*Flex*Methanol®

Symposium:

Innovative Schiffsantriebe aus der Bodenseeregion

E-Methanol aus PV/Wind Betrieb
mit modularisierten Methanolanlagen für dezentralen Schifffahrteinsatz.
Mit Herbststrom im Sommer über den Bodensee fahren?

Stephan Rieke

Lindau 2024

Who we are

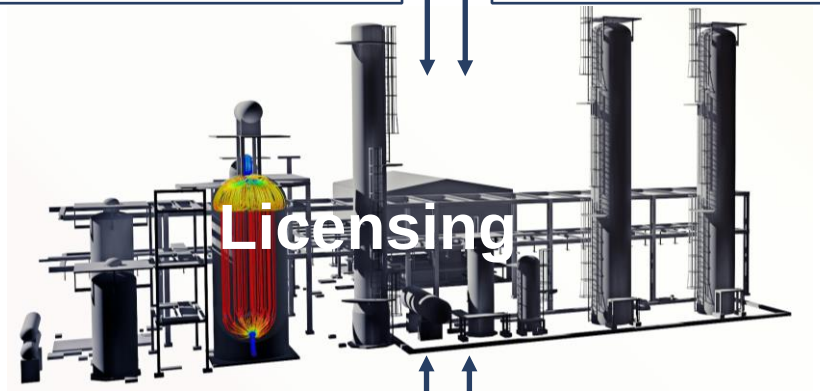
Steps of Engineering

Hydrogen Supply

- Technology / Transport
- Integration

CO_2-Supply

- Technology / Transport
- Integration



Methanol Production

- Technology
- Integration

Methanol Purification

- Technology / Transport
- Integration

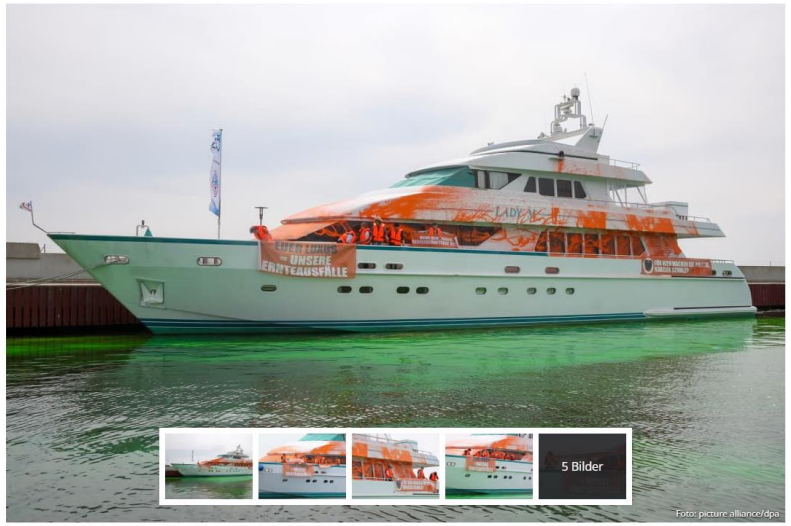
2005	Successfull startup of 200 Mio. Euro biofuel plant as EPCM
2008	Joining the Methanol industry for a revamping of an existing Methanol plant.
2014	R&D project for benchmark of the available catalyst under flexible operation condition and pure CO2 and H2 Feed.
2017	Signing the Joint Development Agreement with BASF for process and catalyst development.
2018	Start of long-term testing catalyst under bse process conditions and 7.000 h operation achieved.
2021	Selected as process provider for the „first of its kind“ Power-to-Methanol plant in Antwerp.
2021	Signing cooperation with MAN ES (DWE) to supply FlexMethanolTM Skids on the global market.
2022	Signing Joint Development Agreement with Green Hydrogen System for integration and to secure supply.
2023	PtM-Project Development exceeds 2,000 MWel capacity.

Situation today

ANCORA MARINA NEUSTADT

Klimaaktivisten besprühen Luxusyacht „Lady M“ mit Farbe

Tobias Frauen · 21.06.2023



Die Motoryacht „Lady M“ wurde am Dienstag von Aktivisten der „Letzten Generation“ geentert und mit orangener Farbe besprüht. Die Gruppe will damit auf die überdurchschnittlichen Emissionen der Superreichen hinweisen.

