



synergetics



Introducing methanol as a marine fuel
Danube Port Days 2023-11-24 Vienna
Bengt Ramne *ScandiNAOS AB*



Funded by the Horizon Europe Programme of the European Union under grant agreement No 101096809

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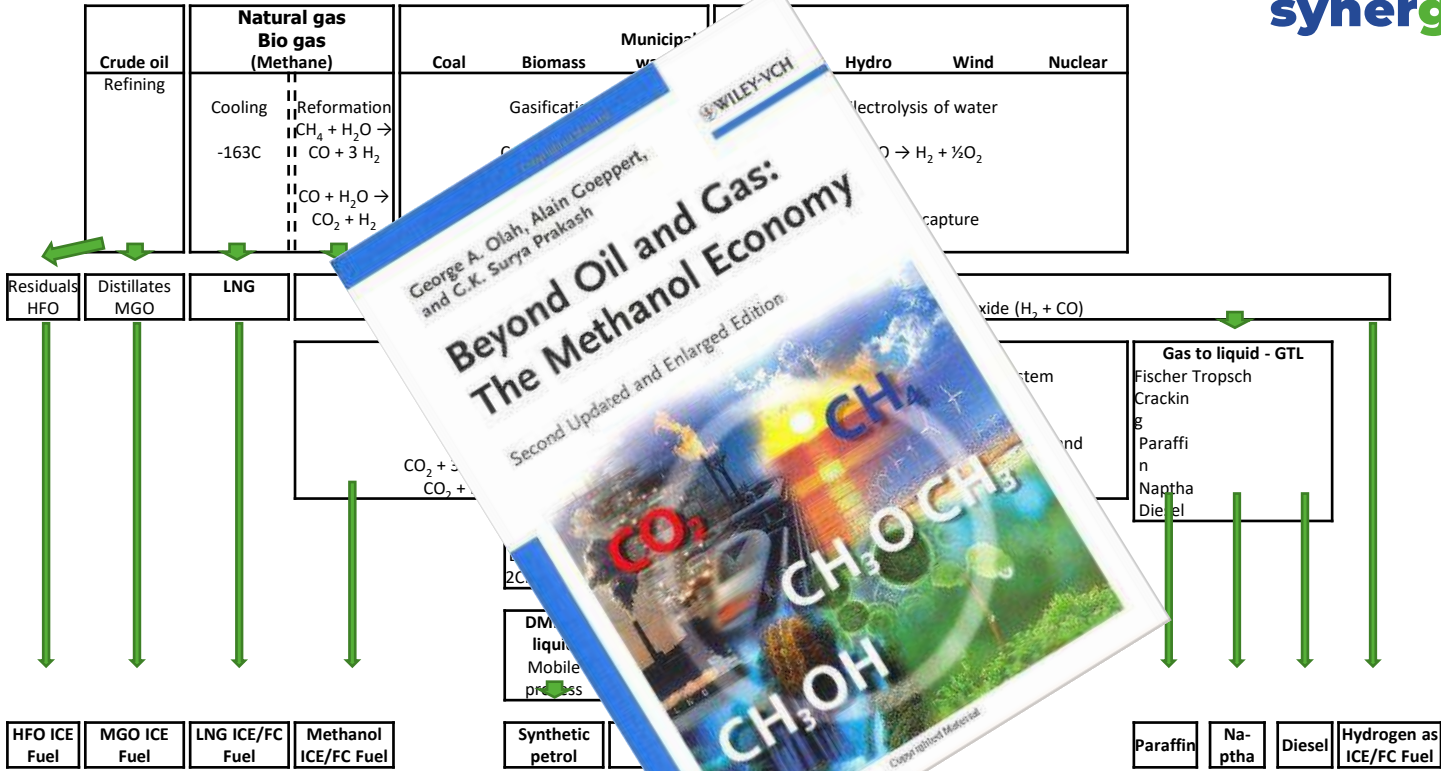
Funded by the Swiss State Secretariat for Education, Research and Innovation



➤ Established in 2005

➤ **ScandiNAOS AB** is a Swedish ship design company with expertise within energy efficient and sustainable shipping. We aim to find the best environmental and economic alternative for a sustainable and successful maritime transport industry.

