Guidance on Waste Definitions

21 September 2021

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Introduction

The CPA is committed to deliver on its pledged objective to uptake in Europe every year 10 million tonnes of recycled plastics in final products by 2025. It has also set up a system to monitor progress towards the achievement of such objective.

Purpose of this document is to assist the CPA Monitoring system by defining the materials, post-consumer, and pre-consumer, that will be monitored in that system, specifying under which conditions peculiar to each of the CPA WGs.

This guidance document[1] provides general definitions and a classification of plastic waste and material, building on the EU legislative framework and international standardization bodies. It also focuses more specifically on waste (post-consumer and pre-consumer) generated by the five sectors monitored by the CPA, as well as on the recycled plastics used by these sectors:[2]

- → Agriculture
- → Automotive
- → Packaging
- → Electrical and electronic equipment (EEE)
- → Construction

[1] The distinctions hereby listed are to be used for indicative reference only and do not constitute an official guidance provided by the EU nor international standardization bodies.
[2] Medical waste, hazardous waste, forestry, fishing, septic tanks, and sewage network wastes will not be covered by the present document, as they are out of scope of this guidance.

PART I: Definitions and scope for monitoring purposes

1. Waste

The European Union's Waste Framework Directive[3] (WFD) - the umbrella Directive that provides definitions for many legislative documents concerning packaging waste, end-of-life vehicles (ELV), or waste from electronic and electrical appliances, to name a few - defines 'waste' as:

→ *Art. 3(1): 'Waste' means any substance or object which the holder discards or intends or is required to discard.*

This definition, and the general approach in the EU legal framework, does not make a distinction whether waste is used for other purposes (i.e., re-use, recycle, other recovery, e.g., energy recovery) or disposed of.

However, the WFD, Art. 4 'Waste Hierarchy' prioritizes waste prevention and management operations according to the hierarchy described Figure 1.

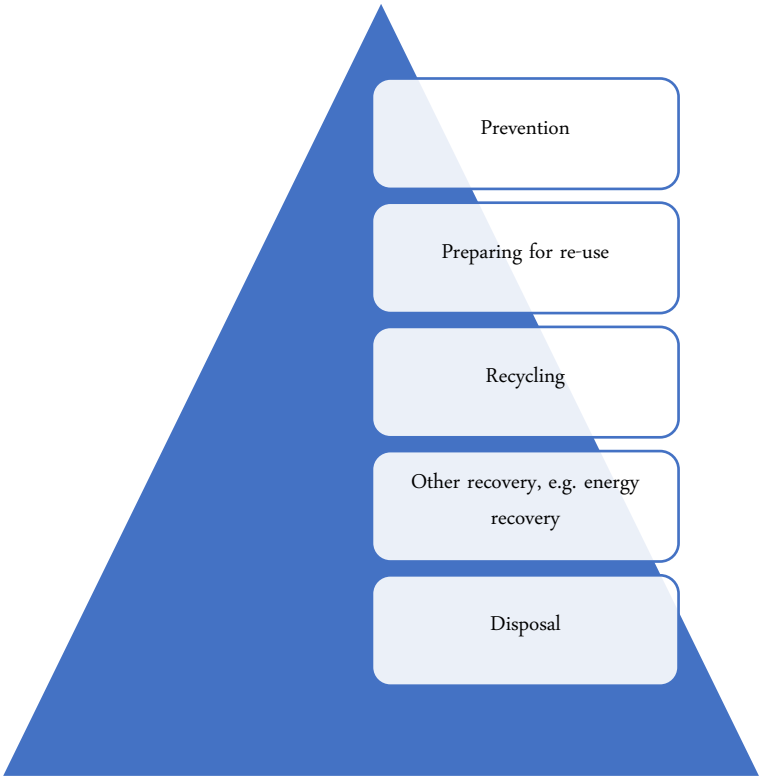


Figure 1. Waste Hierarchy

[3] *OJ L 312, 22.11.2008,* p. 3–30.

2. Waste & Material

An important distinction between the terminology used in legally binding EU law, and in non-binding **international guidelines and standards**, is that the latter **define 'waste' only when 'waste' cannot exercise any further functions and cannot be recovered**, in all the other cases the preferred terminology is 'material'.

As 'pre-consumer' and 'post-consumer material' are not included within the EU legal framework, there are no legally binding definitions for these[4].

Pre-consumer material originates from the production of a product, post-consumer material originates from its use.

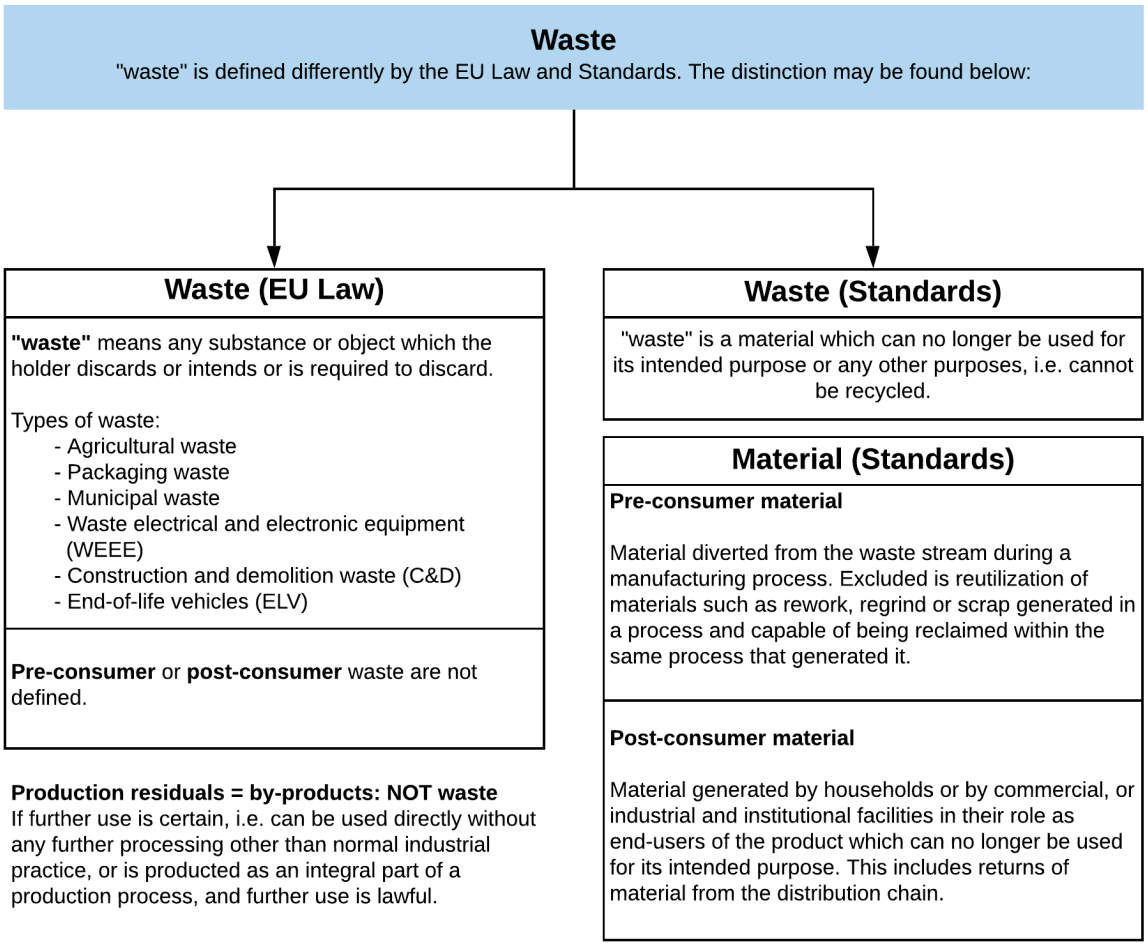


Figure 2. Waste and material definitions according to EU law and Standards

[4] Reference to waste definition in EU Law, EN 15353:2007. Other definitions of pre-consumer and post-consumer material in standards can be found in § 5.b and 5.c.

3. Recycling and waste-status

Art. 3(17) of the Waste Framework Directive (WFD)[5] defines recycling as:

→ *'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.*

Despite not being defined within the WFD, **a recycling operation represents the process whereby waste are actually reprocessed into products, materials or substances, where waste cease to be waste**. Implementing Decision EU 2019/1004[6] defines 'preliminary treatment' as "any treatment operation that municipal waste materials undergo before submission to the recycling operation whereby these materials are reprocessed into products, materials or substances that are not waste. This includes checking, sorting and other preparatory operations to remove non-targeted materials and to ensure high-quality recycling". Regulation 282/2008[7] Art. 2(2) defines a 'recycling process' as "a process in which plastic waste is recycled pursuant to the definition of recycling in point 7 of Article 3 of Directive 94/62/EC on packaging and packaging waste; for the purpose of this Regulation, this term is limited to processes, in which a recycled plastic is produced".

