Methanol

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Presentation documents:
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Page 8: Kjeld Aabo, MAN Energy Solutions
Page 21: Anita Gajadhar, Proman
Page 26: John Livorness, SABIC
METHANOL AS A MARINE FUEL

Chris Chatterton, COO
SWOT

STRENGTHS
AVAILABLE COMPLIANT LIQUID
NEW BUILD & RETROFIT
SAFE HANDLING EXPERIENCE
SUSTAINABLE

WEAKNESSES
LOW ENERGY DENSITY
LARGELY PERCEIVED UNPROVEN
LOW ENGINE AVAILABILITY

PLAYING TO METHANOL'S STRENGTHS, WE OFFER A FULLY COMPLIANT FUEL, READILY AVAILABLE, COMPETITIVE ON BOTH CAPEX AND OPEX CRITERIA, WITH A FUTURE PROOF PATHWAY

THREATS
DELAY OF DECARBONISATION
CONTINUED LOW OIL PRICE
SPACE

OPPORTUNITIES
EFFICIENT LOGISTICS | DESIGN TRADING | PRICE COMPETITIVE
FEEDSTOCK FLEXIBILITY | BLEND
Grey, blue or green – sustainable & available

METHANOL AS A SUSTAINABLE SOLUTION

SUSTAINABLE BIOMASS
- (Residues, MGO, etc.)
  - Fermentation
  - Gasification

SYNTHETIC FUELS
- Kraft Process
- Renewable Electricity
- Electrolysis
- Carbon Capture

METHANOL AVAILABLE IN OVER 100 PORTS TODAY

- Ports with confirmed methanol supply/storage
- Ports with private bulk liquid storage

www.methanol.org/join-us
Over 100,000 hours of safe and reliable operations

**RETROFFECTS ECONOMICALLY VIABLE**

**METHANOL FUELED VESSELS AND PILOTS**

**DUAL FUEL**
- Chemical Tankers: 11+9*
- Ropax Ferry: 1
- Pilot Boat: 1

**FUEL CELL**
- Tourist Boat: 2
- Ferry: 1

**PROJECT R&D**
- Cruise Ships, Fishing Boats, Barges, Dredges, Others: 4

*9 additional new builds scheduled for delivery by 2023
Report focuses on the three primary pillars of the adoption of zero-carbon fuels when compared with traditional fossil-based fuels, or their readiness from the perspectives of:

Community ⬇️
Technology ⬇️
Investment ⬇️
Easily bunkered & competitively priced

Global Pricing – MGO v Methanol

US$/MT (Energy Equivalent)


Bunker Index – All World Ports: MGO

Global Average Methanol Price
ME-LGIM engines operating at Methanol
Methanol Webinar: Monday 29th June at 2pm

Kjeld Aabo
Director New technologies
Sales and Promotion Two stroke Marine
Member of WG ISO 8217 & Chairman CIMAC Fuels

Whatever your vessel, we have a fuel solution that fits
Fuel flexibility

MAN B&W technology available for the combustion of the following fuels

- Residual
- Distillates
- ULSFO
- Crude Biofuel
- Methanol
- LPG
- Ethane
- Methane/LNG
- Ammonia - carbon free

ME-C

ME-LGIM/LGIP

ME-GI/GIE
## Dual Fuel Orders Including Options

<table>
<thead>
<tr>
<th>Engine type</th>
<th>Number of engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI</td>
<td>231</td>
</tr>
<tr>
<td>LGIM</td>
<td>18</td>
</tr>
<tr>
<td>GIE</td>
<td>23</td>
</tr>
<tr>
<td>LGIP</td>
<td>40</td>
</tr>
</tbody>
</table>

- **Total dual fuel engines including options**: 312 engines
- **Total power main engine**: 6,4 GW
- **Total dual fuel 2-Stroke in service**: 120 engines
- **2 Stroke Gas Running Hours above**: 1 million
ME-LGI Methanol - Development Milestones

Historical timeline

- 2015: LGI demonstration event at RCC 4T50ME-X
- 2016: Test at MES 7S50ME-B9.3-LGIM
- 2017: Test at HHI 7G50ME-B9.3-LGIM
- 2018: Development of Tier III compliance by Water in methanol
- 2019: NOx certification 6G50ME-C9.5-LGIM-W at HHI June 2019
- 2020: Order book of 14 LGIM engines in total, 8 in service >65,000 running hours accumulated on methanol

1st sea trials on methanol MNS Taranaki Sun & HMD Lindanger
ME-GI engine
GI components
ME-GI Concept
Combustion Concept

- Direct injection of pilot oil and gas
- Yellow = pilot oil
- Blue = gas
- Conventional slide fuel valve
- Gas fuel valve
- Gas distribution channel
- Gas block
- Gas chain link double-walled pipes
The LGIM engine

Concept

1. Combustion illustration
   - Yellow = pilot oil
   - Blue    = Methanol

2. Conventional slide fuel valve

3. Methanol injection valve (FBIV-M)

The ME-LGIM engine is derived from the industry standard ME engine

- Diesel Cycle operating principle with high efficiency
- High fuel flexibility
- No risk of knocking
- A robust gas consumption – unchanged load response – unaffected by ambient condition
Fuel supply system

