Dossier on Certified Recycled Content

Bridging The Recyclate Gap

Kofinanziert von der Europäischen Union

Ministerium für Umwelt, Naturschutz und Verkehr des Landes Nordrhein-Westfalen

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CERTIFIED RECYCLED CONTENT

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Dossier on

Certified Recycled Content Credit-Trading

Bridging The Recyclate Gap-

1 Problem statement and challenges

1.1 Recyclate demand and outlook for 2030

According to the EUs Joint Research Centre (JRC), 5.3 million tonnes of recyclate in total and close to one million tonnes of non-PET food contact-sensitive plastic recyclate will be needed in 2030 to fulfil the recycled content requirements of the Packing and Packing Waste Regulation, PPWR (Graph 1).

1.1.1 Graph 1: JRC demand calculation for 2030.

1.2 PPWR recyclate gap

Art. 7 PPWR will cause a recyclate gap between availability and demand of close to 1mt for food and contact-sensitive plastic packaging. The predictions of the Conversio report/study: Recyclate gap Forecast_Model_2030_Europe have already proven to be too low since its first publication: the time plan for the PPWR has been delayed, and the discussion about chemical recycling and its viability is still ongoing. The fall-back or safeguard clauses contained in the PPWR also seem to be keeping the industry from investing in the capacities required for closing the gap. The latest estimates by Conversio can be found here

1.3 Challenge of approving recycled polyolefins for food-grade applications

At the same time, according to (all) experts it is highly unlikely that the European Food Safety Authority (EFSA) and the Commission will be able to recognize recycled polyolefin

materials for food grade packaging applications before 2030 except for a few lighthouse projects. Chemically recycled polyolefins seem to be the only way out of the dilemma caused by a recycled content obligation (Art. 7 PPWR) on the one hand and the legal and practical impossibility of using mechanically recycled polyolefins on the other hand.

1.4 Risks of traceability issues and false claims

The lack of traceability and false declaration of imported recycled plastics remain a legal, reputational and commercial threat for European enterprises. It has become a trend on the polymer markets to claim (chemically) recycled content without trustworthy proof. One popular trick, for instance, seems to be that recycled content claims are based on reprocessed off-spec-grades, by-products or recycled pre-consumer waste, which is not in accordance with the regulations laid down in Art. 3.1 (40) PPWR. The measures proposed in this dossier will significantly reduce pressure on supply chains to use such imported recycled plastics and will encourage the players involved to tackle potential fraud and consumer deception.

1.5 Benefits of existing structures in European packaging recycling

The plastic packaging recyclers processing European waste are already closely monitored and audited to prevent fraud and ensure reliable data reporting. The same applies to the packaging industry, as the placed-on-market-figures are also monitored by the authorities, and to the legally required recyclability of packaging in Art. 6 PPWR. If the remedies proposed in this dossier are correctly incorporated into this existing network of PPWR audits and reports, additional bureaucracy can be minimised.

1.6 Market impact: Disappearance of contact-sensitive packaging

Without countermeasures the PCR supply gap 2 to 8 million tonnes of contact sensitive plastic packaging could need to be taken off the markets because of the regulation in Art. 15 (1) PPWR: no compliance, no market. This would be happening even if all those packaging products would have been redesigned by 2030 reaching grade A recyclability.

1.7 Substitution by paper-based packaging and environmental implications

Without countermeasures the PCR supply gap can lead to a massive substitution of sustainable plastic packaging, such as paper-based packaging in the field of food packaging and other contact sensitive packaging. Paper-based materials are exempt from the recycled content targets if they contain less than five per cent plastic by weight (Art. 7 (5.b) PPWR). Such mixed material packaging is more difficult to recycle and causes additional burdens to the environment (GVM-Study: Recyclingfaehige-Kunststoffverpackungen.pdf). The above design-trend has already become more and more popular in the consumer goods and food industries for several years now. To reverse this harmful development better measures are proposed in this dossier.

1.8 Economic pressure, fraud, and greenwashing concerns

The economic pressure exerted especially on SME market participants by the threat of disappearing from the market will make false claims more likely and lead to more greenwashing. This dossier proposes a way to prevent this from happening.

1.9 Mass balance rules in chemical recycling and distortion

As a prerequisite for investing in chemical recycling capacities the chemical industry has applied for certain far-reaching mass balance and allocation rules which will privilege chemical recycling over mechanical recycling. These privileges ("fuel-exempt" mass balance calculations and allocations of non-polymers as recycled content in polymer production) will be granted to the chemical industry although chemical recycling is indisputably an ecologically inferior route merely outperforming landfilling or incineration. Because of the privileges there will be no level playing field with mechanical recycling, despite its significant advantages in terms of cost and environmental impact. Additional measures as those proposed in this dossier must be put in place to level the playing field.

1.10 Oligopoly formation in chemical recycling

Predictably, plastic producers in Europe will form an oligopoly which will dominate the market for a long time to come by suppling all converters with chemically recycled content for contact-sensitive packaging. At the same time these converters are legally obliged to use chemically recycled content materials for contact-sensitive packaging (including food packaging). The recycled content targets will hence lead to an unfair competitive advantage of chemical recycling over the mechanical route, which will need to be offset by additional measures as explained in this dossier.

1.11 Disadvantages faced by SME packaging manufacturers

Multinational packaging manufacturers have already secured their access to chemically recycled material through LOIs or even contracts. SME packaging manufacturers here have a size-related disadvantage. They have reason to fear that they will be cut off from supply and thus lose all or at least a large part of their market shares because of Art. 15.1 PPWR. This will can be avoided by measures such as those proposed in this dossier.

1.12 Downward trends in plastic packaging and future uncertainties

The overall downward trend in plastic packaging caused by refill, reuse, and reduce targets and rising packaging costs especially related to plastic will further put the existence of SME packaging producers in jeopardy. This trend can be mitigated by the additional measures as proposed in this dossier.

1.13 Safeguard clauses in PPWR and investment delays

Another easy way out of the above dilemmas could be the safeguard clauses in Art. 7 PPWR, allowing the Commission to adopt targets and / or time frames to market developments. However, the uncertainties resulting from this option for the legislator and the Commission are further delaying necessary investments and continue to create additional political uncertainty for the industry and the markets.

