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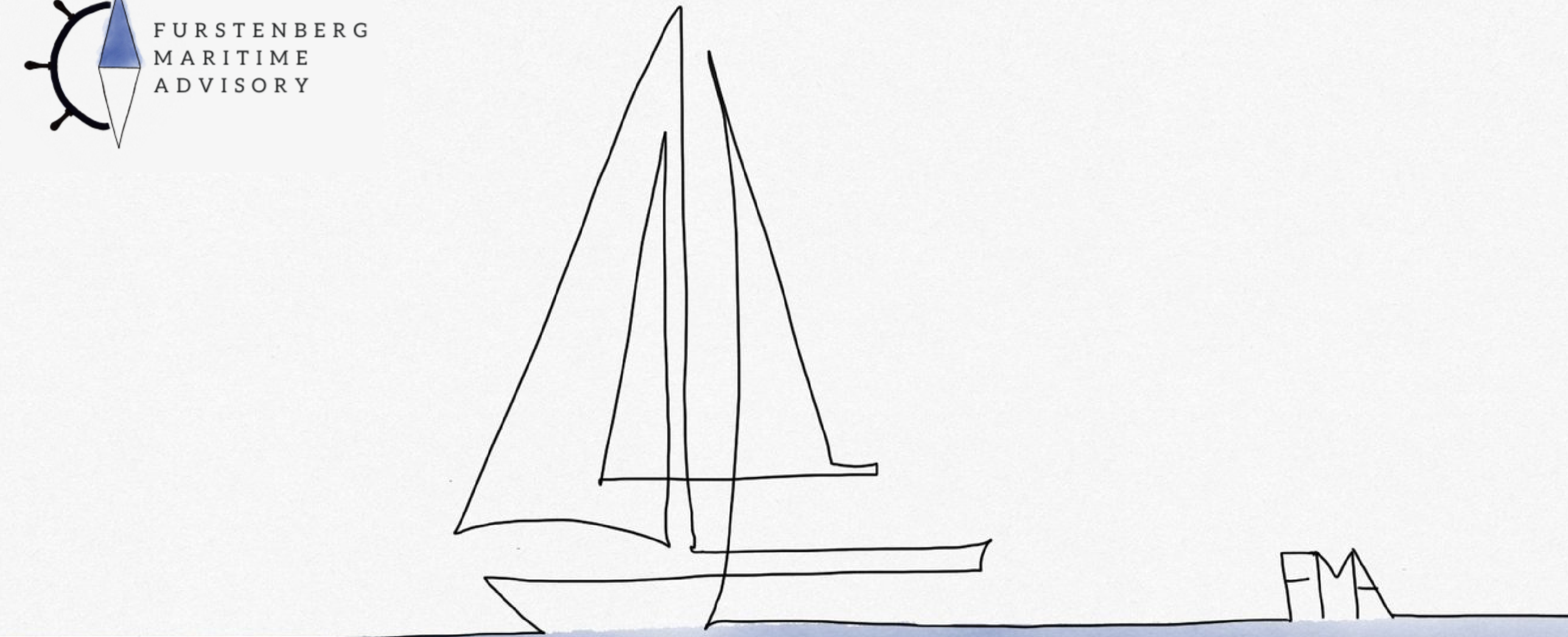

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MARITIME AMMONIA WEBINAR FOR THE AMMONIA ENERGY ASSOCIATION, DEC 13, 2023

WHO WE ARE

FURSTENBERG
MARITIME
ADVISORY

- Micro consultancy since 2019
- Holistic sustainability for maritime
- Immediate past Maritime Directors to the AEA

Content of this webinar

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- Recap from 2 years of maritime webinars
- Progress of maritime ammonia - looking back
- Perspectives from outside AEA - maritime ammonia
- Next steps for maritime ammonia - where to get involved

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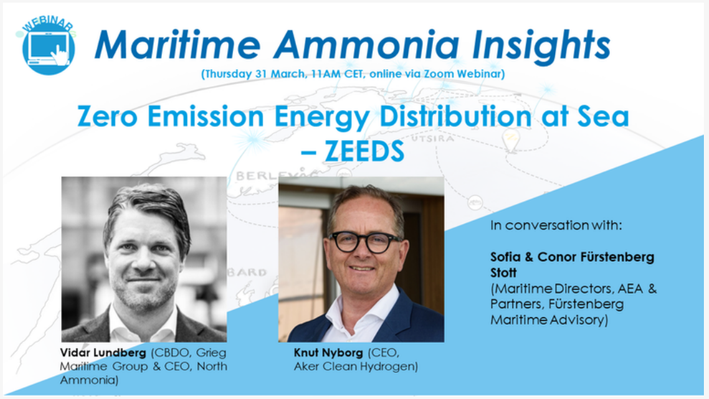
Maritime Ammonia Webinars 2022



Maritime Ammonia Webinars 2023

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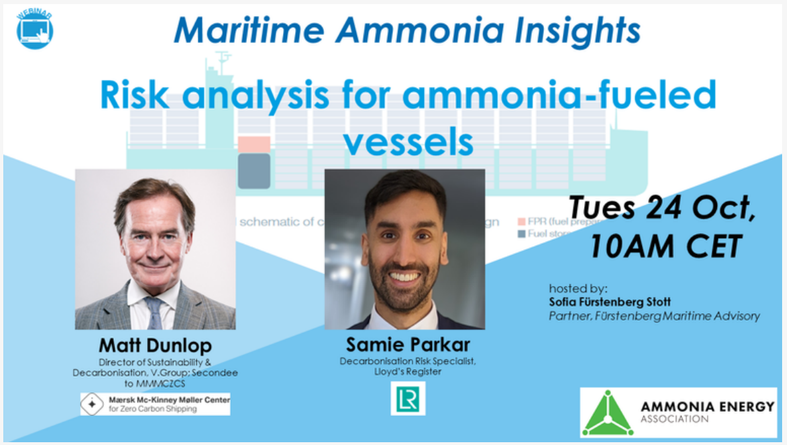

