NexantECA

Technology and Costs

Biorenewable Insights: Propylene

Propylene is one in a series of reports published as part of NexantECA's 2019 Biorenewable Insights program.

Overview

With a growing global focus on greenhouse gas emissions reduction and the consumption of plastics continuing to grow, the establishment of commercially viable "green" alternatives to conventional petro-based polymers, such as polyethylene, polypropylene, and PET is becoming increasingly important. Some technology players are pursuing the development and commercialization of novel renewable polymers, such as polylactic acid (PLA), polyhydroxyalkanoates (PHAs), and furandicarboxylic acid (FDCA) to replace conventional petro-based polymers. However, the commercial viability of these polymers is oftentimes reduced by high production costs relative to conventional routes, comparatively poor processability, and inferior physical properties for certain applications. Thus, it is desirable to develop and scale-up technologies to produce renewably derived "green" analogues to key olefin intermediates, such as propylene, with identical physical properties to conventional propylene that can be used as a drop-in chemical for the propylene value-chain.

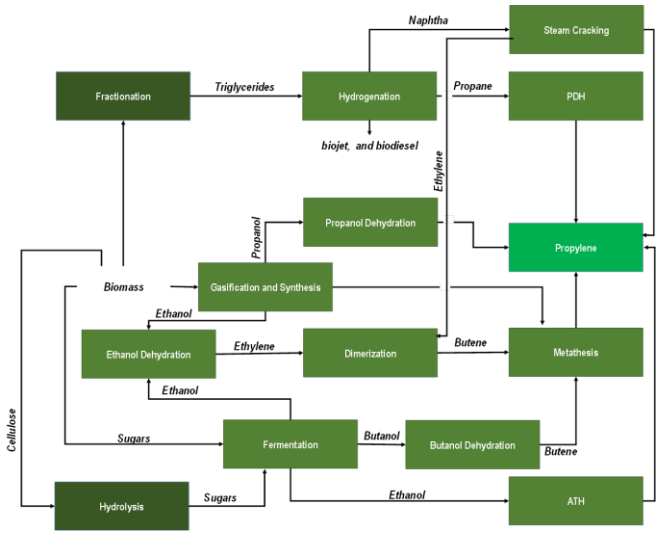
Currently, there are several commercial options for producing bio-propylene, and several others are under development.

Technologies

There are many potential routes to produce bio-based propylene that are technically feasible; however, only a few of these routes are currently being explored for commercial viability. The following process routes are currently being pursued for commercial-scale bio-propylene production or have been identified as promising routes by NexantECA:

- Direct fermentation of sugar to bio-propylene
- Dehydration of ethanol to olefins
- Fermentation of sugar to isopropanol, followed by the dehydration of isopropanol to bio-propylene
- On-purpose propane dehydrogenation using bio-propane byproduct from biodiesel production mixed with conventional propane
- Co-cracking of conventional naphtha with bio-based naphtha byproduct obtained from biodiesel production

There are other potential process routes to bio-propylene, but these routes are not being actively pursued for a number of reasons including high capital expenditure requirements, overly complicated process flow, and low bio-propylene yield.



Process Economics

Cost of production models for USGC, Brazil, Western Europe and China are shown for propylene from:

- Bio-Propane PDH
- Bio-Naphtha Cracking
- Iso-Propanol to Propylene
- Gevo ETO
- Global Bioenergies Direct Fermentation

Capacity

NexantECA has catalogued existing and planned renewable propylene capacity and profiled projects.

For more information. please contact
Technology@NexantECA.com or www.NexantECA.com

NexantECA

Technology and Costs

Biorenewable Insights: Propylene

Subscribe to BI

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 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

Subscription Options

A subscription to BI comprises:

- PDF reports including detailed technology analyses, process economics, as well as commercial overviews and industry trends
- Cost of production tables in spreadsheet format (as requested)
- Consultation time with the project team

An annual subscription to BI includes 10 reports published in a given program year. Reports can also be purchased on an individual basis, including reports from previous program years.

For more information, please contact
Technology@NexantECA.com or www.NexantECA.com

NexantECA

NexantECA Subscriptions & Reports provide clients with comprehensive analytics, forecasts and insights for the chemicals, polymers, energy and cleantech industries. Using a combination of business and technical expertise, with deep and broad understanding of markets, technologies and economics, NexantECA provides solutions that our clients have relied upon for over 50 years.

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.

NexantECA serves its clients from over 10 offices located throughout the Americas, Europe, the Middle East, Africa, and Asia.

Americas
Tel: +1 914 609 0300
44 S Broadway,
5th Floor White Plains
NY 10601-4425
USA

Europe, Middle East & Africa
Tel: +44 20 7950 1600
110 Cannon Street
London EC4N 6EU
United Kingdom

Asia Pacific
Tel: +662 793 4600
22nd Floor, Rasa Tower I
555 Phahonyothin Road
Kwaeng Chatuchak
Khet Chatuchak
Bangkok 10900
Thailand

For more information. please contact
Technology@NexantECA.com or www.NexantECA.com