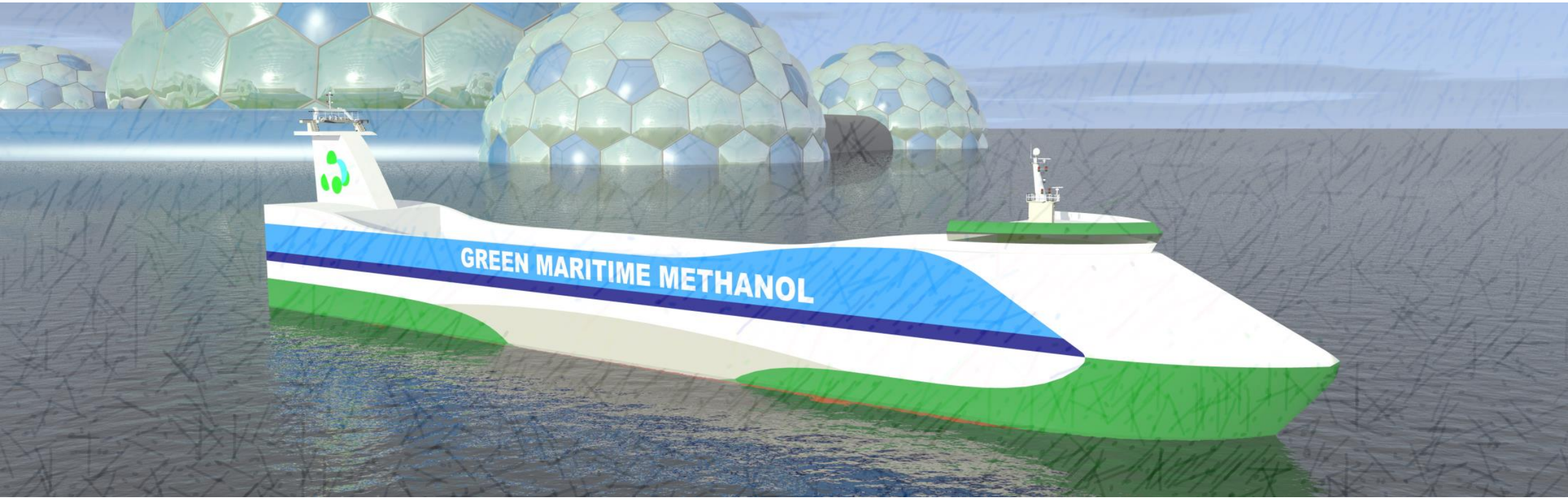
GREEN MARITIME METHANOL 2.0



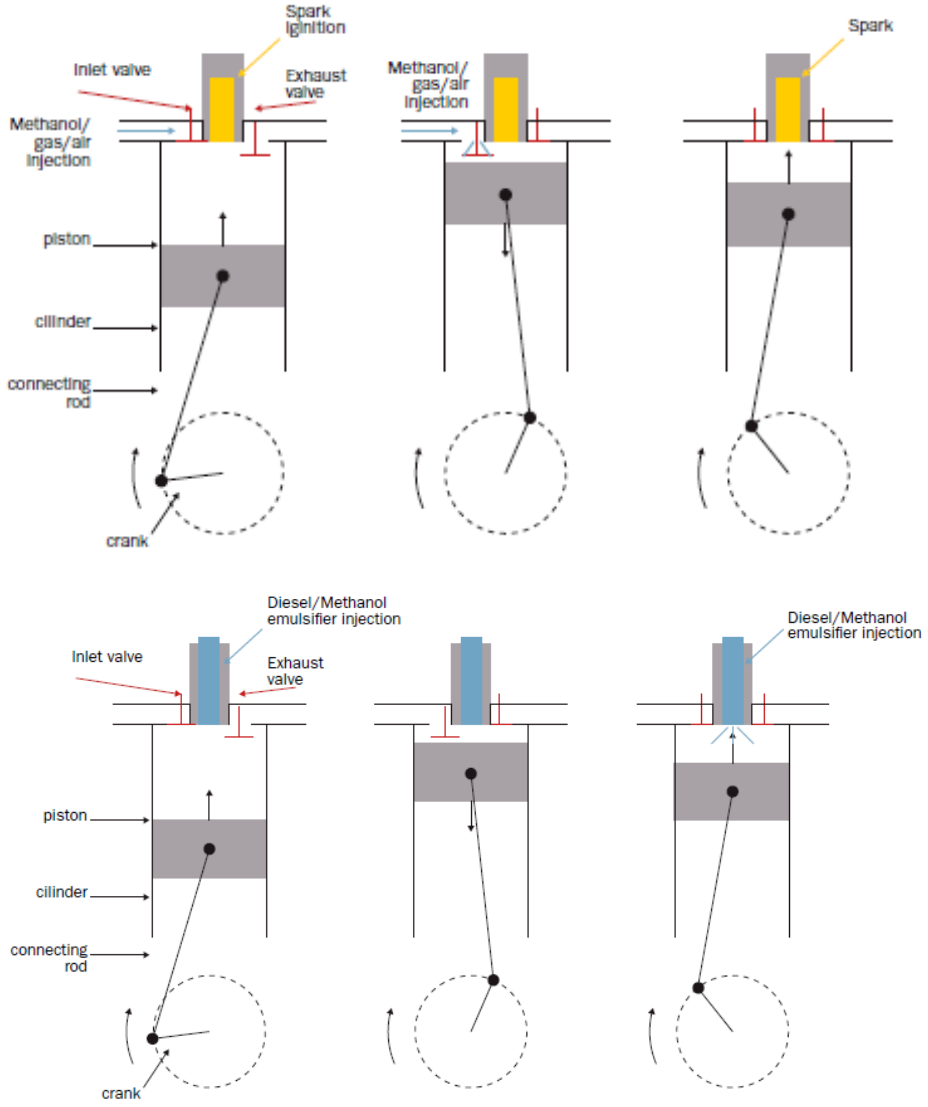
Alternative Fuels V workshop

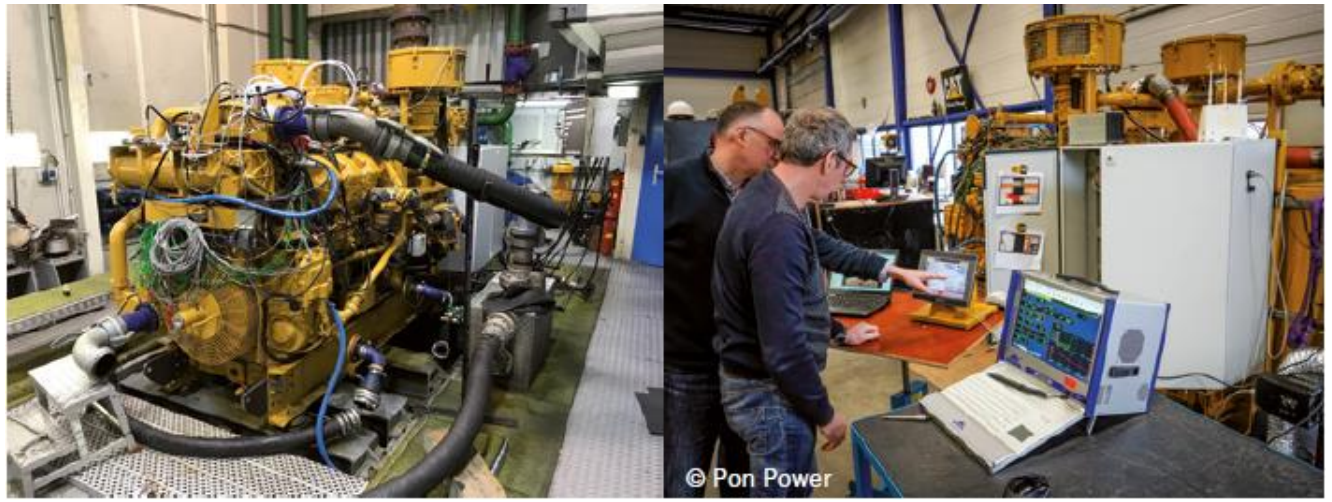
INTRODUCTION

- Promising options for implementation in the short to medium term:
  - Methanol production capacity is readily available worldwide
  - Energy density of the fuel makes methanol a suitable fuel for small and medium sized vessels
  - Implementation of both biobased or synthetic feedstock is possible further reducing WTP CO_2-emissions

- In the project, the following topics were raised:
  - Overall technical and operational requirements (engine performance, safe storage and bunkering)
  - Economic and environmental viability
  - Translation of these overall results into different shipping markets

