A circular multilayer plastic approach for value retention of end-of life multilayers films

D7.8: Final report on legislative and pre-normative actions: Policy briefs

WP7: Pre-normative studies, dissemination, communication and exploitation

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Executive summary

By turning multilayer plastic waste into circular and valuable resources, CIMPA project and its results contribute to achieve the EU's sustainability targets set under the EU Green Deal and the Circular Economy Action Plan.

In order to ensure that CIMPA results are relevant and have a positive impact, CIMPA partners have analyzed and discussed all the EU legislative and standardization developments on plastics circularity, as part of the Task 7.1. Pre-normative studies.

As result of the mentioned analysis, CIMPA published the deliverable D7.7 "Report on pre-normative actions" which offers a panoramic description of the legislative context in Europe and some specific countries, as well as the standardization landscape for multilayer plastic films.

As a second step, considering the current legislative developments and the results obtained by the project, CIMPA partners have discussed and agreed on key elements that are needed at policy level to unlock the potential of multilayer plastic films recycling.

This deliverable (D7.8) includes policy recommendations to increase the recycling rate of complex plastic film waste and the uptake of recycled materials in new products. Because of its relevance, an update on the agreement on a new Packaging and Packaging regulation is included. Key suggestions from CIMPA partners have been compiled in two policy briefs: the first one targeted to the new Packaging and Packaging Regulation (June 2023) and the second one, with general policy recommendations to increase the circularity of plastic films (October 2024).

Update on EU policy developments

New Packaging and Packaging Waste Regulation (2024)

On 15 March 2024, the Council presidency and the European Parliament's representatives reached a provisional political agreement on a proposal for a regulation on packaging and packaging waste. The aim is to tackle the increase in packaging waste generated in the EU, while harmonising the internal market for packaging and boosting the circular economy.

The agreement was then formally endorsed by the EU27 ambassadors on 15 March, followed by approval from the EU Parliament's Committee on Environment, Public Health and Food Safety (ENVI) on 19 March. On 24 April 2024, the file was voted in the plenary session of the Parliament.

However, after the linguistic lawyer review, the text needs to be formally adopted, which is expected for the end of the year. The text will be then published in the EU's Official Journal and enter into force. The regulation will be applied from 18 months after the date of entry into force.

Some of the main elements of the proposal relevant for the CIMPA project are described below.

- **Recyclability requirements**

Recyclable packaging should be designed for material recycling and packaging recyclability performance grades should be established based on **design for recycling criteria** for packaging categories. They are listed in Annex II and expressed in grades A, B or C so that the packaging should be considered recyclable and, consequently, allowed to be placed on the market. When packaging is below the grade C it should be considered technically non-recyclable, and its placing on the market should be restricted. By 2030, only packaging in grades A, B or C should be considered recyclable and allowed to be placed on the market. By 2038, packaging should comply with grade B in order to be put on the market.

In a second step, packaging will need to comply with requirements on **recyclability at scale**, to ensure that packaging is recycled in practice. That means that packaging waste is really collected separately, sorted and recycled in installed infrastructures. These infrastructures should use established processes proven in an operational environment which ensure (at Union level) an annual quantity of recycled material under each packaging category equal to or greater than 30% for wood and 55% for all other materials. Extended Produced Responsibility (EPR) fees will be modulated according to the recyclability of the packaging.

- **Recycled content in plastic packaging**

The new rules establish mandatory targets for **recycled content in plastic packaging at different levels** depending on the contact-sensitivity of different plastic packaging applications and ensuring that the targets become binding by 2030. To ensure packaging circularity *on an incremental basis*, increased targets should apply as of 2040.

The text exempts compostable plastic packaging and packaging whose plastic component represents less than 5% of the packaging's total weight from those targets. The Commission will have to review the implementation of the 2030 targets and assess the feasibility of the 2040 targets. The Commission will assess (three years following the entry into force of the regulation) the state of technological development of **bio-based plastic packaging** and, based on that assessment, to lay down sustainability requirements for bio-based content in plastic packaging.

- **Collection and Deposit return systems (DRS)**

Under the new rules, by 2029, member states must ensure the separate collection of at least 90% per annum of single-use plastic bottles and metal beverage containers. To achieve that target, they are required to set up **deposit return systems** (DRSs) for those packaging formats. The minimum requirements for DRS will not apply to systems already in place before the entry into force of the regulation, if the systems in question achieve the 90% target by 2029.

