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EU REQUIREMENTS FOR RECYCLATES: CHALLENGE OR OPPORTUNITY?

The automotive industry is at a turning point: the EU Commission's draft for the End-of-Life Vehicle Regulation (ELV) **requires that 25% of the plastics used in vehicles must come from post-consumer recyclates (PCR)** - and at least **25%** of these **must come directly from end-of-life vehicles**.

This ambitious target presents OEMs and the supplier industry with new challenges. challenges. At the same time, however, they open up great opportunities:

- **Increasing resource efficiency** - through the closed material cycle.
- **Reduce CO₂ emissions** - by using recycled plastics instead of fossil raw materials.
- **Secure competitive advantages** - through a sustainable and innovative materials strategy.

The question is: **How can car manufacturers and suppliers implement these requirements?**

implement

In this white paper, we provide an overview of the current use of recyclates in the automotive industry and the availability of recyclates. We show specific successful practical examples and the next steps to be taken in order to respond to the regulatory requirements at an early stage.

Use of recyclates in the automotive industry

TYPES OF RECYCLATE USE

There are various approaches to the use of recyclates in the automotive industry. One possibility is to recycle the sprue. These are material residues that occur during the production process in plastics processing. Recycling takes place either directly via sprue mills or indirectly through grinding and reuse together with rejects and start-up parts. In terms of waste legislation, this is waste prevention and therefore the use of by-products.

Post-industrial recycle (PIR) is also used. This material comes from production waste from other plastics processors. Another important source is post-consumer recycle (PCR), which is obtained from plastic products that have already been used. These different types of recycle contribute in various ways to using resources more efficiently and reducing environmental impact. As described above, the draft ELV Regulation stipulates that in future, 25% of the plastics used in a vehicle must consist of PCR.

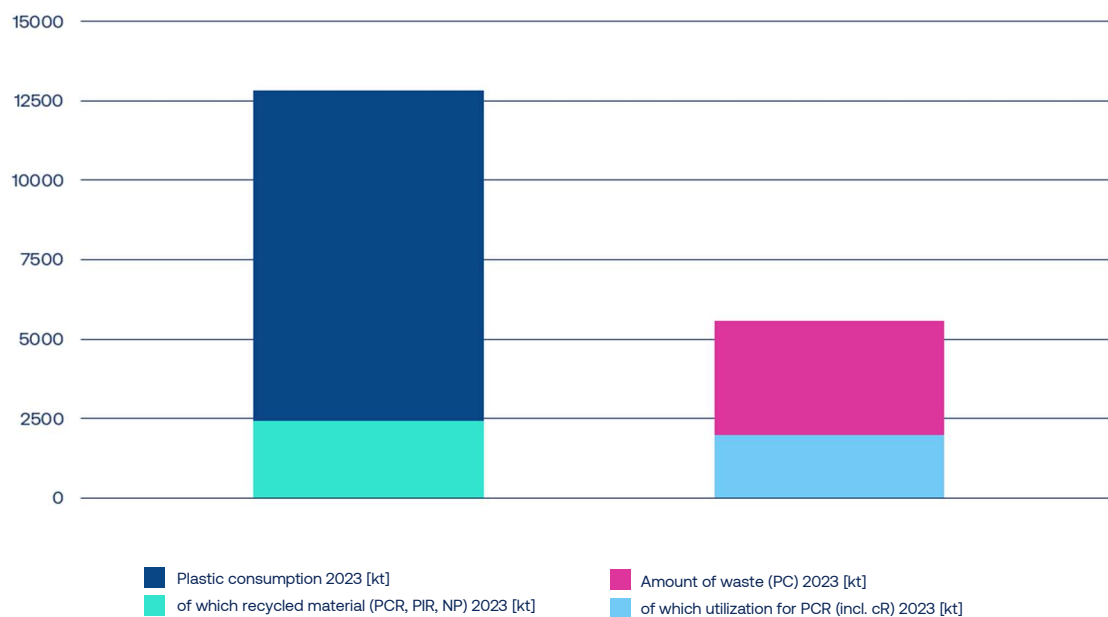
REASONS FOR USING RECYCLATE

Historically, the use of by-products and recyclates, especially PIR, was primarily used to reduce costs. Today, the use of recyclates, especially PCR, is becoming increasingly important. This is not only due to the economic advantages, but also to the need to decouple plastics processing from the consumption of fossil raw materials in order to reduce greenhouse gas emissions. The use of recycled materials is therefore a decisive step towards more sustainable and environmentally friendly production in the automotive industry.

