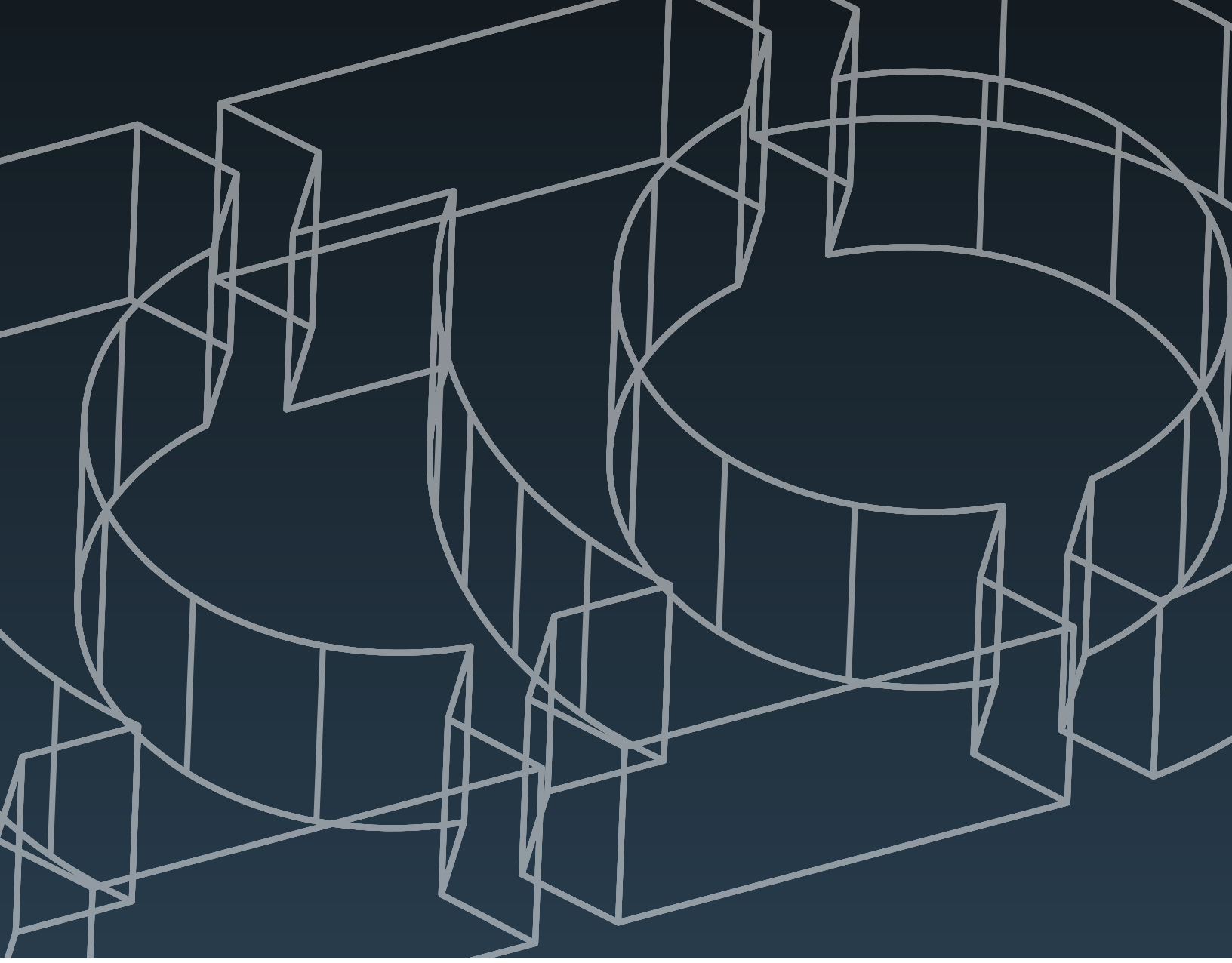

THE RECYCLED MATERIAL STANDARD

Plastics Module

Issued May 6, 2021

RMS
RECYCLED MATERIAL STANDARD

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GreenBlue is an environmental nonprofit dedicated to the sustainable use of materials in society. Our mission is to promote the principles of sustainable materials management — use wisely, eliminate toxicity, and recover more. Through our projects, we achieve our goal by influencing the debate, enhancing supply chain collaboration, and creating action. GreenBlue is the parent nonprofit to The Sustainable Packaging Coalition, How2Recycle, CleanGredients, Forests in Focus and other programs.

