

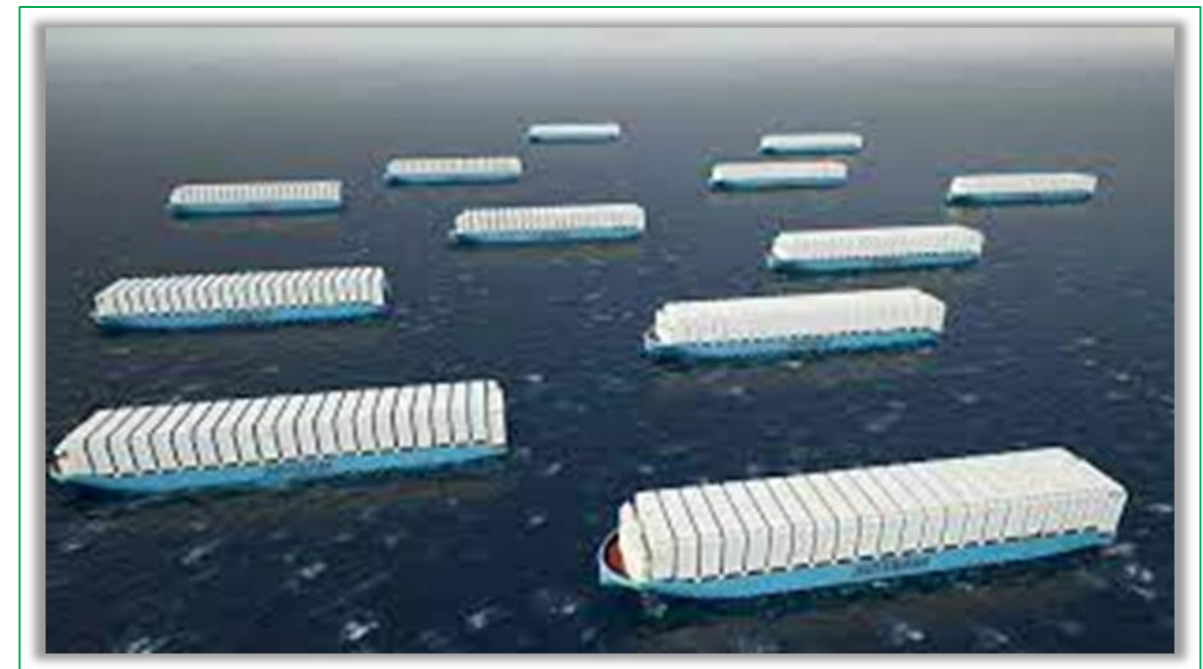
METHANOL INSTITUTE

Singapore | Washington | Brussels | Beijing | Delhi

Marine Methanol

Gregory Dolan, CEO

JULY 2023



MI History

- The Methanol Institute (MI) was established in 1989
- More than three decades later, MI is recognized as the trade association for the global methanol industry
- We facilitate methanol's increased adoption from our Singapore headquarters and regional offices in Washington DC, Brussels, Beijing and Delhi



Members



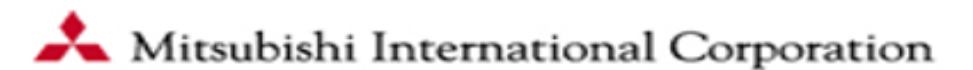
Tier 1



Tier 2



Tier 3



Tier 4





2022: “...the Year Methanol Went Global in the Shipping Industry”

Maersk spends \$1.4 billion on ships that can methanol

SUSTAINABLE ENERGY
PUBLISHED THU, AUG 24 2022 11:01 AM
AARON STRAUSS

KEY POINTS

- Maersk says it will have capacity
- According to

Algoma and CSL in for methanol-ready bulkier newbuilds

Asia Aglin - February 20, 2023



Canada's Algoma Central Corporation and CSL have ordered two new methanol-ready bulk carriers from China's Daewoo Shipbuilding & Marine Engineering (DSME).

IMO general assembly

China Merchants Orders Large, Methanol-Fueled Vehicle Ro-Ros



MSC explores Methanol fuel

MSC and the German drybulk shipowner MSC Marine Management Institute (MI) in order to boost decarbonization goals.

Chinese Study Examining Methanol as a Marine Fuel

July 14, 2020

The Methanol Institute (MI) has joined a research project led by the China Waterborne Transportation Research Institute (CWTRI) as a think tank of the Chinese Ministry of Transport. The project will consider the technical and operational requirements for the use of methanol as a marine fuel. The study is expected to be completed by the end of 2022.

COSCO Orders 12 Ultra-Large, Green Methanol Containerships for \$2.9B



THE WALL STREET JOURNAL

Markets World U.S. Politics Economy Business Tech Markets Opinion Books Arts Real Estate Life & Work Style Sports News & Analysis



Methanol Takes Lead in Shipping's Quest for Green Fuel

A successful shift to methanol, however, will require billions of dollars of investments in new ships and fueling infrastructure, as well as lower prices for methanol.

The future fuel race is over for this decade

Sam Chambers - February 22, 2023
42 2 minutes read

The problem with writing editorials is that they can come to look extremely misplaced predictions rather quickly. Not that that has ever stopped me before, so here goes!

I am calling the future fuel race over for this decade – methanol is the – again I am wary of writing the next word for how it might be viewed in posterity – clear winner.

methanol-operated fuel cell 2021

Norwegian Cruise Line Holdings Proceeding with Methanol Tests



Norwegian Cruise Line discussed its future fuel plans during the premier of Norwegian Prima in New York (NCL).
PUBLISHED OCT 12, 2022 5:14 PM BY THE MARITIME EXECUTIVE

Splash 247.com

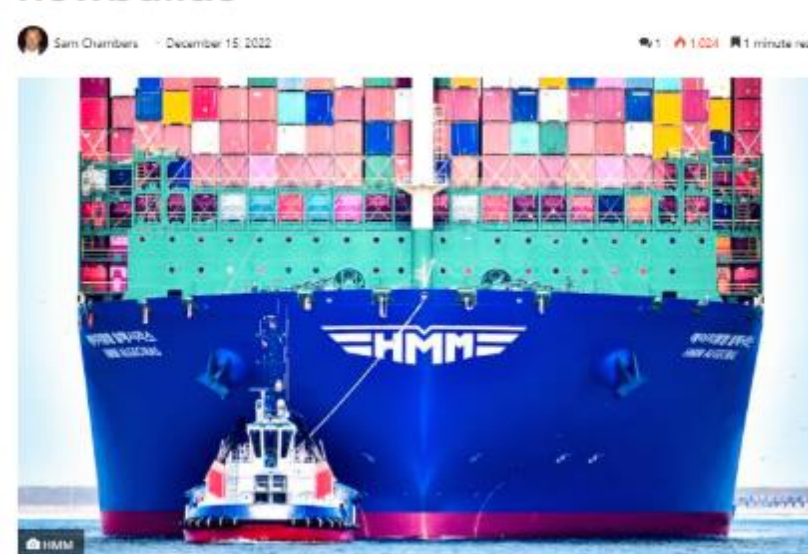
PIONEERING THE SAFETY AND PROTECTION OF CYBER SECURE SYSTEMS
Shaping a better maritime world.

CMA CGM signs for \$3bn worth of methanol and LNG powered boxships in China

Asia Aglin - April 10, 2023



HMM readies methanol-fuelled newbuilds



2022 is rapidly shaping up as the year methanol went global in the shipping industry.

Norwegian Cruise Line's \$1.3bn methanol bet a 'great signal'

Chemical tankers and container ships are already using alternative fuel for propulsion.



OOCL will add seven methanol dual-fuel container ships to its fleet (source: OOCL)

Methanol newbuilds elbow LNG out of the spotlight in October

08 Nov 2022 by John Snyder

published by the European Maritime Safety Agency (EMSA).

The use of alternative fuels in the shipping industry has been receiving increasing attention as a method of complying with low sulphur requirements for fuels and reduced emissions of sulphur oxides. As methanol and ethanol are sulphur-free, they would ensure compliance with the European Commission Sulphur Directive.

Marine Methanol Report

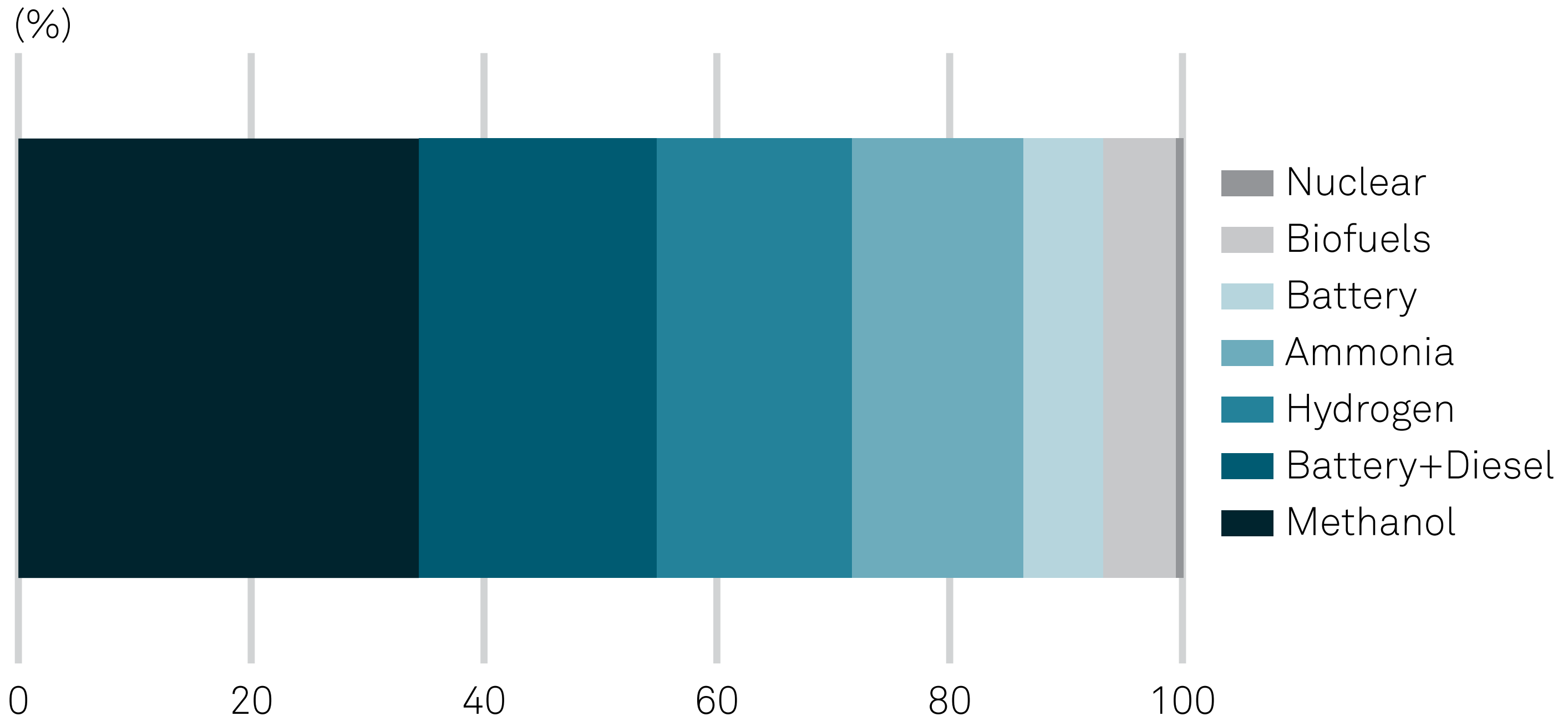


- Comprehensive report into all aspects of methanol as a marine fuel, using all available knowledge, experience, tools and insights available to date, with numerous contributors
- Features case studies from Maersk, Waterfront Shipping, Proman Stena Bulk, and Stena Germanica
- Focus on support for policy proposals which MI could then use to push our key messaging and sensibly localized policy solutions to the global decarbonization effort