The maritime ammonia value chain…

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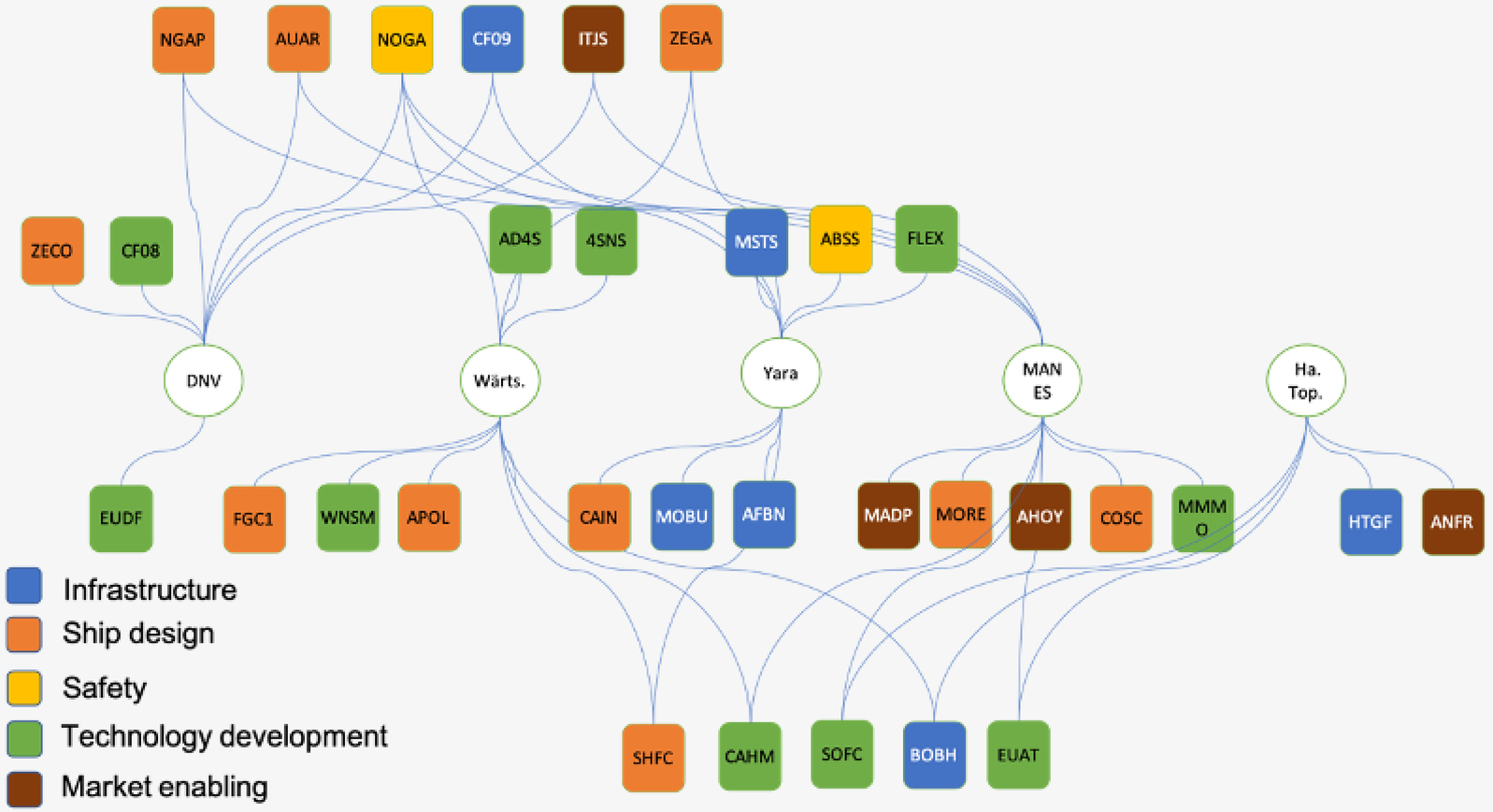
Source: Global Maritime Forum, Workshop material produced duriing NoGAPS 1

…this is how we thought about it in 2020

3 years ago, it was all about the Nordics



Out of 100 mapped projects in 2020, a third involved DNV, Wärtsilä, Yara, MAN ES or Haldor Topsoe, all HQ in the Nordics.

Source: Ammonia Energy Association, part of maritime mapping executed on behalf of members, 2021

Maritime ammonia - knowledge acceleration

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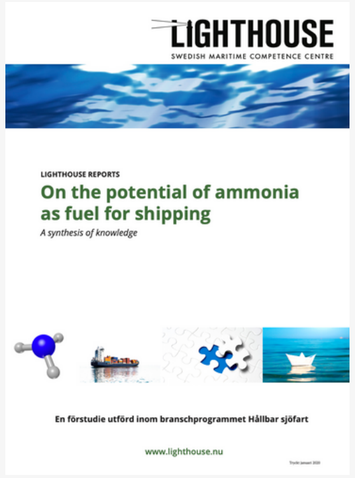
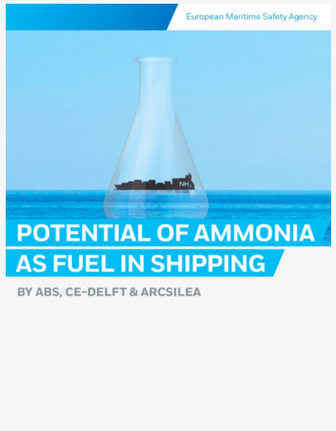
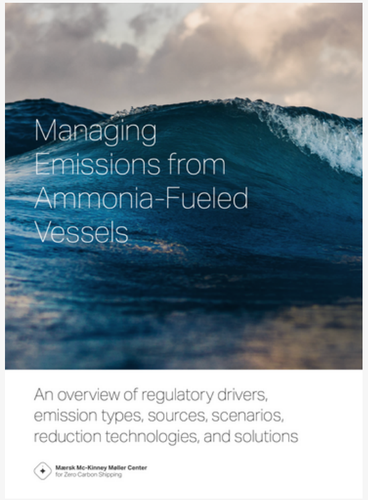
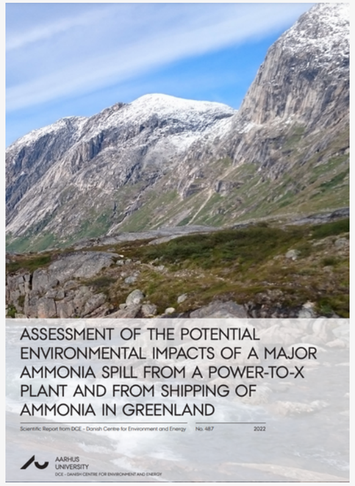
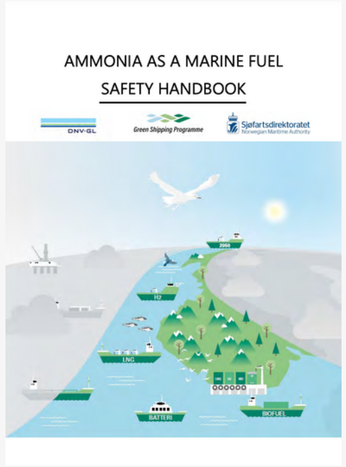
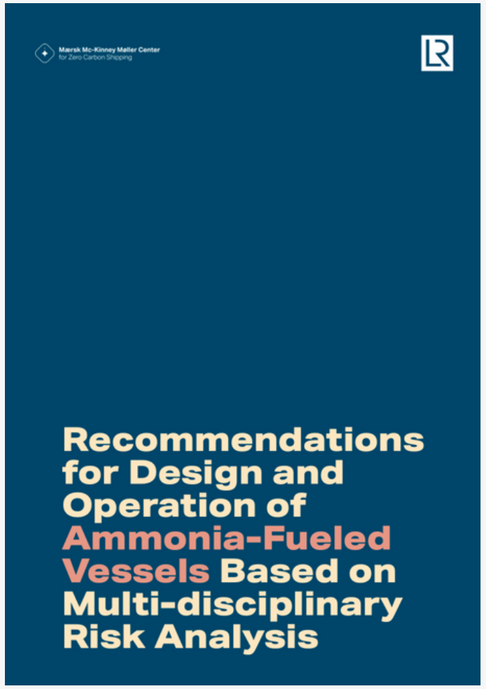