2 The Solution: Certified Recycled Content Credit-Trading System

2.1 Basic Concept and Mechanism

The basic idea behind the Certified Recycled Content trading system (Graph 2) is that the

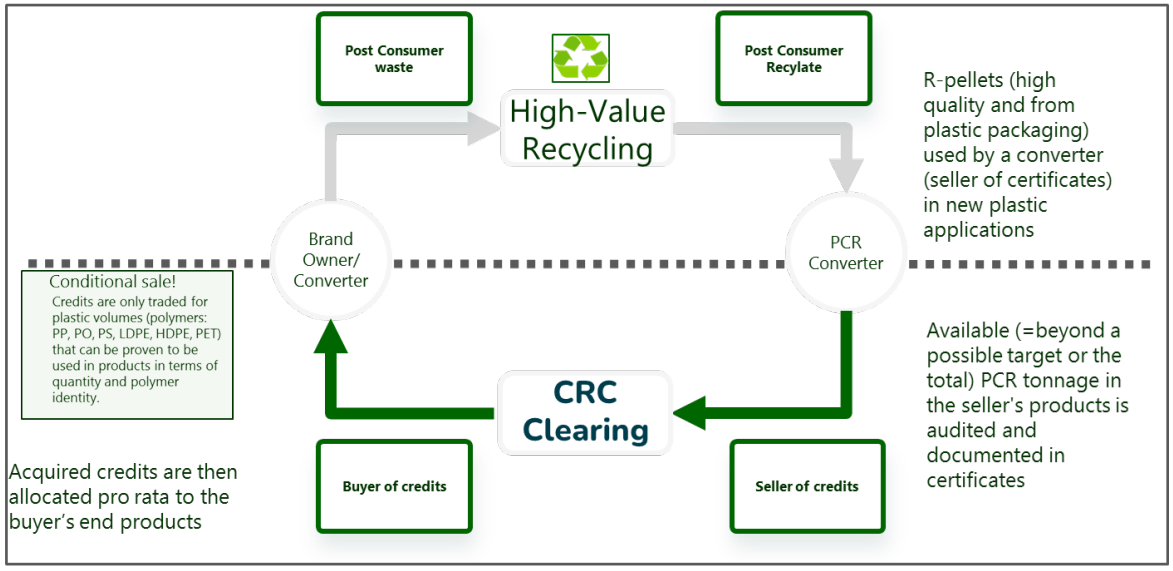
use of mechanically produced post-consumer recyclates (m-PCR) made from plastic packaging in high quality applications is documented by certificates. Each certificate is checked and audited to ensure that the paperwork matches the actual physical use of recyclate. Companies that using more recyclate than required by the regulation will now be able to sell the 'surplus' as certificates to those manufacturers (Art. 3.1 (13) PPWR) who do not (yet) meet the targets for the use of recyclate for various reasons:

- It is not technically possible, for example because recyclates do not meet the necessary technical requirements
- Too little recyclate is available on the market, leaving some processors with insufficient quantities
- It is very costly
- It may not be permitted (food, contact-sensitive).

In this way, companies exceeding the legal targets and companies not yet able to meet the targets complement each another and together they achieve the use targets for post-consumer post-consumer recyclates set by the legislator. Please note that only the physical presence of recyclate can be claimed in this system. The certificates cannot be used for claiming purposes. They only serve as proof to the authorities that manufacturers have fulfilled their legal obligation to use recycled materials by purchasing certificates as a substitute.

Credit trading will create effective new, market and price driven pull-factors to boost the production and use of recyclates in the packaging industry:

2.1.1 Graph 2: The Entire Collaboration System



2.2 Linking m-PCR use with high-quality recyclable packaging

Linking the use of m-PCR to the placing on the market of high-quality recyclable plastic packaging:
So far, this link does not exist. Instead, packaging is being recycled in large quantities but the majority of recyclates are leaving the packaging industry to be used in other industry

sectors (construction, leisure, sports, automotive…). There are many technical and toxicological reasons for this, but with CRC the packaging industry will at least be able to buy credits back if they have resulted from packaging recyclate and use them to fulfil its own obligations.

2.3 Continuous improvement of m-PCR quantity and quality

Continuous quantity and quality increase of the m-PCR in circulation:
The quantities of credits available for trading are doubly limited by quality and quantity requirements:
On the one hand, credits may only be sold

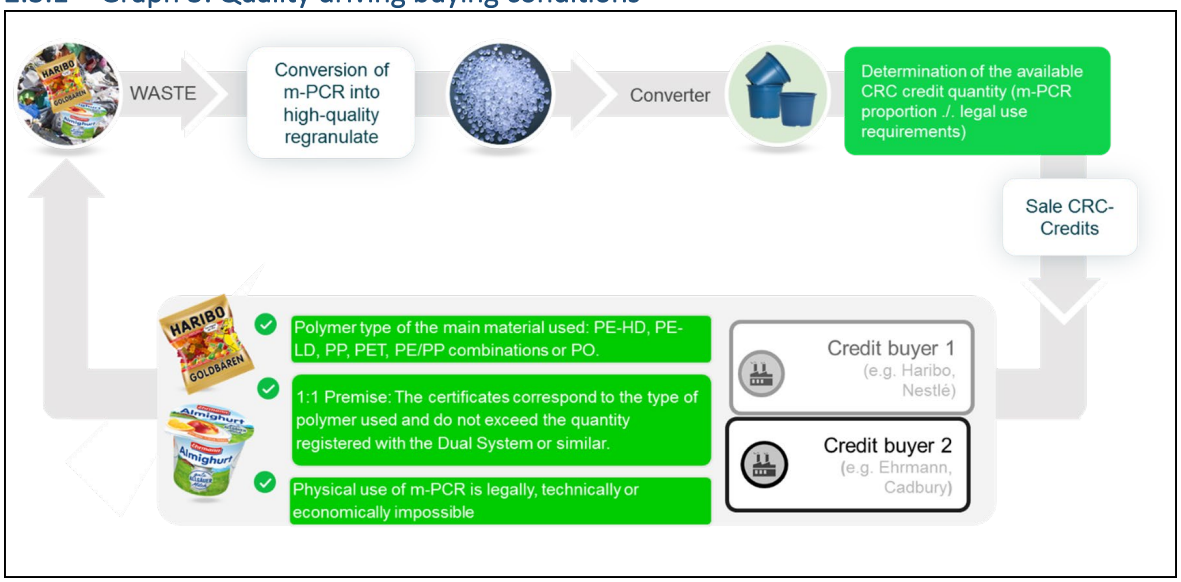
- for recyclates made from packaging waste
- of specific polymer types (PE-HD, PE-LD, PP, PET, PO, PS),
- polymer types which have been produced in a “high-quality recycling process” (FAQ 3.4) and
- polymer types which replace virgin material in typical plastic applications (“high-value recyclate”; FAQ 3.5)
- if the seller has fulfilled their own legal obligation to use recyclate for those recyclate amounts exceeding this obligation (see below Graph 3)

On the other hand, they may only be bought if

- they “replace” recyclate content in high-quality recyclable packaging
- they are of the same polymer type (PE-HD, PE-LD, PP, PET, PS, PE/PP combinations)
- they are necessary to meet or to exceed legally stipulated recycled content requirements
- which cannot be met by the buyer for economic, technical and/or legal reasons.

