



## General

The ICIS Product Category Rules (PCR) for Plastic provide a standardized framework for conducting Life Cycle Assessments (LCAs) and preparing Environmental Product Declarations (EPDs) for plastic materials and products. Developed in alignment with ISO 14025, ISO 21930, and EN 15804, and governed by the principles of the International Climate Intelligence System (ICIS), this PCR ensures consistent, transparent, and scientifically credible reporting of the environmental performance of plastic across its life cycle.

Applicable to a broad range of plastic types—including virgin, recycled, and bio-based plastics—this PCR defines rules for impact assessment from raw material extraction, polymerization, and manufacturing, through product use and end-of-life scenarios. It supports producers, sustainability professionals, and third-party verifiers in developing EPDs that meet international procurement and disclosure standards, including those used in green building, packaging, and consumer goods sectors.

The PCR outlines:

- Functional units and system boundaries tailored to plastic applications.
- Standardized impact categories such as climate change, energy use, resource depletion, and marine pollution potential.
- Guidelines on allocation, data quality, and circularity considerations, including recycled content and recyclability.
- Requirements for third-party verification and public disclosure.

By following this PCR, plastic manufacturers and product developers can communicate their environmental performance transparently, enable more sustainable design choices, and support industry-wide efforts to improve material efficiency and reduce environmental impact.

## Disclaimer

This document is intended solely for informational and methodological use as part of the ICIS Product Category Rules (PCR) for Plastic. It does not constitute product certification, legal guidance, or regulatory approval. Although the content is based on globally accepted standards and current best practices, users are responsible for ensuring compliance with local regulations, sector-specific standards, and application-specific requirements.

Program rules, calculation methods, and documentation guidelines may be periodically updated in response to changes in scientific knowledge, international standards, or stakeholder input. ICIS accepts no liability for decisions made based on the use or interpretation of this material. For verified EPD development and official certification procedures, please consult [www.climateintell.com](http://www.climateintell.com) or contact an ICIS-approved verifier or program operator.

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## 1.0 INTRODUCTION AND OVERVIEW

This Product Category Rules (PCR) document establishes a consistent methodology for assessing the environmental impact of plastics in primary forms. By standardizing the approach to life cycle assessment (LCA), this PCR enables the creation of transparent and comparable Environmental Product Declarations (EPDs) across the plastics industry. Such standardization is crucial for meaningful comparison between different plastic products and for communicating credible environmental performance information to stakeholders throughout the value chain.

Developed in accordance with ISO 14025 (Environmental labels and declarations) and ISO 14040/44 (Life cycle assessment principles and framework/requirements and guidelines), this PCR represents a consensus-based approach that incorporates input from industry experts, environmental specialists, and regulatory bodies. The document aligns with the International Climate Intelligence System (ICIS) formatting standards to ensure accessibility and clarity for all users.

The primary purpose of this PCR is to support manufacturers in documenting the environmental performance of their plastic products in a standardized manner. By following these guidelines, producers can generate EPDs that provide customers, regulators, and other stakeholders with reliable information about the environmental impacts associated with their products. This transparency facilitates informed decision-making throughout the supply chain and encourages continuous improvement in environmental performance within the plastics industry.

Furthermore, this PCR contributes to broader sustainability initiatives by establishing a common language for environmental assessment in the plastics sector. As market demands for environmental transparency continue to grow, manufacturers who utilize this PCR will be well-positioned to respond to customer inquiries, regulatory requirements, and voluntary reporting schemes. The standardized approach also reduces the burden on manufacturers by eliminating the need to develop custom methodologies for each environmental assessment.

## 2.0 SCOPE OF DEFINITIONS

### 2.1 Product Types Covered

This PCR applies specifically to thermoplastics and thermosetting plastics in primary forms, as classified under the United Nations Central Product Classification (UN CPC) 347. Primary forms encompass the raw material state of plastics before they undergo further processing into finished products. These forms include granules, chips, pellets, powder, and gel states that serve as the base materials for subsequent manufacturing processes.

**Thermoplastics:** Defined according to ISO 472:99 as plastic materials that can be repeatedly softened by heating and hardened by cooling through a temperature range characteristic to the polymer, and that in the softened state can be shaped by flow. Common examples include

polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polyethylene terephthalate (PET), and polystyrene (PS).

