



Principles for the Advanced Recycling of Plastics Using a Mass Balance Approach

Introduction

Plastic waste is seen as a critical issue by the plastics industry and a majority of Americans. America's Plastic Makers have established ambitious circular economy goals to help end plastic waste and use less virgin resources, and consumers are eager for bold and meaningful solutions to the plastics waste challenge. Advanced recycling, which breaks plastics down back into their chemical building blocks, is becoming an essential part of the solution, but must be supported by a credible tracking mechanism, such as a mass balance chain of custody system and certification that inspires consumer trust. Accelerating the growth of advanced recycling through "mass balance" will result in more difficult to recycle plastic being diverted from landfill and will incentivize a lower carbon path to produce plastics, as well as displacement of virgin resources in chemicals manufacturing.

Mass balance is a chain of custody system with a long track record used by many industries such as forestry, renewable energy, cocoa and aluminum, to track the attribution of recycled, renewable or sustainable origin products in complex manufacturing and distribution systems where products with different characteristics are blended and physical segregation is impractical. For example, mass balance in the forestry sector supports consumer trust in the certification of forest stewardship they see on wood product labels. Similarly, solar and wind power consumers rely on mass balance certification to support confidence that the electricity system is delivering renewable energy and sustainability claims are credible.

This same principle applies to advanced recycling. Mass balance certification reporting helps confirm that the used plastic inputs to the advanced recycling system are accounted for accurately, and the output from this system can be certified as being derived from used plastics. Various, international certification programs provide rigorous, audited frameworks that incorporate mass balance for advanced recycling. With mass balance, existing assets can be modified to incorporate used plastics as a feedstock and transfer credits between existing manufacturing facilities, thus eliminating the need for duplicate infrastructure and reducing the carbon footprint associated with transporting end products between facilities.

Reliable and transparent mass balance bookkeeping is critical to integrating advanced recycling outputs into existing, world scale chemical manufacturing infrastructure to rapidly scale advanced recycling solutions. Co-processing recycled material together with virgin raw materials in existing facilities and processes will help reduce infrastructure investment, accelerate industry scale up and reduce GHG emissions associated with physical transport. Global alignment in approach, terminology, requirements, and guidance on the application and certification of mass balance will help scale advanced recycling to expand the scope and volume of plastics recycling.

The American Chemistry Council offers the following, updated mass balance principles for advanced recycling to guide standards organizations and policymakers as they help advanced recycling grow to scale.

Core Principles

The following set of principles builds on ACC's initial [Mass Balance Certification Principles for Advanced Recycling](#) and helps support responsible utilization of advanced recycling along the plastics value chain.

Operations and Process

1. **Mass balance for advanced recycling:** An internationally recognized certified mass balance system for advanced recycling processes will support the credibility of circularity claims for advanced recycling outputs.
2. **Attribution:** The calculated amount of mass balance recycled material can be attributed or allocated to any final and/or intermediate products within the mass balance system so long as that material can be physically produced within the system. This allows the impact of the recycling to flow where it is most valued by society.
3. **Yield:** The system yield (i.e. operating efficiency or conversion factor) of the advanced recycling process should be calculated based on the plastic feedstock (inputs) and the amount of usable or saleable product resulting from the process (outputs) within the mass balance system boundary.

Chain of Custody

4. **Mass balance system boundary:** The manufacturing and processing site(s), entity, and time boundaries for the certified mass balance system must be clearly defined in advance to support transparent reporting or certified claims.
5. **Multi-site mass balance:** The boundary of a certified mass balance system can accommodate multiple manufacturing and processing configurations including continuous processes, multiple inputs within a single site, integrated processing sites, or between multiple, disconnected sites of a corporation, partnership, joint venture, affiliate, or other legal entity capable of manufacturing the end-product to which the credit is being assigned.
6. **Credit transfers:** A certified mass balance system should accommodate credit transfers between multiple sites on a "like-for-like" product basis. Mass balance systems do not accommodate a market for buying and selling credits independent of product-related transactions.

Compliance

7. **Third-party verification:** The credibility of mass balance chain of custody claims should be supported by internationally recognized, auditable, and transparent independent third-party verification.
8. **Public Policy:** Regulations and policy to support and steward advanced recycling should be aligned between jurisdictions and levels of government.