The above quality aspects on both sides of the deal will lead to a continuous increase in quantity and quality improvement of recyclates: The increased demand will lead to a bottleneck of credits and subsequently higher prices. The credit bottleneck can only be resolved with additional m-PCR quantities, suitable for high-quality applications. More credits hence require more high-value recycled polymers and therefore incentivise the redesign of packaging ensuring much better recyclability. Otherwise, according to Art. 7 PPWR, the unchanged, hard-to-recycle packaging will have to be taken off the markets. Accordingly, a continuous increase in the circulation of high-quality m-PCR is to be expected. This will also have the effect that recyclates from packaging will increasingly be useable in packaging again. Ideally, credit trading will become superfluous once the value chain has been fully optimised and EFSA approvals for recyclates in contact sensitive packaging have been granted.

2.3.1 Graph 3: Quality driving buying conditions



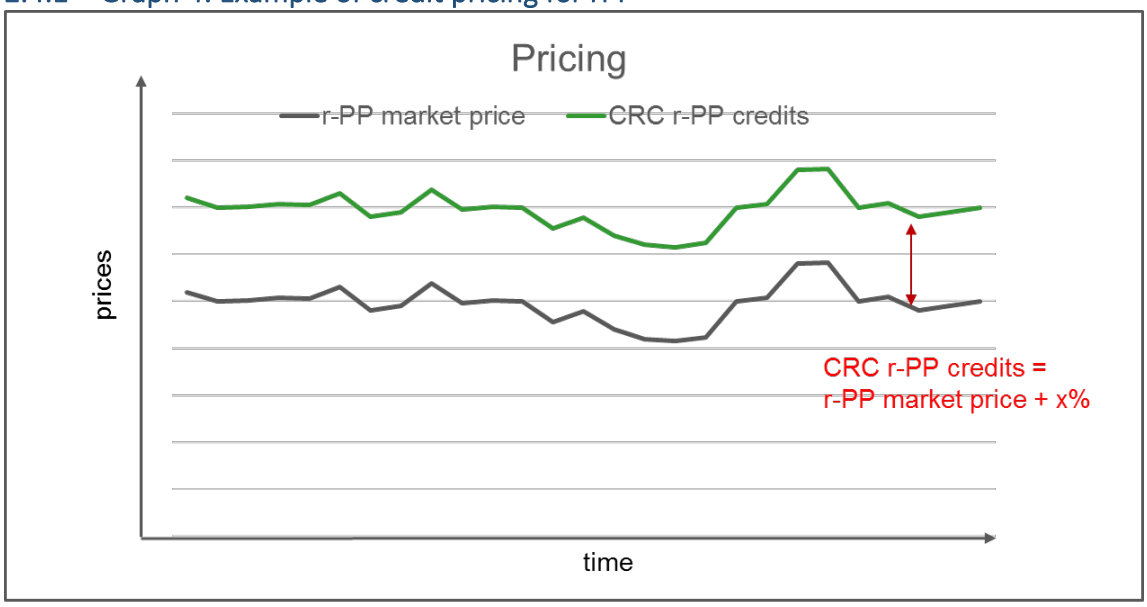
2.4 Market dynamics and price formation for credits

Improvements will be driven by pricing and market developments and not only by legal obligations:

A scarcity of credits fetches higher prices. The price of a credit is formed on the trading platform operated by CRC and depends on the factors ‘credit market volume’ and ‘credit demand’.

The minimum price per tonne of credit to be paid to CRC shall be set at an € 1,000 equivalent, i.e. the system head will only open trading procedures if this minimum price is reached. In any case, the price floor should be at least € 100 or 10% higher than the respective price for recyclates to keep up the price-incentive to (a) use physically present recyclates instead of credits as well as (b) continue to develop technologies for the mechanical production of PRC.

2.4.1 Graph 4: Example of credit pricing for rPP



2.5 Incentives for packaging optimization and increased recyclate use

The above price pressure will incentivise the purchaser to optimise his packaging as much as possible to avoid the high costs for eco-modulation, to use recycled content wherever possible, and to boost the certificate market and thus lower certificate prices. This will contribute to an increase in the available high-quality recyclate quantities. This in turn will cause credit prices to fall. More and better recyclate quantities will appear on the markets, over all segments.

2.6 Environmental benefits

Sellers will receive the proceeds generated via CRC trading minus a margin for the System Head. They can use the sales proceeds to finance the purchase of more and better recyclates, even if the latter are more expensive than virgin plastics. This will enhance recyclate production in all market segments and lead to more and better recyclate materials. The price-driven increased amount of m-PCR in the cycle substitutes a corresponding amount of fossil raw materials. The quantity that is fed into low-quality recycling or even energy use is reduced by the same amount.

3 Definitions / Glossary

3.1 Recyclate credits

Recyclate Credits embody recyclate quantity equivalents. They serve as proof to the authorities that manufacturers (Art 3.1(13) PPWR) have fulfilled their legal obligation to use recycled materials by purchasing credits as a substitute. Recyclate Credits can also help saving any plastic tax that may be passed on to the manufacturer, if this is permitted by law. Recyclate Credits can be issued by a plastic converter who uses mechanical post-consumer recyclate (m-PCR) to produce high-quality plastic products (e.g., injection moulded parts). The seller may offer them to manufacturers, who must fulfil certain conditions, e.g., their

packaging must be exclusively and demonstrably recyclable to a high standard. The purchaser can acquire the credits in a trading process on an IT-blockchain-platform operated by CRC.

3.2 Credit purchaser

Credit purchasers are manufacturers as defined by Art. 3.1 (13) PPWR, who must but cannot physically use m-PCR in their packaging. For credit purchasers, the physical use of m-PCR has to be technically, economically and/or legally impossible. The credits serve as proof to the authorities that the manufacturers have fulfilled their legal obligation to use recycled materials by buying certificates as a substitute.
The purchaser can only acquire CRC Credits for specific polymer types (PE-HD, PE-LD, PP, PET, PS, PE/PP combinations or PO[polyolefin], i.e., compounds of PP and PE; independent of the polyolefin producer) which they have verifiably used as the main material in his respective packaging product.
A purchaser must be placing packaging on the market which can demonstrably be fed into a specified sorting fraction and subsequently be sent to high-quality recycling if credits are necessary to replace PCR in them. Proof of recyclability is a prerequisite, e.g., by presenting testing results showing that the respective packaging achieves at least level "A" or “B” according to Art. 6.1 and Annex II Table 3 PPWR.
The number of Credits that can be bought by a purchaser cannot exceed the packaging amount has registered with the ZSVR “Zentrale Stelle”, or with comparable registration bodies according to Art. 43 and 44 PPWR, via an EPR-scheme.
A buyer can be a seller at the same time if he fulfils the requirements for both sides. In that capacity he can for example buy back his own credits issued for one PP-packaging to reach his compliance for another food-grade PP-packaging in his portfolio. The CRC trading platform will supply a right of first refusal for those cases.