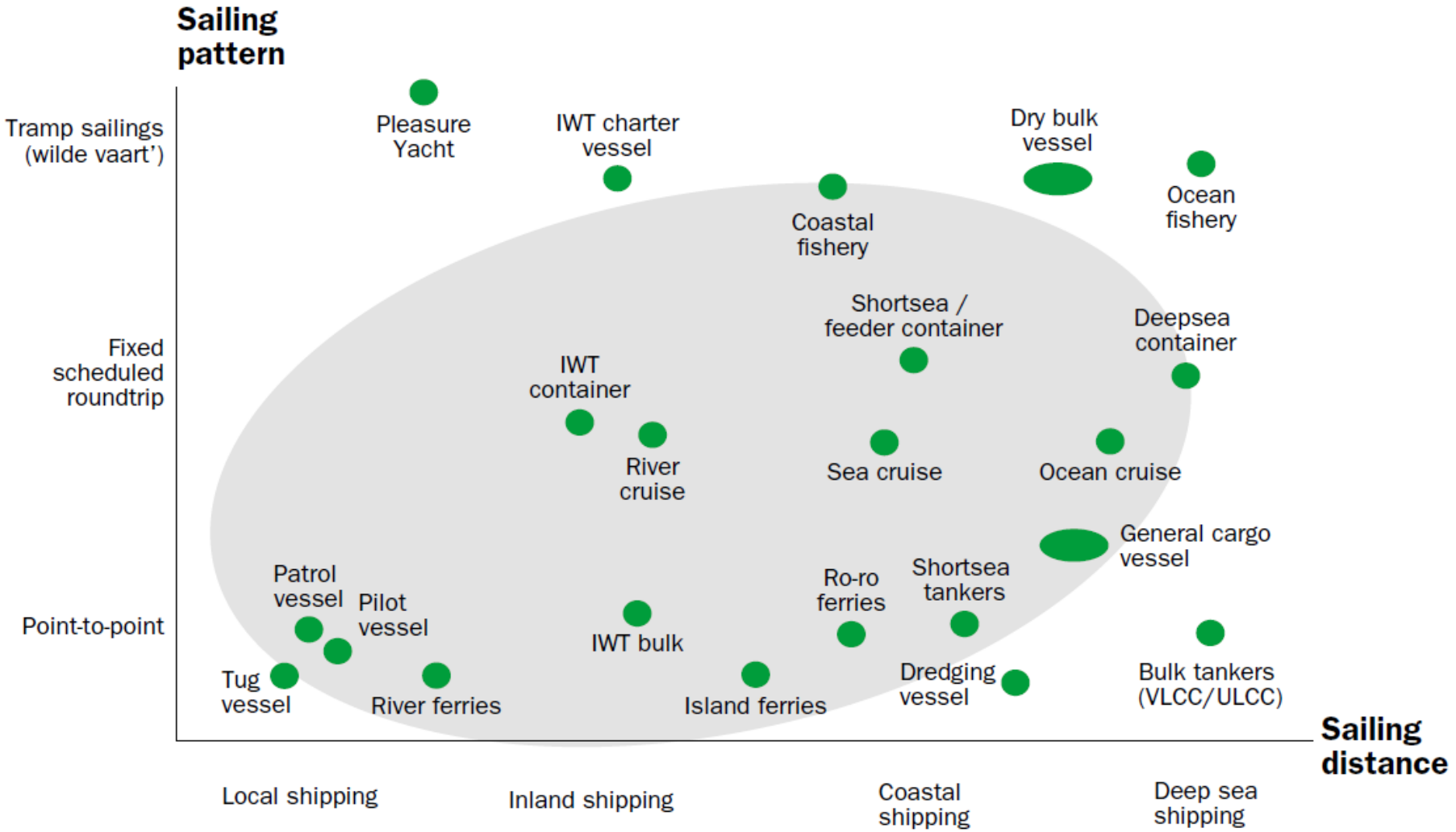
ENGINE PERFORMANCE





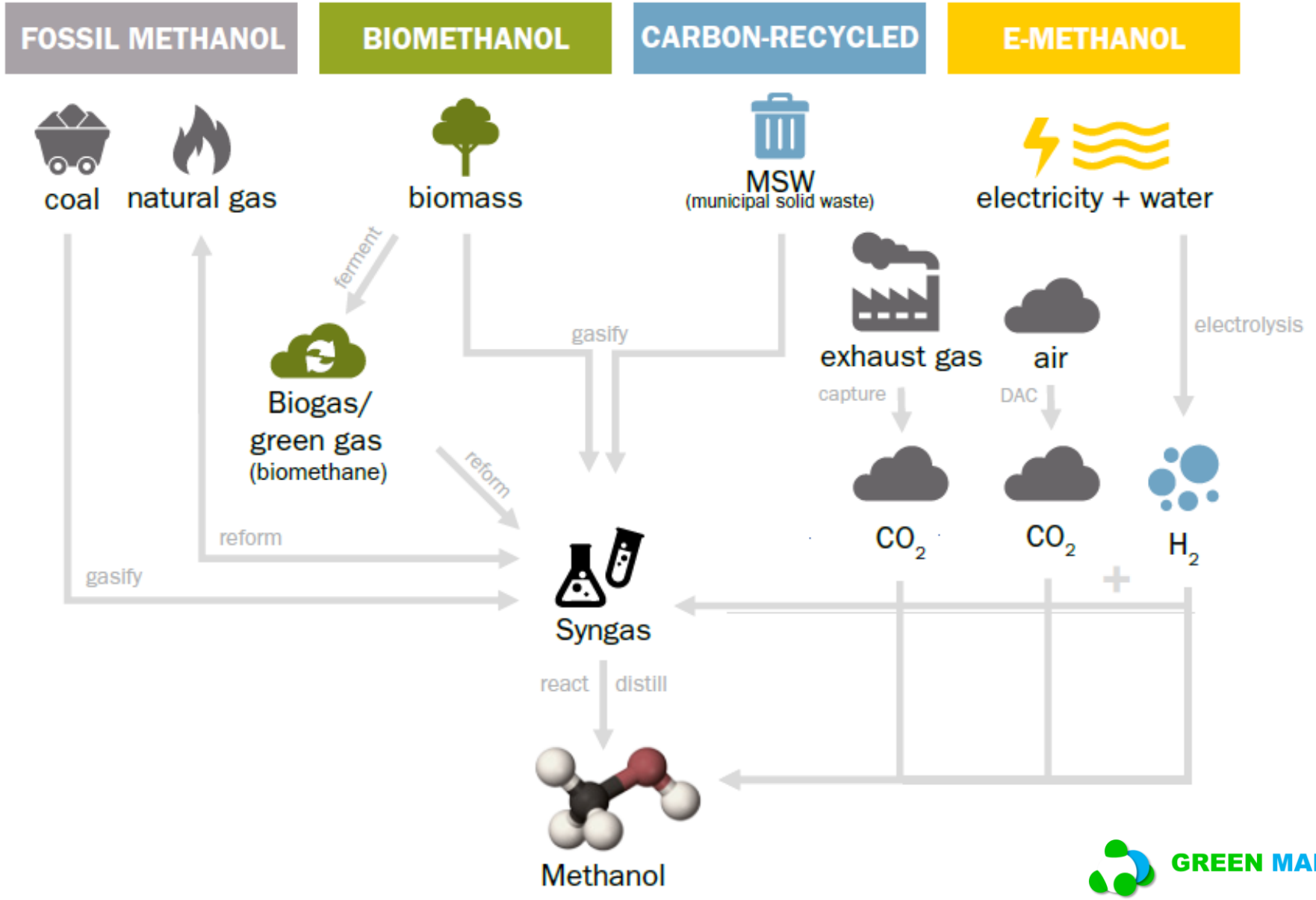
GREEN MARITIME METHANOL

POTENTIAL SIZE OF THE METHANOL SHIPPING MARKET



GREEN MARITIME METHANOL