By 1 January 2029, Member States shall adopt **mandatory collection objectives** and take the necessary measures to ensure the collection of the packaging materials are consistent with the recycling targets and with the mandatory recycled content targets.

- **Restrictions on certain packaging formats**

The new rules introduce restrictions on certain packaging formats, including **single-use plastic packaging** for fruit and vegetables, for food and beverages, condiments, sauces within the HORECA sector, for small cosmetic and toiletry products used in the accommodation sector (e.g. shampoo or body lotion bottles), and for very lightweight plastic bags (e.g. those offered at markets for bulk groceries).

- **PFAS restriction**

The text strengthens the requirements for substances in packaging by introducing a restriction on the placing on the market of food contact packaging containing per- and polyfluorinated alkyl substances (PFASs) above certain thresholds. To avoid any overlap with other pieces of legislation, the co-legislators

tasked the Commission with assessing the need to amend that restriction within four years of the date of application of the regulation.

Implications for the project

The new requirements on recyclability of packaging will affect the design of multilayer films for packaging applications and it will require scale up sorting and recycling infrastructure to comply with the 'recyclability at scale' criteria.

In addition, recycled content targets will stimulate the demand for recycled materials and the scale up recycling capacity in Europe. For food packaging, this will require decontamination processes or new technologies to close the loop and introduce recyclates in contact sensitive applications.

1st CIMPA POLICY BRIEF

on the new Packaging and Packaging Waste Regulation

Published in June 2023

CIMPA POLICY BRIEF

Packaging and Packaging Waste Regulation

Introduction: turning multilayer plastic waste stream into a fully circular model.

CIMPA is an EU funded H2020 project aiming at developing a recycling value chain for post-industrial and post-consumer multilayer films from food and agricultural applications. CIMPA proposes innovative solutions including a circularity strategy for new packaging designs, the development of new technologies for sorting different films, together with mechanical and physical (dissolution) recycling processes. Furthermore, decontamination and upgrading processes are applied to produce quality material from waste which will be suitable to close the loop.

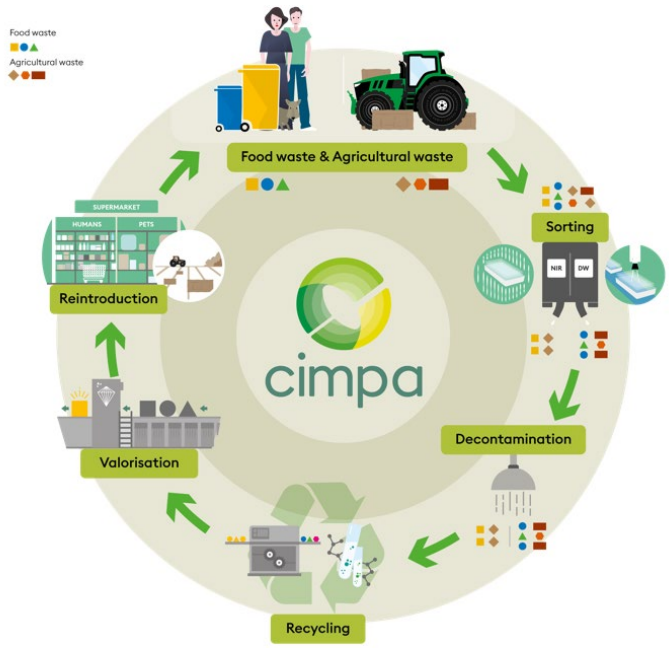

Figure 1. CIMPA's value chain for multilayer films recycling

CIMPA brings together 13 partners from 5 countries (France, Belgium, Spain, the Netherlands, and Finland), covering the whole value chain of the sorting, separation, recycling, and manufacturing of multilayers materials.

By turning the multilayer plastic waste stream into a fully circular model, CIMPA innovative solutions can play a key role in achieving the EU's sustainability targets set under the EU Green Deal[1] and the Circular Economy Action Plan[2].

As part of the EU's transition to a circular economy, the European Commission published a proposal for a Regulation on Packaging and Packaging Waste (PPWR) in November 2022. **This paper outlines CIMPA's position on the proposed EU-wide rules on packaging, with a focus on key measures such as the recyclability criteria, recycled content target and digital watermarks.**

[1] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[2] https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

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Key points

- Harmonized packaging rules across Europe are essential to preserve a smooth functioning of the internal EU market and ensure a high level of circularity of packaging.
- To make all packaging recyclable by 2030, the first step of the value chain must be addressed. When it comes to the design of flexible plastic packaging, mono material structure should be preferred. However, when highly demanding properties are needed, and therefore mono material structures do not suffice, specific recycling paths should be followed.
- Recycled content targets are needed to stimulate the usage of recycled materials in new products. For food contact materials, they will be achieved through investments in R&D to improve the recycling capacity in Europe
- Including digital marking technologies in the legislation is key to facilitate the sorting of complex materials and to deliver food-grade recyclates.

