METHANOL INSTITUTE

Singapore | Washington | Brussels | Beijing | Delhi

Marine Methanol's Regulatory Journey

Lawrence Navin, VP External Affairs

AEA Annual Conference 2023

Atlanta – 15 November 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

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methanex the power of agility · OCI Global · PROMAN · سابك sabic

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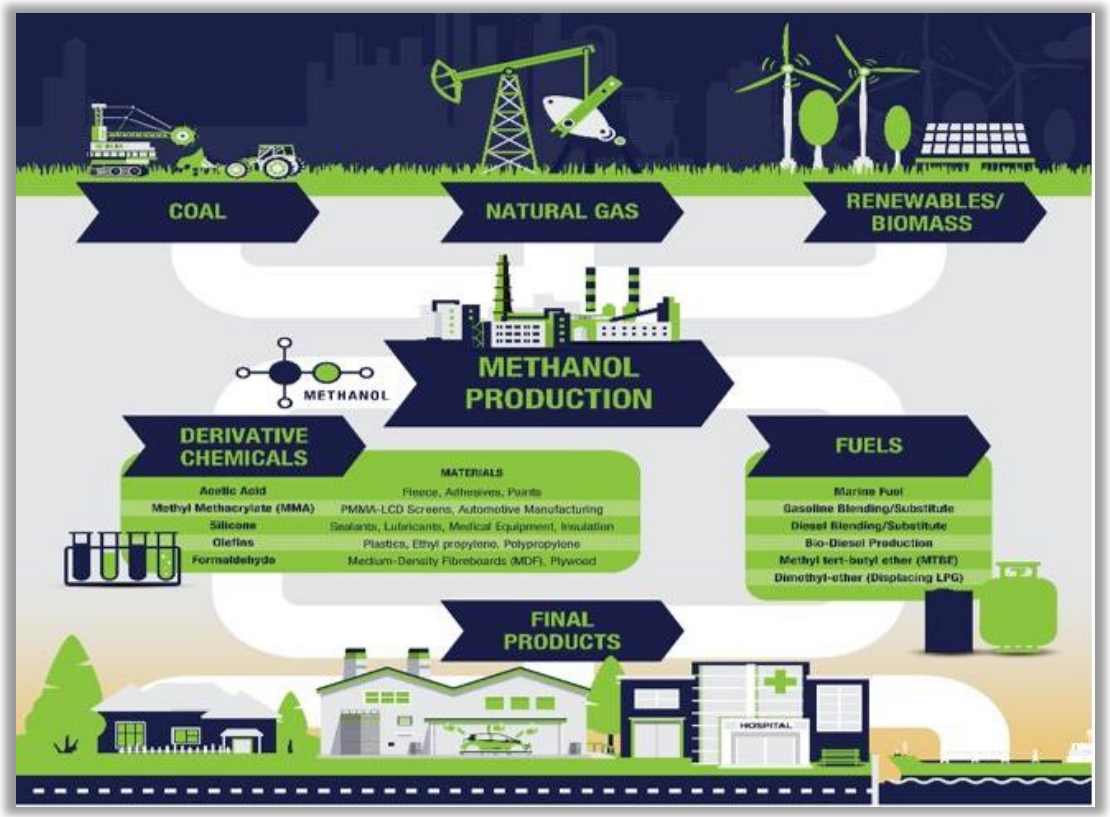
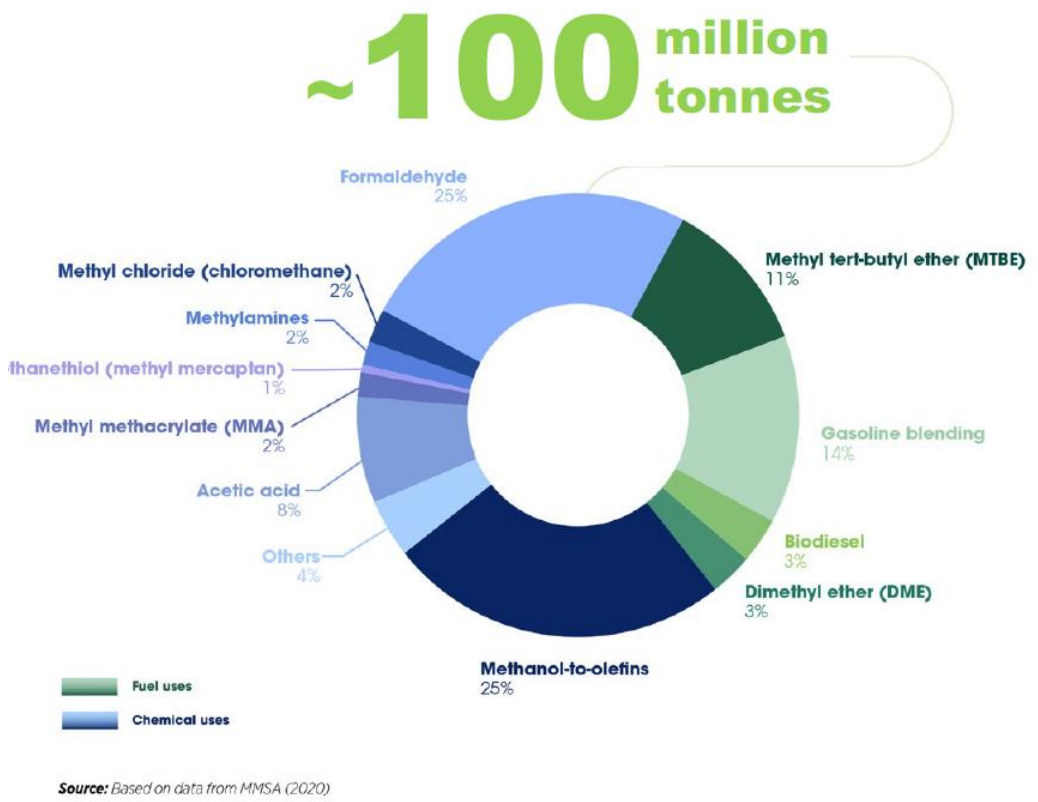
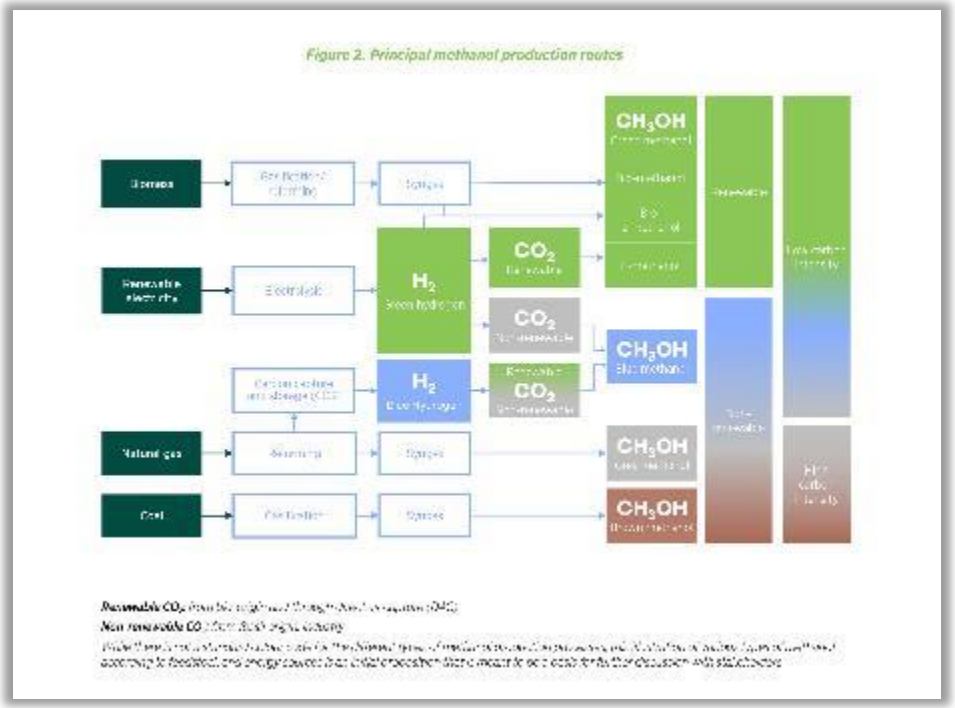
Essential Methanol





