SECONDARY APPLICATIONS FOR RECYCLED CONTENT

Key insights for flexible packaging: implications for circular materials and EU legislative targets

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CEFLEX
A CIRCULAR ECONOMY FOR FLEXIBLE PACKAGING

Demand first: making recycled content work at scale

The circular economy has the potential to boost competitiveness while materially reducing environmental impacts and Europe's reliance on virgin materials. However, even with ambitious legislation in place, this transition is not automatic. It depends on functioning markets and the necessary investment in infrastructure to place recycled content into real products, at scale, across a wide range of secondary applications.

For plastic flexible packaging placed on the European market, this will only be achieved if post-consumer recyclate (PCR) can be absorbed by secondary markets that are technically suitable, commercially viable and aligned with regulatory requirements.

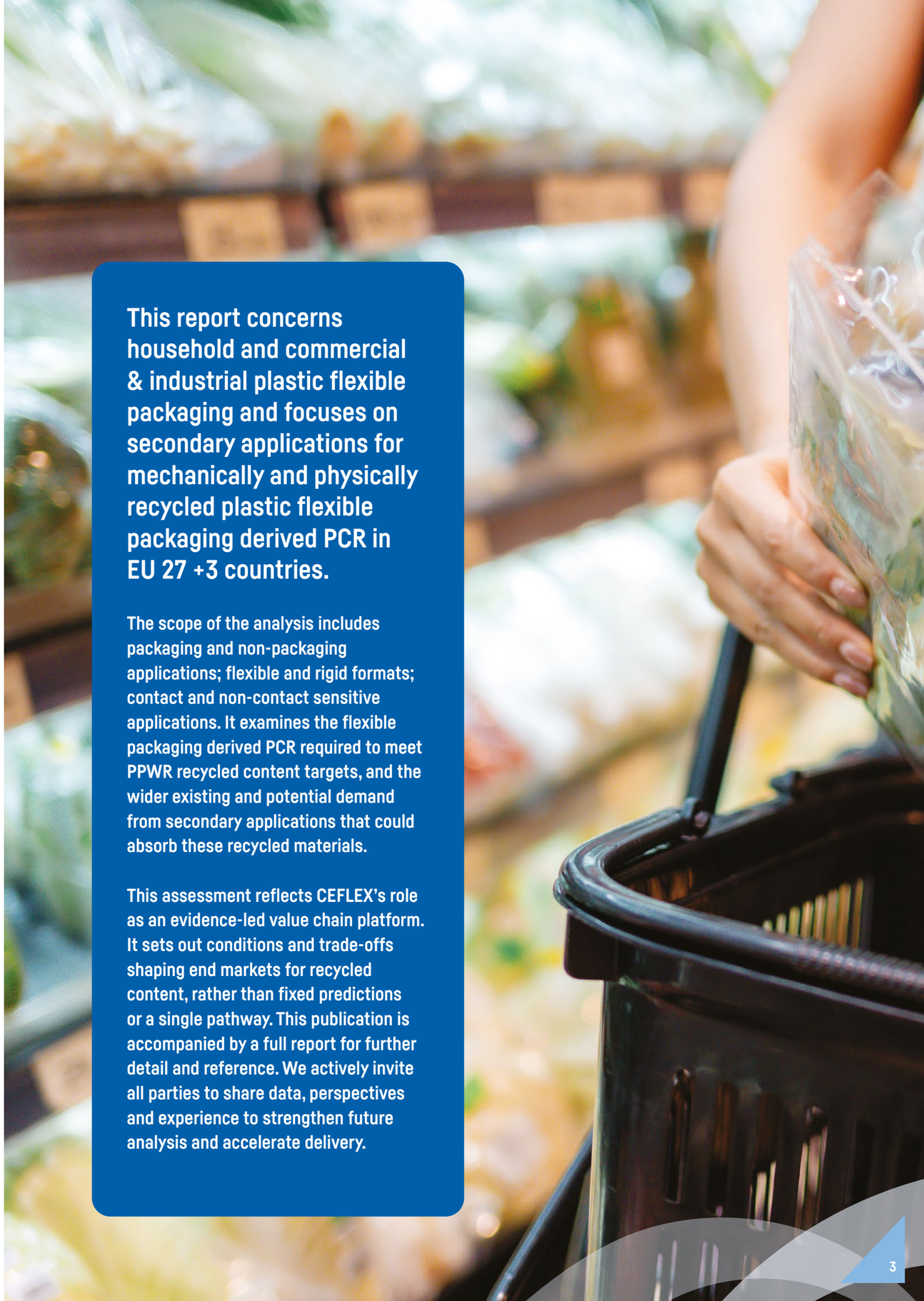
Demand for recycled content must therefore be enabled through packaging design decisions, quality management, investment and coordination across the value chain, rather than assumed as a natural outcome of legislation alone. While the Packaging and Packaging Waste Regulation (PPWR) provides a welcome transformative regulatory impetus, it does not in itself guarantee usable PCR at the right qualities or quantities needed by the market, nor does it finance the design, collection, sorting and recycling systems required to deliver it.