**Thermosetting plastics:** Defined as plastic materials that, when cured by heat or other means, change into a substantially infusible and insoluble product. These materials typically cannot be remolded or reprocessed once they have been cured. Common examples include epoxy resins, phenolic resins, polyurethanes, and unsaturated polyesters.

## 2.2 Excluded Products

This PCR does not cover finished plastic products, plastic components, or plastic materials that have undergone secondary processing beyond their primary form. Specifically excluded from this PCR are:

- Finished plastic products (e.g., plastic bottles, containers, films)
- Semi-finished plastic products (e.g., plastic sheets, films, profiles)
- Plastic composites where plastics are combined with other materials
- Bioplastics that do not meet the definitions of thermoplastics or thermosetting plastics
- Recycled plastics that have already been processed into finished products

## 2.3 Terminology and Reference Standards

For the purpose of this PCR, key terms are defined according to relevant international standards, including ISO 14040/44 (for LCA terminology), ISO 14025 (for EPD terminology), and ISO 472 (for plastics terminology). Additional industry-specific terms are defined in accordance with established industry practices and recognized technical literature. This alignment with standardized terminology ensures consistency in interpretation and application of the PCR across the global plastics industry.

# 3.0 DECLARED UNIT AND REFERENCE FLOW

## 3.1 Definition of the Declared Unit (1 Kg)

The declared unit for this PCR is defined as 1 kilogram (kg) of plastic in primary form, which may include granules, chips, pellets, powder, or gel. This standardized unit facilitates direct comparison between different plastic materials and serves as the reference basis for all calculations and reporting within the Environmental Product Declaration (EPD). It is important to note that while product packaging is included in the assessment, the packaging weight itself is not counted as part of the 1 kg declared unit.

Declared Unit Specification

- **Quantity:** 1 kilogram (kg)
- **Physical state:** Primary form (granules, chips, pellets, powder, gel)
- **Reference point:** Factory gate

## 3.2 Packaging Considerations and Types

Packaging Considerations:

- Packaging impacts included in assessment

- Packaging weight excluded from the 1 kg
- Multiple packaging types require weighted average approach

Common Packaging Types:

- Small bags (typically 25 kg)
- Big-bags/FIBC (typically 500-1000 kg)
- Octa bins (typically 500-1200 kg)
- Bulk formats (silo trucks, container liners)

### 3.3 Volume to Mass Conversions

When converting between volume and mass units, manufacturers must use the actual density of the specific plastic material being assessed. Theoretical or literature values may be used only when actual measurements are not available, and any such assumptions must be clearly documented in the EPD. This detailed approach to defining the declared unit ensures that EPDs developed using this PCR provide meaningful and comparable information about the environmental performance of different plastic materials.

### 3.4 Reference Flow Definition

The reference flow is defined at the factory gate, which represents the point at which the product leaves the producer's facility. This boundary definition is crucial for establishing the scope of the cradle-to-gate assessment and ensures consistency in system boundaries across different EPDs developed using this PCR.

For products that are sold in multiple packaging formats, manufacturers must apply a weighted average approach based on actual production volumes for each packaging type. This approach ensures that the declared unit accurately represents the average environmental impact of the product as it is typically supplied to the market. The weighting factors and calculation methodology must be clearly documented in the EPD to ensure transparency.

## 4.0 SYSTEM BOUNDARIES

### 4.1 Cradle-to-Gate Core Boundary

This PCR employs a cradle-to-gate assessment approach as its core boundary, encompassing all processes from raw material extraction through manufacturing until the product leaves the factory gate. This comprehensive boundary ensures that all significant environmental impacts associated with the production of plastics in primary forms are captured in the assessment.

- **Raw Material Extraction:** Extraction of fossil resources or biomass feed stocks
- **Material Processing:** Refining, cracking, polymerization processes
- **Manufacturing:** Compounding, additives incorporation, forming into primary forms
- **Factory Gate:** Product ready for distribution (system boundary endpoint)

The system boundaries include all material and energy inputs required for production, including but not limited to fossil resources, agricultural or forestry products (for bio-based plastics), chemical additives, catalysts, and auxiliary materials. Transportation of raw materials to the manufacturing facility is included, as are all manufacturing processes required to produce the plastic in its primary form. The assessment also encompasses all emissions to air, water, and soil associated with these processes, as well as the production and disposal of waste generated during manufacturing.

