



Overview

Plastics play a significant role in modern society, with applications in healthcare, food safety, transportation, energy, and consumer goods. Many plastic products, however, are not readily recyclable using conventional mechanical processes due to factors such as material complexity, contamination, or degradation. As a result, most waste is managed through disposal pathways such as landfilling or incineration.

Advanced recycling technologies have emerged as an important complement to traditional recycling systems, enabling the recovery of materials that would otherwise be rejected by **mechanical recycling** facilities. Coupled with mechanical recycling, the method of shredding, melting, and forming used plastic into new plastic pellets that can be made into new products, advanced recycling would better address the plastic waste problem. This Basic will provide a broad overview of advanced recycling technology, its current and future market opportunities, and legislative interest and potential to modernize recycling frameworks and definitions.

Advanced Recycling Technology

Advanced recycling uses chemical or molecular processes to break plastics down into their molecular building blocks. These outputs can be purified and used as feedstock for manufacturing new products, such as plastics and fuels. By operating at the molecular level, advanced recycling expands the range of plastics that can be recycled and produces materials that match the quality of those made from newly extracted resources, known as **virgin raw materials**.

Advanced recycling is often misunderstood, despite being commercially deployed and extensively regulated. Some critics question whether advanced recycling constitutes “real” recycling or whether it is adequately regulated. Advanced recycling advocates argue that these claims overlook both the robust oversight governing these facilities and the reality that plastic waste is converted into new raw materials for productive use.

Facilities operating in the United States are subject to federal and state environmental requirements, including oversight under the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act. Importantly, advanced recycling is distinct from incineration: plastics are not burned for disposal but are chemically or thermally converted into usable raw materials through

Center Forward Basics

Center Forward brings together members of Congress, not-for-profits, academic experts, trade associations, corporations and unions to find common ground. Our mission: to give centrist allies the information they need to craft common sense solutions, and provide those allies the support they need to turn those ideas into results.

In order to meet our challenges we need to put aside the partisan bickering that has gridlocked Washington and come together to find common sense solutions.

For more information, please visit www.center-forward.org

Key Definitions:

- **Mechanical recycling:** The process of recovering and reprocessing plastic waste into new materials without altering the chemical structure of the polymers. As opposed to chemical recycling, which breaks down plastics into their basic chemical constituents, mechanical recycling aims to retain the original polymer chains.
- **Virgin raw materials:** Any material extracted directly from nature without processing. Examples include timber, coal, natural gas, and metal ores.

controlled, engineered processes designed to minimize environmental releases.

To enable this technology at scale, a **mass balance accounting** method to account for mixed inputs as they move along the value chain could be used to credibly attribute recycled content through third-party certification. By allowing recycled and conventional feedstocks to be processed together, mass balance systems reflect real-world manufacturing practices and facilitate broader adoption of certified circular materials.

Advanced Recycling Market

Decades of innovation in refining and chemical processing underpin advanced recycling technologies. The scale of current and planned investment underscores the technology's viability. The U.S. manufacturing sector has announced more than 40 advanced recycling projects, representing over \$7 billion in capital investment and the potential to divert nearly 21 billion pounds of plastic waste annually from landfills and other **end-of-life pathways**.

These facilities are intended to process large volumes of plastic waste that would otherwise be managed through alternative end-of-life pathways, such as incineration or landfills. These systems can handle a wider range of plastic inputs than mechanical recycling, including materials that are difficult to sort or are contaminated, thereby capturing value from waste streams that would otherwise be lost.

By keeping valuable carbon resources in productive use, advanced recycling also contributes to a more circular economy. For every ton of certified circular plastics produced, more than a ton of plastic waste is diverted from landfill or incineration.

Challenges and Opportunities

The evolution of policy in the United States has developed at different paces and different levels. State and local governments have adopted a patchwork of definitions, labeling rules, and regulatory classifications governing recycling and recycled content. This fragmented approach creates uncertainty for manufacturers, recyclers, and brand owners operating across multiple jurisdictions while confusing consumers about what qualifies as recyclable material and recycled content.

There is a growing appetite across industries for adopting clearer, technology-neutral recycling definitions. Groups like The Recycling Leadership Council (RLC), which includes participants from the manufacturing, packaging, and recycling sectors, have a goal to “expand circularity, strengthen transparency and consumer confidence, and enable existing and new recycling technologies to work together to recover more materials, support U.S. manufacturing, and reduce waste.” These groups advocate for modernizing federal recycling policy by adopting clear, inclusive definitions that reflect today's technologies and supply chains. They believe clear definitions would recognize the full spectrum of recycling technologies while maintaining rigor and transparency through certification and accounting standards. The bipartisan introduction of the Recycled Materials Attribution Act (RMAA) occurred in February 2026, which would establish federal standards for recycling and recycled content marketing claims.

As recycling technologies and manufacturing practices continue to evolve, these topics remain part of broader conversations

- **Mass balance accounting:** An accounting approach that allows the manufacturing supply chain to mix sustainable materials with conventional materials using existing infrastructure. The mass balance approach is also cost-effective as it allows the mixing and co-processing of conventional and sustainable resources in the same facility rather than building new plants.
- **End-of-life pathways:** The planned, systematic sequence of actions designated for a product or material once it is no longer usable for its original purpose. These pathways prioritize resource recovery methods such as repair, reuse, refurbishment, recycling, or safe disposal, moving away from linear landfilling.

among policymakers, regulators, industry participants, and other stakeholders.

Discussions related to recycling definitions and technologies address several areas, including:

- Consistency of definitions across federal, state, and local programs
- Classification of recycling technologies and processes
- Methods for measuring and verifying recycled content
- Clarity of recycling claims for consumers

Advanced recycling can be an effective and complementary solution to mechanical recycling, enabling the recovery of plastic materials that would otherwise be lost to landfilling or incineration. Backed by decades of chemical processing expertise, growing private investment, and strong environmental oversight, these technologies are contributing to more circular supply chains and domestic manufacturing. As demand for recycled materials continues to grow, aligning federal and state policies around clear, technology-neutral recycling definitions could help increase recycling rates. Updating federal definitions could provide greater consistency, reduce regulatory friction, and ensure that innovation is supported rather than constrained by outdated or inconsistent rules.

Links to Other Resources

- America's Plastic Makers – [What is Advanced Recycling?](#)
- American Chemistry Council – [Advanced Recycling](#)
- Closed Loop Partners – [Advancing Recycling's Role in a Circular Economy](#)
- Congress.gov – [H.R.7502, the Recycled Materials Attribution Act \(RMAA\)](#)
- Consumer Brands Association – [What is Advanced/Molecular Recycling?](#)
- Government Accountability Office – [Science & Tech Spotlight: Advanced Plastic Recycling](#)