



RECYCLING IS REAL

ADVANCED RECYCLING: REDUCING PLASTIC WASTE, CUTTING EMISSIONS, GROWING ECONOMIES

Plastics are highly valuable materials that play an important role in the modern economy. They offer increased sustainability benefits compared to alternative materials and will continue to play an essential role in helping society mitigate greenhouse gas emissions.

As we move toward a circular economy, there is a growing demand to increase plastic recycling as well as recycled content in products. **Advanced recycling is a necessary and essential complement** to mechanical recycling to ensure that plastics stay **out of the environment**, while also creating **new products** and **economic growth opportunities** that benefit society.

What is Advanced Recycling?

Advanced recycling, also known as chemical, molecular, tertiary or feedstock recycling, encompasses technology that converts plastics into a purified form or a feedstock that can be used in the production of new polymers, monomers, intermediates, or other materials.

How does Advanced Recycling work?

While mechanical recycling uses physical processes such as grinding, washing, separating, and compounding (through which polymers remain intact), advanced recycling typically alters the chemical structure of plastics, through methods such as dissolving with chemicals or using heat to break them down into original components. Advanced recycling produces materials that are indistinguishable from virgin plastic so they can be used to make a wide range of new products.

Advanced recycling is typically grouped into three categories: purification, depolymerization, and conversion.

Purification



Yogurt cups and takeout containers



Auto bumpers and engine wiring clips

Purification uses solvents to separate plastic polymers from additives, coloring, odor, and other resins, without breaking down the polymers. The resulting materials can then be used to make new plastic products. Purification is the most successful when processing single types of plastic waste.

Depolymerization



Colored bottles



Clear PET bottle

Depolymerization uses chemicals, instead of heat, to break plastics down into their original monomers, which can then be used to make new plastic products. This technology is best used for similar types of plastic as opposed to mixed plastic waste.

Conversion



Mixed materials



Durable plastic products

Conversion uses heat to break plastics down to their most basic building blocks, which can be used as raw materials for new plastic products or other materials. Pyrolysis and gasification are two examples of technologies that use thermal conversion to produce recycled plastic similar to virgin plastic. These types of advanced recycling can process more complex mixtures of plastic and yield the same high-quality recycled polymers.

More than one million Americans work in jobs directly or indirectly connected to the plastics industry, spanning a wide range of sectors. From the engineers who design the machinery that manufactures essential plastic products, to the material suppliers distributing raw plastics, to the processors shaping materials into goods, and the recyclers giving used plastic a second life, the plastics supply chain is a vital aspect within both the U.S. and global economy.



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Environmental Benefits

In addition to diverting plastics from landfills and ensuring that plastics stay out of the environment, advanced technologies are more environmentally beneficial than producing virgin plastic from fossil fuels. According to a 2021 report from investment firm, [Closed Loop Partners](#), purification, depolymerization (decomposition), and conversion technologies require less energy, use less water, and emit fewer greenhouse gases compared to the production of virgin plastics. These technologies can also help mitigate climate change by displacing the use of virgin plastics and keeping valuable materials in circularity.

Economic Opportunity

In a 2021 report from [Closed Loop Partners](#) found that advanced recycling could yield up to **\$970 million** in potential revenue based on demand for advanced recycling products and could double the amount of plastic packaging recycled in 2019. The development of advanced plastic recycling and recovery facilities also has the potential to support nearly **40,000** new jobs in the United States alone. Major brands already buying or committed to using products from advanced recycling include Gatorade, H&M, L'Oréal, Procter & Gamble, PepsiCo, and Unilever. In recent years, several industry members have also announced new investments in [advanced recycling facilities](#), like Exxon's expanded capacity in Texas, to ensure that all plastic can and is recycled.

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