



Biorenewable Insights: Bioaromatics

Bioaromatics is one in a series of reports published as part of NexantECA's 2022 Biorenewable Insights program.

Overview

Benzene, toluene and xylenes (BTX) aromatics are the major fundamental building blocks for petrochemicals. Bioaromatics aim to replace fossil-based building blocks in the chemical industry, serving as a “drop-in replacement”.

Growing public demand for greener alternatives has been a driver in developing a renewable source of aromatics (particularly *para*-xylene). Being the most commercially important xylene isomer, *para*-xylene is the principal co-monomer for polyethylene terephthalate (PET) used in the production of fibers and bottles.

Bioaromatics can be derived from bio-based/renewable feedstocks with most development being concentrated on lignocellulosic biomass (e.g., wood and starch).

This report aims to answer the following strategic questions:

- What are the commercially available technologies to produce bioaromatics? Who are the key technology holders and producers?
- What are the recent industry developments in bioaromatics?
- On a high-level basis, what are the cost competitiveness between available bioaromatics technologies?
- What are the strategic and commercial implications of bioaromatics in the overall petrochemical industry as a whole?

Technologies

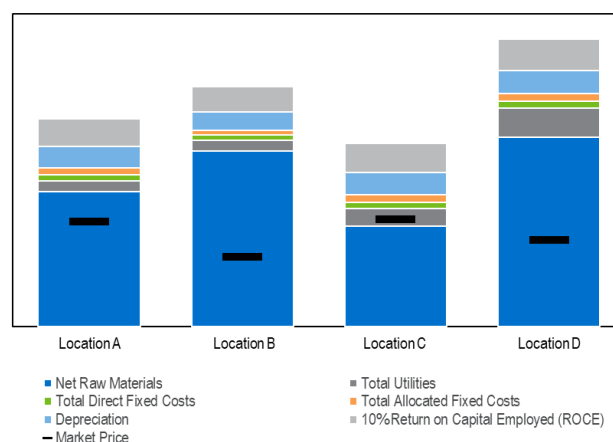
This report covers bioaromatics technologies by existing and potential major licensor/producers:

- Anellotech
- Origin Materials
- Gevo
- Virent
- Other key players (e.g., BioBTX, Ekobenz, Encina, Versalis, VTT, etc.)
- Producers through the mass balance approach (e.g., Neste-Borealis, UPM Biofuels-SABIC, etc.)

Process Economics

Cost of production estimates for four locations (USGC, Brazil, Western Europe and China) are presented for production of bioaromatics from various routes.

- Catalytic fast pyrolysis
- Cycloaddition of biomass-derived furans
- Catalytic conversion of iso-butanol to *para*-xylene
- Catalytic reforming of carbohydrates
- Enhanced fluid catalytic cracking of vegetable oil
- Ethanol-to-Aromatics
- Methanol-to-Aromatics
- LPG-to-Aromatics



Regional pricing is set on Q3 2022 basis. Fossil-based feedstocks for the conventional routes are replaced with biomass-derived feedstocks (e.g., soybean oil, corn-derived ethanol, biogas-based methanol and bio-LPG).

Commercial Impact

This report offers comprehensive coverage on existing and planned bioaromatics capacity as well as a critical analysis of current and future implications for the conventional aromatics industry.

Currently, bioaromatics are already in commercial production via the mass balance approach utilizing bio-naphtha), albeit at a very limited quantities relative to conventional aromatics. There remains a huge potential for substitution of fossil-based aromatics.

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The BI program (sister program to the world renowned 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 renewable energy and chemical industries.

BI's comprehensive studies include detailed technology analyses, process economics, as well as capacity analysis and impacts on conventional industry. Reports typically cover:

- Trends in technology
- Strategic/business overviews and/or developer profiles
- 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
- Capacity tables of plants and analysis of announced capacities
- Regulatory and environmental issues where relevant

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- Cost of production tables in spreadsheet format (as requested)
- Consultation time with the project team

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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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