Source: Based on data from MMSA (2020)

Low Carbon and Net Carbon-Neutral



https://www.irena.org/publications/2021/Jan/Innovation-Outlook-Renewable-Methanol

All globally traded methanol is produced to the IMPCA Methanol Specification Reference to a minimum purity of 99.85%
https://www.impca.eu/IMPCA/Technical/IMPCA-Documents

E-Methanol

- Feedstocks: green hydrogen and captured CO_2
  - Green hydrogen produced from the electrolysis of water with renewable energy (e.g. solar, wind, geothermal etc.)
  - CO_2 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 Projects

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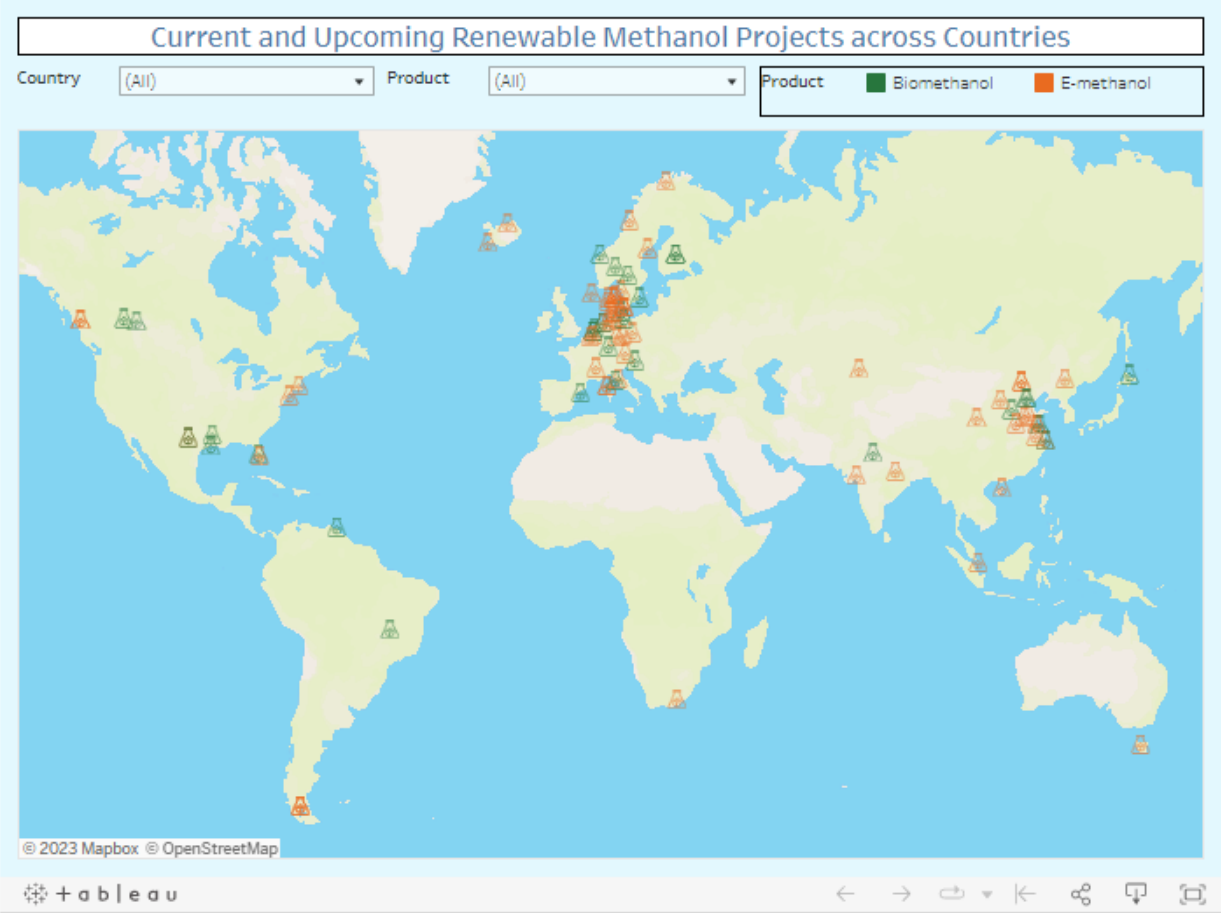
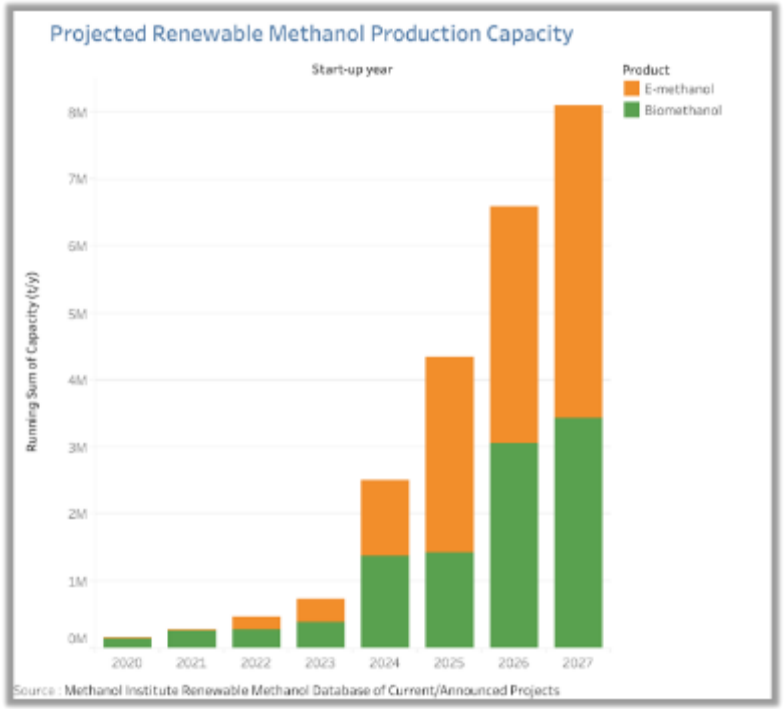
www.methanol.org/renewable/



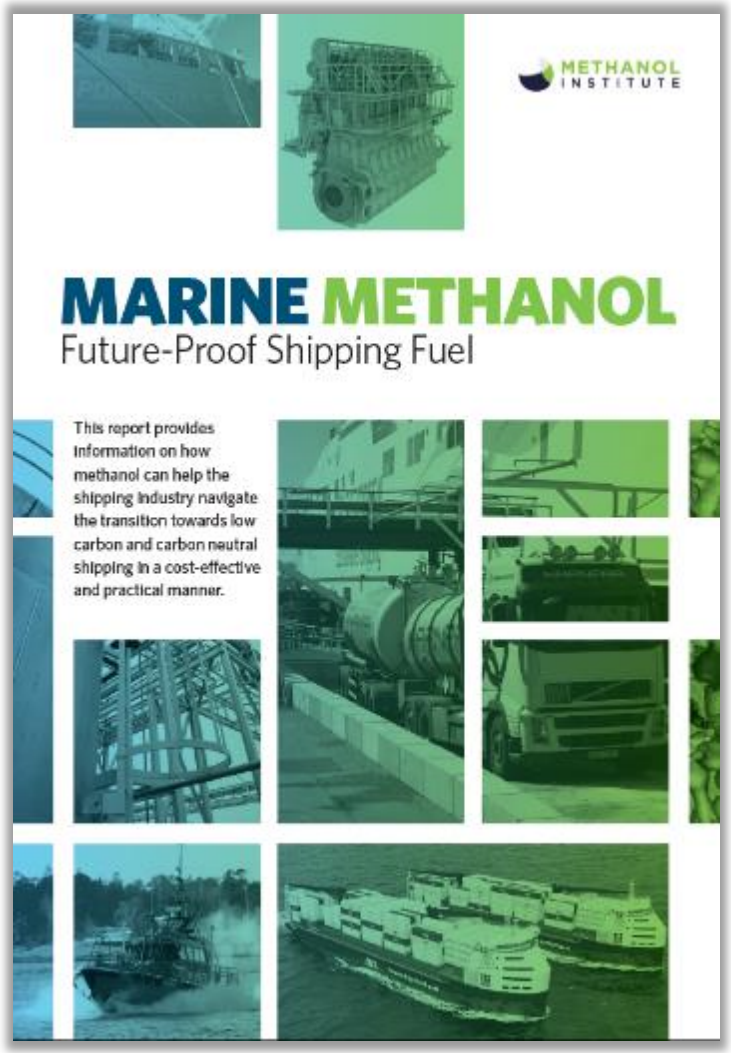


"With 80 renewable methanol projects already announced, we are seeing clear signs of an incoming wave of bio-methanol and e-methanol production"
Gregory Dolan, CEO, Methanol Institute

