

Synthetic methanol as a maritime fuel for shipping from Bremerhaven – the research project MariSynFuel

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MariSynFuel – Synthetic Methanol „Made in Bremerhaven“

Key elements:

- Development and construction of a plant for the production of "green" methanol on a demonstration scale
- Production capacity of 500 kg/d
- Direct application for the new research vessel "Uthörn"

Project partner:

Time schedule

- 01.01.2023 – Beginning of the Project
- Q4 2025 - Production of synthetic methanol "Made in Bremerhaven" for the direct use by the "Uthörn" (annually 180 t estimated)
- 31.12.2026 – End of the project



Funded by



Federal Ministry
for Digital
and Transport

Due to a resolution of
the German Bundestag

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6.5 Mio. Euro



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Objective:

- Production of hydrogen-based synthetic marine fuels from Bremerhaven, in line with the reduction of CO₂ emissions from fossil fuels
- Development of a sustainable value chain in Bremerhaven with companies from the City



Green electricity/
exhaust gas flow



Green H₂
recycled CO₂



Methanol
synthesis



storage &
transhipment



Application



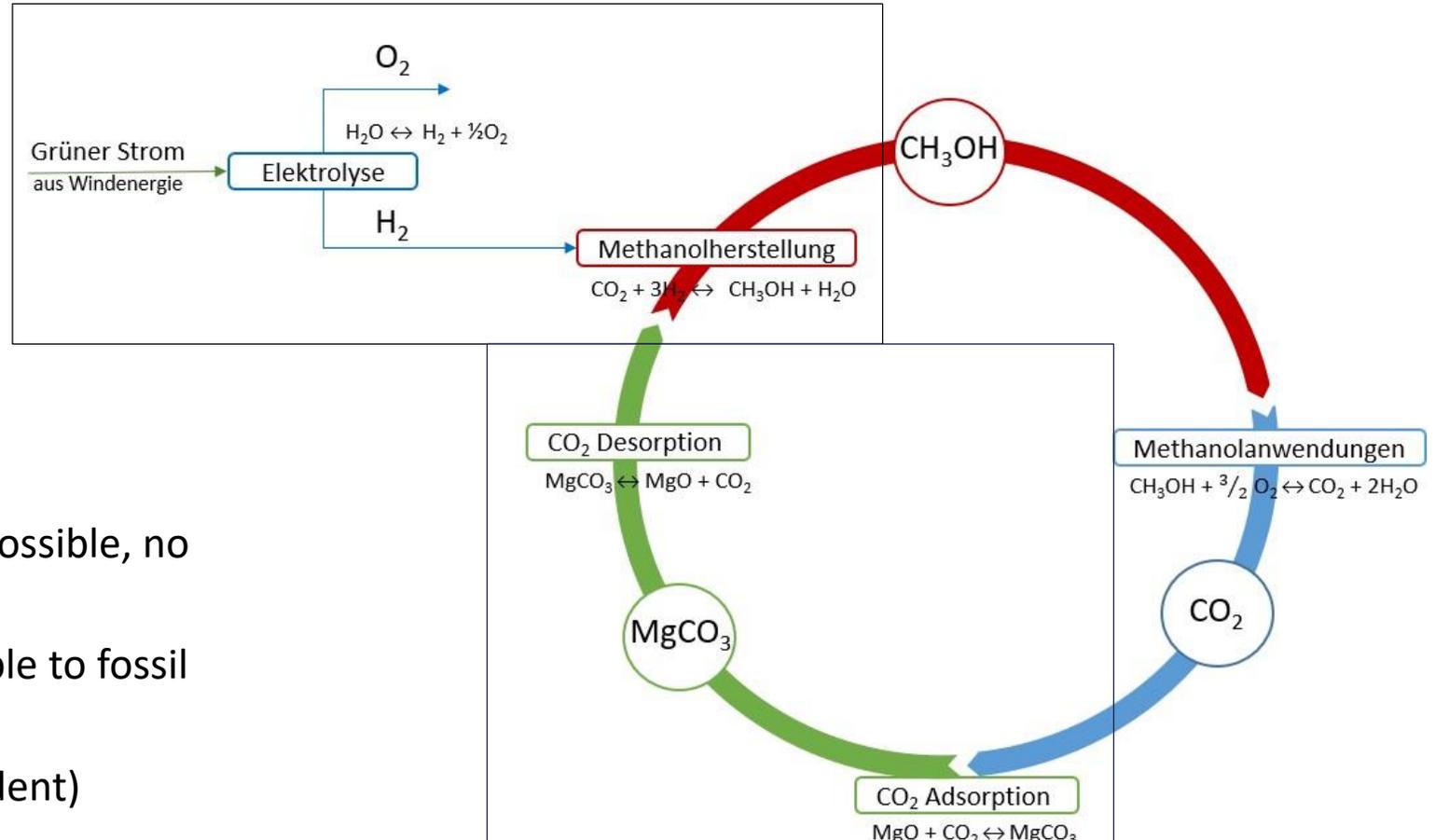
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Production cycle