#### **4.2 Optional Gate-to-Grave Modules**

While the core assessment is cradle-to-gate, this PCR also provides guidance for optional modules that extend the assessment to include gate-to-grave impacts (use and end-of-life phases). These optional modules may be included in the EPD to provide a more comprehensive view of the environmental impacts throughout the product's full life cycle, though they must be clearly separated from the mandatory cradle-to-gate assessment.

#### **4.3 Cut Off Criteria**

Cut-off criteria have been established to ensure practical implementation while maintaining the integrity of the assessment. Processes or inputs that contribute less than 1% of the total mass input per unit process may be excluded, provided that their environmental relevance is negligible. However, the cumulative excluded mass must not exceed 5% of the total input. For energy inputs, a similar 1% threshold applies, based on the total energy input to the system. All known inputs and outputs for which data are available must be included, regardless of the cut-off criteria.

#### **4.4 Exclusion of Infrastructure**

Infrastructure (buildings, machinery, etc.) is generally excluded from the system boundaries unless it can be demonstrated that its inclusion would significantly affect the results. Capital equipment with a lifespan greater than three years may be excluded, but the rationale for any such exclusion must be clearly documented in the EPD.

### **5.0 LIFE CYCLE INVENTORY (LCI) ANALYSIS REQUIREMENTS**

The Life Cycle Inventory (LCI) analysis forms the foundation of the environmental assessment process. In accordance with ISO 14044:2006, this PCR establishes rigorous data collection procedures to ensure that the resulting inventory accurately reflects the environmental aspects of plastics production in primary forms. Manufacturers must compile comprehensive inventories of all material and energy inputs, as well as outputs including products, co-products, emissions, and waste.

#### **5.1 Primary Data Requirements**

- Mandatory for all manufacturing processes under the organization's control
- Minimum data collection period of 12 consecutive months
- Data must represent normal operating conditions
- Production volume covered by data must represent  $\geq 90\%$  of annual production

## 5.2 Secondary Data Requirements

- Acceptable for upstream processes not under direct control
- Must come from verified databases (e.g., GaBi, Ecoinvent, ILCD)
- Data sources must be documented and justified
- Age of secondary data should not exceed 10 years

## 5.3 Transportation and Energy Modelling

- Actual transportation distances and modes required
- Standard scenarios provided for cases with limited data
- Regional differences in transportation systems must be considered.

Energy inputs must be modeled using regional electricity grid mixes that accurately reflect the location of production. For production spanning multiple facilities or regions, a weighted average approach based on actual production volumes must be employed. The use of renewable energy must be documented with appropriate certificates or contracts to substantiate any claims regarding the energy source.

## 5.4 Allocation Procedures

Allocation procedures for multi-output processes must be clearly documented and follow the hierarchy established in ISO 14044:2006. Physical allocation (based on mass, energy content, or stoichiometric relationships) is preferred over economic allocation. System expansion may be used where appropriate, but the methodology and assumptions must be transparently documented. For recycled materials, the cut-off approach is recommended, where only the impacts associated with the recycling process itself are allocated to the recycled material.

## 5.5 Chemical Inputs and Hazardous Substances

For chemical inputs, a cradle-to-gate inventory must be established using either primary data from suppliers or secondary data from verified databases. Chemical substances classified as hazardous according to relevant regulations (e.g., GHS, CLP) must be explicitly identified in the inventory, though actual formulations may be kept confidential if necessary for proprietary reasons. Catalysts and other process chemicals that remain in the final product in trace amounts must be included in the inventory, regardless of concentration.

## 5.6 Water Use Inventory

Water use must be inventoried by source (e.g., surface water, groundwater, municipal supply) and quality (e.g., potable, industrial grade). Water outputs must be categorized by receiving body (e.g., surface water, municipal treatment) and quality parameters. The water balance should account for evaporative losses and water incorporated into the product. This detailed approach to LCI analysis ensures that EPDs developed using this PCR provide a comprehensive and accurate representation of the environmental aspects associated with plastic production.

## 6.0 LIFE CYCLE IMPACT ASSESSMENT (LCIA) CATEGORIES

The LCIA translates the inventory data into environmentally relevant information by assessing potential impacts across multiple environmental categories.

### 6.1 Required Impact Categories

This PCR requires the assessment and reporting of a comprehensive set of impact categories to ensure that EPDs provide a holistic view of the environmental performance of plastics in primary forms. Further indicators are to be declared and documented in accordance with EN 15804.