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

Marine

Marine Methanol Report



- **May 2023:** 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
- **Covers:** Regulatory Drivers; Methanol Availability; Engines and Fuel Systems; Bunkering; Safety; Costs; Competitive Advantage; What is Next for Marine Methanol?
- **Case Studies:** Proman Stena Bulk, Maersk, Waterfront Shipping, and *Stena Germanica*

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

2022: "…the Year Methanol Went Global in the Shipping Industry"

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Algoma and CSL in for methanol-ready bulker newbuilds

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

Chinese Study Examining Methanol as a Marine Fuel

The future fuel race is over for this decade

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.

01 Dec 2020 by Craig Jallal

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

THE WALL STREET JOURNAL.

Methanol Takes Lead in Shipping's Quest for Green Fuel

REUTERS

Analysis: Shippers bet on green methanol to cut emissions, supply lags

TradeWinds

CRUISE AND FERRY

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

Splash 247.com

OCEAN

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

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

Methanol newbuilds elbow LNG out of the spotlight in October

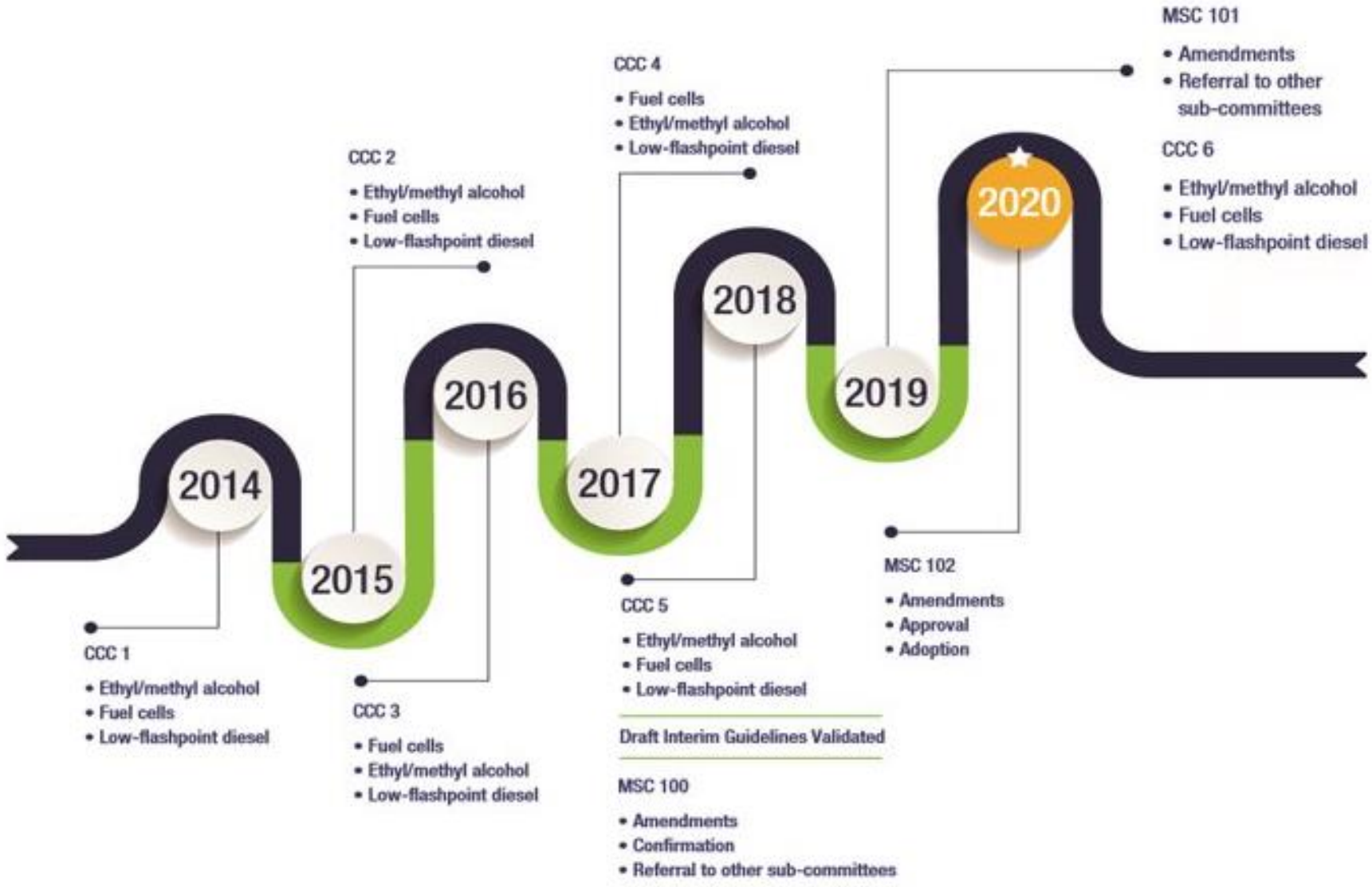
08 Nov 2022 by John Snyder

Fuelled Ships.

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

Hyundai Engine & Machinery Division, HHI-EMD, wi

Process: IMO IGF Code



IMO IGF Code Approval

INTERNATIONAL MARITIME ORGANIZATION

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MSC.1/Circ.1621
7 December 2020

INTERIM GUIDELINES FOR THE SAFETY OF SHIPS USING METHYL/ETHYL ALCOHOL AS FUEL

1 The Maritime Safety Committee, at its ninety-fifth session, adopted, by resolution MSC.392(95), inter alia, amendments to chapters II-1, II-2 and the appendix to the annex of the International Convention for the Safety of Life at Sea (SOLAS), 1974, to make the provisions of the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code) (resolution MSC.391(95)) mandatory under the Convention.

2 While the provisions of the IGF Code in part A-1 limit the application to natural gas, the Committee recognized that requirements for additional low-flashpoint fuels may be added to the Code as and when developed.

3 The Maritime Safety Committee, at its 102nd session (4 to 11 November 2020), aware of the increased use of methyl/ethyl alcohol as fuel and the current lack of relevant provisions in the IGF Code, approved the *Interim guidelines for the safety of ships using methyl/ethyl alcohol as fuel* (the Interim Guidelines), as set out in the annex.

4 The Committee agreed to keep the Interim Guidelines under review, taking into account operational experience gained with their application.

5 Member States are invited to bring the Interim Guidelines to the attention of all parties concerned.

IMO IGF Code – Methanol RA

IACS International Association of Classification Societies

No.146

No. 146 (Aug 2016)

Risk assessment as required by the IGF Code

1.1 General

To help eliminate or mitigate risks a risk assessment is required by the IGF Code[1]. In this regard it requires that the risk assessment is undertaken using acceptable and recognised techniques, and the risks and their mitigation are documented to the satisfaction of the Administration.