3.3 Credit seller

Credit sellers are producers which are using high-quality recyclates from PPWR- related packaging recycling as substitute for virgin polymers in new, material-typical applications ("high-quality recycling" according to Art. 3.1(41) PPWR). From the actual quantities of recyclate used, any shares required by the seller to fulfil own legal requirements are deducted. Only the difference is available for credit trading (Graph 5 below).
This m-PCR content in the seller's articles/products will be determined by a registered expert using publicly recognised audition methods and already existing data (recyclers certificates etc.). The m-PCR content serves as the basis for calculating the quantities of recyclate credits that can be permissibly issued because of this m-PCR use. The relevant information will be needed for conformity assessments according to Art. 15.2 PPWR anyhow.

3.4 “High-quality” recycling

High quality recycling is defined in Article 3.1 (40) PPWR as meaning “any recycling process which produces recycled materials that are of equivalent quality to the original materials, based on preserved technical characteristics, and is used as a substitute to primary raw materials for packaging or other applications where the quality of the recycled material is retained’.
For CRC, this must involve at least the following typical waste-treatment steps: re-sorting

(if necessary), shredding, washing, separating, melting, degassing, filtering, granulating and homogenising.
Plastic packaging waste is thereby converted into high-quality re-pellets (m-PCR) which can be used to substitute fossil-based polymers. The relevant technical information and percentage of packaging waste vs. other waste reprocessed can be found in the recycler's certificates such as issued by Recyclass or comparable, which will be needed for conformity assessments according to Art. 15.2 PPWR anyhow.

3.5 "High-quality plastic application"

"High-quality applications" are products (articles and substances like compounds) that can be produced and marketed despite high costs for the use of high-quality recyclates as replacement of fossil-based polymers. However, there is an exception: Where a convertor or compounder needs high-quality recyclates to dilute his otherwise unsellable products, the respective application (made from a blend of low-quality and high-quality materials) is excluded from credit trading because it will not contribute to an overall increase in the quality of circulating polymers. CRC-Auditors will have this as a criterion on their checklists.

3.6 "High-value/high-quality recyclable"

"High quality recyclable" is any packaging that can be recycled to a very high percentage. This is usually either measured or qualified in percent (>80 or 95%) or in grades (as in Annex II Table 3 PPWR; grades A and B in this case) by qualified auditors.

4 Organization of the trading process

4.1 Content and structure of a recyclate credit

The following data are specified in the recyclate credit:

- Issuing body: System Head (CRC)
- Tonnage of recyclate to be substituted
- One unique number identifying the credit
- One unique number assigned to the seller and its test audit, which enables an assignment of seller to purchaser. This can only be evaluated by auditors. An x-digit check digit will be used in the system for this purpose. The auditor adds up the packaging quantities of the specific polymer type accruing at the purchasers. In the next audit the use of existing credits must be verified, whether since the last audit, a packaging design has been changed and thus fallen out of the high-value recyclability classification or the originally assigned main polymer type in the individual case.
- Designation of the recyclate substitute according to polymer type (PP, PE-LD, PE-HD, PO, PET, PS)
- Authorised auditor(s) who has/have verified the origin, production and re-use of the credit equivalents at the seller's premises.

4.2 Role of CRC as system head

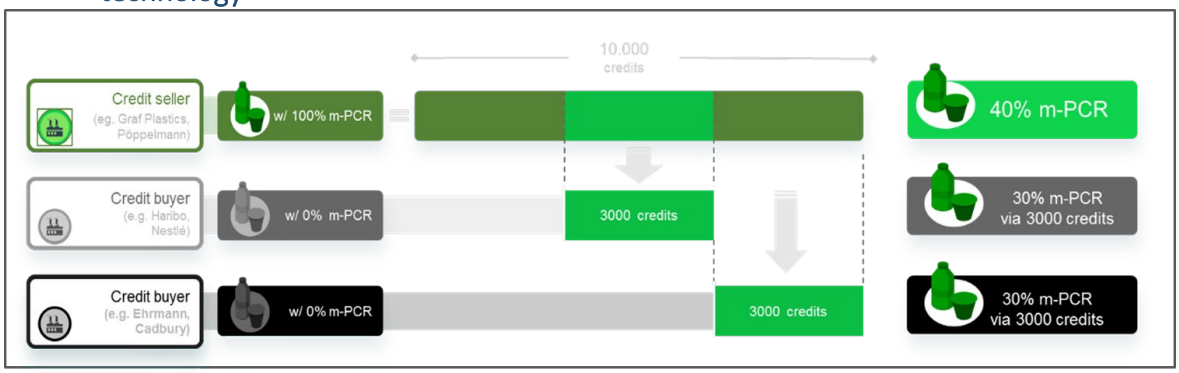
In operating the blockchain trading platform the System Head warrants to the purchaser of the Credits that

- by purchasing the credits via the System Head, the purchaser enters a partnership

with the System Head which enables him to count the seller's m-PCR use towards his own packaging (restricted polymer specific offset).

- there is current evidence, verified by the System Head, that the purchaser (brand owner) is using packaging that is recycled to a high-quality m-PCR after use through sorting and mechanical recycling,
- the acquired m-PCR volumes are validated by publicly certified / sworn in experts to the effect that the acquired credit volumes correspond to the tonnage of high-quality recycling.
- certified m-PCR quantities are not used (twice) by the seller for crediting elsewhere and/or against any of his own statutory m-PCR crediting quotas. The corresponding quantity is set aside in crediting targets so that there are no arithmetical conflicts in the case of statutory regulation of PCR targets. (see the Graph 5 below: the seller may then only credit 40% m-PCR use instead of e.g. 100% m-PCR in the example).

4.2.1 Graph 5: Auditing steps preventing double counting combined with blockchain technology



Together with a Registered Verification Company (like REVISA CycleProof GmbH www.cycleproof.com), the System Head is developing a verification guideline (by verification field, frequency, methodology and result) to audit and certify the above verification items, making extensive use of already existing data in the interest of efficiency. CRC reserves the right to have documentation verified by an expert, such as the comparability of different testing tools and their results. A packaging that only (just) meets the requirements of the German Minimum Standard of the ZSVR, or a comparable foreign minimum standard is expressly not entitled to be linked to credits. In other words: It must be better recyclable (as defined by the classification) and not just be considered an acceptable contamination (as defined by the Minimum Standard)
Auditing the System Head is the third and last additional verification step introduced by this dossier.