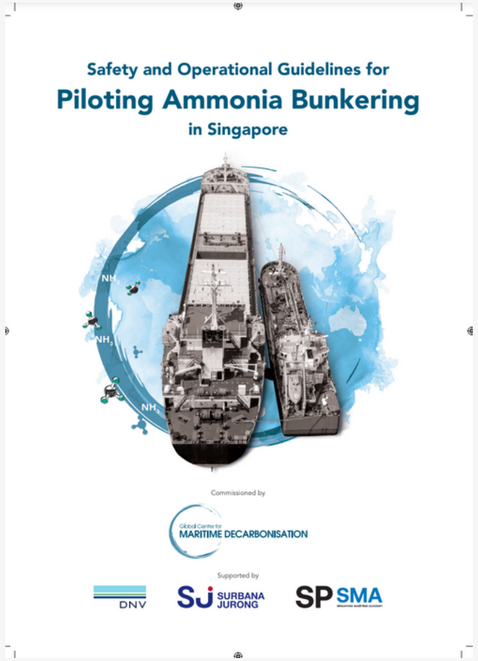


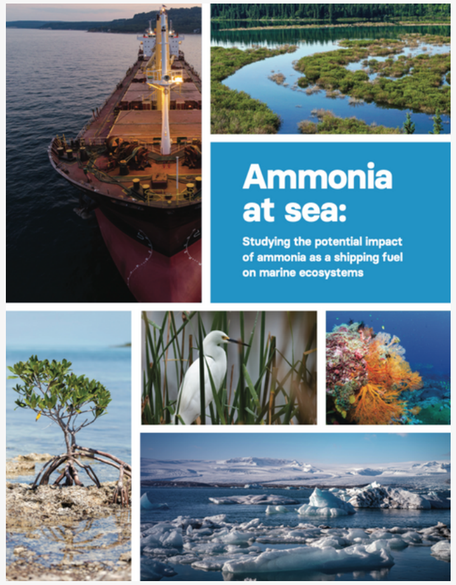


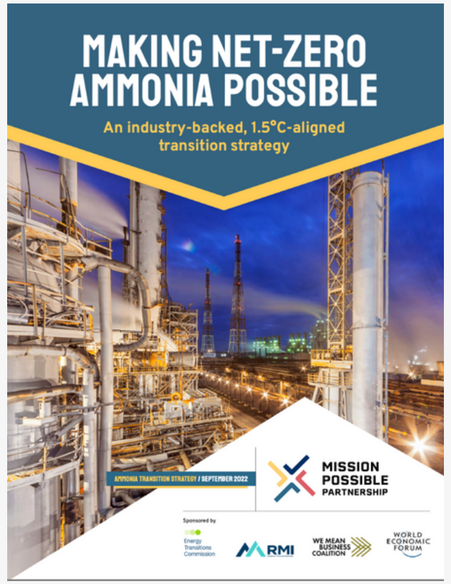


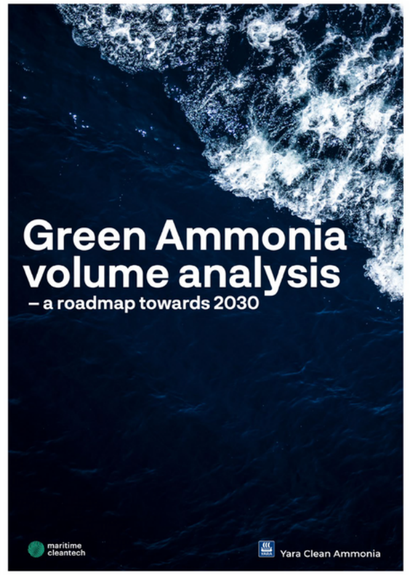




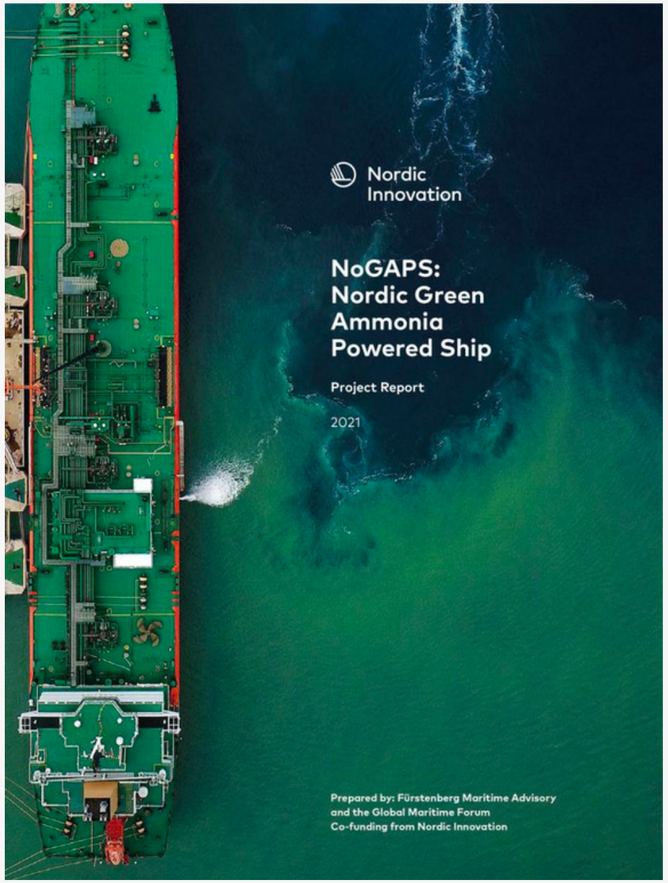








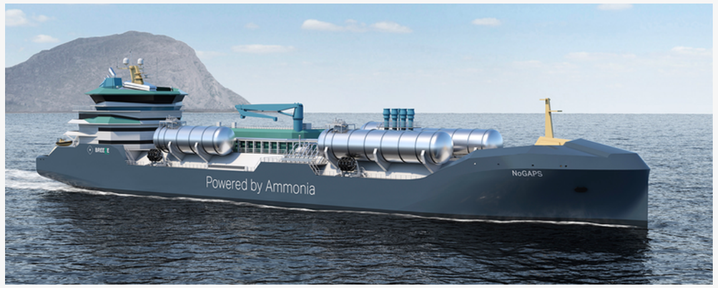
From gaps identification to concept design