<https://www.methanol.org/marine/>

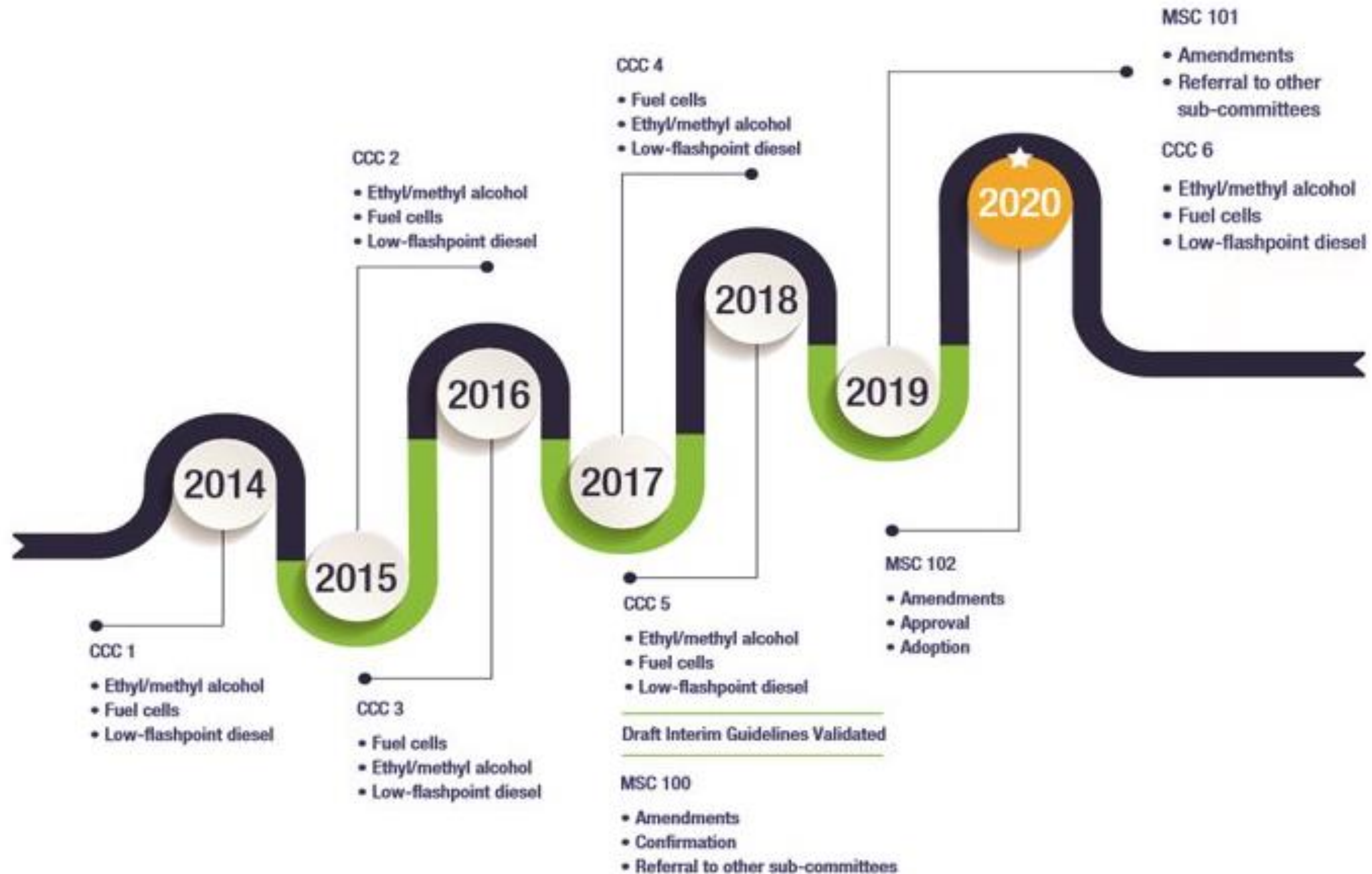


Alternative shipping fuels outlook - 2030

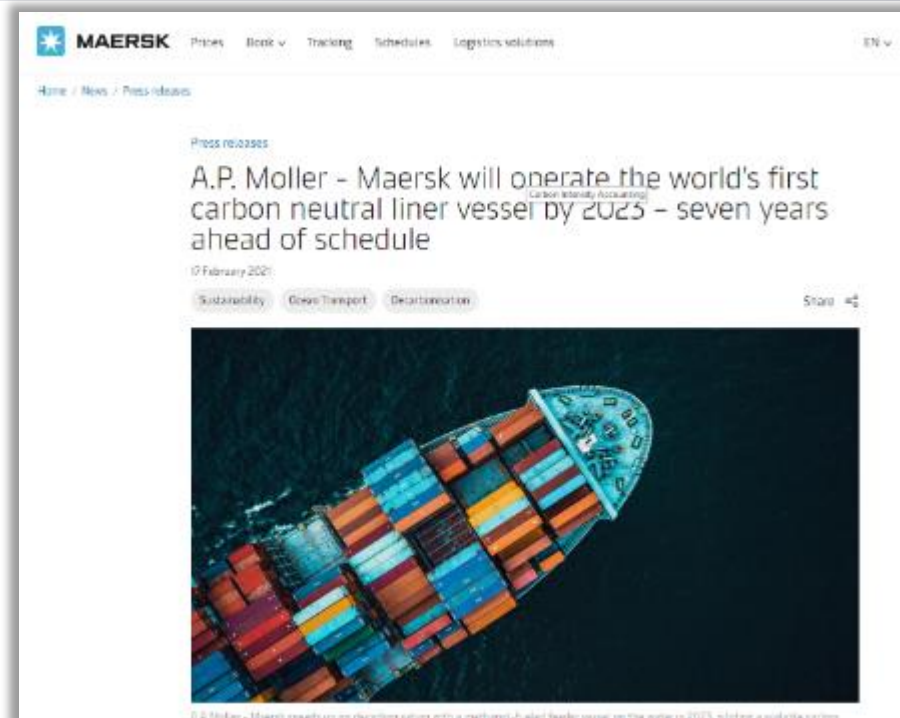


Source: S&P Global Commodity Insights

Game Changer 1: IMO IGF Code

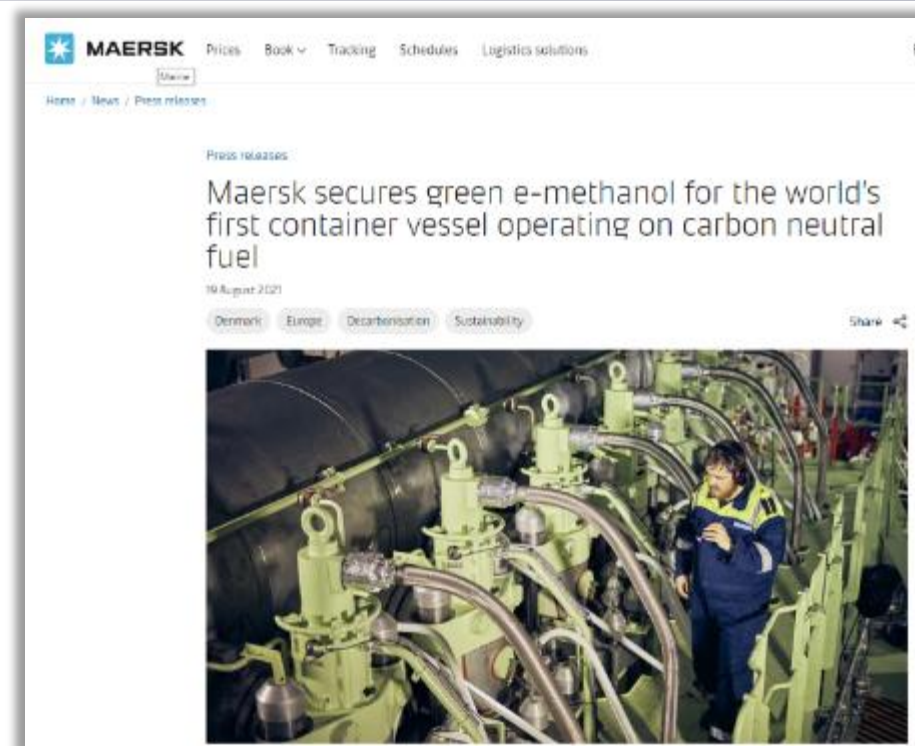


Game Changer 2.0: Maersk Vessel Orders

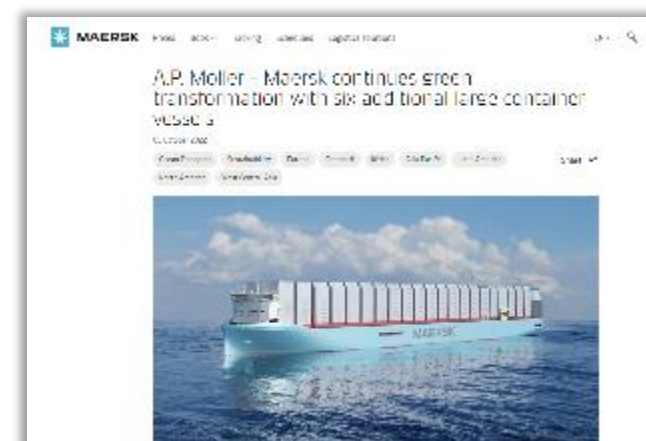


“The reason that we have gone for methanol on the first one is that it is the most mature from the technology perspective; we can get an engine that can burn it.” Morten Bo Christiansen, head of decarbonization at Maersk

<https://www.maersk.com/news/articles/2022/10/05/maersk-continues-green-transformation>



“That means that if we end up finding exactly the right solution then there will be a big retrofit opportunity for us.” Maersk CEO Soren Skou speaking during Maersk’s on 10 February earnings call

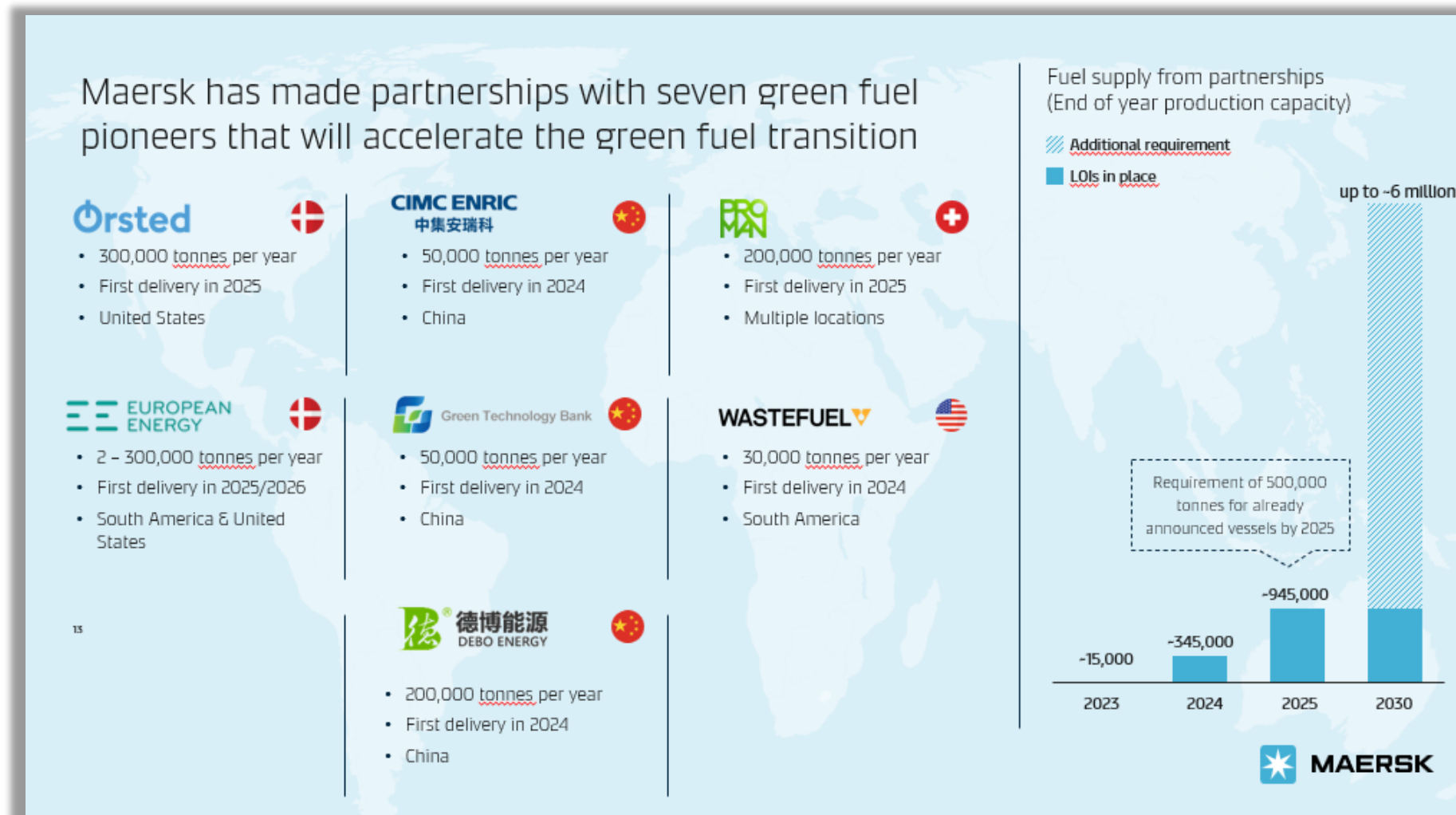


- **21 Feb 2021:** Maersk announces that the world’s first carbon neutral container vessel by 2023 will operate on dual-fuel methanol
- **24 Aug 2021:** Maersk accelerates fleet decarbonization ordering eight 16,000 TEU ocean-going vessels to operate on methanol
- \$1.4 billion order each vessel \$175 million 10-15% more expensive
- **5 Oct 2022:** Maersk orders additional six 17,000 TEU methanol dual-fuel vessels, in total now ordered 19 vessels to be delivered by 2025
- **18 April 2023:** Maersk’s first methanol dual-fueled feeder vessel (2,100 TEU) moved from drydock to water at Korean shipyard
- *Each ship will require 35,000-40,000 tons of methanol annually or a total of over 750,000 tons of methanol*
- *Customer Pull:* Maersk’s 200 largest customers asking for carbon neutral transport

Game Changer 2.1: Maersk Methanol Supply

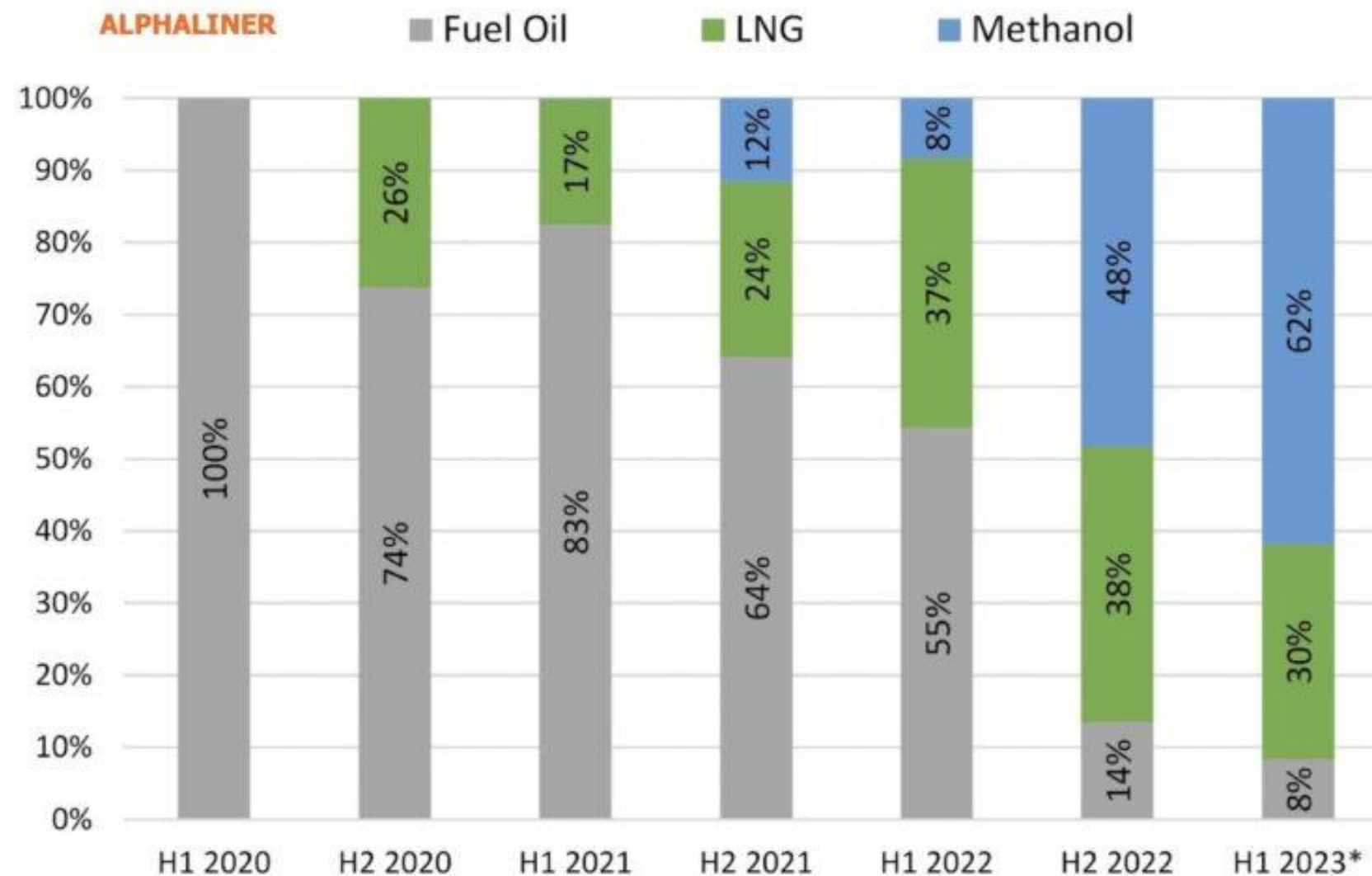


- **10 March 2022:** Maersk began announcing a series strategic partnerships with now ten leading companies -- including MI members Proton, Orsted, European Energy, Wastefuel, and SunGas Renewables -- with the intent of sourcing at least 730,000 tons/year of green methanol by end of 2025
- Maersk estimates will need 6 million tons of renewable methanol by 2030 to fuel 25% of their 700-vessel fleet

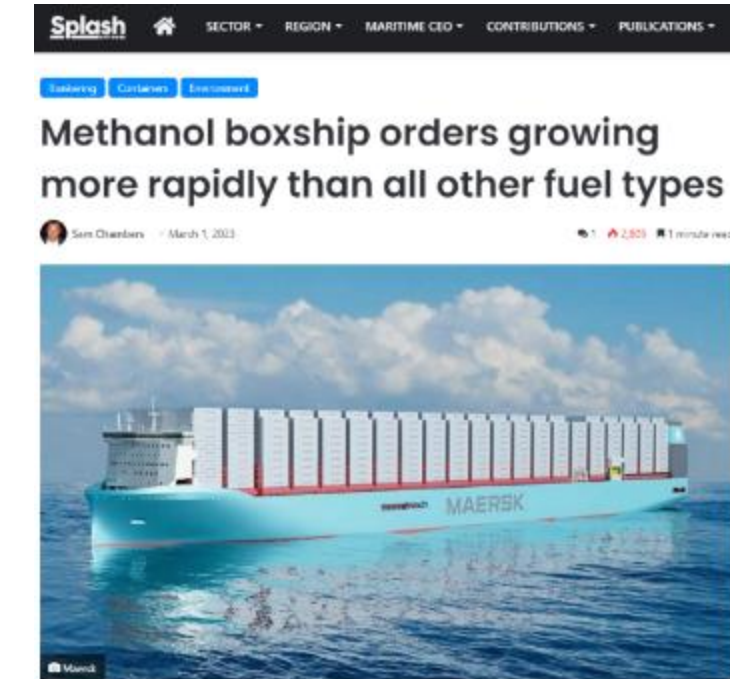


Dominating Container Orderbook

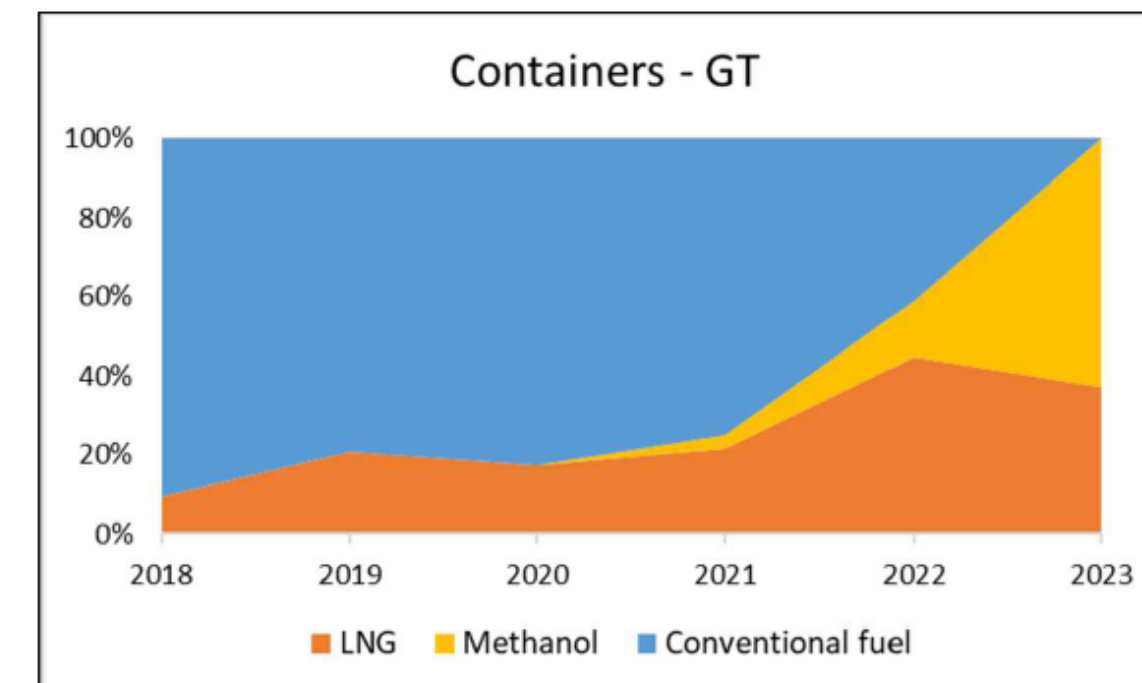
Current orderbook: propulsion method by capacity/order date



* at 24/02/2023. Based on current orderbook; does not include vessels ordered since 2020 and delivered.