Recycling and recycling operations only apply to materials holding a waste-status. This applies to post-consumer and pre-consumer materials that can be considered "recycled" and count in the recycling targets, where previously classified as waste. The European Court of Justice has provided several insights on the concept of waste, delivering the conclusion that a case-by-case approach must be followed in those cases whereby production scraps reclaimed in the same industrial processes were deemed to participate to the recycling rate targets.[8]

A recycled material is the output of a recycling operation, and it can be considered as such when substances or objects previously classified as waste achieve a non-waste status.

Art. 6 WFD defines the end-of-waste status, **the output material of a recycling operation ceases to be waste when the following conditions applies**:

→ *(a) the substance or object is to be used for specific purposes;*
→ *(b) a market or demand exists for such a substance or object;*
→ *(c) the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and*

[5] *OJ L 312, 22.11.2008*.
[6] *OJ L 163, 20.6.2019*.
[7] *OJ L 86, 28.3.2008*.
[8] See the example for metals provided by ECJ case C-444/00 - Mayer Parry Recycling, ECLI:EU:C:2003:356.

→ *(d) the use of the substance or object will not lead to overall adverse environmental or human health impacts.*

In the same article, detailed criteria and procedures can be set for specific waste streams by Member States or at European Union level by an Implementing Act. End-of-waste criteria shall include:

→ *(a) permissible waste input material for the recovery operation;*
→ *(b) allowed treatment processes and techniques;*
→ *(c) quality criteria for end-of-waste materials resulting from the recovery operation in line with the applicable product standards, including limit values for pollutants where necessary;*
→ *(d) requirements for management systems to demonstrate compliance with the end-of-waste criteria, including for quality control and self-monitoring, and accreditation, where appropriate; and*
→ *(e) a requirement for a statement of conformity.*

At the EU level, end-of-waste harmonized criteria are available for several materials but not for plastics. Currently, end-of-waste criteria are defined separately by each Member States and lack harmonization, regarding the status of ready-to-use flakes and micronized plastics.

4. By-products

Waste is not the by-product of a production process generating plastics or plastic products.

A production residue is a material that is not deliberately produced in a production process; it may or may not be waste.[9] Despite not being explicitly defined under Art. 3 ("Definitions") of the WFD, **the Directive provides four criteria for a production residue to be considered a by-product**, under Art. 5(1):

→ *Member States shall take appropriate measures to ensure that a substance or object resulting from a production process the primary aim of which is not the production of that substance or object is considered not to be waste, but to be a by-product if the following conditions are met:*
- *(a) further use of the substance or object is certain;*
- *(b) the substance or object can be used directly without any further processing other than normal industrial practice;*
- *(c) the substance or object is produced as an integral part of a production process; and*
- *(d) further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.*

A 'by-product' has no waste-status when all the above conditions are met.[10]

By-products are excess materials that are deficient only to a minor extent but that are materially like the primary product which after a normal industrial practice result in a product which can be used directly in the primary process or other integrated productions where reuse is also certain.[11]

Nevertheless, these criteria leave some room for interpretation, especially regarding **"normal industrial practices" (criteria b) and "produced as an integral part of a production process" (criteria c)**. Although the WFD grants a mandate for the Commission to define "by-product" criteria for specific substances, today "by-product" criteria are assessed on a case-by-case basis.

This "case-by-case" approach generates a certain degree of legal uncertainty for operators and results in discrepancies amongst Member States. Guidance is provided in Figure 3[12], examples of rework, regrind or scrap in Table 1.

[9] European Commission, 2012, "Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste, p. 15.
[10] Some standards use the terminology "own rework" or "reworked material" to express the same concept.
[11] EC 2007, Interpretative Communication on waste and by-products, online available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52007DC0059&from=EN.
[12] European Commission (2012), Guidance document on the Waste Framework Directive.

Further use is certain:

→ "*'Further use is certain' means that it is not a mere possibility but a certainty; in other words, it is guaranteed that the material will be used. The purpose of this criterion is that if further use were not certain, there would be a risk of the material being disposed of as waste. In the Palin Granit case, the CJEU ruled that 'the holder of leftover stone resulting from stone quarrying which is stored for an indefinite length of time to await possible use discards or intends to discard that leftover stone, which is accordingly to be classified as waste'. Thus, if the holder of the material in question is storing it for an indefinite time period, further use is not certain"*[13].

Be used directly without any further processing:

→ *"Used directly"* means used back in the normal industrial practice.[14]

Normal industrial practice:

→ The "normal industrial practice *"can include all steps which a producer would take for a product, such as the material being filtered, washed, dried or adding materials necessary for further use. Such processing tasks can take place on the site of the manufacturer, on the site of the next user or by intermediaries, as long as they are considered an integral part of a production process."*

→ Regarding the "normal industrial practice" criteria, **on a general basis**, recovery operations that address *typical waste-related characteristics such as contamination with hazardous or not useful* components would not be included in the definition of normal industry practice (ex: sorting, melting and pelletization). *On the other hand, the **modification of size or shape** (ex: balling, crushing, flaking) does not prevent the material from being regarded as a by-product.*[15]

Produced as an integral part of a production process:

→ Regarding the "produced as an integral part of a production process" criteria, on a general basis, *"if the material leaves the site or factory where it is produced to undergo further processing, this may be evidence that such tasks are no longer part of the same production process, thus disqualifying it as a by-product."*[16]

→ *"[T]reatment techniques that address typical waste-related characteristics of the production residue, such as its contamination with components which are hazardous or not useful [ex: sorting, melting and pelletization], would prevent classification as non-waste. This is to ensure that such operations, which might pose risks to the*

[13] European Commission, 2012, "Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste, p. 16.

[14] "In meeting the criterion of being 'used directly without any further processing other than normal industrial practice', the crucial point is to determine what 'normal industrial practice' is." European Commission, 2012, "Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste, p. 16. Online available at: https://ec.europa.eu/environment/waste/framework/pdf/guidance_doc.pdf

[15] European Commission, 2012, "Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste.

[16] European Commission, 2012, "Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste.

environment or human health, are monitored under waste management law in accordance with the precautionary principle. On the other hand, a treatment which is normal industrial practice, e.g., modification of size or shape by mechanical treatment [ex: balling, crushing, flaking], does not prevent the production residue from being regarded as a by-product."[17]

Nevertheless, **a change in the ownership of by-products does not automatically lead to a change in the classification of by-products into waste**. In the same way, some converters have recycling technology on site; therefore, location criterion is not relevant to all cases.

A case-by-case approach is therefore necessary, given the lack of a harmonization at Union level that could be addressed setting a guideline to differentiate by-products from waste.

However, if the processing is a normal industrial practice, it can be carried out on an intermediate site without excluding the classification of a production residue as a by-product.[18]

[17] European Commission, 2012, "Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste, p. 17.
[18] EC, Guidance on the interpretation of key provisions of Directive 2008/98/EC.