PRODUCTION ROUTES

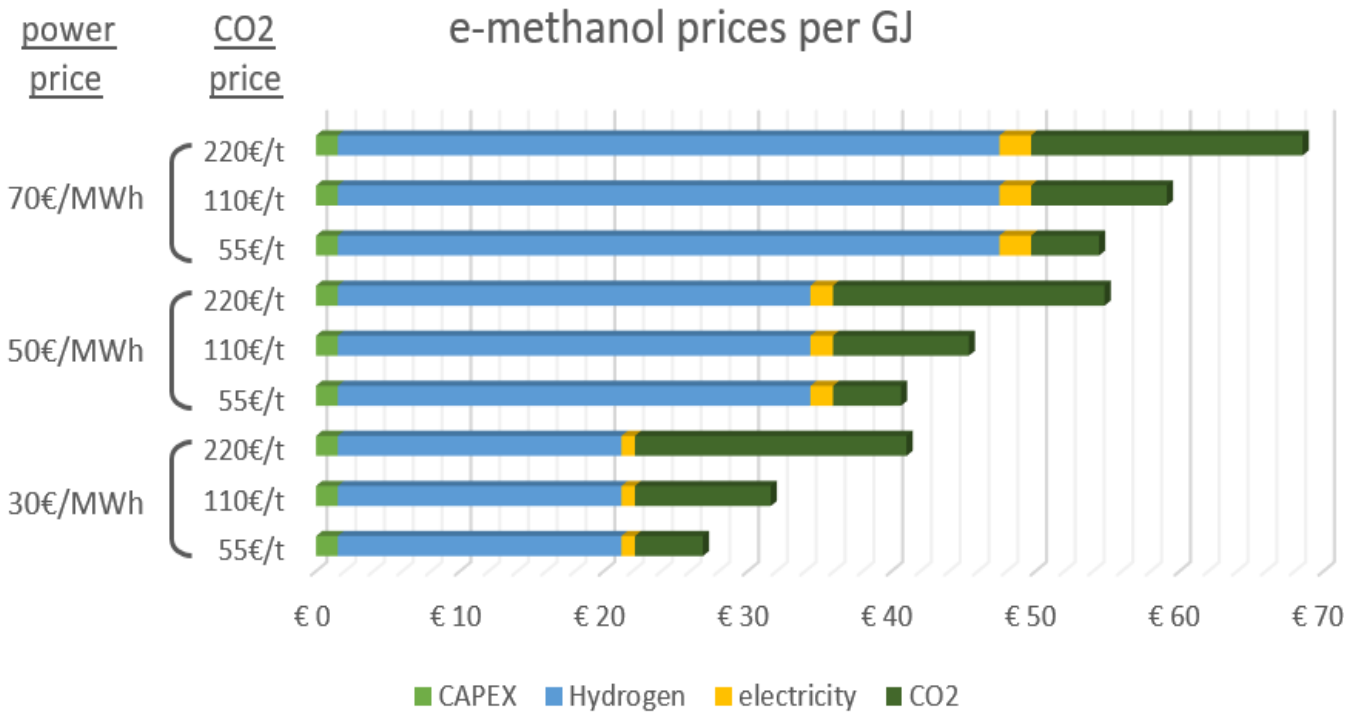


GREEN MARITIME METHANOL

E - METHANOL

PRICE

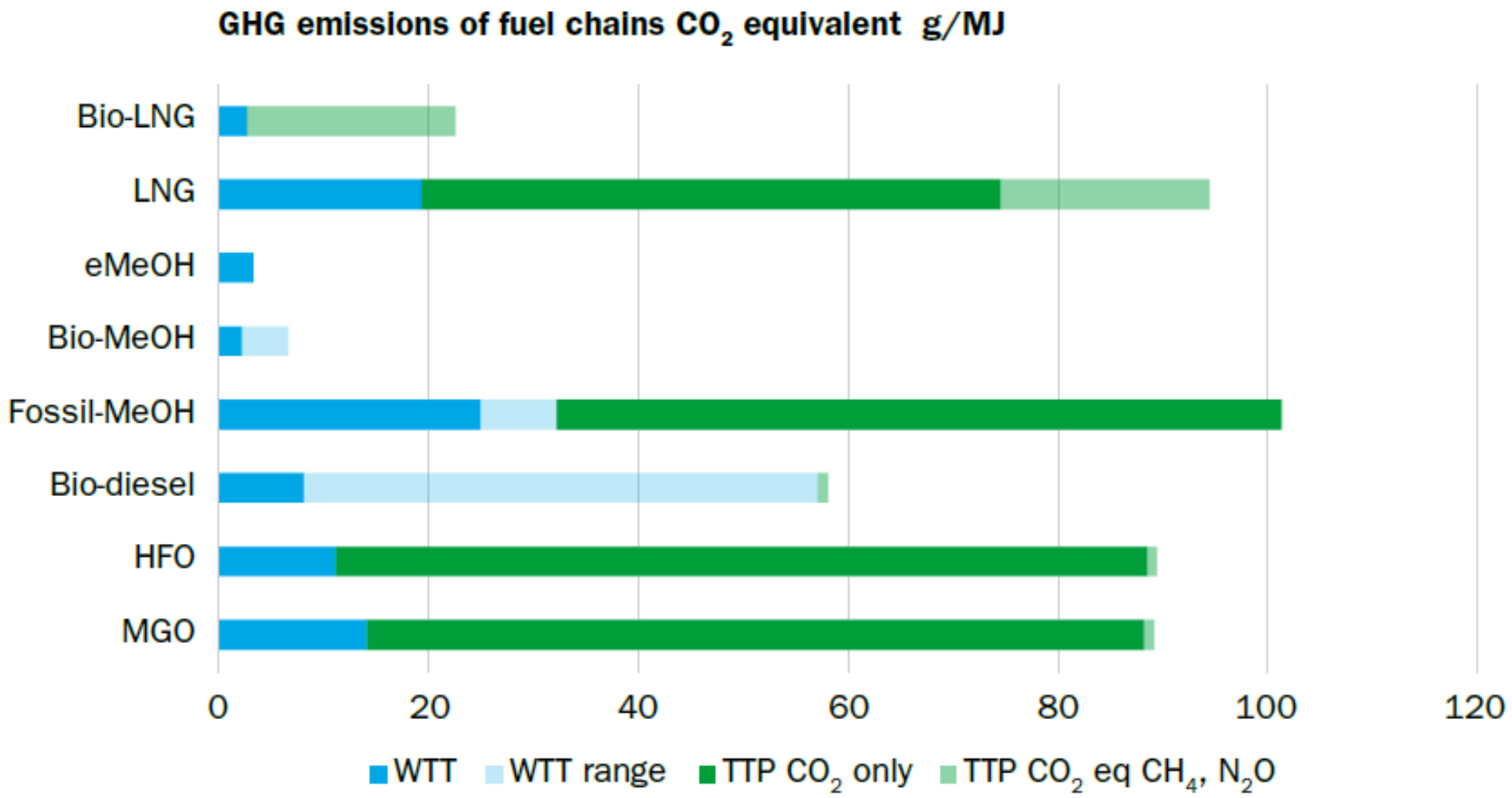
- Price
  - Depends on H_2/electricity cost and CO_2-source
  - Dominated by hydrogen production cost
  - Range: ca. 27–68€/GJ or 540–1360€/t
    (grey methanol: 200-500€/t)
- Future: depends on electricity price, policy and tech development.



AVAILABILITY

- Current
  - 2020: ca. 55PJ sun and wind energy in NL
- Future:
  - Theoretical capacity much higher than for biomass
  - ~2000PJ capacity in the Netherlands

