

Short version of the study

“End-of-Life Vehicles Regulation (ELVR) – Fulfilment of recycled content target in EU 27+3”

- **Analysis of the current situation and forecast 2032/2042**

Prepared for: **BKV GmbH**
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KONZEPTE
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 **PLASTICS**
EUROPE

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Project partner

Introduction



BKV GmbH

As a think tank and centre of excellence for the plastics industry, BKV provides the industry with data and facts on topics related to resource efficiency and recycling of plastics to aid in business decision-making. To this end, BKV has a broad network of experts with whom it cooperates both nationally and internationally.

The main task of the BKV is to protect the interests of its shareholders from across the plastics industry in the field of resource efficiency of plastics, with a focus on end-of-life issues. The main focus is on the recycling of plastic packaging in particular, but not exclusively. The BKV closely monitors how these issues develop in the political environment.

Current developments relevant to the plastics industry are identified and addressed in project work. In this way, the BKV creates a factual basis for informed discussions at an early stage for all interested stakeholders.



Conversio Market & Strategy GmbH

Conversio employees specialize in B2B market research and consulting and have more than 20 years of experience in the field of plastics manufacturing, processing and recycling.

Conversio has extensive experience with numerous studies on plastics recycling and material flow analysis for renowned clients such as Bayernoil, BDE, Borealis, BASF, BVSE, Dansk Retursystem, OMV, Braskem, Indorama Ventures Recycling Group, Covestro, Eumeps, Rehau, Orlen, Sabic, Total, BKV, Plastics Europe, VinylPlus and SCS.

Numerous well-known studies have been published at EU and global level in collaboration with partners along the entire plastics value chain. Conversio has in-depth market knowledge and a European network.

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Policy background

Executive summary

- Following on the Circular Economy Action Plan¹ where the roll out of further legislative initiatives to establish sustainability principles in key product value chains, the European Commission has introduced a proposal in July 2023² for the amendment of the end-of-life vehicle regulation. The draft aims to facilitate the transition of the automotive sector to the circular economy, at all stages of the vehicle - from design to treatment at end-of-life until the use of recycled plastics in new vehicles.
- In view of the low recycling rate for plastics, especially from end-of-life vehicles, and the overall negative impacts of other forms of treatment of plastic waste, the EU Commission's ELVR draft² aims to increase the uptake of recycled plastics in vehicles.
- To this end, a mandatory target for plastic recycled from post-consumer waste and post-industrial waste are being discussed to be included in new vehicles.
- Various proposals reflecting differing mandatory recycled content targets have been discussed over the last few years.
- In December 2025, the trilogue negotiations have reached a provisional agreement on the new ELV regulation.
- This study analyses and compares the impact of the three drafts of the EC, EP and the trilogue agreement.

Main positions regarding mandatory recycled content targets in new vehicles

	European Commission	European Council	European Parliament	EU Trilogues Provisional agreement
Post-consumer recycled plastics (PCR) mandatory targets	<p><small>Initial proposal by the European Commission from 13/07/2023 → starting point of the legislative process and setting the baseline for future negotiations</small></p> <ul style="list-style-type: none"> • 25% PCR plastics in new vehicles • after 6 years i.e. estimated start date 2032 	<p><small>Council of the EU adopted its general approach, consolidating member state positions and in response to Commissions proposal published on Jun 17/2025</small></p> <ul style="list-style-type: none"> • Graduated recycled plastic target: • 15% after 6 years → 20% after 8 years → 25% after 10 years 	<p><small>European Parliament has adopted its first reading position, published on Jan 29/2025 and Sept. 9/2025</small></p> <ul style="list-style-type: none"> • 20% PCR plastics after 6 years • Ambition to increase to ≥25% later 	<p><small>12/2025 - must be endorsed by the Council and the Parliament before being formally adopted. The regulation will start applying 2 years after its entry into force.</small></p> <ul style="list-style-type: none"> • 15% post-consumer recycled plastics after 6 years • 25% post-consumer recycled plastics after 10 years
Closed-loop targets	<ul style="list-style-type: none"> • 25% of 25% PCR plastics must come from ELV plastics (post-consumer only), with very few exceptions • i.e., 6.25% PCR closed-loop of total plastic content in new vehicle types 	<ul style="list-style-type: none"> • 25% from graduated PCR targets above must come from ELV plastics • i.e., 3.75% after 6 yrs → 5% after 8 yrs. → 6.25% after 10 yrs 	<ul style="list-style-type: none"> • 15% of 20% PCR plastics closed-loop i.e. 3% PCR plastics from ELV • No final closed-loop target set yet • closed-loop content must be reported 	<ul style="list-style-type: none"> • 20% of the above PCR plastics must come from ELV plastics (post-consumer only), with very few exceptions
Accepted material sources for mandates	<ul style="list-style-type: none"> • Mechanically and chemically recycled materials • Only PCR materials • No Post-Industrial (PIR) materials • No bio-based materials 	<ul style="list-style-type: none"> • Mechanically and chemically recycled materials • Only PCR materials • No Post-Industrial (PIR) materials • No bio-based materials (only if recycled) 	<ul style="list-style-type: none"> • Mechanically and chemically recycled materials • Only PCR materials • PIR may be accepted up to 50% of total target • Bio-based materials not mentioned 	<ul style="list-style-type: none"> • Mechanically and chemically recycled materials • Only PCR materials • No Post-Industrial materials • No bio-based materials

¹ European Commission, 2020. A new Circular Economy Action Plan for a cleaner and more competitive Europe.

² European Commission, 2023. Proposal for a Regulation of the European Parliament and the Council on circularity requirements for vehicle design and on management of end-of-life vehicles

³ Council of the European Union, 17 June 2025. Circular economy: Council adopts position on the recycling of vehicles at the end of their life

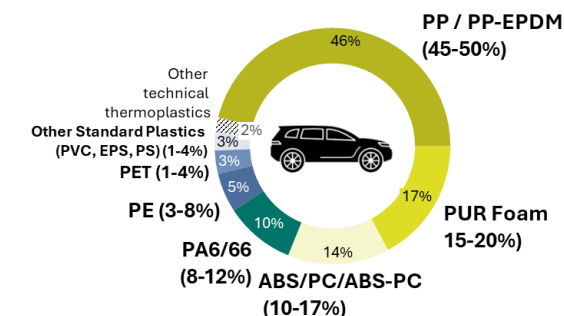
⁴ European Parliament, 9 September 2025. Amendments adopted by the European Parliament on the proposal for a regulation of the European Parliament and of the Council on circularity requirements for vehicle design and on management of end-of-life vehicles.