Background & Legal Instrument

As part of the project activities, CIMPA published an interim report on legislative and pre-normative actions which offers a panoramic description of the legislative context as well as the standardization landscape for multilayer plastic films. It addresses the EU and national legislation in particular in France, Spain, the Netherlands and Finland, having impacts on multilayer films circularity, from their design to their end-of-life management and recycling. An overview of the relevant standards and technical bodies for the CIMPA project is also included.

The findings in this report reflect the current discrepancies among different national measures such as the tax on virgin plastic, the packaging labelling requirements, the definition of recyclability, etc. Consequently, it highlights the need for harmonized EU rules to preserve a smooth functioning of the internal EU market as well as high level of circularity of packaging and plastic products placed across the EU.

The CIMPA partners welcome the EC's proposal for a regulation on Packaging and Packaging Waste and supports the legal form of a Regulation instead of a Directive. This will ensure a harmonized implementation and enforcement of the new rules, which are essential to preserve a smooth functioning of the internal market as well as high level of circularity of packaging products placed across the EU.

Making all packaging recyclable by 2030

The CIMPA partners also welcome the introduction of a harmonized definition of recyclable packaging (Article 6) and would like to stress the importance of developing design for recycling criteria and assessing recyclability of the different recycling options at scale.

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To prepare and design the next generation of 100% recyclable multilayers, CIMPA is implementing a collaborative recycling-by-design methodology. This is based on concatenated data from sorting, recyclability, decontamination and upgrading, to identify designs compatible with advanced sorting and recycling, relying on actors from the whole value chain as well as influential and important stakeholders.

One of the latest results of the project is the report "D1.2: Circularity by design guidelines for the next generation of recyclable films capable of substituting today's difficult to recycle multilayers" This report includes a mapping of the existing European guidelines and recommendations to design flexible plastic packaging considering the results obtained in the CIMPA project.

Figure 1. CIMPA's guidelines on circularity by design

When it comes to the design of flexible plastic packaging, mono material structure should be preferred. However, when highly demanding properties are needed, other resins such as EVOH or specific PA may be used. To keep the value of these multilayer materials, particular recycling paths should be followed, and new structures should be created with sustainable secondary raw material.

For this purpose, CIMPA partners have studied 4 streams of flexible multimaterial polymers (see table 1) and the proposed recycling path. CIMPA sorting trials have demonstrated that the combined deployment of the NIR technology developed by the company PELLENC ST and the Digital Watermarking (DW) technology developed by Filigrade (CurvCode) enables effective sorting of complex multi-layer materials. However, until now the recycling paths have only been applied to virgin and post-industrial materials. The results with real packaging waste will become available during the upcoming months.

MULTILAYER STRUCTURE	RECYCLING PATH	
PE/EVOH/PE stream	Sortable by DW	Mechanical recycling
PE/PA streams	Sortable by NIR	Mechanical recycling
PE/PET stream	Sortable by NIR	Mechanical recycling Physical recycling
Metalized or metal laminated polyolefin structure	Sortable by NIR – induction separation	Physical recycling (dissolution)

Table 1. Multilayer structures studied in the CIMPA project.

CIMPA calls for promoting measures aiming at improving design for recycling during the packaging product's development, with preference towards sorting and recycling techniques with the lowest environmental footprint (see figure 2). In the CIMPA project, mechanical recycling will be preferred over physical recycling whenever possible due to its better

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environmental impact. Around 70% of simple multilayers will be able to be recycled in this way. Physical (dissolution) recycling should be applied in those cases where the quality of the material from mechanical reycling is insufficient for re-use in packaging.

