



TECH 2023-4: Polypropylene

Polypropylene is one in a series of reports published as part of NexantECA's 2023 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

Polypropylene (PP) is one of a number of polyolefins that are commodity plastics that are used globally in a wide range of market segments including packaging, consumer products, automotive, and building and construction. Polypropylene is a linear polymer that is very versatile and can be used for injection molding, fiber, film, and other extrusion processes.

This TECH report provides an updated overview of the technological, economic, and market aspects of polypropylene. The following issues are addressed in this report:

- What are the major technologies for polypropylene production. How do the technologies differ? Which technologies are available for license?
- How do the process economics compare across processes and different geographic regions?
- Who are the top 10 producers and leading licensors of polypropylene? How will this change over the next five years?
- Can polypropylene be recycled and by which methods?
- What is the carbon intensity (scope 1 and 2) of polypropylene processes and how does it compare with upstream raw materials?
- What is the current market environment for polypropylene? Where will new capacity be added? Based on current capacity, where are the low-cost and high-cost producers located?

Commercial Technologies

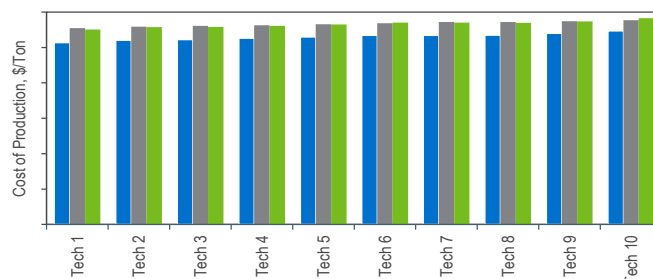
Multiple technologies are used to produce polypropylene. These technologies can be grouped into three main categories: gas phase, bulk, and slurry, which generally refers to the first reactor system, as all state-of-the-art processes employ either a gas phase or bulk reactor system for the production of homopolymer and random copolymer, followed by a gas phase reactor system for the sequential production of impact copolymer.

Technologies developed and/or licensed by Borealis (BORSTAR), ExxonMobil, Grace (UNIPOL), INEOS (INNOVENE), Japan Polypropylene (HORIZONE), Lummus Novolen Technology (NOVOLEN), LyondellBasell (SPHERIPOL and SPHERIZONE), Mitsui (HYPOL), and Sumitomo are described and analyzed, with a focus on recent developments. A list of licensees is included for each technology.

Process Economics

Detailed cost of production estimates for various technologies are presented for USGC, coastal China, and Middle East locations. Estimates are developed for homopolymer and impact copolymer polypropylene injection molding resins.

Regional Cost of Production Comparison for Impact Copolymer Polypropylene Resins



Commercial Overview

Global polypropylene consumption was 83 million tons in 2022. Injection molding, fiber, and film applications are the major end-uses, followed by other extrusion (including pipe and conduit, thermoformed packaging, and sheet). A complete global capacity list by producer and global cost curve are provided in this TEC



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- Chemistry
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- Process economics – comparative costs of production estimates for different technologies across various geographic regions
- Overview of product applications and markets for new as well as established products
- Regional supply and demand balances for product, including capacity tables of plants in each region
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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program, the Biorenewable Insights program (BI), and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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