

Reduced Carbon Intensity and Renewable Methanol Production

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Abstract

Methanol is a large-volume commodity chemical that is a major building block for industrial and consumer products. In 2020, worldwide production was more than 131 MMT. Globally, methanol capacity has expanded over the past five years at an average rate of 3.5% a year, driven by new plants built in Northeast Asia, North America, and the Middle East. Mainland China alone accounted for 52% of the global capacity in 2020; it is also the sole producing country in the Northeast Asian region.

Our prior PEP Report 43F on conventional methanol production from natural gas was published in 2019. It covered four licensed technologies: Haldor Topsøe Autothermal Reforming, Casale and Lurgi's Combined Reforming, and Johnson Matthey/Davy Gas-Heated Reforming-based processes. In recent years, there has been significant research on reducing carbon emissions from methanol production.

The focus of this report is on renewable, low-carbon-intensity, or emission-free, methanol. These are precommercial technologies. We have examined three processes:

- Renewable small-scale power to methanol by using German company bse Methanol's *FlexMethanol* modules.
- Low CO₂ emission by natural gas two-stage reforming methanol production, based on the Johnson Matthey/Davy process, modified with RWGS.
- Biomass gasification from wood chips and two-stage reforming for methanol production.

The iPEP Navigator tool is attached to the electronic version of this report. The iPEP Navigator interactive module provides an economic snapshot for each process, allowing the user to select and compare processes, units, and regions of interest.

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