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Going mainstream

From new engines to retrofit solutions, design approvals to vessel orders and bunkering agreements, methanol was everywhere in 2023, but the transition process continues, writes **Gregory Dolan**, CEO of The Methanol Institute

2 023 could fairly be called the year that methanol went mainstream, with new methanol-capable vessel orders ahead of those for other dual fuel ship types, according to classification society DNV.

DNV's Alternative Fuels Insight platform logged 298 ships with alternative fuel propulsion ordered in 2023 – an 8% increase year on year – and a further 298 vessels booked for retrofitting to enable them to run on alternative fuels.

Methanol saw a sharp increase in orders to 138 putting it just ahead of LNG at 130, DNV said. It is interesting to note that the 138 vessels that are methanol-capable excludes orders for methanol carriers though the order book is skewed heavily to container ships, followed by bulk carriers and car carriers.

It's good news for an industry still coming to terms with decarbonisation and the International Maritime Organization's (IMO) ambition of net zero carbon emissions from shipping by 2050 but is not cause for complacency.

If anything, the scale of the challenge ramps up now. We are not yet at an inflection point, but we know what needs to happen next. Methanol bunkering options are increasing as the green corridor concept takes hold, albeit with an urgent need for more capacity. Filling those bunker lines means more production of conventional, blue and renewable methanol, either as blended 'drop in; biofuels or a 'neat' standalone fuel.

POLICY AND REGULATION

Whether or not one believes that last year's COP28 meeting had a positive outcome for shipping, the maritime industry's pathway was already established – both at a global and regional level – with emissions regulations set to grow progressively tighter.

The call by the CEOs of leading global container shipping lines for an end date for fossil-only powered newbuilds certainly grabbed headlines – the operators also urged IMO to create the regulatory conditions to accelerate the transition to renewable fuels. Incoming IMO Secretary General Arsenio Dominguez made clear that implementing the revised IMO strategy was critical to progress at the next Marine Environment Protection Committee (MEPC) meeting this year. 'We are already carrying out the impact assessment on the fleet and on States in order to provide the necessary information and that will lead us to those measures that will be adopted by 2025 and implemented in 2027,' he said. propulsion in addition to featuring energysaving equipment. Its tanker shipping unit also placed an order for six methanol dualfuel vessels with first delivery expected end-2026. Orders have been placed by China Merchant Energy Shipping for eight pure car and truck carriers, with a further four PCTCs ordered by Wallenius Wilhelmsen.

Parent COSCO Group teamed with State Power Investment Corporation Limited,

'Methanol bunkering options are increasing as the green corridor concept takes hold, albeit with an urgent need for more capacity'

Conclusions from COP28 suggest that fossil fuel use in general will be reduced across most industries in the coming 25 years, but maritime is in some ways further along this track simply because vessels operate for 20-25 years and so all new ships must be of a compliant design today. Shipping will require a strong policy-driven framework that supports the economic viability of lower carbon vessels and which can make net zero a reality.

This framework should address the certification of actual emission of all fuels rather than relying on default values. This would serve to unlock contributions of existing lowcarbon fuels, ensuring swift near-term progress as the renewable fuel supply reacts to policy signals and ramps up supply. The large-scale production ramp-up and delivery of sustainable alternative fuels capable of addressing the needs of shipping is contingent on a framework that fully recognises the contributions of carbon capture and utilisation as several key energy carriers are sourced from captured and re-used emissions.

INTEREST ACROSS THE SECTORS

The strong preference for methanol by containership operators was a feature of last year, with newbuildings announced and approvals in principle (AiPs) granted by classification societies. Among the highlights was the AiP granted by Korean Register for a methanol dual-fuel retrofit design for a 16,000 TEU containership operated by Hyundai Merchant Marine.

But container lines are not the only operators committed to Methanol. COSCO's shipping arm has ordered two very large ore carriers which will have methanol dual-fuel Shanghai International Port Group and China Certification & Inspection Group to develop a green methanol industrial chain which will comprise the production, transportation, refuelling, and certification of green methanol as bunker fuel.

In the booming offshore market, investor JP Morgan has taken options on four vessels contracted with Norway-based Ulstein Werft to build two methanol-ready commissioning service operation vessels (CSOVs) for windfarm operations. Orders for two vessels with two-plus-two options were originally placed by Bernhard Schulte Offshore, with all now declared.

The orderbook for methanol fuel engines has in the last two years increased far beyond expectations. Both two- and fourstroke engines burning methanol are now in service and the many new projects are proof that the maritime world wants meth-

'Both two- and four-stroke engines burning methanol are now in service and the many new projects are proof that the maritime world wants methanol' anol, and that methanol will continue to be an important fuel for the marine market.

To date, 192 two-stroke engines of two main designs and with power output between 8 MW and 80 MW have been sold in the maritime market. The majority of orders in 2023 were for larger container vessels requiring large engines and for each ship, three to five auxiliary engines are also needed.

For example, the world's first carbon-neutral containership, the *Laura Maersk*, operates on three methanol dual-fuel engines with one MAN Energy Solution two-stroke engine for propulsion, and two HiMSEN four-stroke, medium-size engines for the vessel's APU load. HD Hyundai has now received orders for 177 methanol-powered engine units for a total of 42 ships.

