demolition of buildings. In electronics, this communication should incentivize citizens to collect more (avoiding hoarding), to avoid bad disposal habits and to use formal collection channels.

5. Creating certainty for investment

There is a need for clear recognition and demonstrated confidence by all actors of the role of recycled and then circular plastics in delivering a carbon neutral economy for Europe. National governments, local authorities and industry need to work together to ensure conditions that bring investment certainty and encourage everyone to act now, today, to make the significant investments in collection, sorting and recycling identified and quantified by the CPA. In particular as

regards a coherent and harmonised implementation of solutions to safeguard the European single market.

Industry and authorities need to work together to create conditions for long-term investment certainty in the circular plastics economy. This includes ensuring that all recycled plastics from all waste streams (pre-consumer and post-consumer) and all recycling technologies (physical and chemical) are recognised and supported in national implementation of legislation, standards, quality marks and ecolabels.

Industry and authorities also need to work together to rapidly demonstrate the safety of recycled plastics in food contact materials and speed up the process that facilitates authorisation of safe use in these products.

The CPA's recommendation on new European standards to enhance the circularity of plastics and drive greater use of recycled plastic in products

The influence of standards on recycled content in products

The growing demands that come with increased usage of recycled plastic will be improved through the development of standards.

In every part of the value chain, European standards can provide higher level of recyclable products, with an increased quality level in collection, sorting and recycling. This will lead to a standardised map of properties of recyclates to enable an increased uptake in products, clearly defined in the end product.

Standardisation in relation to the CPA commitment

In the Circular Plastics Alliance commitment[9], the need for standardisation as a tool to reach the goal of 10 million tons is clearly defined.

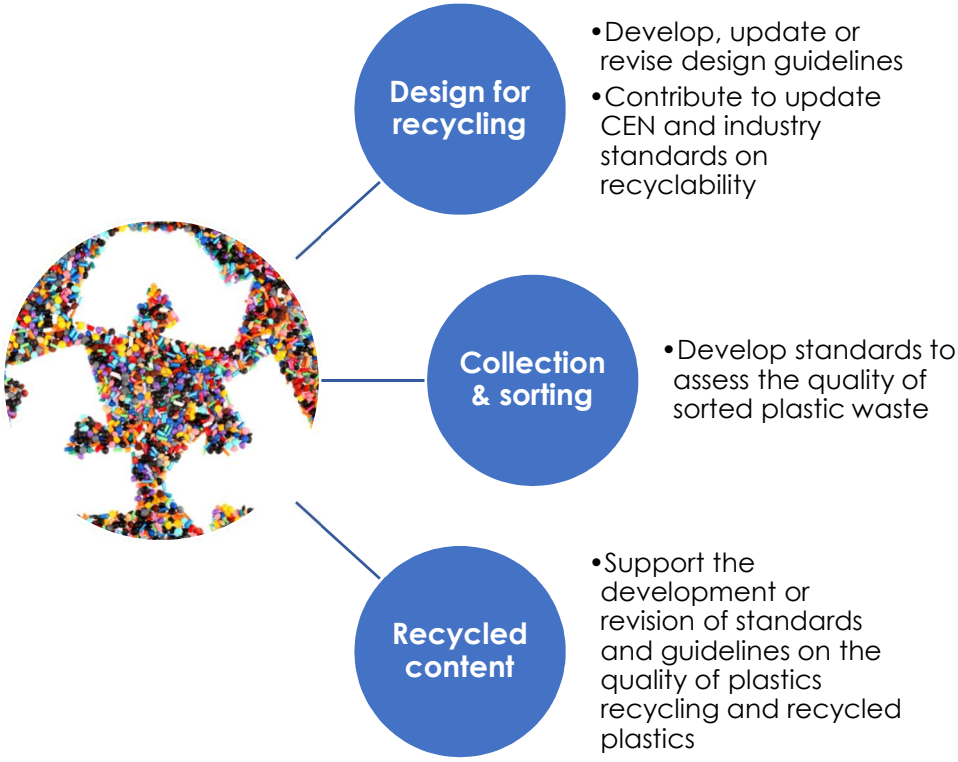


Image 3: Overview of standardisation commitments from CPA declaration

[9] See the CPA declaration at https://ec.europa.eu/docsroom/documents/36361

Following up on the Annual Union Work Programme on Standardisation for 2019[10], and building on preliminary analysis by CEN and CENELEC and by the CPA Working groups[11], the European Commission have drafted a standardisation request. The CPA supports this request by the Commission and is of the view that this request will ensure that the standardisation work is managed and executed in an organised way.

Standardisation Requests from the European Commission to CEN CENELEC often request for a standard to be developed with the purpose of supporting legislation ("harmonised standards"). In this case the Standardisation Request envisaged by the Commission is not related to legislation, but in support of policy implementation (request for "European Standards").

Image 4: Visualisation of a Standardisation Request for a harmonised European Standard not related to legislation

Standardisation needs identified

As described in the Commitment, the CPA identified needs for European Standards along the value chain.