It is recognised that there are many acceptable and recognised techniques and means to document a risk assessment. As such, it is not the intent of this document to limit a risk assessment to a particular technique or means of documentation. This document does, however, describe recommended practice and examples to help satisfy the IGF Code.

1.2 Risk assessment - Objective

The objective or goal of the risk assessment, as noted in the IGF Code, is to help *"eliminate or mitigate any adverse effect to the persons on board, the environment or the ship"*[2]. That is, to eliminate or mitigate unwanted events related to the use of low-flashpoint fuels that could harm individuals, the environment or the ship.

Source: IACS Recommendation No.146

Complexity

INTERIM GUIDELINES FOR THE SAFETY OF SHIPS USING METHYL/ETHYL ALCOHOL AS FUEL

Fuel containment system

Fire safety

Independent fuel tanks

Ventilation

Control, monitoring and safety systems

Risk assessment

Training, drills and emergency exercises

Functional requirements

Provisions for location and protection of fuel piping

Limitation of explosion consequences

Control, monitoring and safety systems

Electrical installations

Bunkering

Fuel supply to consumers

Material and general pipe design

Ship design and arrangement

Power generation including propulsion and other energy converters

Explosion prevention and area classification

Game Changer: Maersk Vessel Orders

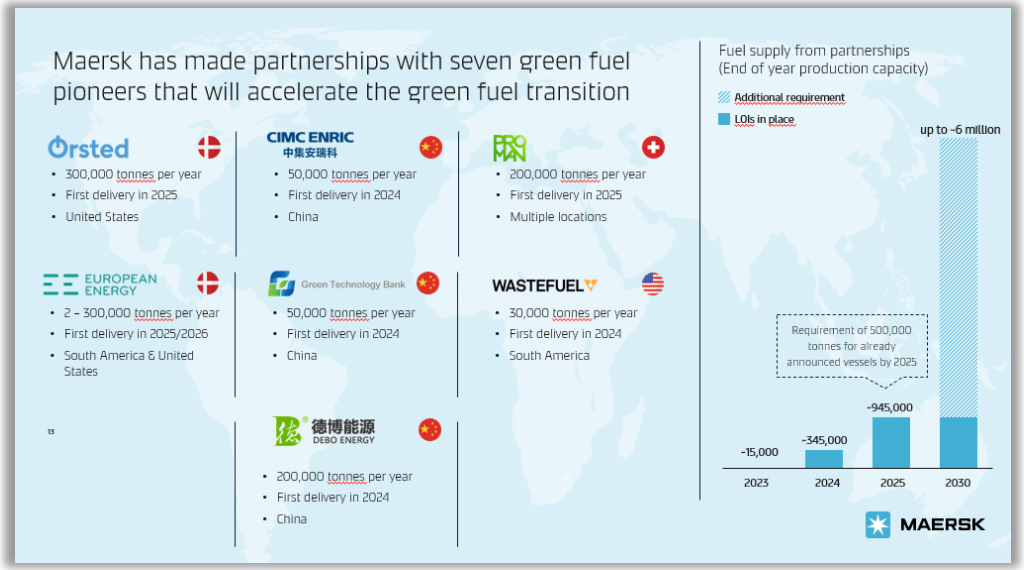
- **21 Feb 2021**: Maersk announces that the world's first carbon neutral container vessel by 2023 will operate on dual-fuel methanol
- **24 Aug 2021**: Maersk accelerates fleet decarbonization ordering eight 16,000 TEU ocean-going vessels to operate on methanol
- $1.4 billion order each vessel $175 million 10-15% more expensive
- Maersk has now ordered 25 newbuild methanol dual-fuel vessel, with an additional 11 retrofit orders
- **14 September 2023:** Naming ceremony held in Copenhagen for Laura Maersk the world's first methanol dual-fueled container ship, bunkered with green methanol from OCI
- *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: Maersk Methanol Supply

- **10 March 2022**: Maersk began announcing a series strategic partnerships with now ten leading companies -- including MI members Proman, 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

- 14 September 2023: Maersk announces the formation of a new company – C2X Global – to produce up to 3 million metric tons of methanol per year by 2030

- Maersk estimates will need 6 million tons of renewable methanol by 2030 to fuel 25% of their 700-vessel fleet



Order book → Fuel Consumption

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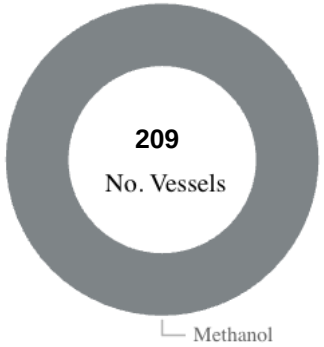
Alternative Fuels Uptake



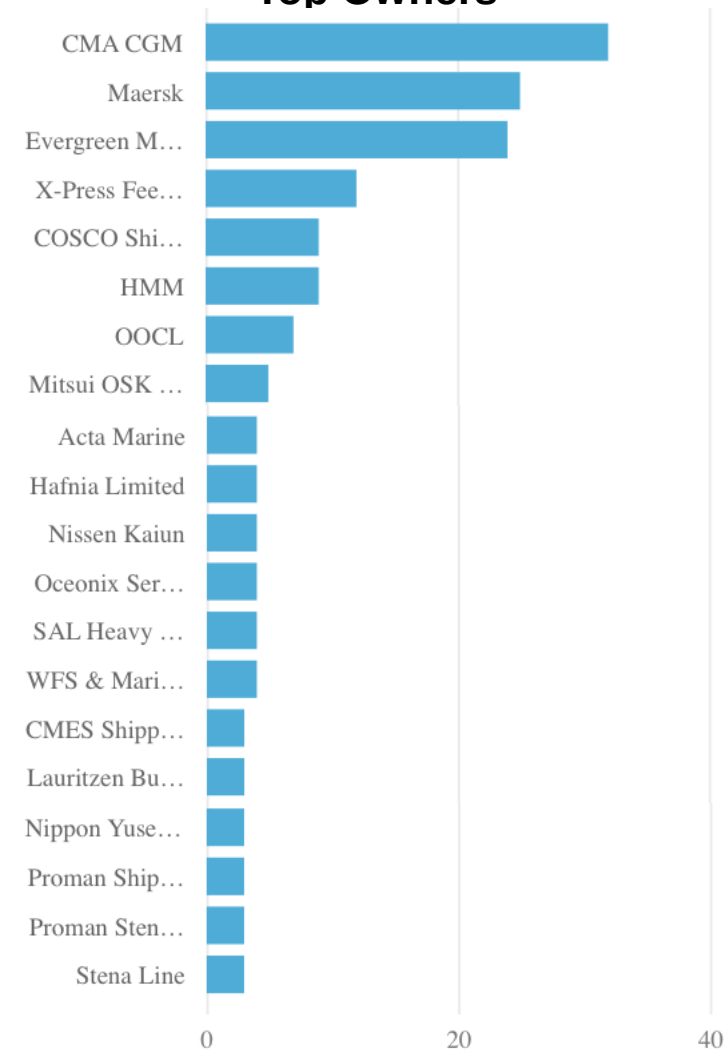
Potential Methanol Demand

184 x 300 = 55,200 mt/day
55,200 x 25 = 1.38M mt/mo
1.38M x 12 mo = **16.56M mtpa**