THE RECYCLATES MARKET IN GERMANY AND EUROPE

The Conversio study, also known as the "Plastics material flow picture in Germany", comprehensively analyzes the production, processing, consumption and recycling of plastics in Germany every two years.

According to Conversio's 2023 material flow diagram, the total amount of plastics processed in Germany in 2023 will be 12,845 kt. Of this, 390 kt will be PIR, which corresponds to 3% of total consumption, and 1,540 kt will be PCR, which accounts for 12%. Post-industrial waste is recycled as PIR with almost no losses. In contrast, only 26% (1,540 kt) of 5,580 kt of post-consumer plastic waste is recycled as PCR in Germany. The most important sources of post-consumer waste are packaging, which accounts for the largest share at 3,072 kt. The most important sectors for the use of recyclates are construction products (900 kt = 29.5% PCR share in construction products), packaging (720 kt = 18.8%) and agricultural products (270 kt = 47.4%).



At European level, the "Plastic the Facts 2022" report by Plastics Europe with data for 2021 shows that plastic consumption amounts to a total of 50,300 kt per year. PCR

accounts for 5,496 kt of this, which corresponds to 11% of total consumption. A total of 29,500 kt of plastic waste is collected in the EU, of which approximately 19% (5,496 kt) of which is recycled as PCR. The most important sectors for the use of PCR are also construction products (2,364 kt = 22% PCR share in construction products), packaging (1,836 kt = 9%) and agricultural products (592 kt = 38%).

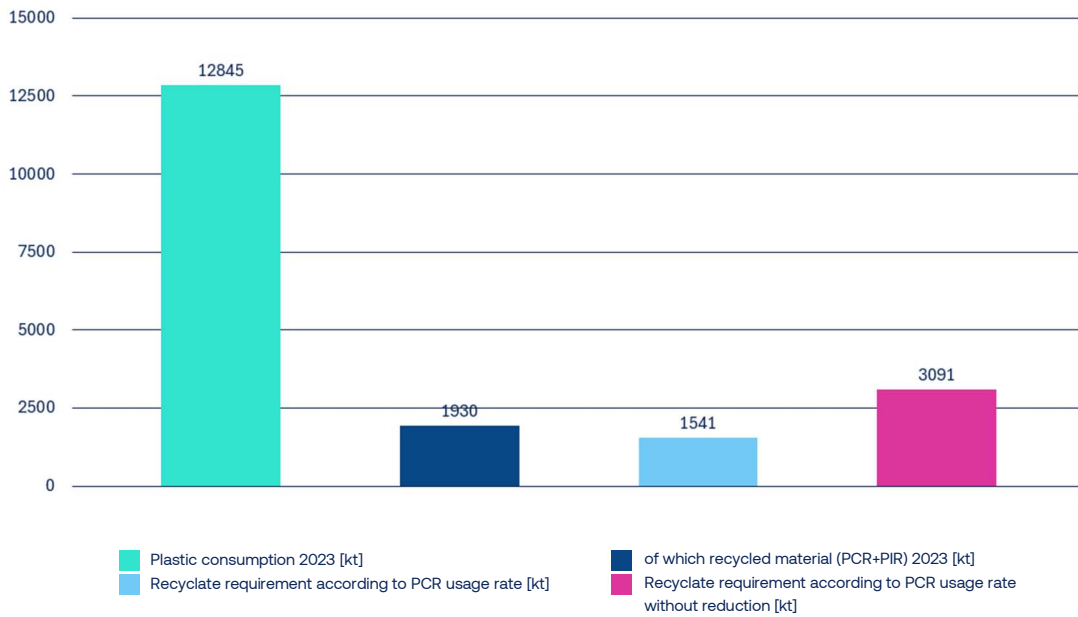
FUTURE DEVELOPMENTS IN THE RECYCLATES MARKET

Statutory recyclate use quotas will have a significant influence on the recyclate market in the future. As part of the EU's Green Deal, recyclate input quotas are being defined for more and more plastic products. For packaging, this is regulated in the Packaging and Packaging Waste Regulation (PPWR). From 2030, between 10% and 35% PCR must be used, depending on the plastic and use of the packaging. From 2040, even quotas of between 25% and 65% PCR are planned.

