

# DESIGNING FOR A CIRCULAR ECONOMY

Recyclability of polyolefin-based  
flexible packaging





**Flexible packaging is an important part of our modern world. It protects food and other goods and is generally made of plastics but can also include other materials such as paper or aluminium foil.**

It helps to ensure products reach consumers safe and fresh, preserving nutrients, taste, and quality. It reduces waste of the goods it protects and often uses far less material than alternative packaging. Being very light and thin, flexible packaging reduces the environmental impact of transportation.

The qualities that make it so useful, lightweight and resource efficient can also present a challenge once packaging becomes waste.

The flexible packaging value chain recognise these issues and is working to resolve the challenges required to ensure packaging flows back into the economy and displaces virgin materials.

Designing flexible packaging suitable to be collected, sorted, and recycled after use is critical. Critical to meeting the new legislative requirements. Critical to meeting the flexible packaging industry's own sustainability goals. And critical to preventing waste and pollution.

The Designing for a Circular Economy Guidelines (D4ACE) have been developed by, and for, the whole value chain to build understanding of end-of-life processes, give practical support and advice on circular economy design principles and make design choices for recyclability clear.

The entire value chain – from material and film producers, packaging converters and machine suppliers to brand owners, waste management companies, recyclers, extended producer responsibility schemes, associations and more – have collaborated to produce these guidelines and help realise a circular economy for flexible packaging.

The guidelines have been developed in a credible and robust manner, drawing on the technical, environmental, and business expertise of hundreds of CEFLEX stakeholders. They are based on commercial practices at scale somewhere in Europe and supported by test or trial data wherever feasible.

The Designing for a Circular Economy Guidelines aim to make flexible packaging circular by:



Giving clarity to brand owners, retailers, film producers, converters and others in the value chain so flexible packaging is also designed for collection and sorting for recycling.



Helping to increase the level of collection, sorting and recycling.



Producing higher quality recycled materials to be kept in the economy and used in a wider number of sustainable end markets.

CEFLEX stakeholders and the wider flexible packaging industry are encouraged to consult and apply the principles and information provided by the guidelines to help deliver significant environmental improvements while not compromising functionality to protect, package, transport, sell and use the product.

## ▴ The CEFLEX initiative

The Circular Economy for Flexible Packaging (CEFLEX) initiative is a collaboration of European companies, associations and organisations representing the entire value chain of flexible packaging. Together, we work to make all flexible packaging in Europe circular by 2025.