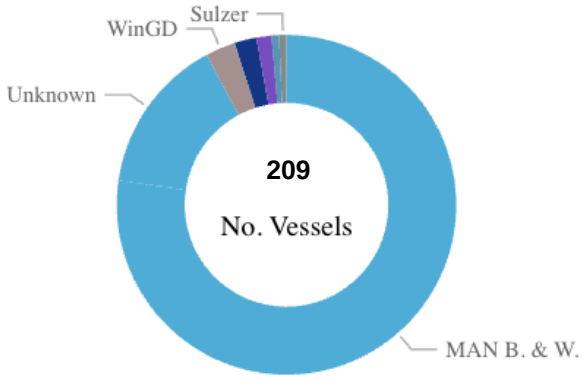
Alt Fuel Uptake by Number of Vessels

Alt Fuel	Fleet	% Fleet	Order Book	% Order Book
Methanol	25.0	0.0%	184.0	3.4%

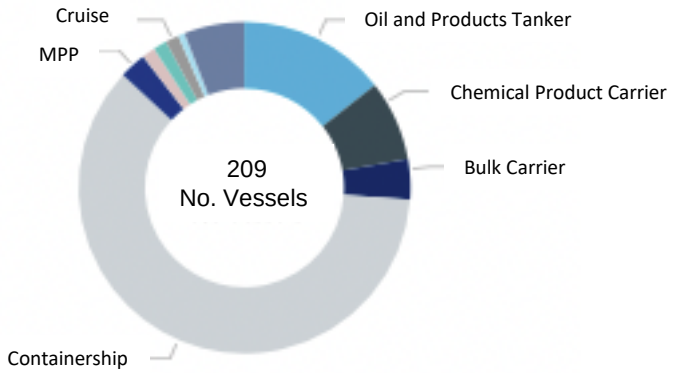
Top Owners



Engine Designers

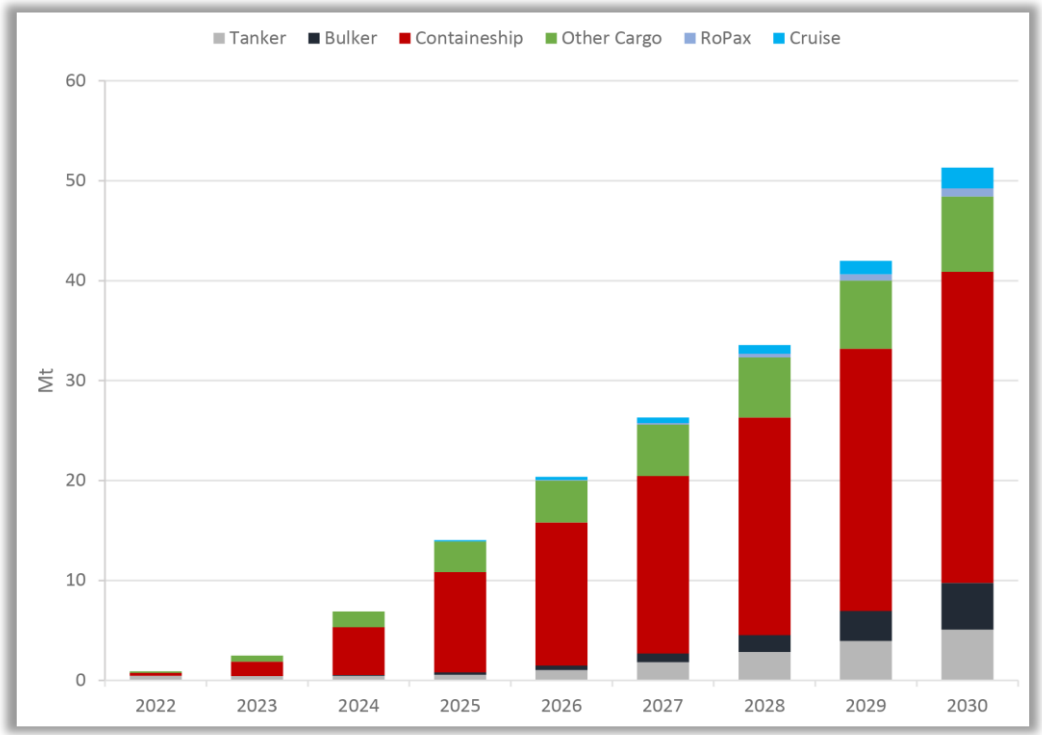


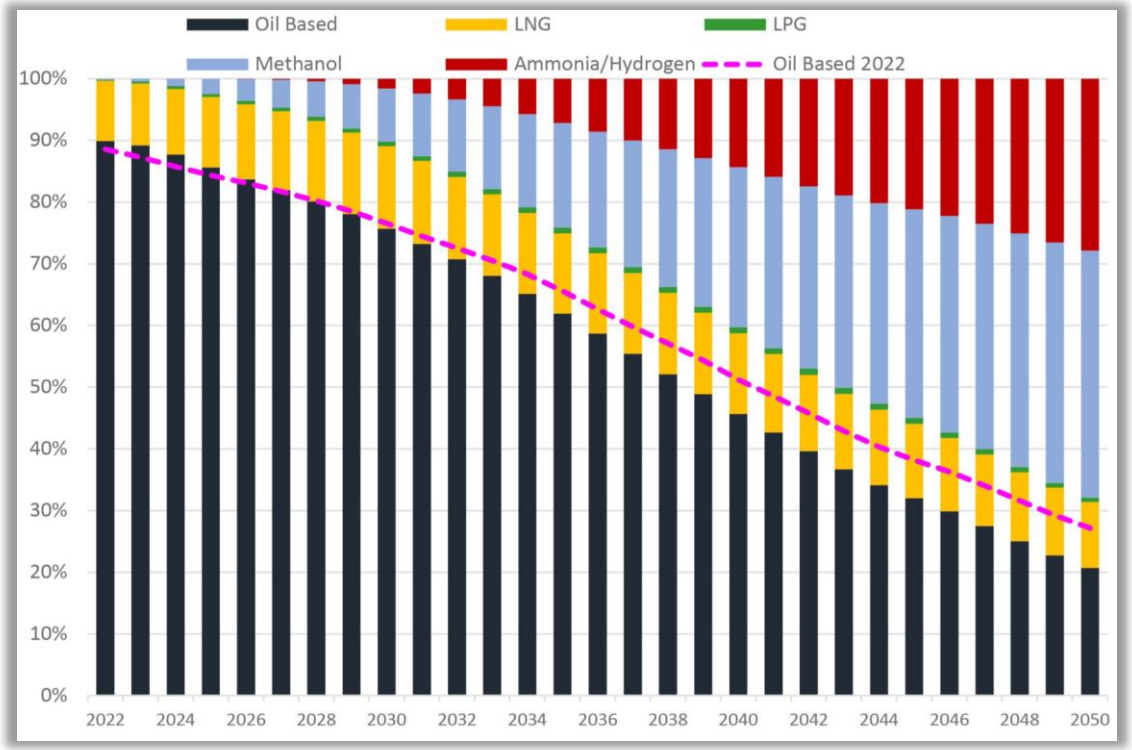
Uptake by Vessel Type



Source: Clarksons

Potential Bunkering Demand





https://absinfo.eagle.org/acton/media/16130/outlook2023

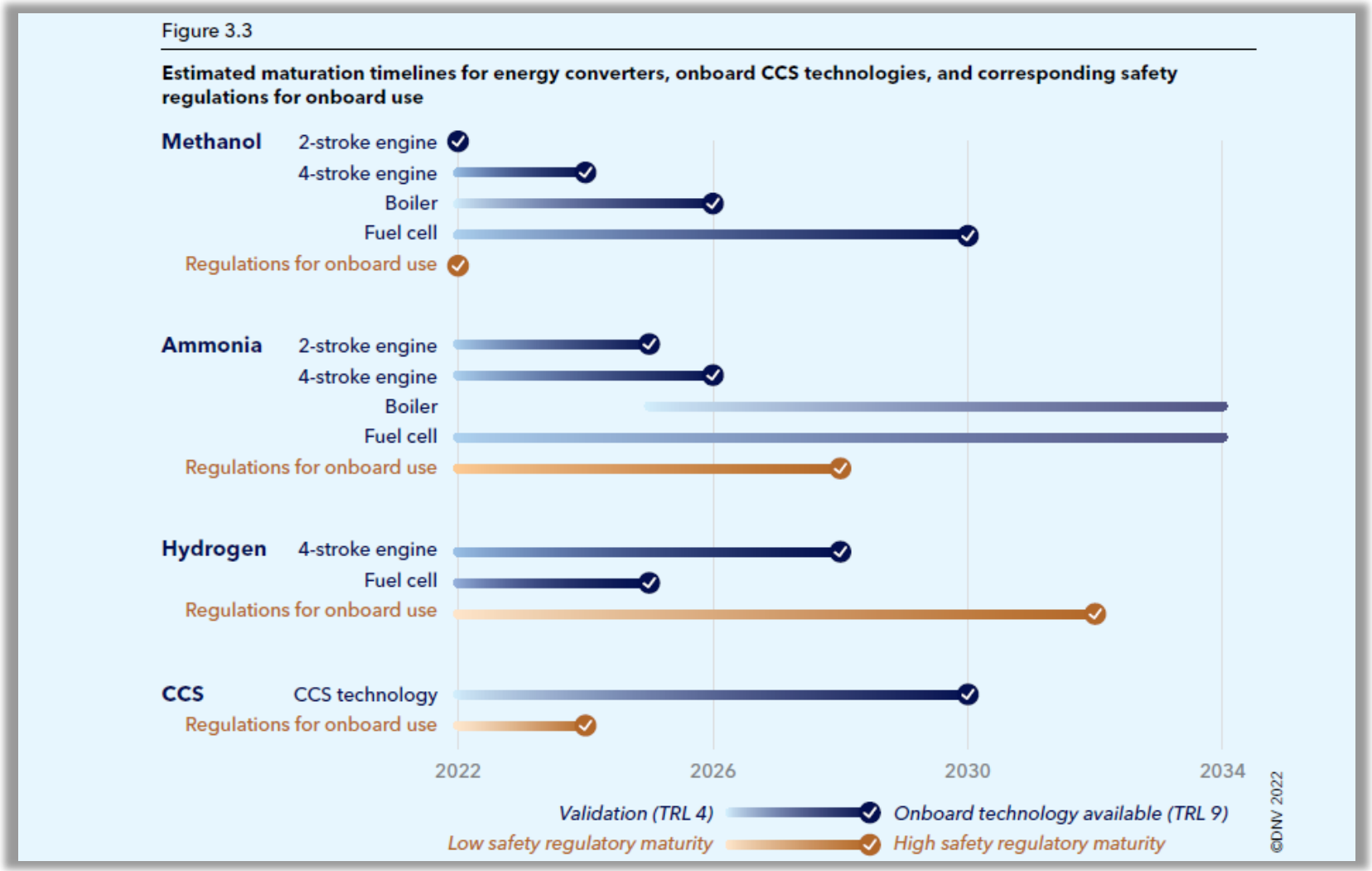
Leading by Example - Tankers

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

- *In 2016*: **Methanex** subsidiary **Waterfront Shipping** launched first methanol dual-fuel 49,000-DWT chemical tanker, the *Cajun Sun*, using MAN ES two-stroke engines.
- WFS now has 18 methanol dual-fuel vessels in its fleet, with over 140,000 hours of operating hours.
- *24 Oct 2023*: **Proman Stena Bulk** hold naming ceremony in New Orleans for *Stena Pro Marine*, one of four methanol-fueled tankers, with two more methanol vessels on the way. The vessel has been in full-time operation since mid-2022, and consumes 12,500 tonnes of methanol annually.
- *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.

https://www.proman.org/news/proman-stena-bulk-holds-naming-ceremony-for-methanol-tanker-stena-pro-marine-in-the-port-of-new-orleans/

Technology Readiness