The coming decade introduces two distinct but interlinked regulatory milestones: recycled content targets create a 'pull' on specific recycled content applications, while higher recycling rate targets 'push' larger volumes of material through collection, sorting and recycling systems. Together, these mechanisms will shape where recycled content can realistically be used, at what quality and at what pace.

The five insights that follow summarise key findings from a new CEFLEX in-depth analysis of flexible packaging derived recyclate. They highlight where demand for recycled content can be unlocked, where constraints remain, and what industry and policymakers need to address now to enable credible circularity, whilst meeting PPWR targets for 2030 and 2035.

It is part of a broader set of work by CEFLEX to map the collection, sorting and recycling capacities and infrastructure needed to deliver the circular economy and EU legislation for flexible packaging, aligned to real-world recycled content demand.

Principal sources: CEFLEX research, analysis and data, expert interviews, stakeholder feedback, AMI virgin polymer demand at convertor level 2022.



This report concerns household and commercial & industrial plastic flexible packaging and focuses on secondary applications for mechanically and physically recycled plastic flexible packaging derived PCR in EU 27 +3 countries.

The scope of the analysis includes packaging and non-packaging applications; flexible and rigid formats; contact and non-contact sensitive applications. It examines the flexible packaging derived PCR required to meet PPWR recycled content targets, and the wider existing and potential demand from secondary applications that could absorb these recycled materials.

This assessment reflects CEFLEX's role as an evidence-led value chain platform. It sets out conditions and trade-offs shaping end markets for recycled content, rather than fixed predictions or a single pathway. This publication is accompanied by a full report for further detail and reference. We actively invite all parties to share data, perspectives and experience to strengthen future analysis and accelerate delivery.

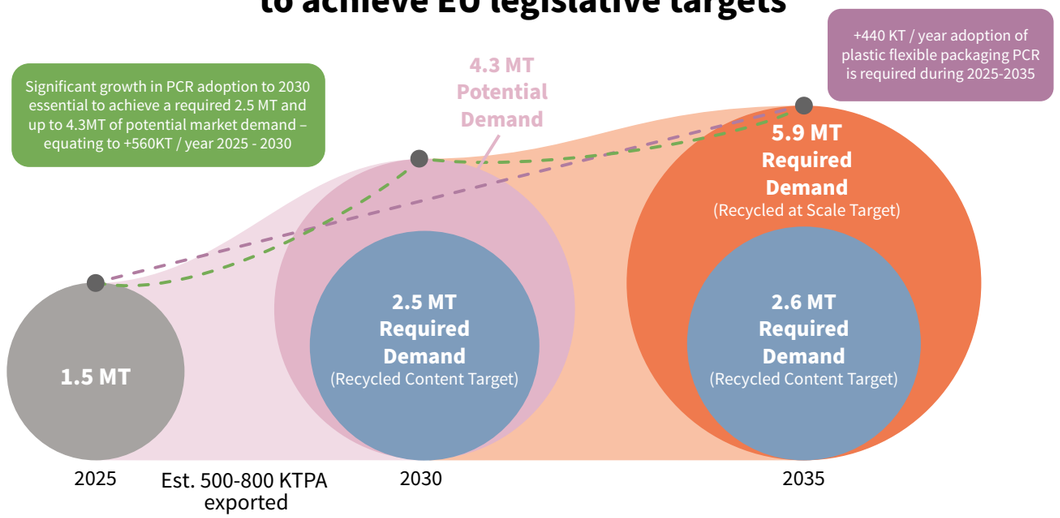
1 Markets for secondary applications must grow significantly and quickly to absorb the PCR generated in 2030 and 2035

Europe currently uses about 1.5 million tonnes of flexible plastic packaging derived PCR each year. By 2030, around **2.5 million tonnes of PCR will be required to deliver PPWR flexible packaging recycled content targets**.