Total automotive plastics demand are expected to stay stable over the next years

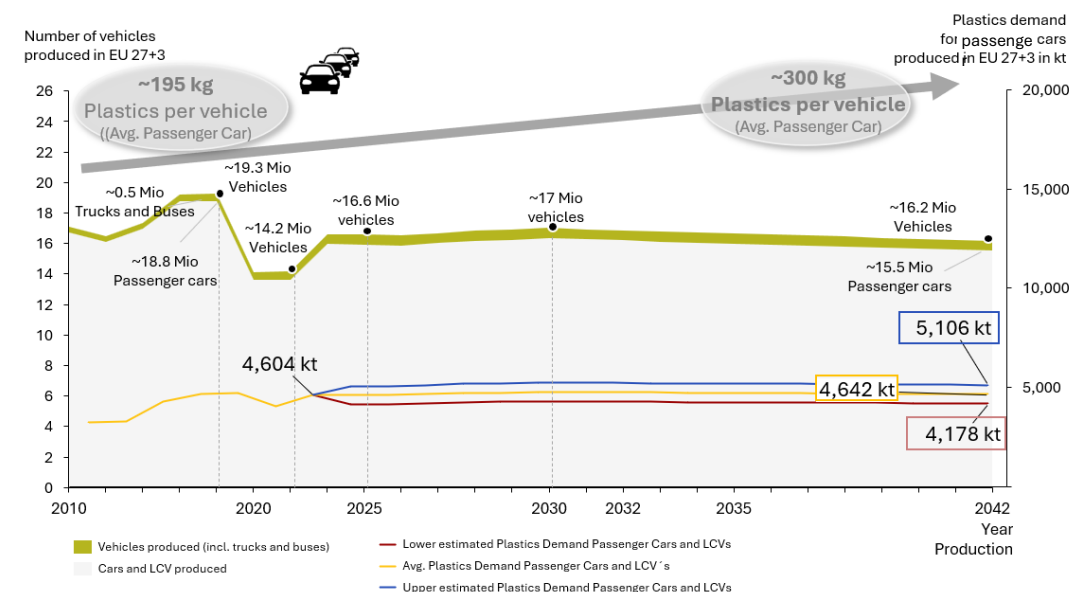
Executive summary – Baseline assumptions for plastics used in the automotive industry

- Plastics play a crucial and growing role in automotive design and manufacturing, driven by their versatility, durability, and ability to support lightweight construction. Over the past decades, the importance of plastics in vehicles has steadily increased, with many components - interior, exterior, underbody or under-the hood applications.
- The absolute amount of plastics used per vehicle continues to rise. Based on current market forecasts, the total demand for automotive plastics in Europe is expected to remain stable until 2042, reaching approx. 4,642 kt - roughly the same level as today.
- At the same time, vehicle production in Europe is expected to decline slightly from ~15.9 million passenger cars and light commercial vehicles (LCVs) in 2025 to an estimated ~15.7 million units in 2042.
- This means that plastic consumption per vehicle will remain high, even if fewer cars are manufactured.
- This projection of future plastics demand is an essential baseline for the study assessing the feasibility of meeting the targets for recycled plastic content currently discussed by EU institutions under the new ELVR (End-of-Life Vehicle Regulation) framework.
- Understanding the long-term plastics demand helps clarify:
 - Total plastics demand and the required nominal PCR volumes needed to fulfill the targets for recycled plastic content.
 - What plastic types are used and are required to fulfill the targets for recycled plastic content?

Plastic types used in an average vehicle in Europe



Automotive plastic demand in future



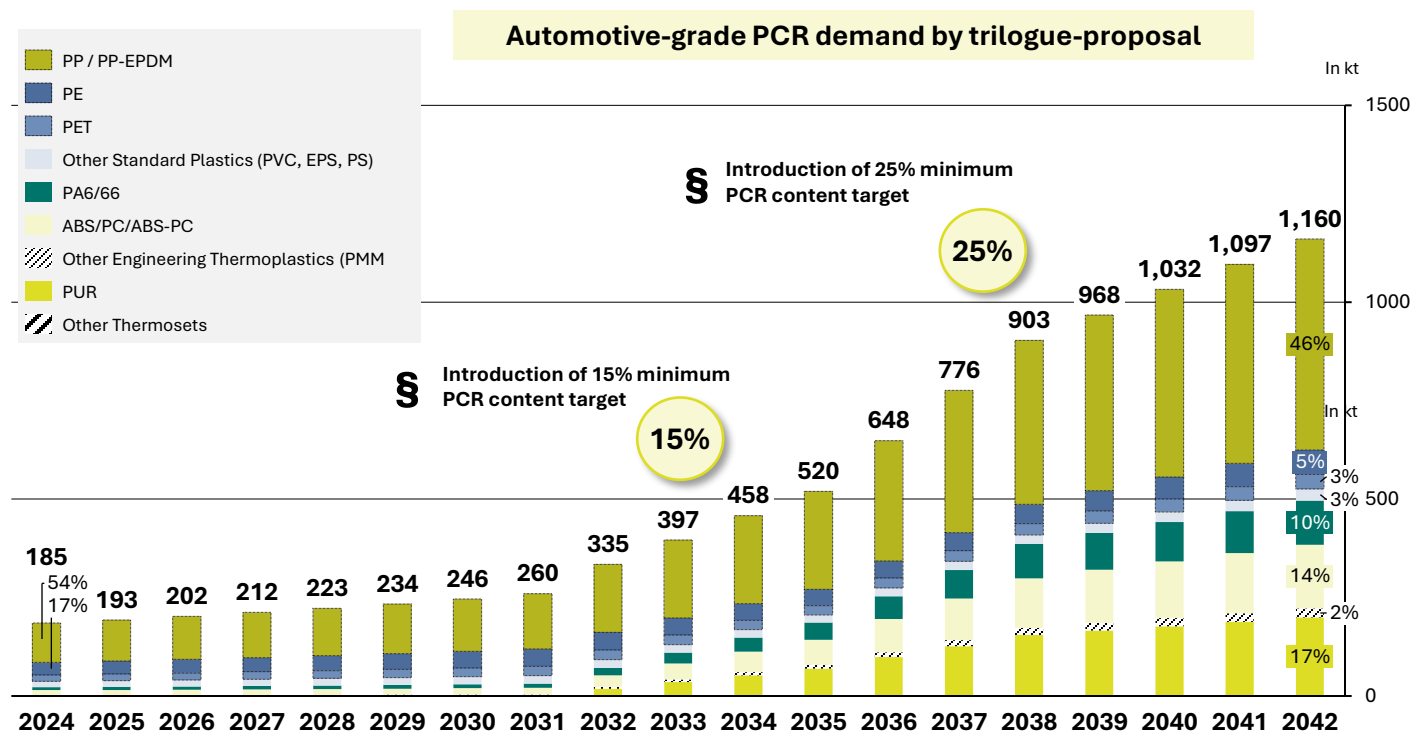
Source:
¹ OICA (International Organization of Motor Vehicle Manufacturers): Production statistics; missing data points for selected vehicle categories and countries were estimated
² Roland Berger: Global Automotive Supplier Study 2023

Growing demand for automotive-grade PCR is particularly expected for rPP, technical polymers and PUR foams

Executive summary - PCR demands by polymer – forecast to 2042

- Even though the current ELVR drafts do not set specific targets for individual plastic types, it is still helpful to break the overall PCR requirement down by plastic type.
- By estimating how much each type of plastic would need to contribute—based on the average plastics distribution of a vehicle—it can better be understood where recycled material is likely to be missing.
- This makes it easier to see which plastic types may not be able to meet their share of the target and where gaps will need to be closed, either
 - through alternative solutions (e.g. through the use of chemically recycled plastics)
 - or by using more recycled content in other plastics to compensate
- Today, automotive applications where PCR materials are used focus mainly on PP/PP-EPDM plastic type. Recycled PP is one of the few plastic types that is available in appropriate quantity and quality that fulfils automotive requirements.
- If each plastic type would contribute equally to fulfil the minimum recycled plastic content targets, further increasing demands for PCR arise mainly for technical polymers (e.g. ABS/PC/ABS-PC, PA6/66) and PUR foams according to the proportionately high occurrence in an average European vehicle.