- Technology upscaling
- Catalysts, process parameters, process concept for methanol synthesis, product processing
- CO₂-Neutrality

Use in shipping

- "grey" methanol is available on the market
- Conversion of existing ship engines easily possible, no new development of engines required
- Transport and storage properties comparable to fossil liquid fuels
- in case of entry into seawater (case of accident) methanol is good biodegradable





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Own process of ttz Bremerhaven for CO₂ adsorption, storage and material use - Project "Material use CO₂"

Funding of technology development by the BMWi as part of the INNO-KOM module. Market-oriented research and development, FKZ 49MF190001 (04/01/2019 - 12/31/2021)

applicable to CO₂ from:

- flue gases/exhaust gases
- biogas
- particularly energy-efficient CO₂ separation by using residual thermal energy in flue gases/exhaust gases for binding/storing the CO₂
- in MariSynFuel upscaling of the plant capacity to the required amount of CO₂ (687.5 kg CO₂/d for 500 kg/d methanol))



Pilot plant for CO₂ capture and storage in ttz Bremerhaven



Essential work steps

Work Block A: Technical development and construction of the methanol plant

- Planning phase
- Plant development (TRL 5-6)
- System extension (TRL 7)
- Demonstration scale (TRL 8)

Working block B: conception of supply and infrastructure

- Detailed planning of the installation site of the demo system
- Provision of green H₂ and biogenic CO₂
- Bunker and refueling concept
- Operator and operating concept



Essential work steps (continued)

Working block C: Scientific monitoring and evaluation of the technology

- Techno-economic process evaluation
- life cycle assessment
- Transferability to other locations and possible uses

Working Block D: Project coordination and public relations

- Public Relations and Marketing
- security concept
- coordination and reporting



Existing infrastructure in Bremerhaven

- Green electricity:
 - Offshore wind farm German North Sea (capacity approx. 6,700 MW)
- Electrolyser power:
 - 2 MW each – scalable in perspective
 - HY.City Bremerhaven GmbH & Co KG
 - Fraunhofer IWES
- Storage, handling, bunker:
 - UTG tank farm Bremerhaven
 - 97,300 m³ tank space
 - Can be converted to methanol storage as required
 - Blending and bunker options
- Transport logistics -> trailer solution in the project





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An outlook on the opportunities and potential

- Establishment of synthetic fuels from hydrogen and recycled CO₂ in the regional and national market
- Future expansion as a large-scale plant solution possible at the Seeschiffsbunkerplatz Bremerhaven
- Increasing product demand from large shipping companies

" Green methanol is the most scalable green fuel solution for this decade, and we're pleased that several other shipping companies have chosen this path as well ..."

Palle Laursen (Chief Fleet and Technical Officer at Maersk) autumn 2022