Alternative Marine Fuel - Feedstock and products



Diesel fuel	Diesel fuel	Otto fuel Requires spark ignition or dual fuel or diesel engine	Otto fuel Requires spark ignition, dual fuel or methanol - diesel engine
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Otto fuel Diesel fuel

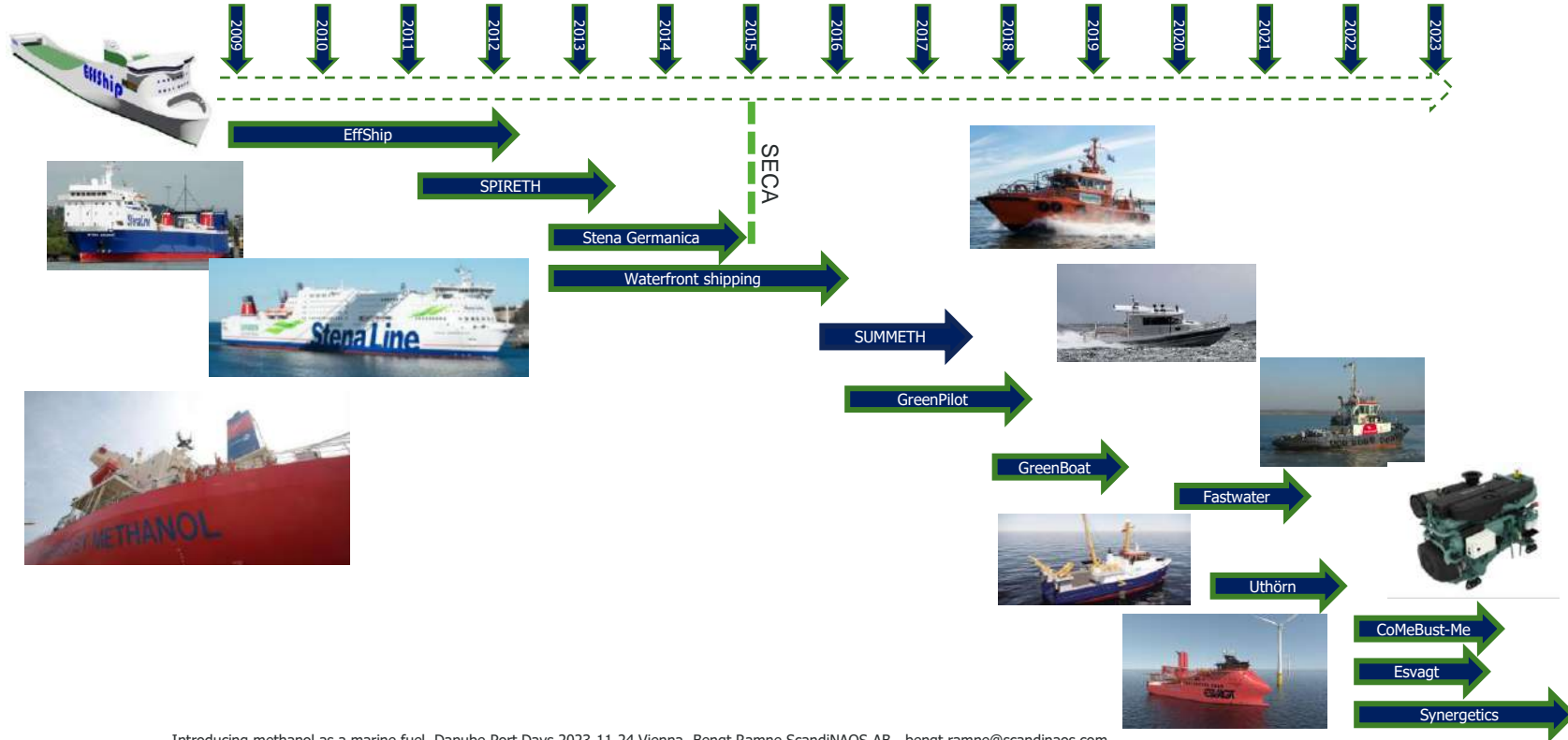


Why Methanol

- Clean burning alcohol with no sulphur, and low emissions of particulates and nitrogen oxides
- Good potential for being produced from renewable feedstocks
- Is biodegradable and does not bioaccumulate in the aquatic environment