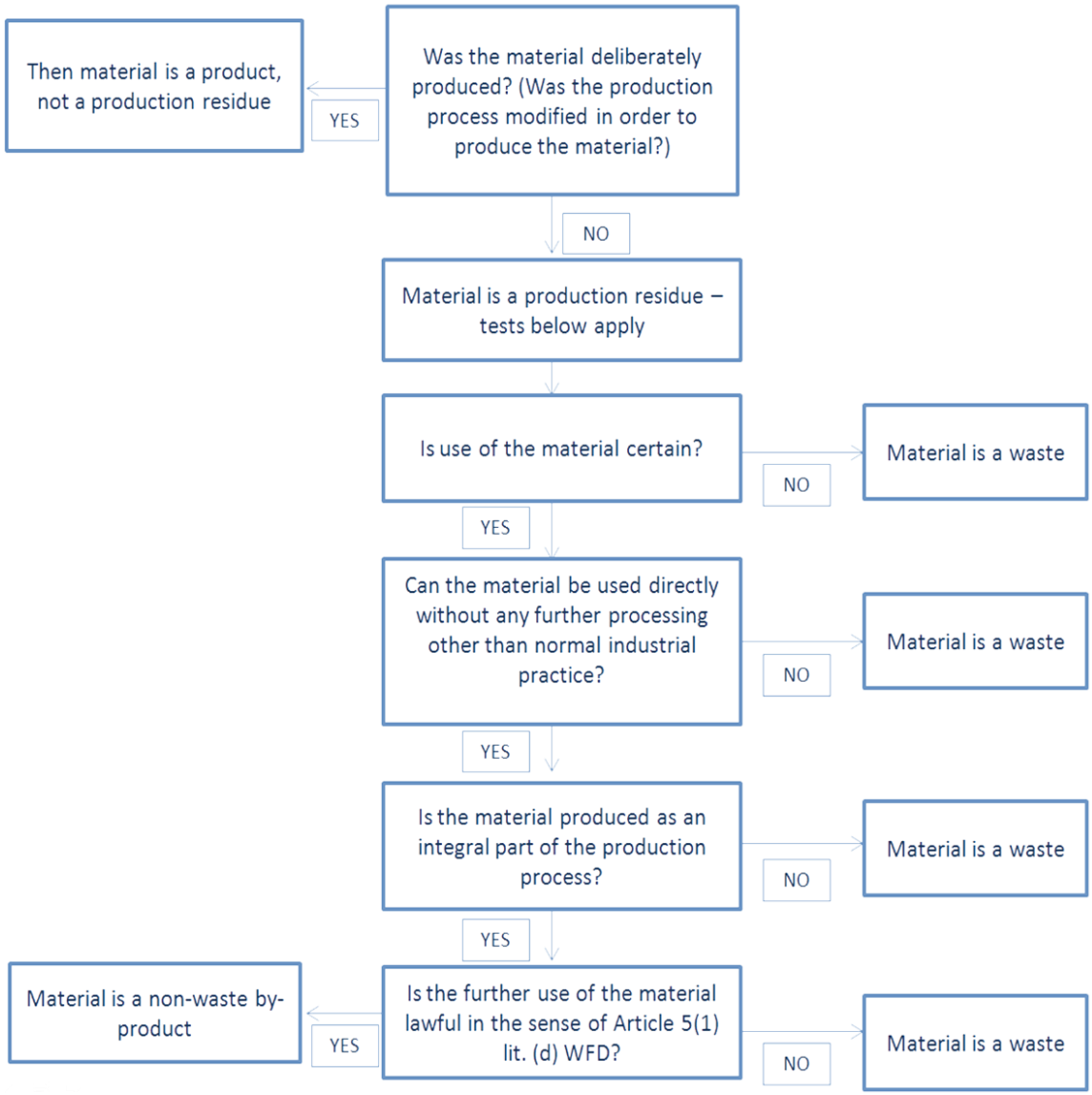


Figure 3. Decision tree for determining whether the material is a by-product.

5. Scrap, pre-consumer material, and post-consumer materials

a. Scrap, rework or regrind

Reworked materials such as regrind or scrap **generated in a process and capable of being reclaimed within the same process that generated it**, are not defined as pre-consumer material according to the standards. **These materials are likely to fulfil the legal criteria of being a by-product**.

General examples for scrap, rework or regrind common to different industrial production processes are provided in Table 1.

Table 1. Examples of rework, regrind, or scrap.

Product & polymer	Origin	Description
Plastic off-speck pellets	Plastic manufacturing industry	Pellets that have different specification that the targeted ones but can still be used in the same manufacturing operation for the same type of product in the same or different physical location
Punching scrap, edge strips, change-over scrap,	Industrial converting processes	Off-cuts of production lines that can be reintroduced in the same manufacturing operation for the same type of product in the same or different physical location
Trial runs and test production,	Industrial converting processes	Where the product is not finalized or complete (new products on production line)
Sprues and start-up material	Industrial converting processes	By-product of the plastic converting process that can be fed in the same manufacturing operation for the same type of product in the same or different physical location.
Faulty production	Industrial converting processes	Converted plastic parts not fit to the production process due to a small defect that can be fed in the same manufacturing operation for the same type of product in the same or different physical location.

b. Pre-consumer material

Pre-consumer material is defined in standards as follows:

ISO 472

- → *Descriptive term covering material diverted during a manufacturing process.*
- → *Note 1 to entry: This term excludes re-utilized material, such as rework, regrind or scrap that has been generated in a given process and is capable of being reclaimed within that same process.*
- → *Note 2 to entry: The term "post-industrial material" is sometimes used synonymously.*

ISO 14021:2016

- → *Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.*

EN 45557:2019

- → *Material diverted from the waste generated during a manufacturing process, excluding reutilization of materials such as rework, regrind or scrap generated in a process and being reincorporated in the same process that generated it.*[19]
- → *Note 1 to entry: Same process means the same manufacturing operation for the same type of product in the same or different physical location.*
    - Annex A for plastics:
        - *"same process" refers to a repetition of a manufacturing operation or the production of the same type of product that has been already carried out. Manufacturing operations can be, for example, extrusion, injection moulding, blow moulding, thermoforming, welding or printing. Types of products can be, for example, packaging film, shrink film, pipes or profiles. E.g. the extrusion of a packaging film is a different process than the extrusion of a housing film;*
        - *"waste generated" should be interpreted as waste output from a process with no change of composition.*

For the scope of this guidance and for the purpose of CPA monitoring and objective, "pre-consumer materials" refers to a waste discarded from the production process.[20]

[19] EN 45557 "General method for assessing the proportion of recycled material content in energy-related products" uses ISO 14021:2016 definition [SOURCE: ISO 14021].

[20] To distinguish non-waste from waste materials, to provide consistency and avoid misinterpretations in further parts of the guidance. The definitions refer to material diverted from the waste stream, where the waste stream cannot be recovered. Pre-consumer waste is a recoverable waste that do not satisfy the by-product's criteria.

As a waste, it shall be subject to processes beyond the reprocessing of by-products in a "normal industrial practice", such as e.g., decontamination, sorting, melting or pelletisation, compounding after which it will be used in another manufacturing process than the one that generated it. This may take place either at the site where the initial production process is carried out or at another site with a different geographical location.

According to EN 45557, "Regrinding internal scrap from a forming process, e.g. injection moulding, extrusion, etc., producing plastic parts or intermediate products and reusing it in the same process ("in-house use") in the form of flakes or granules, shall be excluded from the calculation of recycled content, in accordance with ISO 14021 principles. Regrinding may also be applied to plastics proceeding from damaged or defective products, overstock or obsolete inventories from manufacturers, distributors, and wholesalers which have not been put on the market. In this case, the ground plastic, in the form of flakes or granules shall be considered as pre consumer recycled material."[21]

A modification of size and shape alone does not represent a recycling operation and should not be considered as recycled content.

To summarize, a clear distinction shall be made between by-products and pre-consumer materials, only the latter being considered as waste and in the scope of CPA.

More in detail, this means that several conditions must be met to properly identify, possibly on a case-by-case basis, waste destined to recycling and recycled content targets, from by-products being only subject to "normal industrial practice".

European and international standards slightly differ in the exact wording when defining the terms "pre-consumer material" and "post-consumer material". Nevertheless, based on internal rules of CEN, **European standards cannot contradict the pertinent legislation in force**. Hence, **the definitions provided in the next pages must be interpreted and understood in line with the Waste Framework Directive**.

[21] EN 45557:2019 "General method for assessing the proportion of recycled material content in energy related products."

c. Post-consumer material

ISO 472: 2013 (confirmed 2018)

→ *Descriptive term covering material, generated by the end-users of products, that has fulfilled its intended purpose or can no longer be used (including material returned from within the distribution chain)*

→ *Note 1 to entry: The term "post-use" is sometimes used synonymously.*

ISO 14021: 2016

→ *Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.*

EN 45557:2019

→ *Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose.*

→ *Note to entry: This includes returns of material from the distribution chain.*

Under the umbrella of post-consumer material, we can include most plastic waste currently being collected by the EU Member States EPR schemes and sent to recyclers. An overview may be found in Figure 4.

