

Green electro-fuel for the marine industry

H2 in practice

Claes Fredriksson
Liquid Wind, CEO & Founder



Info@LiquidWind.se

LiquidWind.se

About Liquid Wind & the Liquid Wind "family"

Liquid Wind is an **electrofuel development** company focused on **developing, financing, building and managing** replicable facilities for the production of **electrofuel/green eMethanol**:

- Electrofuel is produced from **biogenic CO₂** and **renewable electricity** and will **enable and accelerate** the transition to carbon neutral shipping



HALDOR TOPSØE 



Worley
energy | chemicals | resources



SIEMENS
energy

Ørsted



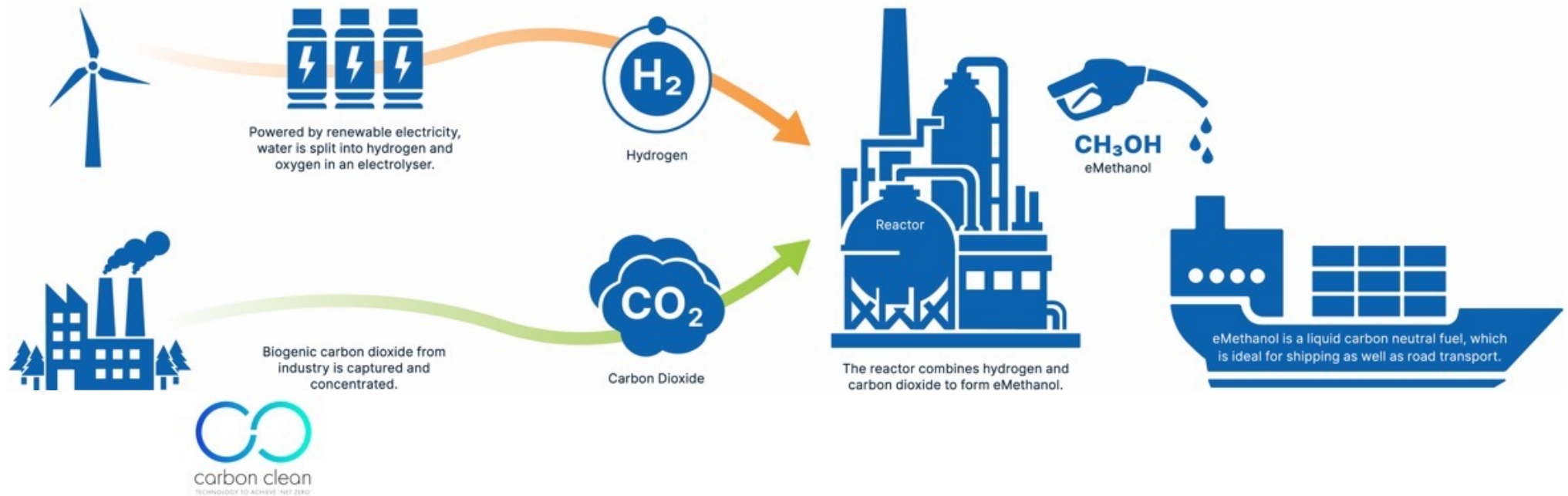
Converting process to electro fuel well known

Worley
energy | chemicals | resources

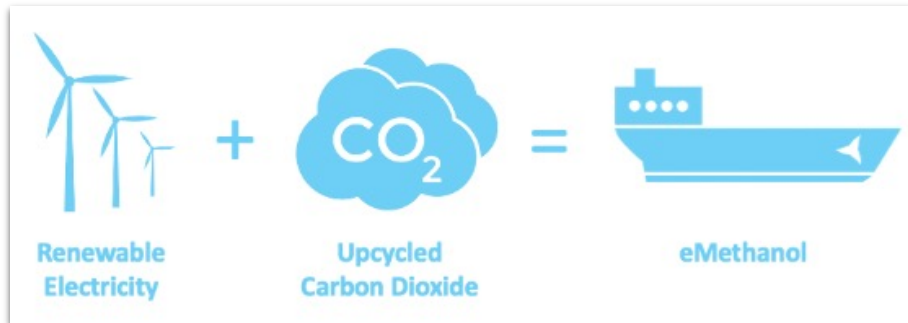
ALFA
LAVAL

SIEMENS
energy

HALDOR TOPSØE 



Liquid Wind's roll-out plans



Establishing commercial-scale facilities

- 2024** 1st facility in Örnsköldsvik, Sweden
- 2030** 10+ facilities Nordics
- 2050** 500 facilities, Globally