Effect of the target for recycled plastic content on the total PCR demand of the automotive industry based on the trilogue proposal – by polymer



*PCR demand includes both demands - for existing vehicle fleets and ELVR-compliant demand for new vehicle types

Two scenario models project future supply potentials to analyse and identify supply gaps for the automotive industry on high-quality PCR materials

Executive summary – How much automotive-grade PCR will be available in future? – 2 scenarios

- How much post-consumer recyclates (PCR) in the quality required for automotive applications will be available in future and will the volume be sufficient to meet the mandatory content targets stipulated by the ELVR?
- To answer this question, two scenarios were considered - modelling the potential **supply of mechanically and chemically recycled post-consumer plastics** for 2032 and 2042. Additionally, the contribution of post-industrial recyclates was analysed, i.e., the amount of industrial plastic waste resulting from manufacturing and converting processes (e.g., faulty parts, sprues, edge sections, leftovers), recycled and directed into processing again.

A Business-as-Usual Scenario:

- Moderate mechanical recycling growth rate from 2024 to 2042: +2.6 % p.a.
- Chemical recycling contributes only little with a growth of chemically recycled plastics output of ~100 kt to ~380 kt from 2024 to 2042 (+9% p.a.)
- ELV recycling value chain is developing (provided that first pilots by cross-industrial collaborations show impact) with ELV recycling rate increase from today ~13% to 17% in 2042 (including chemical and mechanical recycling)
- The share of "unknown whereabouts" at all ELV generated will remain on 35% as estimated valid figure for today.
- High-quality mechanically produced PCR output grows proportionately to total PCR output with +2.6% p.a. (CAGR 2024-2042)

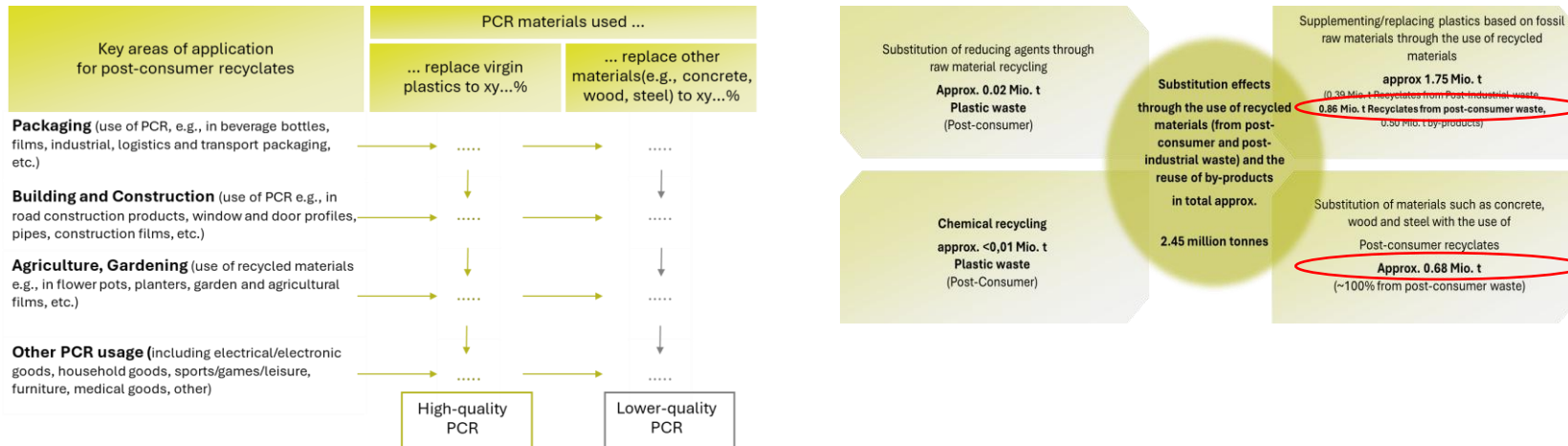
B Progressive growth Scenario:

- Significant mechanical recycling growth rate from 2024 to 2042 +3.5% p.a. (for mechanical recycled output)
- Chemical recycled plastics play an increasing role with growth rate of +16% resulting in ~900 kt chemically recycled plastics output
- ELV recycling value chain is stronger growing and will reach an ELV recycling rate of ~21% in 2042
- The level of "unknown whereabouts" will drop to 19%, meaning that more ELV 's will enter the official route of proper waste treatment and thus can contribute to ELV recycling value chain.
- Quality advancements in recycling technology are anticipated leading to stronger growth rates of high-quality PCR output (+3.8%) compared to overall PCR growth with +3.5 % p.a.

- These supply and demand projections are ultimately brought together in a **comprehensive gap analysis**, identifying where structural shortages are inevitable and where targeted interventions could close the loop for ELV plastics.

High-quality PCR is defined as PCR material that is able to substitute virgin materials in the production of new plastic products

Methodology to calculate high-quality PCR



Source "Stoffstrombild Kunststoffe in Deutschland 2023"

0.86 million tons post-consumer recyclates used to replace fossil raw materials

1.54 million tons post-consumer recyclates produced and used in plastic processing

