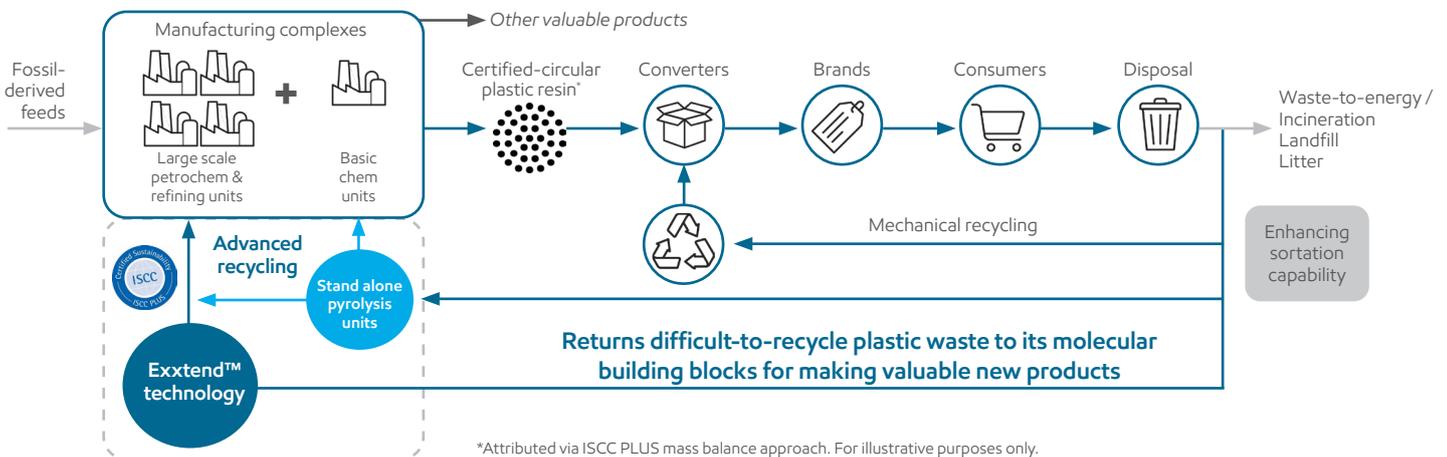




Advanced recycling can help unlock value from a broader range of plastic waste

Exxtend™ technology for advanced recycling breaks down plastics that can be more difficult to recycle through mechanical methods, increasing the range of plastics that can be used as feedstock for new products and helping to divert plastics from landfills and incineration.

Exxtend technology aims to accelerate progress towards a more circular economy



The Challenge

In pursuit of plastic circularity goals, manufacturers of plastic goods are looking for more ways to support the collection and diversion of plastic waste from landfills and incineration. Mechanical recycling breaks down material into pellets or shreds, which are then melted or mixed with other components to create new plastic products. The practice contributes to the circular economy, which seeks to create value from used materials, instead of disposing of them once they have reached their conventional end of life.

Mechanical recycling will continue to play a role in the circular economy, but it has limits. Not all components of plastic products can be easily separated by physical

processes, which involve sorting, separating, and breaking down plastics based on specific polymer streams. And, because polymer performance declines through the mechanical recycling process, these materials can have lower performance than plastics made from virgin feedstock. That degradation and difficulty involved in removing some contaminants can prevent the use of products made from recycled plastic in sensitive applications such as food packaging and medical supplies. The challenge is to convert mixed plastic waste into raw materials with quality equivalent to raw materials made from virgin feedstock.

| | Mechanical recycling | Exxtend™ technology |
|--------------------------|--|---|
| Feed | Typically limited to cleaner single-polymer feeds | Can use mixed-polymer, more difficult to mechanically recycle feeds ¹ |
| Polymer performance | Degraded quality with each cycle, often downcycled | Virgin-quality polymer performance and processability |
| Greenhouse gas footprint | GHG emissions advantage compared to advanced recycling | Exxtend technology for advanced recycling results in lower GHG emissions when processing plastic waste than when processing the same amount of fossil-based feedstocks ² |
| Scaleability | Leverages regional-scale infrastructure | Leverages existing world-scale infrastructure |

1 For example, mixed polyolefins with limited amounts of PET or PS

2 According to a cradle-to-gate carbon footprint assessment of ExxonMobil's Exxtend™ technology completed in June 2022 by Sphera, a leading sustainability consulting group for life cycle assessments, every 1,000 tons of waste plastics processed results in 185-525 tons CO2e (19-49%) lower GHG emissions than processing the same amount of fossil-based feedstock.
<https://www.exxonmobilchemical.com/en/exxonmobil-chemical/sustainability/advanced-recycling-technology/carbon>

A Solution

With ExxonMobil's Exxtend technology for advanced recycling, we can take a powerful step forward in addressing plastic waste. The technology uses manufacturing processes to break down difficult-to-recycle plastics to the molecular level for reformulation into new products that are useful to society. With the ability to break down complex, layered material and remove contaminants, Exxtend technology helps unlock value in materials that otherwise would have been disposed of as waste in landfills or incinerated.

The Benefits

Exxtend technology for advanced recycling challenges former limits to plastics circularity by helping to expand the types of plastic waste that can be converted to valuable use. The process has been audited and certified through the International Sustainability and Carbon Certification (ISCC) PLUS program and leverages mass balance attribution of plastic waste to support the sale of certified-circular polymers. ExxonMobil has received ISCC PLUS certification at several facilities worldwide.

| Material type | Single-stream plastics recovered for mechanical recycling ^{1,2,3} | Mixed plastics desirable for Exxtend technology ⁴ | |
|---------------|--|--|------------------|
| 1 PET | ● | ● | ● Best fit |
| 2 HDPE | ● | ● | ● Moderate fit |
| 3 PVC | ● | ● | ● Challenged fit |
| 4 LDPE | ● | ● | |
| 5 PP | ● | ● | |
| 6 PS | ● | ● | |
| 7 | ● | ● | |

1 Recyclable in communities with programs and facilities in place that collect and recycle the resulting product

2 Plastics Recyclers Europe: PET Market in Europe: State of Play – Production, Collection and Recycling Data 2018

3 Prepared for ACC by More Recycling, US PCR 2020

4 Based on ExxonMobil analysis of its Exxtend™ technology for advanced recycling

Contact your ExxonMobil representative for more information about Exxtend technology for advanced recycling.



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