Quelle:https://www.boote-magazin.de/aktuelle-themen/ancora-marina-neustadt-klimaaktivisten-bespruehen-luxusyacht-lady-m-mit-farbe/

Home > News > Float and Dive

Sanlorenzo to Build the World’s First Superyacht Powered Only by Green Methanol

Published: 25 Jan 2023, 07:02 UTC • By: Otilia Drăgan

Although it minimizes the contribution of yachting to global pollution, stating that it accounts for “only” 0.22% of the total greenhouse gas emissions in the shipping sector, the luxury superyacht builder Sanlorenzo wants to lead the way on the path to green yachting.

Quelle:Sanlorenzo to Build the World’s First Superyacht Powered Only by Green Methanol - autoevolution/

Home › Shipping News

Rolls-Royce And Lurssen To Focus On Methanol Propulsion For Large Yachts

By MI News Network | September 30, 2022 | Shipping News

Quelle:Rolls-Royce And Lurssen To Focus On Methanol Propulsion For Large Yachts (marineinsight.com))

Produkte

114 Meter lange Superyacht mit Wasserstoff-antrieb tankt Methanol

20.03.2023

Die Schiffswerft Lürssen baut die erste Superyacht, die CO2-neutral mit Brennstoffzellen und Methanol fährt.

Quelle:114 Meter lange Superyacht mit Wasserstoffantrieb tankt Methanol (futurezone.at)

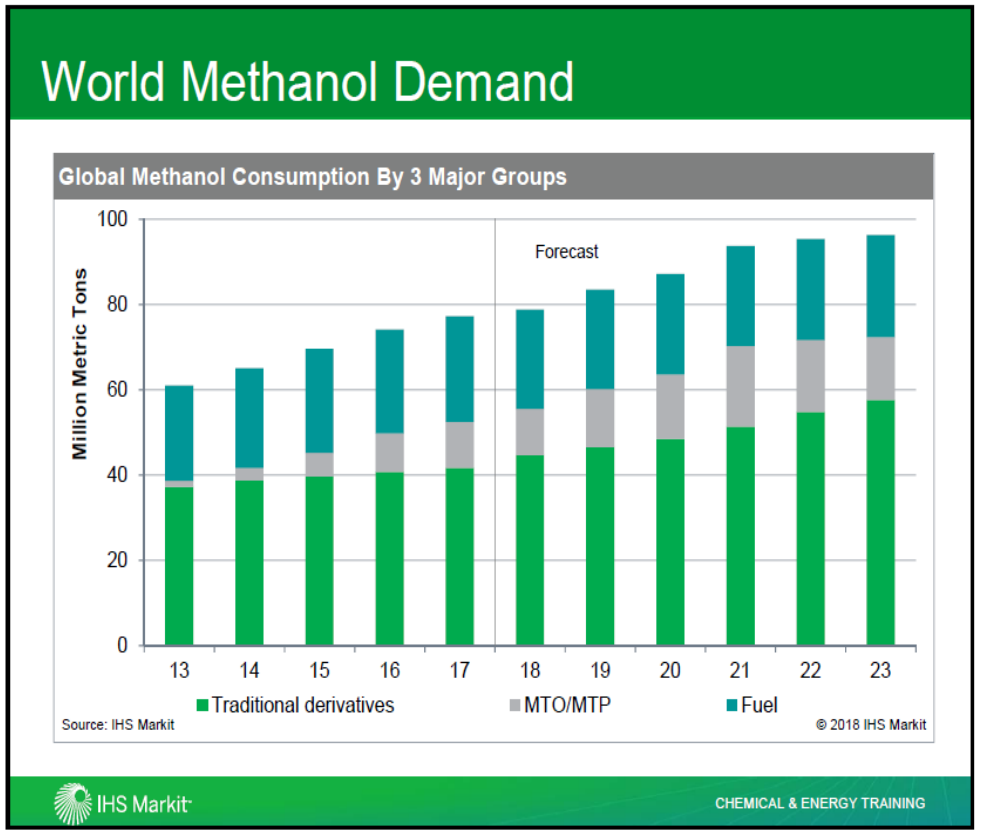
Methanol Market

Methanol (MeOH) is a global commodity with an annual worldwide production totaling nearly 100 million metric tons and made nowadays from natural gas (~ 65%) and coal (~35%) and less than 1% from renewable resources.

With uses ranging from industrial feedstock, solvent, and fuel; methanol is a diverse product and its utilization can be seen frequently in our everyday lives.