June 2021

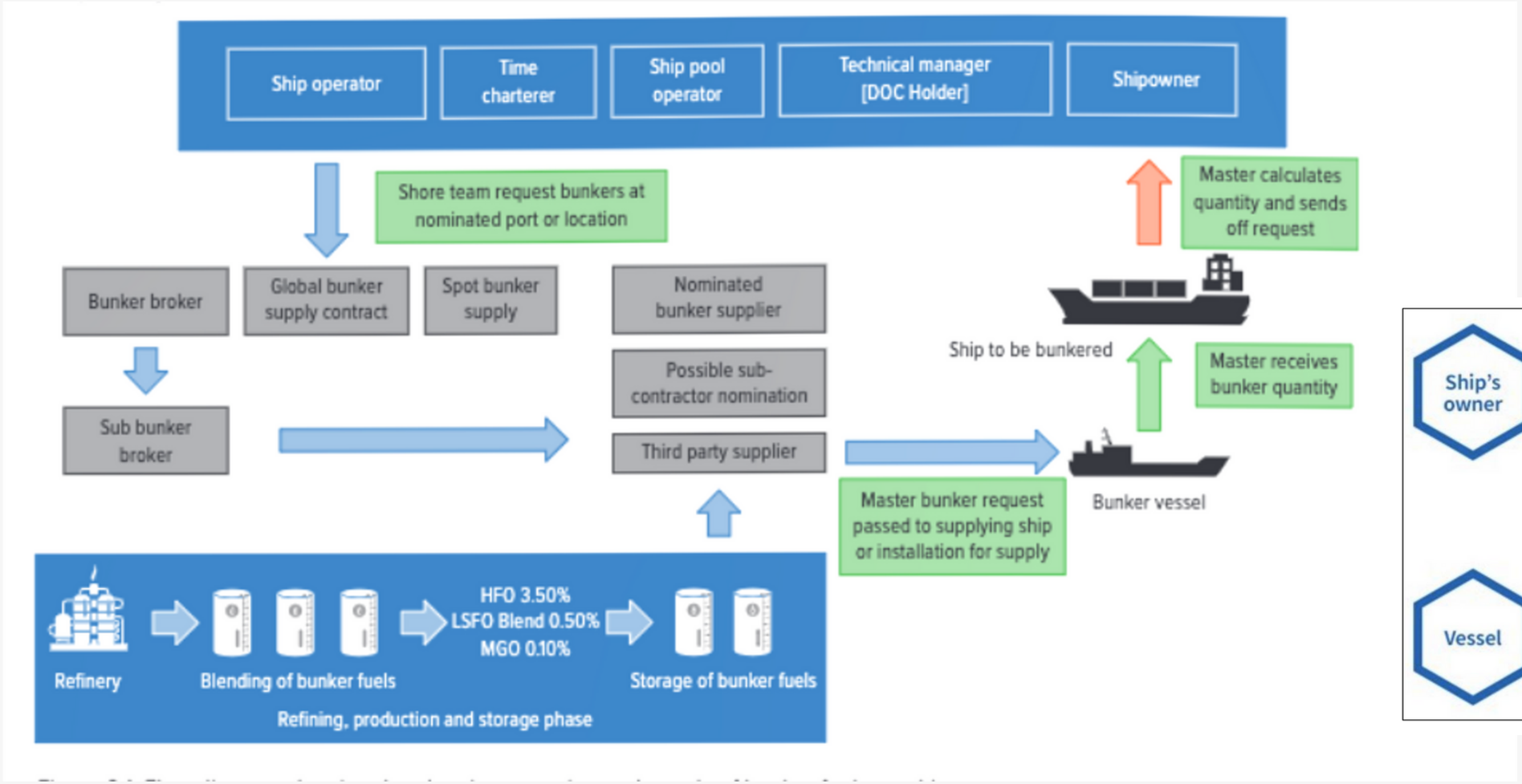
March 2023

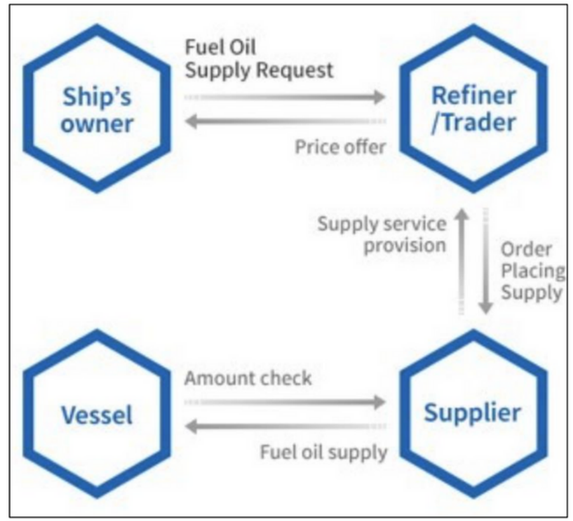
AIP Presentation at the DNV stand at Nor-Shipping (L to R: Anna Rosenberg, Project Coordinator, Decarbonisation, GMF, Martin Cartwright, Business Director Gas Carriers at DNV, Eystein Leren, Director Industry and Market Leads at Yara International, Thomas Woidemann, Commercial Director BW Epic Kosan, Tuva Flagstad-Andersen, Regional Manager Region North Europe, DNV, Claus Graugaard, Chief Technology Officer, MMMCZCS, Reinert Nordtveit, COO, Breeze Ship Design, Pål Einar Spilleth, Ship Type Expert Gas Carrier and FSRUs DNV, Kjeld Aabo, Director New Technology 2 stroke promotion at MAN Energy Solutions.)



June 2023

The value chain of bunkering operations





Source: BIMCO and IBIA, Shipmaster's Bunkering Manual, 2022

InterSessional Working Group submission by IBIA to the IMO

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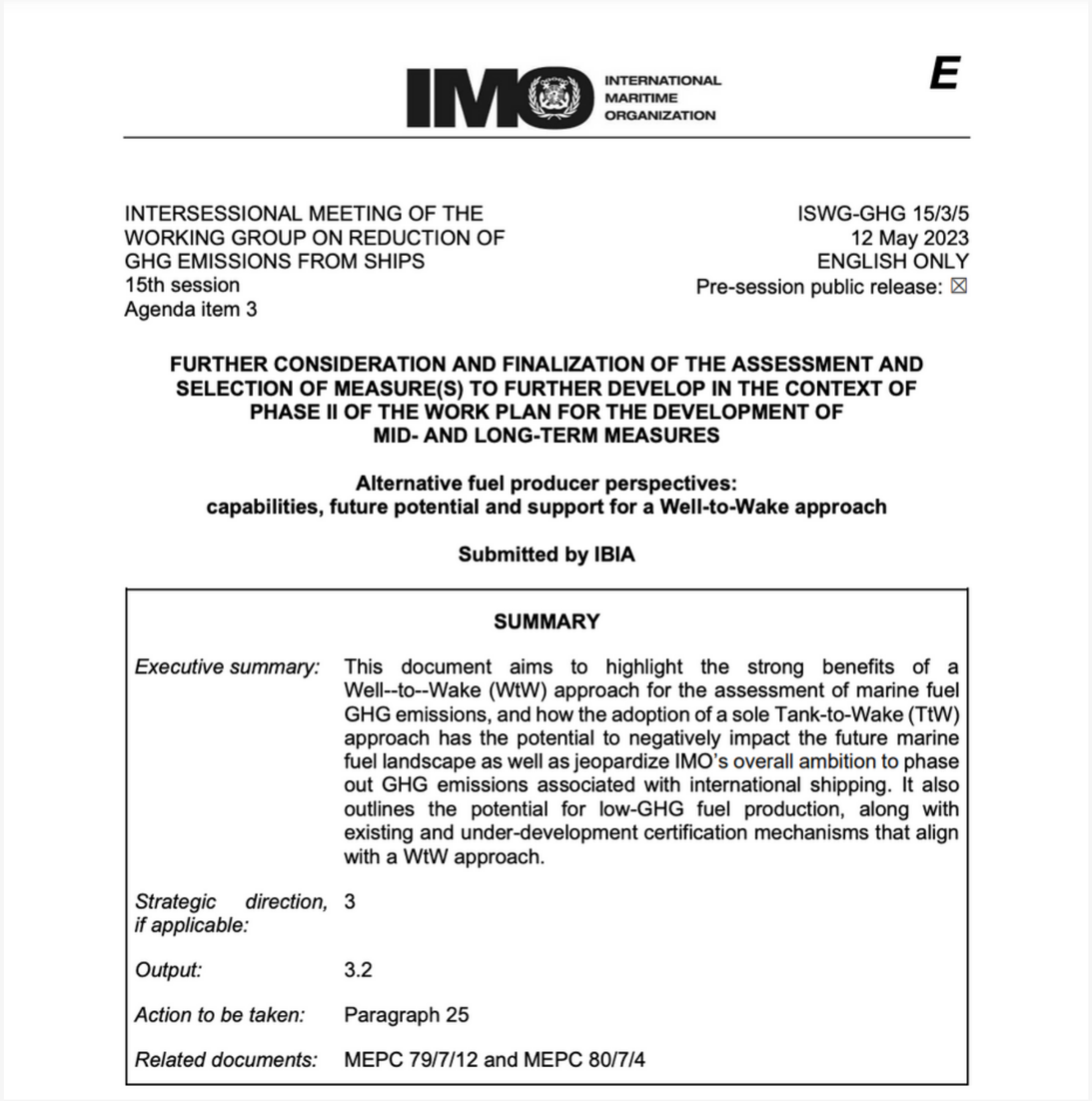
May 2023