In addition to new orders for new vessels, several container shipping companies have made orders to retrofit methanol fuel engines on existing ships, with OEMs reporting a growing number of projects for methanol conversion. Last October, Maersk selected the Zhoushan Xinya shipyard south of Shanghai to transform the 15,282 TEU *Maersk Halifax* to methanol operation, the first of 11 retrofits. Market experience with methanol since 2015 and its ease of storage contribute to making the conversion process simpler and easier.

PORTS AND CORRIDORS

Developments at the world's largest bunkering port last year will likely lead to methanol bunkering operations becoming increasingly commonplace. The Maritime and Port Authority of Singapore (MPA) recently issued an Expression of Interest which invites parties interested in supplying methanol as a bunker fuel at the port to submit their proposals by the end of February 2024.

This is a development MI applauds and we are working to support the port authority's initiative to help the international shipping community decarbonise.

Singapore's MPA is also actively developing plans to incorporate methanol into its bunkering pool and is anchoring two of the largest green corridors globally, including the Port of Rotterdam to Singapore Green Corridor and the Silk Alliance Green Corridor, which spans from Shanghai to Singapore. Together with partners, MPA is working to demonstrate proof of concept that can underpin the transition and be scaled up progressively over time.

In Japan, Maersk together with the City of Yokohama and Mitsubishi Gas Chemical have signed a Memorandum of Understanding for the development of green methanol bunkering infrastructure at the Port of Yokohama. The bunkering facility will be located at APM Terminal's Minami-Honmoku container terminal.

In the European Union (EU), Equinor is supplying bio-methanol on a mass-balance basis from its existing plant in Norway to *Laura Maersk*, the first methanol dual fuel feeder vessel which entered service at the end of 2023. Meanwhile OCI Global is providing biomethanol to Xpress Feeder Lines for their fleet hitting the water in the first half of 2024.

Taiwan's Evergreen, which ordered a slate of dual-fuel ships last year, has signed a memorandum of understanding with the Port of Shanghai to develop the supply of green methanol bunker fuel to its ships. Shanghai International Port Group will handle the physical supply and bunkering services for the dual fuel ships as part of a broader strategy to develop a comprehensive green methanol industry chain.

Shippers and container lines alike are backing Hong Kong government plans to develop the city as a regional bunkering hub for nextgeneration ship fuels to retain existing business and lure back lost container volumes. The initiative was laid out in the government's action plan on maritime and port development published in December and follows comments by the port's leadership team. Globally, out of the 30 ports now capable of offering methanol bunkering, five are in China.

INCREASING FUEL SUPPLY

The increasing demand is a signal well noted by producers, who are working to bring onstream additional volumes of methanol, using existing natural gasbased assets, recycling CO_2 , incorporating green hydrogen or renewable electricity and exploring carbon capture and storage.

Because conventional methanol can also be burned on the new vessels, owners do

'The increasing demand is a signal well noted by producers, who are working to bring onstream additional volumes of methanol' 'It will be important to adopt a transition approach that facilitates the contribution of conventional, blue and green fuels towards targets for low carbon and for net carbon neutral emissions'

have the opportunity to blend blue and green methanol with grey as production ramps up and 'dial in' the desired carbon intensity and price point they are looking to achieve.

In 2022, the Methanol Institute was tracking more than 90 projects globally, with announced projected production capacity exceeding 8 million tonnes by 2027, and we are seeing the number of projects and capacity plans increasing dramatically. New data for release by MI soon is expected to show a very strong increase in renewable methanol projects, with positive implications for fuel supply.

For example, Spanish energy major Cepsa partnered with Maersk affiliate C2X to build a green methanol plant in Huelva, Spain at an estimated cost of up to \$1.1bn. On completion, the plant will produce 300,000 metric tons of green methanol annually, making it one of the largest facilities of its kind in Europe. The new capacity is expected to significantly bolster Spain's green energy infrastructure while also contributing to the region's economic growth. In the US, OCI Global announced it would double its green methanol production capacity at its Texas facility to 400,000 tons of green methanol per annum, citing the increasing demand from the maritime industry as a key driver.

European Atlantic ports are set to play host to a variety of pilot schemes exploring the use of hydrogen and methanol for shipping and port vehicles alike. Led by the EnergyLab Technology Center, the E3.43 million HYDEA project brings together 11 private and public partners from Spain, France, Ireland, and Portugal to drive the use of technologies based on green hydrogen.



INTO THE FUTURE

So what does 2024 have in store for methanol as a marine fuel? The signs are certainly positive; methanol provides a practical, implementable pathway for the maritime industry in terms of timescale, regulation and fuel production. The technology is in place: proven, approved, and straightforward to implement in practice.

More broadly, there remains the need to extend the net zero carbon toolset to onboard carbon capture, but this is true across the industry. Supply chain maturity must accelerate for owners to have full confidence that product will be available in volume – this includes production and supply in ports as well as seaborne cargoes and more green corridors.

As the IMO develops its own GHG lifecycle guidelines this year, it will be important to adopt a transition approach that facilitates the contribution of conventional, blue and green fuels towards targets for low carbon and for net carbon neutral emissions. A market mechanism will ultimately be essential and is something industry needs to work together to promote. In the meantime, we will continue to provide the support the industry needs, from newbuilding and retrofit decisions, informing regulation and policy and promoting the infrastructure that can enable the energy transition.

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