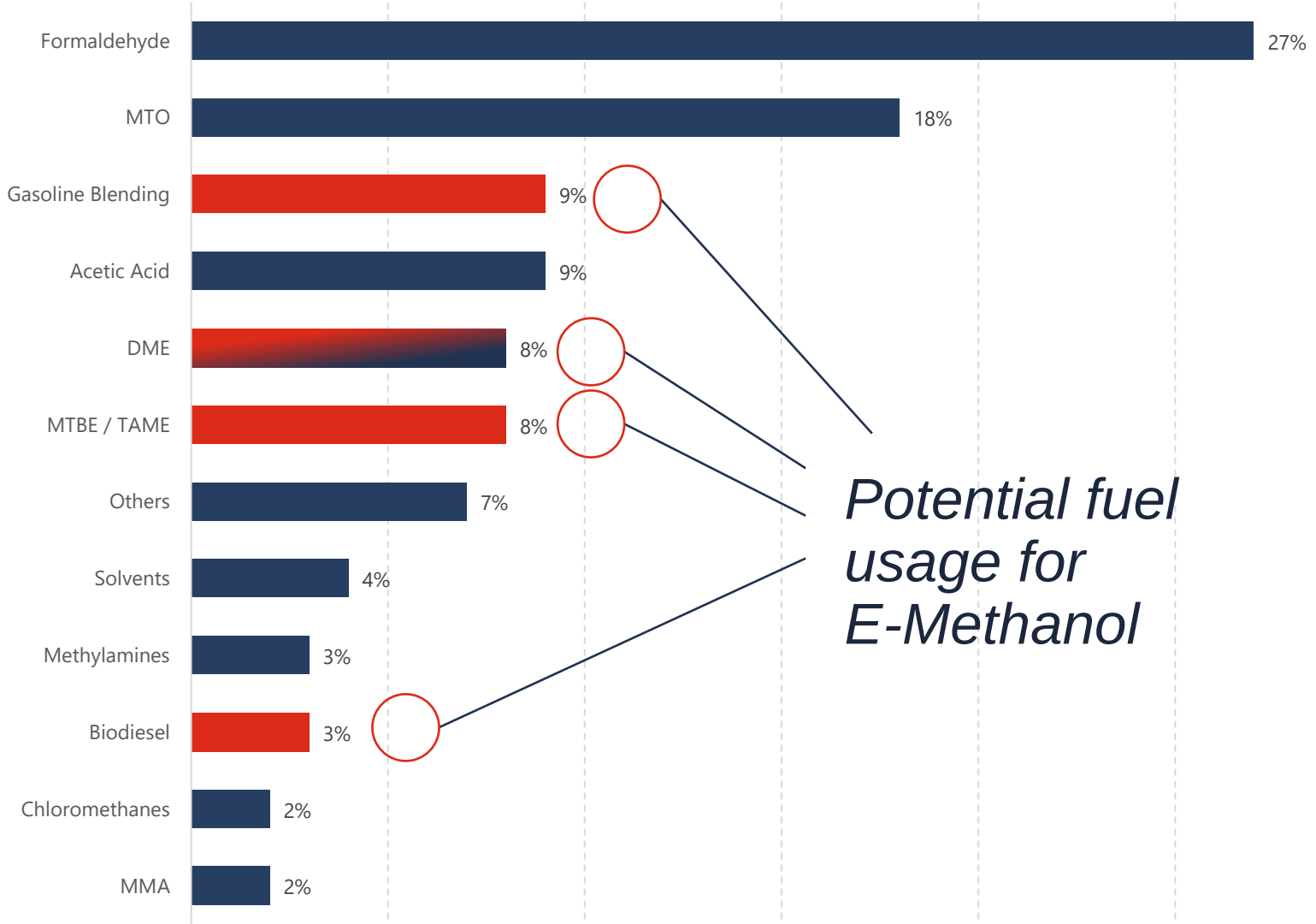
The production of methanol is possible from power-based electrolytic hydrogen and carbon dioxide captured from flue gas.

Renewable methanol from biomass (via electrification) or renewable power or recycled waste carbon has a unique market in transport fuel sector to substitute fossil transport fuel.