- Liquid fuel that is easy to transport and distribute



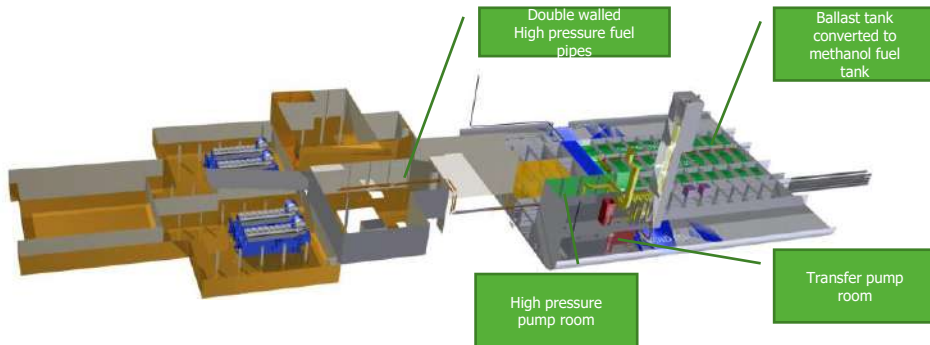
Relevant methanol projects



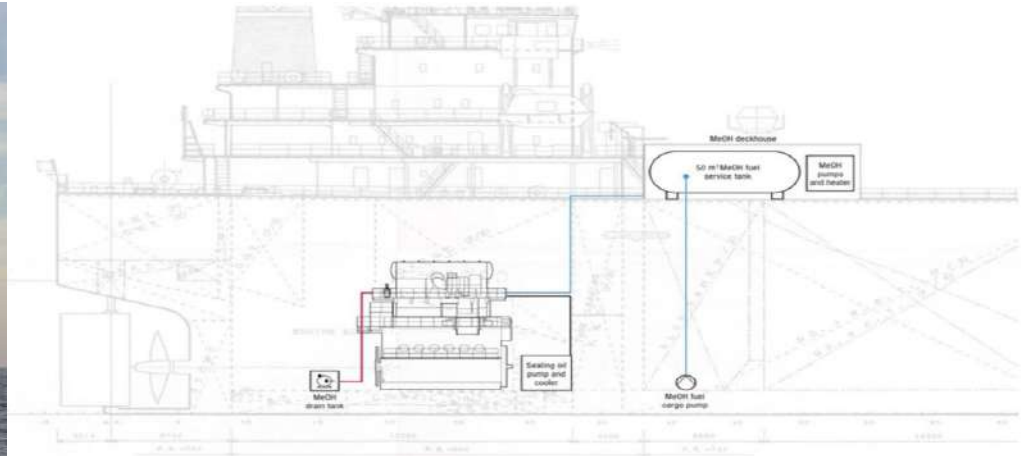
Design – Challenges

- Low flashpoint fuel 11 °C
 - Diesel 60 °C
 - Gasoline -40 °C
 - LNG -188 °C
- Methanol flame is almost invisible in daylight
- Fire suppression
 - Less heat radiation compared to diesel
 - Water can be used for fire suppression
- Material compatibility
 - Metals and rubber in contact with methanol to be considered