4.3 Conditions for the purchase of credits

4.3.1 Identification as a manufacturer

The purchaser must identify himself as the manufacturer (Art. 4.1 (13)) using plastic packaging with the polymer types of PET, PS, PP, LDPE, HDPE or PP/PE combinations as the main materials when registering with the System Head.

4.3.2 Proof of packaging recyclability

After identification, the buyer proves the recyclability of its packaging by:
Presentation of a current certificate/testing report officially confirming the high-quality recyclability (see above 3.6). Non-exhaustive list of recognised auditors:

- RecyClass
- HTP-Cyclos
- Interzero

Alternative testing institutes recognised by the German ZSVR or internationally comparable institutions.
Alternatively: Proof of a data sheet including a picture and sample of the packaging, if no audit/testing report from a registered auditor is available. In that case the System Head will have the recyclability determined (for example by applying the methodology laid down in the Minimum Standard of the ZSVR) at the purchaser's expense.

4.3.3 Determination of the relevant tonnage

The tonnage relevant for certification, i.e., the tonnage required to fulfil the purchaser's legal obligations regarding the recycled content, is determined annually for each polymer type by a publicly appointed and sworn expert (e.g., via an invoice audit).

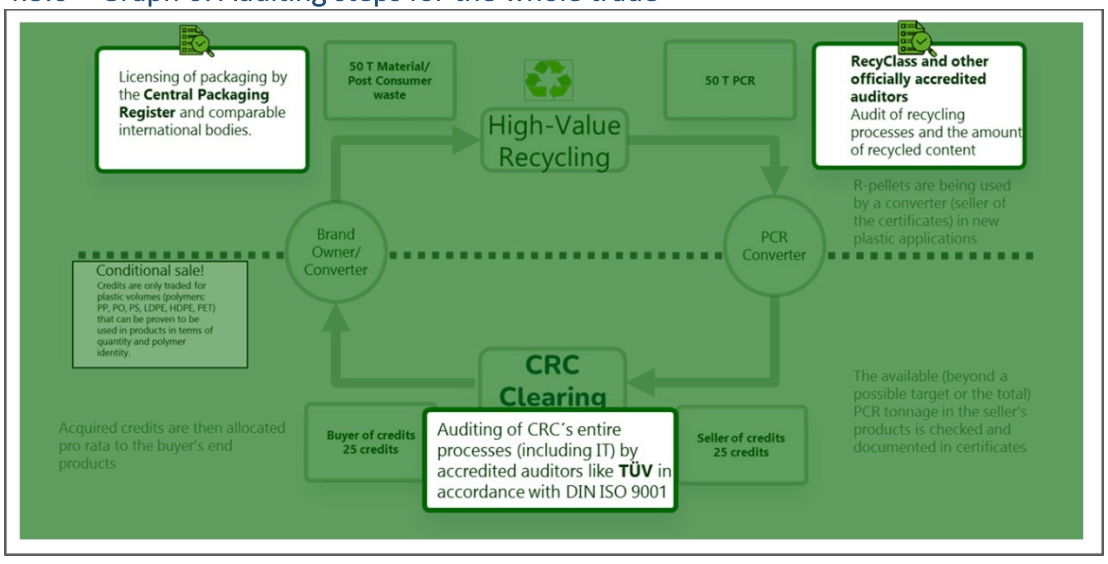
4.3.4 Admission to the trading platform

The purchaser is then admitted to the trading platform and has the possibility to purchase credits up to this tonnage/quantity, provided that sufficient polymer type credits are on offer.

4.3.5 Allocation of credits to the purchaser

The acquired credits are attributed to a specific purchaser. Resale to "third parties" is not permitted and makes the credits invalid. If a group company wants to purchase centrally, it must do so in the name and for the account of the individual buyer.

4.3.6 Graph 6: Auditing steps for the whole trade



4.4 Conditions for the sale of credits

- The seller must provide evidence of the production of packaging-based m-PCR at his supplier by means of a certificate issued by a recognised auditing system (e.g. Eucertplast) which must be updated every twelve months.
- The use of packaging-based m-PCR material in the seller's production is verified by a publicly appointed and sworn expert, per tonnage of each polymer type, and must be updated in case of changes in the product range (volume, composition).
- CRC GmbH generates credits based only on the packaging-based PCR material used in production at the credit seller per polymer type.

4.5 Validity of the credit

The credits are valid for 12 months as from the date of purchase or less if the purchaser's related packaging has changed to a recyclability rating below "B" in the meantime. The respective credits become invalid for the future, beginning with the introduction in the market of the redesigned packaging. In alignment with the System Head the outdated credits can be renewed and assigned to other packaging. The System Head shall request an update of the credits in good time before their expiry.

4.6 Communication and Consumer Protection

CRC trading is governed by two plain and simple rules regarding claims toward the consumers: Any claiming must always be related to audited physically present recycled content:

- The credit seller is allowed to advertise that his products have the physically present recycled content (as in his respective audit report), even if he has sold credits as recycled content equivalents.
- The credit purchaser may advertise to his customers and the public that his credit backed packaging placed on the market is "high value recyclable" (see above 3.4), with the advertised quantity being limited to the amount of equivalents he has purchased in the form of credits. He may not, however, advertise the physically absent recyclate content which is represented by credits to avoid double counting and consumer deception.

CO_2 credits/savings remain a separate matter, a separately regulated issue, and are not sold virtually with CRC recyclate credits, and must therefore not be advertised by the purchaser as such in relation to traded credits.

5 Frequently Asked Questions (FAQ)

5.1 Projected demand for recycled packaging material in 2030

The Commission proposes mandatory recycled content targets of between 10% to 35% for plastics in packaging from 2030. This corresponds to a Europe-wide demand of approx. 6 million tonnes of PCR. Currently, about 1.6 million tonnes of PCR, mainly PET are used in packaging production. To achieve the 2030 targets proposed by the Commission, the reuse of PCR in packaging made of PP and PE in particular, which constitute with approx. 70% the most important packaging polymers, would have to be increased at least fivefold. That is an extreme challenge and quite unrealistic in view of the developments to date. See Conversio Forecast Model "Use of recyclates in Europe 2020 to 2030", commissioned by

IK e.V. and Conversio studies on "the status quo of recyclate use in plastic packaging and forecast on availability of Post-Consumer-Recyclates (PCR) in 2030"
Major hurdles are:

- There is still too little plastic waste being collected and recycled separately across Europe - 19 EU countries are in danger of failing to meet the packaging plastics recycling targets for 2025 (see also Cutting Plastics ollution, 2 Mar 2023; eib.org/attachments_cutting_plastics_pollution_en.pdf). This report explicitly calls for financial support for the plastics recycling business. In case ofCRC, such funding will not come from member states or banks, but from the industry itself, thus reducing the risk of additional bureaucracy.
- The challenging high-quality requirements in the packaging market are unrealistic to meet for the time being, as shown by the lack of approvals for the use of PCR in food and other contact-sensitive packaging by EFSA.
- The danger of an undersupply of PCR is exacerbated by the fact that other sectors will also be given legal obligations to use recyclates. Even today, the vast majority of PCR from used packaging is reused in other sectors such as construction, agriculture and automotive.
- It is unclear whether PCR from chemical recycling will be available in sufficient quantities from 2030 onwards. Neither have the legal requirements for this have not yet been established, nor have the processes not yet fully developed and tested on a large scale, not to mention the fact that the necessary investments have not yet been made.

