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TrueBlue Methanol® Process

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Glossary

ACS	American Chemical Society
barg	Gauge pressure
BDE	BD Energy Systems, LLC
BFW	Boiler feedwater
bhp	Brake horsepower
Btu/scf	British thermal units per standard cubic feet
°C	Degree Celsius
¢/lb	Cent(s) per pound
capex	Capital expenditure
CEH	Chemical Economics Handbook
Clariant	Clariant AG
CW	Cooling water
$/t	Dollar(s) per metric ton
DME	Dimethyl ether
EOR	Enhanced oil recovery
°F	Degree Fahrenheit
ft	feet
ft^3	Cubic feet
ft dia	feet diameter
gal	Gallon(s)
G&A	General and administrative
gpm	Gallon(s) per minute
h	Hour(s)
HHP	High high-pressure
HPLC	High-performance liquid chromatography
ISBL	Inside battery limits
kg	Kilograms
kJ/mol	Kilojoules per mole
KO	Knockout
kW	Kilowatt
kWh	Kilowatt-hour
lb/h	Pounds per hour
LLP	Low low-pressure
m^2	Square meter
Mgal	Thousand gallons
Mlb	Thousand pounds
mm	Millimeter(s)
MMBtu	Million British thermal units
MMlb/y	Million pounds per year
MMt	Million metric tons
MMscf	Million standard cubic feet
mol%	Molar percent
MTBE	Methyl tert-butyl ether
MTO	Methanol-to-olefins
MTP	Methanol-to-propylene
NG	Natural gas
NO_x	Nitrogen oxide(s)
opex	Operating expenditure
PFD	Process flow diagram
ppm	Parts per million
PSA	Pressure swing adsorption
psi	Pounds per square inch
psia	Pounds per square inch absolute
psig	Pounds per square inch gauge
ROI	Return on investment

s	Second(s)
S/C	Steam-to-carbon
SMR	Steam methane reformer
SN	Stoichiometric number
SO_x	Sulfur oxides
sq ft	square feet
SS	Stainless steel
Syngas	Synthesis gas
TAME	Methyl tert-amyl ether
t/d	Metric tons per day
TFC	Total fixed capital
TMT	Tube metal temperature
TOP	Tunnel optimal performance
vol%	Volume percent
wt%	Weight percent

Abstract

Methanol is a large-volume commodity chemical and a major building block for industrial and consumer products. It is traditionally produced from fossil fuels, such as natural gas or coal. In 2022, the worldwide methanol capacity exceeded 140 million metric tons, with capacity expanding at an average rate of 4.4% over the past five years. Blue or low-carbon methanol is also derived from fossil fuel sources but uses a carbon capture and sequestration step to significantly reduce a manufacturing plant's CO_2 emissions. Blue methanol is expected to be increasingly used in the chemicals, petrochemicals, transportation and energy sectors, and power-to-X concepts as part of decarbonization efforts.

The Process Economics Program (PEP) last covered low-carbon methanol technologies based on natural gas and biomass feedstocks in PEP Report 43G *Reduced Carbon Intensity and Renewable Methanol Production* (December 2021). In this review, we present a comprehensive techno-economic assessment of the TrueBlue Methanol® technology developed by BD Energy Systems, LLC. This process uses the conventional steam methane reformer to produce synthesis gas but still lowers the carbon footprint by employing internally generated hydrogen as the primary fuel and incorporating pre-combustion CO_2 capture. The economic assessment in this review is for a plant based at a US Gulf Coast location, with an annual production capacity of 1,810.5 million pounds of methanol (2,500 metric tons per day).

An iPEP Navigator® module, an Excel-based computer costing model developed by S&P Global Commodity Insights, is also attached with this review to allow quick calculation of the process economics in other major regions of the world. This review will be a valuable resource for planners, producers and designers who are looking for an authentic evaluation of capital and production costs for blue methanol production.

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