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1 General

1.1 Introduction

The Recycled Material Standard (RMS) Framework provides the core set of criteria for certification to the RMS for any material sector. The Material Modules are intended to supplement the Framework with additional material-specific criteria, definitions, and examples.

The terms “shall” and “must” are used throughout this Module to indicate mandatory requirements for conformance to this Standard; the terms “should” and “may” are used to indicate preferred and allowable actions, respectively. “Can” is used for statements of possibility and capability, whether material, physical or causal.

1.2 Scope

This Module applies to plastic-based material intended to be certified to the Recycled Material Standard. The requirements contained in this Module shall be considered binding and necessary for RMS certification of plastic-based materials.

Plastic-based material includes products wholly or partially consisting of synthetic materials made from organic polymers such as polyethylene, polystyrene, and polypropylene.

2 Terms and Definitions

For the purposes of this standard, the terms and definitions given in the RMS Framework Definitions and the following apply:

2.1 Fair market value: Value of the facility prior to the completion of a reinvestment. Fair market value is what the facility could be sold for if neither the buyer or seller were under any financial compulsion to buy or sell. Fair market value is not the book value (depreciated asset value) of the upgraded facility and is not the price of the facility if it was purchased prior to the re-processing upgrade investments.

2.2 New reprocessing equipment: New or used primary reprocessing equipment and any other equipment purchased for the purpose of contributing to the recycling of post-consumer plastics at the facility. This does not include used or refurbished equipment relocated from another facility.

2.3 Official reclaimed plastic material classification systems: Official classification systems of reclaimed plastics are developed by (supra-)national organizations (e.g. industry associations) and are based upon defined, verifiable and transparent criteria. These criteria usually aim at the categorization of reclaimed plastic materials according to certain quality aspects, but their application in specific supply chains should allow the characterization of the relevant points of reclamation. Official classification systems are recognized and used in the market in such a way that the classifications and corresponding claims are basic elements in commercial transaction documents and incorrect claims may lead to legal actions against the one who made the claim.

The predominant systems in the US are available from:

- Institute of Scrap Recycling Industries (ISRI), Scrap Specifications Circular
- Association for Plastic Recyclers (APR), APR Bale Specifications

2.4 Point of reclamation: The location, process or site where material is diverted from the waste stream from

industrial, commercial or municipal sources and reclaimed thereby constituting the starting point within the supply chain for reclaimed material.

2.5 Post-consumer plastic: Plastic generated by households, or by institutional, commercial or industrial facilities as end-users of products, that can no longer be used for its intended purpose. This includes returns of materials from the distribution chain such as obsolete inventory or damaged goods.

2.6 Post-industrial plastic: Plastic diverted from the waste stream during a manufacturing process that cannot be reclaimed within the same process producing the same product that generated it without reformulation of the input stream. Plastic which undergoes size reduction only (e.g. cutting, shredding or regrinding) is not considered recycled material. May also be referred to as pre-consumer plastic.

NOTE: A manufacturing process is defined by a combination of equipment, operational settings, material specifications and formulation of materials. The same or similar equipment using different input materials is not considered the same process

2.7 Primary reprocessing equipment: Recycling primary reprocessing equipment includes equipment used for: size reduction, sortation, metal detection, washing (wet or "dry" aka elutriation), drying (including crystallization or solid-stating) extrusion, filtration, formation of pellets, deodorizing, conveyance and storage.

2.7.1 For chemical recycling facilities, equipment may also include pyrolysis or gasification units, or equipment used for depolymerization to chemical intermediates.

2.7.2 Reprocessing equipment does not include: packaging lines, power or energy generation to support the facility.

2.8 Upgraded facility: All of the new and/or existing primary reprocessing equipment and any associated process control equipment and structures at the facility. The land on which the facility sits will not be considered as part of the upgraded facility for the purposes of determining the financial threshold. Similarly, intangibles such as the value of a facility's contracts or its brand portfolios will not be considered part of the upgraded facility.

3 Group Certification

3.1 Plastics processors and manufacturers that qualify as "small business entities" and meet the requirements in this section are eligible for pursuing RMS Certification as a group with certification managed by a group leader.

3.2 Small business entities are defined as organizations with less than 50 employees and annual revenue less than USD$3 million.

3.3 Participants in groups must perform similar types of operations.

Example 1: Group Participants

1. A group of small, independent MRFs is formed under a single certificate.
2. A group of small retailers is formed so that materials recovered from their operations can be deemed as certified post-consumer plastics.

