



TECH 2022-2: HDPE

HDPE is one in a series of reports published as part of NexantECA's 2022Technoeconomics – Energy & Chemicals (TECH) program.

Overview

High density polyethylene (HDPE) is one of a number of polyolefins that are commodity plastics that are used globally in a wide range of market segments, including flexible packaging, pipe and conduit, storage containers, and automotive parts.

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

- What are the major technologies for HDPE 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 of HDPE? How will this change over the next five years?
- What is the current market environment for HDPE? Where will new capacity be added?

Commercial Technologies

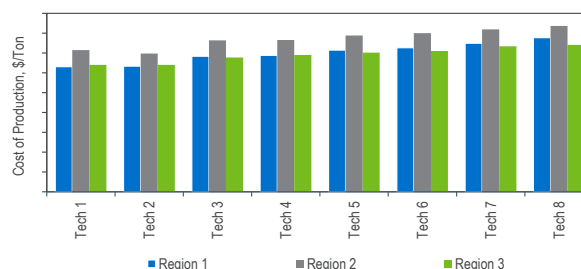
Multiple processes are used for the production of HDPE. Ziegler slurry technologies employ dual reactors to produce a bimodal product with careful control of comonomer distribution to produce resins with excellent environmental stress crack resistance. The loop slurry processes were developed to focus on the production of medium density and HDPE resins producing quality broad MWD resins for blow molding and pipe applications. Gas phase processes were the first to produce linear low density polyethylene (LLDPE) but can swing to produce HDPE. With the development of a dual-site catalyst, bimodal resins can be made in a single gas phase reactor. Although typically focused on LLDPE film, solution processes are also used to produce HDPE resins.

Technologies developed by Borealis, Chevron Phillips, Dow, INEOS, LyondellBasell, Mitsui, NOVA, and Univation are described and analyzed, with a focus on recent developments.

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 injection molding, copolymer bimodal film, and copolymer bimodal pipe resins.

Regional Cost of Production Comparison for HDPE Injection Molding Resins



Commercial Overview

Global HDPE consumption was 51 million tons in 2021 with blow molding and film applications the major end uses, followed by injection molding and pipe and conduit. A key driver for HDPE demand is substitution of materials such as glass, metal, and wood. Almost 19 million tons per year of new global capacity will be added over the next five years, mainly in Asia Pacific and the Middle East. An overview of the supply, demand, and trade of HDPE on a global and regional (North America, Western Europe, and Asia Pacific) basis is provided in this TECH report.



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The TECH program (formerly known as PERP) is globally recognized as the industry standard source of process evaluations of existing, new and emerging technologies of interest to the energy and chemical industries.

TECH's comprehensive studies include detailed technology analyses, process economics, as well as commercial overviews and industry trends. Reports typically cover:

- Trends in chemical technology
- Strategic/business overviews
- Process Technology:
- Chemistry
- Process flow diagrams and descriptions of established/conventional, new and emerging processes
- 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
- Regulatory and environmental issues where relevant

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- Cost of production tables in spreadsheet format
- Consultation time with the project team

An annual subscription to TECH includes twenty reports published in a given program year. Reports can also be purchased on an individual basis, including reports from previous program years.

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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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