IMPACT ON CO_2-EMISSIONS



GREEN MARITIME METHANOL

SIX DESIGN STUDIES

GREEN MARITIME METHANOL

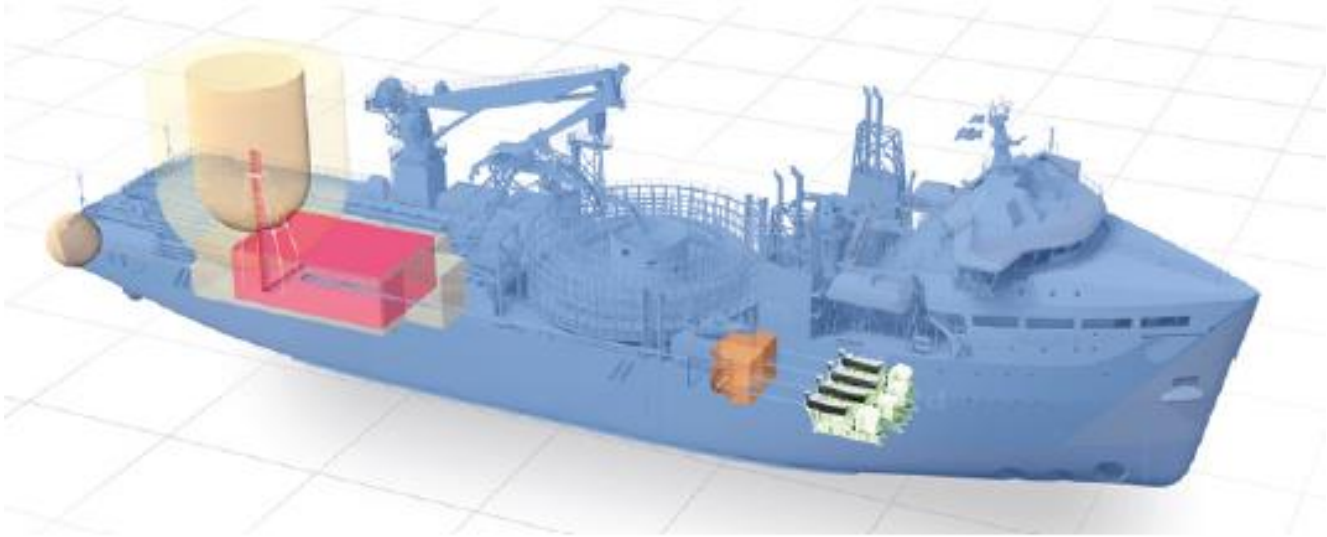
CABLE LAYING VESSEL

Built:	2014
Length over all:	122.68 m
Breadth moulded:	27.45 m
Max. draught dredging:	5.82 m
DWT:	8,398 tons
Cable carousel	5,000 tons
Total bunker capacity:	1,678 m³ (incl. service tanks)
Main Power:	10,948 kW (Total Power installed)
Speed:	12.4 knots

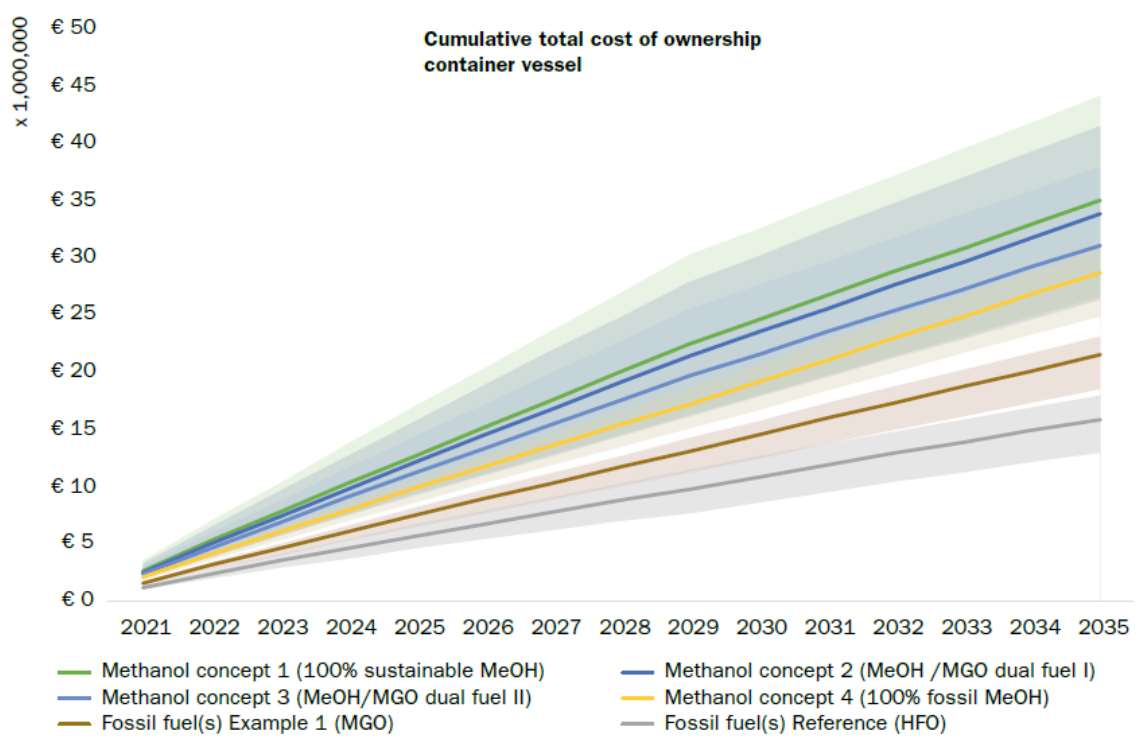
Fuel consumption and CO_2 emissions	Fuel Type	Energy [GJ]	Volume [m³]	CO_2–emissions Weight [Tons]	Tons[1)]	Reduction %
Short range mission profile (two weeks autonomy)	MeOH	8,05	517	409	262	54%
	MGO pilot[2)]	403	10	9	29	
	Total	8,453	527	418	291	
	MGO only	8,453	230	198	634	0%
Long range mission profile (four weeks autonomy)	MeOH	8,05	517	409	262	22%
	MGO pilot[2)]	403	10	9	29	
	MGO	12,1	329	283	906	
	Total	20,553	856	701	1,197	
	MGO only	20,553	559	481	1,539	0%