Mari Jone

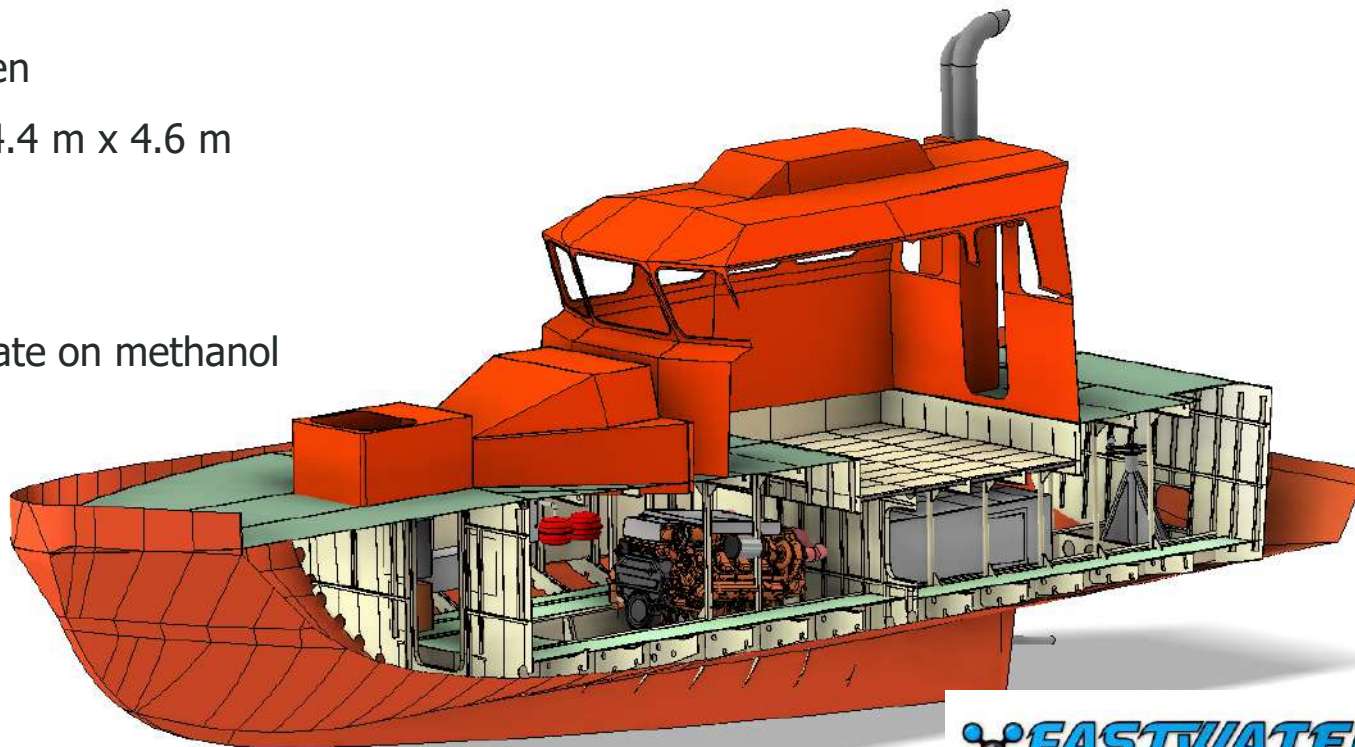


Compression ignited, with ignition improver (CI)



PILOT BOAT 120 SE

- Operated in Sweden
- Length x width: 14.4 m x 4.6 m
- Single engine
- Fixed propeller
- Converted to operate on methanol



