

# Floating Methanol Production

PEP Review 2020-05

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**Praveer Joshi**, Associate Director

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### Abstract

This review examines the technology and economics of a methanol producing plant, which is built on a floating production, storage, and offloading (FPSO) vessel used in oil and gas production.

Conventionally, methanol is produced from natural gas (NG) through steam-methane reforming (SMR) or autothermal reforming (ATR). The reforming of NG produces a mixture of CO and H<sub>2</sub> (synthesis gas), which is subsequently converted to methanol. Methanol can also be produced by direct hydrogenation of CO<sub>2</sub>. There is another process for methanol production, which involves steam-methane reforming with CO<sub>2</sub>. This steam-methane-CO<sub>2</sub> reforming technology is also referred to as Steam-CO<sub>2</sub> Combined Reforming (SCR). As SCR consumes CO<sub>2</sub> as a raw material, the CO<sub>2</sub>-rich gas produced on FPSO can be utilized without a CO<sub>2</sub> separation unit. The raw material used is the by-product gas and steam generated during the heat recovery phase from the process system.

The configuration or baseplate of the process analyzed in this review is extracted from a paper titled “*The process design and simulation for the methanol production on the FPSO (floating production, storage and off-loading) system*”. Authored by Won Seok Kim et al., this paper was published in *Chemical Engineering Research and Design* (2014). The evaluation process entails a series of steps involving a brief process review, followed by more detailed parametric information about the technology, such as process operation key conditions, process description, material and energy balance, equipment sizes, utilities consumption, and a process flowsheet. Process economics are presented in the latter part of the review.

The floating methanol production technology is a two-step process. The first step is the production of H<sub>2</sub>-rich syngas by the endothermic steam-methane reforming reaction over a Ni-based catalyst, in an externally heated tubular reformer. The CO<sub>2</sub>-rich associated gas produced on the FPSO is cleaned and successively fed to a prereformer and reformer, along with steam in a molar ratio of 1 to 2. The syngas, thus produced, is then fed to the methanol synthesis reactor. The crude methanol stream exiting the reactor is cooled, scrubbed, and purified using distillation columns. The purified methanol is finally sent to storage.

In the end section of the review, the economics of a floating methanol production unit are presented. IHS Markit PEP’s estimates indicate that the net production cost of methanol is 9.06 ¢/lb. The production of methanol on an FPSO vessel provides the benefit of reducing flaring and could also result in increased oil production capacity. The economic impact of increased oil production, however, has not been accounted for in the calculation of the economics.

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## IHS Markit Customer Care:

CustomerCare@ihsmarkit.com

Americas: +1 800 IHS CARE (+1 800 447 2273)

Europe, Middle East, and Africa: +44 (0) 1344 328 300

Asia and the Pacific Rim: +604 291 3600

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