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

Easily Bunkered

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Methanol Bunker Vessel Planned for Northern Europe

Vingaren delivered in late 2020 expanded the company's Northern European bunkering oeprations (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

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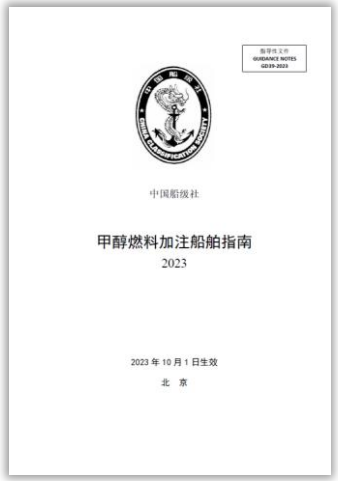
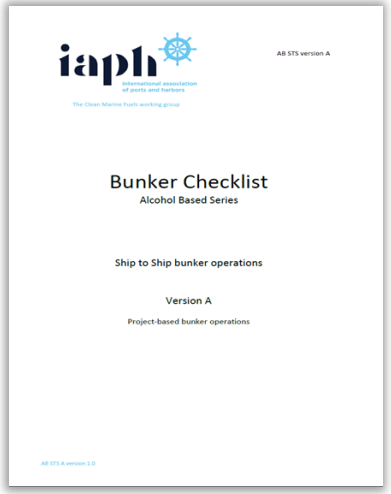
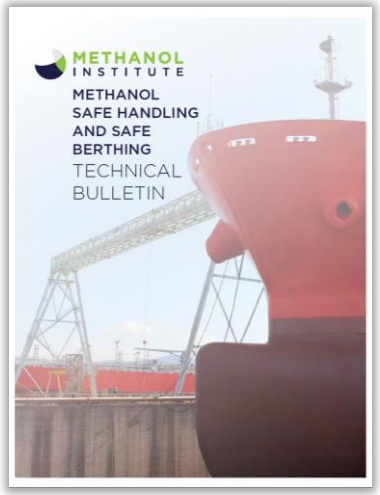
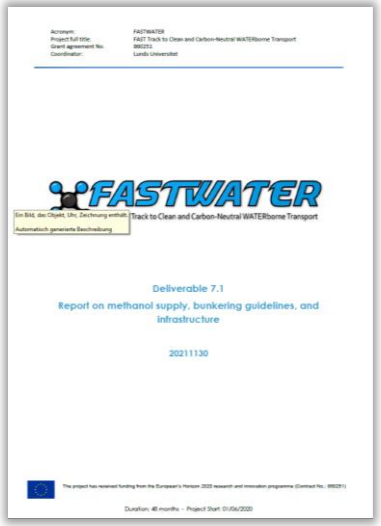
- Bunker guidelines have been released by International Association of Ports and Harbors, Lloyd's Register, China Classification Society and EU CEN
- Guidelines cover:
  - Truck-to-Ship bunkering
  - Shore-to-Ship bunkering
  - Ship-to-Ship bunkering
- Additional guidelines being developed by leading 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 Handing and Safe Berthing Technical Bulletin and comprehensive Methanol Safe Handling Manual









Crew Training

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GREEN MARINE

SP Singapore Polytechnic

IBIA

informa corporate learning

Download Brochure

Contact Us

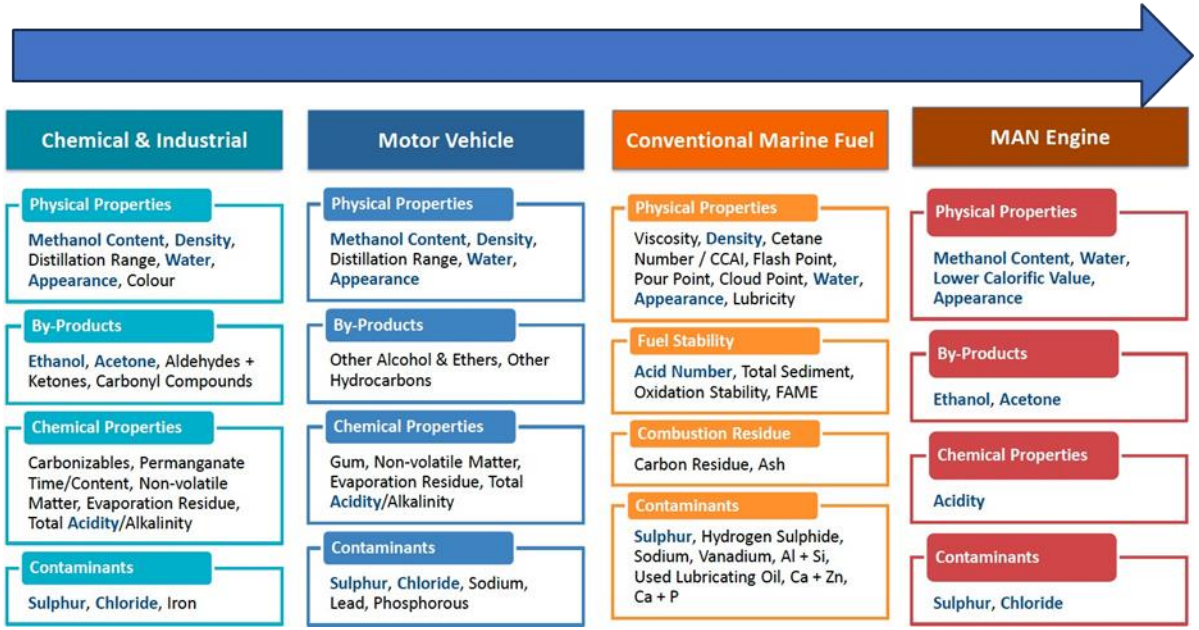
Methanol for Maritime

Live Online Training: 2-Part series | Over 2 days

29 - 30 August 2023 | 13:00 – 16:00 (SGT)