From 2030 onwards, large parts of the packaging market are therefore threatened by a shortage of recyclates, and in need of a mitigation tool.

5.2 What are the risks related to the recycled content gap?

It can be assumed that from 2030 onwards there will not be enough recyclates available in the required qualities to meet demand in the packaging market. This gives rise to various risks:

- Risks to supply chain security: Lack of PCR quantities and qualities for the packaging market pose a significant risk to supply chains and the secure supply of consumers in Europe, because packaging that does not meet the legal requirements would be banned from 2030.
- Risks for SMEs: Small and medium-sized manufacturers would be particularly affected by a shortage of supply, as they would not be able to obtain recyclates in the required qualities on the open market, or only at significantly worse conditions.
- Ecological risks: A diversion of recycled plastics from other sectors to meet PCR targets in the packaging market entails the risk that, due to the higher quality requirements, a far greater amount of energy must be used for recycling (e.g. for chemical recycling), while more virgin plastic is used again in the previous application markets for the recyclate. In addition, there are fears of evasive movements towards laminated paper packaging, especially if these are exempted from PCR use quotas and do not have to be highly recyclable.

5.3 How does credit trading for recyclates work?

The principle is simple: a manufacturer who uses more post-consumer recyclates (PCR) than required by law receives credits for this. He can sell these to manufacturers who cannot (yet) meet the legal target. Together they thus achieve the use targets for post-consumer

recyclates set by the legislator.
Both sides benefit: Producer A receives a financial incentive to use more recyclates through the proceeds from the sale of the credits. Manufacturer B can meet the legal PCR target by purchasing the credits and remain on the market with its products, even if there are not yet enough recyclates on the market for these in the required qualities (e.g., for food contact).
How the system works in detail, including the verification and audit obligations of the companies involved, should be worked out by the EU Commission in a delegated act based on Article 7(7) PPWR. We make it a condition that both sides, seller and buyer, must use plastics of the same polymer type (e.g., PE, PP, PET) in their products and produce highly recyclable products and packaging.

5.4 What are the key advantages of credit trading?

- **Credit trading acts as a catalyst for transformation** by increasing economic efficiency and mitigating economic and environmental risks.
- **Credit trading protects supply chains, SMEs and consumers:** The risk of marketing bans for certain packaging due to a lack of suitable recyclates (Art. 5; Art. 15.1 PPWR) is significantly reduced by credit trading, as manufacturers can compensate for a lack of recyclates by purchasing credits. This protects supply chains, especially of small and medium-sized enterprises, and the secure supply of consumers in Europe.
- **Credit trading reduces energy demand and transformation costs:** Credit trading ensures that PCR is preferentially used where it is most economically and energetically efficient, and consumer prices do not rise unnecessarily. Food packaging does not necessarily have to become food packaging again if the replacement of virgin plastic in other segments is possible with lower energy and cost expenditure.
- **Credit trading promotes recyclability:** A supply of credits can be expected above all for those polymer types that are recycled on a large scale *(at scale)* and are in demand on the market. Packaging manufacturers (distributors) who use these types of polymers are likely to benefit from a larger and cheaper supply of credits than users of polymer-types the recycling of which is less economical. This increases the economic efficiency of the transformation without having to ban rarer polymer types, which have their justification in certain functions. In addition, the products in which the recyclates are used and receive the credits must also fulfil the requirements for high-value recyclability.
- **Credit trading ensures a *level playing field* between mechanical and chemical recycling processes**. Even though the EU's deliberations on mass balance procedures in chemical recycling have not yet been completed, it is likely that some form of allocation of PCR shares *(credits)* will have to be allowed for chemically recycled polymers to enable a higher recyclate share to be shown than physically present. The chemical recycling industry has stated that this is required to create a business case for chemical recycling in the first place, besides the recycled content targets in contact sensitive packaging applications. Credit trading extends this possibility of allocating PCR shares between different products to mechanically produced recyclates. It is roughly equivalent to the "proportional" mass balance procedure, in which an allocation of credits within a polymer type will most likely be made possible, though it only concerns physically existing “polymer-only” recyclates.
- **Credit trading enhances demand for high-quality plastic recyclates and makes**

exemptions unnecessary: All packaging producers can contribute to increasing the use of recyclates via credit trading by putting highly recyclable packaging on the market and guaranteeing the reuse of recyclates from packaging recycling. Even if no or only little PCR can (yet) be used in certain packaging, no exceptions are necessary. This is a significant step forward in extended producer responsibility.

- **Credit trading can also be used to take advantage of plastic tax exemptions.**
- **Credit trading can ensure continuity for the framework of the PPWR:** Amending targets, timeframes and other requirements related to recycled content rules will not be needed. The economic pressure caused by the requirement together with Credit Trading will push the industry towards the technical and ecological optimal solutions.

5.5 Will credit trading affect Design for Recycling (DfR)?

The availability of credits for certain polymers will reflect the recycling industry's capability to high-value recycle the respective polymer. The more credits for a certain polymer type are needed the higher the need for stricter DfR-guidelines. For example, for certain film-applications specific R-film-grades will be needed. Today these grades cannot be produced from post-consumer packaging waste unless it is unprinted and mono-material. The available waste materials are scarce and mostly coming from C&I-sources. To boost availability of certificates specific polymer-grades DfR-guidelines will have to ban certain types of printing, inks, barriers, material combinations and other contaminants. If these bans are then successfully implemented by the packaging industry more and more credits will become available. Where printing and barrier-functions are indispensable, a switch to another polymer type might be the likely solution because DfR-guidelines for that polymer-type may not have to be as restrictive. Hence, again more credits will become available on the platform.

5.6 Will credit trading impact EU packaging imports and exports?

Yes, all placed on market packaging will be subject to the rules of the PPWR, including those coming from outside the EU (Art. 3.1 (10)). Auditing and reporting rules will apply to them in any case. The audits needed for credit trading will make use of those already existing data. For plastic recyclers outside the EU audits have been common practice for the last 30 years. Additional auditing at the convertors (sellers) and BO- (buyers) levels can be easily done and will allow certificates to be sold into the EU based on verified, solid data. Compliant packaging exported from the EU will positively affect qualities of waste to be recycled in other countries.