Ratio High-quality PCR to total PCR materials used

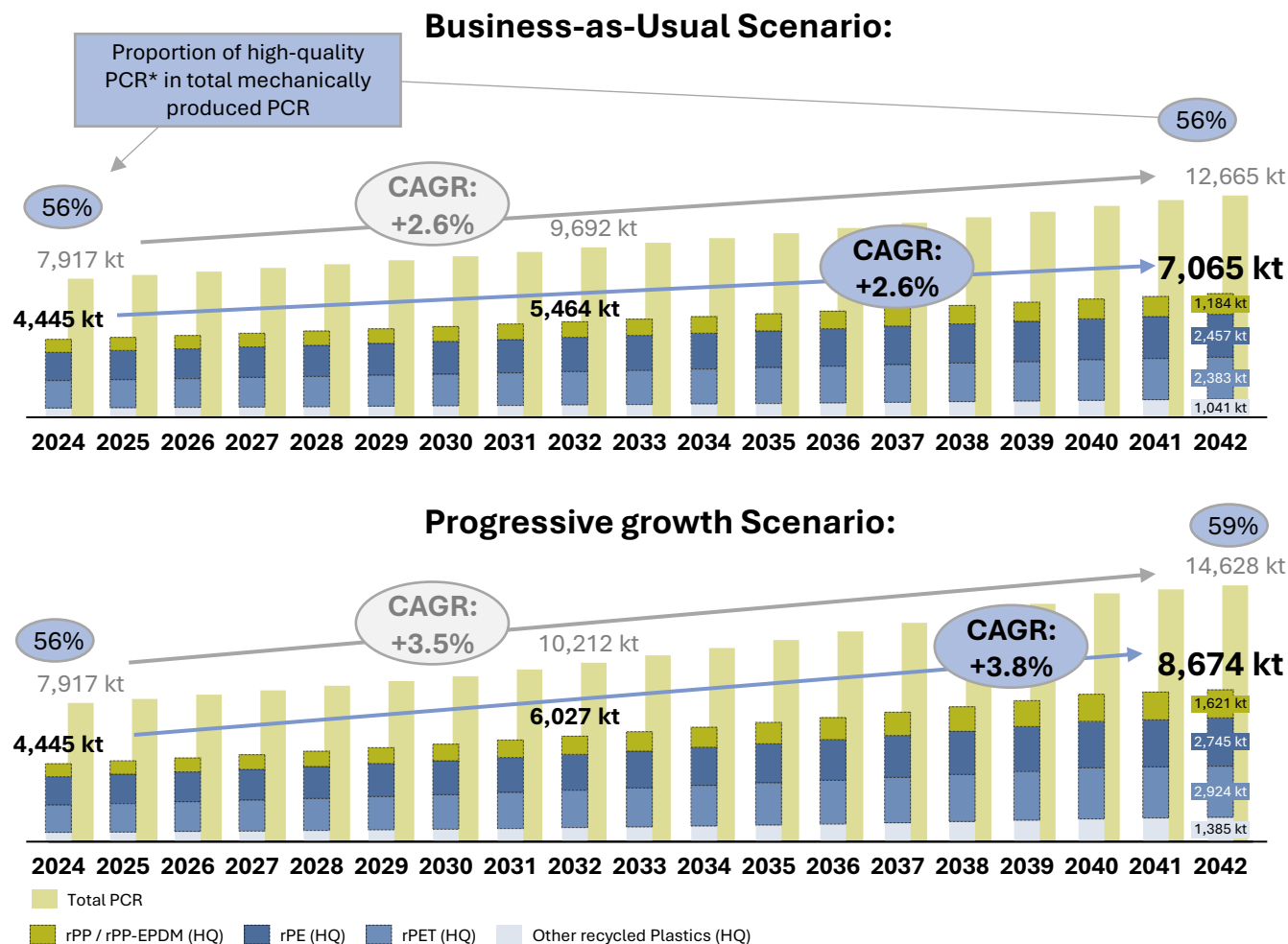
56%

- High quality post-consumer recyclates (HQ- PCR) are plastics recycled from end-of-life products to replace virgin plastics in the production of new plastic products.
- Today, about 56% of all PCR can be regarded as high-quality.
- HQ-PCR can be used to manufacture compounds suitable for automotive applications
- The ratio of 56% derives from the "Material flow study for plastics in Germany in 2023" and was applied for this study to estimate the amount of high-quality PCR available based on the European total production.
- The same method was applied considering key areas of application for post-consumer recyclates based on the available total PCR materials produced.

It is important to note that only about half of the PCR materials produced is suitable for use in the automotive industry

Executive summary – high-quality PCR output forecast – 2 scenarios

- High-quality post-consumer recyclates (HQ-PCR) are defined as plastics recycled from end-of-life products to replace virgin plastics in the production of new products.*
- Today, about 50-60% of all PCR can be regarded as high-quality.
- HQ-PCR can be used to manufacture compounds suitable for automotive applications, but could also be used for other plastic applications, e.g., in the packaging sector, in furniture, electronics or any other product insofar as it meets the manufacturers' requirements.
- As the predominant waste stream for recycling derives from plastic packaging waste, most high-quality plastic types that are available focus on rPET (HQ), rPE (HQ) and rPP(HQ).
- In 2042, these three polymer types will account for ~84-85% of all high-quality PCR potentially produced, i.e., in Business-as-Usual scenario 5,789 kt of 6,750 kt (all high-quality PCR) respectively in the Progressive scenario 7,108 kt of 8,408 kt of all high-quality PCR.
- The figures show that, despite ambitious growth, engineering plastics types such as those required in the automotive industry (e.g., PA6/66, ABS, PC) are only produced on a small scale.



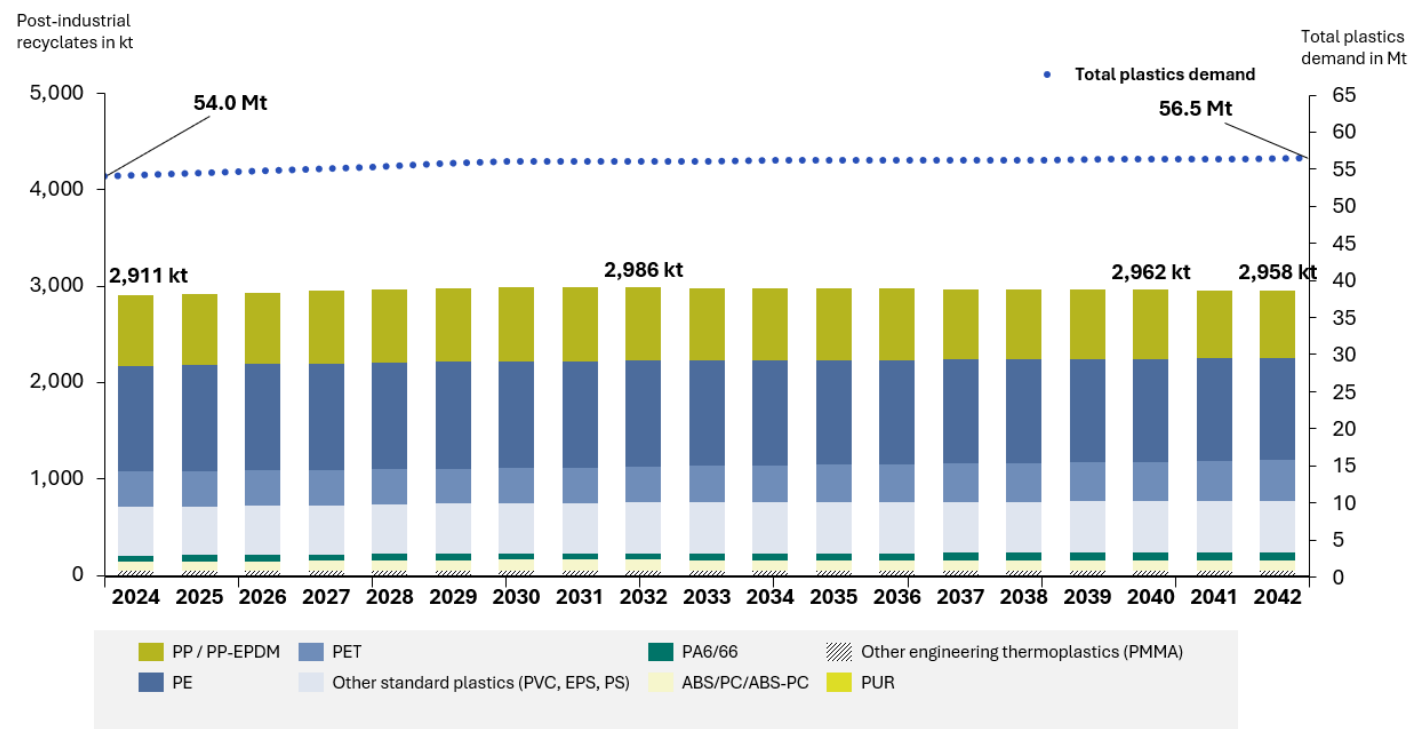
*explanation of High-Quality recyclate definition see page 9

Post-industrial waste will remain at a stable level in coming years, PIR recyclates accordingly

Executive summary - Post-industrial plastic waste forecast

- The ELVR proposal from the European Parliament suggests to accept post-industrial recyclates to fulfil the targets for recycled plastic content. 50% of the total recycled plastic content in new vehicles could potentially be used by Post-industrial recyclates (PIR).
PIR can be obtained from waste and residues in plastic production and conversion. They offer the advantage of higher quality compared to post-consumer recyclates.
- PIR are high-quality recyclates often with virgin like specifications and are thus often used to replace virgin materials in the production of new products.
- However, PIR are available only in limited amounts. In average, 6-7% production residues and scrap accrues during plastics processing and product manufacturing (mainly applicable for Thermoplastics while thermosets are mainly not used for recycling).
- The majority is forwarded to mechanical recycling. As the volume of post-industrial waste generated is directly linked to the total plastic volume being processed, the total volume of PIR produced is correlative to the plastic demand development.
- Little improvements can be expected in future, as recycling of plastic production waste is already well established in Europe.
- The total availability of PIR is ~2.9 Mt to 3.0 Mt and is expected to remain stable.