3.4 More than one site from the same company may participate in a group as long as their combined staffing and revenue does not exceed the eligibility requirements.

4 Plastic Material Classification

4.1 For the purposes of certification and chain of custody in accordance with the RMS, all plastic-based materials shall be classified according to the categories presented in the Recycled Material Standard Plastic Material Classification.

4.2 Plastic-based materials shall be assigned the appropriate classification and RMS ID code based on the relevant Level 3 category. Participants should refer to the RMS website for the most current classification list.

4.3 When classifying materials participants are encouraged to follow guidelines for allowable contamination and prohibited materials as designated by industry standards.

5 Conversion Factors

5.1 Conversion factors are used to account for and document the flows of recycled material through recycling and manufacturing processes based on yield, as described in the Recycled Material Standard Framework, Section 5. This section provides additional criteria and supplemental examples for plastics.

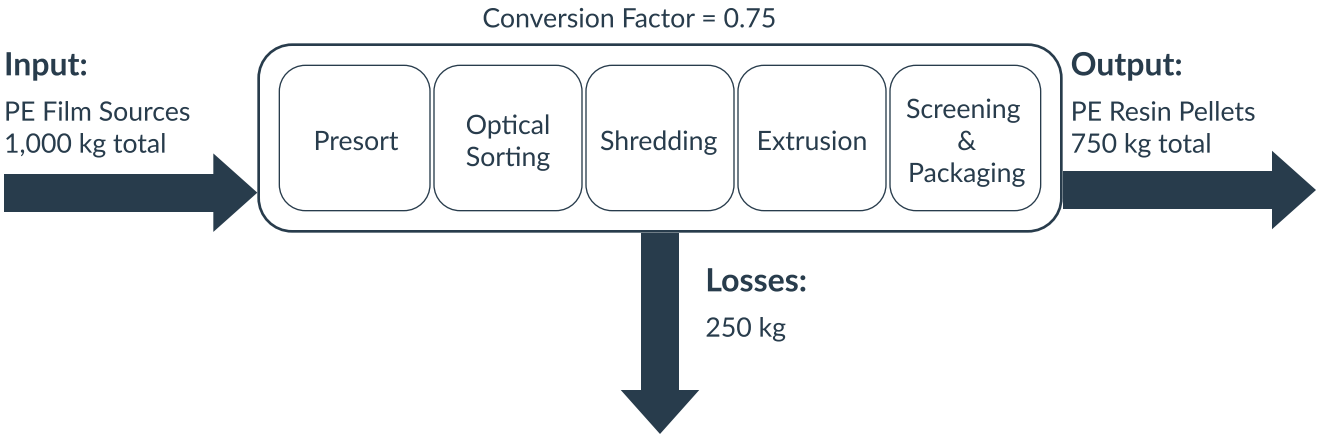
5.2 Conversion factors for plastic processing shall be based on mass of inputs and outputs and must account for system losses.

5.3 If it is not possible to characterize inputs based on mass, Lower Heating Value (LHV) may be used as the basis for conversion factors. LHV should be used only when there is no other means to determine a conversion factor, such as for thermochemical processes with mixed feedstocks. LHV values used in conversion factors must be measured and documented.

5.4 Where processes include both post-consumer (PC) and post-industrial (PI) sourced plastics, conversion factors must account separately for differences in yield of PC and PI inputs.