Required demand refers to the minimum volume of PCR that flexible packaging applications (both contact and non-contact sensitive) must incorporate to meet legal PPWR recycled content targets in 2030. The CEFLEX forecast of 2.5 million tonnes is therefore a regulatory minimum rather than a forecast of market uptake.

Wider existing and potential demand is broader. It includes flexible non-packaging applications, rigid packaging and rigid non-packaging applications that already use, and could absorb more, flexible packaging derived PCR if material is available at the right quality, performance and price.

Post Consumer Recyclate (PCR) Demand 2030 – 2035 to achieve EU legislative targets



Scope: Flexible packaging derived PCR (PE, PP, PO) into secondary applications: flexible and rigid; packaging and non-packaging; contact and non-contact sensitive. EU 27 + 3

KT = thousand tonnes **MT** = million tonnes

N.B. In addition to 1.5 MT estimated flexible PCR use in 2025 between 500-800 KTPA of flexible plastics are exported to non-OECD countries – a practice set to be banned in 2027.

FIGURE 01

The scale of change required is unprecedented. Europe must find viable homes for millions of additional tonnes of flexible derived PCR within a short timeframe - across a wide range of new and existing secondary applications for this to be feasible. Delivering this shift depends on a stable regulatory environment, urgent investment and interim incentives that reward recycled content use and help markets develop.

When established secondary markets are included, CEFLEX analysis identifies around 4.3 million tonnes of existing and potential demand for flexible packaging derived PCR in 2030. This includes applications in sectors such as agriculture, building and construction, alongside packaging applications. Use of PCR in many non-packaging applications is not mandated by legislation and is therefore more sensitive to availability, affordability and technical compatibility. **These markets are essential to absorb material beyond minimum PPWR compliance and to support higher recycling rates across the system**.

Meeting this combined demand requires the market to absorb 560,000 tonnes of additional flexible derived PCR each year between 2025 and 2030[1]. Even if Europe keeps all of the estimated 500,000-800,000 tonnes of currently OECD exported bales of flexible plastics within its borders, a sustained and significant scale-up is required to meet compliance in 2030.

Interim milestones that stimulate recycled content use, including through incentives introduced by Producer Responsibility Organisations (PROs), Member States, regions and public procurement rules, can help spread development and investment across the decade. This gives organisations time to adapt packaging designs, introduce testing and qualification in a controlled way and secure supply.

Looking to 2035, the PPWR recycled-at-scale target of 55% **effectively makes finding meaningful secondary applications for around 5.9 million tonnes of flexible packaging derived PCR a requirement.**