Per year, each standard facility;

Upcycles 70,000 tons CO₂

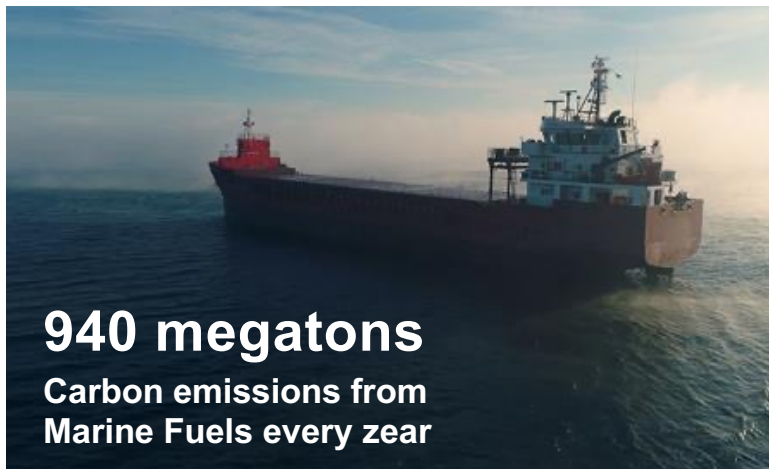
Generates 50,000 tons eMethanol

Prevents 100,000 tons CO₂ emissions



The shipping fuel opportunity is immense

Fuel conversion required to reach emission reduction targets

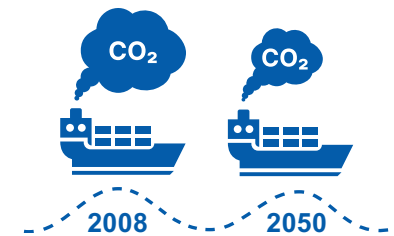


99.9% of marine fuels are fossil based

Source: UNCTAD - Review of Maritime Transport 2019



“Reduce the total annual GHG emissions (from International Shipping) by at least 50% by 2050 compared to 2008.”



Committed to “net-zero CO₂ emissions from operations by 2040.”