IMO INTERNATIONAL MARITIME ORGANIZATION

E

INTERSESSIONAL MEETING OF THE
WORKING GROUP ON REDUCTION OF
GHG EMISSIONS FROM SHIPS
15th session
Agenda item 3

ISWG-GHG 15/3/5
12 May 2023
ENGLISH ONLY
Pre-session public release: ☒

FURTHER CONSIDERATION AND FINALIZATION OF THE ASSESSMENT AND SELECTION OF MEASURE(S) TO FURTHER DEVELOP IN THE CONTEXT OF PHASE II OF THE WORK PLAN FOR THE DEVELOPMENT OF MID- AND LONG-TERM MEASURES

Alternative fuel producer perspectives: capabilities, future potential and support for a Well-to-Wake approach

Submitted by IBIA

SUMMARY

Executive summary:	This document aims to highlight the strong benefits of a Well--to--Wake (WtW) approach for the assessment of marine fuel GHG emissions, and how the adoption of a sole Tank-to-Wake (TtW) approach has the potential to negatively impact the future marine fuel landscape as well as jeopardize IMO's overall ambition to phase out GHG emissions associated with international shipping. It also outlines the potential for low-GHG fuel production, along with existing and under-development certification mechanisms that align with a WtW approach.
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 25
Related documents:	MEPC 79/7/12 and MEPC 80/7/4

- Alternative fuel producers perspectives
- Capabilities, future potential and support of a well-to-wake approach
- Contribution by Ammonia Energy Association, Methanol Institute, European Biodiesel Board

Call to Action for Sustainable Maritime Fuels

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June 2023

Call to Action for Sustainable Maritime Fuel Production

Call to Action for the Clean Energy Transition

Maritime shipping is responsible for 3% of global greenhouse emissions. For the shipping industry to play its role in limiting global warming to 1.5°C, emissions must be rapidly reduced within this decade and reach zero by 2050.

These signatories vocalize their support by calling on countries to develop ambitious policies that account for fuel emissions on a Well-to-Wake (WtW) basis within the International Maritime Organization (IMO) and pledge to play their part in facilitating emissions reductions through the production and uptake of sustainable fuels at the scale and pace necessary to meet the 1.5°C aligned ambition.

Fuel Production Incentives and Developing Countries

A robust and comprehensive framework that incentivizes sustainable fuels is also likely to greatly benefit developing countries. Unlike in the case of fossil fuels, production of many sustainable fuels is not related to scarce reserves that only a handful of countries possess - the main ingredient for these new fuels is renewable energy. That means many more countries can join in, become producers, and diversify their economies. This opportunity can only materialize if policies make a clear distinction between the different fuel production pathways and reward options that are in line with 1.5°C.

Well-to-Wake Emissions Regulations, Transparency, and Certification

In 2018, the IMO set an ambition for shipping to reduce its greenhouse gas emissions by at least 50% by 2050, compared to 2008. While this was an important first step, this is not ambitious enough to limit warming to 1.5°C or even keep us under the well below 2°C scenario. Now is the time for the IMO to set a clear target for the shipping industry to run entirely on sustainable and renewable energy sources by the year 2050.

While we applaud the IMO members initiative to introduce "robust lifecycle GHG/carbon intensity guidelines for all types of fuels", without proper regulations incentivizing the production of sustainable, WtW accounted, fuels significant emissions sources will be missed and the first-mover market for the transition will be jeopardized.

edfeurope.org/shipping

Industry Action Coupled with Government Action

Fuel and technology production stakeholders are prepared to lead the energy transition and provide sufficient support to push the industry towards full decarbonization by the year 2050.

We, the signatories of this Call to Action, are ready to take the baton and prove that the urgent energy transition will be less disruptive, more equitable, and lower cost, so long as policies provide necessary confidence for investment in fuel production, scale, and uptake.

In support of the responsibility which lies on the shoulders of policy makers, we have come together to state, clearly and unambiguously, that the sustainable energy transition is practical and holds huge economic potential.

Unlocking the investment, which is ready and waiting, is firstly a matter of regulators providing clarity and form.

We therefore voice support for:

- **The full decarbonization of the maritime shipping industry by the year 2050** at the latest, and develop practical and cost-effective pathways for the maritime sector to be in line with a pathway that limits global warming to no more than 1.5°C.
- **Ensuring the adoption of 1.5°C-aligned interim targets[1] for 2030 and 2040**, that are essential to kick-start the maritime industry's decarbonization. Ambitious interim targets will galvanize prompt investment in sustainable fuels, reduce ambiguity, and increase the uptake of existing efficiency measures promoting a first-mover market that can stimulate the energy transition.
- **The adoption of Well-to-Wake emission policies to clearly and without ambiguity reach real and effective decarbonization of the industry**. The absence of a lifecycle (or Well-to-Wake) approach disincentivizes investment in, and production of, sustainable fuels and other technological development opportunities. This would be most damaging for developing countries where opportunities for sustainable fuels production are often greatest while also most vulnerable to uncertainty.

Collectively, we are prepared to facilitate the energy transition so long as the necessary measures are put in place to motivate our production of sustainable fuels.

We encourage others to join us.