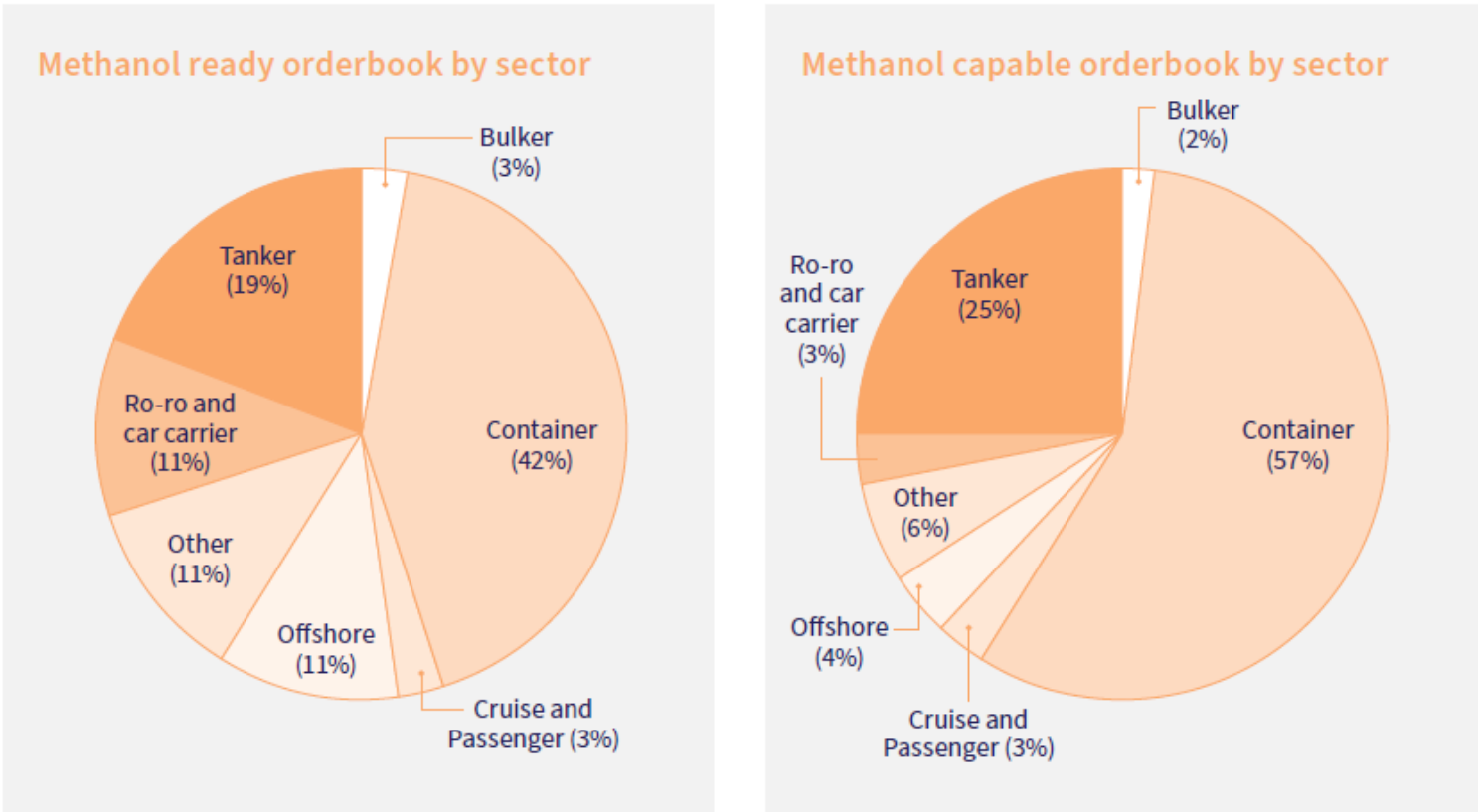
<https://splash247.com/methanol-boxship-orders-growing-more-rapidly-than-all-other-fuel-types/>



Methanol Dual-Fuel Orderbook

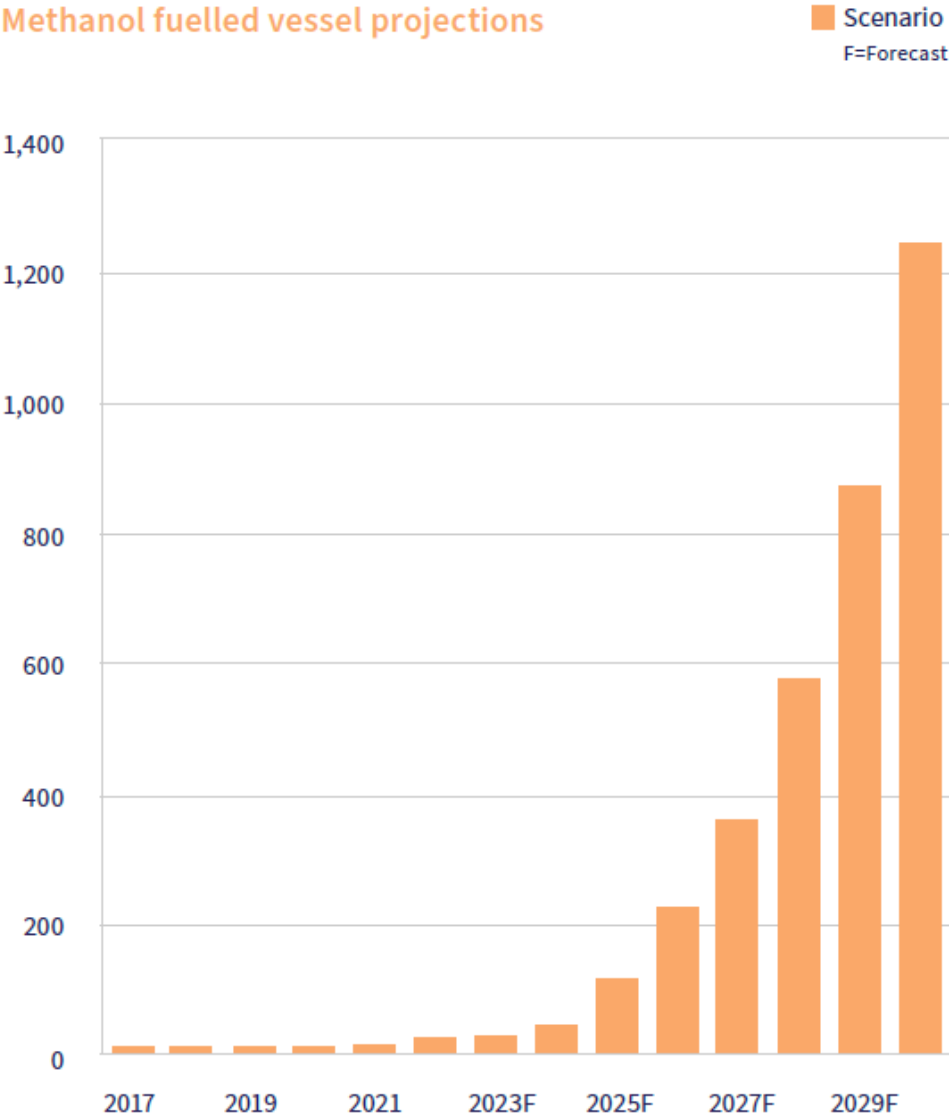
Methanol fuelled newbuilding update

(Source: Clarksons, June 2023)



Clarksons forecasts suggest a significant climb in methanol capable and methanol ready orders. In 2022, methanol accounted for 3% of the orderbook (7% by GT). By 2030 this could be close to 20%, representing up to 1,200 vessels.

Methanol fuelled vessel projections



Leading by Example - Tankers

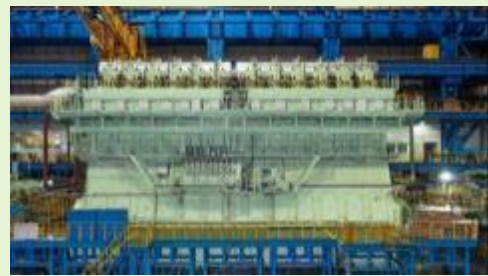


- In 2016, **Methanex** subsidiary **Waterfront Shipping** launched first methanol dual-fuel 50,000-DWT chemical tanker, the *Cajun Sun*
- WFS now has 18 methanol dual-fuel vessels in its fleet, with over 140,000 hours of operating hours
- In December 2022, **Proman Stena Bulk** took delivery of its fourth methanol-fueled tanker, and has two more methanol vessels on the way
- In February 2023, the dual-fuel vessel *Cajun Sun*, operated by WFS and chartered from MOL, completed the first-ever net-zero voyage fuelled by bio-methanol. By blending ISCC-certified bio-methanol that has negative carbon intensity with natural gas-based methanol, net-zero greenhouse gas emissions on a lifecycle basis were achieved for the 18-day trans-Atlantic voyage. This innovative fuel solution, produced at our ISCC-certified plant in Geismar, offers shipping companies the ability to achieve net-zero carbon emissions today, supporting the industry's transition to a low-carbon future.



<https://www.methanex.com/news/release/methanex-and-mol-complete-first-ever-net-zero-voyage-fuelled-by-bio-methanol/>

On the Water and On the Way



SINGAPORE - WASHINGTON - BRUSSELS - BEIJING - DEHLI

Methanol Fuelled Vessels on the Water and on the Way

To learn more about each project, click on the project title.

China (March 2023)

COSCO has placed orders for four 16,000 teu methanol-fueled ships at its affiliated yard in Yangzhou for an undisclosed price basis delivery in the second half of 2025.



Singapore (March 2023)

Singapore's Consort Bunkers has signed a contract with China Merchants Industry Holdings (CMHI) Jinling for a series of six 6,500-dwt methanol fuels new buildings, to be delivered in 2025



Denmark (March 2023)

FJ. Lauritzen has signed a letter of intent with Tsuneishi Shipbuilding, for the construction of at least two methanol dual-fuel 81,200 DWT Kamsarmax bulk carriers. The vessels have been ordered in partnership with Cargill, which will operate the vessels for a period of at least seven years.

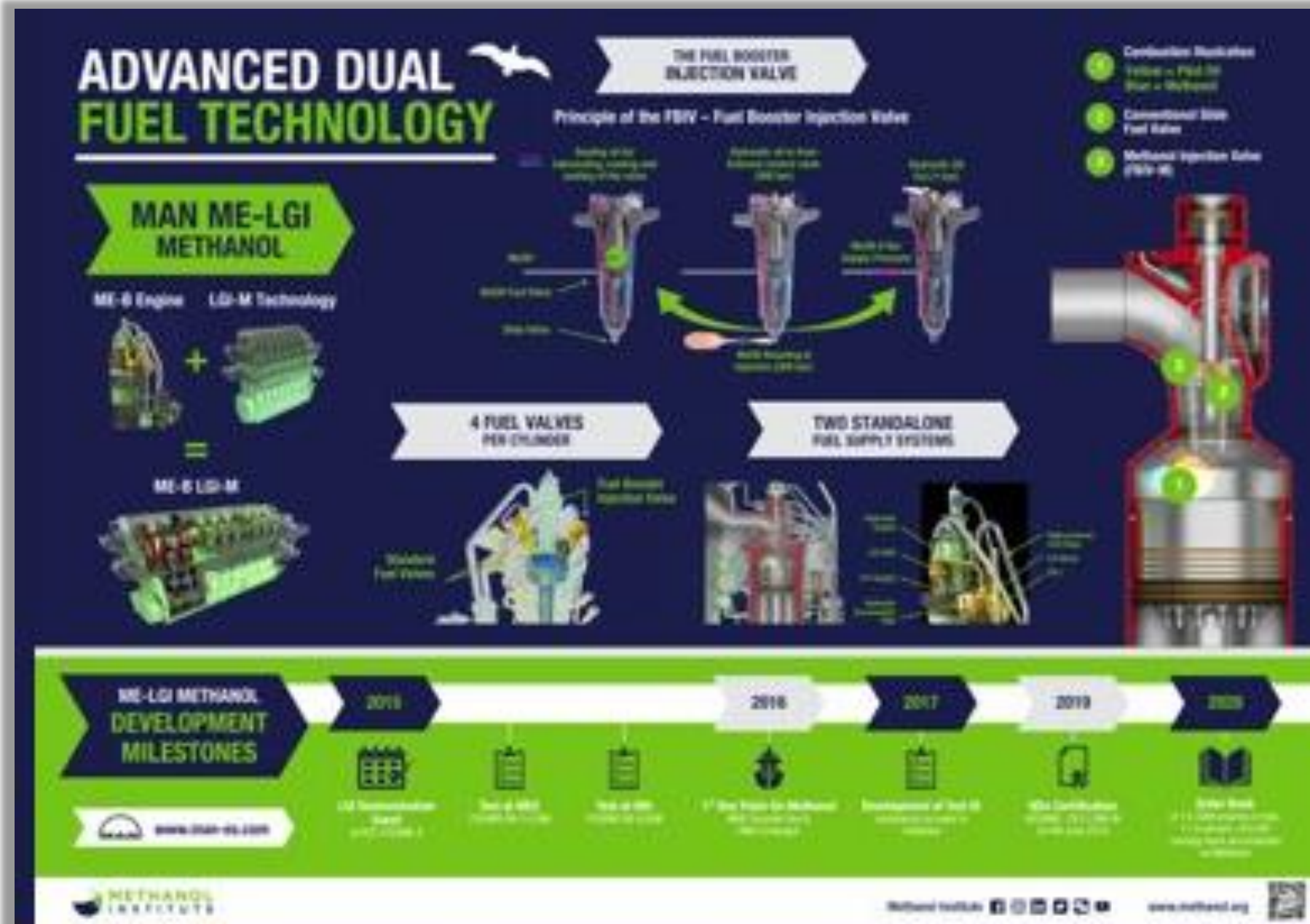


China (March 2023)