Impact Category	Unit of Measurement	Calculation Method
Global Warming Potential (GWP)	kg CO <sub>2</sub> equivalent	IPCC AR5, 100-year time horizon
Ozone Depletion Potential (ODP)	kg CFC-11 equivalent	WMO model, steady-state
Acidification Potential (AP)	kg SO <sub>2</sub> equivalent	Accumulated Exceedance
Eutrophication Potential (EP)	kg PO <sub>4</sub> equivalent	CML baseline
Photochemical Ozone Creation Potential (POCP)	kg C <sub>2</sub> H <sub>4</sub> equivalent	LOTOS-EUROS model
Abiotic Resource Depletion Potential - Elements	kg Sb equivalent	CML baseline
Abiotic Resource Depletion Potential - Fossil Fuels	MJ, net calorific value	CML baseline

### 6.2 Resource Use and Waste Indicators

In addition to these impact categories, manufacturers must report several resource use and waste generation metrics to provide a more complete picture of environmental performance. These include total primary energy consumption (renewable and non-renewable), water use, and waste generation by type (hazardous and non-hazardous).

### 6.3 Biogenic Carbon and Land Use Change

Global Warming Potential (GWP) must be calculated using the most recent IPCC Assessment Report factors available at the time of EPD development, with a 100-year time horizon. Separate reporting of biogenic carbon is required to provide transparency regarding the source of carbon emissions and removals. For plastics derived from biomass, the carbon uptake during biomass growth must be accounted for, along with emissions from land use change where relevant.

- **Mandatory Reporting:** All impact categories listed must be reported in the EPD without exception. Results must be presented per declared unit (1 kg of plastic in primary form).

## **6.4 Regional Adjustments and Sensitivity Analysis**

For certain impact categories (e.g., water scarcity), region-specific characterization factors must be applied to reflect local environmental conditions. For key parameters with high uncertainty or variability, sensitivity analysis is recommended to assess the robustness of the results.

The LCIA results must be presented in the EPD with a clear explanation of what each impact category represents and its environmental significance. This explanation should be accessible to non-expert readers while maintaining scientific accuracy. Comparison with industry benchmarks or previous versions of the same product is encouraged to provide context for the results, though direct comparisons with competing products should be avoided unless those products have been assessed using the same PCR and equivalent methodological choices.

## **7.0 REPORTING REQUIREMENTS**

Environmental Product Declarations (EPDs) developed using this PCR must adhere to strict reporting requirements to ensure transparency, comparability, and credibility. The EPD document serves as the primary communication vehicle for the environmental performance of plastic products and must therefore present information in a clear, comprehensive, and accessible manner that meets the needs of various stakeholders.

### **7.1 Mandatory EPD Content**

Every EPD must include the following sections:

- Product description and identification
- PCR identification and compliance statement
- Declared unit definition
- System boundaries diagram and description
- Detailed LCI results (resource use, emissions, waste)
- LCIA results for all required impact categories
- Data quality assessment and uncertainty analysis
- Verification statement and verifier credentials

### **7.2 Documentation and Assumption Transparency**

Supporting documentation must include:

- Detailed description of allocation procedures
- List of all assumptions and limitations
- Data sources for all primary and secondary data
- Calculation methodologies for derived values
- Sensitivity analysis for key parameters
- Description of manufacturing processes
- Disclosure of any data gaps and their treatment

The EPD must clearly identify the temporal, geographical, and technological scope of the assessment. For products manufactured at multiple facilities, the EPD must specify whether it represents a specific site or the weighted average of multiple sites. Any site-specific data must be clearly distinguished from industry-average data, and the representativeness of the data must be evaluated and reported.

All assumptions and limitations must be transparently documented in the EPD. This includes assumptions related to transportation distances, energy sources, allocation procedures, and end-of-life scenarios. Any gaps in data must be explicitly identified, along with the approach used to address these gaps. The EPD must also include a statement regarding the comprehensiveness of the impact assessment, acknowledging any known environmental impacts that are not covered by the selected impact categories.

### **7.3 Third Party Verification Statement**

Third-party verification is mandatory for all EPDs developed using this PCR. The verification must be conducted by an independent verifier who has not been involved in the LCA study or EPD development. The verifier must have demonstrated expertise in LCA methodology, relevant environmental issues, and the plastics industry. The verification statement must be included in the EPD, along with the name and credentials of the verifier.

