Methanol as a Marine Fuel
A clear, colourless fuel, liquid at ambient temperature, miscible in water

More environmentally benign than conventional marine fuels (HFO, MGO, MDO).

Already used as a transport fuel all over the world

**Diesel Bunker Fuel**  
**Methanol Marine Fuel**
What is Methanol’s relevance to IMO2020?

Methanol is among the lowest emission fuels for marine engines

- SOx: 99%
- NOx: 60%
- Particulate Matter: 95%

Source: Stena Lines -- Emission reductions when compared to alternative fuels currently available (fuel oil)
In operation, conventional Methanol offers significantly lower CO2 emissions compared to conventional marine fuel.

If produced from one of numerous renewable pathways, such as biomass or renewable electricity combined with recycled carbon dioxide, Methanol has the potential to significantly reduce CO2 emissions on a well-to-propeller basis.
Progression through the IMO process

- **2014**: CCC 1
  - Ethyl/methyl alcohol
  - Fuel cells
  - Low-flashpoint diesel

- **2015**: CCC 2
  - Ethyl/methyl alcohol
  - Fuel cells
  - Low-flashpoint diesel

- **2016**: CCC 3
  - Fuel cells
  - Ethyl/methyl alcohol
  - Low-flashpoint diesel

- **2017**: CCC 4
  - Fuel cells
  - Ethyl/methyl alcohol
  - Low-flashpoint diesel

- **2018**: CCC 5
  - Ethyl/methyl alcohol
  - Fuel cells
  - Low-flashpoint diesel

- **2019**: MSC 100
  - Amendments
  - Confirmation
  - Referral to other sub-committees

- **2020**: MSC 101
  - Amendments
  - Referral to other sub-committees

- **2020**: CCC 6
  - Ethyl/methyl alcohol
  - Fuel cells
  - Low-flashpoint diesel
In June 2018, MSC 99 invited the International Standards Organization to develop a standard for methyl/ethyl alcohol as a marine fuel.

In September 2019, the IMO’s CCC5 sub-committee completed interim guidelines covering the safety of ships using Methanol as fuel, with the ultimate goal of adding a new chapter to the IGF Code as soon as possible.
Methanol is subject to the same bunkering guidelines and safety standards as conventional marine fuels.

Methanol-fuelled tankers are bunkered during cargo loading, *Stena Germanica* has recorded thousands of hours of safe operations and over 400 successful stems placed since its conversion to Methanol.
Renewable methanol is an ultra-low carbon chemical produced from sustainable biomass, often called bio-methanol, or from carbon dioxide and hydrogen produced from renewable electricity.

**Renewable Methanol Emission Reductions:** CO2 by up to 95%; NOx by 80%; virtually eliminating SOx and Particulate Matter (PM)
Methanol Vessels On the Water

DUAL FUEL
- 9x - +2 chemical tankers
- MOL, WL, Marinest
- 2 stroke MAN
- new build
- ROPAX ferry
- Stena Line
- 4 stroke Wärtsila
- retrofit
- Pilot boat
- Scania, Weichai, Yuchai
- dryer bulk
- Jiang Long
- high speed
- DMCC
- retrofit
- new build

FUEL CELL
- 2x Tourist Boat propulsion
- Innogy HTWG Konstanz
- SerEnergy fuel cells
- Retrofit
- new build

PROJECT and R&D
- Cruise ships, fishing boat, barge, dredge, a.o.
- SUMMETH/MARTEC, Lean Ships, Methaship, Billion Miles, FiTech, India, PCG Product Vessel, NTU Test Post of Rotterdam Barge, Green Maritime Methanol, FastWater
- SI hybrid, dual fuel, fuel cells
- new build & retrofit

WWW.METHANOL.ORG
• **Sweden/Switzerland:** Proman Stena Bulk – joint venture of shipowner Stena Bulk and Proman Shipping a subsidiary of methanol producer Proman – to build two 50,000 dwt tankers with methanol dual fuel engines

• **Netherlands:** Damen Shipyards has developed new concept Offshore Support Vessel (OSV) to operate on methanol

• **Germany:** Shipowner Liberty One has ordered new multipurpose (MPP) ship powered by methanol

• **Germany:** Shipowner SAL Heavy Lift to install FUELSAVE hydrogen/methanol injection system in 6 vessels

• **Germany:** Abeking & Rasmussen shipyard designing ‘green cruise’ concept vessel using methanol fuel cells for hotel load and methanol propulsion engines
What type of engines can use Methanol?

Source: Wärtsilä

Source: MAN ES

Source: Clean Shipping International
"We developed the ME-LGIM engine in response to interest from the shipping world in alternatives to heavy fuel oil. With the growing demand for cleaner marine fuels, methanol is a sulphur-free alternative that meets the industry’s increasingly stringent emission regulations."

René Sejer Laursen, Promotion Manager at MAN Energy Solutions

https://marine.man-es.com/two-stroke/2-stroke-engines/me-lgim
“Methanol is an economically competitive marine fuel over the cycle”

Paul Hexter, CEO
Waterfront Shipping
Methanol is Globally Available
Marine Fuel Calculator

- MI has engaged Lloyd’s Register to develop a calculator ship operators can use to understand the CAPEX, OPEX and other metrics of the various options for complying with IMO rules, including methanol

Methanol Marine Fuel and Safe Bunkering Guidelines

- As part of the Methaship project, and in cooperation with MI, Lloyd’s Register is also developing a marine fuel and safe bunkering guidelines report that will be shared with the IMO
Pollution in Perspective

LC50 - Lethal Dosis: fish

- Gasoline [1] 8.2 mg/l
- Methane [2] 49.9 mg/l
- Diesel [3] 65 mg/l
- Heavy Fuel Oil [4] 79 mg/l
- Methanol [5] 15.400 mg/l

Sources:
[1] Petrobras/Statoil ASA, Safety Data Sheet, ECHA registration dossier Gasoline
[4] GKG/ A/S Dansk Shell, Safety Data Sheet
Methanol is:

- A simple, safe liquid fuel, miscible in water
- Plentiful, available globally, price competitive
- Works with existing engine technologies as a drop-in or a dual fuel
- Complies with IMO2020 provides a pathway to IMO 2030 and 2050
- Requires only minor modifications to current bunkering infrastructure
What Do The Operators Say?

“We are very enthusiastic about Methanol’s possibilities and it has the potential to be the maritime fuel of the future”
Carl-Johan Hagman
CEO
Stena Line

“We have found the technology for handling Methanol is well developed and offers a safe dual-fuel solution for low-flashpoint liquid fuels”
Patrik Mossberg
Chairman
Marinvest/Skagerack Invest

“Investing in technology that encourages the use of a fuel like Methanol that significantly reduces emissions is a step forward for both our company and the shipping industry”
Akio Mitsuta
Senior Managing Executive Officer
Mitsui O.S.K. Ltd

“We have found Methanol to be one of the best alternative fuels due to its wide availability, the use of existing infrastructure, and the simplicity of the engine design and ship technology”
Rolf Westfal-Larsen Jr.
CEO
Wesfal-Larsen Management
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