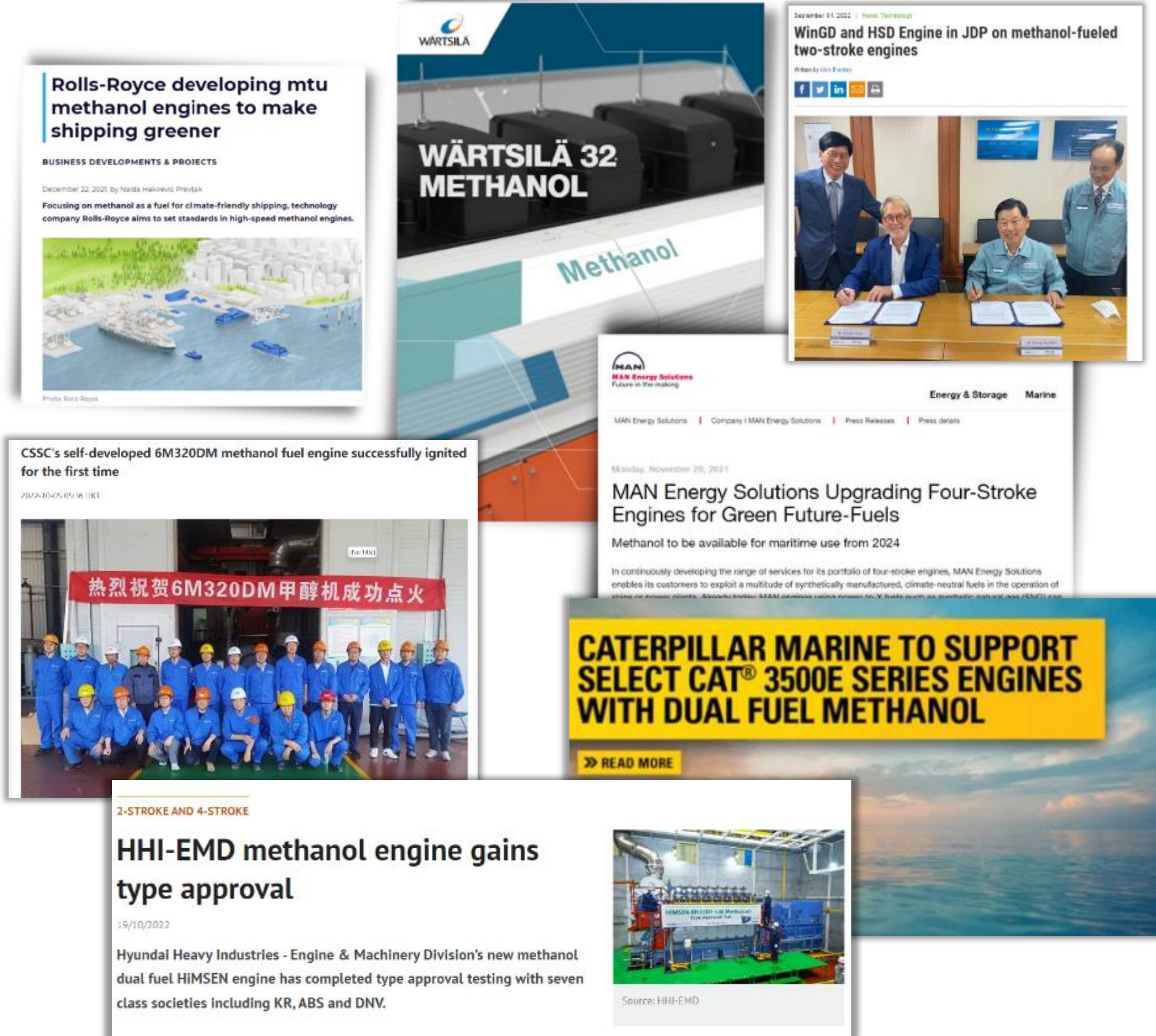
China State Shipbuilding Corporation has signed a cooperation agreement with France's CMA CGM Group to produce 16 large methanol dual-fuel container vessels worth more than 21 billion yuan (about 3 billion U.S. dollars).



Engines Available and More Coming

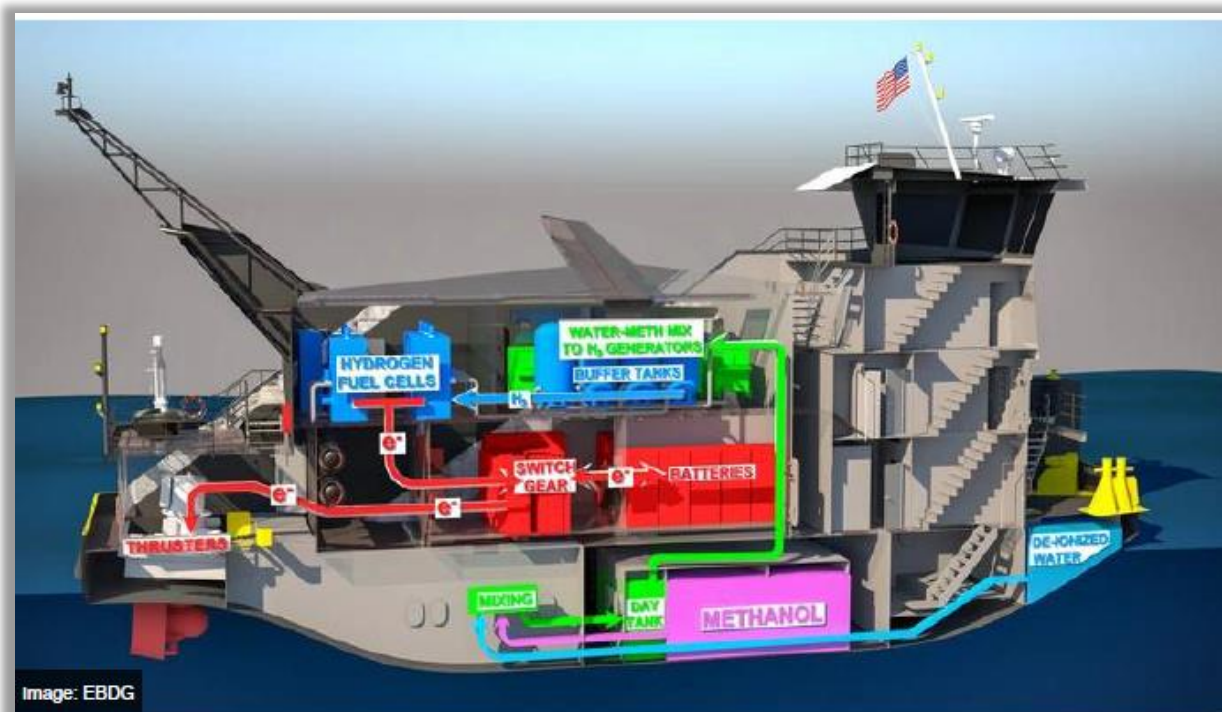


Since 2016, MAN has received orders for 110 large, two-stroke methanol engines, with 24 already in operation in chemical tankers operated by MI members. Another 100+ engine orders on the way!!!





- The world's first methanol-fueled towboat is set to join the fleet of Metairie, La., based Maritime Partners LLC and become available for charter in 2023 to meet the pressing demand for sustainable towboat operations.
- The vessel, the M/V Hydrogen One, will be IMO 2030 compliant, meet the USCG's Subchapter M requirements, and have an operational range of 550 miles before refueling. It is being developed by Maritime Partners in cooperation with Elliott Bay Design Group, e1 Marine, and ABB.
- Decarbonizing the towboat sector poses substantial challenges, particularly due to towboats' inherent size, space, and weight limitations. Batteries are only suitable for boats that operate on fixed routes and can recharge daily, and a towboat's limited storage capacity restricts the use of pressurized or cryogenically stored gases as fuels. There are also very few dockside facilities to load such marine fuels, which severely constrains a vessel's range and functionality.
- The ship has been designed by Elliott Bay Design Group using proven, efficient technology throughout, from ABB's electrical power distribution and automation to e1 Marine's methanol-to-hydrogen fuel cell.

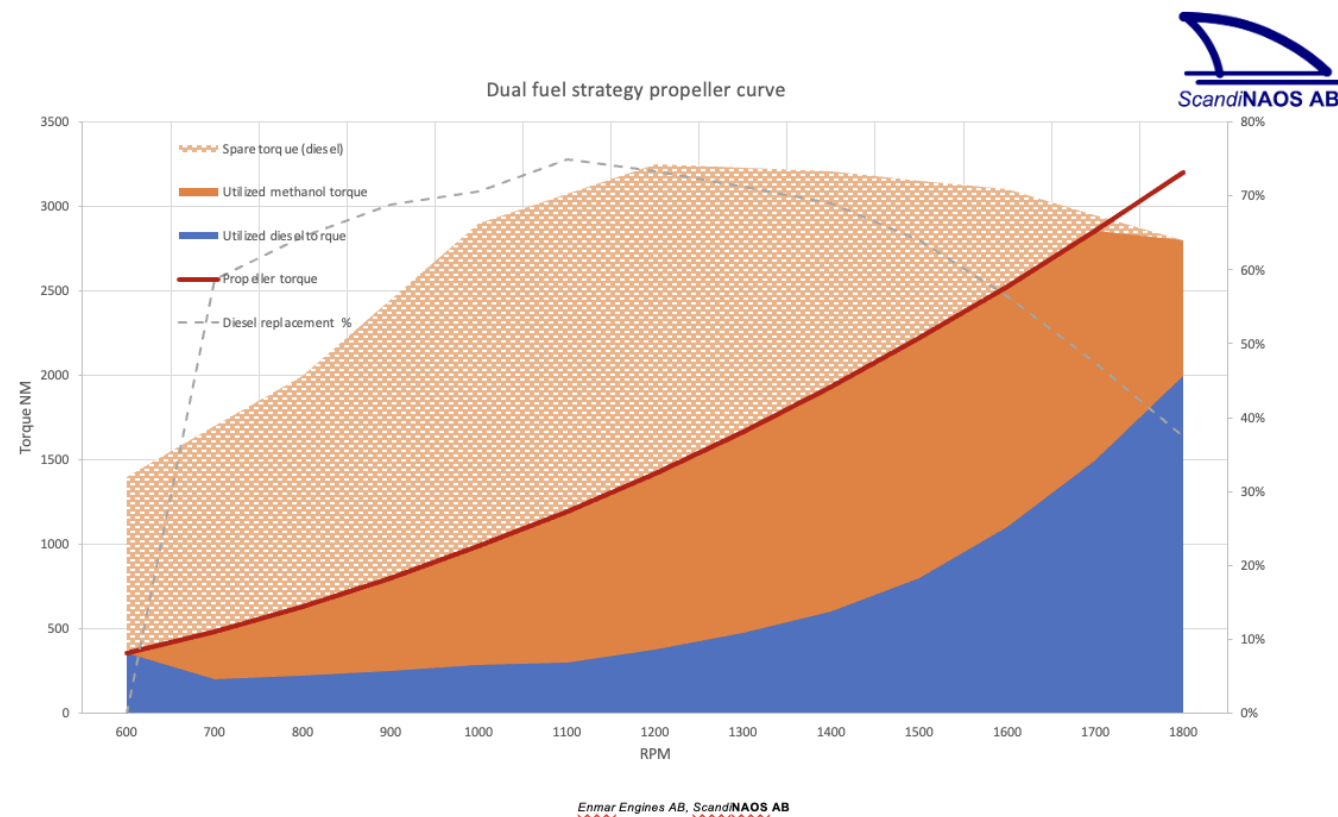
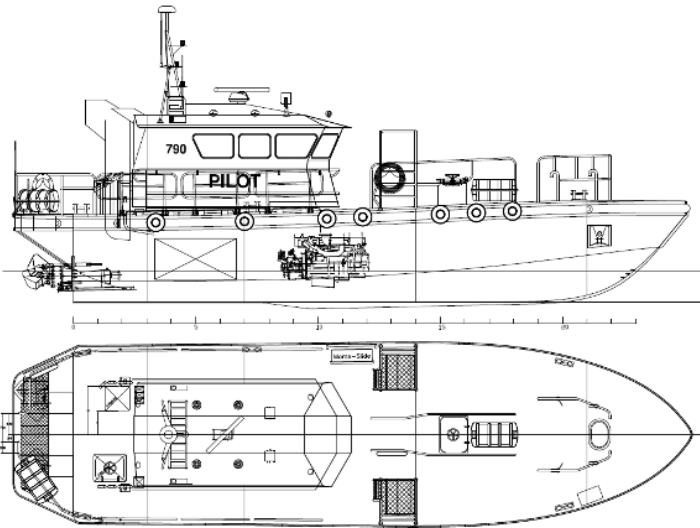


CoMeBust – Methanol Pilot



CoMeBust-Me

CONVERSION METHODS FOR COMBUSTION OF METHANOL



PROJECT PARTNERS

ScandiNAOS AB

- To provide ship design
- To provide Dual-fuel kits

Sjöfartsverket

- Ship owner & operator
- To convert the ship to methanol operation

Chalmers

- To employ one Post doc. Dedicated for applied dual fuel research

Swedish Energy Agency

- To cover 50% of project costs

Industry partner (Methanol institute and Proman AG)

- To fund the project with approx. €200.000 cash.

TOTAL Project budget 8.6MSEK = €850.000

PROJECT MAIN TASKS

Engine conversion

- ScandiNAOS: Dual fuel kit 50-85% Diesel replacement
- Suitable engine for Sjöfartsverket
- Kit is Generic for any diesel engine 200-1000kW
- IMO Tier III (Emission approval)

Ship conversion

- Tanks
- Ventilation
- Safety system

Research

- Chalmers university to employ one dedicated post doc researched supporting methanol engine development