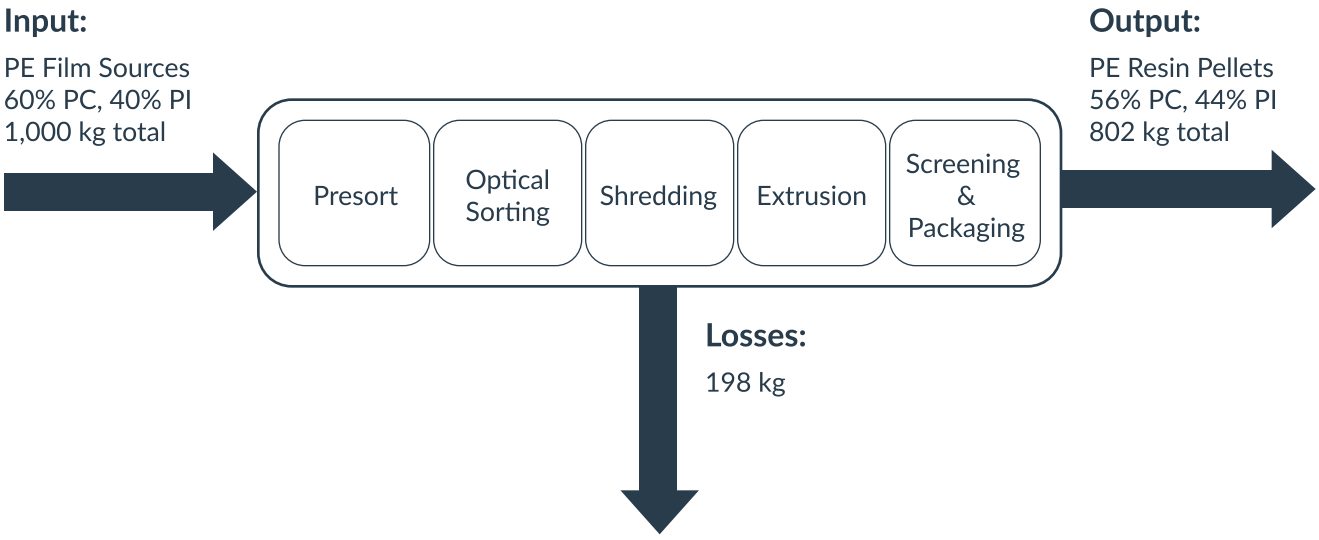
Example 2: Conversion Factor Example

A recycling process includes sorting, shredding, and extrusion of post-consumer polyethylene film. Based on measured performance, there is a 75% conversion factor (mass based yield) across the system.



Example 3: Conversion Factors Applied to Combined Materials

A recycling process includes sorting, shredding, and extrusion of a blend of post-consumer (PC) and post-industrial (PI) polyethylene recovered plastic to produce PE resin pellets. The process has a 75% yield when processing post-consumer PE materials and an 88% yield from post-industrial PE materials.



Input Description & Material ID Code	Input Quantity	Conversion Factor	Output Quantity	Output Description & Material ID Code
PE Retail Film Mix PC_P1.1.5	600 kg	0.75	450 kg	PC PE Resin Pellets PC_P3.1.5
PE Converter Scrap PI_P1.1.5	400 kg	0.88	352 kg	PI PE Resin Pellets PI_P3.1.5
Total	1,000 kg		802 kg	

5.5 For systems generating co-products, the certified material should be attributed to the outputs (and losses) in the same mass ratio that the co-products are produced. This approach is also known as proportional allocation. However, participants may apply non-proportional allocation for chemical recycling facilities. In all cases, any recycled material proportion consumed or sold as fuel must be treated as a loss and may not carry a recycled status claim.

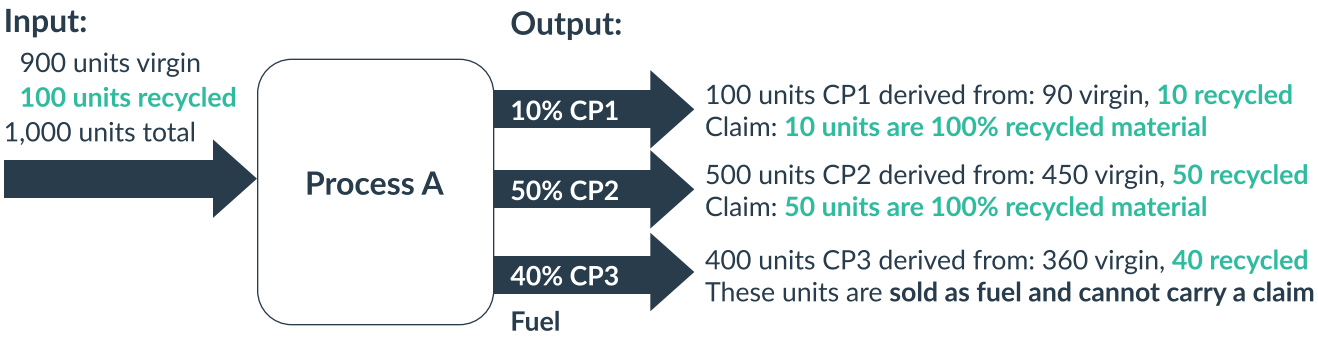
Example 4: Proportional Allocation

Process A generates three co-products in different proportions where:

- 10% of output goes to co-product 1
- 50% of output goes to co-product 2
- 40% of output goes to co-product 3 which is sold as a fuel

The process is fed 1,000 units of material where 100 units have a recycled status.