Forecast of available post-industrial recyclates (PIR)



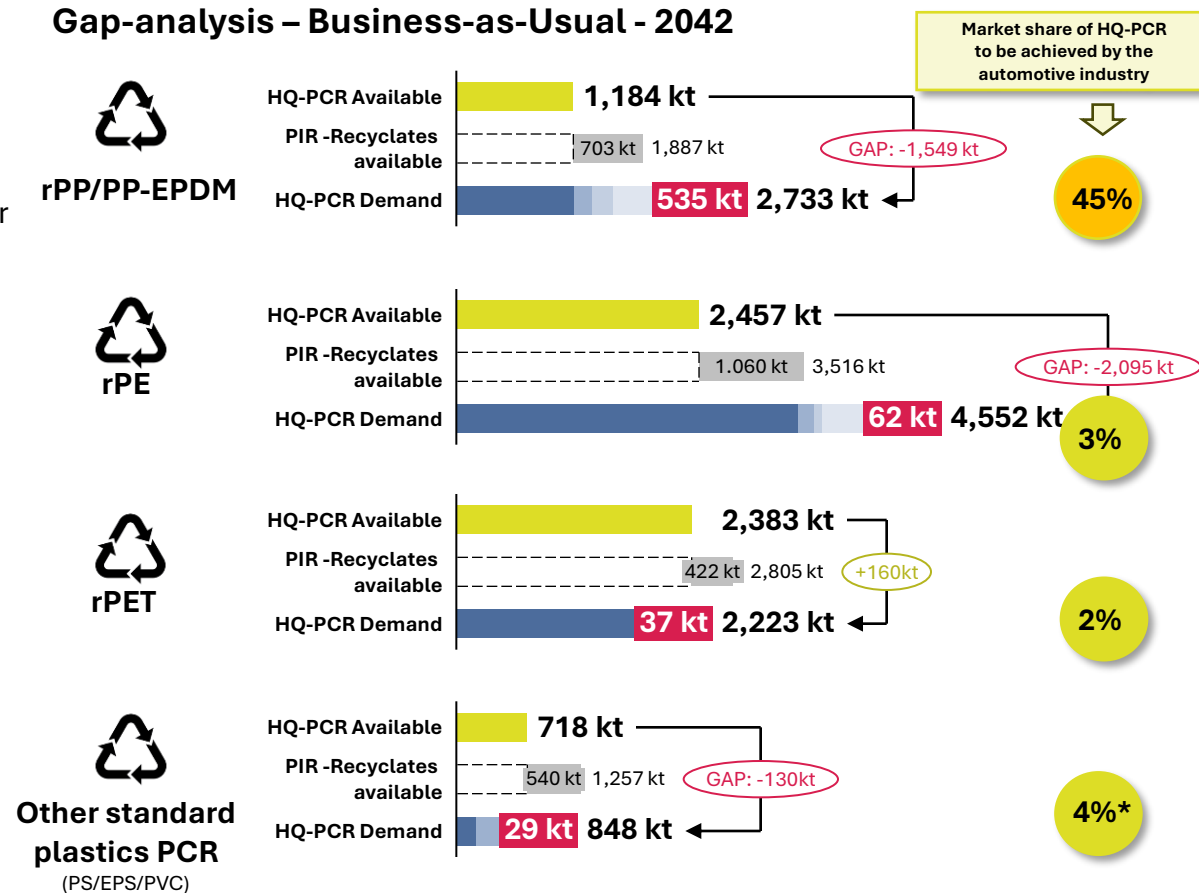
A supply gap is predicted for all types of plastic.

The supply gap for rPP/rPP-EPDM has a significant impact on the automotive industry

Executive summary - Supply gap for high-quality PCR based on *Trilogue draft* in in Business-as-Usual scenario for 2042 – (1/2)

- Based on the future supply and demand projections for high-quality PCR made, it is now possible to identify potential supply bottlenecks at a polymer-specific level.
- It becomes evident, that for high-quality PCR significant supply gaps are likely to emerge in future, even for those plastic types that are supposed to build on established recycling value chains. In a Business-as-Usual scenario, supply gaps for high-quality PCR of 1,549 kt for PP/PP-EPDM, 2,096 kt for rPE and 130 kt for other standard plastics are likely.
- In order to assess whether the automotive industry will be able to procure sufficient quantities of automotive-grade PCR, it is crucial to consider the market share of available high-quality PCR the automotive industry will demand.
- For rPE, rPET and other standard plastics, the automotive industry's demand is less than 5% of the total available quantity of high-quality PCR. In this respect, procuring the necessary quantities of these types of plastic should not be a major issue.
- In the case of rPP/rPP-EPDM, however, the supply situation is quite critical. The automotive industry would have to claim almost half (45%) of all PCR quantities available on the market in order to meet its minimum requirements.
- PIR can only partially contribute to meeting demand. Even in the case for rPP/rPP-EPDM, there is a total demand of 2,733 kt, but only 1,887 kt of post-industrial and post-consumer recyclates combined are available.

Gap-analysis – Business-as-Usual - 2042



■ HQ-PCR
 ■ Packaging
 ■ E+E
 ■ Automotive according to Trilogue draft
 ● Sufficient supply with HQ PCR
 ● Critical supply situation for HQ PCR
 ● Supply GAP

■ PIR
 ■ B&C
 ■ Others
GAP GAP indicates difference between demand for HQ-PCR by all sectors and potential supply with HQ-PCR not considering supply by PIR-recyclates

