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FEVE/FERVER contribution: Quality of recycling

The Waste Framework Directive and the Packaging & Packaging Waste Directive refer to “high-quality recycling” but do not define this concept. FERVER, the European Federation of Glass Recyclers, and FEVE, the European Container Glass Federation, therefore welcome the JRC-led project that will discuss and suggest approaches for defining the quality of recycling.

We believe that the definition of a high-quality recycling must be based on three different concepts.

1. Firstly, the material to be recycled must be able to withstand several recycling loops without significant degradation of its intrinsic properties (see below “Permanent Material”).
2. Secondly, an efficient recycling scheme must be in place to collect a significant share of the tonnage put on the market and to deliver recyclates meeting the quality requirements of the market. This will ensure that packaging is not only recyclable but also effectively recycled.
3. Finally, emphasis should be put on closed loop applications (where the material is recycled into the same application or an application which allows the material to be recycled again and again) to reduce reliance on virgin raw materials.

Overall, the study on assessment of the definition of recycling has three objectives that should all be aligned with the definition of ‘recycling’ in the Waste Framework Directive (i.e. “*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*”) and with subsequent calculation rules set in Commission implementing Decision (EU) 2019/665 of 17 April 2019.

Promoting high-quality recycling with Permanent Materials

- A ‘Permanent Material’ is a material whose inherent properties do not change, regardless of the number of times it goes through a recycling process. It means that once it is produced for the first time, and properly collected and processed at its end of life, it becomes the raw material for new and endless production loops. Glass (see [study commissioned by FEVE and carried out by the Italian Research Institute ‘Stazione Sperimentale del Vetro’](#)), as well as metals, are such Permanent Materials.
- Technically, glass bottles can be produced with up to 100% recycled glass. Glass packaging manufacturers are committed to make our Circular Economy work better by ensuring that resources used are kept productive in the EU economy for as long as possible. By using recycled glass in a closed loop, the industry significantly reduces the use of virgin raw materials. Closed loop recycling guarantees that the packaging placed on the market contains the highest possible level of recycled glass—rather than being produced from virgin raw materials. Recycled glass is the most important raw material that is used to produce new glass packaging solutions. On average a glass container made in Europe contains 52% recycled glass. Permanent materials are and will remain at the heart of any proven and well-functioning Circular Economy.
- The European Parliament in a [2021 report on the Circular Economy Action Plan](#) recognised the “*need to increase the availability and quality of recyclates, focusing on the ability of a material to*

retain its inherent properties after recycling, and its ability to replace primary raw materials in future applications". This is a welcome first step that should pave the way for a legislative recognition of permanent materials at EU level. Such recognition would be a strong incentive to promote further investments in closed loop, "circular" recycling. Not all forms of recycling being of equal benefit, we believe that introducing the concept of a "recycling hierarchy" will promote circularity, high-quality and multiple recycling:

- **Multi-recyclable**, i.e., packaging materials that have the ability to retain their intrinsic properties after recycling and are capable of replacing the same primary raw material in future applications. Multi-recyclable also means that recycling process for these materials can be repeated over and over again with high recycling yields, guaranteeing minimal amount of material losses, thus maintaining a circular material loop.
- **Non-multi-recyclable**, i.e., the potential to be recycled only a few times with a risk of losing the intrinsic properties. The recycling process for these materials leads to a gradual degradation of the original material. The recycled material might not always substitute the primary material on a like-for-like basis, risks to be down-cycled and finally leaves its circular material loop.

Quality ratios in the Product Environmental Footprint (PEF) methodology

- In the context of the Product Environmental Footprint (PEF), the Circular Footprint Formula (CFF) has been developed to calculate the environmental impacts of products. Two quality ratios are used in the CFF, to take into account the quality of both the ingoing and the outgoing recycled materials: Q_{sin}/Q_p and Q_{sout}/Q_p , where:
 - Q_{sin} : quality of the ingoing secondary material, i.e. the quality of the recycled material at the point of substitution.
 - Q_{sout} : quality of the outgoing secondary material, i.e. the quality of the recyclable material at the point of substitution.
 - Q_p : quality of the primary material, i.e. quality of the virgin material.
- According to the Product Environmental Footprint Category Rules Guidance, the quantification of the quality ratios shall be based on:
 - Economical aspects: i.e. price ratio of secondary compared to primary materials at the point of substitution. In case the price of secondary materials is higher than the primary ones, the quality ratios shall be set equal to 1.
 - When economic aspects are less relevant than physical aspects, the latter may be used.
- Default values of Q_{sin}/Q_p and Q_{sout}/Q_p have been defined for different packaging materials in Annex C of the PEF method document.