With proportional allocation the recycled units are split in the same mass proportion as the co-product output. Because co-product 3 is a fuel, it may not carry a recycled status claim and the recycled units from that stream are considered lost from the system.



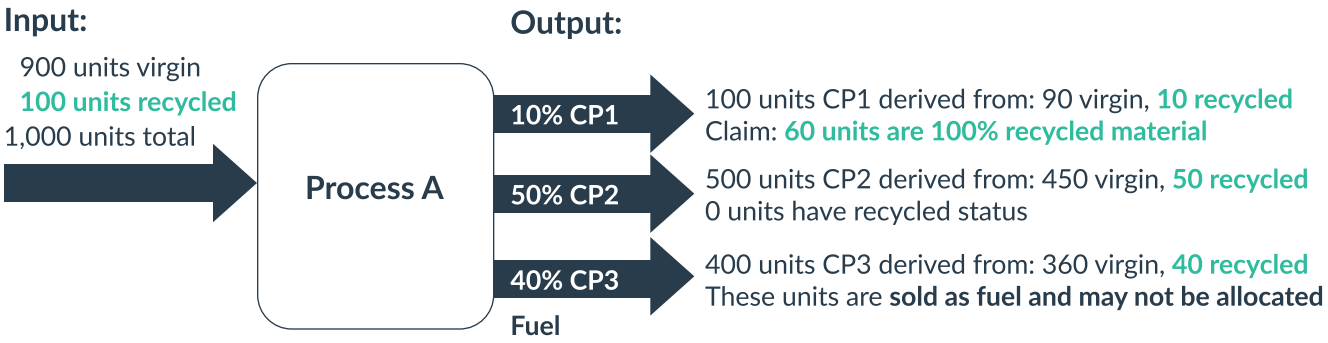
Example 5: Non-Proportional Allocation

Process A generates three co-products in different proportions where:

- 10% of output goes to co-product 1
- 50% of output goes to co-product 2
- 40% of output goes to co-product 3 which is sold as a fuel

The process is fed 1,000 units of material where 100 units have a recycled status.

Because co-product 3 is a fuel, the recycled units from that stream shall not be allocated to a product group and the four units are considered lost from the system. With non-proportional allocation the remaining recycled units may be assigned to any non-fuel co-product after accounting for losses. In this example, the participant chooses to allocate all 60 units of recycled material to co-product 1.



6 Plastic ARCs

6.1 Plastic Attributes of Recycled Content Certificates (ARCs) may only be generated by certified reprocessors, from RMS-certified recycled plastic resins.

6.2 The functional unit for plastic ARCs is 1,000 kg of recycled material.

6.3 At the time of generation plastic ARCs must be assigned a type classification in accordance with Table 1, based on resin type, or for chemical recycling intermediates, polyethylene equivalents (PEQ).

Table 1: Plastic ARC Types

RMS ID Code	ARC Type	ARC Code
P3.1.1	Acrylonitrile Butadiene Styrene (ABS)	ABS_ARC
P3.1.2	Acrylic (poly methyl methacrylate) (ACR)	ACR_ARC
P3.1.3	Nylon (polyamide)	PA_ARC
P3.1.4	Polycarbonate	PCAR_ARC
P3.1.5	Ethylene polymers (HD, LD, LLD)	PE_ARC
P3.1.6	Polyethylene terephthalate (polyester)	PET_ARC
P3.1.7	Polyethylene terephthalate glycol	PETG_ARC
P3.1.8	Polylactic acid	PLA_ARC
P3.1.9	Polypropylene	PP_ARC
P3.1.10	Polystyrene	PS_ARC
P3.1.11	Polyurethane	PU_ARC
P3.1.12	Polyvinyl chloride	PVC_ARC
All P2	Chemical recycling monomers and blended intermediates	PEQ_ARC
P3.1.13, All P3.2	Other monomaterials, mixed batches, materials not elsewhere classified	Other_ARC

6.4 Chemical recyclers may generate ARCs based on polyethylene equivalents (PEQ) for chemical recycling intermediates. PEQ ARCs are generated using the LHV ratio for the base material compared to polyethylene, with one PEQ defined as the heating value equivalent to 1,000 kg of polyethylene. For the purposes of ARC generation, the reference LHV for PE is considered to be 44.6 MJ/kg.