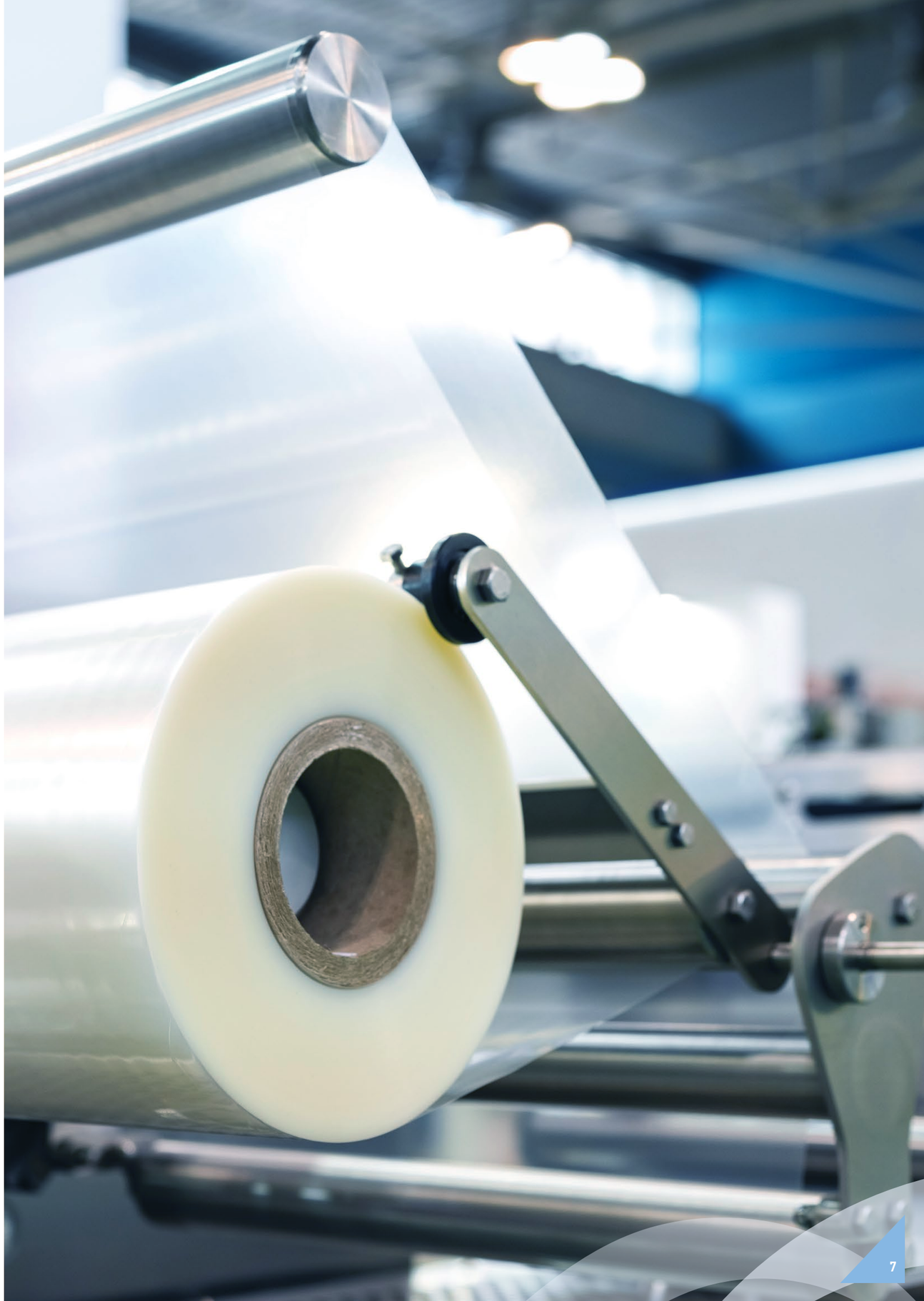
CEFLEX analysis of secondary market application requirements suggests this includes around 1.4 million tonnes of additional flexible packaging derived PCR generated between 2030 and 2035 by higher collection, sorting and recycling yields. With lower quality PCR end market applications expected to be exhausted, these volumes will also need to be of sufficient quality to find a home in more demanding applications and markets.

All viable applications capable of using flexible packaging derived recyclate must develop in parallel with the sorting and recycling systems that supply them. Without this alignment, Europe risks building recycling capacity that generates material with limited or no viable end markets.

PPWR delivery depends not just on volume targets, but on targeted infrastructure and recycling technologies capable of producing recyclate in the right qualities and quantities for real applications.

For policymakers, this reinforces the importance of regulatory stability and predictability. Clear and stable signals support investment decisions, and investment underpins the system transition that PPWR is designed to deliver. The scale of the challenge and the short timeframe also point to the need for **complementary measures to incentivise recycled content use** across a wider range of specific secondary applications, implemented at the appropriate levels of the system.

[1] 1.5MT to 4.3MT over 5 years calculated at a linear 560KTPA required increase



2 PPWR creates two phases of demand for plastic flexible packaging - with packaging and non-packaging applications shaping compliance in different ways

PPWR introduces two linked, but distinct, demand phases that will shape recycled content markets over the next decade for plastic flexible packaging. These functions are created by different parts of the Regulation and operate through different mechanisms.

Packaging PCR demand secures recycled content compliance, while non-packaging markets provide the outlets that allow higher recycling rates and translate into increased material circularity and reduced use of virgin materials.

The first phase is driven by **mandatory recycled content targets from 2030**. These targets apply directly to packaging placed on the market. Flexible packaging containing plastic that does not contain the required share of PCR cannot be sold in the EU. This is expected to create a clear regulatory pull for recycled content into packaging applications and may prioritise access to PCR for compliance-critical uses.

