Recycling technology

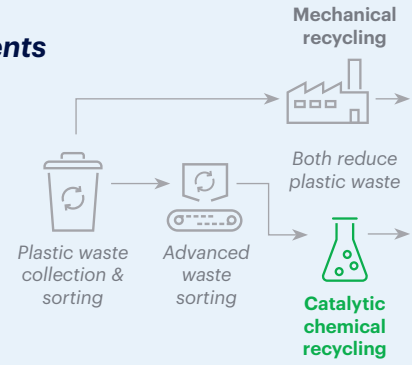
Catalytic chemical recycling

For highly mixed and hard-to-recycle pre-sorted post-consumer waste

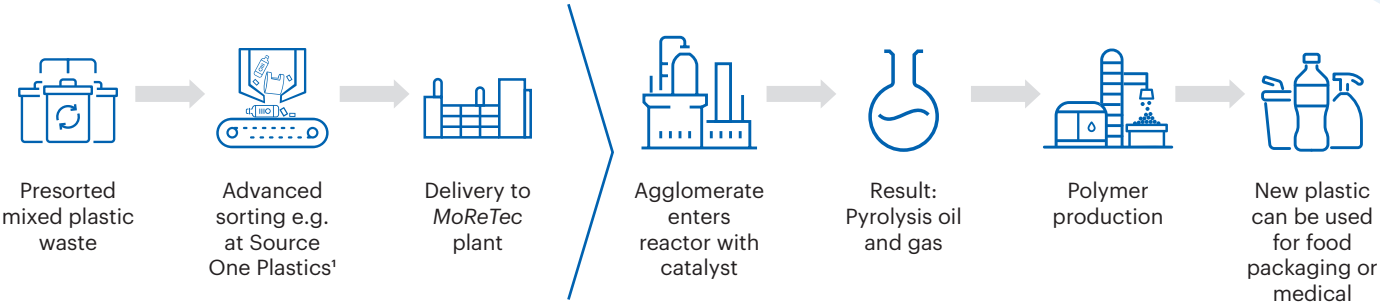
What is it?	Chemical process to decompose polymers back to the molecular level
Applications	New plastic materials for various applications, including medical and food packaging

Imagine if your bag of chips could be recycled and turned into ingredients to make new products like packaging for deli meats and cheeses.

With our catalytic chemical recycling technology *MoReTec*, pre-sorted mixed plastic waste is broken down into its basic ingredients – creating oil and gas feedstocks. Our booster-like catalyst helps us get more useable material from plastic waste while keeping process energy consumption low. These oil and gas materials can be used to make new polymers that can be used in food packaging or medical products like syringes or infusion bags. Another benefit: Our *MoReTec* plant can be operated with renewable energy.



How it works



Benefits

- More than 80% of the input plastic waste can be turned into usable products, depending on the quality of the feedstock.[2]
- 50%: Lower carbon footprint compared to fossil-based processes.[3]
- Unique process design allows for electrical heating of the process with the potential to be powered by renewable energy.

Facts

- LYB began its journey in 2018 and has gained extensive experience with its semi-industrial scale *MoReTec* pilot plant in Ferrara, Italy, which has been in operation since 2020.
- Our commercial-scale catalytic chemical recycling plant in Wesseling is expected to have an annual capacity of 50,000 metric tons per year. It is designed to recycle the amount of plastic packaging waste generated by over 1.2 million German citizens per year into valuable raw materials to make new products.
- LYB has been selected to receive a €40 million grant from the European Union (EU) Innovation Fund to support our *MoReTec* plant in Wesseling, Germany. This plant is one of the 41 projects selected in the EU Innovation Fund 'Third Call for Large Scale Projects.' [4]

Funded by the European Union
Emissions Trading System
Innovation Fund

1: Source One Plastics is a joint venture of LYB and 23 Oaks Investments formed in October 2022.

2: Also known as "yield", which is defined as the percentage of waste plastic (with >85% polyolefin feed) converted into usable products (pyrolysis oil and gas).

3: Feedstocks produced via the *MoReTec* process (pyrolysis oil and gas) displace fossil-based feedstocks in the olefins cracking process; the stated carbon footprint reduction is based on a comparison of Life Cycle Assessment (LCA) results for (1) pyrolysis oil and gas produced by the *MoReTec* technology, and (2) fossil-based naphtha feedstock. LCA for pyrolysis oil and gas based on *MoReTec* pilot plant data. LCA for fossil-based naphtha includes carbon emissions associated with the production of fossil-based naphtha feedstock, plus incineration of the equivalent amount of mixed plastic waste required to produce pyrolysis oil and gas via the *MoReTec* process.

4: Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.

Quotes/ Outlook

Yvonne van der Laan
Executive Vice President, Circular and Low Carbon Solutions

"At LyondellBasell, we believe that each recycling technology brings unique strengths. We are committed to leveraging these strengths collaboratively to reduce plastic waste and advance a circular economy. Our *MoReTec* catalytic chemical recycling technology offers a solution for highly mixed and contaminated, pre-sorted post-consumer waste that is difficult to recycle mechanically."

Paula Sanabria Luque
Senior Director EMEAI Marketing & Comm Development

"Our customers and partners are eagerly anticipating the first delivery of our *Circulen*Revive material from the *MoReTec* commercial-scale catalytic chemical recycling plant in Wesseling, Germany – a key enabler in reaching their sustainability targets."

Jim Seward
Executive Vice President and Chief Innovation Officer

"While our catalytic chemical recycling plant in Wesseling is currently under construction, our research efforts continue: LYB is developing post-treatment solutions to enable higher volumes of chemically recycled feedstock to be processed into plastics."

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