Methods to Reach High Diesel Displacement

- Cooler combustion air
- EGR
- De-rate
- Lower compression ratio



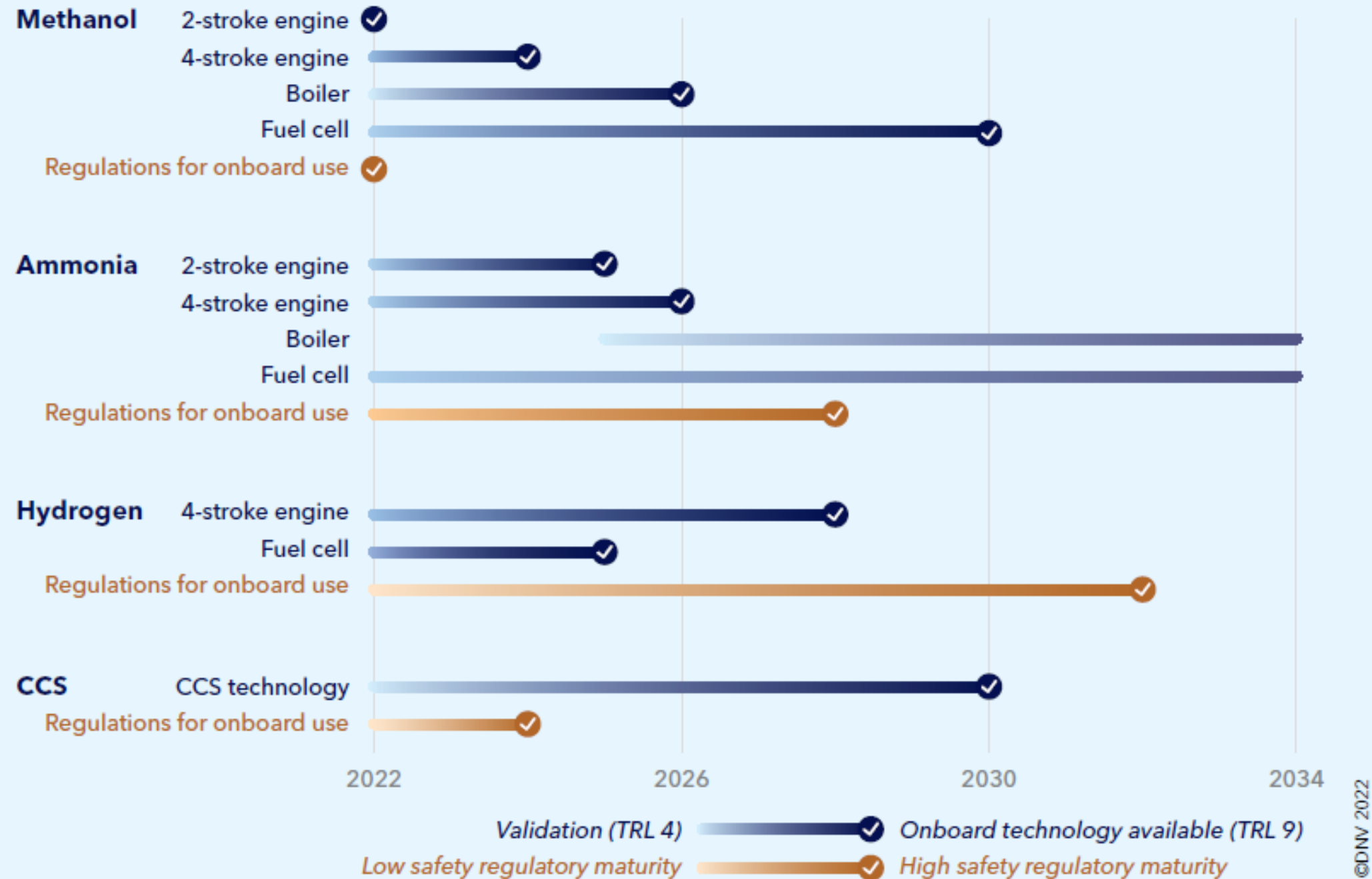
www.methanol.org/join-us



Technology Readiness

Figure 3.3

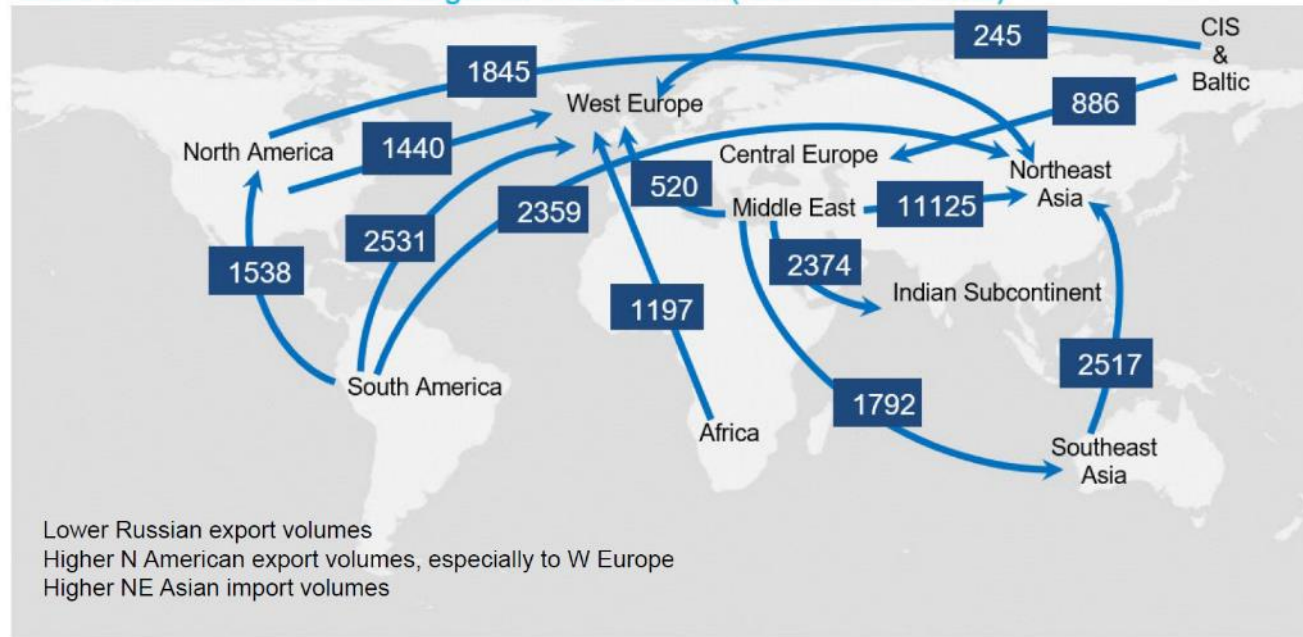
Estimated maturation timelines for energy converters, onboard CCS technologies, and corresponding safety regulations for onboard use



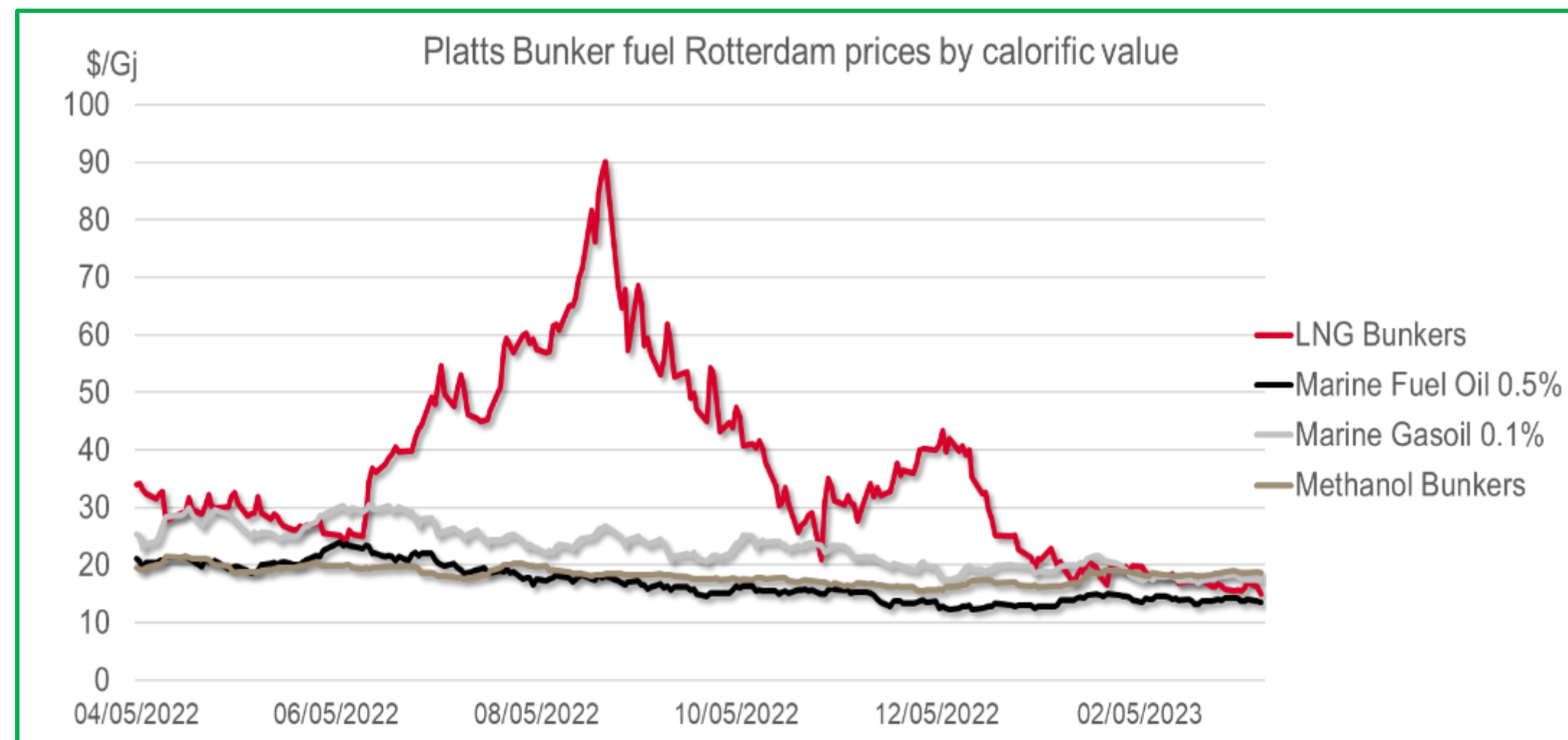
<https://www.dnv.com/maritime/publications/maritime-forecast-2022/index.html>

Available and Affordable

2023 Main Methanol Inter-Regional Trade Flows (-000- Metric Tons)



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Friday 26 May
S&P Methanol
Rotterdam Methanol = \$290/tonne
Ship and Bunker
Rotterdam VLSFO = \$534/tonne
Rotterdam MGO = \$675/tonne

Easily Bunkered



Methanol Bunker Vessel Planned for Northern Europe



Vingaren delivered in late 2020 expanded the company's Northern European bunkering operations (OljOla)
PUBLISHED NOV 9, 2022 7:06 PM BY THE MARITIME EXECUTIVE



Global Energy Group orders first methanol bunkering tanker for Singapore

Japanese newbuilding could pave the way to a new generation of versatile bunkering tankers

3 November 2022 5:41 GMT UPDATED: 3 November 2022 8:47 GMT
By Jonathan Boonzaier in Singapore



First dual-fuel methanol bunker barge headed for Rotterdam

by Mariska Buitendijk | Feb 3, 2023 | Emissions, Energy transition, Inland navigation, Marine fuels, News, Ports, Shipping



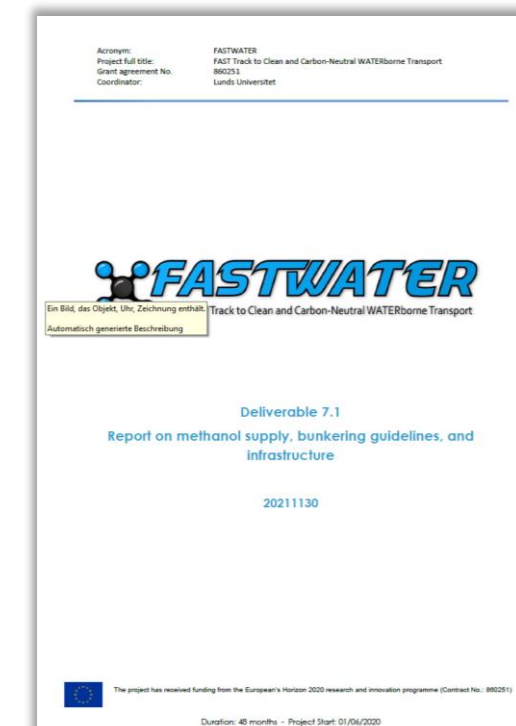
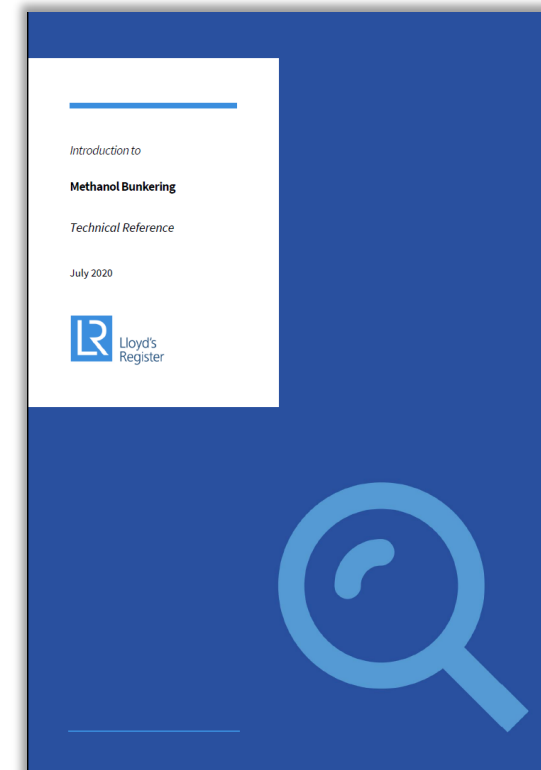
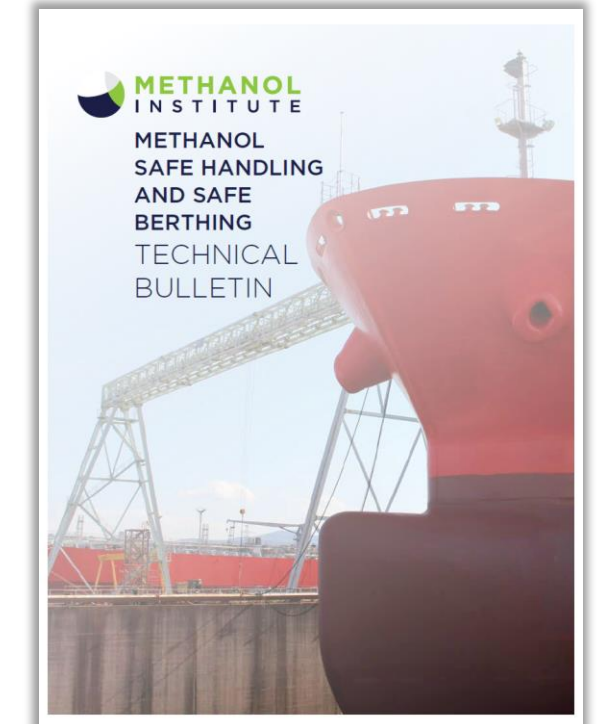
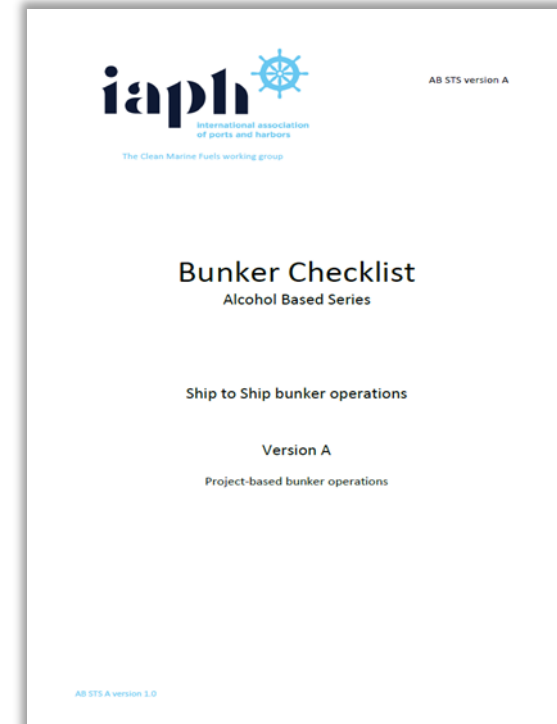
OCI and Unibarge have joined forces to develop Europe's first dual-fuelled green methanol bunker barge, driving cleaner shipping. The vessel will be deployed at the Port of Rotterdam in 2024.



Bunker & Safe Handling Guidelines



- Bunker guidelines have been released by International Association of Ports and Harbors, Lloyd's Register and EU CEN
- Guidelines cover:
 - Truck-to-Ship bunkering
 - Shore-to-Ship bunkering
 - Ship-to-Ship bunkering
- Additional guidelines being developed by leading ports including Port of Rotterdam and Port of Singapore
- FASTWATER.eu project has released report on methanol supply, bunkering and infrastructure
- MI prepared Methanol Safe Handling and Safe Berthing Technical Bulletin and comprehensive Methanol Safe Handling Manual

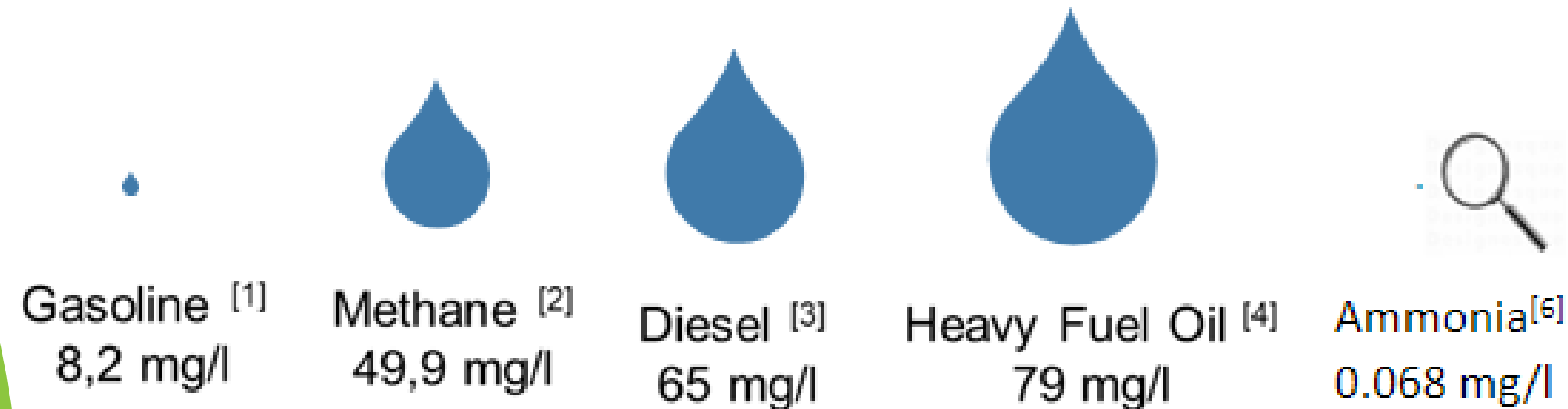


Marine Spills Still Happen....