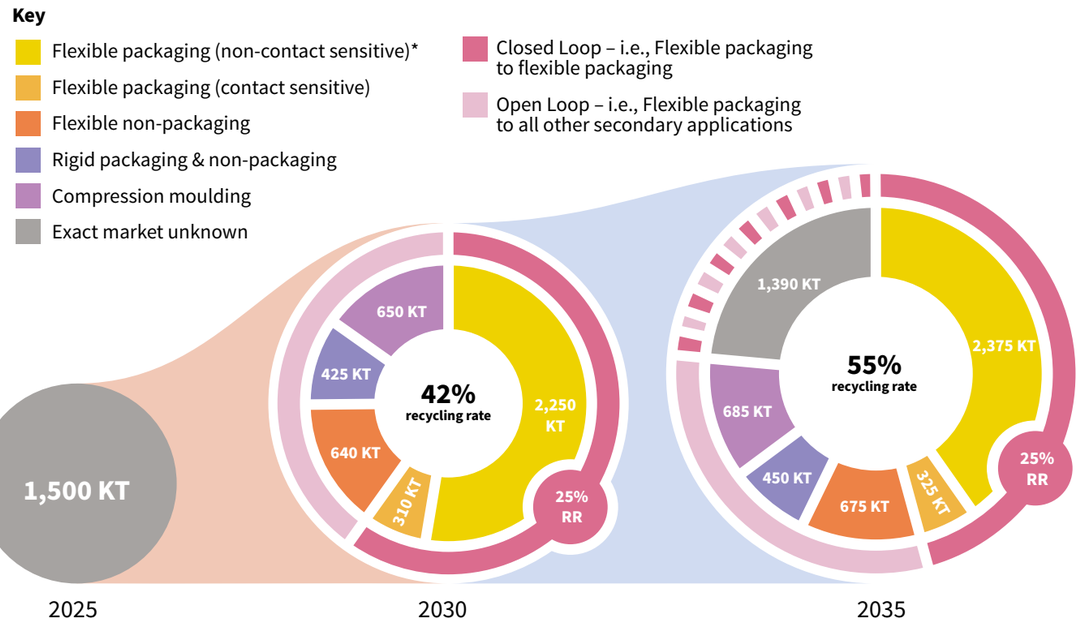
For plastic flexible packaging, the second phase is driven by the **recycled-at-scale requirement for all plastic packaging formats from 2035**, which effectively makes finding meaningful secondary applications for around 5.9 million tonnes of flexible packaging derived PCR a requirement. This applies at system level rather than product level. If the 55 percent recycling rate for all flexible plastic packaging is not achieved, flexible plastic packaging as a category cannot be placed on the market, even if individual packs meet recycled content, recyclability and other minimum requirements.

This distinction is critical because **packaging alone cannot absorb all the recycled material needed to meet the PPWR's required higher recycling rates**.

CEFLEX analysis shows that recycling plastic flexible packaging back into plastic flexible packaging, even under favourable assumptions, would only deliver a recycling rate of around 25 percent. Enabling flexible packaging PCR to flow into rigid packaging and non-packaging applications increases the achievable recycling rate to around 42 percent by 2030[2]. These secondary applications are therefore necessary to convert higher recycling rates into more recyclate replacing virgin materials.

[2] Recycling Rate (RR) in this report is calculated in line with PPWR definitions and expressed as PCR used divided by polymer placed on market (POM) forecasts established using market data and CEFLEX analysis. The figures presented here and in graphic 2 therefore indicate performance against the 55% PPWR recycling target for plastic flexible packaging.

Post Consumer Recyclate (PCR) Demand 2030 – 2035 by application category and associated effective recycling rate to achieve EU legislative targets



*modelling of 2030 NCS flexible packaging includes anticipated ~60KTPA (2030) & ~100KTPA (2035) additional PCR demand above regulatory targets in selected applications: carrier bags and heavy duty sacks

FIGURE 02

From 2030 onwards, an additional dynamic reinforces this interaction. Mandatory recycled content targets reshape market behaviour and economic viability across sectors. Packaging faces a direct market access restriction when recycled content thresholds are not met, creating a strong incentive to secure PCR supply early. As similar legislative obligations emerge in other sectors, such as automotive, and through eco-design frameworks, competition for high-quality PCR is likely to intensify.