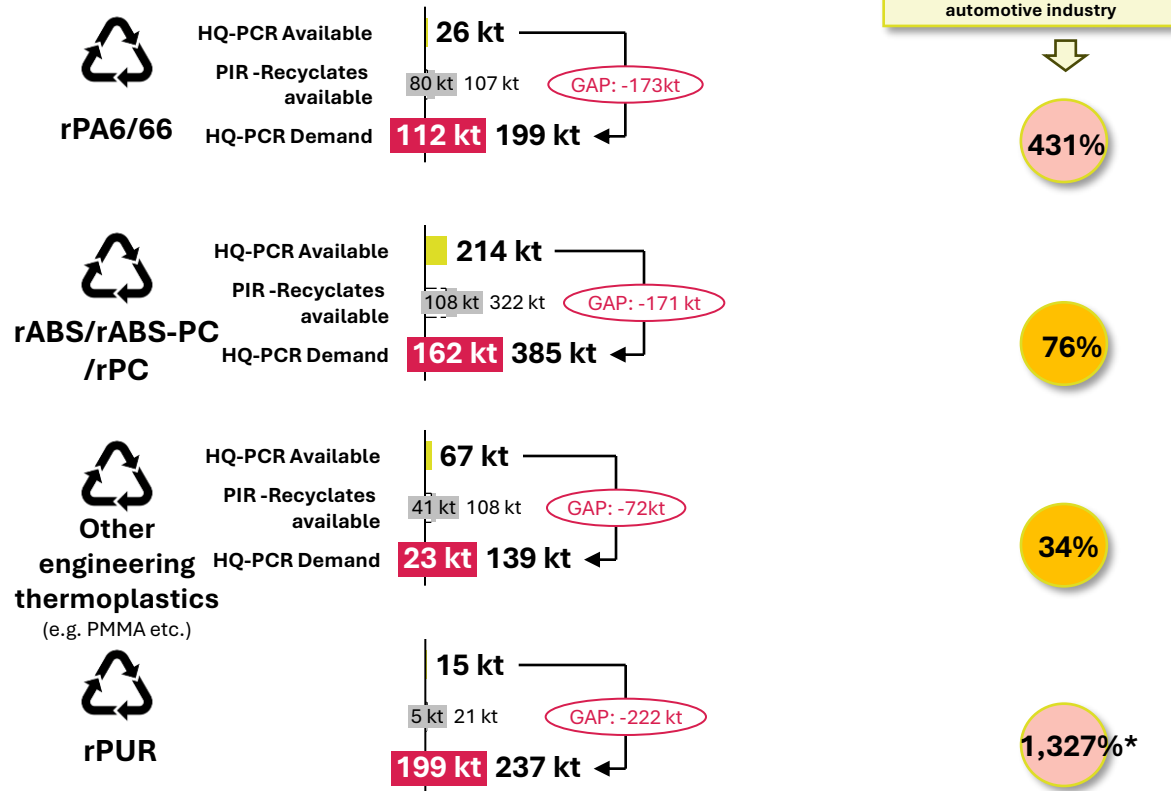
*All available recycled materials are not sufficient to supply the demands by the automotive industry

In the case of engineering plastics, the Business-as-Usual scenario reveals significant supply gaps for high-quality PCR materials

Executive summary - Supply gap for high-quality PCR based on *Trilogue draft* in Business-as-Usual scenario for 2042 – (2/2)

- With regards to other plastic types such as rPA6/66, rABS/rABS-PC/rPC, other engineering thermoplastics and rPUR, the supply situation is critical or insufficient in a Business-as-Usual scenario.
- The supply of high-quality post-consumer polyamides is limited to 26 kt, whereas the automotive demand is more than four times higher at 112 kt. Even if the automotive sector would procure all available PIR and PCR plastics, the supply would not be sufficient.
- With regards to polyurethane, it is not expected that the small volumes of mechanically recycled PCR (14kt) would sufficiently meet the demands of the automotive industry. Targets for PUR materials may only be fulfilled by chemically recycled plastics or by substitution of higher PCR content in other plastic parts.
- Although 194 kt of high-quality rABS/rABS-PC/rPC are projected for 2042, the demand of 163 kt would result in the automotive industry securing 84% of all available HQ-PC.
- Less critical, but still significant gap emerge for other engineering thermoplastics with a needed market share to be secured by automotive industry of 35%.

Gap-analysis – Business-as-Usual - 2042



■ HQ-PCR
 ■ Packaging
 ■ E+E
 ■ Automotive according to Trilogue draft
 ● Sufficient Supply with HQ PCR
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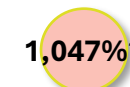
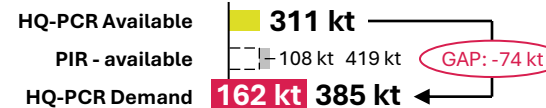
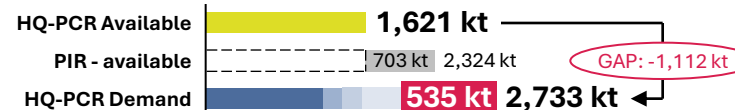
■ PIR
 ■ B&C
 ■ Others
GAP
 GAP indicates difference between demand for HQ-PCR by all sectors and potential supply with HQ-PCR not considering supply by PIR-recyclates

*All available recycled materials are not sufficient to supply the demands by the automotive industry

Even in a Progressive growth scenario, significant gaps for various plastic types occur

Executive summary - - Supply gap for high-quality PCR based on *Trilogue draft* in Progressive scenario for 2042

- Even in a Progressive growth scenario, significant gaps for various plastic types occur
- While for PE, PET and other standard plastics sufficient PCR materials are expected to be in the market to supply Automotive industry in 2042, high-quality recyclates consisting of PP/PP-EPDM, PA6/66, ABS/ABS-PC/PC, PUR and engineering thermoplastics may not be sufficiently being produced.



■ HQ-PCR
 ■ Packaging
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*All available recycled materials are not sufficient to supply the demands by the automotive industry

The automotive industry is expected to face supply shortages for high-quality PCR materials in future for selected plastic types

Executive summary – Overview on high-quality PCR available and share that must be claimed by auto industry to meet targets – (1/2)

Plastic Type	Business-as-Usual scenario				Progressive growth scenario			
	2032		2042		2032		2042	
	Available HQ-PCR in kt	Target automotive share* in %	Available HQ-PCR in kt	Target automotive share* in %	Available HQ-PCR in kt	Target automotive share* in %	Available HQ-PCR in kt	Target automotive share* in %
rPP/PP-EPDM	906 kt	19%	1,184 kt	45%	1,050 kt	16%	1,621 kt	33%
rPE	1,946 kt	2%	2,457 kt	3%	2,043 kt	2%	2,745 kt	2%
rPET	1,906 kt	1%	2,383 kt	2%	2,137 kt	1%	2,924 kt	1%
Other standard plastics	505 kt	4%	718 kt	4%	550 kt	4%	895 kt	3%
rPA6/6,6	18 kt	105%	26 kt	431%	20 kt	95%	33 kt	339%
rABS/rPC/rABS-PC	129 kt	23%	214 kt	76%	157 kt	19%	311 kt	52%
Other engineering thermoplastics	42 kt	10%	67 kt	34%	57 kt	7%	127 kt	18%
rPUR	12 kt	158%	15 kt	1,327%	13 kt	146%	19 kt	1,047%

● Sufficient Supply with HQ PCR
 ● Critical supply situation for HQ PCR
 ● Supply GAP

*according to Trilogue-draft

The automotive industry is expected to face supply shortages for high-quality PCR materials in future for selected plastic types

Executive summary – Overview on high-quality PCR available and share that must be claimed by auto industry to meet targets – (2/2)

- Both scenarios reveal that for key plastic types in the automotive industry significant supply gaps for high-quality PCR materials are likely to emerge based on the agreed Trilogue targets.
- In case of Polyamide, the automotive industry would require 4 times higher volumes of all high-quality PCR materials produced. As mechanical recycling of polyurethane is not common, it only can contribute minimally to the targets for recycled plastic content.
- With regards to engineering plastics as ABS, PC, and ABS-PC as well as for PP/PP-EPDM demands for high-quality PCR plastics addressed by the automotive industry reach critical status, as they claim very high shares of all available material in the market.
- Considering that other plastic manufacturing sectors as the packaging industry, electronic industry and other durable plastic product producers have high demands too (partially based on legislative mandates), the shortage of high-quality PCR plastics is substantial and resulting to critical supply situation for the automotive industry in future.
- The utilisation of post-industrial recyclates has been identified as a potential contributor to address the existing deficit in the supply of recyclates across various sectors.
- However, it is important to note that this approach is not sufficient to meet the full requirements for recyclates in these sectors and that PIR is currently not included in the bill to contribute to meeting the targets.