Usage of Methanol by End-Use

High Fuel Sector Usage



- 28% are used in the fuel sector
- **> 70% are used in the Chemical sector**
- Substitution of petrol based chemistry
- First step for large scale sustainable chemistry
- Creating market volume over the fuel sector

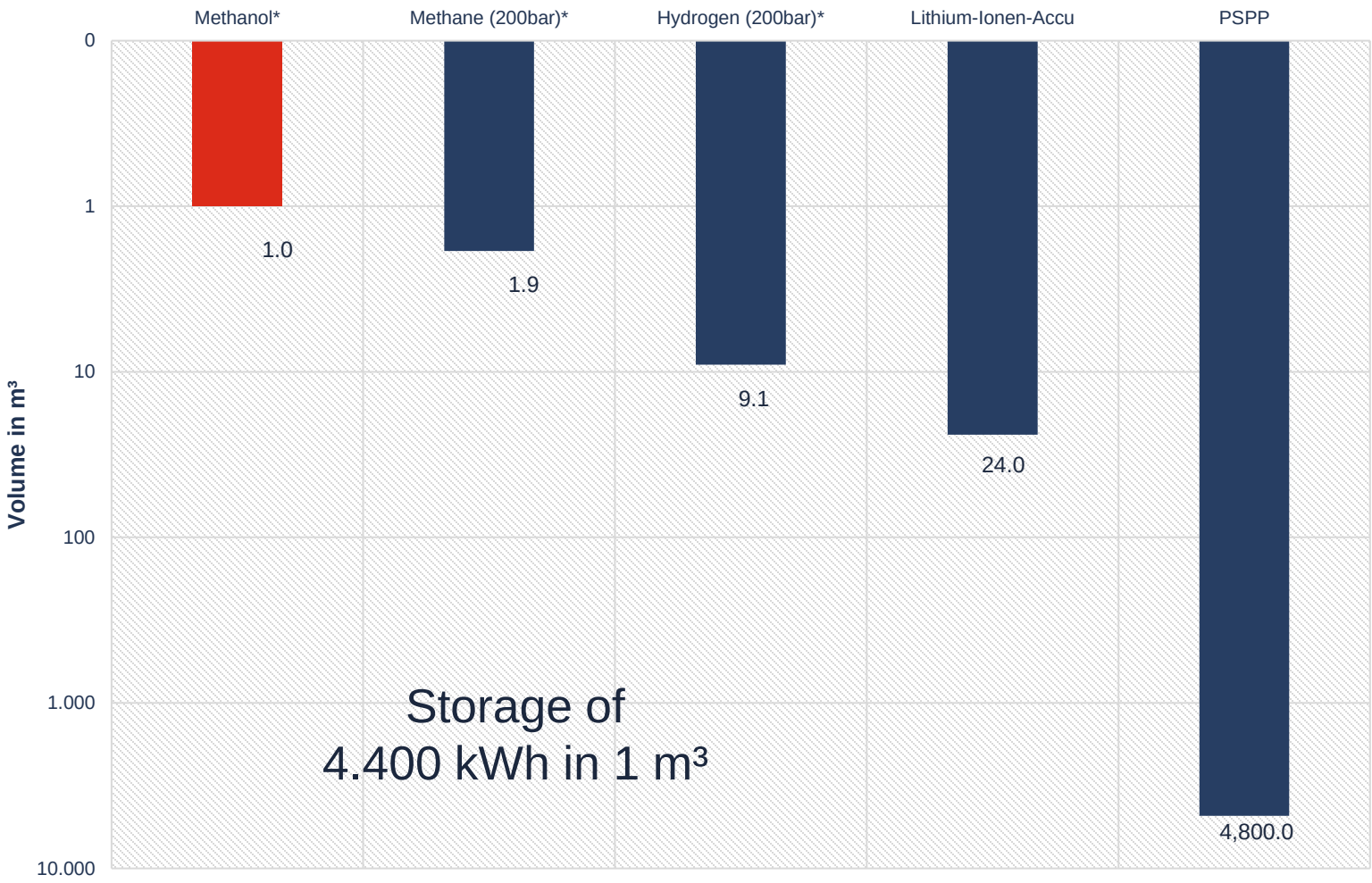
Source: IHS (2015)

What is Methanol

Base Chemical and Liquid Energy Storage

Methanol is the simplest representative of alcohols, mostly produced organic chemical.

Volumetric energy density of methanol is the highest making it the ideal chemical hydrogen carrier and energy storage.