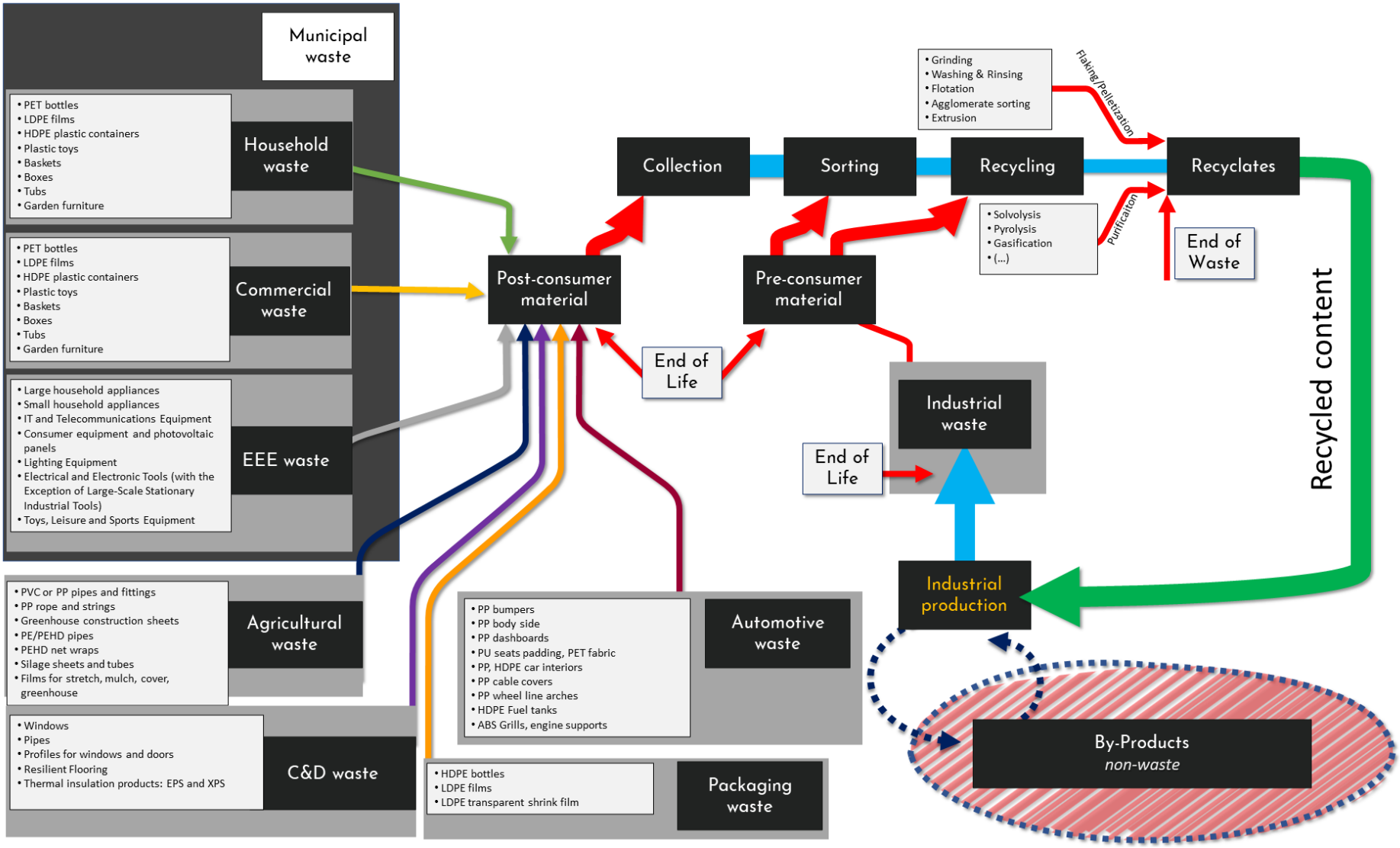


Figure 4. Rework materials, pre-consumer materials and post-consumer materials (including examples of waste products)

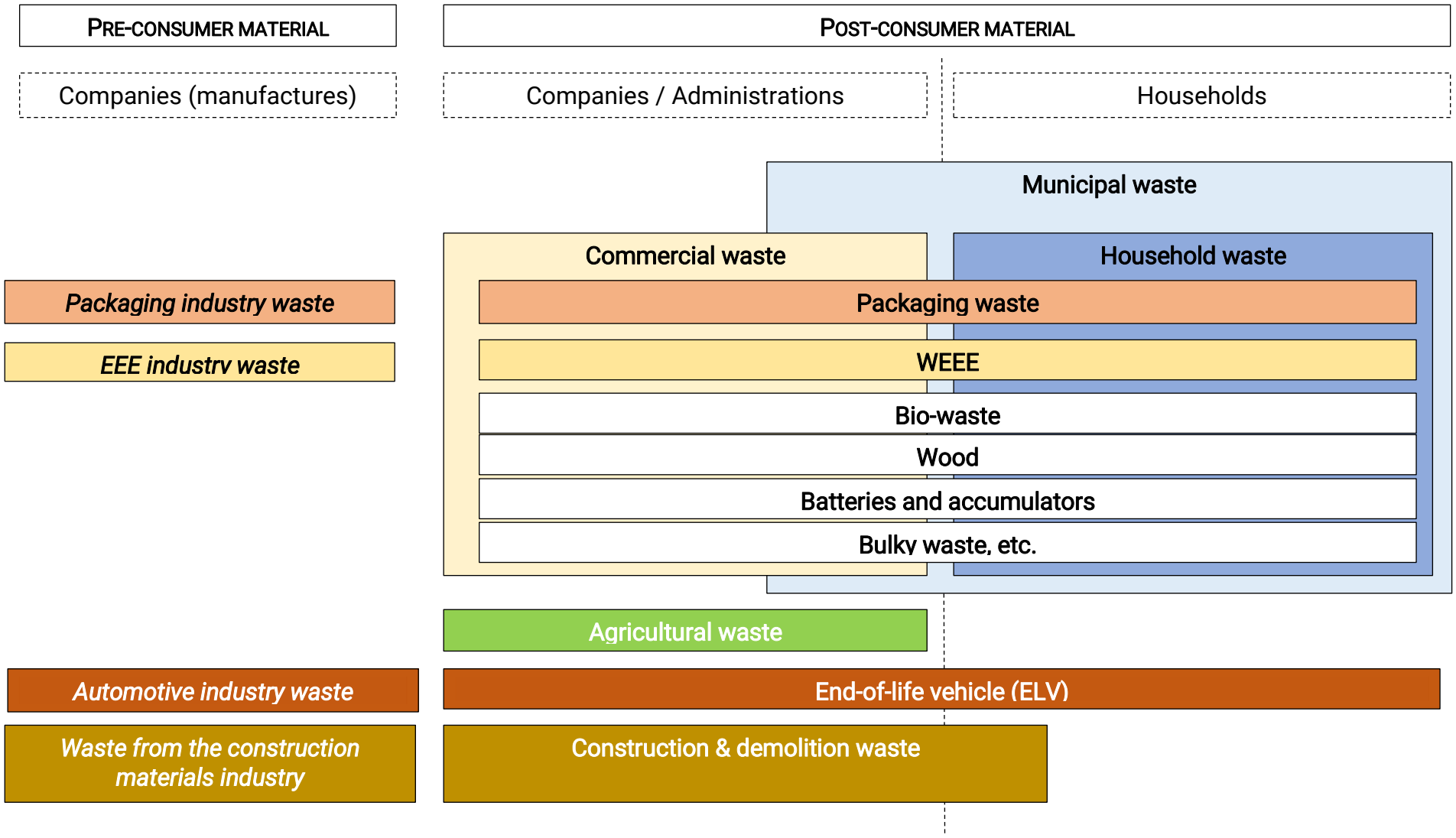


Figure 5. Waste categories overview

PART II: Waste generating from CPA WG industrial sectors

6. CPA WGs: material examples for monitoring purposes

The next section provides for industry specific examples, taking into account the two following metrics:

1 **What kind of material it is** according to Standards (e.g. ISO 14021): Rework, pre- or post-consumer material.
2 **What status the material has** according to WFD: Product, by-product, or waste.

a. Agriculture WG: Agricultural waste

Agriculture WG: post-consumer material

Agricultural waste comprises plastics generated from agricultural activities. According to CPA scope, this mainly includes films (silage, greenhouse coverings, etc.), nets, twines, and irrigation piping. Agricultural waste is usually collected and transported business to business between the farmers and the local reprocessing facilities.

The average of soilage coefficient is 1,62 for films and 1,57 at global level. In fact, agri-plastics being used in exterior, in contact with ground, dust and exposed to sun and rain are often heavily soiled after use with organic and mineral elements like sand, dirt or vegetables remains.

Agriculture WG: pre-consumer material

Converters' manufacturing plastics products for agriculture don't generate pre-consumer waste, since their production residuals can be reclaimed in the same process that generates them.

Use by converters of other sectors' pre-consumer recycled material in agriculture products.

Agri-plastics converters use for their products recyclates arising from pre-consumer waste generated by other sectors than agriculture, such as packaging: e.g., cut-off of printed films used in the production of black silage films…

In some applications, pre-consumer might be the only option to incorporate recyclates, at least in a first moment. In addition, the monitoring of pre-consumer waste is needed to avoid any substitution of pre-consumer by post-consumer waste that would prevent an increase of the effective recycled content incorporation level.

Agriculture WG: use of recycled plastics

Recycled plastics are already used in agriculture, since almost 50 years, especially in the silage applications. Agriculture is also one of the major providers for recycled material thanks to its relatively thick products, made of high-quality homogeneous polymers. Agri-plastic are also sorted at farm and collected selectively in quite big streams, lowering the logistical cost. Traditional outputs are the construction sector, automotive and garbage bags application. The current application available for recyclates from agri-plastics are limited by the average soilage of used products.