Plastic Type	Business-as-Usual scenario				Progressive growth scenario			
	2032		2042		2032		2042	
	Available HQ-PCR in kt	Target automotive share* in %	Available HQ-PCR in kt	Target automotive share* in %	Available HQ-PCR in kt	Target automotive share* in %	Available HQ-PCR in kt	Target automotive share* in %
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rPET	1,906 kt	1%	2,383 kt	2%	2,137 kt	1%	2,924 kt	1%
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rPUR	12 kt	158%	15 kt	1,327%	13 kt	146%	19 kt	1,047%

● Sufficient Supply with HQ PCR
● Critical supply situation for HQ PCR
● Supply GAP
*according to Trilogue-draft

3% and 5 % closed-loop targets according to Trilogue draft will be challenging to reach

Executive summary – Closed-loop Gap analysis

- The relevant challenges in current end-of-life vehicle separation and dismantling practices lie particularly in the production of homogeneous plastic fractions in preparation for downstream recycling. Technological innovations aimed at improving the conditions for plastic recycling focus on two specific points within the ELV value chain.
 - On the one hand, attempts are being made to pre-sort end-of-life vehicles into waste fractions that are as homogeneous as possible during the dismantling process and aftertreatment.
 - On the other hand, there are efforts to optimize the shredder and sorting technology by density separation using float-sink technology. In addition to this, pilot projects should be mentioned which separate vehicle parts into different product clusters through a pre-sorting step. The aim of downstream shredding and sorting is to obtain polymer-specific waste fractions for use in chemical and mechanical recycling processes.
- These R&D efforts suggest that vehicle disassembly, combined with direct granule-based reprocessing, can offer a practical and scalable approach to improving ELV plastic recovery rates in future **under the assumption that cross-sectoral stakeholders and collaboration platforms will engage and invest with infrastructure accordingly.**
- **Two scenarios have been developed to project future ELV-recycling**

A Business-as-Usual Scenario:

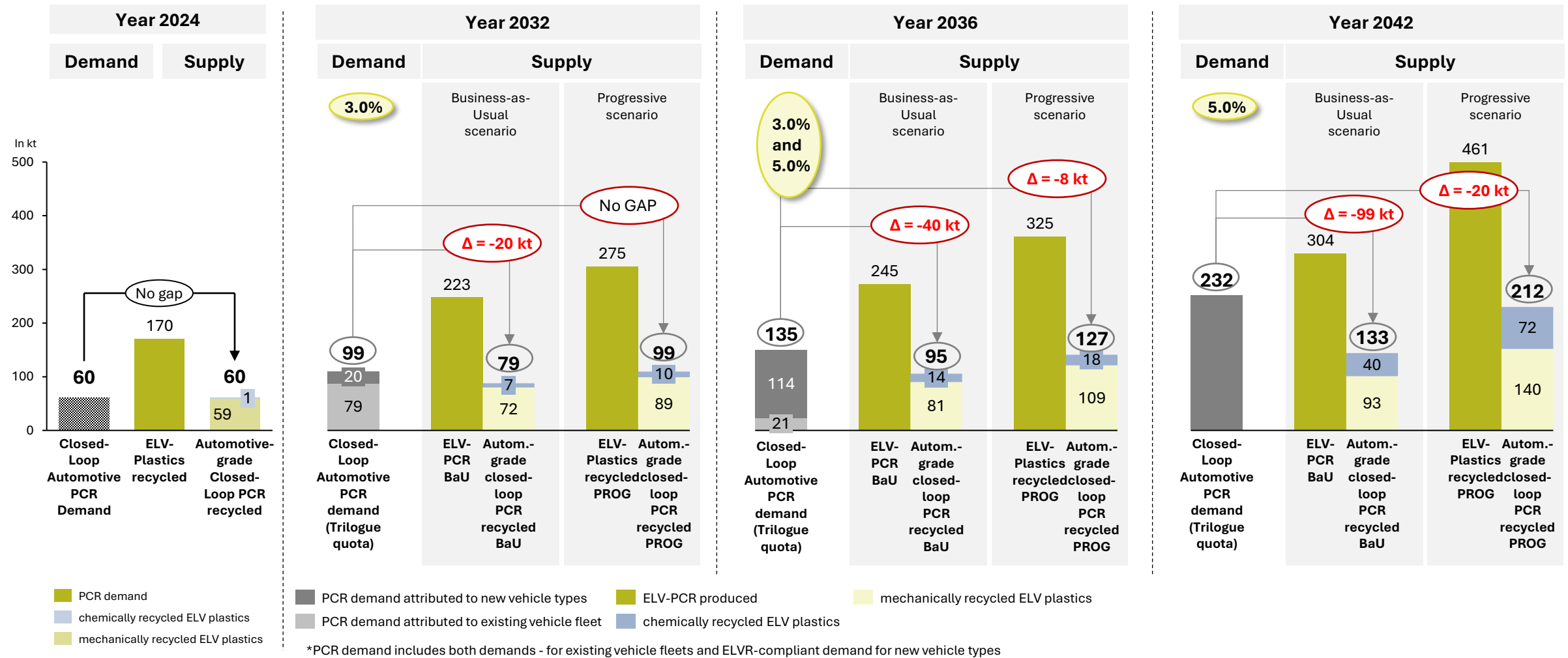
- Business-as-Usual scenario expects that 30% of plastic-rich and heavier car components (as mandated in Annex VII Part C) will be removed before shredding.
- Resulting in approx. ~120-130 kt of dismantled plastics equals to ~16 kg of plastics per vehicle in average.
- Assumption that 7.6 million ELVs will be treated by 2042.
- Chemical recycling will be fed by ELV plastic waste both from dismantling route as well as from Post-shredder-sorting routes, yet to minor extent. (up to 40 kt)

B Progressive growth Scenario:

- The removal of plastic-rich and heavier car components (as mandated in Annex VII Part C) are expected to realize by 50% in average from all ELV's leading to ~27 kg of plastics dismantled from ELVs in average in Europe by 2042 and sums up to 250-260 kt dismantled car parts from ELV.
- Strong investments into advanced post-shredding sorting technology will result in ~240-250 kt of additional mechanical recycled plastics.
- Assumption that 9.5 million ELVs will be treated by 2042.
- Higher quantities of chemically recycled plastics (up to 70 kt) from ELV will be achieved

In case of 3% resp. 5% stepwise introduced closed-loop target, a supply gap can be expected even in progressive scenario

Gap-analysis for closed-loop plastics according Trilogue draft agreement



Supply constraints will gradually become effective from 2032 and will differ by plastic type

Conclusion – Supply constraints in 2042 - (1/2)