ME-LGIM auxiliaries overview
Fuel supply system

ME-LGIMW - water in methanol - Tier III technology
Examples

of ship types where LGIM could be applied

50,000 dwt tanker
6G50ME-C9.6-LGIM EcoEGR
SMCR 7,500 kW at 85.0 r/min

15,000 teu Container Vessel
8G95ME-C10.5-LGIM EcoEGR (alt. 9G95ME-C10.5)
SMCR 45,000 kW at 75.0 r/min
6G50ME-B9.3-LGIM Engine

Cleaner than most peoples kitchen

– Mari Jone has reached 12.000 operation hours solely on methanol

The picture is from Mari Jone, and it is taken after 10.000 operation hours.

✓ No signs of oil anywhere in the engine room.
Disclaimer

All data provided in this document is non-binding. This data serves informational purposes only and is especially not guaranteed in any way. Depending on the subsequent specific individual projects, the relevant data may be subject to changes and will be assessed and determined individually for each project. This will depend on the particular characteristics of each individual project, especially specific site and operational conditions.
Thank you very much!
On the Water with Methanol: A Practical “Future Proof” Marine Fuel

Riviera Maritime Webinar
June 2020
Proman: Key Facts and Figures

- Headquartered in Wollerau, Switzerland
- Parent company of Methanol Holdings (Trinidad) Limited (MHTL).
- 2nd largest methanol producer in the world
- One of the 10 leading global fertilizer companies
- 1,750 employees operating in four continents
- 17 petrochemical plants worldwide
- 10,000,000 MT/y production capacity
- EPC experience with over 15 plants built
- A fleet of 13 time-chartered vessels comprised of 9 zinc-coated and 3 epoxy-coated chemical tankers, 1 marine-line coated tanker
- 2 newbuildings on order, both with methanol dual-fuel engines, jointly owned with Stena Bulk
Methanol is a biodegradable, clean burning fuel with significantly lower GHG emissions than traditional marine fuels. Clear environmental benefits make methanol a ‘future-proof’ fuel to help meet IMO 2030 and 2050 carbon emission targets.

Methanol is safe to handle, and part of a tested and established infrastructure. It is available in 122 ports worldwide, including all major bunkering hubs, with relatively low infrastructure costs.

Methanol dual fuel engines can be easily retrofitted to chemical tankers at a competitive cost.

New technology to blend methanol and water to meet Tier III NOx requirements, resulting in further reductions in GHG emissions and reduced CAPEX and OPEX.
Proman Stena Bulk JV – Dual-fuel vessels to be in service by 2022

- Owner: Proman Stena Bulk Limited
- Engine: Methanol Dual Fuel (MAN B&W 6G50ME-C9.6 MW Tier III)
- IMO II – 18 Cargo Tanks
- Methanol consumption: ~ 40-46 MT/Day
- Size (DWT): 49,900 MT
- Fleet Size No. – 2
- Delivery – Q1 2022
Thank you
CHEMISTRY THAT MATTERS™

METHANOL MARINE FUEL

JOHN LIVORNES
SENIOR BUSINESS MANAGER
SABIC ASIA PACIFIC PTE. LTD.
June 2020
SABIC AT-A-GLANCE......A HIGH RATE OF GROWTH WITH 75.3 MILLION MT PRODUCTS PRODUCED IN 2018.......HIGH FOCUS ON SAFETY, THE ENVIRONMENT AND SUSTAINABILITY......6MILLION MT METHANOL CAPACITY

- Company established: 1976
- Employees around the world: 33,000
- Countries of operations: 50
- Largest global chemical company*: 3rd
- Largest public company in the world*: 122nd
- Estimated Brand Value**: 4.334
- US$ bn Total assets: 82.6
- US$ bn Net income: 1.5
- US$ bn Annual revenue: 37.3
- ≈ 150 New products each year
- 12,540 Global patent filings
- 68 World-class plants worldwide

*Forbes 2019   **Brand Finance, 2020
METHANOL BROAD APPLICATION BASE.....FUELS USE EXPECTED TO GROW

Methanol Industry capacity growth as new applications emerge

- “Spare” capacity in China
- Diversity of applications supports methanol demand through the cycles
- Demand for methanol as a clean fuel alternative growing
- Methanol producers invested in capacity when demand became transparent
  - Methanol-to-Olefins demand grew from 0 in 2010 to 20 million Tonnes in 2020

METHANOL ATTRACTIVENESS AS A MARINE FUEL

✓ Widely traded in physical, paper, contract, spot & futures markets
  ➢ Global specification
  ➢ Price transparency
  ➢ Globally available at major port locations
  ➢ Ready infrastructure for bunkering

✓ Well known properties – toxicology, flammability, handling & environmental
  ➢ IMO Interim Guidelines (LFP)

✓ Clean burning (SOX/NOX/PM)
✓ Known routes to renewable methanol – scaling up now
✓ Engine designs known and proven in commercial use
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