Quotas for the use of recycled materials in vehicles are being discussed as part of the end-of-life vehicle regulation (ELV). In its draft of 2023, the EU Commission proposed a use quota of 25% PCR per vehicle, 25% of which should come from the recycling of end-of-life vehicles. The European Parliament and the European Council are currently positioning themselves on this draft. The trilogue is expected to begin in the course of 2025, during which the final form of the ELV will be negotiated. The Commission is also expected to present a draft Waste Electrical and Electronic Equipment Regulation (WEEE) in the course of the year, which will also propose recyclate input quotas of 25% PCR for plastic products from the electrical and electronics industry.

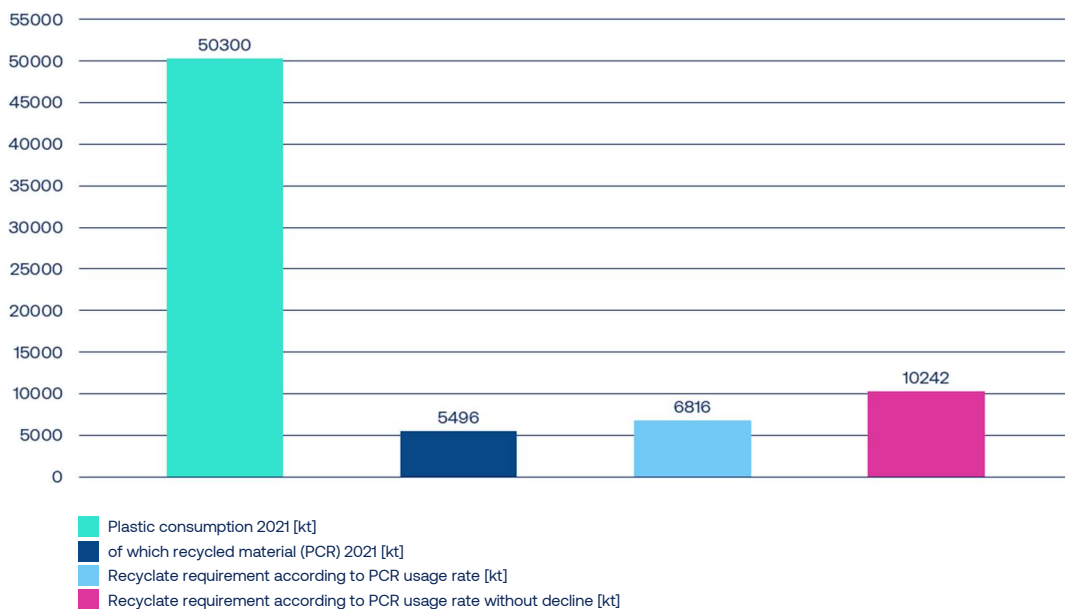
CONCRETE IMPACT OF THE ADOPTED AND PROPOSED QUOTAS

A simplified estimate of the impact of the quotas on the recyclate market in Germany and the EU is to assume a PCR usage rate of 25% for the packaging, automotive and E&E products sectors. Based on the studies cited above, the demand from these three sectors in Germany would then be 1,541 kt compared to a current supply of 1,979 kt of PCR. However, if the other sectors (particularly construction products and agricultural products) continue to use recyclate to the same extent as before, demand would rise to 3,091 kt and a gap of 1,112 kt of recyclate would open up.



Own calculation based on the study "Material flow diagram for plastics in Germany 2023 - facts and figures on the life cycle of plastics" by Conversio

In the EU, the current supply of 5,496 kt would be offset by a demand from the sectors of 6,816 kt (recyclate gap of 1,320 kt) or, if the current use of recyclates in the other sectors were also taken into account, a demand of 10,242 kt (recyclate gap of 4,746 kt).



