

TECH 2021-2: Methanol



Methanol is one in a series of reports published as part of NexantECA's 2021 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

The methanol industry has transformed itself over the last 15 years, and methanol is becoming an ever more versatile and important molecule. In 2005, chemical derivatives accounted for almost all methanol demand. More than a decade later, chemical derivatives comprised three-quarters of methanol demand as fuel end uses represent the remainder of methanol consumption.

Today's practical conventional methanol production technology employs a two-step process. The first step is the generation of synthesis gas. In the second step, the synthesis gas produced is converted to methanol.

Synthesis gas can be prepared from a variety of hydrocarbon materials, ranging from natural gas, solids such as coal, or even biomass (e.g., wood, MSW, corn stover).

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

- What are the main routes for synthesis gas and methanol production? Who are the major licensors and what technologies do they offer? What technologies are being offered for 10 000 tons per day single train lines?
- What are some of the differences across the various conventional and green technologies? Who are the companies that have commercialized green methanol processes?
- How do the process economics compare across processes and different geographic regions? Which technology offerings provide the lowest cost of production, and which regions in the world provide attractive investment opportunities?

Commercial Technologies

License technologies for methanol production are primarily based on conventional (i.e., natural gas and coal) resources. Key licensors covered in this report that offer conventional technologies include Air Liquide, Casale, Haldor Topsøe, Johnson Matthey, Mitsubishi, thyssenkrupp, and Toyo.

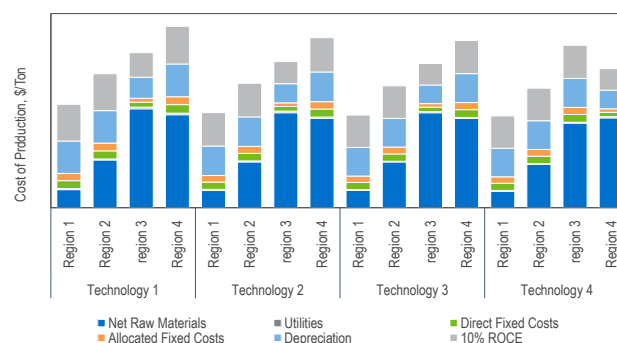
Alongside mega-scale methanol (5 000 tons per day) plants, conventional licensors are also offering small-scale (less than 1 000 tons per day) methanol plants or giga-scale methanol (10 000 tons per day) units.

There are currently only about a handful of companies that have developed methanol technologies from green resources. These include BioMCN, Carbon Recycling International, Enerkem, and GIDARA Energy.

Process Economics

Detailed cost of production estimates for five different production routes to methanol are presented for USGC, Western Europe, China, and the Middle East locations. Estimates are developed for steam reforming, combined reforming, autothermal reforming, gas heated reforming, and coal-based conventional commercial routes to methanol. Sensitivity analyses on feed pricing, economy of scale, and capital investment were also developed. Additionally, a return on investment and investment attractiveness analysis for methanol production facility is provided for the five routes and regions studied in this report.

Methanol Production Costs



Commercial Overview

Global methanol demand grew by 4.3 percent in 2020 to 110.9 million tons, a relatively weak year of growth following two years of double-digit demand growth. Capacity growth has been strong in recent years, growing at an average of 8 percent per year since 2010. The most dramatic rates of capacity change have been in China and the United States.

Supply, demand, and trade of methanol on both a global and regional basis are provided in this TECH report.



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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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