Agriculture WG: description of pre- and post-consumer materials

Table 2. Post-consumer materials: agriculture

Post-consumer agriculture		
Product & polymer	Origin	Description
Mulching and cover films	Horticulture	Used films from ground cover in horticulture, including small tunnels
Greenhouse films	Horticulture	Used films from high tunnels and greenhouses
Silage sheets and bags	Catling	Used films and bags for silage
Silage stretch films	Catling	Used wrapping films for silage
PP twines	Catling and horticulture	Used twines for forage preservation and tying in horticulture
HDPE net wraps	Catling	Used bale net wraps
HDPE protective nets	Horticulture	Used nets for shading, anti-hail, wind, ground and insect's protection
HDPE pressure pipes	Water supply	Used irrigation and water supply pipes
LDPE thick wall pipes	Horticulture	Used semi-flexible irrigation pipes
LDPE thin wall pipes	Horticulture	Used flexible drip irrigation pipes
PP non-woven films	Horticulture	Used films for ground cover

Table 3. Pre-consumer materials: agriculture

Pre-consumer agriculture		
Product & polymer	Origin	Description
N/A	N/A	N/A

b. Automotive WG: ELV material

Automotive WG: post-consumer material

According to the scope of the CPA, this is either "service material" coming from repair workshops or material generated from End-of-life Vehicles waste (ELV), defined in Article 2 of the Directive[22] as:

→ *'vehicle' means any vehicle designated as category M 1 or N 1 defined in Annex IIA to Directive 70/156/EEC, and three wheel motor vehicles as defined in Directive 92/61/EEC, but excluding motor tricycles;*
→ *'end-of life vehicle' means a vehicle which is waste within the meaning of Article 1(a) of Directive 75/442/EEC [now Waste Framework Directive 2008/98/EC];*

Automotive WG: pre-consumer material (ISO 14021:2016)

Pre-consumer material according to ISO 14021:2016 consists in parts or rest material from production such as:

- Virgin material offspec. (black spots, yellowed, overaged)
- Virgin material from start and stop of production
- Offspec pellets (doubles etc.)
- Production scrap, Punch scrap

To go further, pre-consumer material can then cover:

- Plastic which has been used during purging at (re-)start of production, from main or additional injection unit.
- Material removed during post-processing operations such as drilling or trimming.
- Scrap parts rejected after quality control (not validated and not repairable within the usual production flow)
- Material resulting from any cleaning operation (resulting from changing specifications), that can be used for moulding.
- Protective caps/covers etc. used (e.g. in engines) for the delivery of parts which are removed during production of the final product (e.g. car) but are not supplied to the final customer
- Off-cuts from Polypropylene- or Polyamide-textiles (carpets, diapers etc.)

[22] *OJ L 269, 21.10.2000*, p. 34

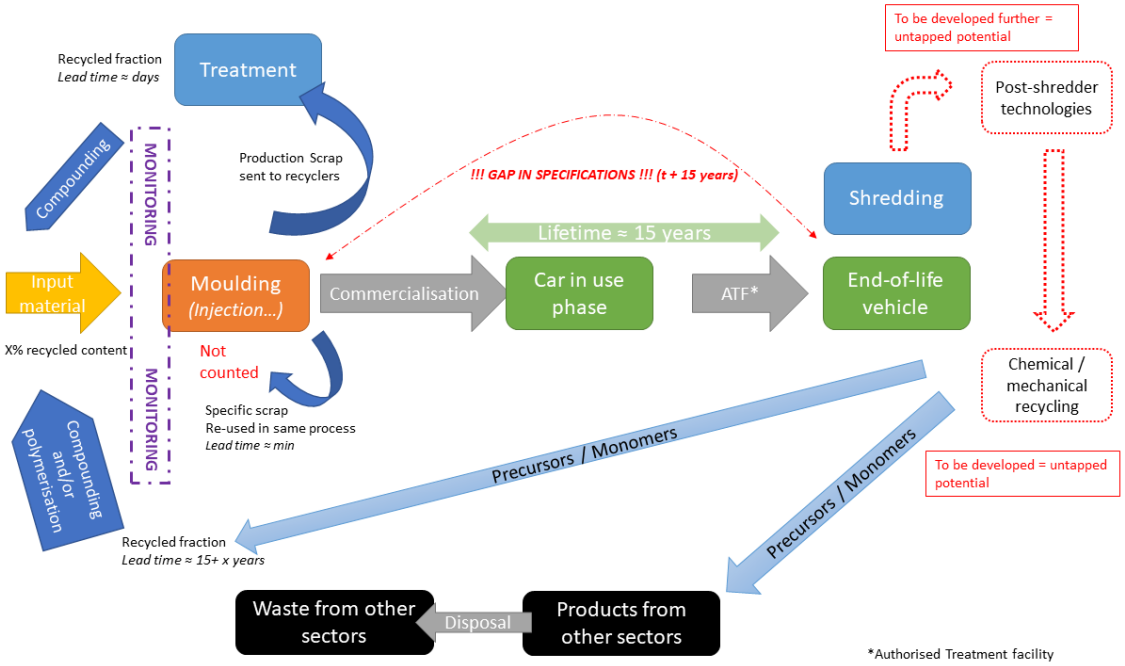


Figure 6. Polymer material flow in the Automotive Industry

Automotive WG: use of recycled plastics

Up until recently, most recycled plastics from the automotive sector originated from pre-consumer materials which become waste (if it is not waste, it could not be recycled plastic), at a rate of 10-20%, to decrease scrap generation and production costs.[23] The use of pre-consumer waste also guarantees more homogeneous properties on the new compounds. Recycled plastics used in the automotive sector can also originate from post-consumer waste generated by other market sectors. Since automotive parts and vehicles are long-lasting products, the use of recycled plastics from automotive post-consumer waste is hindered by evolution in specification and substances management over time.

However, with the development of Post-Shredder Treatment (PST) technologies, the use of recycled plastics from post-consumer waste is increasing[24]. On their end-of-life, vehicles (over 6 million cars) are sent to Authorized Treatment Facilities (ATF) and acquire the ELV status so that can be further treated for recycling. Consequently, there is a considerable gap in potential use of plastics in this sector.[25]

[23] Rossi, M., Griffith, C., Gearhart, J., Juska, C., 2005, "Moving towards sustainable plastics: a report card on the six leading automakers", Report, Ecology Center, P.56.
[24] Alfons Bueken & Trevor M. Letcher (2020) Chapter 15 - The treatment of plastic in automobile shredder residue, Plastic Waste and Recycling, Academic Press, Pages 401-414, ISBN 9780128178805, https://doi.org/10.1016/B978-0-12-817880-5.00015-3.(http://www.sciencedirect.com/science/article/pii/B9780128178805000153)
[25] Oeko-Institut e.V. - Institute forApplied Ecology. 2016. Assessment of the implementation of Directive 2000/53/EC on end-of life vehicles (the ELV Directive) with emphasis on the end-of life vehicles of unknown whereabouts.

Nowadays, dismantling ELV plastics for recycling appears to be limited practice yet (i.e., ELV car bumpers)[26], and in most of the cases downstream recycling processes of the automotive shredder residue (ASR) are the driving forces for the economical profitability and efficiency of the recycling process. In this way, PST technologies could compensate for the lack of dismantling, and these are extremely relevant as they deal with the biggest proportion of plastics present in a car.

Most of today's recycled material applications in vehicles are in the non-visible areas, like:

- Wheelhouse arches liners (fender liners)
- Heating and air conditioner housings (HVAC systems)
- Carpets; starter battery trays
- Air cleaner assemblies and underbody panels
- Reinforcement/support for bumpers
- Powertrain applications insulation materials
- Engine covers

Automotive WG: description of pre- and post-consumer materials

Post-consumer materials can originate from dismantling at an authorised treatment facility for end-of-life vehicles. However, stakeholders agree that economic viability exists only in specific cases. In this regard, products mentioned in table 6 do not match a current general practice: they are potential parts that may be recovered or are recovered on a limited basis.

Most plastics end up in Automotive Shredder Residue.

Some parts can be recovered from service workshops.

Table 4. Post-consumer materials: automotive (examples – potential)

Post-consumer automotive		
Product & polymer	Origin	Description
PP bumpers	ELV ATF – No general practice	
PP body side	ELV ATF – No general practice	
PP dashboards	ELV ATF – No general practice	
PU seats padding, PET fabric	ELV ATF – No general practice	
PP, HDPE car interiors	ELV ATF – No general practice	
PP cable covers	ELV ATF – No general practice	
PP wheel line arches	ELV ATF – No general practice	
HDPE Fuel tanks	ELV ATF – No general practice	

[26]Gallone, T. and Zeni-Guido, A., 2019. Closed-loop polypropylene, an opportunity for the automotive sector. Field Actions Science Reports (19) 48-53. Retrieved from: https://journals.openedition.org/factsreports/5225.

ABS Grills, engine supports	ELV ATF – No general practice	
All plastic parts from workshops	Service workshops	
Automotive shredder residue	ELV ATF	

Table 5. Pre-consumer materials: automotive

Pre-consumer automotive		
Product & polymer	Origin	Description
All plastics*	Industrial converting processes	Plastic which has been used during purging at (re-) start of production, from main or additional injection unit.
All plastics*	Industrial converting processes	Material removed during post-processing operations such as drilling or trimming.
All plastics*	Industrial converting processes	Scrap parts rejected after quality control (not validated and not repairable within the usual production flow)
All plastics*	Industrial converting processes	Material resulting from any cleaning operation (resulting from changing specifications) that can be used for moulding.
All plastics*	Industrial converting processes	Protective caps/covers etc. used (e.g. in engines) for the delivery of parts which are removed during production of the final product (e.g. car) but are not supplied to the final customer
PP	Industrial converting processes	Cover panels, brackets for bumpers and under body panels
PA	Industrial converting processes	Airbag cut off or carpets, for under the bonnet components

*Polymers used in the automotive sector: PP, PA, PPA, ABS, ABS-PC, PC, PMMA, PVC, TPU, PET, ASA, PUR, PS, PE, POM, LL/LDPE, HDPE, EPS, SAN.

