



TECH 2023S9: Recycling Options for PET

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

Overview

PET (polyethylene terephthalate) has among the highest recycling rates among plastics, driven by its widespread presence in waste streams, relative ease of collection and separation, and amenable properties for mechanical recycling. Particularly as bottles, PET's inherent properties support multiple cycles of reshaping and remelting without significant quality degradation. PET's versatility also bolsters its appeal in sectors like textiles and packaging. Yet, by 2030, the demand for rPET is predicted to triple the projected supply. With escalating environmental concerns, regulatory imperatives, and consumer expectations, brand owners are ramping up their commitment to improving recyclability. Nonetheless, only 27% of PET bottles are currently recycled. The majority of PET is often destined to landfills stifling rPET supply growth amid rising demand. Globally, the annual production of plastic waste broadly nears 400 million metric tons, of which less than 10% is recycled.

Commercial Technologies

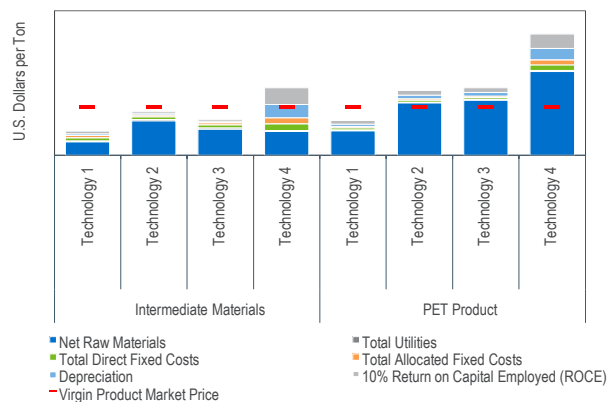
This rPET TECH report provides a comprehensive analysis of PET recycling, delving into technical, environmental, regulatory, and economic vectors affecting PET recycling on a global and regional basis. The report covers mechanical to chemical recycling technologies including solvent-based purification, glycolysis, methanolysis, and enzymatic hydrolysis. The report provides in-depth profiles of essential technology licensors, owners, operators, and sorting technology companies, delving into the intricacies of their respective operations. The report offers a Cost of Production analysis spanning the United States Gulf Coast (USGC), Western Europe, China, Japan, and Southeast Asia. Region-specific insights shed light on market dynamics and the economic viability of intermediates, including rPET flakes, Bis-Het through both full and partial glycolysis, and DMT via methanolysis. Additionally, it benchmarks final products like rPET pellets against the Q1 2023 virgin market price.

Process Economics

PET recycling encompasses a set of key processes: collection, separation, processing, and re-fabrication. Recycling practices differ across regions, driven by local policies, infrastructure, and end-use demand. A comprehensive evaluation of the PET recycling market, informed by NexantECA's Cost of Production analysis for Q1

2023, suggests mechanical recycling methods are most economically viable given high-quality PET flake inputs. However, the chemical recycling avenue holds promise in converting low-value and challenging feedstocks into high-value products. Factors such as feedstock quality and technological progress can bolster the competitiveness of advanced chemical recycling techniques, filling gaps where mechanical recycling might be limited. NexantECA's regional-specific insights illuminate the most promising mechanical and advanced recycling technologies, considering factors like feedstock availability, recycling maturity, energy usage, and market demand, providing a clearer understanding of the true economic feasibility of these recycling approaches.

Cost of Production Summary - United States
(Basis: Q1 2023)



Commercial Overview

As one of the most recycled plastics in the world, advanced technologies such as near-infrared (NIR) and optical sorting can further boost the efficiency of PET recycling assuming collection rates increase. Though the rPET market, particularly in Europe, has seen volatility, due to factors like lower virgin PET prices and inexpensive Asian imports, the prospects for PET recycling remain promising. The push from public support and legislations in regions like the U.S. and EU propels optimism in the sector. The increasing emphasis on sustainability among multinational companies, in response to consumer expectations, further augments the demand for recycled PET, driving investments into improved recycling technologies and infrastructures.

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- 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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