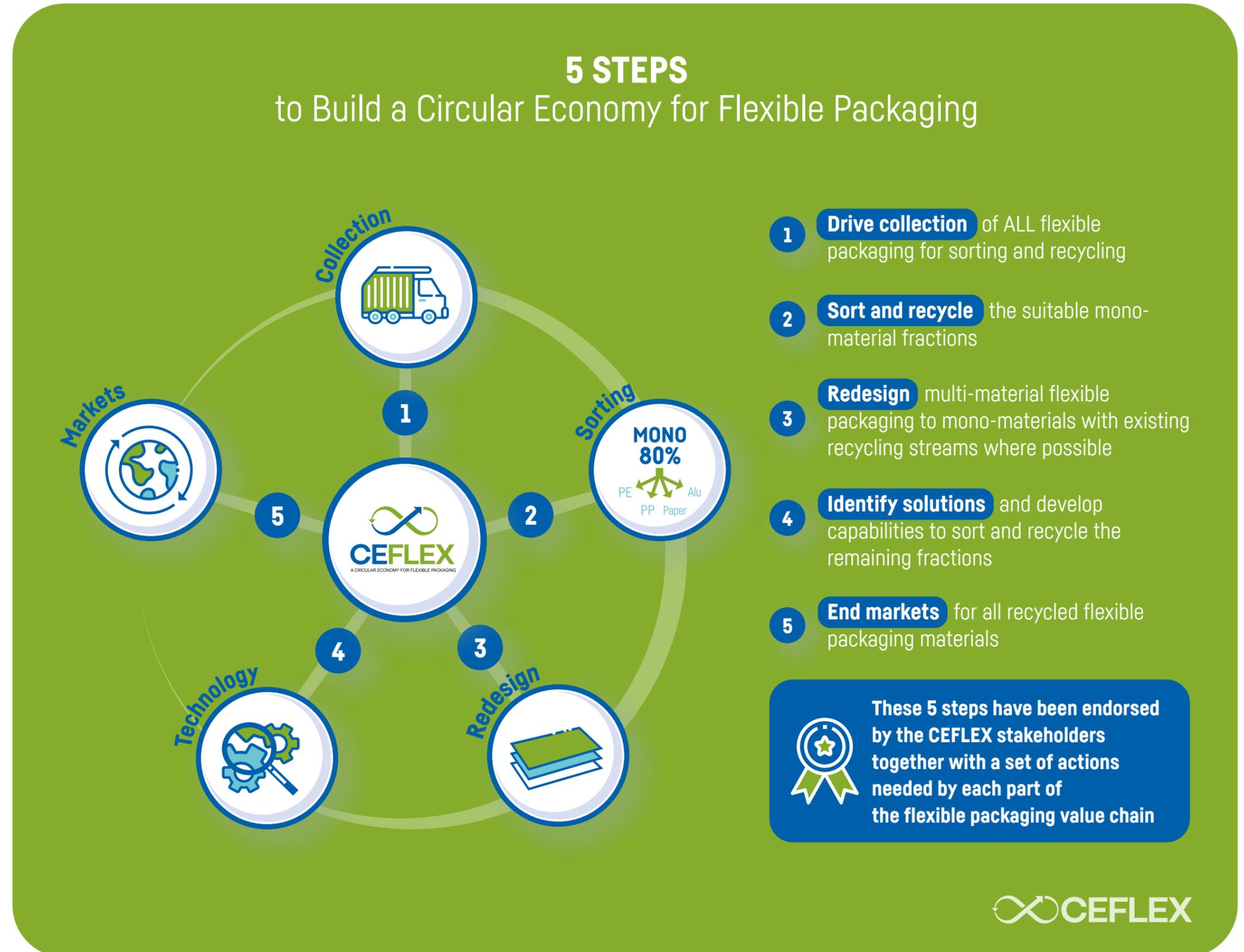
The initiative is committed to avoiding waste and pollution by redesigning consumer flexible packaging and ensuring appropriate collection and recycling infrastructure in all European countries.

This will enable used flexible packaging to be cost effectively collected, recycled and sustainable end markets developed to ensure resources are returned to the economy to be used again and again.

**Our vision is a Europe where flexible packaging is integral to a truly circular and sustainable future.**

To achieve it, a 5-step roadmap to build a circular economy for flexible packaging has been endorsed by CEFLEX stakeholders, together with a set of actions needed by each part of the value chain to make it happen.

The five steps have a focus on recycling, because while CEFLEX recognises the role of reduction and reuse in achieving a circular economy, ensuring the recyclability of flexible packaging is the primary pathway for it to become circular in the short to medium term.



## Current situation in Europe



In Europe, around half of all food products are packed in flexible packaging and the household flexible packaging market is estimated to be just under 3.7 million tonnes per annum<sup>1</sup>. Of this, approximately 70-80% (3 million tonnes) is reported as mono-polyethylene (PE), mono-polypropylene (PP) or potentially a PE/PP mix<sup>2</sup>.

While flexible packaging made from PE, PP and PE/PP mixes can generally be regarded as being 'Designed for Recyclability', the infrastructure to collect, sort and recycle them are not yet established at scale or harmonised across Europe. Therefore, this type of flexible packaging can only

be considered recyclable in those countries where the infrastructure is already in place.

The guidelines are based on what is considered current best in class sorting and mechanical recycling processes in Europe. The development and harmonisation of collection, sorting and recycling infrastructure throughout Europe is crucial, with collection the key step in developing a circular economy for flexible packaging. Progress on design of flexible packaging needs to be made in parallel to developing the infrastructure.