5.7 How to ensure high quality recycling and avoid downcycling?

Which sectors may participate in credit trading can be determined by the EU Commission in the delegated act according to Article 7(7) PPWR. Only manufacturers of high-quality recyclable plastic products - such as packaging, construction, or automotive parts - should be entitled to receive and sell credits. It is crucial that more recyclates are used voluntarily or through market-based financial incentives than required by law and that the use of recyclates replaces fossil-based new plastic. Applications in which the recyclate does not replace virgin plastic should be excluded by law. "Intrusion moulding" of PCR without a washing process into products with low market value, only to gain credits from it, can thus be ruled out. In addition, the products themselves should fulfil DfR-requirements so that they in turn are high-value recyclable.

In the future, chemical recycling can close a gap in the circular economy of plastics by processing waste that cannot be mechanically recycled into secondary raw materials to produce new plastics. This opens new fields of application for recyclates, especially in food packaging. Together with the use of biomass and CO_2 as well as the conversion to renewable energies, it forms a key technology to be able to completely do without fossil raw materials in the plastics sector by 2050 and to achieve climate neutrality. However, these processes do not offer an alternative to energy- and cost-efficient mechanical recycling.

5.8 Does credit purchase allow claiming recycled content to consumers?

No. The purchase of credits is merely a means to be able to compensate for the legal requirements on recyclate quotas, to cushion economic and ecological risks and to increase the overall economic efficiency of the transformation. To avoid misleading the consumer, the buyer of credits should not be entitled to advertise the compensated recycled content as recycled material contained in the product. Only recycled material physically used should be indicated on the packaging or in consumer communication. The EU Commission should lay down the rules for advertising statements on the recycled content in the delegated act pursuant to Article 7(7) PPWR.
Only an advertising reference may be used to the effect that the packaging in question is recyclable to a high standard.

5.9 Can credit sellers still advertise recycled content in their products?

Yes, because the recyclate is physically contained in its products and this has been tested and audited. Double counting is excluded, because the buyer of the credits is not allowed to advertise the quantity equivalents he has purchased. The allocation of CO2 credits or debits must be considered separately from this.

5.10 How can credit trading be controlled and fraud risks reduced?

The trade in credits must be monitored just as strictly as the trade in post-consumer recyclates itself. However, the monitoring effort in both cases does not differ significantly. Since the recyclate content in the packaging cannot be analytically determined via laboratory methods, auditing methods such as purchase receipts etc. are required anyway to provide secure evidence of the material flows. Complete traceability of recycling back to the source of the waste is essential to ensure that the recyclate was produced from waste after use and that recycled quantities were not charged more than once. In the value chain, the necessary data is already available in audited form at various points (e.g. declarations of completeness, EUCERTPLAST credits for recycling companies). In the case of credit trading, this audit also extends to the production of the manufacturer who sells the credits. The Commission has announced that it will lay down the rules for the calculation and verification of the recycled content in a delegated act in accordance with Article 7(7).

5.11 How will greenwashing be avoided in this system?

Double counting vis-à-vis the consumer is prevented, esp. by a block-chain programmed IT-trading platform. All credit-relevant tonnages and qualities are made transparent, checked, and audited. All participants in this trading system undertake to contribute to high-

quality recycling: The seller of the credits by making his products with recyclate content recyclable to a high quality, the buyer of the credits by bringing only packaging that can be recycled to a high quality onto the market. The overall result is that the recyclability of packaging brought into the cycle increases. Moreover, trading in credits does not lead to undesirable evasive behaviour because credit prices will be high from the outset: The incentive to physically use recycled material is thus maintained. Credits will only be bought by those who objectively cannot fulfil their legal obligations otherwise.

5.12 Does credit trading promote low-value recycling ("downcycling")?

The opposite is the case: only the manufacturer of high-quality recyclable packaging (Recyclass "A", at least 90% recyclable packaging components) may buy credits at all. And only the user of high-quality recyclates that replace virgin material 1:1 may sell credits. This initiates a continuous improvement process driven by market mechanisms: Those who have so far put less recyclable packaging on the market will try to improve their Design for Recyclability (DfR) to be able to use credits as well. Those who still use inferior recyclates can gain the opportunity of additional revenues of selling credits by improving their quality.

5.13 Will NGOs oppose this system because of the negative image of 'credit trading'?

This proposal has been tested and (controversially) discussed with

- industry partners like Pöppelmann, Kuchenmeister, Jockey Group, Graf, Procter&Gamble, dm-drogerie markt, Nestlé, Aldi, Harry Brot,
- Industry associations and consortiums like Ceflex, IK Industrievereinigung Kunststoffverpackungen e.V., BDS, BVSE, PRE, EUPC
- NGOs like BUND, DUH, WWF, NABU
- Ecological experts from ÖkoInstitut, Wuppertal Institut
- Government bodies like DGs Growth and Environment, UBA (Federal Environmental Agency), Federal State Ministries in Germany, Zentrale Stelle (Central Body Packaging Register), Federal Ministry of the Environment
- MEPs, MDBs

It was mostly endorsed by all our discussion partners. Concerns raised by them were respected when designing the system.

5.14 Will credit trading cement the status quo?

No, unlike to chemical recycling, continuous improvements are immediately triggered by price mechanisms and these lead to a broad-based increase in the recyclability of PET, PP and PE plastic waste, and to a reduction in the quantities of plastics that are difficult to recycle and could otherwise only be recycled chemically. This pressure does not apply to chemical recycling, because it propagates that it can also take on waste streams that are difficult to recycle. But it will encourage chemical recyclers to look for feedstock that today is not yet collected, sorted, and recycled in areas outside packaging, and thus further a broad movement towards more recycling and less landfilling and incineration.

5.15 Can idle packaging manufacturers buy their way out of legal obligations?

Inaction on the part of packaging manufacturers does not pay off, because if they put poorly

recyclable packaging on the market, they are not allowed to buy credits. This means they face sanctions for failing to meet recyclate content targets (fines, marketing bans). Or they must use particularly expensive and ecologically disadvantageous recyclates from chemical recycling.

5.16 Isn't credit trading just another kind of fraudulent trading of weighing bills as we had in the 1990s?

In the 1990s, when weighing bills were traded between parties obliged to prove recycled quantities to the authorities this was a clandestine double and triple counting scheme. It was a. against the law, and b. violating contracts between waste-management companies, sorters, and EPR-schemes. Once discovered it was quickly and explicitly outlawed by German authorities. Any comparison to the Credit Trading System in question here is misleading, inadmissible and defamatory as in our case we are talking about an audited system that excludes double counting, with a legal basis and transparent rules.