Example 6: PEQ Generation

A chemical recycler generates an intermediate monomer to be used in further plastic manufacturing. The monomer has an LHV of 40.0MJ/kg. 1,000 kg of the intermediate is eligible to generate 0.897 PEQ.

$$1000\text{kg intermediate} * \frac{40.0\ \frac{MJ}{kg}}{44.6\ \frac{MJ}{kg} * 1{,}000\ \frac{kg}{PEQ}} = 0.897\ \text{PEQ}$$

6.5 The 'Other' ARC category may be used for copolymers, blends or other materials that do not align with the other available ARC types. Eligible ARC generators may also submit a request for an additional ARC type through their certification body.

6.6 Recycled status of the ARC is specified in accordance with the RMS Framework and the definitions for post-consumer plastic and post-industrial plastic contained in this Module.

6.7 Reprocessors must document conversion factors used to determine the mass of plastic generated and the quantity of ARCs claimed.

7 Additionality Requirements for Plastic ARCs

7.1 In order to generate plastic ARCs generators must prove that ARCs are additional and driving increased investment in plastics recycling (i.e. beyond business as usual). This section outlines requirements for Plastic ARC generators to be eligible to generate ARC certificates.

7.2 Plastic ARC generators must meet all Class A additionality tests and at least one Class B test as outlined in Table 2. Additionality tests are further described in the sections below.

Table 2: Additionality Tests

Class	Test Type
Class A (Required)	Regulatory / Legal
	Newness
Class B (Choose One)	Common Practice
	Financial
	Activity, Practice or Technology Based
	Performance Benchmarks

7.3 Class A Regulatory/Legal Test

7.3.1 The reprocessing project must generate recycled materials beyond a level required by official policy, regulations, or legal mandate.

7.3.2 Recycled material from projects that are not credited toward or used for regulatory requirements are eligible under this standard if they meet all other requirements of the standard.

7.3.3 Projects initiated to meet a regulatory target must demonstrate material generation capacity beyond that required by law.

Example 7: Regulatory / Legal Test

A processor sells 40% of material into markets to meet California's reusable bag mandate for recycled materials. Those materials are not qualified for generating ARCs. The remaining 60% of output is eligible to support ARCs if the facility meets the remaining additionality criteria.

7.4 Class A Newness Test

7.4.1 Recycled material is eligible for ARC generation if it is from projects that are considered new operations and/or qualify as an eligible reinvestment after the relevant New Date, defined as January 1 three years prior to the certification year. The New Date is demonstrated in Table 3 below.

Table 3: Additionality New Dates

Certification Year	New Date
2021	January 1, 2018
2022	January 1, 2019
2023	January 1, 2020
2024	January 1, 2021
...	...
2033	January 1, 2030

7.4.2 Projects meeting the Newness Test satisfy this additionality requirement for 15 years after the eligible new installation or reinvestment occurred. After this date the generator must renew their eligibility to the additionality requirements based on the New Date for the recertification year.

Example 8: Newness Test

A new recycling plant is installed in 2020 and is certified to RMS in 2023. As long as they maintain continuous certification the plant is eligible to generate ARCs until 2035.

7.4.3 New Operations

7.4.3.1 A newly constructed facility is considered a new operation.

7.4.3.2 An existing facility is considered a new operation if the facility ceases operation for at least six months, transfers ownership and is restarted.

7.4.3.3 A facility that is shut down and restarted under the same ownership does not qualify as a new operation.

Example 9: Newness Test - New Operations

A recycling facility ceased operation in April of 2020 and was purchased by new owners in December of 2020. The facility passes the newness test and is eligible to be initially certified as an ARC generator until the end of 2023.

7.4.4 Eligible Reinvestments

7.4.4.1 Reinvestment in existing infrastructure may help a facility to satisfy the Newness Test to render some or all of a facility's production capacity eligible to generate ARCs.

7.4.4.2 The scope of the investment may be defined by the entire facility or by a single processing line within a facility that operates multiple lines. If scope is based on a single line, only the output from the qualified line will be eligible to generate ARCs.

7.4.4.3 The applicant must document that the capital investments were not made more than three years prior to the date that the facility is seeking certification. Expenses are only applicable on that portion of the facility that contributes directly to the reprocessing of plastic materials.

7.4.4.4 For a facility to meet the RMS Reinvestment Criteria the facility must meet at least one of the following criteria and provide sufficient documentation to verify conformance:

a) Financial threshold;
b) Quality improvement; or
c) Increased capacity.