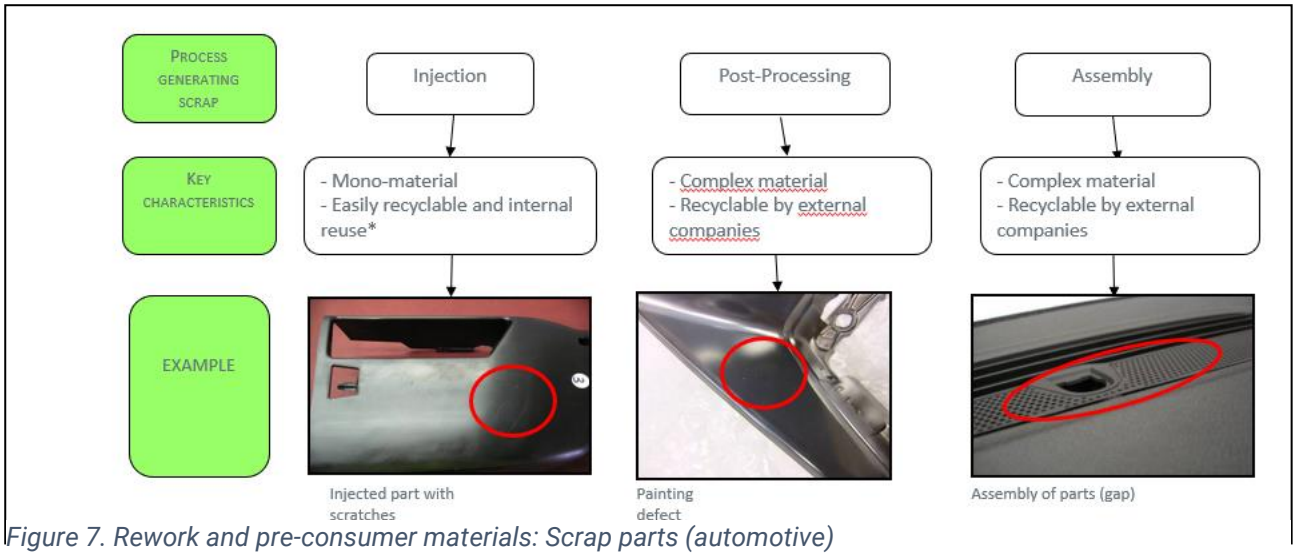


Figure 7. Rework and pre-consumer materials: Scrap parts (automotive)

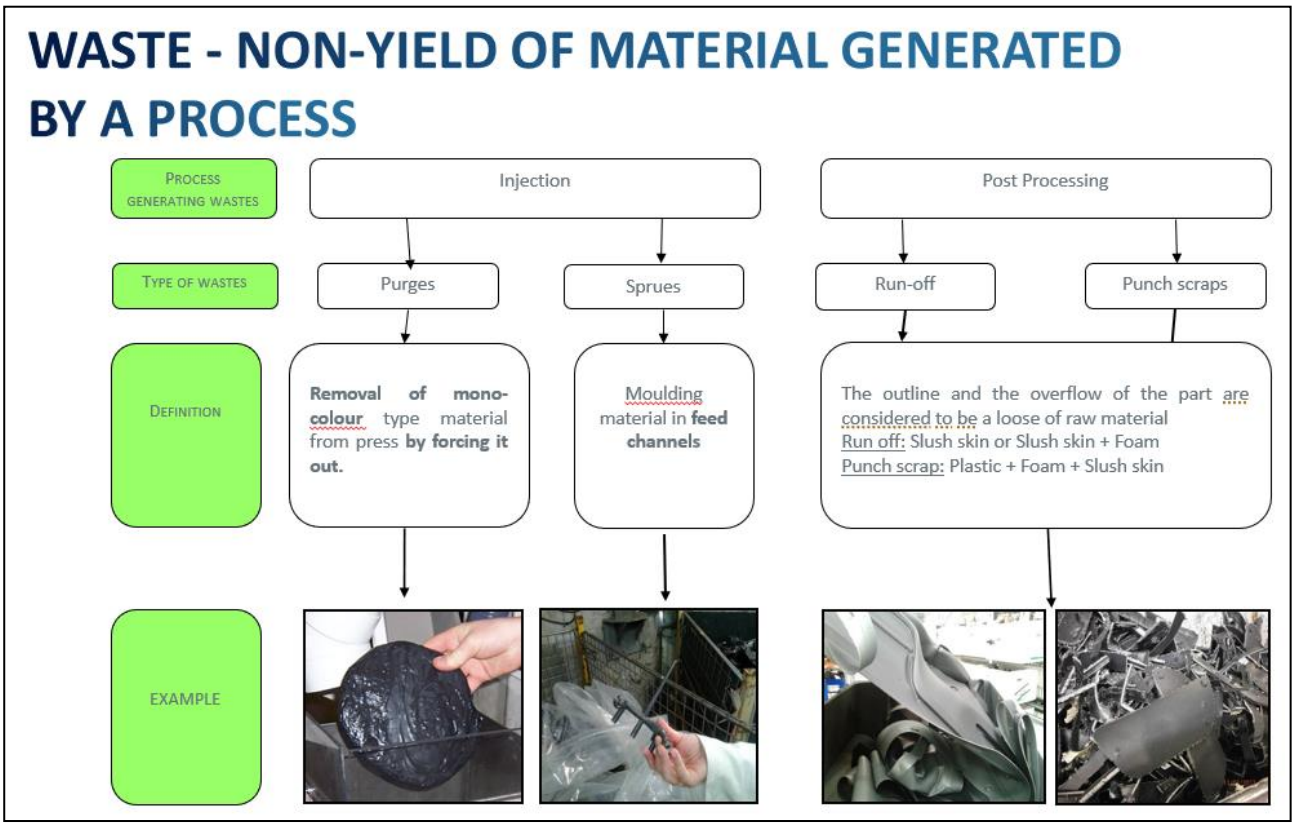


Figure 8. Non-yield of material generated by a process (automotive)

c. Packaging WG: Packaging material

The distinction of pre and post-consumer material is based on the origin of the material. In brief, material from the converter is considered pre-consumer material, whereas material generated by households or by commercial, industrial, and institutional facilities in their role as end-users are considered post-consumer material. The latter also comprises return in the supply chain, such as stocks from trade.

Examples of typical types of pre- and post-consumer materials are given in the figures at the end of this subchapter.

This classification is however independent of the waste criteria. Both kinds of materials can therefore either be waste or by-product. In case of a waste, the ISO classification will determine the prefix: pre-consumer waste will lead to pre-consumer recyclates; post-consumer-waste will lead to post-consumer recyclates.

Packaging WG: post-consumer materials

Post-consumer material becomes waste if discarded after use:

→ household packaging (e.g., sales packaging)
→ or commercial & industrial packaging (transport and outer packaging used by the food industry, agriculture, construction, industry)

Packaging is legally defined within the broad category of products, for the specific functions it exercises.

Art. 3 provides for the following definitions:

→ *'packaging' shall mean all products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer. 'Non-returnable' items used for the same purposes shall also be considered to constitute packaging.*
→ *2. 'packaging waste' shall mean any packaging or packaging material covered by the definition of waste laid down in Article 3 of Directive 2008/98/EC, excluding production residues;* [27,28]

[27] For bags, the following definitions are also provided by the same Article: "1b. 'plastic carrier bags' shall mean carrier bags, with or without handle, made of plastic, which are supplied to consumers at the point of sale of goods or products; 1c. 'lightweight plastic carrier bags' shall mean plastic carrier bags with a wall thickness below 50 microns; 1d. 'very lightweight plastic carrier bags' shall mean plastic carrier bags with a wall thickness below 15 microns which are required for hygiene purposes or provided as primary packaging for loose food when this helps to prevent food wastage;".
[28] *OJ L 365, 31.12.1994, p. 10.* Art. 6a(a) "Packaging waste generated in a Member State may be deemed to be equal to the amount of packaging placed on the market in the same year within that Member State;".

Additionally, packaging is divided into primary, secondary and tertiary, depending on the sectors in which these are used:

- → *(a) sales packaging or primary packaging, i.e., packaging conceived so as to constitute a sales unit to the final user or consumer at the point of purchase;*
- → *(b) grouped packaging or secondary packaging, i.e., packaging conceived so as to constitute at the point of purchase a grouping of a certain number of sales units whether the latter is sold as such to the final user or consumer or whether it serves only as a means to replenish the shelves at the point of sale; it can be removed from the product without affecting its characteristics;*
- → *(c) transport packaging or tertiary packaging, i.e., packaging conceived so as to facilitate handling and transport of a number of sales units or grouped packaging in order to prevent physical handling and transport damage. Transport packaging does not include road, rail, ship and air containers.*

Packaging WG: pre-consumer materials

Pre-consumer material originate from production processes where it is discarded and becomes waste.