5.17 Does credit trading undermine efforts to improve collection, sorting, and recycling?

Through the Design for Recyclability (DfR) improvement processes triggered by price mechanisms, the collectability, sortability and recyclability of PET, PE and PP waste streams will be increasing continuously.

5.18 Can the content of recyclates, e.g., in food packaging, be ensured in another way instead of through credit trading?

If there will be no EFSA approval for the use of rPP and rPE in food contact, there is no other way. Only when chemical recycling capacities produce the virgin-like recyclates would there be an alternative. This will create price competition between the credits and the prices for chemically produced recyclates, which in turn will lead to market-driven improvements in both mechanical and chemical recycling.

5.19 Can the credit purchaser buy credits in stock, resell, cancel, or exchange them?

Credits are not fungible securities; the respective laws do not apply. They only embody concretely processed recyclate quantities in concrete products of a concrete credit seller. The credit platform brings the latter together with a concrete buyer. Both parties must fulfil certain conditions, which can be transparently controlled and are individual. The credit therefore expires if it is not used or after the end of a calendar year. Since the credit is only assigned virtually on the platform, passing it on outside the platform is ruled out from the outset

5.20 Do the seller and the buyer of the credits know each other on the platform?

For reasons of data protection, the seller’s data are not passed on to the buyers, just as all information about the parties remains strictly confidential. Confidentiality is ensured by the necessary precautions in the programming and operation of the platform, which is supervised by the auditors of the system head in coordination for example with the Stiftung Zentrale Stelle Verpackungsregister (ZSVR) or any other trustworthy official (European)

body assigned by the legislator according to Art. 43 and 44 PPWR.

5.21 What is the relationship between credit trading and chemical recycling?

Chemical recycling should provide the industry with approved virgin material-like recyclates that can be used in food applications and other contact-sensitive packaging. According to the studies mentioned at the beginning, the volume potentials for these demanding applications are very high, while the volume potentials for credit trading are significantly smaller due to the qualitative restrictions. There are only so many credits available because they may only be sold by convertors using high quality recycled pellets in ambitious applications. In purely quantitative terms, there remains a great deal of demand for chemical recycling products that cannot be covered by credit trading.

5.22 Will credit trading lead to unfair windfall profits for certain converters?

This concern is unjustified. If credit trading is enabled already before 2030, all the effects described in this dossier can already begin to work even before the legal recycled content obligation enters into force. This would be completely in line with the intention of the PPWR. Avoiding windfall profits would require setting a deadline as of which previous use of recycled content would be excluded from credit issuance. That would create a once-only effect which could easily be circumvented by reducing the use of recyclate during the period in question, e.g., by replacing recyclate with by-products or virgin. That effect would be more damaging to the environment and to mechanical recycling than possible once-only windfall profits. Also, it seems unfair to punish first movers by not recognising them as such and not allowing them to benefit right from the start.

5.23 Will credit trading drive additional recyclate consumption or freeze the current situation?

Through the double quality ambition credit trading will lead to more high-quality recycling and less ambitious, less quality recyclates (often referred to as “downcycling” with no clear definition), which directly benefits the environment. More high-quality recycling will lead to more recyclate usage in all the converting industries and therefore boost recyclate consumption in general. Chemical recycling seemingly leads to more recyclate usage in the contact sensitive packaging applications field only, but it has no quality effect on packaging in general, neither regarding design for recyclability nor collection or sorting. It will most likely and already visible damage existing recycling pathways by either using up their feedstock or by taking quality pressure away from design for recyclability and from collection and/or sorting.

5.24 Why should only convertors (instead of recyclers) be entitled to issue and sell certificates?

We have chosen this option because CRC wants to incentivise the *processing* of recyclates into high-value plastic applications. *Producing* r-pellets is not in direct focus for the following reasons:

- Compared to fossil virgin polymers even high-quality recycled plastics represent a

different raw material for convertors in many aspects. Therefore, processing of recycled plastics often requires technical adaptations in the convertors production: Changes in cycle times, shorter revision and cleaning cycles, adaptation of tools, pre-drying, blending, even compounding steps may be necessary. Many products may require slight but costly design changes to make the use of r-polymers possible.

- If at all, these obstacles are normally only overcome by lower prices for r-polymers compared to virgin. Certificate revenue can overcome that problem at its source, the convertor. Recyclers on the other hand can claim the “just” price for their products if the convertor has additional financial means.
- It is only at the convertor’s that the true usage of r-pellets in high-value applications can be audited and checked. Recyclers oftentimes have no idea where their pellets end up because their customers won’t reveal this information to them. In case it is revealed at all, that information would have to verified at the customer anyhow.

5.25 Why isn’t issuing certificates limited to manufacturers based in the EU?

The WTO would consider such a restriction as an obstacle to free trade because - other than waste exports - it can’t be justified by security or health concerns. Auditing recyclers and convertors outside the EU is an ongoing practise already, E.g., Recyclass has been doing this for many years, ensuring that equal standards are applied to all audited companies.

5.26 Will credit trading not lead to even more bureaucracy burdens for the parties involved?

Credit trading audits will be based on existing enterprise data which are necessary to fulfill requirements by the PPWR (like the German “Verpackungsgesetz”) anyhow (Art. 16 PPWR). The trading process itself will be a simple online platform using block-chain transaction verification and checks. The platform requires registration and proof of fulfilment of the necessary requirements.

6 What is the purpose and role of CRC GmbH?

CRC GmbH is a privately owned project company, founded in Germany in 2022 with the objective of offering an industry run, competitive, and state supervised building block for the circular economy of plastic packaging that supports several ecological goals:

- Incentives for more recycling-friendly design (DfR)
- Incentives to produce larger quantities of ecologically high-quality recyclates
- Ecological high-quality response to legal, technical, and economical obstacles to the use of recyclates in contact-sensitive packaging applications (food, cosmetics, medicine, ...)

The corporate purpose of CRC is to organize trading in new, physical quantity backed recycled content credits. CRC offers to act as System Head for that trade by providing the trading platform. As system head for credit trading CRC will be using independent auditors (registered with the ZSVR or comparable institutions) and publicly secured, generally accepted auditing procedures. Thus, we will ensure that the requirements for the purchase and sale of credits as defined in this paper will be met by the participants (reliable and trustworthy). An additional professional requirement for any CRC-registered auditor is that

he is examined according to Recyclass (modules 1-3) or a comparable system.
The trading platform (system head) CRC itself will also be audited in its entirety by independent auditors (and operate on a block-chain-basis) to ensure that the functionality of the trading platform is sustainably guaranteed and publicly trustworthy (system head audit / volume clearing / IT-security).
CRC intends to introduce the trading system in the EU.