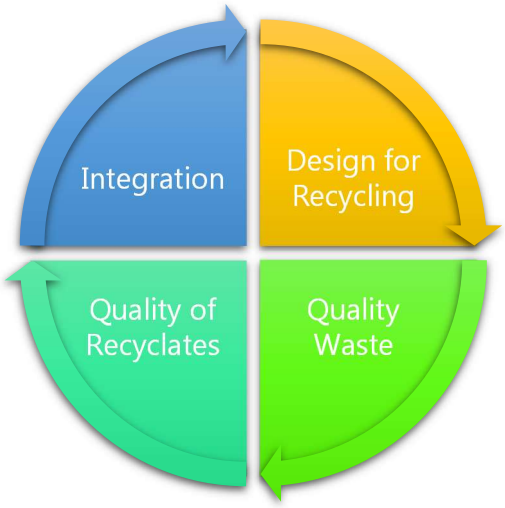


Image 5: CPA identified needs for European Standards along the value chain.

[10] COM (2018) 686 final
[11] Ancillary and preliminary action on sustainable chemicals" (Specific Agreement n° CEN/000/2017-05 Sustainable Chemicals)

As explained in its Design work plan[12], the CPA created Dedicated Products Teams to work on the recyclability of 26 priority products. These teams identified related standardisation needs.

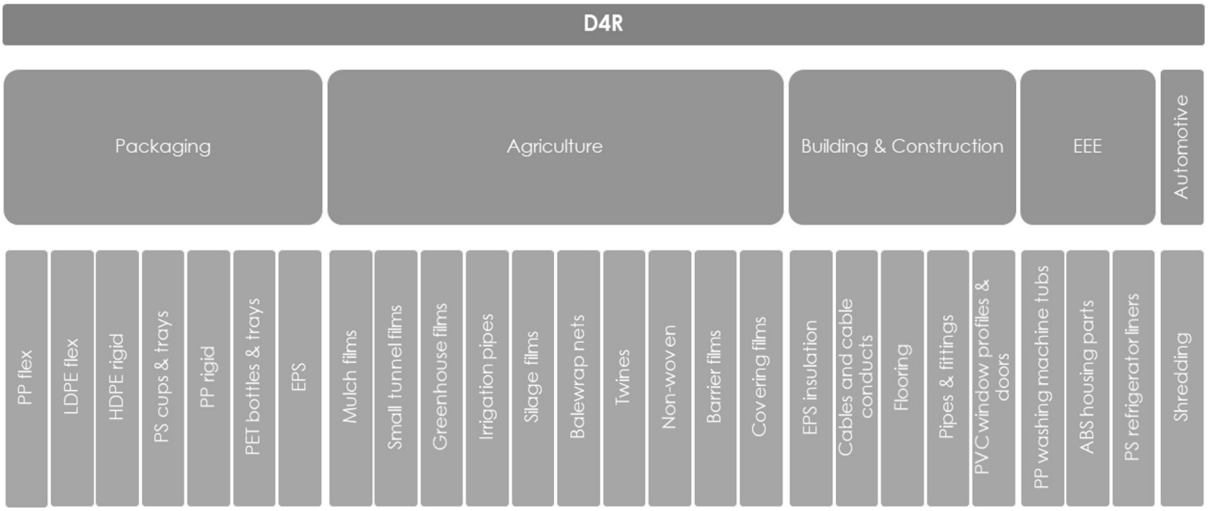


Image 6: Table identifying the dedicated product teams of the CPA which work on design for recycling (D4R).

In total, the CPA identified 58 European standards that would need to be developed or revised to ensure better recyclability of priority products and allow a better functioning of the single market for recycled plastics and sorted plastic waste in the 5 CPA sectors (packaging, automotive, building & construction, agriculture, and electrical and electronics).

Design for Recycling

Design for recycling is the first step to reach the quality demands on recyclates for uptake in products.

It is also essential to increase material stream volumes, to secure the need for recyclates which benefits from clearly identified design requirements for the prioritised products.

Design for recycling standards will also enable a more unified approach within the internal market in Europe, which will benefit the quality of recyclates.

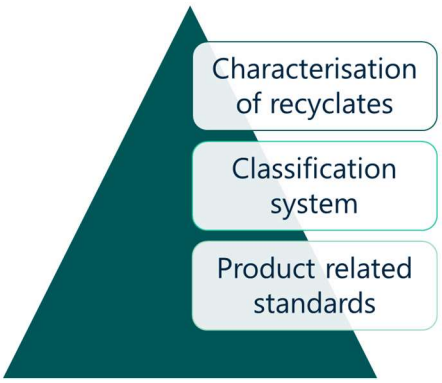
Quality of Waste

Standardised characterisation of waste, including bale quality, is the next step to increase of quality of recyclates. This provides the tool to enable possible higher level of isolated material streams with a clear communication of expected content in the standardised waste streams.

This series of characterisation of waste standards will enable the development of the infrastructure in the Member States to provide high quality recyclates that meets the demands in the coming steps in the value chain

[12] https://ec.europa.eu/docsroom/documents/47334

Quality of recyclates and integration of recyclates in products



The characterisation of recycled plastics cannot be compared to the criteria for virgin plastics. Recycled plastics properties are more complex and demand an increased list of properties to be tested and reported in order to enable usage of the recyclates.

The first step in the testing will be provided per plastic material stream and the basic list of properties to be evaluated will be developed in the *Characterisation of recyclate* standards

To be able to fulfil the need from the market demand and legislation a series of *Demand driven standards* are under development. This includes a classification system of recyclates to enable end customers and brand owners to specify the level of quality and data required for the acceptance of recycled plastic content in their product.

For some additional specific products there is a need for product and process specific standards of the recyclates in relation to specific applications and production processes.