**Getting to Zero
Coalition**

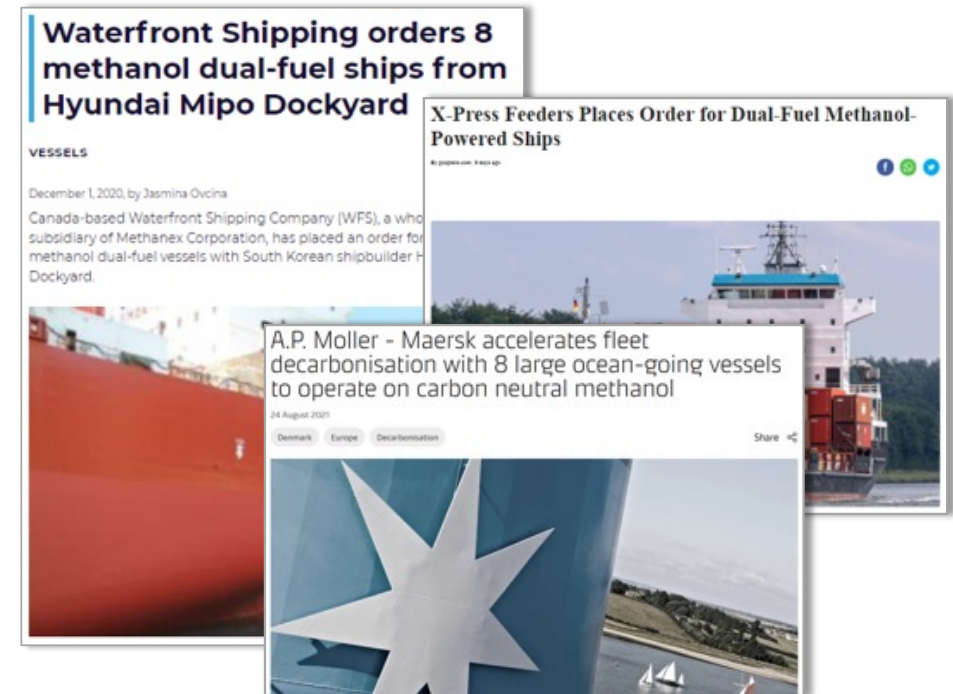
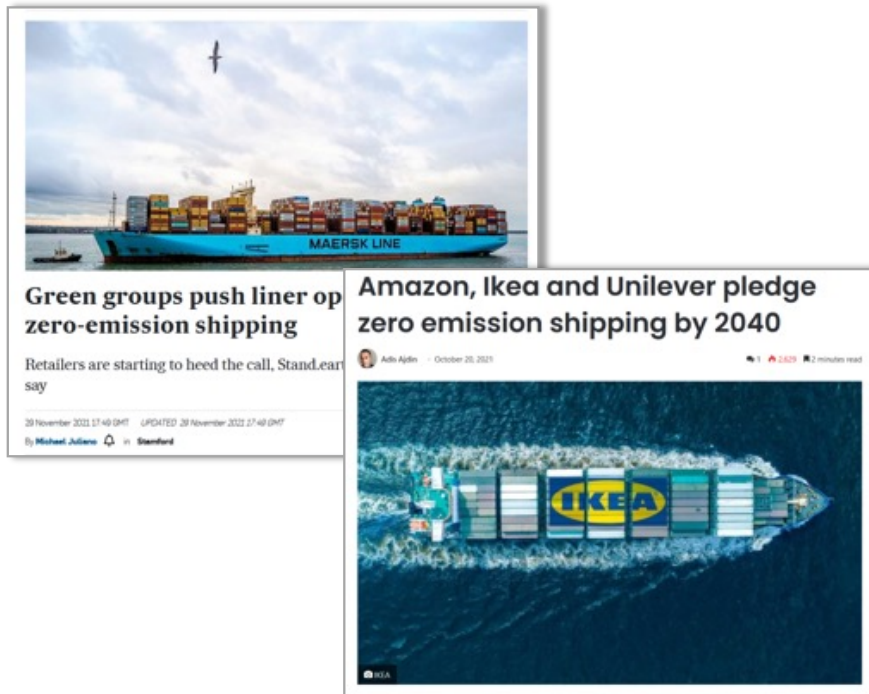
“Development and deployment of commercially viable deep sea zero emission vessels by 2030.”



Climate change requires and enables change

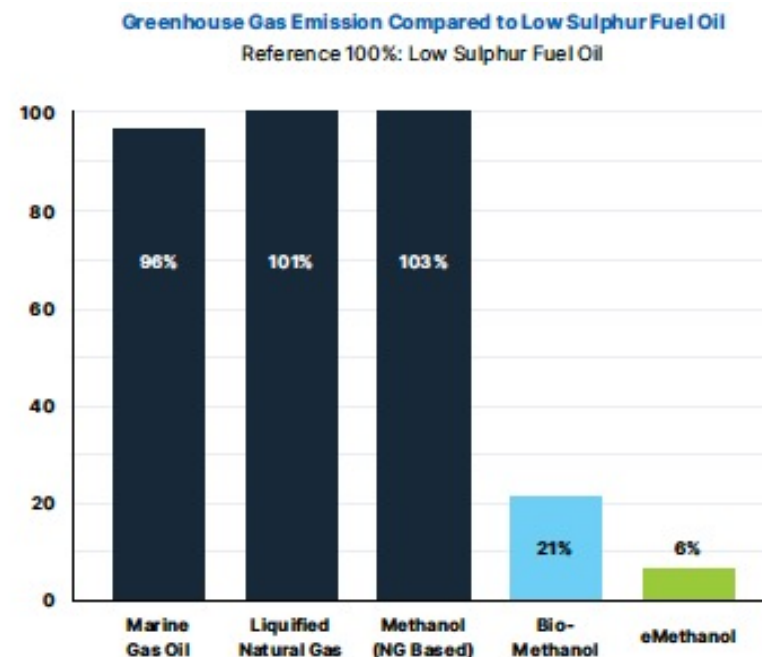
Retail customers push for decarbonisation

eMethanol vessels are being ordered



eMethanol is by far the best option to decarbonize the shipping industry

- ✓ Carbon neutral fuel
- ✓ More than 90% reduction in CO₂ emissions
- ✓ Easy to store, transport and use
- ✓ Compatible with existing infrastructure
- ✓ Scalable to replace large volumes of fossil fuels
- ✓ Methanol engines ready - Today



