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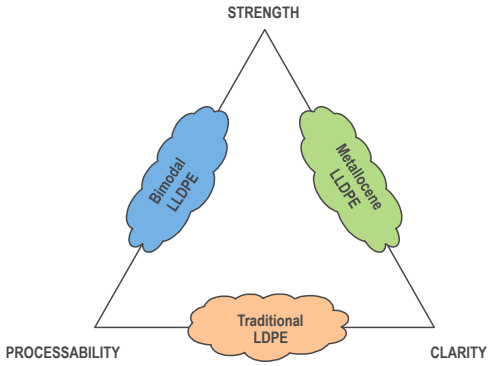
PERP Report 2016-7: Linear Low Density Polyethylene (LLDPE)

"Linear Low Density Polyethylene (LLDPE)" is one in a series of reports published as part of the 2016 Process Evaluation/Research Planning (PERP) Program.

Report Overview

Linear low density polyethylene (LLDPE) has been one of the polyolefins with the fastest demand growth, driven mainly by film applications for flexible packaging. LLDPE has enjoyed higher market growth due to the substitution of LDPE in many markets. However, LDPE still maintains significant market share due to product capability and economics.

PERFORMANCE BALANCING FOR LOW DENSITY POLYETHYLENE



This PERP report provides an updated overview of the technological, economic, and market aspects of LLDPE, including conventional and specialty resins. The following issues are addressed in the report:

- What are the major technologies for LLDPE production? How do the technologies differ? What technologies are available for license?
- What comonomers are used and how does it affect the cost of production?
- How do the process economics compare across different geographic regions?
- What is the current market environment for LLDPE? How does its growth compare with other polyolefins?

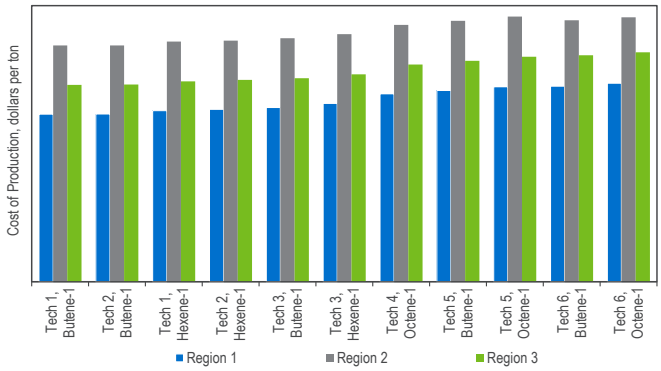
Commercial Technologies

The major commercial routes for the production of LLDPE are gas phase, solution, and slurry/slurry loop. Many are swing processes that can also produce HDPE. The technologies are very mature, with licensors focusing on cost reduction and product enhancement to differentiate their technologies. The scale of all processes has increased significantly, reducing operating and investment costs. Product enhancement efforts focus on improving the properties of LLDPE by itself and as a substitute for LDPE. 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 commercial LLDPE technologies are presented on a USGC, China, and Middle East basis using market-priced ethylene. Estimates were developed for conventional, metallocene/single-site, and easy processing film grade resins, depending on the technology. In each region, the comonomer (butene-1, hexene-1, or octene-1) and the technology employed affected the relative cost of production.

REGIONAL COST OF PRODUCTION COMPARISON FOR CONVENTIONAL LLDPE RESINS



Commercial Market Review

Global LLDPE consumption in 2015 was 28 million tons with film applications the major end use, followed by injection molding and extrusion. Strong growth, driven by the Asia Pacific region, is forecast with demand expected to exceed 35 million tons by 2020. This PERP report provides an overview of the supply, demand, and trade of LLDPE on both a global and regional basis, including demand by end use and a capacity list for each region.

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