NexantECA

Technology and Costs

Biorenewable Insights: Ethanol

Ethanol is one in a series of reports published as part of NexantECA's 2020 Biorenewable Insights program.

Overview

The bioethanol sector is mature and largely continues to be populated with first-generation ethanol producers. Concerns about competition with food resources and doubts about the environmental sustainability of first-generation processes, as a well as a search for a sustainable cost advantage over first-generation production methods, continue to motivate the search for second-generation ethanol technology.

This search has encountered many setbacks. At one point, the last five years had promised multiple first-of-kind commercial second-generation ethanol plants. However, success has been difficult to achieve with many developers exiting the sector, leaving only the most promising technologies still operating. These remaining second-generation technologies have embraced a broadly diversified set of strategies to continue the process of commercialization.

Understanding the ethanol sector requires knowledge of the following key strategic questions:

- What is the current status and cost position of the first-generation ethanol sector?
- What second-generation ethanol technologies have remained operational, and which promising candidates are nearing commercialization?
- What is the expected capacity of second-generation ethanol likely to be in the near future, and how does it compare to the conventional first-generation ethanol industry?

Technologies

This report has three major technology areas of coverage:

- Baseline conventional ethanol from sugarcane, corn (maize), and other minor feedstocks
- "Generation 1.5" technologies to give bolt-on second-generation functionality to existing first-generation facilities
- Second generation technologies, including 13 different technology developers using hydrolysis and fermentation, syngas fermentation, or gasification and syngas reforming

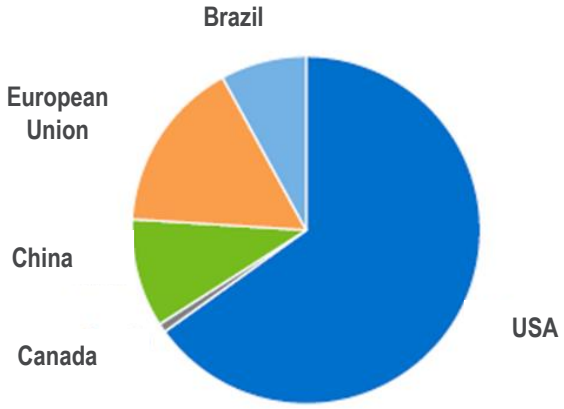
Process Economics

This report covers economics of manufacturing in four location scenarios (US, Western Europe, Brazil, and China) with regional pricing and variations on preferred agricultural feedstock on a 1H 2020 basis. Economics of first-generation processes are covered as a baseline and compared to two second-generation processes broadly representing biomass hydrolysis and fermentation processing and syngas fermentation processing, respectively.

Commercial Impact

This report focuses on the commercial impact of second-generation ethanol with a current capacity listing and tracking of announced commercial capacity, with first-generation capacity given for context of potential impact.

Global Second-Generation Ethanol Capacity by Region



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- Process economics – comparative costs of production estimates for different technologies across various geographic regions
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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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