7.4.4.5 Financial Threshold

a) Investments that meet a minimum financial threshold of 25% of the pre-investment fair market value of the facility are considered eligible reinvestments.
b) The fair market value of the facility must be determined prior to the completion of the reinvestment by submitting either tax records or an assessment of the value of the facility.
c) Only investments in primary reprocessing equipment at the facility shall be included in the reinvestment value. Non-equipment costs such as labor, engineering studies, rentals, or permits do not qualify.
d) A reinvestment meeting the 25% minimum threshold but less than 50% qualifies one-half of the production capacity of the facility to generate ARCs.
e) A reinvestment equal to or greater than 50% of the fair market value of the facility qualifies the entire production capacity to be eligible to generate ARCs.

Table 4: Reinvestment Thresholds for ARC Generation

Reinvestment Threshold	Output Qualified for ARCs
0 - 24%	None
25 - 50%	Half of the production capacity
51% or more	All of the production capacity

Example 10: Financial Threshold for Reinvestment

A facility producing 1,000 tonnes of recycled plastic per year is determined to be worth $10 million and makes a $3 million investment in new processing equipment. The investment is equivalent to 30% and would qualify half of the production capacity, or 500 tonnes, to generate ARCs.

7.4.4.6 Quality Improvement

a) Investments that significantly improve the quality of materials generated at the facility are considered eligible reinvestments. Quality improvement must be demonstrated by comparing sales prices or through reclassification of product specifications (e.g. achieving food-grade status or introducing color separation).
b) If price is used as the indicator, there must be at least a 10% difference apart from average market indices.
c) The volume of eligible ARC generation is equivalent to the volume of the material meeting the new quality specifications.

Example 11: Quality Improvement Reinvestment

1. A PE film processing plant adds washing capacity and is able to increase the average selling price of resins by 15%. The same year the average price of resins rose by 3%. The difference between the processor's average and market average is 12% so the price threshold is met.
2. A facility installs robotics on a pre-sort line and able to process 2 million lbs of PET that meets food grade standards. Prior to the installation the facility did not offer food grade resin. The 2 million lbs of PET would be eligible for ARC generation.

7.4.4.7 Increased Capacity

a) Investments that increased the quantity of recycled materials produced by at least 10% are considered eligible reinvestments.
b) Increases in capacity must be demonstrated through production records for at least one year prior to the investment.
c) The volume of eligible ARC generation is equivalent to the volume of increased capacity.
d) If the facility operates more than one production line, the ARCs may be generated only from the line that has been improved.

Example 12: Increased Capacity Reinvestment

A facility produced 20 million lbs of PET resin in a twelve month period. By refurbishing the pelletizer at the plant, production throughput is increased and shown to be 2 million lbs/month or 24 million lb/yr (a 20% increase). The additional 4 million lbs would be eligible for ARC generation.

7.4.5 Newness Exemption for Existing Processors

7.4.5.1 Plastics reprocessors that do not meet the Newness Additionality Test are eligible to generate ARCs from existing production capacity for an initial phase-out period lasting until December 31, 2025. A maximum of 50% of the facility's production capacity on a mass basis is eligible to generate ARCs in the first year, with the eligible percentage decreasing in 10% increments each year of the phase-out period.

7.4.5.2 During the phase-out period, ARCs may be generated only from post-consumer recycled plastic.

Table 5: ARC Eligibility for Existing Processors

Time Period	Percent of Production Capacity (Mass Basis) Eligible for ARCs
January 1, 2021 - December 31, 2021	50%
January 1, 2022 - December 31, 2022	40%
January 1, 2023 - December 31, 2023	30%
January 1, 2024 - December 31, 2024	20%
January 1, 2025 - December 31, 2025	10%

7.5 Class B Common Practice Test

7.5.1 Projects must not be "common practice" in the sector or region, compared with activities that produce the same products and/or services that have received no ARC financing.

7.5.2 If similar activities exist, the new project must identify essential distinctions between the proposed and existing projects.

Example 13: Common Practice Test

A new HDPE facility is installed in a state where an existing recycler has a plant. The new facility is going to install technology that allows the materials to achieve food grade quality while the first producer does not have that capability. This demonstrates a distinct difference and the new applicant passes the test.

7.6 Class B Financial Test

7.6.1 To be considered additional, the recycling project must be economically or financially infeasible or unattractive without ARC revenue, and/or the project faces capital investment return constraints which can be overcome with ARC revenue.

Example 14: Financial Test

In order to qualify for a CapEx loan, the applicant indicates ARC revenues as part of the revenue stream. Without the ARCs, the lender would not approve the loan.