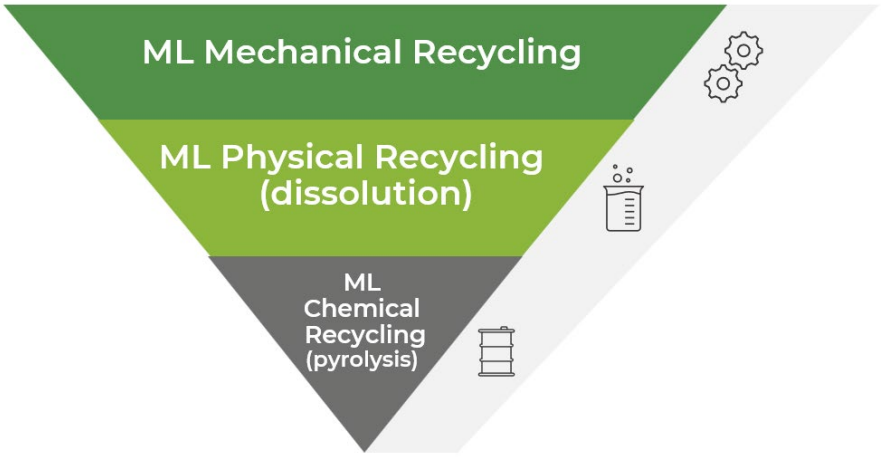

Figure 2. Recycling hierarchy for multilayers (ML)

Finally, CIMPA partners emphasise that chemical recycling technologies should only be used in cases where no alternative recycling processes with a lower environmental impact are available

The CIMPA consortium encourages the Commission to transfer CIMPA's results and work to the development of the design of recycling criteria and the methodology to assess if packaging is recycled at scale, through delegated acts.

In order to accelerate the transition to a circular economy for plastics, all plastic packaging should comply with design for recycling criteria as soon as possible, and support for investment should be provided in order to scale up recycling technologies.

Recycled Content for plastic packaging

CIMPA seeks the reintroduction of recycled materials into industrial processes and aims to demonstrate the reusability of recycled materials for agricultural films and food packaging.

The CIMPA partners support the introduction of recycled content targets for plastic packaging (Article 7), as a key measure to reward recycling environmental benefits to stimulate the usage of recycled materials in new products. Recycled content targets will be achieved through investments in Research & Development to improve the recycling capacity in Europe.

However, to increase the use of recycled materials for food contact packaging and achieve the recycled content target of 10% by 2030, investments and innovation needs to take place at an accelerated pace. Collection remains an essential first step to enable the attainment of recyclability and recycled content targets. High collection rates are essential to supply the recycling industries with the required raw materials. This can be achieved by setting collection targets for all kinds of packaging. In addition, sorting plays a fundamental role to identify and

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separate the different polymers and materials into specific waste streams. Thus, quality input can be provided to the recycling process leading to higher quality recycled materials.

In combination with NIR techniques, a digital coding technology ('digital watermarks' - nearly invisible to the human eye) containing relevant data (e.g. film composition, polymer grades, film producer etc) has been tested through the CIMPA project. This combination is key to sort multilayer materials and to sort food vs non-food packaging, which will enable to produce food safe recycled granulates.

Furthermore, CIMPA believes that all packaging materials should follow the same rules for food contact applications to ensure the safe use of packaging and the minimum volume required to develop a new stream.

Labelling, marking and Digital Watermarks

Regarding the labelling of packaging (Article 11), **CIMPA partners support the development of an implementing act to establish the conditions for identifying the material composition of packaging by means of digital marking technologies**, that should be adopted by the Commission.

By inserting digital watermarks into new packaging, recycling plants will be able to sort food grade packaging as input for recyclers to make food-safe recycled granulate. This would help to meet the recycled content targets for food packaging while complying with EFSA requirements.

Figure 3. CIMPA's consortium

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2nd CIMPA POLICY BRIEF

Policy recommendations to increase the circularity of plastic films.

Published in October 2024

October 2024

CIMPA POLICY BRIEF

Policy recommendations to increase the circularity of plastic films

Turning multilayer plastic waste stream into a fully circular model

CIMPA is an EU funded H2020 project aiming at developing a recycling value chain for post-industrial and post-consumer multilayer films (from food and agricultural applications). CIMPA proposes innovative solutions including a circularity strategy for new packaging designs, the development of new technologies for sorting different films, together with mechanical and physical (dissolution) recycling processes. Furthermore, decontamination and upgrading processes are required to produce quality material from waste which will be suitable to close the loop.

CIMPA brings together 13 partners from 5 countries (France, Belgium, Spain, the Netherlands and Finland), covering the whole value chain of the sorting, separation, recycling and manufacturing of multilayers materials.