LC 50: Lethal Dose: Fish

Methanol [5]
15,400 mg/l

- Methanol is a more environmentally-benign fuel in marine environments
- In a waterbody, nearly 200 times more methanol is needed to kill half the number of fish than marine heavy fuel oil



Sources:

[1] Petrobras/Statoil ASA, Safety Data Sheet, ECHA registration dossier Gasoline

[2] ECHA, European Chemicals Agency, registration dossier Methane

[3] ECHA, European Chemical Agency, registration dossier Diesel

[4] GKG/ A/S Dansk Shell, Safety Data Sheet

[5] ECHA, European Chemical Agency, registration dossier Methanol

[6] ECHA, European Chemical Agency, registration dossier Ammonia



Crew Training



GREEN MARINE

- Denmark-based company has finalized a specialist training programme for crews onboard methanol dual-fuel vessels, supplementing baseline regulatory training requirements with practical, experience-based learning.
- The crew training programme was created based on practical knowledge gathered over a decade of experience working on Methanol dual fuel vessels with services from design consultancy to newbuilding construction supervision, technical management and operations.
- The curriculum, which can be delivered onboard, in a classroom or online, was developed to address the knowledge gaps between theoretical regulation and practical experience in the use of Methanol as marine fuel. GREEN MARINE is able to supplement regulatory baselines with real life experiences based on operational experience, emergency troubleshooting and the application of historical data.

“Our methanol specialists are captains and chief engineers with first-hand knowledge of working with Methanol as a fuel and how to ensure these dual fuel ships operate safely,” said Morten Jacobsen, CEO of GREEN MARINE. “Theoretical knowledge is little use in real life situations when you need to know what to do; we bridge that gap and provide practical knowledge to support crews in adopting this methanol dual fuel technology.”

- Working with Thome Group Singapore/Philippines/India, where they maintain their largest hubs in Asia, a methanol crew training platform is being created as senior trainers, classroom and onsite facilities are available as well as appropriate government networks for certification.
- Thome has already started on this work and have the basic SOLAS/IGF/STCE requirement for the Basic and Advanced IGF trainings already in hand. So, the task Thome completed is to make it methanol specific.
- Two pilots successfully completed by March and now looking at a ‘train the trainer’ approach with quite a bit of external demand already.



- IBIA hosts a series of paid bunkering course work offered on-line and in-person with methanol now being addressed.
- IBIA is currently compiling comprehensive knowledge for certified course planning through dedicated working groups (MI is represented in the methanol working group).
- Planning to produce a course module on methanol.



Safety Assessment

- June 2022: *Together in Safety*, a non-regulatory shipping industry consortium initiated the “*Future Fuels Risk Assessment*,” a cross-industry study to evaluate the potential operational risks of LNG, methanol, hydrogen and ammonia.
- The study, which involved a series of hazard identifications (HAZID) workshops across a set of operational scenarios, found of the four fuels reviewed, methanol poses the least overall risk, followed by LNG, hydrogen and ammonia.
- Methanol scored the lowest risk ratings within navigation-related scenarios, as well as in scenarios related to ship operations.
- Methanol also scored the lowest risk ranking in the external event scenario of hull breach from ship collision.
- The study identified some ‘intolerable’ risks associated with ammonia that need to be resolved before it can be used at scale as a bunker fuel.

Table 1: Risk acceptance criteria

			Consequence				
			C1	C2	C3	C4	C5
			Minor injury	Minor injury	One fatality or multiple major injuries	2-10 fatalities	11+ fatalities
Likelihood	L7 Extremely Likely	≤ 100 to 10^1					
	L6 Very Likely	$\leq 10^1$ to 10^2					
	L5 Likely	$\leq 10^2$ to 10^3					
	L4 Unlikely	$\leq 10^3$ to 10^4					
	L3 Very Unlikely	$\leq 10^4$ to 10^5					
	L2 Extremely Unlikely	$\leq 10^5$ to 10^6					
	L1 Remote	$\leq 10^6$					

Legend: Intolerable risk (Red), Tolerable risk - ALARP (Yellow), Broadly acceptable (Green)

Bud Darr, Executive Vice President, Maritime Policy, MSC Group: “Without the safety issues being thoroughly identified and properly addressed, we will not reach the end state we need. Safety and net zero GHG operations must go hand-in-hand in a world powered by future fuels at sea.”

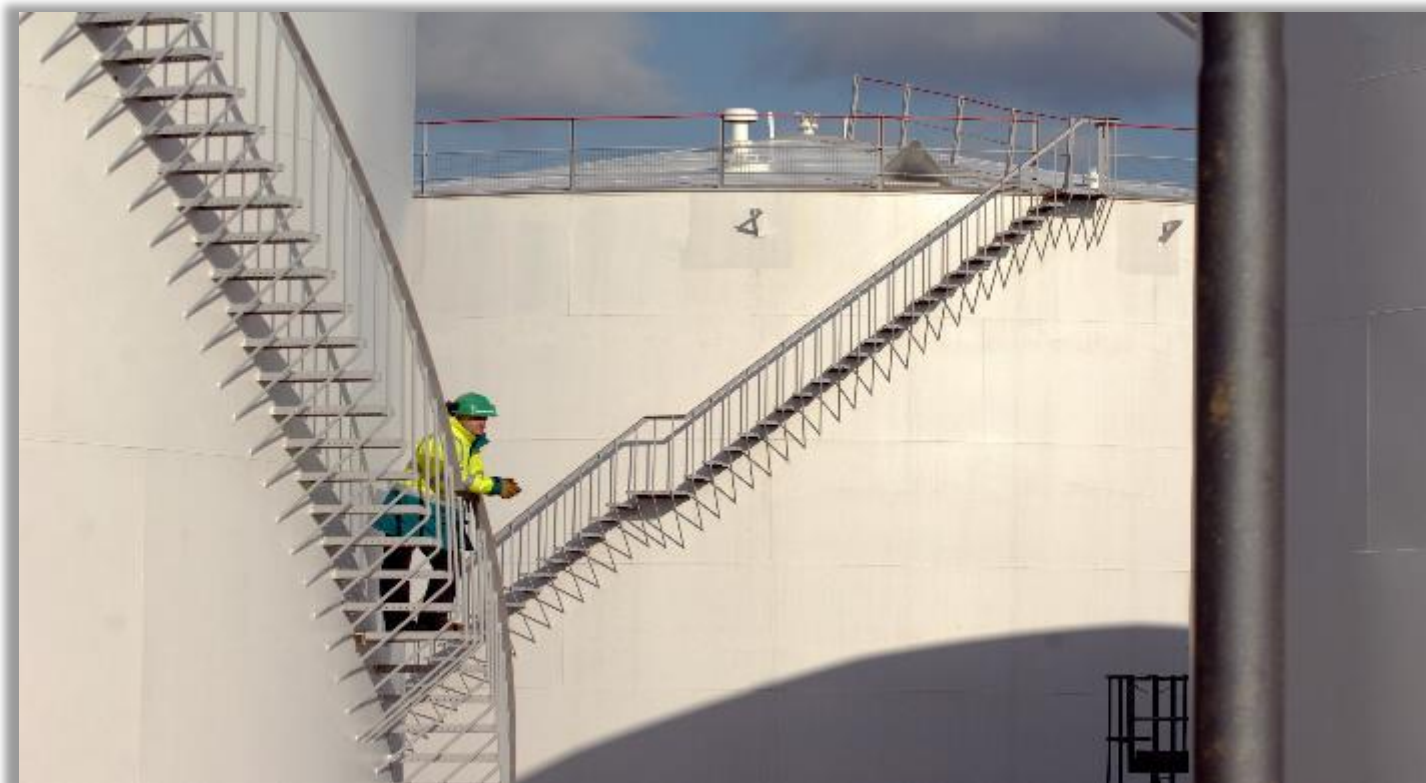


<https://togetherinsafety.info>

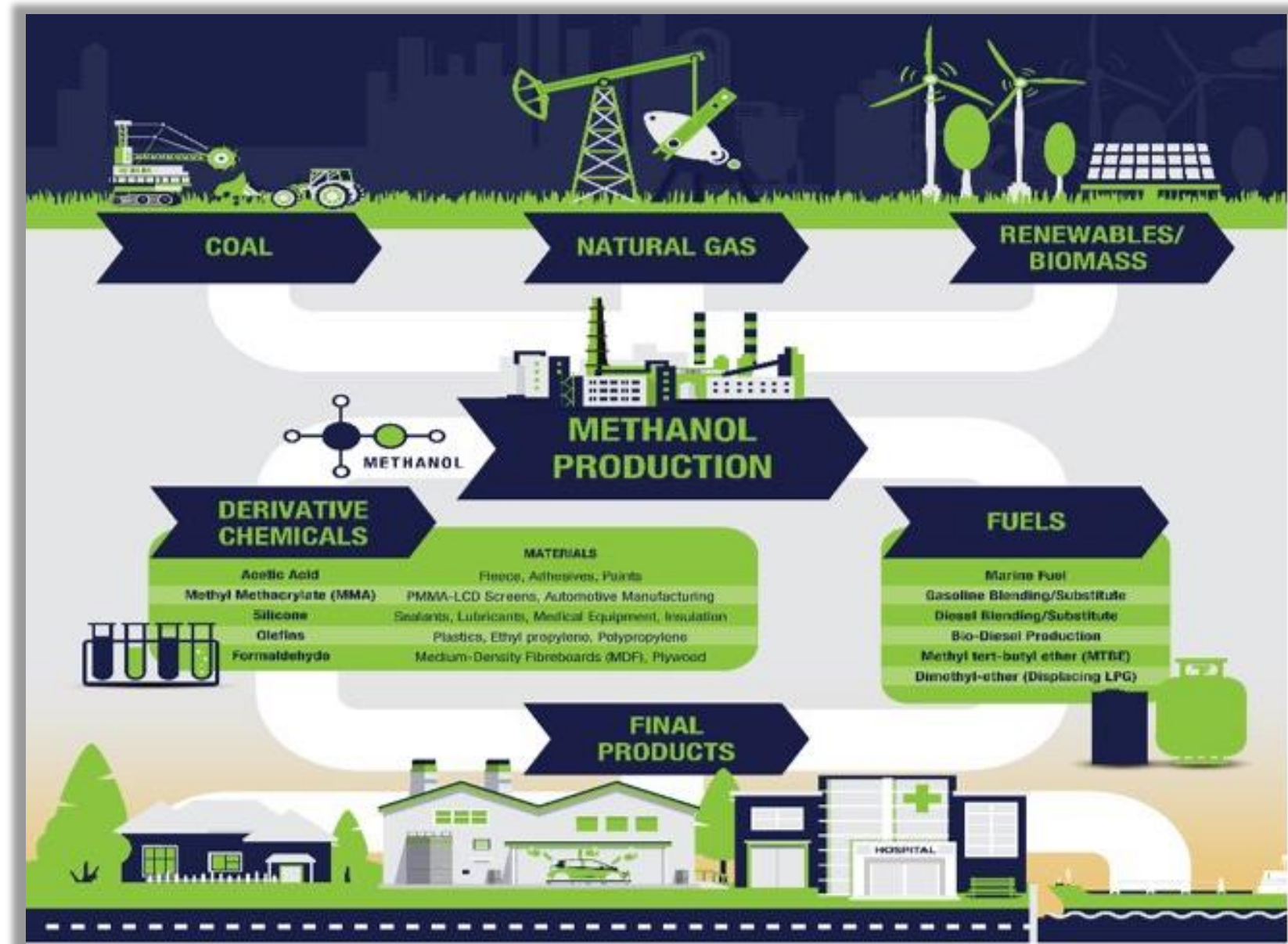
Table 2: Indicative comparison of HAZID risk rankings

			Intolerable risk	Tolerable risk - ALARP	Broadly acceptable
Node	What if / Question	Consequence	LNG	H2	Ammonia
1. Navigation	What if there is loss of manoeuvrability at sea?	1. Propulsion failure	C1-4	C1-4	C1-4
		2. Collision	C1-4	C1-4	C1-4
		3. Build-up of tank pressure	C1-5	C1-5	C1-5
		4. Excess motions	C1-5	C1-5	C1-5
	What if there are excessive motions at sea?	1. Loss of fin stabilisers	C1-5	C1-5	C1-5
	What if there is a black-out at sea?	1. Engine / generator failures	C1-2	C1-2	C1-2
		1. Soli-off management affected that could lead to build-up in tank pressure	C1-2	C1-2	C1-2
	What if an excessive trim / list develops at sea or in port?	1. Loading / Ballasting error	C1-2	C1-2	C1-2
		1. Potential for gas pocket formation	C1-2	C1-2	C1-2
		1. Large heel / trim angles that could lead to liquid fuel coming from vent mast	C1-2	C1-2	C1-2
2. External events	What if there is a requirement for tug support / 3rd party vessel attendance at sea or in port?	1. Collision leading to hull breach	C1-2	C1-2	C1-2
		1. Fuel / Bunker / Supply up lift	C1-2	C1-2	C1-2
		1. Potential source of ignition	C1-2	C1-2	C1-2
		2. Damage to pipe work (hard landing / hard contact by tug)	C1-2	C1-2	C1-2
		3. Potential of exposure to toxic fumes	-	-	C1-2
	What if there is a ship grounding in way of the Future Fuel tanks and system?	1. Propulsion / Steering gear / Human failure	C1-1	C1-1	C1-1
	What if the vessel needs to be abandoned?	1. Loss of LNG tank pressure control / LNG tank breach / Loss of propulsion in high seas that pose risk to crew	C1-1	C1-1	C1-1
		1. Liquid / vapour release / Tank pressure build up	C1-1	C1-1	C1-1
	What if there is a ship collision in way of the fuel tanks?	1. Hull breach	C1-1	C1-1	C1-1
		1. Loss of containment	C1-1	C1-1	C1-1
3. Ship operations other than bunkering		2. Build-up of tank pressure	C1-2	C1-2	C1-2
		3. Potential ignition sources in hazardous areas (from colliding vessel)	C1-2	C1-2	C1-2
	Potential of ignition	1. Oil spill / pipe breach / vehicle fire / lightning strike / etc.	C1-2	C1-2	C1-2
		1. Build-up of tank pressure	C1-2	C1-2	C1-2
	What if cargo operations are required in way of the Future Fuel tanks and system components?	1. Operational requirements	C1-5	C1-5	C1-5
		2. Crane reach	C1-5	C1-5	C1-5
	What if there is a crew change?	1. Operational requirements	C1-5	C1-5	C1-5
		1. Potential for un/under-informed personnel taking over control	C1-5	C1-5	C1-5
	What if there is a completely new crew after vessel handover?	1. Crew unfamiliar with the vessel	C1-5	C1-5	C1-5
		1. Potential for un/under-informed personnel taking over control	C1-5	C1-5	C1-5
4. Bunkering	What if onboard access is required by personnel not managed by the ship's operator?	1. Electronic equipment carried inadvertently in hazardous areas	C1-4	C1-4	C1-4
		2. Persons inadvertently being exposed to toxic atmosphere	C1-4	C1-4	C1-4
	What if there is a misalignment of the bunkering stations?	1. Mooring Control	C1-4	C1-4	C1-4
		2. Tension on hoses and couplings, manifolds	C1-4	C1-4	C1-4
	What if there are excessive motions?	1. Peating ships / weather	C1-4	C1-4	C1-4
		2. Asymmetric filling of tanks	C1-4	C1-4	C1-4
		1. Heel angles exceeding limits for bunkering	C1-4	C1-4	C1-4
	What if there is a loss of control?	1. Filling rate	C1-3	C1-3	C1-3
		2. Incorrect level readings	C1-3	C1-3	C1-3
		3. BOG management	C1-3	C1-3	C1-3
5. Fuel preparation, use and monitoring		4. Roll over	C1-3	C1-3	C1-3
	What if there is a leak / loss of containment?	1. Overfilling	C1-3	C1-3	C1-3
		2. Joint leakages	C1-3	C1-3	C1-3
		3. Incompatible flange types	C1-3	C1-3	C1-3
		4. Insufficient pre-cooling of bunkering lines	C1-3	C1-3	C1-3
		1. Damage to equipment / vent mast	C1-3	C1-3	C1-3
		1. Power outages	C1-4	C1-4	C1-4
		2. Sensor and system failures	C1-4	C1-4	C1-4
		1. Automated shut-down	C1-4	C1-4	C1-4
	6. End of life	What if the vessel is scrapped?	1. Vessel age	C1-2	C1-2
		1. Potential for residual gas in tank	C1-2	C1-2	C1-2

