

WERNER & MERTZ



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Proof: a case for designing flexible plastic packaging for the circular economy

Plastic waste poses a growing risk to the economy, environment and society. A response is to create a circular economy for plastic that eliminates plastic waste and pollution at source. Against this backdrop, Project Proof set out to design and prototype a plastic-based flexible packaging solution in collaboration with customers, competitors and all stakeholders across the value chain, that is scalable, commercially viable, and which can be processed in sorting and recycling facilities.

Project Proof involved the prototyping of a packaging solution in the pre-competitive stage to demonstrate proof of concept and tangible outcomes. Over the course of the project (November 2017 to May 2019), the participants worked together with open communication and equal opportunity to contribute to and influence its development. The ultimate aim is to tender an actual product with market value in the competitive stage (post May 2019).

Compliance with EU Competition Law was essential, given that the project team were supply chain partners, customers, suppliers and competitors, embarking on a pre-competitive collaboration with commercial potential. The Ellen MacArthur Foundation developed an acknowledgement form as a legal framework for the project, which the participants signed.

This publication provides a summary of the collaboration, outputs, learnings and future steps of the project. For the full report, please visit the [website of Mondi Group](#).

The project team targeted two different end-use applications and packaging types. Option 1 targeted a non-food end-use (household detergent) in the form of a large-format FFS pouch, replacing PET/PE multilayer laminates with a mono-material and including a minimum of 20% post-consumer recycled (PCR) content. Option 2 targeted a food end-use (wet pet food) in the form of a pouch involving an FFS packaging type, replacing PET/ALU/PP or PE multilayer laminates, while retaining barrier properties. The packaging was based on virgin material and aimed for retortability.

For Option 1, targeting PCR content was important to the participants, as this would increase circularity and give an end use for the material being recycled in the marketplace. The trial process involved the processing of post-use plastics by recycling companies; and blowing them into film, laminating and finally manufacturing the pouch by converters.

In the first trial which led to a prototype, the post-use material processed involved a 'worst-case' scenario with minimal sorting. The overall construction of the pouch was excellent, with fair seal strength and zipper integrity. The appearance of the pouch was the main shortcoming due to the gel content of the material. The converters shared other 'pilot plant' blown film sample results from a variety of sources – recycling suppliers with different starting materials, leading to various levels of quality, and gel content in particular. One of the samples had been processed in a new recycling plant. This state-of-the-art sorting plant achieved a 60-70% recycling yield (pre-sorting, washing, flake sorting, extrusion) and a 90-93% recovery rate for the LDPE during pre-sorting. In addition to the higher yield, samples made from these recyclates had better clarity, smell and overall appearance, and included far fewer gels.

For Option 2, technical specifications agreed to by the FMCGs were highest in their range, and the retort, fill rate, appearance, shelf life and other requirements made it especially complex to achieve. While each of the converters had been working on a solution, none had an approved version during the timescale of the project. Some FMCGs had been working with suppliers on solutions involving an AlOx/SiOx coating or EVOH co-extrusion, with PP mono-material, which is suitable for retortable wet food and which, relative to multi-material laminates, could improve the quality of the recyclates. The converters agreed to a possible Joint Development Agreement, acknowledging possible compromises (such as shelf life). FMCGs will then carry out tests on submitted samples of jointly developed wet pet food pouch.

Learnings:

- A collaborative approach has a better chance of achieving success when players from the full value chain are involved and have full sight, transparency and disclosure of issues that need to be addressed
- Taking the time to prepare, clarify and agree on the legal framework at the outset is essential if future collaborative 'safe space' developments are to take place involving a full value chain initiative
- While the time and effort spent on cleaning and separating the household PCR was arguably uneconomic, it demonstrated what can be achieved for valuable end uses when the after-use material is appropriately engineered and cleaned
- A preferentially separated material, going through a state-of-the-art cleaning and sorting process, would lead to a packaging of a higher quality product, which is more suitable and valuable for the end consumer, as well as more likely to favour scalability. Improvements in cleaning and sorting plants can further heighten the quality of the recyclates. While the higher quality products will cost more, those will be used for higher quality end uses, enabling greater retention of value throughout the value chain
- Mechanical recycling alone will not solve the pressing issue of plastic pollution. It is necessary to develop upstream solutions such as elimination of problematic and unnecessary plastic packaging, and new delivery models such as reuse models in combination with other means of recycling – for example solvent based recycling and depolymerisation technologies

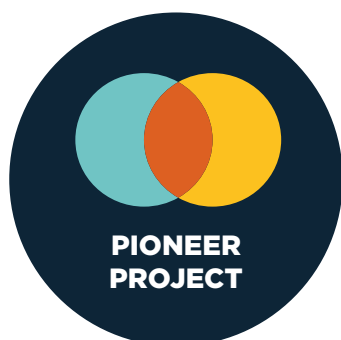
Going forward

In addition to redesigning flexible plastic packaging to enable recycling, preferential separation and sorting of these plastics are critical to achieve recyclability in practice and at scale, and to meet the demand for PCR material. True collaboration needs to continue. There is a strong desire for action, and ensuring that the right partners participate in

finding solutions is key. Future efforts should be harmonised in such a way that resources, experience and ideas can be pulled together, and the industry should work towards targeted focus areas and agreed definitions such as those provided in the New Plastics Economy Global Commitment.

CONTRIBUTORS TO PIONEER PROJECT PROOF

The Project was led by Mondi Group and facilitated by the Ellen MacArthur Foundation. The participant group consisted of representatives from APK, BASF, Borealis, CEFLEX, Constantia Flexibles, Danone, GreenCycle, Henkel, Huhtamaki, L'Oréal, LWARB, Nestlé, PepsiCo, RPC-BPI, Sloop, SUEZ, Target, Tomra and Werner-Mertz.



WHAT ARE PIONEER PROJECTS?

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.