



Biorenewable Insights: Ethanol as a Platform Chemical

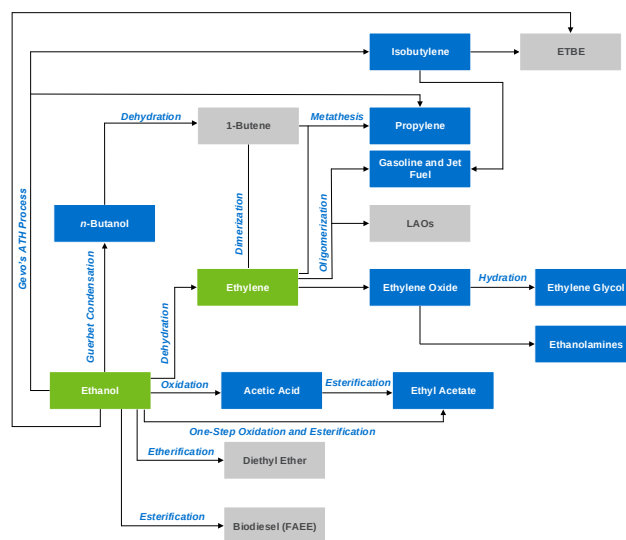
Ethanol as a Platform Chemical is one in a series of reports published as part of NexantECA's 2018 Biorenewable Insights program.

Overview

Several chemicals can currently be produced economically from ethanol, providing a market opportunity going around the cap that the fuel ethanol "blend wall" currently imposes on the market. Some basic chemicals, such as ethylene, produced from ethanol also unlock additional chemistries and value chains, which further expand the potential reach of ethanol-based chemicals. Additionally, combining ethanol molecules together to produce larger molecules can unlock the potential of C₄ (e.g., butadiene) as well as larger molecules (e.g., gasoline components and/or LAOs). Due to the chemistry involved and the fact that ethanol is a two carbon molecule, optimal yields will be achieved targeting product molecules with even numbers of carbon atoms. This is not completely new, in that the modern organic chemical industry began with the dehydration of bio-ethanol to ethylene before complexes were established around steam cracking olefins plants, in many countries, including Australia, Brazil, Russia, and India. This allowed the olefins off-takers to begin operations on the bio-ethylene before the high and risky investment in crackers were made. Getting supplies of critical chemicals during World War II when petroleum supplies were cut off was another motivation for implementing bio-ethanol-based routes.

Technologies

The following illustrates the ethanol to chemicals overview:



Process Economics

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

- Ethylene, Ethylene Oxide, and Ethylene Glycol
- Ethanolamines
- Acetic Acid and Ethyl Acetate
- Butanol
- Butadiene
- Isobutylene
- Gasoline
- Jet Fuel

Capacity

NexantECA has catalogued existing and planned ethanol to chemicals capacity.



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