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PERP Report 2017-2: Polyethylene Terephthalate

"Polyethylene Terephthalate" is one in a series of reports published as part of the 2017 Process Evaluation/Research Planning (PERP) Program.

Report Overview

Polyethylene Terephthalate (PET) is a thermoplastic polymer originating from the polyester family. Currently, around 65 percent of global melt phase PET is used for the production of synthetic polyester fibers (fiber grade PET) in textile industries. When used for textile applications, PET is commonly referred to as simply "polyester", while "PET" often refers to packaging applications. Bottle grade PET resins used for the production of rigid packaging materials such as containers and plastic bottles account for 28 percent of melt phase PET demand. The remaining melt phase PET is used in the production of PET film for flexible food packaging and tape applications.

The PET fiber market over the last decade has been characterized by a boom in East Asia and bust in most other regions. Older plants in higher cost regions in the West have been gradually driven out of production by modern, highly competitive producers in East Asia. Within East Asia, producers in Japan, South Korea and Taiwan themselves face competitive pressure from the snowballing industry in China, which benefits from lower labor cost, and now accounts for over 60 percent of global polyester fiber production.

Fiber producers have for some time been converting older plants to PET bottle grade production by adding solid state polymerization (SSP) capacity, in order to escape the more difficult market conditions in the fibers industry. This is now rarely a viable option, as the bottle grade PET market has become intensively competitive and cost focused, and converted fiber plants cannot generally achieve the required cost basis. The reverse is currently happening in North America, where an old bottle grade line which was originally a fiber plant is being converted back to fiber production.

The PERP report provides an overview of the production, market and economics of PET. The following issues are addressed in this report:

- What are the major technologies for PET production? How do the technologies differ? What technologies are available for license?
- How do the process economics compare across different geographic regions?
- What are the process economics for an integrated plant starting with the production of purified terephthalic acid (PTA) through to bottle grade PET? How do the process economics for this integrated plant compare across different geographic regions?
- What is the current market environment for PET?

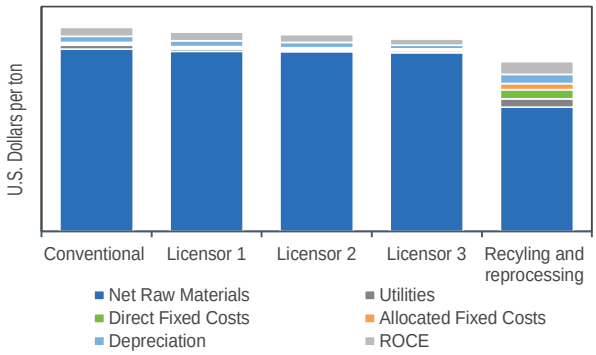
Commercial Technologies

Over the last few years, a number of key developments in PET manufacturing have occurred. A process that optimizes the transition from the melt to solid state treatment is offered in collaboration among INVISTA, Chemtex and POLYMETRIX. Technip Zimmer GmbH has developed a technology called the Direct High Intrinsic (DHI) viscosity process, which exploits the benefits of linking the granulation and crystallization steps in the PET process. Grupo Petrotemex (GPT) a subsidiary of Alpek offers the IntegRex® process for license and is characterized by its patented pipe reactor design.

Process Economics

Detailed cost of production estimates for the conventional process, commercial technology processes and recycling and reprocessing technologies for PET are provided in this report, including the case or integrating PTA and PTA production to reduce costs. Estimates are presented for USGC, Western Europe and China locations.

COMPARATIVE COST OF PRODUCTION OF PET



Commercial Market Review

Global PET consumption growth continued to accelerate in 2016, driven by a particularly strong year for polyester fiber in Asia. This report provides an overview of the supply, demand and trade of melt phase and bottle grade PET on both a global and regional basis.

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