## The guidelines

### What is their purpose?

'Designing for a Circular Economy' is a set of comprehensive guidelines to help anyone working in the flexible packaging value chain design packaging solutions which are recyclable.

One of the main points of the guidelines is that flexible packaging should be designed to meet its core function, protecting goods, and reducing the risk of product waste. Compromising this functionality to meet other requirements of the CEFLEX guidelines would be counterproductive.

However, while fulfilling this vital function, flexible packaging should also be designed so it can be collected, sorted, and recycled.

### How were they developed?

The CEFLEX D4ACE guidelines have been developed by, and for, the whole flexible packaging value chain. The content is based on value chain consensus, using the best available data from testing and commercial practices.



### Who are they for?

The guidelines are for anyone in the flexible packaging value chain, including:

- ▶ Brand owners and retailers
- ▶ Film producers and packaging converters
- ▶ Material producers
- ▶ Technology suppliers
- ▶ Waste collectors, sorters and recyclers
- ▶ End users

The guidelines are intended to act as a catalyst, facilitating and enabling the value chain to design flexible packaging to be recyclable, whilst providing waste management and recycling companies with increased confidence to invest and develop the sorting and recycling infrastructure required to make all flexible packaging circular.

<sup>1</sup> 2016 data: 3,987,000 tonnes including exports. Estimate based on data from 'Plastics – the facts 2016' and 'FPE Market Report Summary 2016'.

<sup>2</sup> CEFLEX is undertaking a waste compositional analysis study of post-consumer flexible packaging to provide robust data on the proportions of mono-material and multi-material structures.

## What do they cover?

The guidelines focus on polyolefin-based flexible packaging (mono-PE, mono-PP and PE/PP mixes) because this material makes up the largest proportion of the post-consumer flexible packaging waste stream.

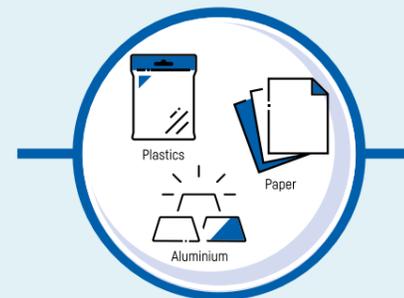
Additionally, the ability to sort and mechanically recycle these materials is already proven at industrial scale in Europe.

The guidelines contain information and practical advice on designing polyolefin-based flexible packaging to be recyclable, covering the key elements of a flexible packaging structure.

This includes setting limits on some materials and elements, to enable designers to maximise the sortability and recyclability of their flexible packaging. Outlined below are some aspects covered in the guidelines.

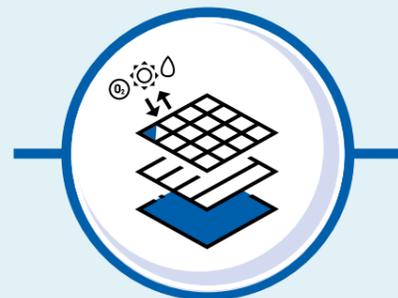
The guidelines also highlight specific issues, materials and technologies where further research is required to understand the impact of their use on achieving a circular economy for flexible packaging – helping the value chain build these factors into the design and decision-making process wherever possible.

**In addition to offering practical advice on packaging design, the guidelines also offer detailed insight into current sorting and mechanical recycling processes for polyolefin-based flexible packaging.**



### Material choice

The materials used in flexible packaging influences how the packaging is identified when disposed of, and how it is managed in the waste stream. Mono-material packaging is currently preferable to mixed materials, as these are easier to recycle and contribute to an improved quality of recycled materials. For polyolefin-based structures the guidelines recommend the use of mono-PE and mono-PP structures where possible.



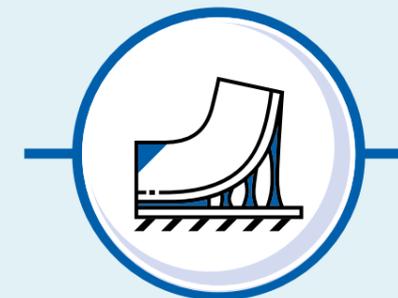
### Barrier layers and coatings

Barrier materials and coatings are an important element of many flexible packaging structures, providing functionality and reducing overall use of materials and resources. The guidelines provide limits for these elements to ensure the choice of barrier material and the amount used does not adversely affect recyclability.