PILOT BOAT 120 SE

New methanol powered engine

- Installed in a normal engine room
- Diesel-like performance

Double-walled fuel pipes and double-skinned tank

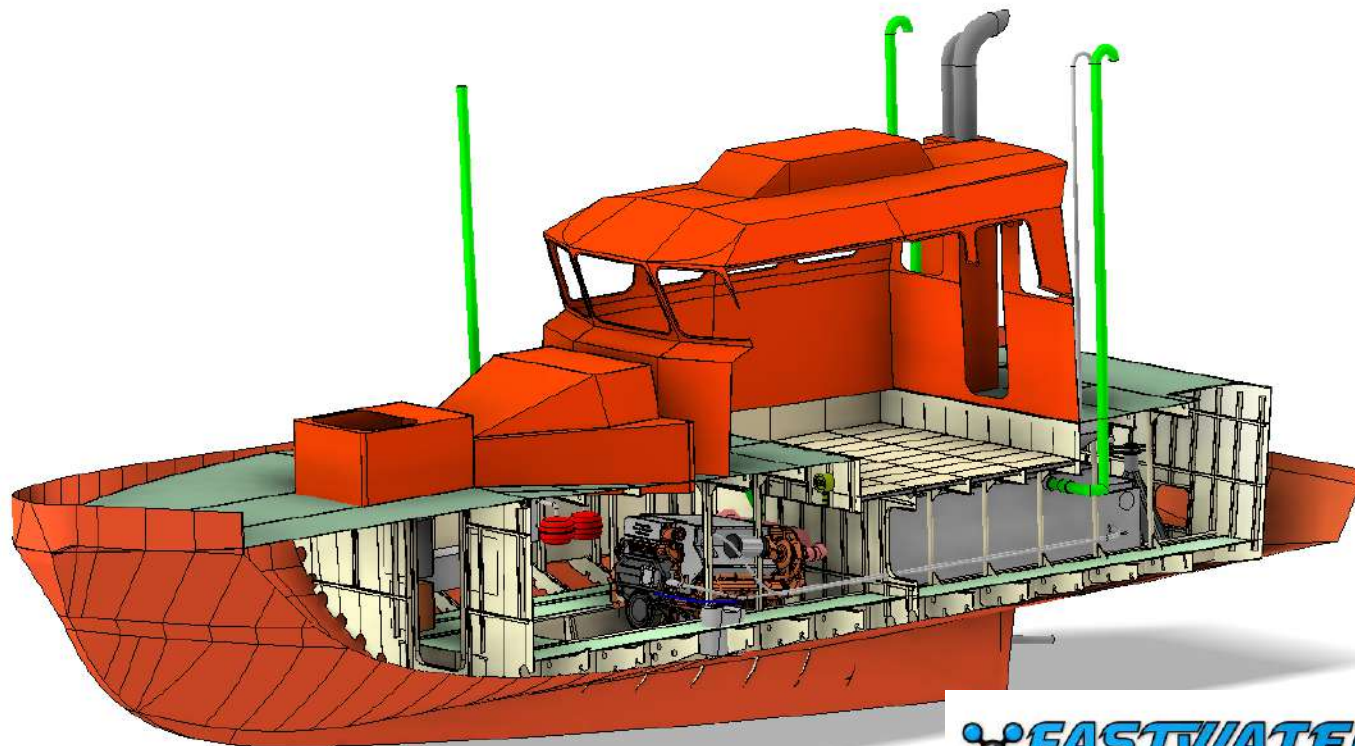
- Fuel filters inside fuel. Prep. space
- Simple tank arrangement

Leakage alarm:

- Gas detectors
- Level switch

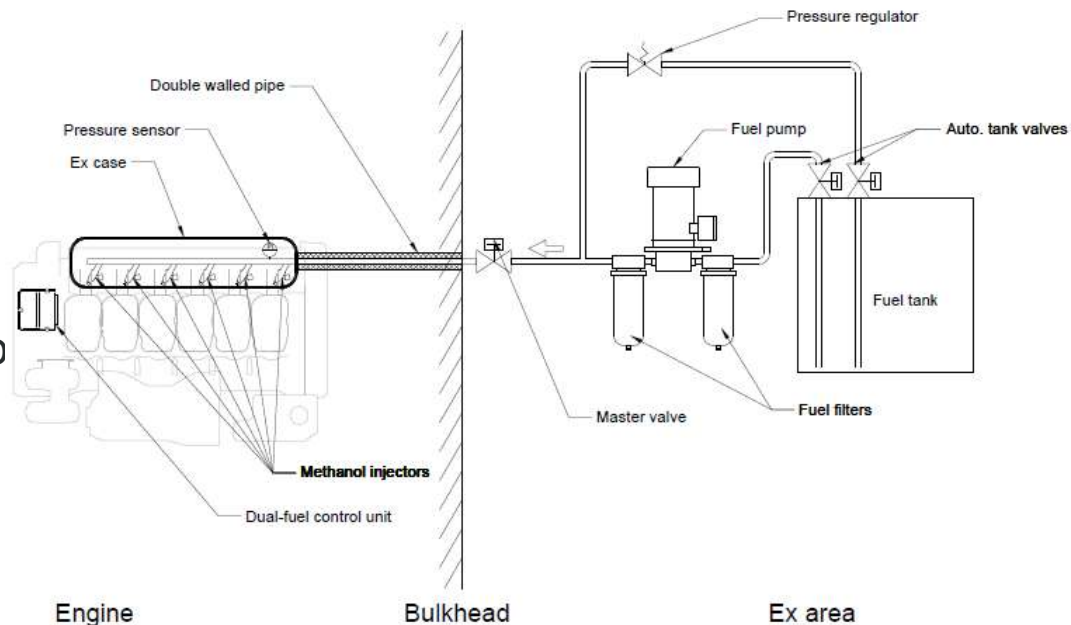
Fire safety:

- Heat detectors



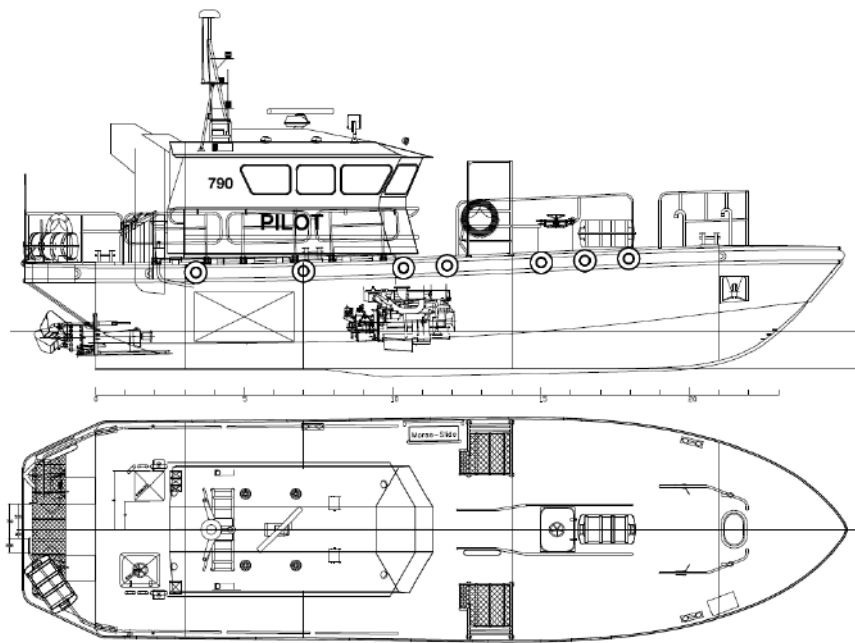
Dual-fuel – system layout

- Dual-fuel system with port injection. injectors in the air intake manifold
- Conversion of existing engines
- The baseline is to replace 50% to 85% (energy ratio) of diesel with methanol
- 100% power available
- Target 200-1000kW