Download Brochure I Register Now

- Green Marine has established training hubs in Asia, with senior trainers, classrooms and onsite facilities as well as appropriate government networks for certification
- Basic SOLAS/IGF/STCE requirement for the Basic and Advanced IGF trainings already in hand, modified to ensure they are methanol specific
- Courses lectures materials have been finalized with courses now on offer: Basic, Advanced, M&O, Bunkering



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.

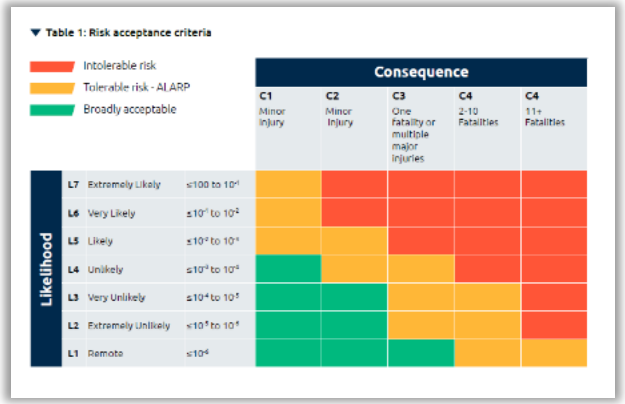


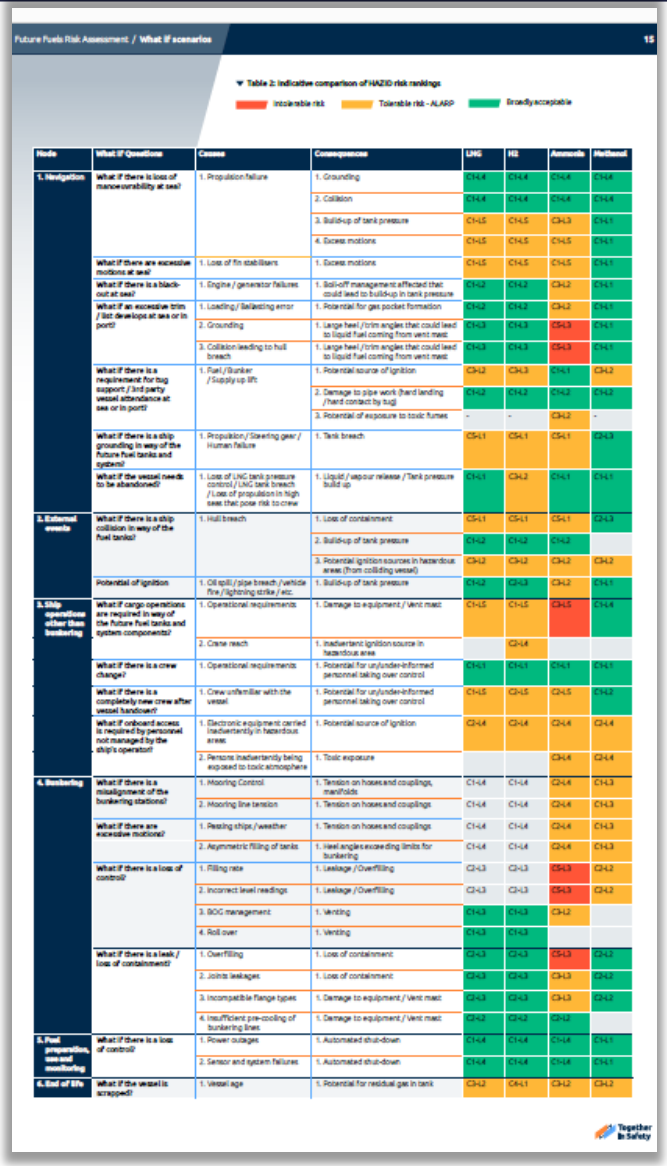
Table 1: Risk acceptance criteria

Intolerable risk
Tolerable risk - ALARP
Broadly acceptable

Likelihood			Consequence C1 Minor injury	C2 Minor injury	C3 One fatality or multiple major injuries	C4 2-10 Fatalities	C4 11+ Fatalities
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	$\leq 10^{-6}$					