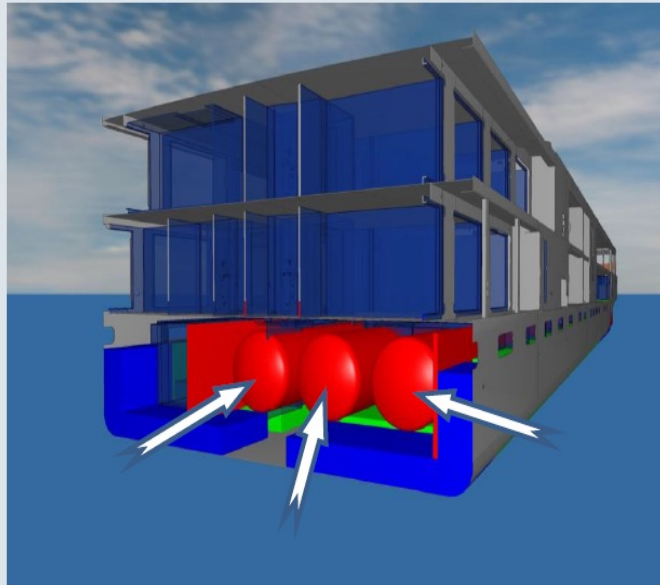
Source: Liquid Wind whitepaper

eMethanol's unique properties suitable for shipping

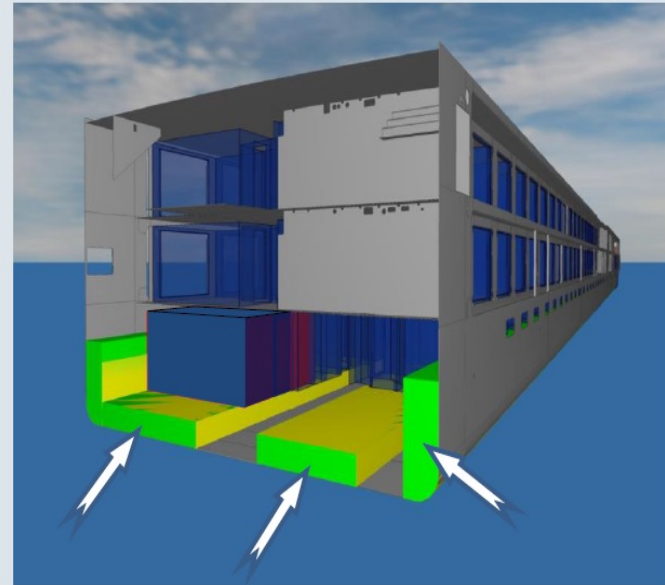
ENERGY STORAGE ON BOARD



Methane (@-162°C)



Methanol

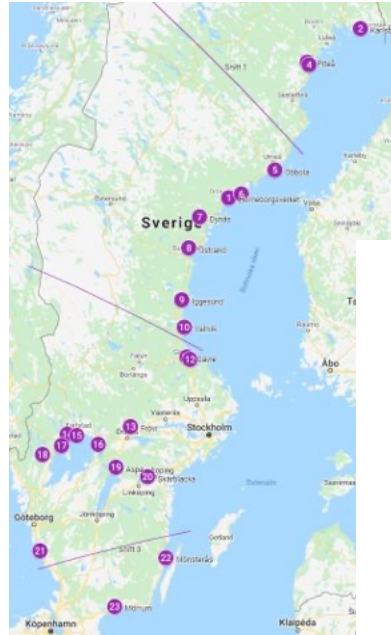


Methanol allows nearly random tank arrangement

11

Nordics offer ideal conditions for production

- ✓ Wind expansion. Best prices in Europe.
- ✓ Growth & cost reductions – green H₂
- ✓ Biogenic CO₂ from forestry
- ✓ Project financing model proven