To fully decarbonize the maritime shipping industry by the year 2050 we call upon world leaders to work together to deliver the right enabling environment with clear timelines, ambitious policies, and updated regulations ensuring that we, the fuel and technology production stakeholders, can maintain the energy transition.

bosal · BunkerTrace · MAN Energy Solutions · Methanol Institute · WATTLAB · Yara Clean Ammonia · HY2GEN · Australian Hydrogen Council · eolic Green Ammonia · EBB European Biodiesel Board · Hexamar · PROMAN · Shell · H2 Chile · InterContinental Energy

Knowledge Partners

Furstenberg Maritime Advisory · Opportunity Green · Ports for People · Environmental Defense Fund · Pacific Environment

[1] Interim targets defining a pathway of GHG reduction consistent with avoiding temperature rise above 1.5 degrees Celsius by 2100: un.org/sites/un2.un.org/files/high-level_expert_group_n7b.pdf

Source: Environmental Defense Fund, 2023

Revised strategy at the IMO approved

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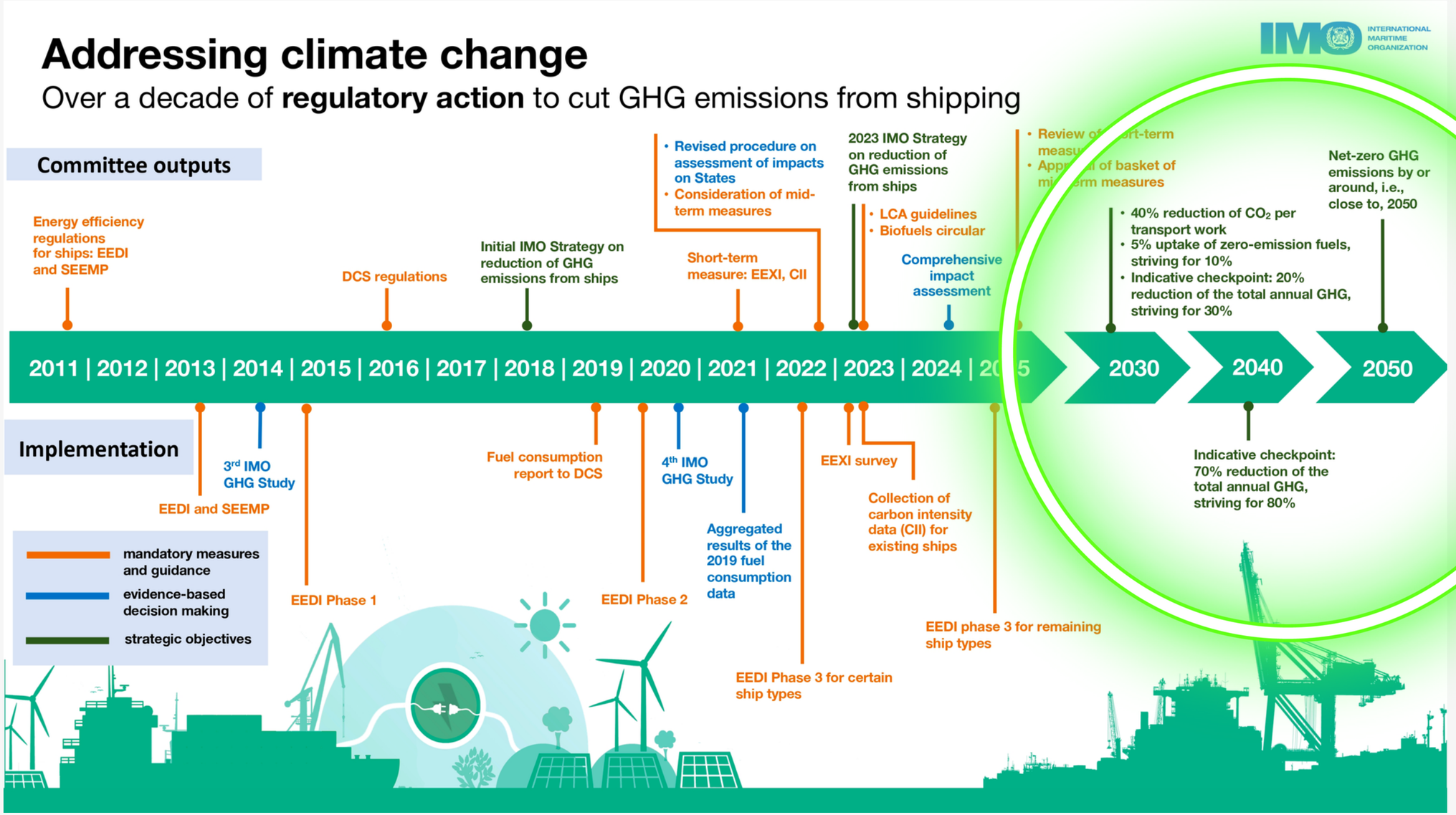
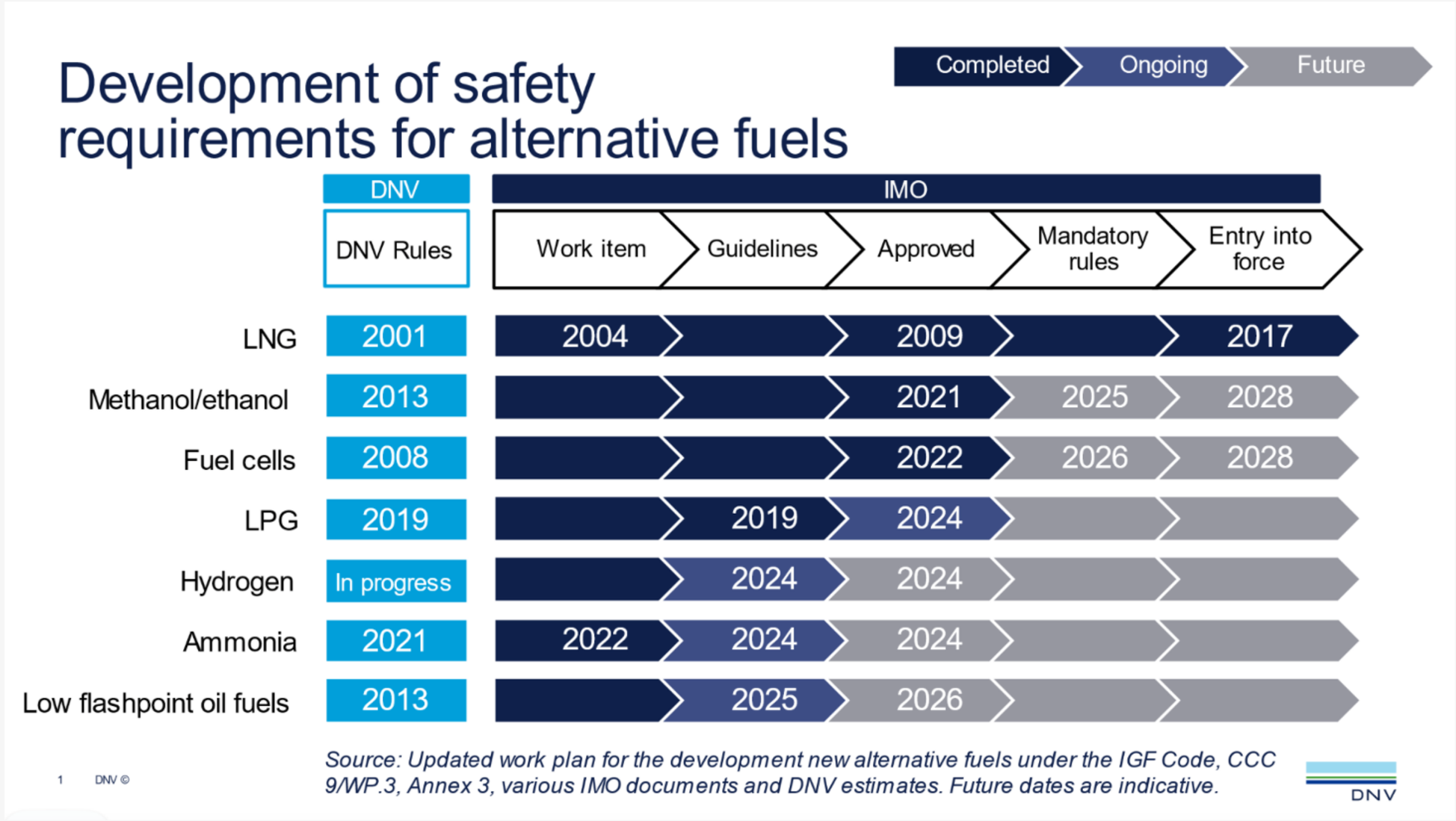
June 2023