If recycling capacity, yields and quality do not scale fast enough, constrained supply conditions will prioritise packaging compliance and reduce PCR availability for non-packaging applications. This risks weakening the very secondary markets needed to absorb additional recyclate as recycling rates increase.

Together, these dynamics show why PPWR delivery depends on packaging and wider secondary applications developing in parallel. **Recycled content targets create a direct compliance pull for packaging, while higher recycling rate targets require additional markets able to absorb recycled material at scale.**

Higher recycling rates only increase circularity if recycled material has somewhere to go. Meeting the 55% recycled-at-scale requirement for flexible plastic packaging – and even a 55% recycling rate for all plastic packaging – depends on strong secondary applications in flexible non-packaging and rigid product markets that can absorb additional PCR. Without these outlets, higher recycling rates will not translate into higher material circularity, even if packaging meets its recycled content obligations.

3 A small group of applications will determine whether the system meets its targets

Demand for flexible packaging derived PCR is concentrated in a small number of high-volume applications. **Nine polyethylene (PE), polypropylene (PP) and polyolefin (PO) secondary applications account for about 80% of mechanical PCR demand in 2030**. The top five PE film applications alone represent more than 60% of the total volume. These include stretch film, shrink film, refuse sacks, other PE bags and heavy-duty sacks.

These applications matter because they combine scale with realistic technical suitability for PCR. When they increase their recycled content use, the effect on the system is immediate. Conversely, slow progress in these categories cannot easily be offset elsewhere. Low-volume applications, even when innovative, cannot match the tonnage impact of the main film categories.

Estimated flexible packaging derived PCR demand 2025 - 2035 – growth by key applications

Flexible packaging derived PCR (PE, PP, PO) into secondary applications required to meet EU legislative targets

FIGURE 03

For converters, recyclers and brand owners, this suggests that investment and collaborative testing may be most effective when concentrated around these anchor applications representing over 80% of mechanically recycled PCR demand. Their performance can define end-market development and provides strong signals for infrastructure, quality improvements and long-term procurement strategies.

For policymakers, this concentration of demand has practical implications. Restricting formats such as pallet wrap, shrink and collation films would reshape not only the transit packaging market, but also directly affect the supply of high-quality infeed and one of the largest outlets for PCR.

A systems perspective is therefore essential to successful regulatory outcomes. Complementary measures, including eco-label criteria and public procurement requirements for recycled content, could help maintain stable demand and avoid unintended disruption to circular material flows.

Circularity will be won or lost in a handful of high-volume applications. Stretch, shrink and sack films enable everyday logistics and consumption: from pallet wrap in warehouses and distribution centres, to shrink-wrapped multi-packs in retail, to refuse sacks and heavy-duty bags used across households, construction and agriculture. These formats dominate PCR demand and set the pace for the entire system. Substantial recycled content use here delivers far greater impact than spreading effort thinly across many smaller markets.

4 Polyethylene provides scale, while polypropylene and polyolefin blends are essential for system balance and strategy

Polyethylene (PE) dominates the flexible packaging waste stream and anchors early recycled content uptake. Non-contact sensitive PE film applications are well positioned to absorb high-purity PCR in significant volumes. Their requirements for consistency, clarity and predictable melt flow place pressure on the system to produce high quality grades of recyclate.

Polypropylene (PP) has different use-cases. Around 80 percent of PP flexible packaging is placed on the market in contact-sensitive formats, making mechanical recyclate return to flexible films limited in the foreseeable future. However, PP is a versatile polymer and performs well in a wide range of moulded goods, such as reusable storage boxes, pallets or transport crates, watering cans and more when the consistency of recyclate quality is right. These applications, which include household goods, horticultural items and selected packaging formats, become increasingly important as recycled PP volumes increase due to design-for-recycling choices and market changes.

Mixed polyolefin (PO) products provide a structural outlet for recycled content because these products can accommodate darker colour and lower-purity recyclate of blended PE and PP not able to be used elsewhere. As recycling volumes increase, this flexibility helps prevent material from becoming commercially stranded.

These polymer-specific dynamics underline why a single approach to market development or PCR quality improvement is unlikely to meet the needs of all materials. **PE, PP and mixed PO each have distinct pathways and opportunities**.