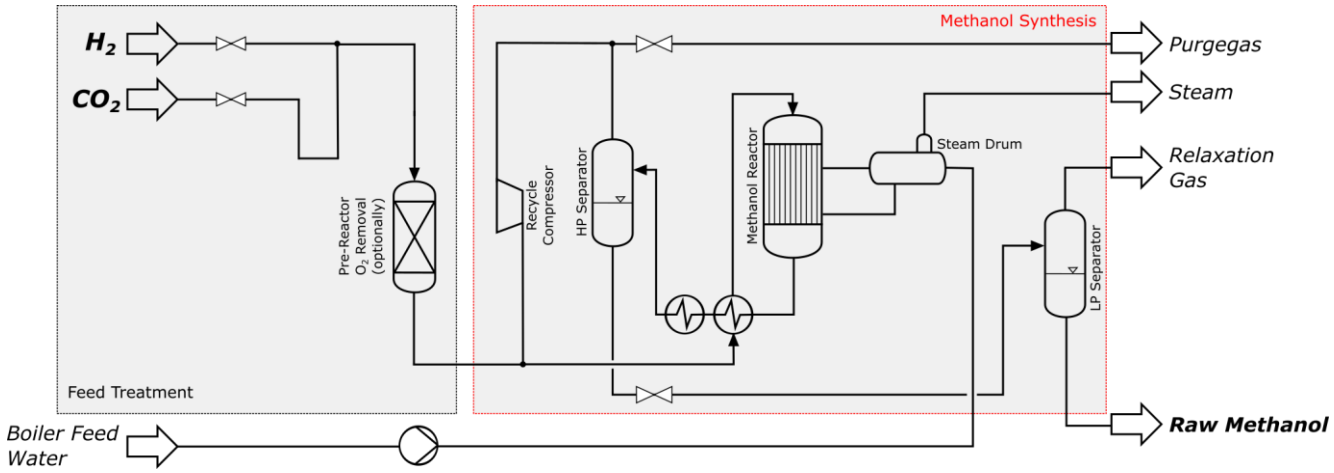


*Calculation without conversion losses based on the heating values.

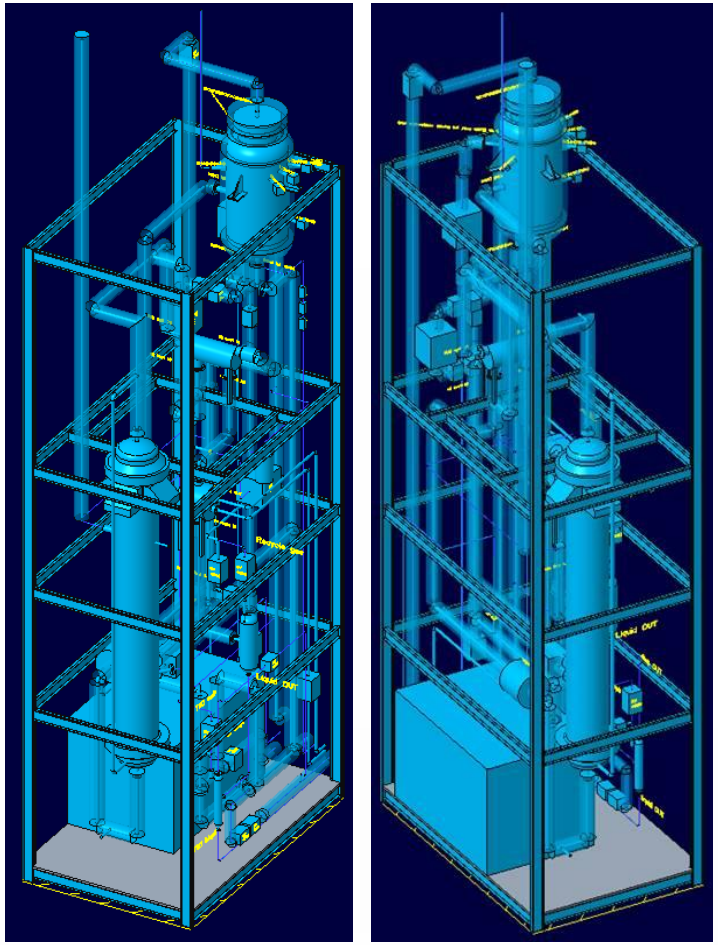
*Flex*Methanol *process*

Proven Process

$$CO_2 + 3\ H_2 \rightleftarrows CH_3OH + H_2O$$
$$CO_2 + H_2 \rightleftarrows CO + H_2O$$
$$CO + 2\ H_2 \rightleftarrows CH_3OH$$



- Reaction heat used for steam production, which is used in subsequent distillation
- Flexibility range: 10-100%
- Process conditions: 240°C, 40 bar
- Cu/ZnO based catalyst (BASF)



