



TECH 2022-7: BDO/THF

BDO/THF is one in a series of reports published as part of NexantECA's 2022 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

1,4-Butanediol is a low viscosity glycol used almost exclusively as an intermediate to synthesize other chemicals and polymers. Since butanediol can undergo the typical reactions of a primary alcohol, it lends itself to a very large number of chemical modifications

The development of butanediol and derivatives technology has spanned over eight decades. Unlike most key chemical intermediates, BDO can be manufactured from six different fossil fuel derived feedstocks. Although conventional methods of manufacturing BDO still dominate the global market, bio-based BDO developments have been burgeoning during the last few years and can potentially transform the industry.

The largest share of the world's BDO production still relies on the acetylene-based process. While the competing routes for producing BDO from maleic anhydride and allyl alcohol have led to a significant increase in the number of new plants built in the last two decades, a boom in acetylene-based capacity additions in Asia during the last decade has further increased the global share of the acetylene-based BDO technology.

This TECH report provides an updated overview of the conventional and developing technological, economic, and market aspects of BDO/THF. The following issues are addressed in this report:

- What are the major production technologies for BDO and how do they differ?
- What are some of the strategic and business considerations surrounding BDO?
- Is the technology available and who are the key technology owners and licensors? What are the key differences between their offerings?
- What are some of the recent development trends in the technology for producing BDO?
- What are the key end-uses and market drivers for BDO currently?
- What are the key factors that impact overall economics for producing BDO across different technologies and geographic regions and what are the key cost sensitivities?

Commercial Technologies

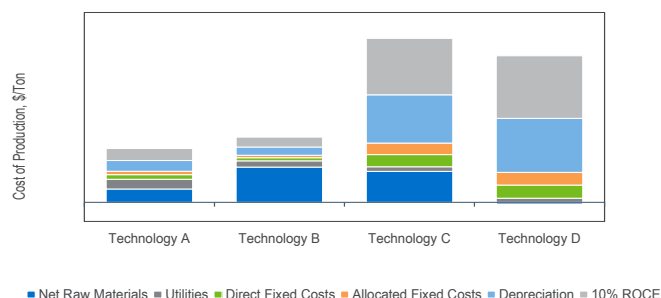
NexantECA has analyzed the process technologies required to produce BDO from six different fossil fuel derived feedstocks. As well as process descriptions, commentary around the availability of technologies to license by third parties has been made.

There is continued R&D with a focus on areas such as energy recovery, catalyst developments, hydrogen recovery and bio-based routes.

Process Economics

The economic analysis provides an overview of production costs for BDO as well as THF in different locations in 2Q 2022. An overview of the carbon intensity across three regions, the US, Western Europe, and China for the BDO production technologies is also presented.

BDO Production Costs



Commercial Overview

As a key intermediate chemical, 1,4-butanediol can be converted into a series of industrially important chemicals through various reaction routes. The two most common reactions are the dehydration and dehydrogenation of BDO to THF and γ -butyrolactone (GBL), respectively. Together, these two chemicals make up close to 50 percent of the end-use consumption of BDO.

The market for BDO is analyzed on a global and regional basis with commentary made around the key market drivers historically and over the medium-term forecast.

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TECH's comprehensive studies include detailed technology analyses, process economics, as well as commercial overviews and industry trends. Reports typically cover:

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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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