Methanol Supply

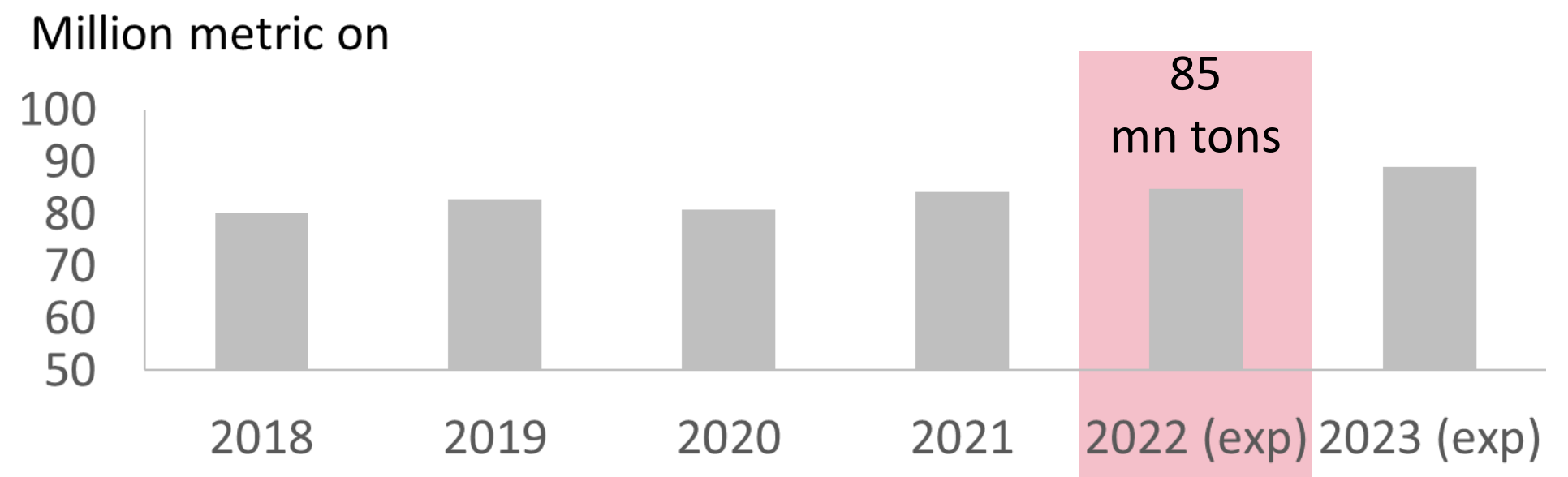
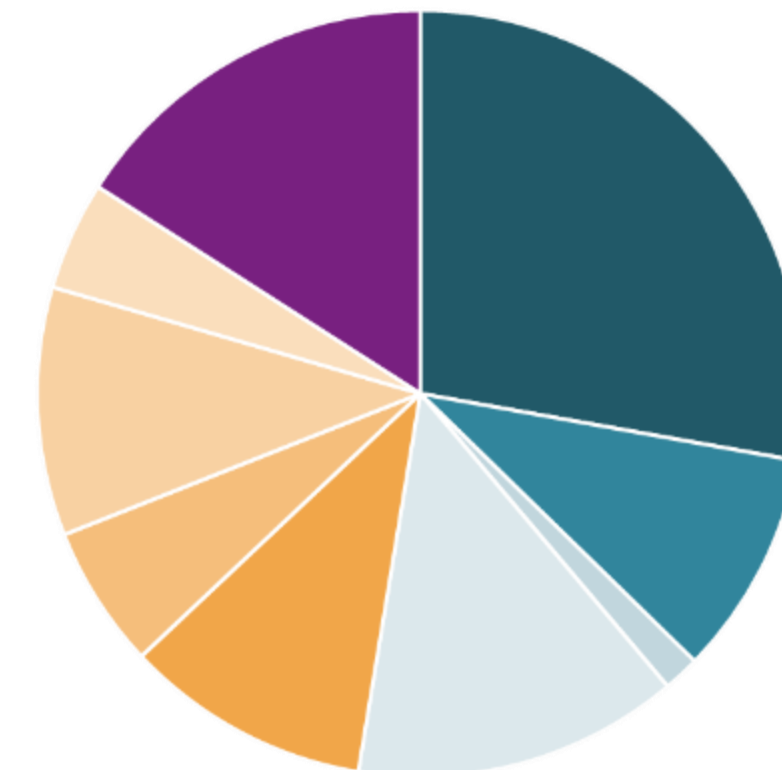


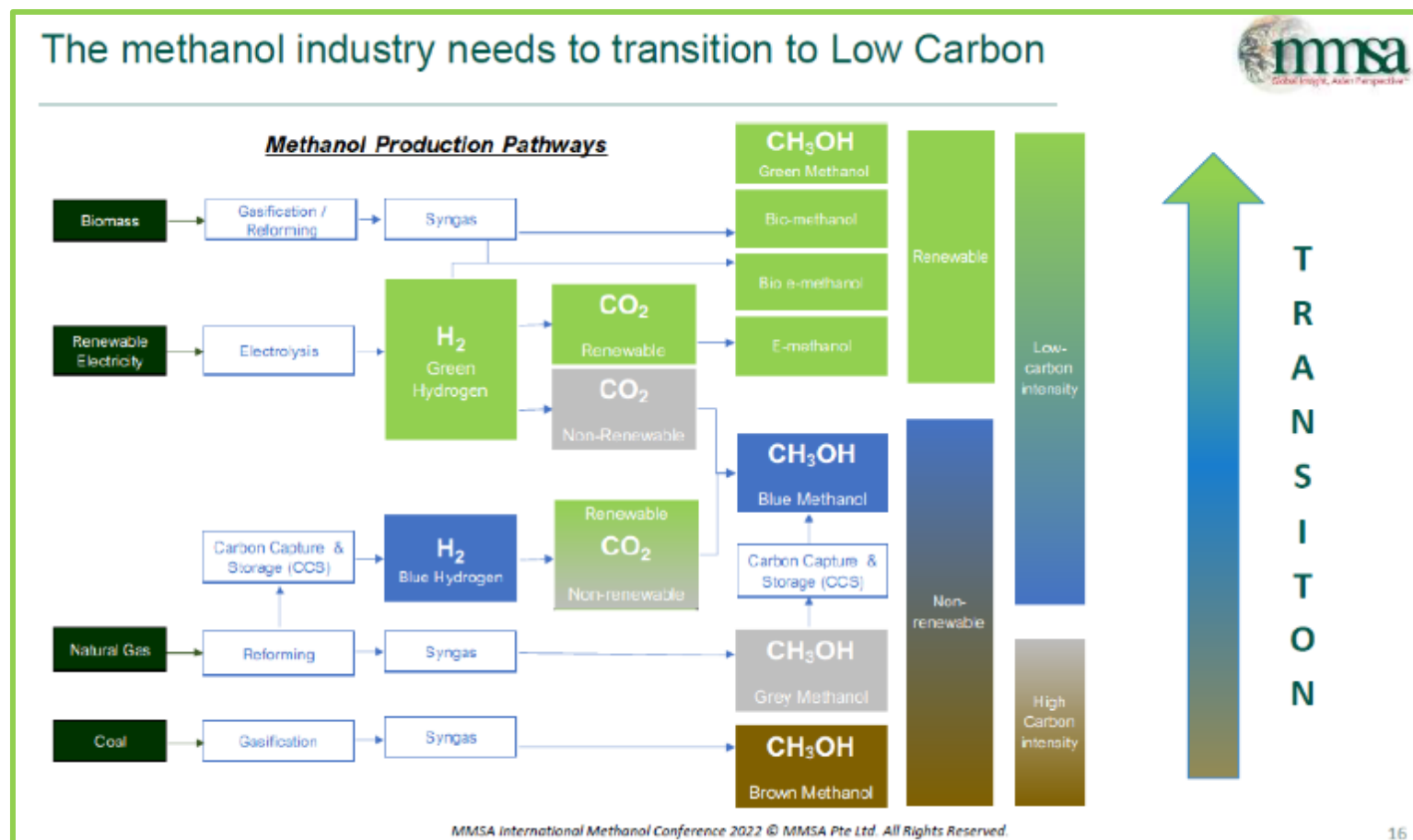
Essential Methanol



Source: S&P Commodity Insights

- Formaldehyde
- Acetic acid
- MMA
- Others
- MTBE/TAME
- Biodiesel
- Fuel applications
- DME
- MTO





E-Methanol

- Feedstocks: green hydrogen and captured CO₂
 - Green hydrogen produced from the electrolysis of water with renewable energy (e.g. solar, wind, geothermal etc.)
 - CO₂ from industrial flue gas (e.g. steel, cement, ethanol), biogenic sources, or direct air capture
- E-methanol is a very-low to net carbon-neutral fuel

Bio-methanol

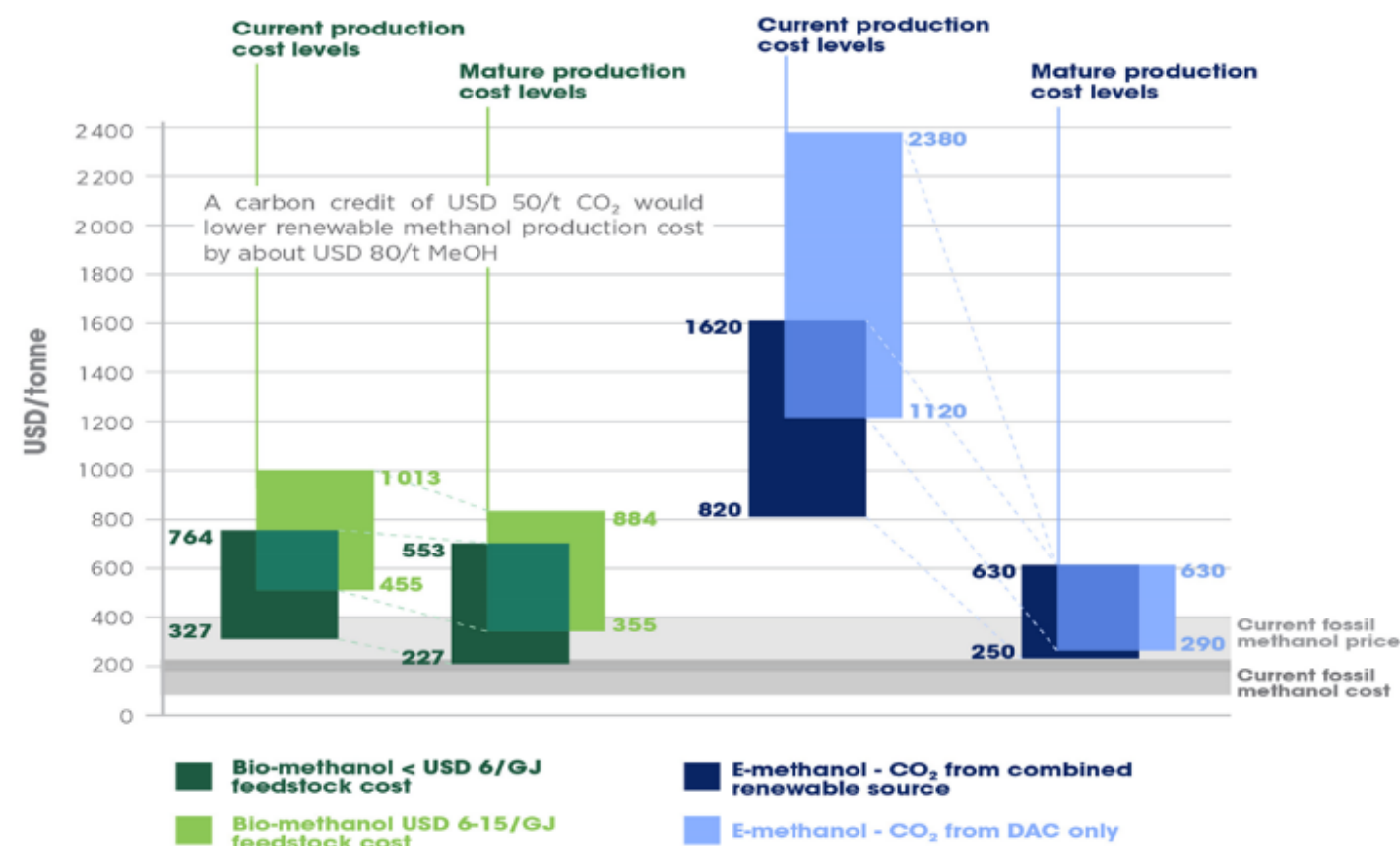
- Feedstocks: Municipal Solid Waste (MSW), Agricultural Waste, Black Liquor, Bio-Methane from wastewater treatment, landfills, or animal husbandry
- Feedstocks can be gasified or anaerobically digested to produce syngas used in methanol production
- Avoided emissions from landfills, incinerators, or dairy farms potentially allow bio-methanol to be a net carbon-negative fuel