CABLE LAYING VESSEL

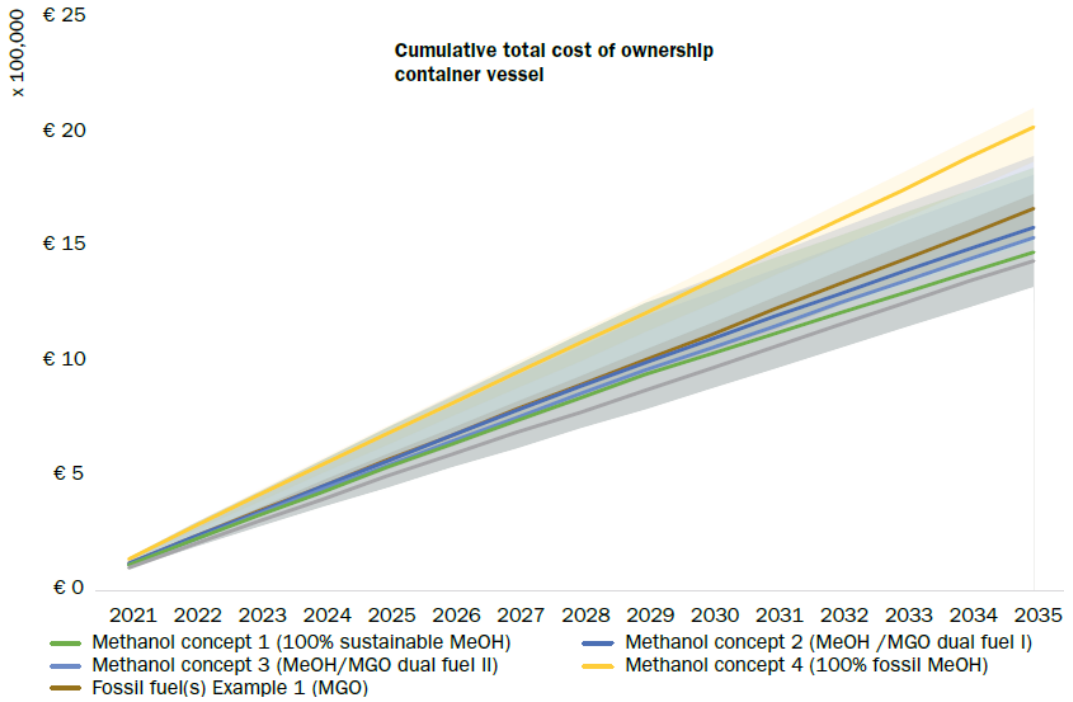
- Concept design for methanol
  - Rebuild towards methanol engines on the ship design is a major conversion
  - It seems feasible to redesign the vessel towards dual-fual
- HAZID
  - Up to 90 people on board, also working on deck with a lot of equipment.
  - The ventilation outlets of tanks and spaces should therefore be positioned so that hazardous zones are as far away from working areas as reasonably possible.
  - More input is needed on safety zones in the engine and tank area.



BUSINESS CASE



Base case



CO2 price 150€

GREEN MARITIME METHANOL

CONCLUSIONS

- Applying methanol as a shipping fuel is deemed to be feasible from a technical and operational perspective:
- There are several options for sustainable production from sources such as biomass, municipal waste and through a synthetic production from hydrogen and a sustainable carbon source.
  - However, the availability and price levels of these feedstock routes are still uncertain.
- From the six methanol ship designs that were performed as part of the project it is concluded that:
  - retrofitting existing vessels is more complicated and costly than redesign of newbuild vessels.
  - The use cases however show significant differences in the redesign costs, based on the current layout and available space onboard and the preferred bunkering solution (either switch to methanol as single fuel option or as a dual fuel

GREEN MARITIME METHANOL 2.0

- The consortium continues with a two year follow-up project, focussing on:
  - Safety aspects venting and storage on board
  - Preparation for engine tests and development
  - Design studies for pilot preparation
  - Supply chain, value chain and policy

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WANT TO KNOW MORE?

- FINAL REPORT

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