By turning the multilayer plastic waste stream into a fully circular model, CIMPA innovative solutions contributes to achieve the EU's sustainability targets set under the EU Green Deal and the Circular Economy Action Plan[1] and are in line with the political guidelines for the next European Commission 2024-2029, which aims to decarbonize Europe's economy.[2]

As part of the EU's transition to a circular economy, the new Packaging and Packaging Regulation will require plastic packaging to comply with recyclability criteria and with recycled content obligations. **In this paper, CIMPA partners welcome the adoption of new rules and propose key measures to foster their implementation. Moreover, measures to enhance the circularity of plastic products (including agriculture films) are proposed.**

Key points

- Boost the incorporation of recycled plastics through recycled content targets and financial incentives.
- Implementation of the recyclability criteria and improving collection are necessary to produce more and better recycled plastics.
- Sustainability criteria for recycling technologies need to be developed by following a recycling hierarchy.

[1] Circular Economy Action Plan. Available here

[2] Von der Leyen's political guidelines next European Commission 2024-2029. Available here.

1. Boosting and rewarding the use of recycled materials

In order to increase the circularity of the European plastic value chain, it is necessary to boost the incorporation of recycled materials in new products. A strong demand for recycled plastics will trigger investments to increase the recycling capacity in Europe.

CIMPA seeks the reintroduction of recycled materials into industrial processes and aims to demonstrate the reusability of recycled materials for agricultural films and food packaging. CIMPA has already launched an industrial blown-extrusion production of recycled materials, obtaining multilayer films with 30% of PE/PA recycled content for agricultural films.[3] In addition, promising results have been obtained from the physical (dissolution) and mechanical recycling of multilayer films[4].

To further expand and scale-up these initiatives, policy support is needed to boost and reward the use of recycled plastic. This can be done by 1) setting mandatory recycled content targets in products and 2) bridging the price gap with virgin plastic with financial incentives.

The introduction of **recycled content targets for plastic packaging** in the new Packaging and Packaging Waste Regulation (PPWR) is a key measure to reward recycling environmental benefits and pull the demand for recycled material. Recycled content targets will be achieved through investments in Research & Development to improve the recycling capacity in Europe. Moreover, CIMPA believes that this policy tool can be extended in other applications and products, such as agriculture plastic films

On the other side, the CIMPA consortium supports additional tools to reward the incorporation of recycled content such as a **lower VAT** for recycled plastic products or the **eco-modulation of Extended Producer Responsibility (EPR) fees** with regards to the uptake of recyclates (not only for packaging, but also for other products such as agriculture films, etc.). Financial incentives are necessary for product manufacturers to shift from using virgin to recycled plastic feedstock.

These incentives and measures require strong **mechanisms for the verification and traceability** of recycled polymers. This is essential to protect recyclers and manufacturers from unfair competition and prevent greenwashing.

2. Recyclability & collection: levers for increasing recycled content

With a view to increase the production and availability of high-quality recycled plastics, it is essential to increase the plastic waste collection rate as well as their pre-treatment and recycling processes. Thus, CIMPA partners would like to stress the importance of improving collection systems and recyclability.

[3] CIMPA result - Blown extrusion of agricultural multilayer films based on recycled materials. Available here
[4] CIMPA results - deliverables available here

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For agricultural plastics, a separate collection system at waste management facilities or, as is the case in certain municipalities, via periodic local collection could be implemented to increase collection and recycling rates. For household waste, Member States will set collection targets by 2029 (as required by the PPWR). Ambitious measures are needed to **ensure high collection rates**, taking into account the effectiveness of established national collection infrastructure and the country specific situation.

When it comes to **recyclability**, to prepare and design the next generation of 100% recyclable multilayers, CIMPA has implemented a collaborative recycling-by-design methodology. This is based on concatenated data from sorting, recyclability, decontamination and upgrading, to identify designs compatible with advanced sorting and recycling, relying on actors from the whole value chain as well as influential and important stakeholders.

Mono-material structure should be always preferred. For some applications that need specific barriers, EVOH resin should be chosen since it is compatible with mechanical recycling. However, when highly demanding properties are needed, other resins such as metal or specific PA may be used. In those particular cases, alternatives barriers such as metal oxydes (Al2O3 and SiO2) might be questioned. To keep the value of these multilayer materials, **particular recycling paths should be followed**, and new structures should be created with sustainable secondary raw material.