### **7.4 Validity Period and Update Triggers**

The validity period for EPDs developed using this PCR is five years from the date of issue. At the end of this period, the EPD must be reviewed and updated if there have been significant changes in the product, manufacturing processes, or LCA methodology. Minor updates may be made during the validity period without requiring full re-verification, provided that these updates do not significantly affect the reported environmental performance. Any such updates must be clearly documented in a revision history included in the EPD.

## **8.0 DATA QUALITY REQUIREMENTS**

Ensuring high-quality data is fundamental to the credibility and reliability of Environmental Product Declarations. This PCR establishes comprehensive data quality requirements across multiple dimensions to guarantee that EPDs provide an accurate representation of the environmental performance of plastics in primary forms. Adherence to these requirements is essential for the development of robust and comparable EPDs.

### **8.1 Temporal Geographic and Technological Representativeness**

Primary data must be collected from a recent time period (not older than 3 years) and cover at least 12 consecutive months to account for seasonal variations.

Data must reflect the geographic region where production occurs, accounting for regional differences in energy systems, transportation infrastructure, and regulatory environments.

Data must accurately represent the specific technologies, production processes, and equipment used in manufacturing plastic products.

## **8.2 Completeness and Precision**

All relevant processes must be included with measured data preferred over calculated or estimated values, covering >95% of mass and energy flows.

## **8.3 Data Quality Assessment Matrix**

Data quality must be assessed and reported using a systematic approach. A data quality assessment matrix should be employed to evaluate each data source against the criteria of temporal representativeness, geographical representativeness, technological representativeness, precision, completeness, and consistency. This assessment should be conducted at both the process level and the overall LCA level to identify any areas where data quality might significantly impact the results.

For primary data, manufacturers must implement quality control procedures to ensure the accuracy and reliability of collected data. This includes cross-checks against mass and energy balances, comparison with historical data, and validation against industry benchmarks where available. Any anomalies or outliers in the data must be investigated and either corrected or justified if they represent actual variations in the production process.

## **8.4 Handling of Secondary Data**

For secondary data, manufacturers must select data sources that best match the geographic, technological, and temporal scope of their assessment. Preference should be given to data from peer-reviewed sources, established LCA databases, or industry associations. The selection of secondary data sources must be justified based on their relevance and quality. When multiple data sources are available for the same input or process, a sensitivity analysis should be conducted to assess the impact of the data choice on the overall results.

## **8.5 Uncertainty and Sensitivity Analysis**

Uncertainty analysis is required for key parameters that significantly influence the results. This analysis should quantify the uncertainty associated with these parameters and assess their impact on the reliability of the EPD results. At a minimum, uncertainty analysis should be conducted for parameters related to energy consumption, major raw material inputs, and emission factors for significant environmental impacts. The results of this analysis must be transparently reported in the EPD to provide stakeholders with a clear understanding of the robustness of the environmental performance claims.

## 9.0 VERIFICATION AND EPD DEVELOPMENT

Independent verification is a cornerstone of the EPD system, ensuring that environmental claims are credible, accurate, and based on sound methodology. This PCR establishes rigorous verification requirements to maintain the integrity of EPDs for plastics in primary forms and to build trust among stakeholders throughout the value chain.

EPD Content Requirements:

- Comprehensive product description
- Detailed environmental performance data
- Transparent documentation of methodology
- Clear identification of system boundaries
- Declaration of data quality and limitations

### 9.1 Verifier Qualifications

- Demonstrated expertise in LCA methodology (ISO 14040/44)
- Knowledge of relevant environmental issues in the plastics industry
- Independence from the organization commissioning the EPD
- Recognition by an accredited program operator
- Minimum of five years of professional experience in environmental assessment

### 9.2 Verification Process

- Review of LCA methodology and calculations
- Assessment of data quality and representativeness
- Validation of impact assessment methods
- Confirmation of compliance with PCR requirements
- Evaluation of clarity and transparency in reporting

### 9.3 Critical Review Requirements

The verification process must follow a critical review approach as defined in ISO 14040/14044. This includes an examination of whether the LCA methods are consistent with international standards, whether the methods used are scientifically and technically valid, whether the data used are appropriate and reasonable in relation to the goal of the study, whether the interpretations reflect the limitations identified, and whether the study report is transparent and consistent.

