



Polycarbonate is one in a series of reports published as part of Nexant's 2019 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

Polycarbonate is an engineering thermoplastic that is used in a range of relatively high-value-added applications. It is impact resistant, thermally stable, optically very clear, dimensionally stable, and has good electrical insulating properties. The majority of polycarbonate is produced using phosgene-based processes.

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

- What are the major technologies for polycarbonate and how do they differ? What new technologies are being developed? Who are the major technology holders and licensors?
- How do the process economics compare across processes and geographic regions?
- What is the current market environment for polycarbonate? How does growth compare across regions? Where will new capacity be built? What technologies will be used?

Commercial Technologies

Commercialized technologies to produce polycarbonate can be divided into three routes: interfacial, non-phosgene melt, and phosgene melt. Similar to other plastics technologies, leading producers continue to work on bio-materials suitable for polymerization to polycarbonate. Isosorbide has been explored as a bio-derived feedstock and has been commercialized on a small-scale basis.

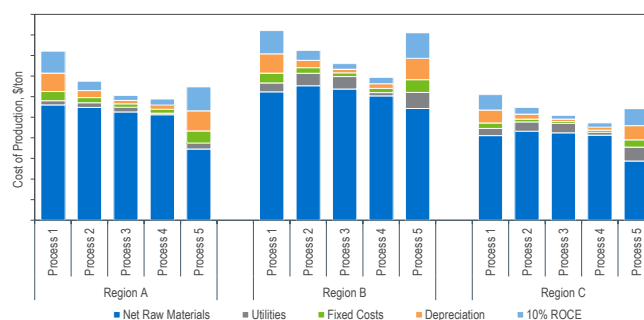
Interfacial technology has been the dominant route used for polycarbonate production, but this has been changing as producers develop non-phosgene routes, as well as phosgene melt technology. If the large capacity additions planned in China proceed, interfacial's share of capacity will change significantly.

The non-phosgene melt technologies all use diphenyl carbonate produced from dimethyl carbonate (DMC) to introduce the carbonate group into the polymer backbone, but the routes to DMC are different and use a variety of raw materials.

Process Economics

Detailed cost of production estimates for five polycarbonate technologies are presented for USGC, Western Europe, China, and South Korea locations. Estimates are developed for interfacial, phosgene melt, non-phosgene melt (DMC via oxidative carbonylation and DMC via methanolysis of ethylene carbonate), and isosorbide melt technologies.

Cost of Production Comparison for Polycarbonate



Commercial Overview

Global polycarbonate consumption was 4.4 million tons in 2018. It is used in a wide range of polymer applications. The electrical and electronics industry is the largest global end-use market for polycarbonate, followed by construction and automotive applications. Optical media still represents a significant market share, but is declining. An overview of the supply, demand, and trade for polycarbonate on a global and regional (North America, Western Europe, Asia Pacific) basis is provided in this TECH report. Global demand and capacity is concentrated in these three regions, especially Asia Pacific.



TECH 2019-5: Polycarbonate

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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program (formerly known as PERP), the Biorenewable Insights program (BI), the Sector Technology Analysis, 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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