Source: www.imo.org

Safety guidelines on ammonia in 2024



Source: DNV, 2023

The regulatory road ahead for maritime ammonia

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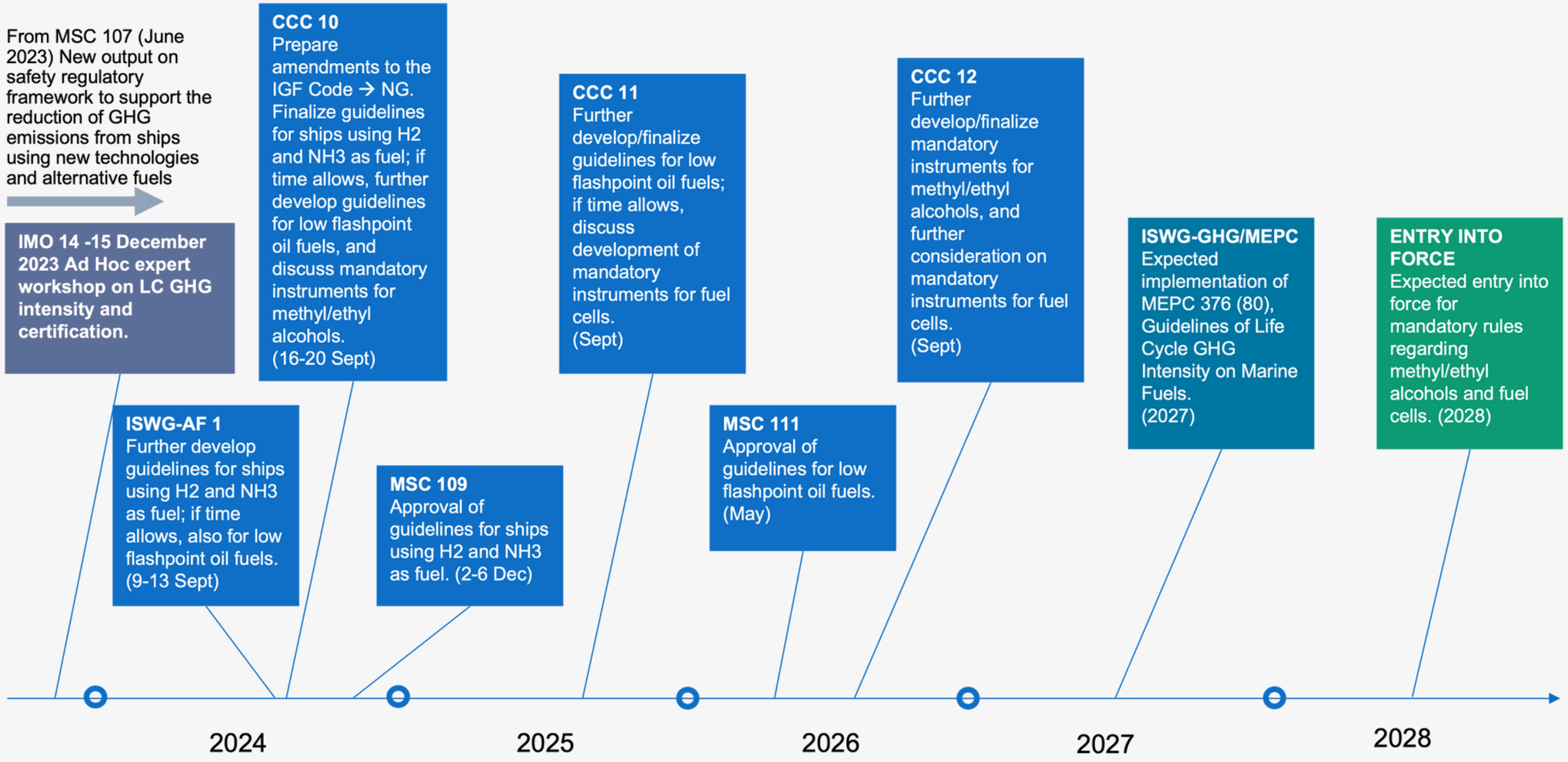
References: CCC 9/WP.3, infograph provided by DNV, and conversation with Tore Longva 2023.11.07



Maersk announcement Dec 1st 2023

Asia Europe Gas Shipyards Tankers

Maersk Tankers orders up to 10 ammonia carriers in South Korea

Adis Ajdin • December 1, 2023 0 372 1 minute read

Denmark's Maersk Tankers has answered the call for a clean ammonia shipping solution with a newbuilding deal for up to 10 vessels in South Korea.

The subsidiary of AP Moller Holding has penned a contract with Hyundai Samho Heavy Industries for the construction of four firm 93,000 cu m units for delivery from 2026 onwards, with options for six additional ships, potentially worth in total more than $1bn.

Japanese trading house Mitsui & Co will join as a co-investor in the first four vessels in a deal worth around $432m.

The newbuilds will be among the largest ammonia carriers in operation, capable of carrying a full cargo of ammonia.

Maersk Tankers re-entered the gas sector in 2023, 10 years after selling the business, and today provides voyage management services for a growing fleet of nearly 30 very large gas carriers.

Maersk Tankers' CEO, Tina Revsbech, said: "Concrete actions are needed for the tanker industry to progress the energy transition, and

in Maersk Tankers, we want to play our part in making transportation of clean energy a reality. We are building on our legacy of operating gas carriers to offer a crucial transportation service that will aid the transition. With this initiative, we will be able to service clean ammonia producers and users in many parts of the world with highly energy efficient and safe ships."

Maersk Tankers said it is working with MAN Energy Solutions and Hyundai Heavy Industries' engine machine division to make the vessels capable of running on clean ammonia, but that a decision to install ammonia-capable engines requires both regulatory and customer support.

AP Moller Holding's liner giant Maersk identified around three years ago both methanol and ammonia as its likely fuels it would use for the 2020s. It has since ordered more than 20 methanol-powered boxships and sourced methanol supplies around the world. The ammonia side of the fuel quest is now coming into view.

Alphaliner reported this week that Maersk is reportedly closing in on orders for a new series of up to twelve 3,500 teu boxships with ammonia considered as a propulsion option.