	Default value (Q_{sin}/Q_p)	Default value (Q_{sout}/Q_p)	Comments
Glass	1	1	
Steel	1	1	
Aluminium	1	1	
Other metals	1	1	
Paper and cardboard	0.85	0.85	This value shall be used when the recycling process doesn't consider fibre losses
Paper and cardboard	1	1	This value shall be used when the recycling process considers fibre losses
PET - SSP recycling	1	1	
PET mechanical recycling	0,9	0,9	
PP	0.9	0.9	
HDPE	0.9	0.9	
LDPE film	0.75	0.75	

- The setting of these quality ratios turned out to be a complex exercise and for the sake of practicality, some values have been assigned to every material but with no strong scientific basis. We would therefore welcome further investigation to fine-tune the values of the quality ratios to be applied for different applications and materials and ensure that they are periodically reviewed and updated by the European Commission. For instance, we consider that these “quality factors” should not be related to the relative prices of the primary and recycled materials. They should be a measure of how long a material can be recycled without losing its inherent properties before being discarded. In this context, an economic approach for calculating the ratio Q_s/Q_p is not the right approach for promoting a circular economy. The price of a particular recycled material is indeed not linked at all with the recyclability of this material, but rather with the economic value of the virgin material.
- To help refine the CFF methodology and the calculation of the quality ratios, FEVE commissioned a study to Politecnico Milano (see attached). The study proposed a quantification of the quality ratios based on physical properties and how the technical properties of a material change during the recycling process. The methodology addresses two aspects:
 - 1) Do the inherent properties of the secondary material equal the ones of the primary material at the point of substitution?
 - 2) Can the product (with a certain target quality) be produced starting from 100% of secondary material at the point of substitution?
- To calculate Q_s/Q_p , the study introduced two coefficients:
 - D: which takes into account for the down-cycled inherent property at the point of substitution
 - M: which represents the maximum percentage (at least technically achievable, but possibly already achieved in products available on the market) of secondary material used at the point of substitution
- The proposed methodology resulted in the following values:

For food & beverage packaging:

	Q_{sin}/Q_p	Q_{sout}/Q_p
Paper	0.83	0.80
PET		
bottle to bottle	0.34	0.34
open loop	-	0.85*
Aluminium		
can to can	0.99	0.99
open loop	0.52	0.40
Steel	0.70	0.70
Glass	0.95-1	0.95-1

* In case the application is bottle-to-fiber, then $Q_{sout}/Q_p = 0.30$

Effective separate collection and sorting of waste to promote high-quality recycling

- The way packaging is collected directly impacts the quantity and quality of the collected materials that can be recycled. Effective separate collection and modern and efficient sorting are therefore the prerequisite to guaranteeing high-quality recycling. The presence of contaminants (e.g.

ceramics, metals, plastics, organics, etc.) in the glass recycling system or how the glass is handled may result in lower recycling yields.

- On average, 76% of glass packaging put on the market is already collected around the EU. With our partners in [Close the Glass Loop](#), a multi-stakeholder partnership bringing together glass manufacturers, glass recyclers, food & beverage producers, extended producer responsibility schemes, and local and regional authorities, we are aiming to raise that figure to 90% across all 27 EU countries plus the UK, as well as improving the quality of collected glass.

About FEVE

FEVE is the association of European manufacturers of glass containers. The glass packaging industry generates 125 000 direct and indirect jobs thanks to 160 Container glass production sites in Europe producing a wide range of glass packaging products for food and beverages, perfumery, cosmetics and pharmacy for European and global customers. FEVE members have plants in 23 European Member States. Container glass is one of Europe's best recycled products. See more on www.feve.org.

About FERVER

FERVER is the association of glass recycling companies in Europe, with members spread over 19 countries and recycling more than 70% of the glass collected in Europe. More than 90% of their cullet production is handled as End-of-Waste in compliance with the European Regulation on End-of-Waste for Glass EU 1179/2012. This contributes significantly to the global circular economy and particularly to the conservation of the permanent status of glass. With their 79 plants, they provide employment to 2350 people. See more on www.ferver.eu