7.7 Class B Activity, Practice or Technology-Based Test

7.7.1 Projects must implement a specific practice or technology which is rarely or never implemented in the absence of ARC revenue, as identified based on analyses of the market or sector.

Example 15: Activity, Practice, or Technology-Based Test

To date, markets for multi-material flexible packaging are limited to compression molding solutions. A new technology is able to process commingled materials with different melting points and produce injection molded parts. A participant installing this new technology would pass this test.

7.8 Class B Performance Benchmarks Test

7.8.1 Projects must exceed the average benchmark for the industry sector for recycled material quality or yield.

Example 16: Performance Benchmarks Test

Post-consumer films are routinely contaminated with paper receipts and labels which result in yield loss and odor problems. A new line is installed with filtration, degassing and deodorizing which delivers a food grade PE resin. This level of performance is not common and would pass the benchmark test.

Annex I: Post-Consumer Plastic Guidelines

Post-Consumer Plastics: Plastic generated by households, or by institutional, commercial or industrial facilities as end-users of products, that can no longer be used for its intended purpose. This includes returns of materials from the distribution chain such as obsolete inventory or damaged goods.

NOTE: Returns of materials from the distribution chain such as obsolete inventory or damaged goods must be at the point in the supply chain where it was intended for use by the end-user in order to qualify as post-consumer.

Eligible Post-Consumer Plastics:

1. Household packaging materials collected and sorted at a material recovery facility.
2. Plastic shipping materials that has been used to ship or protect goods (e.g. air pillows, foam for cushioning, garment hangers, mailers, pallets, polybags, retail bags, strapping).
3. Protective or functional plastic wrap or films that have been used (e.g. pallet wrap, boat wrap, agricultural film).
4. Plastic items or plastic parts of other finished goods that have met their intended use (e.g. consumer products, food service items, building products, healthcare/medical devices, textiles, electronic devices, automobiles).

Interpretive Examples:

1. Plastic trays at a grocery store salad bar are found to be off-color or damaged. The trays are reclaimed for recycling and may be classified as post-consumer material. These materials qualify as returns from the distribution chain because the grocery store was the intended user.
2. A batch of plastic tubs being held in inventory by the manufacturing company (e.g. an injection molder) are rendered obsolete inventory and must be classified as post-industrial plastic as they never reached an intended end-user.

Annex II: Post-Industrial Plastic Guidelines

Post-Industrial Plastics: Plastic diverted from the waste stream during a manufacturing process that cannot be reclaimed within the same process producing the same product that generated it without reformulation of the input stream. Plastic which undergoes size reduction only (e.g. cutting, shredding or regrinding) is not considered recycled material. May also be referred to as pre-consumer plastic.

NOTE: A manufacturing process is defined by a combination of equipment, operational settings, material specifications and formulation of materials. The same or similar equipment using different input materials is not considered the same process

Eligible post-industrial plastic sources typically include:

1. Plastic by-products or scrap generated during manufacturing (e.g. edge trimmings, die cuttings, melt purge from extrusion)
2. Plastic items, parts or packaging which is found to be off-specification, damaged or obsolete inventory

Examples of post-industrial plastics:

1. A defective, household white garbage bag with an assembled, colored drawstring is reclaimed and converted into a black, contractor garbage bag.
2. Scrap from a blue flower pot may be re-blended and formulated to make a black flowerpot on the same equipment.
3. Defective packaging, or scrap from converting a clear packaging film with a zip lock may be recycled as part of the formulation for a similar clear packaging film with different physical properties.
4. Scrap from a conversion process (including printing) that cannot be reworked directly back into the same extrusion line and product.
5. Edge trim from a multi material flexible packaging line is shredded into flake and returned to the same process that generated the material. In order to accommodate the material, the formulation must be adjusted (e.g. requiring additional additives) and the layer accepting the reclaimed material is made slightly heavier than when no edge trim is consumed.

Examples of materials that are not eligible for post-industrial status:

1. Taking scrap or defective product and recycling it at 100%, without modification other than size reduction, back into the same product. For example, an edge roll that is rewound and trimmed to a smaller size would not be considered recycled material.
2. Virgin polymer material, which is off-spec (or “wide spec”) but blended back into a prime grade in small amounts and sold as prime material.
3. Edge trim from a polyethylene film line is shredded into flake and fed back to the same line making the same product at 10% of the input stream without any adjustment to the other raw materials. Because no reformulation is required and the final product has the same properties and performance specifications, the materials do not qualify as post-industrial.