

# Frequently Asked Questions about Advanced Recycling

## ***What is advanced recycling?***

Advanced plastics recycling, also called chemical recycling, refers to [several different technologies](#) that **convert post-use plastics into their original building blocks**, to produce new plastics, chemicals, and other valuable products.

## ***What makes it “advanced”?***

Advanced recycling (AR) enables our ability to remake the “hard-to-recycle” plastics often missed in mechanical recycling. Advanced recycling facilities typically use pyrolysis or gasification, technologies that are deployed in other industries. Both technologies heat used plastics in a low/no oxygen environment, which breaks down the solid material into liquid or gaseous raw materials that can be used to remake plastics or products for other industries.

## ***What are the benefits of advanced recycling?***

Advanced recycling helps us **decrease plastic waste**. It supports continued **progress toward zero waste and sustainability goals** for communities and states. And it enables us to **turn more plastics into a wide variety of new products**—including highly regulated applications such as food-grade packaging—instead of landfilling them.

## ***How are advanced recycling facilities regulated?***

Advanced recycling facilities are subject to the Clean Air Act under sections 111 and 112, the Clean Water Act, and state and local authorities. They also need to obtain operating permits from the states and continue to monitor and report various air emissions as they operate. AR facilities would also be subject to fines and closure for any operational and product safety violations. State environmental officials have the tools they need to properly regulate the facilities.

## ***Are there significant emissions or byproducts created during advanced recycling?***

A [2021 report](#) from Good Company, a sustainability consulting firm, found that emissions at typical AR facilities are about equal to or lower than those from similar facilities such as food or auto making and institutions such as hospitals and colleges.

## ***How does advanced recycling affect climate change?***

Advanced recycling allows us to reuse materials that otherwise would go to waste and can also **help reduce CO2 emissions** during the production process.

A [2022 report](#) by the City College of New York’s Grove School of Engineering found significant environmental benefits of advanced recycling:

- Advanced recycling technologies produce plastic and chemical products with reduced global warming potential compared to products made from virgin resources, and
- Advanced recycling can reduce fossil energy use by up to 97 percent compared to landfilling.

Another [2022 study](#) by the Consumer Goods Forum shows that pyrolysis and related chemical recycling technologies yield lower CO<sub>2</sub> equivalent emissions compared to primary virgin naphtha production in most scenarios.

***Isn't advanced recycling just burning plastics?***

**Plastics are not burned during advanced recycling.** AR technologies often use thermal energy (heat), but take place in the absence of oxygen, so there is no combustion. Advanced recycling is a manufacturing process: raw materials (used plastics) are processed to make new products (plastics, chemicals, fuels, etc.).

***Is advanced recycling economical?***

A [2019 report](#) by the Closed Loop Partners, a N.Y.-based investment firm, estimated that there is a **\$120 billion-dollar economic opportunity** directly connected to the commercialization of advanced recycling technologies.

Additionally, since 2018, nearly 40 U.S. based advanced recycling projects have been announced, totaling over \$6 billion in announced investments. Once operating at commercial capacity, these projects have the potential to divert over 7 million metric tons (~15 billion pounds) of waste from landfills and the environment.

***What's the difference between traditional recycling and advanced recycling? Will advanced recycling replace traditional recycling?***

**Mechanical and advanced recycling are complementary approaches:** mechanical recycling works well for plastics such as beverage bottles and milk jugs, while advanced recycling works well for plastics that are difficult to sort and process mechanically, like flexible pouches. AR helps increase the amount and variety of plastics that can be recycled instead of landfilled.

Mechanical, or traditional, recycling typically uses technologies that retain the plastic's original molecular structure. AR typically alters the chemical makeup of used plastics, either by dissolving the plastic with chemicals or using heat to break down plastics into their original components.

***What are some present-day real-world examples of advanced recycling?***

Today, leading plastic and packaging manufacturers are partnering with multinational brand companies and advanced recycling technology providers to produce **new plastic packaging made from used plastics**:

- [Nalgene](#) bottles
- [Tupperware](#)
- [Wendy's](#) drink cups
- [Herbal Essences](#) shampoo/conditioner bottles
- [Warby Parker](#) eyeglass frames
- [McDonald's](#) drink cups
- [Mattel](#) playsets
- [Ethicon](#) medical device packaging
- [Woofsome](#) pet food pouches

Advanced recycling is also used in other industries, such as building and construction. For example, [GreenMantra Technologies](#) uses advanced recycling to create industrial waxes that are used as **performance enhancers in asphalt roofing and roads, and composite lumber**.

***Who are the customers for the products of advanced recycling?***

Companies already purchasing the products of advanced recycling or have announced agreements to do so include BP, Gatorade, H&M, L'Oréal, Procter & Gamble, PepsiCo, Unilever, and more. Many of these companies have set goals to use more recycled content in their plastic packaging. Using recycled plastic generated through advanced recycling will help these companies meet their goals.

In addition, some companies are integrating these products and processes into their manufacturing and supply chains, such as Americas Styrenics, BASF, Dow, Eastman, LyondellBasell, and SABIC. These companies can take the original building blocks generated through advanced recycling and use them to create new, high-quality plastics, in lieu of virgin plastic from fossil-based sources.

***Are policymakers interested in advanced recycling?***

Policymakers are eager for solutions. As of December 2022, **21 states have passed laws to regulate advanced recycling facilities as manufacturing** – not solid waste facilities, as some states still do. These modernized regulations can help scale advanced recycling and accelerate a circular economy for plastics.