EPD development follows a structured process that begins with the definition of goals and scope, proceeds through data collection and impact assessment, and culminates in the preparation of the EPD document. Throughout this process, manufacturers must maintain detailed documentation to support the verification process. This documentation includes raw data, calculation spreadsheets, assumptions and justifications, data quality assessments, and any supporting studies or references.

## **9.4 Claims Limitations and Comparative Assertions**

Claims limitations are an important aspect of EPD development and use. Manufacturers must adhere to strict guidelines regarding the claims that can be made based on an EPD. Comparative assertions between different products are only permitted when the products have been assessed using the same PCR and equivalent methodological choices. Even then, such comparisons must acknowledge any differences in data quality, system boundaries, or assumptions that might affect the comparison. Claims regarding overall environmental superiority or sustainability must be avoided, as EPDs provide information on specific environmental impacts rather than comprehensive sustainability assessments.

## **9.5 Publication and Confidentiality Procedures**

Registration and publication procedures ensure that verified EPDs are accessible to interested stakeholders. EPDs must be registered with an accredited program operator who maintains a public registry of all published EPDs. The program operator is responsible for ensuring that the EPD meets all formal requirements before publication. Once published, the EPD becomes a public document that can be accessed by customers, regulators, researchers, and other interested parties. However, confidentiality protocols must be established to protect proprietary information while maintaining transparency in the environmental assessment. This balance between transparency and confidentiality is essential for encouraging broad participation in the EPD system while protecting legitimate business interests.

## **10.0 SPECIFIC METHODOLOGICAL CONSIDERATIONS**

This section addresses specialized methodological considerations that are particularly relevant to the environmental assessment of plastics in primary forms. These considerations ensure that EPDs accurately reflect the unique characteristics and environmental challenges associated with plastic materials and their production processes.

### **10.1 Biogenic Carbon Accounting for Bio-Based Plastics**

For bio-based plastics, biogenic carbon uptake during biomass growth and subsequent release during product life cycle must be accounted for separately from fossil carbon. The assessment must follow a transparent approach that distinguishes between:

- Carbon uptake during biomass growth
- Carbon storage in the product
- Carbon emissions during manufacturing
- End-of-life carbon emissions

Land use change impacts must be included when the production of biomass feedstock results in direct land use change. Indirect land use change may be reported separately as additional environmental information.

## 10.2 Recycled Content Approach

The calculation of recycled content must follow the ISO 14021 definition and be based on actual mass balance data. The environmental benefits of using recycled content should be reflected in the LCI through the application of the cut-off approach, where:

- Primary materials carry all environmental impacts until they are delivered to the recycling facility
- Recycled materials carry only impacts from the recycling process onwards
- The recycled content percentage must be documented with appropriate evidence

When recycled content varies over time, a conservative approach based on a minimum guaranteed percentage should be used.

## 10.3 End-Of-Life Scenarios For Gate-To-Grave Modules

End-of-life scenarios and assumptions represent a critical aspect of plastic product assessment, particularly for optional gate-to-grave modules. When included, these scenarios must be based on current typical practices in the relevant geographical region. For plastics, standardized end-of-life scenarios should include:

- Mechanical recycling (with specified recovery rates based on current infrastructure)
- Chemical recycling (where technologically feasible for the specific polymer type)
- Energy recovery through incineration (with efficiency factors for energy recovery)
- Landfill disposal (with considerations for degradation and methane generation)
- Environmental leakage (based on current estimates for the relevant region and application)

## 10.4 Packaging Impact Allocation

Packaging impact allocation guidance is particularly important for plastics in primary forms, as these materials are typically delivered in various packaging formats. The environmental impacts associated with packaging must be allocated to the product based on the specific packaging used. For multi-use packaging (e.g., returnable containers), the impacts should be allocated based on the average number of use cycles. The end-of-life treatment of packaging must also be considered based on typical waste management practices in the market where the product is sold.

## 10.5 Chemical Inputs Categorization

Additives, catalysts, and processing aids must be categorized according to their function and environmental relevance. Chemical inputs categorization guidelines establish a standardized approach for classifying and assessing the diverse range of chemicals used in plastic production. Additives that remain in the final product (e.g., plasticizers, flame retardants, stabilizers) must be included in the inventory regardless of concentration, as these can have significant environmental implications during the product's life cycle. Process chemicals that are consumed or transformed during manufacturing (e.g., catalysts, initiators, solvents) must be accounted for based on their actual consumption rates. For proprietary formulations, generic data may be used provided that it reasonably represents the environmental profile of the actual chemicals used.