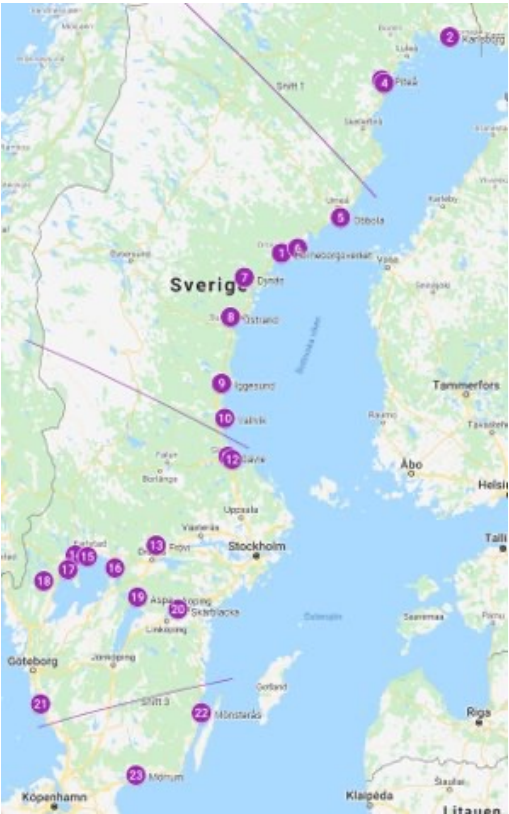
Wind power production forecast – all cases

Production is quickly doubling from 2019-levels and is now close to 30 TWh yearly. The wind power production 2024 is likely to be between 40 and 50 TWh, depending on further addition of contracts/ capacity.



Enables production of cost-effective eFuel

FlagshipONE – Super location in Övik



Excellent site for first full-scale facility

FlagshipONE

Host: Övik Energi

- Biogenic CO₂ source
- Basic Engineering finalized
- Commercial Operation: 2024





Per year, each standard facility;
Generates: 50,000 tons of eMethanol
Upcycles: 70,000 tons of CO₂
Prevents: 100,000 tons of CO₂ emissions

Sustainability leader Ørsted invests in FlagshipONE

January 2022 - The Danish utility Ørsted, acquired 45% of FlagshipONE.

*“By partnering with Liquid Wind on FlagshipONE, we’re entering **one of the most promising and exciting projects to supply e-methanol at scale**”,* said Anders Nordstrøm, Head of Ørsted’s hydrogen and Power-to-X activities.

Dagens industri START BÖRS MARKNADSNYTT BEVAKNINGAR LEDARE DI TV JOBB

Dansk jätte storägare i svenskt miljardprojekt

Danska börskoncernen Ørsted går in som storägare i det svenska energiprojektet FlagshipONE som planerar att miljardinvestera i en ny fabrik för förnybara sjöfartsbränslen.

Målet är att tillsammans med Göteborgsföretaget Liquid Wind utveckla och bygga det som kan bli världens första storskaliga anläggning för förnybar e-metanol i Örnsköldsvik.

Publicerad: 11 januari 2022, 19:01

 **Kim Lundin** 
Text



Methanol as a fuel

The path to become an acceptable fuel has been long...

...has been ongoing since the 80's.



Engine development in process for years

Power: up to 550 kW

Engine type: Propulsion or generator

Compression ignited methanol

Scania 9l, 13 l, 16l

High efficiency -40-45%

Without after treatment system:

IMO Tier III



Green Pilot early in the process

Methanol is a flexible fuel – Fastwater

- Sjöfartsverket I Oxelösund
- In operation 12 months per year, including "light ice conditions"
- A propulsion engine (450-550 kW), "fixed propeller"
- Speed 20-22kn
- Consumption approximately diesel approx. 200 tonnes/year (approx. 400 tonnes methanol/year)



eMethanol used today for transportation



Next generation vessels – arriving soon ...fuelled sustainably by electrofuel



Join our journey towards a cooler world at
liquidwind.se

Follow us on LinkedIn
[linkedin.com/company/liquid-wind](https://www.linkedin.com/company/liquid-wind)

Twitter
[@liquidwind_se](https://twitter.com/liquidwind_se)



Info@LiquidWind.se

LiquidWind.se