#Ammonia #Denmark #South Korea

MOL Pathway to Net Zero is about ammonia

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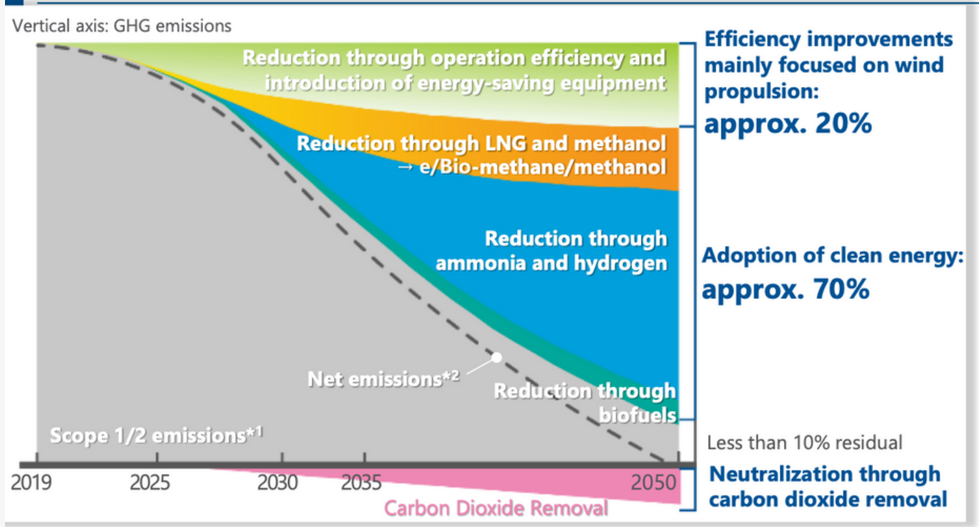
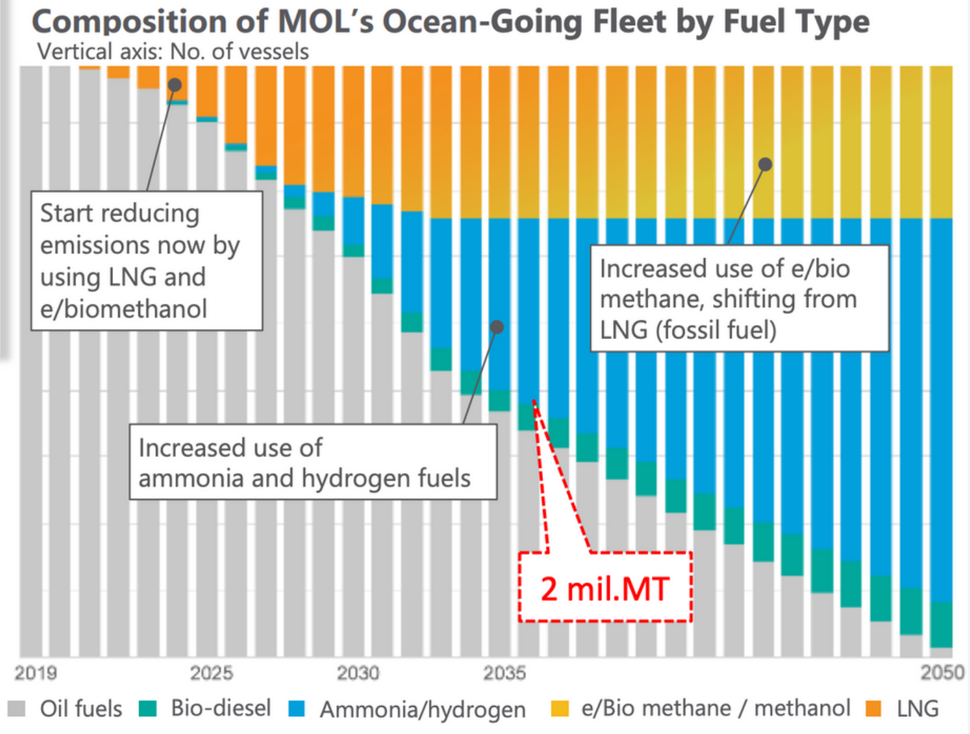
Clarifying the "Pathway to Net Zero Emissions"





Source: MOL, Environmental Vision 2.2, Blue Action for Net Zero, Conference Proceedings, Ammonia Energy Association Annual Convention, Atlanta, November 2023

The obstacles ahead

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Harmonisation of fuel standard in view of other fuels

Safe design and human factors

Bunkering infrastructure

LCA certification

Public perception

Sustainability factors - nitrogen loading

Supply and Demand

Bunker delivery notes

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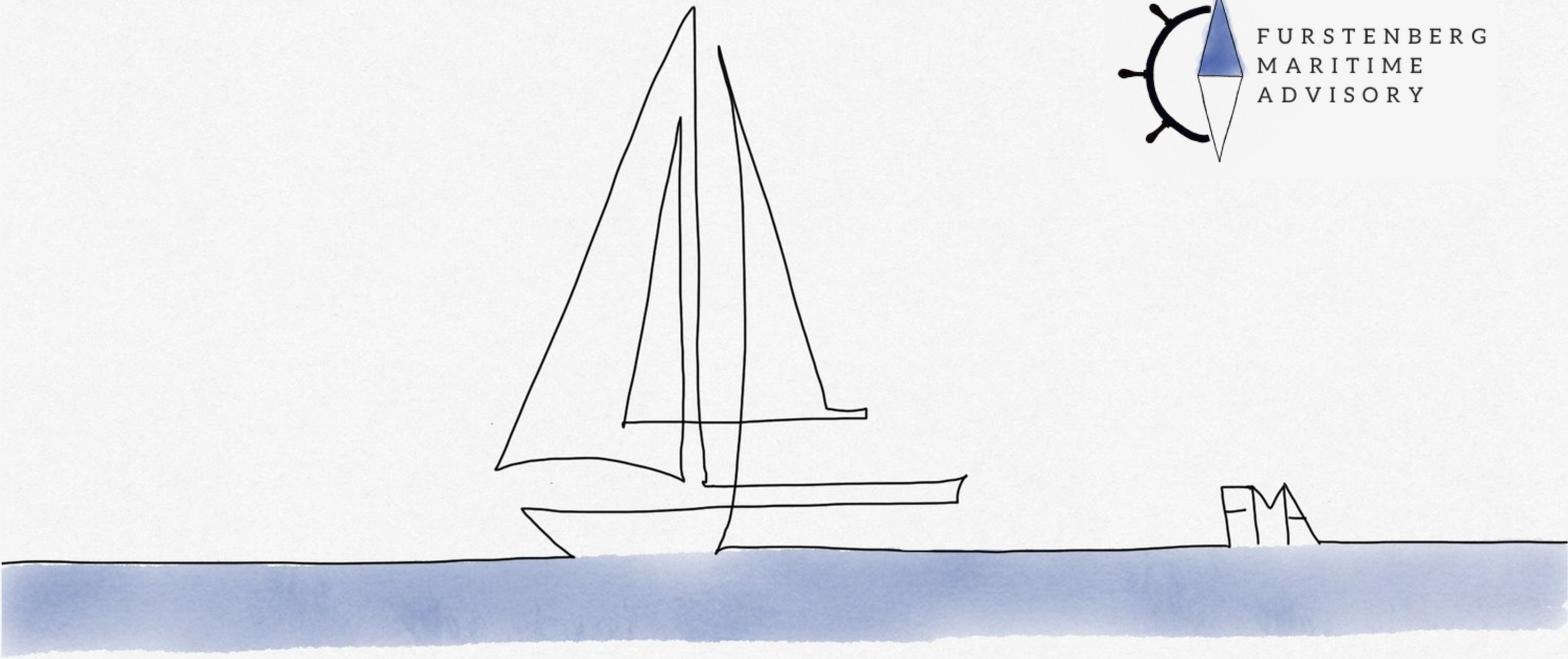
Looking ahead next 12 months: Where to be and how to engage?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