

Barrier



To create a circular economy we need to **eliminate** all problematic and unnecessary plastic items; **innovate** to ensure that the plastics we do need are reusable, recyclable, or compostable;¹ and **circulate** all plastics we use to keep them in the economy and out of the environment. These are the fundamental building blocks to create a circular economy for plastics. While recycling alone won't solve the plastic pollution problem, it is certainly a part of the solution. We therefore need to make significant improvements both to recycling infrastructure and packaging design to increase recycling rates from 14% globally in 2015.

According to the Global Commitment definitions, a packaging item or a packaging component can be considered "recyclable" if its successful post-consumer collection, sorting, and recycling is proven to work in practice and at scale.² This requires the packaging to fulfill both criteria below:

- a. Recycling Infrastructure** - the existence of a recycling stream for the packaging in question including collection, sorting and recycling infrastructure.
- b. Packaging Design** - the packaging itself has to be designed for recycling, i.e. in accordance with design for recycling guidelines for the intended recycling stream.

Project scope: Plastic-based flexible barrier packaging (PFBFP)

PFBFP is flexible, as opposed to rigid, and can be used to package almost any type of product (crisps, instant coffee, juice, candy, soup, soap, beauty products, etc).

For this project, PFBFP was further defined by following characteristics:

- Medium- to high-barrier functionality (barrier against oxygen and water vapor transmission, etc.).
- Generally smaller than A4 in size, but can also be larger for certain applications.
- Primarily polyolefin based and thus targeting the polyolefin recycling stream.
- Often used in packaging for households, on-the-go packaging, or similar, e.g. cafeterias, hospitals.

1 [New Plastics Economy vision](#)

2 [New Plastics Economy Global Commitment definitions](#)

Plastic-based flexible barrier packing (PBFBP) is one of the formats that have the lowest recycling rates globally.³ Due to their lightweight and often highly complex composition – in the form of adhesives, multiple layers, multiple materials, inks, etc. which lower the value of the recycled plastic – the economics of recycling these items are challenging. To solve this problem, we urgently need to either develop and execute a credible roadmap to make recycling work in practice and at scale for PBFBP, or avoid PBFBP in the first place by fundamentally rethinking the packaging, product or system (e.g. through elimination, reuse or other new delivery models).

Building on previous efforts like REFLEX, FIACE and the ongoing CEFLEX⁴ initiative, and taking into account the technical capabilities of today's recycling technologies, Pioneer Project Barrier (PiPro Barrier) focused on the packaging design (point b. of the recyclability criteria listed above), with the aim to increase the feasibility to make recycling work in practice and at scale for PBFBP. Concretely, the project aimed to:

- 1** Create clarity and industry agreement on the types and characteristics of PBFBP designs which could increase the quality of recyclates from PBFBPs and thus enable the development of recycling streams for these.
- 2** Help identify quick wins for PBFBP design changes that could be implemented relatively quickly.
- 3** Guide and support longer-term innovation towards making more challenging packaging applications fit for a circular economy.

This document summarises the approach and high level learnings from the process.⁵

Methodology

PiPro Barrier, led by Amcor, brought together stakeholders from the entire plastic value chain to identify a first set of design principles that help to minimise contamination and highlight areas of innovation and research to increase the value of PBFBP recyclates and the range of applications in which these can be used.

It is important to note that while the guidelines are drafted based on input from experts in the field, they need further refinement, testing and verification. Thus, it should be seen as an opinion piece and a first attempt to provide a sense of direction rather than a final guideline.

³ EMF recyclability assessment

⁴ www.ceflex.eu

⁵ Please see <https://ceflex.eu/projectbarrier> for technical details, the project deliverable and explanatory notes

Outcome

The outcome of the project is an initial design guideline to improve the quality of PBFBP recyclates. The full guideline along with explanatory notes can be found on the CEFLEX website following this link:

The guidelines propose a way forward to simplify and align packaging design for PBFBP both among the project participants and beyond. It provides an initial estimate of expected qualities of recyclates that could be produced following the guidelines and it gives a sense of direction that can be used as guidance for further research and development. It is important to note that while following the guidelines might technically improve a package's ability to go through a sorting and recycling plant it does not render the packaging "recyclable" according to the Global Commitment definition as it is not fulfilling the criterion of being recycled in practice and at scale. Furthermore, it is important to emphasise that the guidelines were based on input from the PiPro Barrier participants hence it is not scientifically proven and needs further verification and testing (such tests and follow up work will be conducted by CEFLEX).

Learnings

PiPro Barrier was a major catalyst for creating alignment and a common understanding of packaging design, technical requirements, challenges and opportunities for stakeholders working at different steps along the value chain.

The presence of stakeholders from across the value chain was a challenge as design changes beneficial to recyclers often complicate life for packaging producers and vice versa. Hence it was crucial to have both views present to balance the discussion and provide the final deliverable.

Next steps

The PiPro Barrier guidelines provided the first step in creating common design standards for flexible barrier packaging, but more work is needed in order to verify, finetune and test the guidelines. The important next steps have been taken on by the CEFLEX initiative, which will develop, test and refine the guidelines further as part of their ongoing design for recyclability work.

Crucially important, in order for the guidelines to have real impact, is to assess the feasibility (for different geographies) of establishing a system and infrastructure to collect, sort and recycle PBFBP in practice and at scale and, if feasible, urgently develop and execute a credible roadmap to put these systems in place in a meaningful time frame.



Today's plastics system faces challenges that no organisation can address alone. Pioneer Projects are pre-competitive collaborations that are led and run by participants of the New Plastics Economy initiative. They invite stakeholders from across the plastics value chain to design and test innovations that could change the way we make, use and reuse plastics.

The New Plastics Economy Initiative is led by the Ellen MacArthur Foundation. The Foundation works with business, government and academia to build a framework for an economy that is restorative and regenerative by design.

The Ellen MacArthur Foundation is not to be held responsible for any output from the Pioneer Projects. It focuses only on facilitating the setup and engaging in the process, and on encouraging circular economy thinking and the application of a systems perspective.