Methanol Plant

State of the Art

EU Policy for the maritime sector

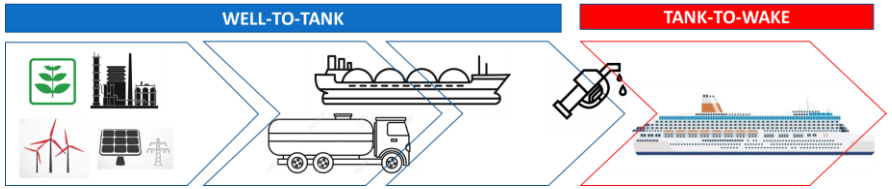
FuelEU Maritime- Proposed Approach

Under the Green deal of Europe/ Fit for 55 the decisions are made by end of March 2023
In here the FuelEU Maritime important impact are done:
Scope: Ships above 5000 GT, 100 % intra-EU traffic + 50% extra-EU, EU ports (same as for ETS**Scope:** Ships above 5000 GT, 100 % intra-EU traffic + 50% extra-EU, EU ports (same as for ETS

- **Establishes** limits on the yearly average GHG intensity of the energy used on-board **(CO2eq/MJ) by:**

2025	2030	2035	2040	2045	2050
2%	6%	13/14,5%	26/31%	59/62%	75/80%

- Inclusion of **CO_2, methane and nitrous oxide** on a full Well-to-Wake calculation: allows fair comparison of fuels



$$\boldsymbol{GHGe}\left[gCO_{2eq}\right] = (\boldsymbol{WtT}\ (fuel, electricity) + \boldsymbol{TtW}(\text{combustion}, \text{slip}))$$

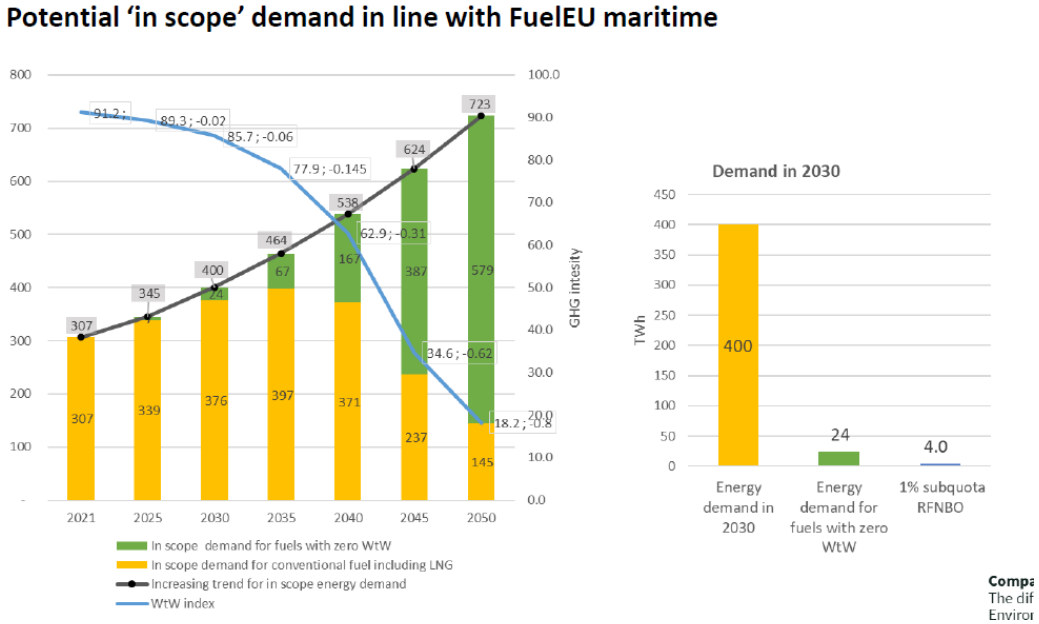
Penalty is expected at app 600,00 €/t CO2eq

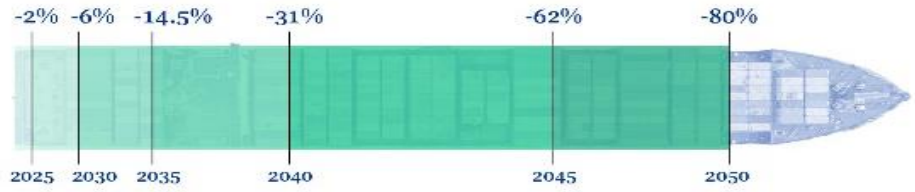
- **Non-compliance** – deterrent financial penalty

Methanol in the maritime sector

FuelEU Maritime

Preview - preliminary results





Year	2030	2035	2040	2045	2050	
Methanol	2,181,818	6,090,909	15,181,818	35,181,818	52,636,364	t/a
CO2 Demand	3,163,636	8,831,818	22,013,636	51,013,636	76,322,727	t/a

Assumption: 50% of demand is Methanol

Installed capacity today

0

How to decarbonize Superyacht

Vison how to decarbonize the Superyacht Industry

Sustainable fuel is **not** available either for international shipping nor for the superyachts.