## 10.6 Transportation Scenarios and Energy Modelling

Standardized transportation distances and modes for raw materials, finished products, and waste when specific data is unavailable. Detailed guidance for modeling energy consumption, including treatment of renewable energy and combined heat and power systems.

## 11.0 APPENDICES

This section provides comprehensive references to the standards, methodologies, and data sources that form the foundation of this PCR. These references serve as essential resources for manufacturers, verifiers, and other stakeholders involved in the development and use of EPDs for plastics in primary forms.

### 11.1 ISO Standards and Industry Methodologies

The PCR is built upon internationally recognized standards that ensure consistency and credibility in environmental assessment and communication. The relevant ISO standards form the methodological backbone of this PCR and include:

- **ISO 14025:2006** - Environmental labels and declarations 4 Type III environmental declarations 4 Principles and procedures
- **ISO 14040:2006** - Environmental management 4 Life cycle assessment 4 Principles and framework
- **ISO 14044:2006** - Environmental management 4 Life cycle assessment 4 Requirements and guidelines
- **ISO 14021:2016** - Environmental labels and declarations 4 Self-declared environmental claims (Type II environmental labelling)
- **ISO 472:2013** - Plastics 4 Vocabulary
- **ISO 14067:2018** - Greenhouse gases 4 Carbon footprint of products 4 Requirements and guidelines for quantification

Industry-specific standards and methodologies complement the ISO framework by providing sector-relevant guidance for environmental assessment. These include the Plastics Europe Eco-profiles methodology, the American Chemistry Council's Life Cycle Assessment guidelines, and the World Business Council for Sustainable Development's Chemical Sector guidance for accounting and reporting corporate GHG emissions.

### 11.2 Approved Secondary Data Sources

Approved secondary data sources and databases provide consistent background data for processes not directly controlled by manufacturers. These include widely recognized LCA databases such as Ecoinvent, GaBi, ELCD, and the US Life Cycle Inventory Database. Sector-specific databases from industry associations like Plastics Europe and the Association of Plastics Manufacturers also provide valuable data specific to plastic materials and production processes.

### 11.3 Calculation Examples and Case Study

Practical examples demonstrate how to apply the PCR methodology to typical plastic production scenarios. The appendices include practical resources to support the implementation of this PCR, such as calculation examples that demonstrate how to apply the methodology to typical plastic production scenarios. Case studies illustrate best practices in data collection, allocation procedures, and reporting.

### 11.4 Glossary of Terms

A comprehensive glossary defines technical terms used throughout the PCR to ensure consistent interpretation, while contact information for the PCR administrator provides a resource for stakeholders seeking clarification or guidance. The revision history tracks changes to the PCR over time, ensuring transparency in the evolution of the methodology. These comprehensive references and appendices ensure that stakeholders have the necessary resources to develop high-quality, consistent EPDs for plastics in primary forms.

## 12.0 SUMMARY AND REFERENCES

PCR for Chemical Products provide a robust framework for assessing and communicating the environmental performance of plastic products throughout their life cycle. By establishing consistent methodologies, system boundaries, calculation rules, and reporting requirements, these PCRs enable credible environmental claims that facilitate market transparency and fair comparisons between products with equivalent functions.

The environmental assessment of plastic products presents unique challenges due to complex production processes, diverse applications, and potential impacts across multiple environmental categories. These PCRs address these challenges through specific guidance on allocation methods for multi-output processes, content declaration requirements that balance transparency with business confidentiality and comprehensive environmental indicators that capture the most relevant impact categories for plastic products.

By following these PCRs, plastic manufacturers can develop Environmental Product Declarations that provide valuable information to customers, regulators, and other stakeholders. These EPDs support informed decision-making in procurement, product development, and policy formulation, driving continuous improvement in the environmental performance of the plastic industry. The standardized approach also reduces the burden on manufacturers by establishing clear rules that streamline the assessment process and avoid duplicative efforts.

- **References:** For the latest PCRs and updates, visit [www.climateintell.com](http://www.climateintell.com) and ISO 14025, ISO 14040/44, and the International Climate Intelligence System General Program Instructions and EN 15804.

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