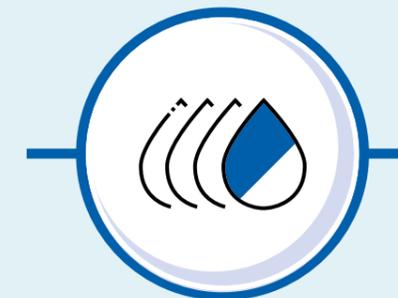
### Size, shape and construction

The size, shape and construction of the pack determines how it behaves in a waste sorting facility. For example, packaging that is too small is likely to fall through holes in screening equipment and end up being sent for energy recovery or landfill. While packs should not be made bigger just to facilitate sortability, the guidelines offer advice on shape and construction to aid the sorting process.



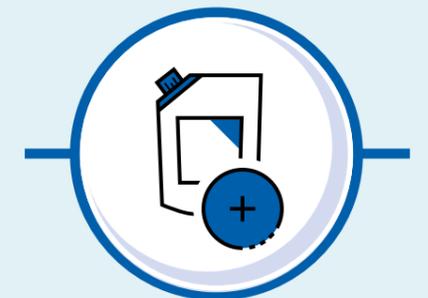
### Adhesives

Adhesives play an important role in combining multiple layers of the same (or different) materials. The total amount of adhesive used should be below specific thresholds to prevent it negatively impacting the recycle quality.



### Inks and lacquers

Printing of flexible packaging provides important product information to consumers, as well as barrier properties. Coverage levels of printing and colours of inks and lacquers can impact the recyclability and the quality of recycled materials.



### Additional features

The guidelines advise that the materials used for packaging features such as zippers, spouts, closures and valves should be the same as the primary pack material.



## Elements of a flexible packaging structure



## Designing for a circular economy in action

In our move towards a circular economy, all parts of the flexible packaging value chain have a vital role to play.

Now is the time to review existing flexible packaging portfolios against these guidelines and evaluate which structures fulfil the designing for a circular economy requirements.

Also, to evaluate what changes can be made to further improve and optimise the design and end-of-life sorting and recycling processes for structures that do not currently fulfil the requirements.

CEFLEX is calling on the whole value chain to use these guidelines as a tool when designing and specifying new flexible packaging structures. Adoption of these guidelines will increase the amount of recyclable flexible packaging on the market and this, in turn, will encourage increased collection. This will mean more becomes available for sorting and recycling, which will improve the quantity and quality of flexible packaging recycled.



## Next steps

The next step in this area for the CEFLEX initiative is the development of guidelines for those flexible packaging structures not yet fully addressed or covered. These include those flexible packaging structures using more complex combinations of materials, barrier layers and other elements to better understand if and how these flexible packaging structures that are not currently being sorted and recycled, can be.

As an initiative, CEFLEX aims to provide forward-looking and future-proof solutions for a circular economy. These guidelines also encapsulate this and will not lose sight of the fact that the capabilities of sorting systems and mechanical recycling are likely to develop significantly in the coming five years. The guidelines will therefore be reviewed on a regular basis. What is not possible today, might well be common practice tomorrow.

The circular economy is driven by innovation and mindset change. The reward is an economic opportunity, which also delivers substantial environmental and social benefits. These Designing for a Circular Economy guidelines bring this reward closer for flexible packaging; ensuring its resource efficient and other unique properties continue benefiting consumers and the fight against climate change.

Now it is over to CEFLEX stakeholders and wider industry across the flexible packaging value chain to embrace the design guideline principles and bring them to life.





# CEFLEX

A CIRCULAR ECONOMY FOR FLEXIBLE PACKAGING

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The CEFLEX initiative would like to thank all the companies, organisations and individuals that contributed to the development of the Designing for a Circular Economy Guidelines.

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