Upcoming Production will first go into the international shipping before getting available for Yachts.

Vision is for the superyachts “Generating our own fuel” at the marinas around the Mediterranean Sea

Marinas are located there, where Sun and Wind can generating renewable power.

Installing ***flex***Methanol synthesis units closed to the marinas

Bunkerung the yachts via Tank container with sustainable e-Methanol independed of supply by third parties.

Potential Marinas

- Port de Saint Tropez, France
- Port of Cannes, France
- Port De Bonifacio, Corsica
- Port Adriano in El Toro, Mallorca Spain
- Ibiza Magna, Ibiza Spain
- Port Vell Barcelona Spain
- Puerto Banús, Marbella, Spain
- Port Hercule, Monaco
- Marina di San Lorenzo Italy
- Marina di Portofino, Genua Italy
- Marina di Porto Cervo, Sardinien iItaly
- Marina Trani, Italy
- Sani Marina, Chalkidiki Greece
- Marina Flisvos in Athen Greece
- Tunis Tunesien
- Bodrum Türkei
- Porto Montenegro, Bay of Kotor MONTENEGRO

*Flex*Methanol *Skid*

Manufactor of the Skids

MAN DWE® power-to-liquid solutions

New cooperation partner bse methanol

MAN Energy Solutions cooperates with licensor bse methanol

- MAN Energy Solutions and bse Methanol cooperate in the field of modular skid based methanol plants
- MAN Energy Solutions supplies the complete equipment for the *Flex*Methanol® Skids
- Further joint development of *Flex*Methanol® Skids
- Pre-fabricated skids *Flex*Methanol® 10 & *Flex*Methanol® 20 are ready for market

*Flex*Methanol® Skids licensed by bse Methanol

Capacity	
*Flex*Methanol®10	10 mio l/a
*Flex*Methanol® 20	20 mio l/a

Pre-fabricated Skids

- Standardized with CE-Marking
- Cost-competitive
- Fast setup, broad rollout options
- Simple extension of capacity

*Flex*Methanol process & skids supply

Benefits and Added Values 1/2

✓ No separate water-gas shift reaction	➢ There is no need for Steam Reforming
✓ Mild process conditions	➢ Low pressure & 240 °C
✓ Direct tie in of Hydrogen pipe from electrolyser	✓ No Hydrogen compression needed ✓ No Hydrogen storage needed
✓ Flexible operation of the methanol plant	➢ Min Load app. 10% up to 100% in minutes following the power supply
✓ No tars, no long chain carbon hydrates	➢ Minimizing number of equipment ➢ Minimizing Hydrogen losses
✓ Proven catalyst from BASF exclusively delivered by BSE	➢ Supply secured over aftersales contract
✓ Lowest OPEX	➢ Low power consumption ➢ High Hydrogen efficiency

Ready. Proven. Profitable.

Yacht Motoren mit Methanol: Fährt da was?

Beispiele für Methanol Schiffsmotoren: Umrüstung BELUGA durch Greenpeace

METHANOL

Nordhavn Power Solutions A/S has the intention and a mission to be in the lead regarding alternative environmentally friendly power solutions.

That is why we have signed an exciting new distributor agreement with **ScandiNAOS*** in Sweden.

ScandiNAOS have developed methanol solution based on the solid Scania marine and industrial XPI-engine. The first internal combustion engine in the world, which operates on methanol.

In the development of the engine, ScandiNAOS have gained a consistently strong understanding for the use of methanol in the industrial and maritime sector – from concept design to risk assessment to approval and rule development.

The engine uses the combustion pressure to ignite instead of spark plug to obtain higher efficiency and avoid potential corrosion due to its 2-pole electrifying system.