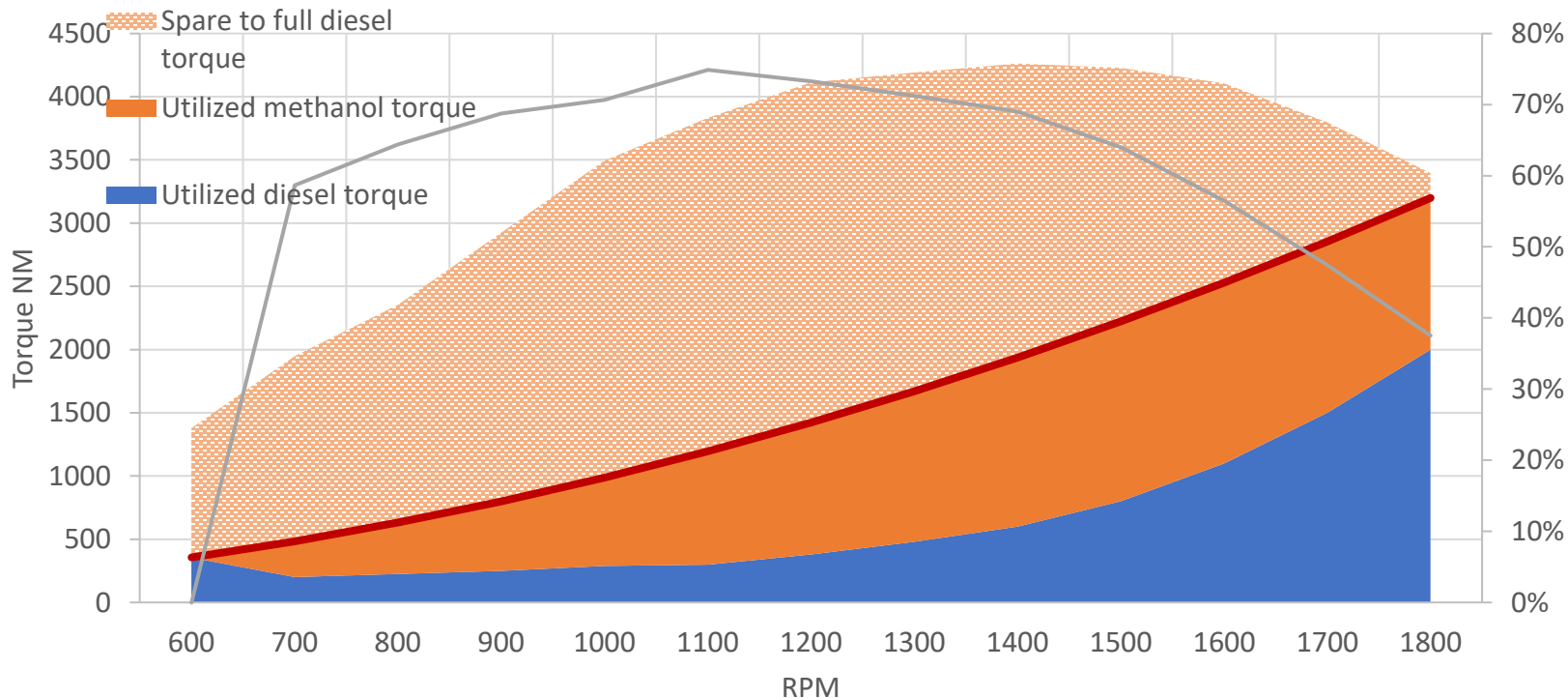
CoMeBust-Me

Conversion Methods for Combustion of Methanol



Dual fuel – Est. diesel replacement

Dual fuel strategy propeller curve



WP3 Task 3.4 System demonstrator

- Two engines toe-to-toe, CI vs DF
 - Compared with respect to a range of performance parameters (cost of engine conversion, fuel efficiency, emissions, etc.)
 - The objective is to identify an optimal solution with respect to the utilization of methanol in internal combustion engines (ICE) depending on the ship type, size, and operational profile.



Methanol Pioneers



- **ScandiNAOS AB**

- Naval architects that have pioneered the introduction of methanol as marine fuel
- Methanol design since 2009



- **Enmar Engines AB**

- Supplier of methanol engines
- Based on Scania engine program
- Dual-fuel retrofit kit





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Thank you!
Questions?



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Dual fuel port injection (DF-PI)