Accurate sorting is the first step to increase the circularity of plastic products, as it prevents contamination and upgrades the quality of sorted streams, and it allows having specific waste streams for different recycling processes. CIMPA has developed two automated sorting solutions for multilayer flexible packaging, which are described in a public report[5]. NIR advanced technology enables to distinguish different waste streams to enhance recycling:

- Mono-material flexible (with EVOH accepted)
- Simple MLs (i.e. PE/PA and PE/PET)
- Complex MLs (i.e. metalized or metal laminated polyolefin structure)

While the advanced NIR-based detection showed very good results, it cannot distinguish complex MLs between each other and neither sort food grade material. The combined sorting prototype could solve easily this issue, with average sorting yields of 94%with purity levels exceeding 80%. This is essential for close loop recycling.

In the new PPWR, Article 6 requires all packaging to be recyclable in two steps: design for recycling and recyclability at scale. A list of packaging materials, types and categories is set under Table 1 in Annex II, which are referred to in Article 6, for the design for recycling requirements. Flexible films will include category 9, 11, 13 and 18, as shown below in Table 1.

[5]CIMPA White Paper. Two automated sorting solutions for multilayer flexible packaging. Available here

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Cat. No	Predominant packaging material	Packaging type	Format (illustrative and non-exhaustive)	CIMPA recommendations
9	Plastic	PET – flexible	Films	1) Prefer monomaterial. 2) Sorting not tested within CIMPA
11	Plastic	PE – flexible	Films, including multilayer and multi-material packaging	1) Prefer monomaterial. When it is not possible, prefer EVOH as a barrier 2) Sortable with current NIR technology.
13	Plastic	PP – flexible	Films, including multilayer and multi-material packaging	3) Prefer monomaterial. When it is not possible, prefer EVOH as a barrier 4) Sortable with current NIR technology.
18	Plastic	Other flexible plastics including multi-materials – flexible	Pouches, blisters, thermoformed packaging, vacuum packaging, modified atmosphere/modified humidity packaging, including e.g. flexible intermediate bulk containers, bags, stretch films	1) When it is not possible, prefer EVOH as a barrier. 2) Sortable only with NIR+Watermarking combined

Table 1. Flexible films categories under PPWR and CIMPA recommendations

3. Recycling hierarchy for plastic films

CIMPA calls for promoting measures aiming at improving design for recycling during the packaging product's development, with preference towards sorting and recycling techniques with the lowest environmental footprint. Thus, mechanical recycling should be preferred over physical recycling (dissolution), and chemical recycling should only be used in cases where no alternative recycling path with a lower environmental footprint is available. In the CIMPA project, around 70% of simple multilayers will be recycled this way.

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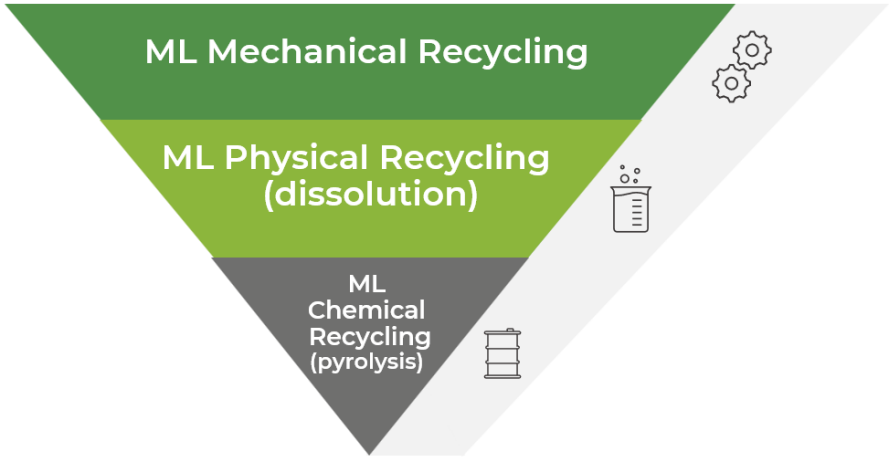

Figure 1. Recycling hierarchy for multilayers (ML)

This recycling hierarchy should be taken into account not only for the design of recyclable plastic packaging, but also for the attainment of recycled content requirements and modulation of the EPR fees.

By December 2026, the Commission shall adopt a delegated act supplementing the new PPWR with **sustainability criteria for plastic recycling technologies**. CIMPA calls the Commission to follow the proposed recycling hierarchy taking into account the environmental impact of the technology for the purposes of recycled content, in order to ensure that the overall process minimizes pollution.

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