- The study demonstrates that the future compliance of the automotive industry with ELVR-mandatory recycled content targets of 15% in 2032 and 25% by 2036 (according to the agreement reached in the ELVR-Trilogue talks) will be **structurally constrained** by limited availability of high-quality post-consumer recyclates (HQ-PCR).
- The ELVR applies **only to new vehicle types starting in 2032**, with a typical **7-year model cycle**. Existing vehicle models—continued in production beyond 2032—remain exempt until they are replaced by new types. Consequently: The **roll-out of ELVR-compliant vehicles is gradual**, not instantaneous.
- **2042** is thus the **first year** in which the regulation unfolds its **full quantitative effect** on PCR demand across the entire fleet of newly produced passenger cars and LCVs. For this reason, **all gap analyses, sectoral competition assessments, and supply–demand feasibility checks are most meaningful when examining the 2042 results**.
- Because the ELVR drafts define **only an aggregate PCR usage target per vehicle**—not broken down by polymer—supply gaps **cannot be aggregated into a single number**. Rather each plastic type exhibits its own supply constraint due to differing recycling value chains and due to differing demands by the automotive sector and other plastic manufacturing sectors.
 - **A critical supply situation is anticipated for rPP/rPP-EPDM** driven by upcoming EU regulation in various sectors. PP/PP-EPDM materials are the most used plastic types in vehicles. 45-50% of all plastic weight used in vehicles amounts to this versatile plastic type. Provided the 25% PCR minimum content target this would translate into ~540 kt automotive high-quality PCR. In both scenarios sufficient high-quality recycled post-consumer PP/PP-EPDM could be produced at first sight with ~1,180 kt to ~1,620 kt in the Business-as-Usual scenario resp. Progressive scenario. However, this would mean that the automotive industry would consume almost 33% to 45% of the total produced high-quality PCR available on the market. It must be noted that the packaging sector alone is obliged to comply to the PPWR and raises high demands for high-quality recycled PP materials of 1,100-1,200 kt by 2042. The expected available high-quality PCR would thus be fully absorbed by the packaging sector alone in a Business-as-Usual scenario.
 - **Least critical for the automotive sector are PET, PE and other standard plastics** (PS, EPS, PVC). These plastic types capture aggregated only ~11% of all plastics used in an average vehicle. If each of the polymer would contribute proportionately to their average occurrence in cars to fulfill the PCR target, their total demand for high-quality PCR amount to ~130. Despite the fact that the majority of high-quality recycled PE, PET and other standard plastic PCR material is allocated to the packaging and other sectors, a substantial volume of high-quality PCR plastic of ~5,560 kt (Business-as-Usual scenario) to ~6,560 kt (Progressive scenario) is likely to be available in the market. Given the low market demand for these plastic types from the automotive industry of only 2% to 2.5% of the total high-quality PCR produced – it seems reasonable that the automotive industry will meet its demands for these plastic types.

Supply constraints will gradually become effective from 2032 and will differ by plastic type

Conclusion – Supply constraints in 2042 - (2/2)

- PCR at **other engineering thermoplastics, such as PMMA and ASA, as well as ABS/PC/ABS-PC, a critical supply situation must be expected in 2042.** ABS/PC/ABS-PC and other engineering plastics are used in vehicles, accounting for approximately 16%–20% within average cars. The demand for a 25% minimum content would therefore aggregate to ~190 kt. Basically, there is sufficient high-quality PCR material available with aggregated ~280 kt (Business-as-Usual scenario) to 440 kt (Progressive scenario) for these plastic types in 2042. However, in order to meet the required demand for these materials, the automotive industry would have to secure about 20% for other engineering thermoplastics and well over 50% for ABS/PC/ABS-PC of the total PCR material produced in the Progressive scenario. Given that other sectors also have demands for these materials, this would lead to fierce competition, which is likely to result in significant price increases.
- With regards to **Polyamide, the supply gap is substantial.** PA6/66 is used in a wide range of components and applications, accounting for 8–12% of the total plastic content weight in an average vehicle. Provided that these components would contain PCR in line with the 25% target, demand would be ~530-540 kt in 2042. However, it is unlikely that recycling value chains capable of meeting this demand for high-quality PCR will be established by 2042. Even in the Progressive scenario, only ~30 to 40 kt from post-consumer plastics would be available. The amount of post-industrial recyclates could reduce the supply gap of ~170kt by ~80kt. Nevertheless, even in the best-case scenario, a gap of at least ~80 to 90 kt would remain. Note that this gap would be even much larger if non-automotive plastic converters claim some of the available high-quality recycled Polyamide.
- **The absence of high-quality mechanical PUR foam recycling technology result in substantial supply gap.** PUR foam is widely used for seats and cushioning in interior applications in cars. It is one of the most used plastic type in cars with content shares of 15-20%. As PUR foam is a thermoset, mechanical recycling options are limited and mostly do not allow the usage in cars in foam applications again. If each plastic type would contribute equally to the target for recycled plastic content, the automotive demand for recycled PUR would be ~200 kt in 2042. In the Progressive scenario, only ~18 kt of mechanically recycled post-consumer recyclate could theoretically be used to meet this demands, which may however only be utilized for car insulation application. The supply gap for PUR foam is likely to be between ~220 kt in both scenarios.
- The gap analysis, based on the hypothetical assumption that each plastic type shall contribute proportionately to their average occurrence in vehicles to fulfil mandatory PCR target, demonstrates the structural supply constraints for high-quality PCR.
- Post-consumer recyclate, such as rPE and rPET, are widely available, yet their utilization in automotive applications remain limited. In contrast, engineering plastic types, including PA6/66, or thermosets like PUR foam are only available in negligible quantities

Closed-loop PCR materials could potentially contribute between 2.8% to 4.5% of the total automotive plastics demand

Conclusion – Closed-loop target

- The ELVR considers closed-loop recycling value chains as one option to ensure high-quality PCR supply in future and has therefore set clear closed-loop targets.
- The ELVR trilogue draft has agreed to that 20% of mandatory PCR content to be used in new vehicles must come from ELV sources. Based on the staggered PCR target requirement for recycled plastics content of 15% in 2032 and 25% in 2042 this translates in a minimum content of 3% closed-loop PCR by 2032 and 5% from 2036 for new vehicle types. The target would translate into **230-240 kt of closed-loop plastics required by the automotive industry by 2042** that needs to be incorporated into new vehicles.
- Two scenarios have been deployed analyzing potential output volumes of closed-loop PCR plastics coming from ELV sources including auto garage waste.
 - Under Business-as-Usual conditions, 300-310 kt of plastics can be recycled from end-of-life vehicles. However, due to the large variety of plastic appliances utilized in vehicles and the complexity in ELV recycling, much of ELV plastics cannot be used in vehicles again. Only **~130 kt of plastics can be recycled (thereof ~90 kt mechanically recycled) and used as closed-loop PCR** in automotive again.
 - This quantity is already based on growing efforts and investments necessary to be taken into various recycling value chains that do not exist today. This development includes improved dismantling practices, advancements in post-shredder sorting technologies and the utilization of chemical recycling technologies that are still currently under development.
 - In a best-case scenario, it could be demonstrated that a maximum of **~210 kt of closed-loop recyclate output (thereof ~140 kt mechanically recycled) could be** achieved by 2042. This will be achieved by dismantling of about ~27 kg of plastics from each car in average before shredding in order to create a more homogenous waste stream for better downstream recycling technologies. The exploitation of auto shredder residues in advanced and more efficient ways is also required to contribute to these volumes.
- **In total, closed-loop plastics could contribute between ~2.8% (130 kt in Business-as-Usual scenario) to ~4.5% (210 kt in a Progressive scenario) to the total automotive plastics demand of 4.6 Mt in 2042, which would fall behind the target of 5% of the Trilogue-proposal. The EP-proposal of 3% could be reached under best case conditions.**