The Packaging WG understands that pre-consumer material becomes waste if:

- → **it´s discarded from the plastic converter or the supply chain and disposed of by an authorized waste disposal company;**
- → **it´s stored or treated in a plant with a waste permit for that kind of material (or issued with an exemption, Art. 23, 24 WFD);**
- → **it has been classified as waste by a competent authority for a particular reason (e.g., because it would not be lawful to further use this material);**
- → **it´s treated by (internal or external) recovery operations beyond modification of size and shape to address typical waste-related characteristics such as contamination with hazardous or not useful components, e.g. solvation, extrusion, decontamination (interpretation of "normal industrial processes").**

The Packaging WG realises that these four bullet points alone do not reflect the whole possible conditions, as there are grey zones either depending on individual production processes or unharmonized implementation of EU law into national legislations. Therefore, a practical guideline should be provided to differentiate between waste and by-product.

- → Example: By-product that becomes waste after a given time of storage (R13) in the production plant (interpretation of "no certainty of further use").

Other examples will be provided in the next versions of the present guidance document.

For these grey zones, the Packaging WG suggest

I. excluding materials originating from these examples, or
II. to amend existing certification schemes to include an assessment to be audited against the WFD Art. 5(1).
III. to clarify this unharmonized implementation of EU law (WFD) into national legislations

Packaging WG: use of recycled plastics

The 10 Mt target set by the Commission corresponds to approximately 20% of the plastic conversion in Europe. To give a reference, in 2017, plastic packaging produced in Germany contained in average approximately 9% recycled content, of which 60% (239 kt) were pre-consumer recyclates and 40% were post-consumer (160 kt) recyclates. It is assumed that the amount of pre-consumer waste will not increase significantly as production waste is limited. **The growth must come from post-consumer recyclates**.

Packaging WG: description of pre- and post-consumer materials

Table 6. Post-consumer materials: packaging

Post-consumer packaging		
Product & polymer	Origin	Description
All polymers	Households	Household or house care packaging. Films, Cups, trays, tubes bottles and containers
All	Retailers	Films, pallets and crates

*Polymers used in the plastic packaging sector: PE, PP, PET, PS, PA.

Table 7. Pre-consumer materials: packaging

Pre-consumer packaging		
Product & polymer	Origin	Description
	Industrial Extrusion/Slitting Process (Reel Production)	
	Industrial Extrusion/Slitting Process (Reel Production)	
Start-up lumps, strands and sprues	plastic converting process	See examples If it is not re-used in the same process that generates it
Faulty production	plastic converting, thermoforming and packaging process	See examples If it is not re-used in the same process that generates it

Punch remnants, offcuts and Remaining pieces of fabrication	Thermoforming and packaging process	See examples If it is not re-used in the same process that generates it

Figure 9. Pre-consumer materials: graphic examples (packaging)

Coarsely crushed chunks and strands

Start-up lump

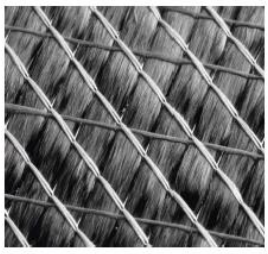
Sprue

Start-up lumps and strands

Sprues and faulty production

Start-up material

Sprues



Production residues of the composite material

Remaining pieces Pipe fabrication

Production remnants PVC window profile production

PUR soft foam production waste

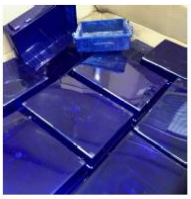
Cutting of non-cross-linked PE foam

Faulty production

Faulty production and (sprues)

Faulty production

Faulty production/ rejects



Faulty production

Faulty production, film scrap / section from production; mixture PA/PE

Faulty production, film scrap / Section from production; mixture PA/PE

Figure 10. Pre-consumer material from the plastic converter (if it is not re-use in the same process that generated it. It that can be either by-product or waste)

Punch remnants

Cutting residues, PE films

Edge sections PMMA sheets

Sections PVC floor coverings

EPS insulation sections

Building materials: PUR insulation boards

Stocks from the trade

Stocks from the trade

Figure 11. Pre-consumer material from thermoforming and packaging process (if it is not re-use in the same process that generated it. It can be either by-product or waste)

Used plant pots

Used protection elements

Used protection elements

Agricultural film, used silage and early harvest films

Post-consumer PE-LD film made of commercial collection

Used industrial drums from the Production

Glass fibre reinforced composites (disused rotor blades, GFK production residues)

residues from the paper industry (rejects)

Figure 12. Industry and commerce post-consumer materials discarded after use (waste)

PET deposit bottles sorted and pressed into bales

Mixed leightweight plastics packaging sorting

Mixed and used plastics from household goods, Sport/Games/Leisure

Electronic scrap plastics

Figure 13. Households or household-like post-consumer materials discarded after use (waste)

d. EEE WG: waste electrical and electronic equipment (WEEE)

EEE WG: post-consumer waste

For waste coming from electrical and electronic equipment, the EU has developed a specific legislative framework within the Waste Package Directive providing for separate collection measures and targets for collection, preparing for re-use, recycling, and recovery. In the EU, waste electrical and electronic equipment (WEEE) should be always separately collected from the mixed household waste[29].

Art. 3 of the Directive provides the following definitions:

- → *(a) 'electrical and electronic equipment' or 'EEE' means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields and designed for use with a voltage rating not exceeding 1,000 volts for alternating current and 1,500 volts for direct current;*
- → *(e) 'waste electrical and electronic equipment' or 'WEEE' means electrical or electronic equipment which is waste within the meaning of Article 3(1) of Directive 2008/98/EC, including all components, sub-assemblies and consumables which are part of the product at the time of discarding;*
- → *(h) 'WEEE from private households' means WEEE which comes from private households and WEEE which comes from commercial, industrial, institutional and other sources which, because of its nature and quantity, is similar to that from private households. Waste from EEE likely to be used by both private households and users other than private households shall in any event be considered to be WEEE from private households;*

According to EN 45557, Plastics originating from EoL finished products for the end-users shall be considered as post-consumer material.

EEE WG: pre-consumer waste

According to the E&E sector specific standard EN 45557, pre-consumer WEEE can be defined as any material diverted from the waste generated during a manufacturing process, excluding:

- → *By-products*
- → *Materials such as rework, regrind or scrap generated in a process and being reincorporated in the same process that generated it. In this context, same process means the same manufacturing operation for the same type of product in the same or different physical location.*

[29] *OJ L 137, 24.07.2012, p. 38-71.*

EEE WG: use of recycled plastics

According to the report RDC Environment[30], Material efficiency by marking in EU Ecodesign Marking to identify and recover Critical Raw Materials (CRM) at End-of-Life Marking to control a mandatory plastic Post-Consumer Recycled content (PCR) (2017), reuse of PCR plastics in EEE (close loop recycling) is estimated below 1%.

- → Plastics obtained from WEEE ends up in EEE or other value chains: to produce plastic chairs, furniture, new EEE….
- → Plastic of a new EEE:
  - 1% comes from PCR WEEE plastic;
  - 99% could be virgin or pre-consumer or PCR from other value chains (from furniture,…)

Examples from the home appliance sector:

- → **Electrolux vacuum cleaner -** https://www.electroluxgroup.com/en/electrolux-presents-vacuum-cleaner-made-of-100-recycled-and-reused-materials-31759/
- → **Philips** - https://www.philips.com/a-w/about/sustainability/sustainable-planet/circular-economy/recycle.html **Steam iron GC 37 series** - This iron is made of 30% recycled plastics
- → Green Performer Vacuum Cleaner - recycled Polypropylene (PP) for the plastic parts of this vacuum cleaner. 25-47% of recycled plastics in entire Performer vacuum cleaners range.
- → SENSEO Up - 13% recycled plastics in the SENSEO Up by replacing virgin materials of two components to recycled ones.
- → Steam Generator – PerfectCare ECO Aqua - About 50% of the weight of this machine is plastic. In total, 17 parts of this iron made of recycled plastics.
- → **Beko** - https://www.bekoplc.com/news/leading-the-drive-to-reduce-plastic-waste/
- → **Washing Machine Tub**
  - A washing machine tub made of recycled PET bottles. A total of 25 million PET bottles (250 tonnes of plastic) were recycled into washing machine tubs; saving 5.7 million kWh energy and preventing 885 tonnes of CO2 emissions. This is now available.
- → **Bio Fridge**
  - This innovative fridge is made with Bio-Based Plastics, Bio-Based Polyurethane insulation material and Bio-Based composites made of food residue. By increasing the endurance of materials from soy, eggshells and corn, the carbon footprint of this bioplastic is 80% lower than conventional plastics used today.