Methanol is gaining momentum

As shipping looks to cut emissions, methanol is emerging as a prime fuel candidate. Wärtsilä has more than half a decade's experience with methanol, converting the first of four engines on the ferry *Stena Germanica* in 2015. Now this expertise is being deployed on one of Wärtsilä's most well-established engine platforms.

The Wärtsilä 32 methanol engine can run on methanol and/or fuel oils. Available for newbuild or retrofitting, it refines the proven fuel handling, injection and combustion technologies of *Germanica's* converted Wärtsilä Z40 engines and combines them with cutting-edge engine automation, control and other state-of-the-art features of the Wärtsilä 32 platform.

Methanol as a fuel

Methanol has been transported as an industrial chemical for decades. It has roughly similar storage density to LNG but does not require cryogenic cooling, making it easier to handle onboard. There is widely established port supply infrastructure and an existing regulatory framework under IMO's IGF Code.

As methanol has the least carbon and highest hydrogen content of any liquid fuel, it has better combustion characteristics than other alternative fuels.

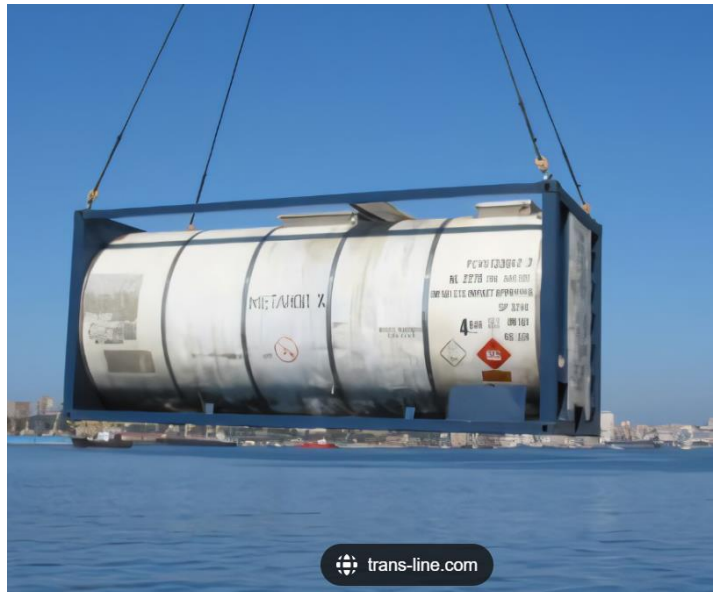
Emissions performance

With no sulphur content, emissions of SOx are negligible and dependent mainly on pilot fuel. Methanol also reduces filter smoke number – representing visible smoke and particle emissions – by 50% compared to fuel oil.

Methanol combustion produces 50% less NOx than fuel oil, making the Wärtsilä 32 methanol engine compliant

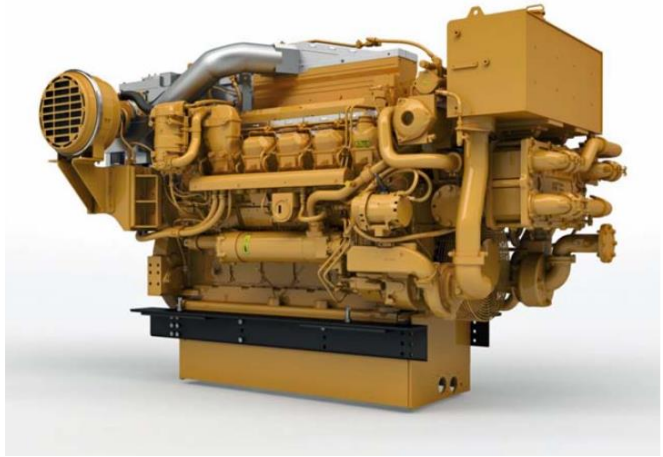
Enabling sustainable fuel use with one of Wärtsilä's most widely deployed engines

Methanol infrastructure



CAT OFFERS METHANOL UPGRADE FOR 3500E ENGINES

Sep 6, 2022 | Marine propulsion & machinery news



Methanol has an existing Infrastructure and can transported via Tank container everywhere where the product is needed

Conclusion

Together we can generate our own fuel and will support the transition of the superyacht industry towards sustainability

In cooperation with BASF We create chemistry

Our Clients

Our Partners

bse Methanol

Thank You

Stephan Rieke

bse Methanol GmbH
Mottelerstrasse 8
04155 Leipzig
Germany

phone +49 341 609 12 0
fax +49 341 609 12 15
mail office@bse-methanol.eu
web www.bse-methanol.eu