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



Future Fuels Risk Assessment / What if scenarios 15

Table 2: Indicative comparison of HAZID risk rankings

Intolerable risk | Tolerable risk - ALARP | Broadly acceptable

Node	What if Questions	Causes	Consequences	LNG	H2	Ammonia	Methanol
1. Navigation	What if there is loss of manoeuvrability at sea?	1. Propulsion failure	1. Grounding	C1-L4	C1-L4	C1-L4	C1-L4
			2. Collision	C1-L4	C1-L4	C1-L4	C1-L4
			3. Build-up of tank pressure	C1-L5	C1-L5	C2-L3	C1-L1
			4. Excess motions	C1-L5	C1-L5	C1-L5	C1-L1
	What if there are excessive motions at sea?	1. Loss of fin stabilisers	1. Excess motions	C1-L5	C1-L5	C1-L5	C1-L1
	What if there is a black-out at sea?	1. Engine / generator failures	1. Boil-off management affected that could lead to build-up in tank pressure	C1-L2	C1-L2	C2-L2	C1-L1
	What if an excessive trim / list develops at sea or in port?	1. Loading / Ballasting error	1. Potential for gas pocket formation	C1-L2	C1-L2	C2-L2	C1-L1
		2. Grounding	1. Large heel / trim angles that could lead to liquid fuel coming from vent mast	C1-L3	C1-L3	C2-L3	C1-L1
		3. Collision leading to hull breach	1. Large heel / trim angles that could lead to liquid fuel coming from vent mast	C1-L3	C1-L3	C2-L3	C1-L1
	What if there is a requirement for tug support / 3rd party vessel attendance at sea or in port?	1. Fuel / Bunker / Supply up lift	1. Potential source of ignition	C2-L2	C2-L3	C1-L1	C2-L2
			2. Damage to pipe work (hard landing / hard contact by tug)	C1-L2	C1-L2	C1-L2	C1-L2
			3. Potential of exposure to toxic fumes	-	-	C2-L2	-
	What if there is a ship grounding in way of the future fuel tanks and system?	1. Propulsion / Steering gear / Human failure	1. Tank breach	C2-L1	C2-L1	C2-L1	C2-L3
	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	1. Liquid / vapour release / Tank pressure build up	C1-L1	C1-L2	C1-L1	C1-L1
2. External events	What if there is a ship collision in way of the fuel tanks?	1. Hull breach	1. Loss of containment	C2-L1	C2-L1	C2-L1	C2-L3
			2. Build-up of tank pressure	C1-L2	C1-L2	C1-L2	
			3. Potential ignition sources in hazardous areas (from colliding vessel)	C2-L2	C2-L2	C2-L2	C2-L2
	Potential of ignition	1. Oil spill / pipe breach / vehicle fire / lightning strike / etc.	1. Build-up of tank pressure	C1-L2	C2-L3	C2-L2	C1-L1
3. Ship operations other than bunkering	What if cargo operations are required in way of the future fuel tanks and system components?	1. Operational requirements	1. Damage to equipment / Vent mast	C1-L5	C1-L5	C2-L5	C1-L4
		2. Crane reach	1. Inadvertent ignition source in hazardous area		C2-L4		
	What if there is a crew change?	1. Operational requirements	1. Potential for unfunder-informed personnel taking over control	C1-L1	C1-L1	C1-L1	C1-L1
	What if there is a completely new crew after vessel handover?	1. Crew unfamiliar with the vessel	1. Potential for unfunder-informed personnel taking over control	C1-L5	C2-L5	C2-L5	C1-L2
	What if onboard access is required by personnel not managed by the ship's operator?	1. Electronic equipment carried inadvertently in hazardous areas	1. Potential source of ignition	C2-L4	C2-L4	C2-L4	C2-L4
		2. Persons inadvertently being exposed to toxic atmosphere	1. Toxic exposure			C2-L4	C2-L4
4. Bunkering	What if there is a misalignment of the bunkering stations?	1. Mooring Control	1. Tension on hoses and couplings, manifolds	C1-L4	C1-L4	C2-L4	C1-L3
		2. Mooring line tension	1. Tension on hoses and couplings	C1-L4	C1-L4	C2-L4	C1-L3
	What if there are excessive motions?	1. Passing ships / weather	1. Tension on hoses and couplings	C1-L4	C1-L4	C2-L4	C1-L3
		2. Asymmetric filling of tanks	1. Heel angles exceeding limits for bunkering	C1-L4	C1-L4	C2-L4	C1-L3
	What if there is a loss of control?	1. Filling rate	1. Leakage / Overfilling	C2-L3	C2-L3	C2-L3	C2-L2
		2. Incorrect level readings	1. Leakage / Overfilling	C2-L3	C2-L3	C2-L3	C2-L2
		3. BOG management	1. Venting	C1-L3	C1-L3	C2-L2	
		4. Roll over	1. Venting	C1-L3	C1-L3		
	What if there is a leak / loss of containment?	1. Overfilling	1. Loss of containment	C2-L3	C2-L3	C2-L3	C2-L2
		2. Joints leakages	1. Loss of containment	C2-L3	C2-L3	C2-L3	C2-L2
		3. Incompatible flange types	1. Damage to equipment / Vent mast	C2-L3	C2-L3	C2-L3	C2-L2
		4. Insufficient pre-cooling of bunkering lines	1. Damage to equipment / Vent mast	C2-L2	C2-L2	C2-L2	
5. Fuel preparation, use and monitoring	What if there is a loss of control?	1. Power outages	1. Automated shut-down	C1-L4	C1-L4	C1-L4	C1-L1
		2. Sensor and system failures	1. Automated shut-down	C1-L4	C1-L4	C1-L4	C1-L1
6. End of life	What if the vessel is scrapped?	1. Vessel age	1. Potential for residual gas in tank	C2-L2	C2-L1	C2-L2	C2-L2

ISO/CD 6583:2023 – Methanol Marine Fuel Standard

Characteristics	Units	Limit	MMA	MMB	MMC	Test method(s) and references[e]
General requirements			Clauses 5-7			
Appearance			Homogenous, clear and free of suspended matter			IMPCA 003
Methanol content by mass on dry basis	%	Min.	99,85	99,85	99,70	[a]
Impurities content by mass on dry basis[b]	%	Max.	0,15	0,15	0,30	IMPCA 001
Distillation range at 760 mm Hg	°C	Max.	1,0	1,0	Report	ASTM D1078
Ethanol on a dry basis	mg/kg	Max.	50	50	150	IMPCA 001
Water content by mass	%	Max.	0,100	0,100	0,500	ASTM E1064
Acetone on a dry basis	mg/kg	Max.	30	30	30	IMPCA 001
Density at 15 °C	kg/m³	Min.	795,0		795,0	ASTM D4052 (see 6.3)
		Max.	797,0		798,0	
Chloride as Cl^-	mg/kg	Max.	0,5	0,5	2,0	IMPCA 002
Sulfur	mg/kg	Max.	0,5	0,5	10,0	ASTM D5453 (see 6.2)
Acidity as acetic acid	mg/kg	Max.	30	30	30	ASTM D1613
Lubricity			[c]	-	-	
Particle count			[d]	-	-	

[a] Methanol content by mass on a dry basis equals 100% minus impurities content by mass on dry basis measured in accordance with IMPCA 001.

[b] Impurities content by mass on dry basis shall be calculated as the sum of the individual impurities results.

[c] See Annex C.

[d] See Annex D.

[e] For test methods that do not include precision data for methanol, ISO 4259-2 cannot be applied in case of dispute.

The three grades as developed:

1. — **Marine Methanol grade A (MMA):** this is based largely on the IMPCA specification but with placeholders for additional requirements in respect of lubricity and cleanliness, as represented by the particle counting, when tests for those characteristics become generally available;

2. — **Marine Methanol grade B (MMB):** this is based largely on the IMPCA specification;

3. — **Marine Methanol grade C (MMC):** although derived from the IMPCA specification some wider tolerances are provided in respect of a number of the listed characteristics.

This section shows a calculation of E_{ns} for an example methanol fuel as MMC. The composition of the methanol fuel and the net specific energy values of the individual species in this example are shown in Table B.1.

Table B.1 – Example of MMC methanol fuel

Compounds	Composition % by mass	Net specific energy MJ/kg
Methanol content on a dry basis	99,90	19,90[a]
Ethanol content on a dry basis[b]	0,0120	26,80[a]
Acetone content on a dry basis[b]	0,0030	30,80
Other impurities[c]	0,085	Not defined
Water	0,350	0

[a] Source: MEPC 364(79)[7].

[b] Species with concentration below 0,1% are not to be included in the calculation; See B.1.

[c] Other impurities covers those detected by test method IMPCA 001 other than those identified in this example as ethanol and acetone. If such impurities are identified at a concentration not less than 0.1% by mass then those should also be included in the calculation using accepted net specific energy (NSE) values appropriate to the compound. For the other impurities at concentrations less than 0.1% by mass those are not to be included.

Green Corridors & IMO Working Groups

METHANOL INSTITUTE

Shipping

- ☑ **Silk Alliance – China to Singapore**
  - Beginning to kick off after some realignment
  - MPA joined in July
  - MI delivered a Methanol Webinar in late September (producer perspective)
  - Focus on 'green' methanol currently
  - Voiced concern by several participants regarding the need to blend fuel to start

- ☑ **Port of Rotterdam | Singapore**
  - MPA has taken over Methanol Track
  - Focus on 'green' methanol currently
  - Using it as an opportunity to introduce fuel blending benefits

- ☑ **Shanghai C40 – Shanghai to LA/Americas**
  - Recent introductory workshop took place in Shanghai after many months of pause
  - Member cities include: Aukland, Barcelona, Copenhagen, Dubai, Durban, Guangzhou, LA, Melbourne, NY/Newark, Oslo, Rotterdam, Seattle, Shanghai, Singapore, Stockholm, Sydney, Tokyo, Vancouver, Yokohama

Cruise

- ☑ **Port of Seattle | Alaska | Vancouver Fraser Port Authority**
  - Announced over a year ago with Pacific Northwest target region
  - Maersk McKinney Centre stepping into project
  - Members now include: Princess Cruises, Holland America, Carnival, Norwegian, Royal Caribbean, Celebrity, Cruise Lines International Association and Methanex

MI Green Corridor Working Group

- ☑ **GC Working Group**
  - To be administered by Marine Fuels Committee
  - Prioritize work across all GCs
  - Will form in coming weeks
  - First organizational Meeting mid-December

MI IMO Working Group

- ☑ **EU-based IMO Working Group**
  - To be administered by MI Brussels staff
  - WG embedded within Policy Committee
  - Drafting key activities for wider discussion
  - To liaise with MFC and GC WG

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