Own calculation based on the study "Plastic - the Facts 2022" by Plastics Europe

In summary, it is clear that the use of recyclates will be a legislative requirement in the future, especially for industries that currently only have a relatively low recyclate usage rate. timing, level and structure of the respective quotas is part of the political discussion.

The industry's task is to respond to this trend at an early stage and enable the use of recycled materials to be increased in the various sectors. Along the value chain, this includes adjustments in waste collection and sorting, the further development of recycling and processing methods, the consistent implementation of circular design and the further development of specifications and quality assessments.

LIGHT TOWER PROJECTS SHOW: PCR USE IS ALREADY POSSIBLE TODAY

If the players in the value chain, from recyclers and processors to OEMs, pull together and explore new avenues together, the use of PCR in automotive applications is already possible in some applications today

We would like to demonstrate how this can be achieved using two components from our product portfolio as examples: These are an add-on console, which is used in the add-on console on the vehicle underbody, and a holder for a sound generator

TOP CONSOLE - CLOSING THE MATERIAL CYCLE: FROM THE CAR INTO THE CAR



The add-on console from Pöppelmann K-TECH® impressively demonstrates how materials from end-of-life vehicles can be fed back into the production process. It consists of **100% PCR-PP**, which is recovered from plastic parts of end-of-life vehicles and processed to a high quality in our own compounding facility. This creates a genuine circular economy.

TECHNICAL FEATURES & BENEFITS:

- **Material:** High-quality PCR-PP with excellent heat and chemical resistance.
- **Weight:** Lightweight construction with high structural integrity.
- **Process reliability:** Consistent quality thanks to innovative recycling technologies.
- **Mechanical stability:** Developed for high loads and robust operating conditions.
- **Sustainable procurement:** By using material from end-of-life vehicles, it contributes directly to meeting ELV requirements.

FOCUS ON SUSTAINABILITY:

- Complete recycling: reuse of plastic material from end-of-life vehicles.
- Reduction of the CO₂e impact by **71%** compared to the new product requested by the customer (in accordance with EN ISO 14067).

SOUND GENERATOR HOLDER - UPCYCLING FROM A "SALAD CUP" TO AN AUTOMOTIVE COMPONENT



The holder for the sound generator is an essential component for modern electric vehicles. Sound generators simulate engine noise, for example drawing the attention of pedestrians and cyclists to the almost silent electric vehicles. The holder ensures that the external loudspeakers are securely attached.

This component is the first time that from Pöppelmann K-TECH® has realized a series application in the automotive sector using PCR. This product development was made possible by the customer's openness to our suggestion to change the material and through cooperation with various parties in the value chain, such as the material supplier. This made it possible to generate a polypropylene suitable for series production for technical plastic parts.

TECHNICAL FEATURES & BENEFITS:

- **Material:** PCR-PP GF30 - a mixture of recycled polypropylene and glass fiber, which ensures high stability and durability.
- **Strength:** High mechanical strength and weather resistance.
- **Weight saving:** The use of lightweight plastics optimizes vehicle weight, which has a positive effect on energy consumption.
- **Process optimization:** The material mix has been specially developed to ensure high dimensional stability and low shrinkage during production.
- **Durability:** Meets strict requirements in terms of temperature resistance and impact resistance in automotive construction.

FOCUS ON SUSTAINABILITY:

- Made from **PCR-PP GF30**, which comes from household recycling collections (e.g. yellow bag/yellow garbage can).
- Reduces the CO₂e impact by **46%** compared to virgin material (according to EN ISO 14067).

CONCLUSION: SUSTAINABILITY AS A COMPETITIVE ADVANTAGE

A sustainable circular economy in the automotive sector has long been a reality - and Pöppelmann K-TECH® is making a decisive contribution to this with the targeted use of PCR materials. Innovative solutions enable future requirements for the use of recycled materials to be met, greenhouse gas emissions to be reduced and material

cycles to be closed. While many are still looking for answers, Pöppelmann K-TECH® already offers sustainable alternatives that not only protect the environment but also strengthen the industry's competitiveness.

Shape the future of mobility with us - sustainably, efficiently and innovatively. Let's close the material cycle together!

MOVING FORWARD TOGETHER. NOW.