Renewable Methanol



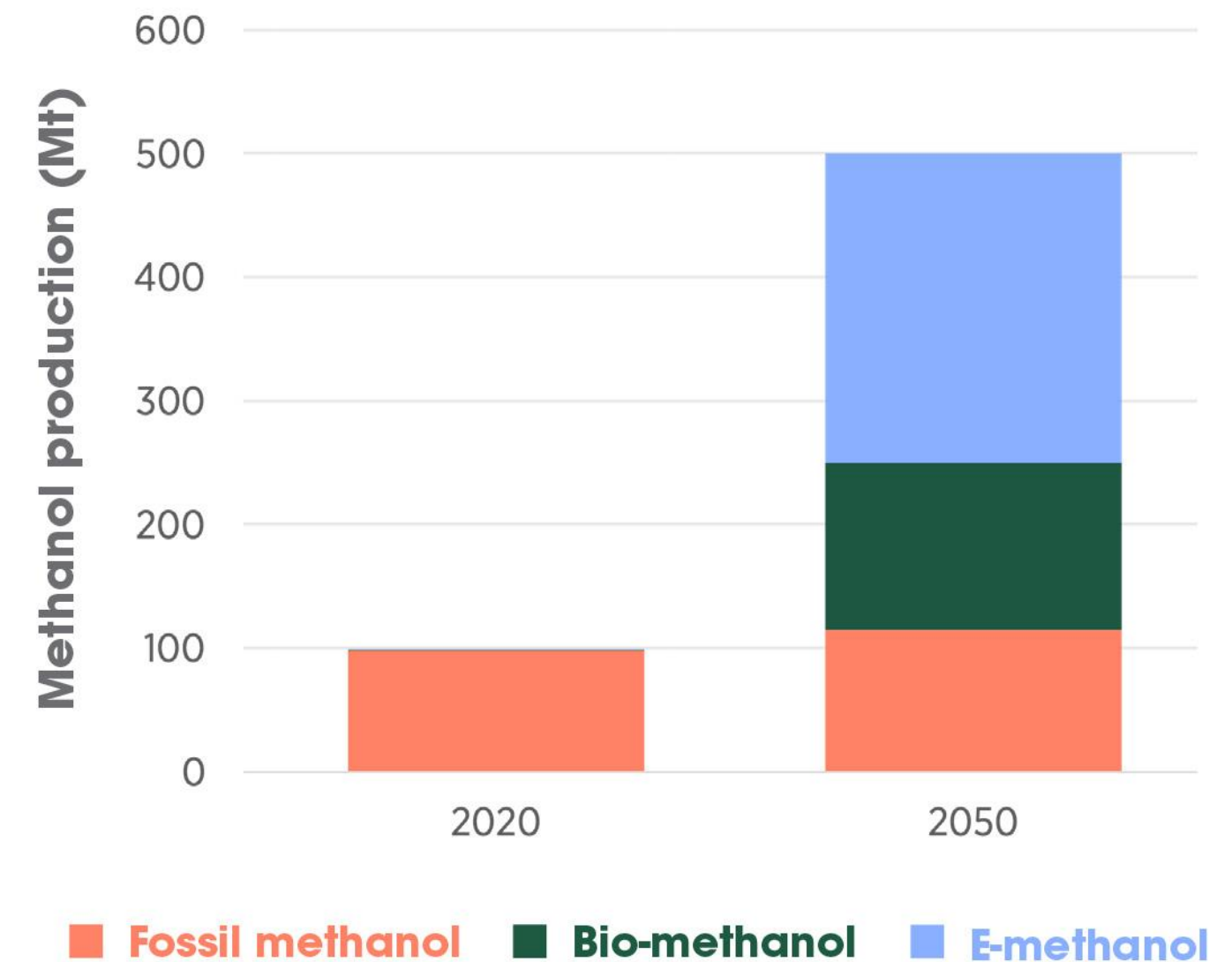
www.methanol.org/renewable/

Figure 3. Current and future production costs of bio- and e-methanol



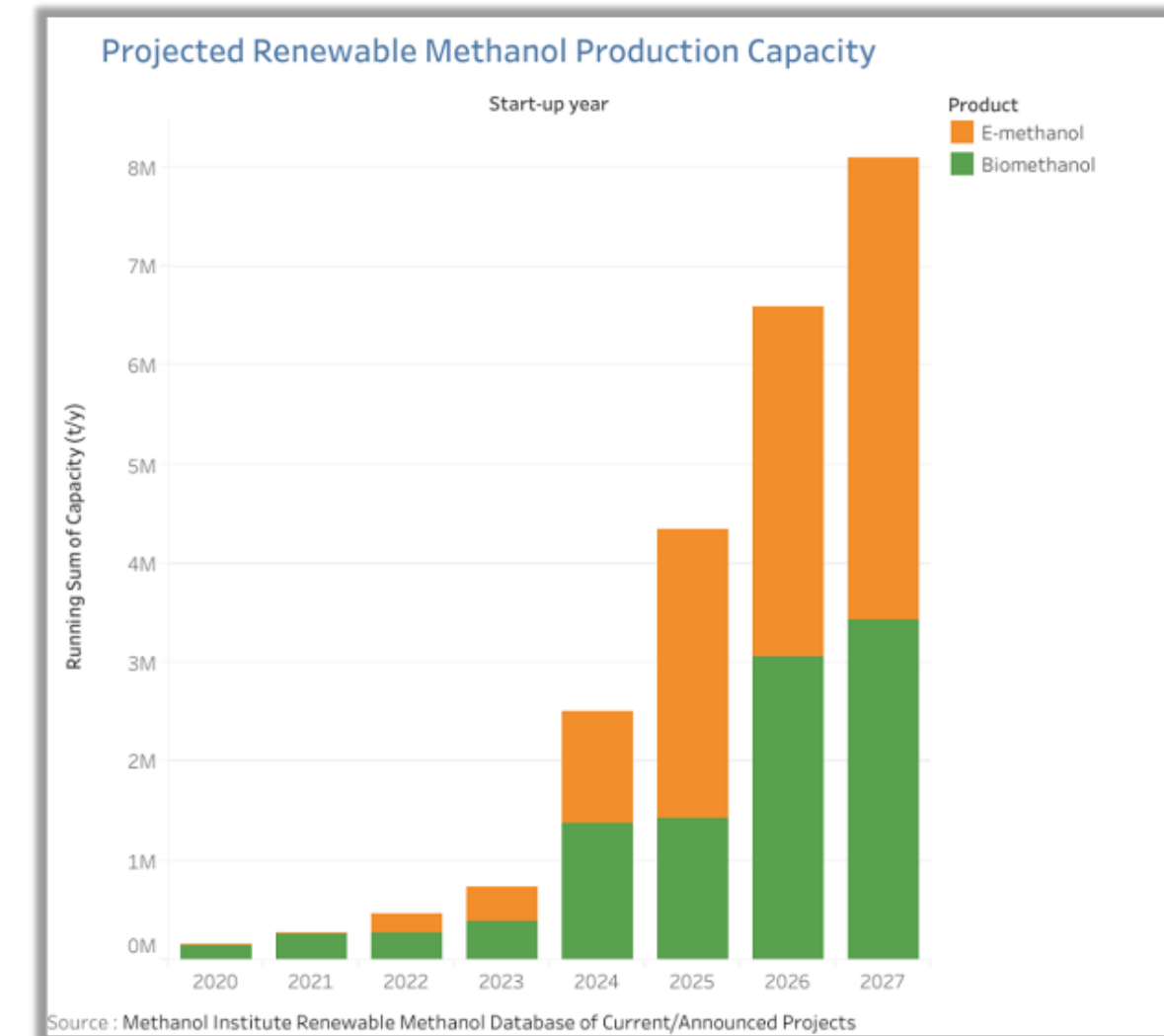
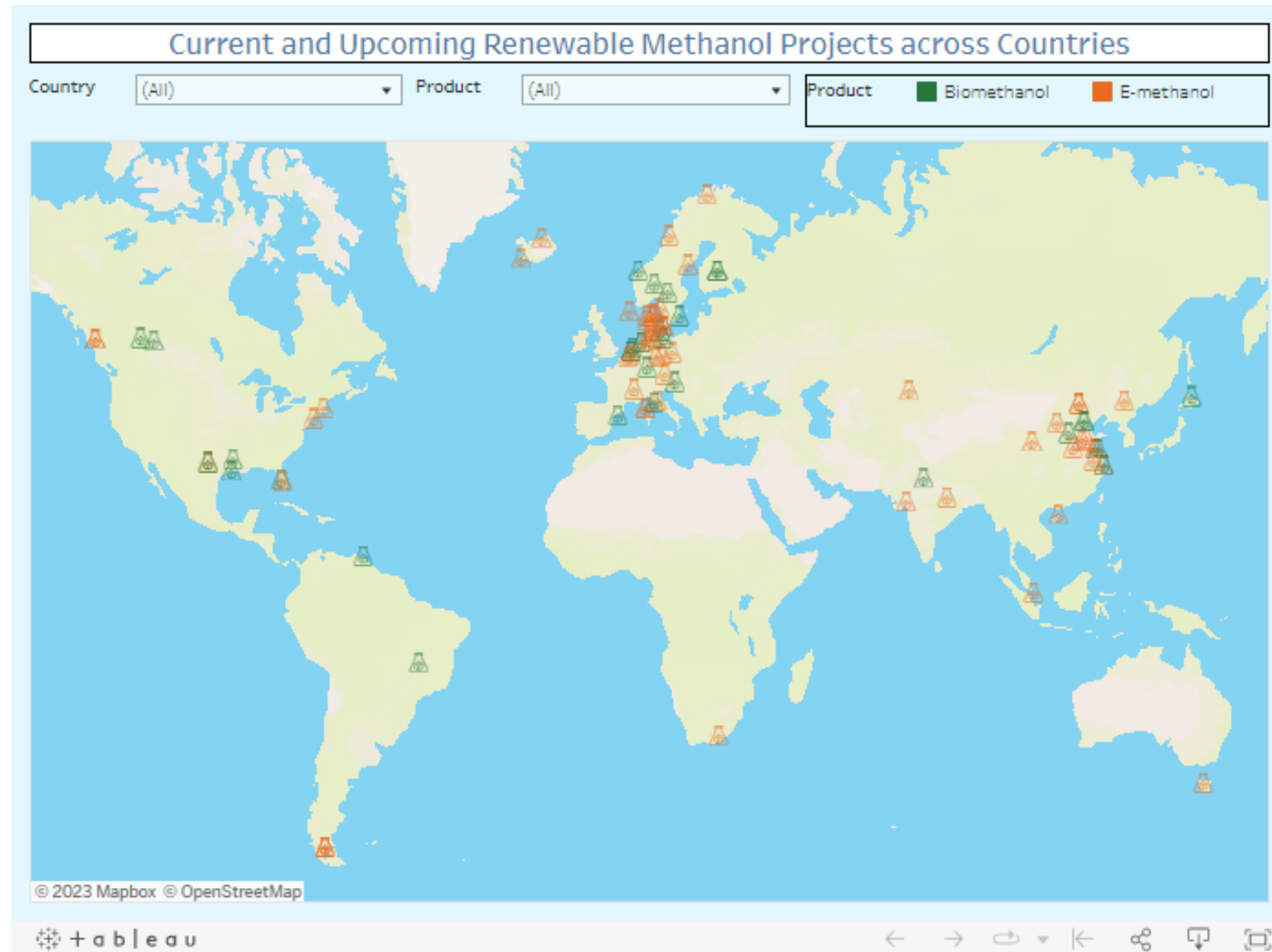
Notes: MeOH = methanol. Costs do not incorporate any carbon credit that might be available. Current fossil methanol cost and price are from coal and natural gas feedstock in 2020. Exchange rate used in this figure is USD 1 = EUR 0.9.

Figure 47. Current and future methanol production by source



Renewable Methanol Tidal Wave

www.methanol.org/renewable/



“With 80 renewable methanol projects already announced, we are seeing clear signs of an incoming wave of bio-methanol and e-methanol production”

Gregory Dolan, CEO, Methanol Institute

<https://www.einpresswire.com/article/594328267/methanol-institute-sees-renewable-methanol-production-growth>

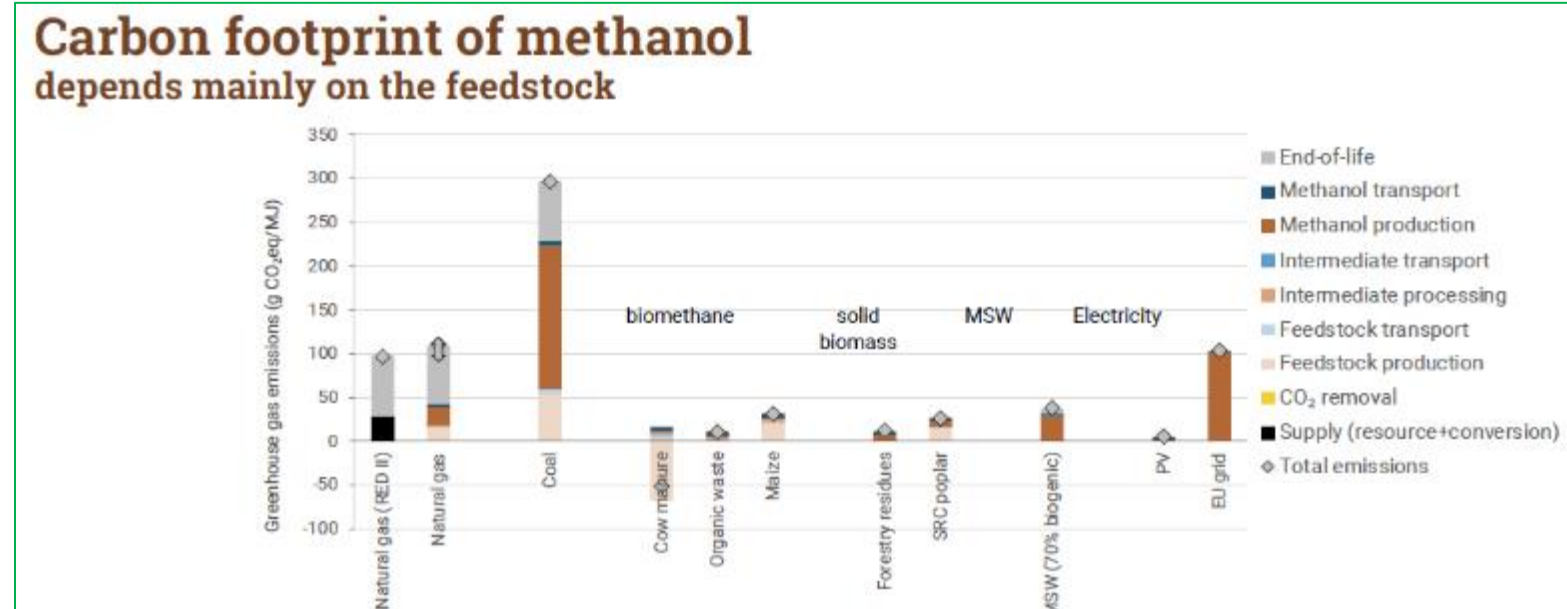
Increasing Scale – Bigger Players

- Increasing scale: To date, e-methanol and biomethanol plants have been in range of 4,000-10,000 tons/year, and we are now seeing announced plants with planned capacity of 50,000, 100,000, 250,000 tons/year
- Expanding from project developers like Carbon Recycling International, Enerkem, Liquid Wind and Gidara, we are seeing major utilities like European Energy, Orsted, Iberdola, SunGas Renewables, and Engie
- We are also seeing interest in methanol from oil/gas majors including new MI members Aramco, BP, ENI/Ecofuel, TotalEngines as well as Chevron, ExxonMobil, and Sinopec

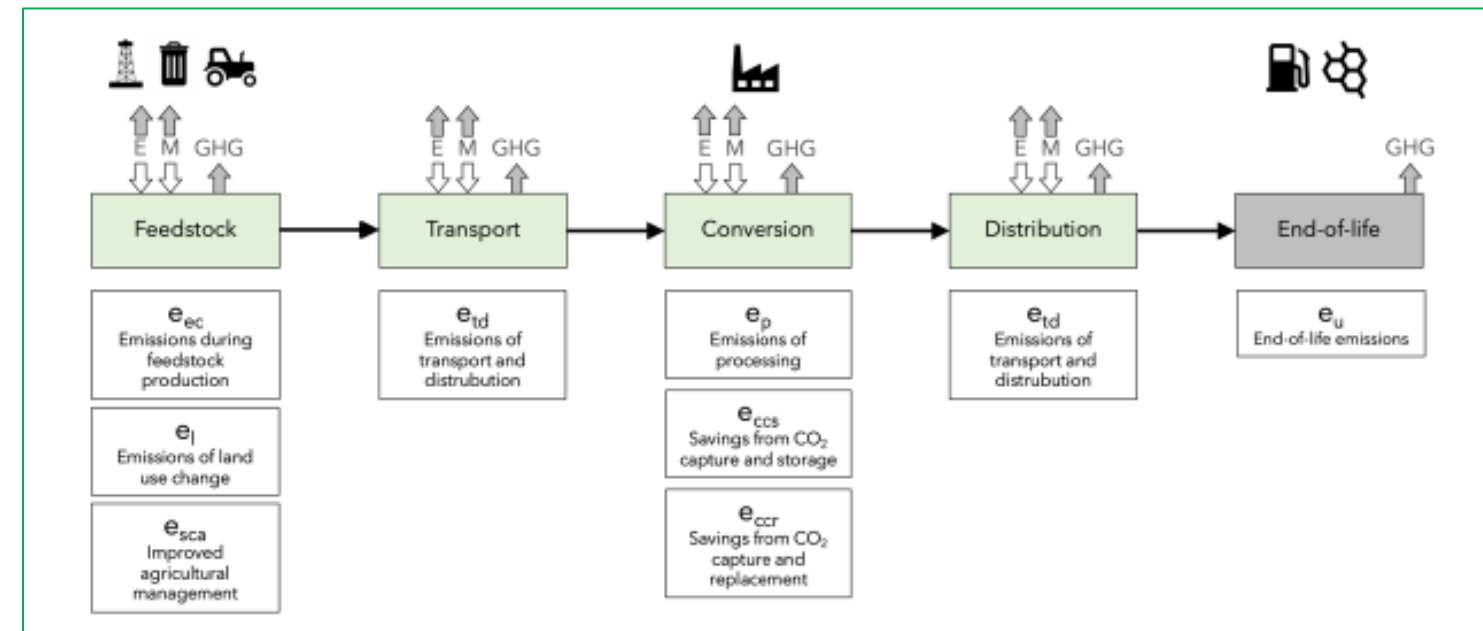


Carbon Intensity Accounting

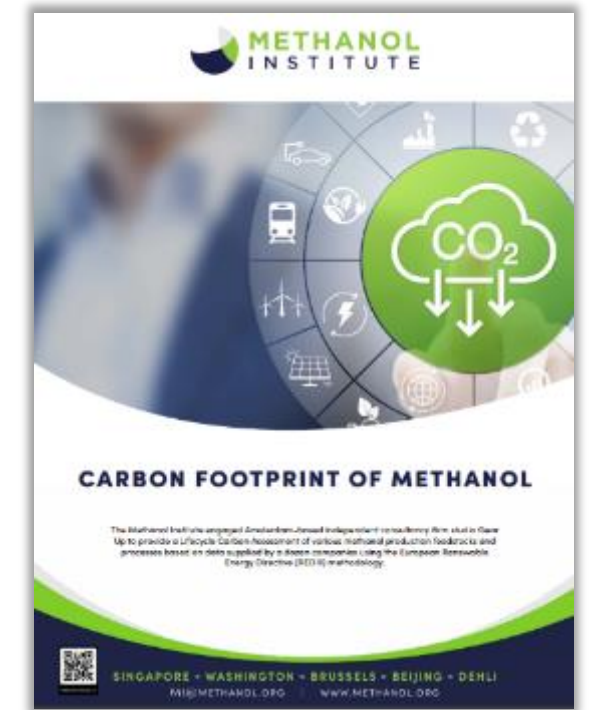
- In January, MI released a report from Amsterdam-based consulting firm studio Gear Up on “Carbon Footprint of Methanol”
- Depending on feedstock and production process methanol’s carbon footprint can be reduced by 65-90%
- In May, International Methanol Producers and Consumers Association working with sGU released a “backpack” calculator can help determine the carbon footprint of methanol depending on feedstock, conversion technologies, and the fate as either fuel or chemical
- **Call to Action: MI and IMPCA working together assist the methanol industry in developing a common platform for carbon intensity accounting**



<https://www.methanol.org/policy-initiatives/europe/>



<https://www.impca.eu/IMPCA/Technical/IMPCA-Documents>



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