Tailored strategies help ensure that the system remains balanced and can absorb the full range of material that recycling processes generate. Decision makers may find it helpful to reflect on the different material flows and markets for different polymers to support achieving overall recycling rate and recycled content objectives.

PE, PP and blends of PO follow distinct pathways and serve different roles within the recycling system. Recognising these differences is essential. Tailored strategies help maintain system balance – ensuring the full range of materials into the recycling process (recycling rates) and PCR produced by it (recycled content targets) can be absorbed and used effectively.

5 Recycling more is not enough: the central role of PCR quality

As recycled volumes rise, PCR quality becomes decisive. It determines where recycled material can be used, at what scale and with what value. CEFLEX uses indicative Gold, Silver and Bronze quality categories to describe this, as practical reference points rather than formal standards.

Most household flexible packaging recycling today is designed to deliver bronze-grade material, reflecting mixed household waste streams and the limits of conventional mechanical recycling. Bronze grades are darker in colour, lower in quality and purity - typically used in refuse sacks, construction products and low impact injection moulded products such as compost bins and laundry baskets. These outlets currently absorb large volumes of recyclate but are nearing saturation.

Estimated flexible packaging derived PCR - existing and potential demand 2030 by quality and polymer type

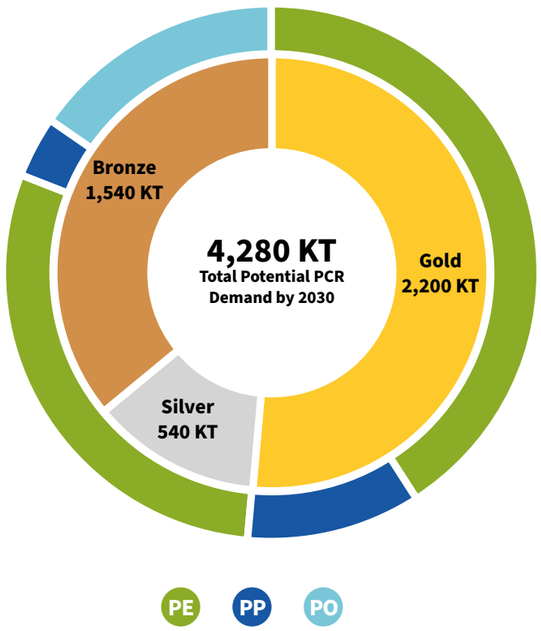


FIGURE 04

Scope: Flexible packaging derived PCR (PE, PP, PO) into secondary applications required to meet EU legislative targets: Flexible and rigid; Packaging and non-packaging; Contact and non-contact sensitive. EU 27 + 3

KT = thousand tonnes

Quality is the key issue. Recycling more is not enough. Without sufficient recycling capacity to deliver higher-quality output and address contact-sensitive needs, rising volumes of recyclate will overwhelm existing outlets. Quality alignment is therefore fundamental to PPWR delivery, not a secondary consideration.

Advanced mechanical and physical recycling processes are capable of delivering Silver and even Gold-grade PCR. However, they have not yet been developed or deployed at significant scale, because the quality gain does not currently compensate for higher production costs. Where deployed, Silver-grade PCR offers higher purity and consistency for applications such as heavy-duty sacks, carrier bags and selected non-food packaging. Gold-grade PCR meets the most demanding requirements and can be used in non-contact sensitive PE films, including stretch, shrink and collation films in logistics and consumer packaging.

As volumes grow, misalignment between PCR quality and secondary market needs becomes a system constraint. If most additional material remains in Bronze grades, uptake becomes harder even as recycling rates increase. Material may be discounted, displaced or unused, limiting circular outcomes.

This links directly to recycling pathways. **Of the approximately 2.6 million tonnes of required PCR demand in flexible packaging by 2030, around 88% is expected from mechanical recycling and around 12% from chemical recycling, mainly for contact-sensitive applications.** Without sufficient delivery of higher-quality output through appropriate routes, quality constraints will limit circularity.

For decision makers, the practical issue is quality. Recycling more material will not be enough - circularity depends on delivering the right quality of PCR, in the right volumes, to the right markets.

Images: Brightmark, CEFLEX, Envato, Shutterstock, Tomra

Keen to know more, share data, perspectives and experience to strengthen future analysis and accelerate delivery?

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