[30] https://www.rdcenvironment.be/wp-content/uploads/2017/11/2665-Ministrie-Infra-Milieu-Ecodesign-1.pdf

Several examples from the ICT sector are available in the DigitalEurope report "Best practices - Recycled Plastics in your ICT Products: The State-of-Play" (2016).

EEE WG: description of pre- and post-consumer materials

Table 8. Post-consumer materials: WEEE

Post-consumer WEEE		
Product & polymer	Origin	Description
Large household appliances	Household	Large cooling appliances Refrigerators Freezers Other large appliances used for refrigeration, conservation and storage of food Washing machines Clothes dryers Dish washing machines Cookers Electric stoves Electric hot plates Microwaves Other large appliances used for cooking and other processing of food Electric heating appliances Electric radiators Other large appliances for heating rooms, beds, seating furniture Electric fans Air conditioner appliances Other fanning, exhaust ventilation and conditioning equipment
Small household appliances	Household	Vacuum cleaners Carpet sweepers Other appliances for cleaning Appliances used for sewing, knitting, weaving and other processing for textiles Irons and other appliances for ironing, mangling and other care of clothing Toasters Fryers Grinders, coffee machines and equipment for opening or sealing containers or packages Electric knives Appliances for hair cutting, hair drying, tooth brushing, shaving, massage and other body care appliances Clocks, watches and equipment for the purpose of measuring, indicating or registering time Scales
IT and Telecommunications Equipment	Household	Centralised data processing Mainframes Minicomputers Printer units Personal computing Personal computers (CPU, mouse, screen and keyboard included) Laptop computers (CPU, mouse, screen and keyboard included) Notebook computers

		Notepad computers Printers Copying equipment Electrical and electronic typewriters Pocket and desk calculators and other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means User terminals and systems Facsimile machine (fax) Telex Telephones Pay telephones Cordless telephones Cellular telephones Answering systems and other products or equipment of transmitting sound, images or other information by telecommunications
Consumer equipment and photovoltaic panels	Household	Radio sets Television sets Video cameras Video recorders Hi-fi recorders Audio amplifiers Musical instruments and other products or equipment for the purpose of recording or reproducing sound or images, including signals or other technologies for the distribution of sound and image than by telecommunications Photovoltaic panels
Lighting Equipment	Household	Luminaires for fluorescent lamps with the exception of luminaires in households Straight fluorescent lamps Compact fluorescent lamps High intensity discharge lamps, including pressure sodium lamps and metal halide lamps Low pressure sodium lamps Other lighting or equipment for the purpose of spreading or controlling light with the exception of filament bulbs
Electrical and Electronic Tools (with the Exception of Large-Scale Stationary Industrial Tools)	Household	Drills Saws Sewing machines Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending or similar processing of wood, metal and other materials Tools for riveting, nailing or screwing or removing rivets, nails, screws or similar uses Tools for welding, soldering or similar use Equipment for spraying, spreading, dispersing or other treatment of liquid or gaseous substances by other means Tools for mowing or other gardening activities
Toys, Leisure and Sports Equipment	Household	Electric trains or car racing sets Hand-held video game consoles Video games

		Computers for biking, diving, running, rowing, etc. Sports equipment with electric or electronic components Coin slot machine
Medical Devices (With the Exception of all Implanted and Infected Products)	Household/Professional	Radiotherapy equipment Cardiology equipment Dialysis equipment Pulmonary ventilators Nuclear medicine equipment Laboratory equipment for in vitro diagnosis Analysers Freezers Fertilization tests Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability
Monitoring and control instruments	Household	Smoke detector Heating regulators Thermostats Measuring, weighing or adjusting appliances for household or as laboratory equipment Other monitoring and control instruments used in industrial installations (e.g. in control panels)
Automatic dispensers	Household/Professional	Automatic dispensers for hot drinks Automatic dispensers for hot or cold bottles or cans Automatic dispensers for solid products Automatic dispensers for money All appliances which deliver automatically all kinds of products
Add examples		

Table 9. Pre-consumer materials: WEEE

Pre-consumer WEEE		
Product & polymer	Origin	Description
Rejects in the output of production lines	Industrial converting processes	Converted plastic parts discarded during the production process due to a small defect that cannot be fed into the converting without undergoing a recycling operation

e. Construction WG: waste electrical and electronic equipment (WEEE)

Construction and demolition waste (C&D) is defined[31] as:

→ *Art. 3(2c): waste generated by construction and demolition activities.*

Construction WG: post-consumer materials

Applications and polymers generating plastic waste in the C&D sector are listed below. These applications and polymers are covered by the CPA Monitoring System.

Table 10. Applications in B&C

APPLICATIONS
Resilient Flooring
Carpet
Roofing, building membranes and sheets
Windows, doors and related building products
Pipes and fittings
Building profiles cladding
Insulation materials
Cables

Table 11. Polymers in B&C

Polymers in B&C	PVC, PP, EPDM, HDPE, LL/LDPE, PC, PMMA, PES, PEX, ABS, PB, PA, PVDF, PPS, PPSU, XPS, EPS, PUR, PIR, , PA, EVA.

Construction products have usually a long service life which may last more than 50 years, which leads towards a slow recirculation of material in the market. Preferably, plastic demolition waste is separately collected at the source which allows for a cleaner input material at the recycler. It can also be sorted out afterwards at a sorting centre. C&D waste is usually collected by either the private sector from building traders, construction companies, utility and telecommunication companies and municipalities.

[31] *OJ L 312, 22.11.2008*, p. 3–30.

Construction WG: pre-consumer materials

Pre-consumer material is not a sub-category of C&D waste as defined in the Waste Framework Directive. The general definitions of pre-consumer material as defined in section 5.2. apply. Further to this, some sector specific CEN and ISO standards have dedicated definitions. Examples are

→ Pipes: As defined in EN ISO 14021:2016 *Environmental labels and declarations — Self-declared environmental claims*: Materials from unused products excluding reworked (plastics) materials. Specific for the plastic pipe industry it is stated that reworked materials, that have:
  - Lost quality and need reprocessing, e.g., by adding new additives to use the material for the original intended products
  - Been out of the control of the manufacture, e.g., if products have been returned from a construction site.

  is defined as pre-consumer material.

→ Windows: EN 17508 PVC-U Profiles for the Fabrication of Windows and Doors – Terminology of PVC based materials
"PVC-U pre-consumer waste: material diverted during a manufacturing process of profiles and/or windows or doors and which the holder discards of intends or is required to discard"

Construction WG: use of recycled plastics

Nowadays, pre-consumer waste is still the main source for recycled content in construction plastics. These constitute mainly production waste generated during production and assemble process, which cannot be re-used directly in the same process which generated the waste (see sections 4 and 5).

One example of the use of recycled plastics is for instance recyclate content in EPS and XPS thermal insulation products which can come from pre and post-consumer PS and pre and post-consumer EPS packaging waste recycled trough different recycling routes. Another example is the use of recycled U-PVC from windows in new windows or pipes

Construction WG: description of pre- and post-consumer materials

Table 12. Post-consumer materials: C&D

Post-consumer C&D		
Product & polymer	**Origin**	**Description**
Windows	Construction, refurbishment or demolition site	Installation waste that arises at a construction, refurbishment or demolition waste from EoL windows
Pipes	Renovation or demolition waste	EoL pipes that are being replaced with new pipes or removed during demolition activities
Pipes	Construction activities	Installation waste
Resilient Flooring	Construction, refurbishment or demolition site	Installation waste that arises at a construction, refurbishment or demolition waste Post-consumer waste from used flooring after renovation, demolition;
Thermal insulation products: EPS and XPS	Demolition with waste sorting	Installation waste that arises at a construction, refurbishment or demolition waste when insulating of the buildings envelope (roof, walls, basement)
Waterproofing membranes used as roofing	Refurbishment or demolition.	Roofing, essentially of commercial buildings with flat roofs

Table 13. Pre-consumer materials: C&D

Pre-consumer C&D		
Product & polymer	**Origin**	**Description**
Profiles for windows and doors	Industrial converting process, window manufacturing	Waste at converter from quality loss or processing, which cannot be re-used without re-compounding, removal of gaskets/foams/etc. or only due to specially developed converting techniques (e.g. co-extrusion). Waste at manufacturing stage from off-cuts and quality loss.
Resilient Flooring	Industrial converting process	Processing waste that has been substantively adapted/reformulated prior to reprocessing*

		Processing waste re-used in other internal processes or sold to other flooring manufacturers or other converters. *e.g .Waste which is sorted and re-mixed with other compatible waste or virgin materials before being reintroduced into the process or which has to be reformulated with the addition of new additives and compounds resulting for example in new granules or feedstock which then can be reintroduced into the new process. Waste which has to be disassembled by separating layers, before being reintroduced into the process.
Thermal insulation products: EPS and XPS	Demolition with waste sorting	Waste that arises during production of insulation of the buildings envelope (roof, walls, basement).
Pipes	Wholesale	Returns from customers or wholesalers that can no longer be sold