Business Breakthrough Barometer 2024

Shipping

World Business Council for Sustainable Development

BAIN & COMPANY

29 October, 2024

Key messages *1/2*

- Confidence in a Paris-aligned transition for shipping is the lowest across sectors, but optimism has improved the past three years on policy action
  - 69% thought the sector was “not on track” for a Paris aligned transition
  - 43% of business respond that their confidence increased in government support past 3 years
- The shipping sector has responded with accelerating its commitments towards net-zero-capable vessels
  - Business report great confidence in progress since 2023, but urgency of cementing global path for the industry to not miss the 2030 IMO target
  - Shipping operators are increasingly turning to dual-fuel vessels as a short-term hedge
- Although methanol is gaining momentum in the short term, business leaders believe that multiple low-carbon fuel technologies will co-exist in the future
  - Orders for methanol-powered vessels are rising, driven primarily by container operators who aim to send a strong demand signal to fuel suppliers while hedging against longer-term regulatory risks
  - This focus on methanol is not limited to Europe, as demonstrated by Wartsila's recent announcement of a large Chinese order for methanol engines, signalling growing global demand
  - In contrast, operators are more cautious about investing in LNG over the past year, with some business leaders attributing this shift to the recent IMO strategy, which, if fully implemented, could limit LNG to offering only short-term decarbonization impact
  - Battery-electric propulsion has also rapidly gained traction over the last five years, particularly among ferries and cruise liners, offering increased energy efficiency, a lower carbon footprint, and cost-effectiveness. Engine manufacturers highlight that high utilization and longer dock times make electric drive an increasingly attractive option for short-distance routes
- Longer term, the shipping industry recognize that methanol will be challenging to scale, but are concerned about pace of development of alternatives
  - Industry leaders point to the long-term potential for ammonia, seeing the bulk of Chinese and South Korean investments into net-zero technology
  - While business are more positive of the fuel supply developments of clean ammonia, the industry at large remain concerned about addressing safety concerns despite the successful launch of the first dual-fuelled ammonia vessel and the IMO releasing ammonia safety guidelines later this year
  - With orders of ammonia vessels just taking off, sector leaders are doubtful that scale ammonia adoption will begin to take off within the next decade
- Business recognize there is a divide within the sector, as bulk carriers have yet to invest in decarbonization at scale
  - While 45% of containership orders are net-zero-capable, only 3% of the bulker orderbook is equipped to run on low-carbon fuels
  - Among those bulk carriers transitioning, ~30% are betting on ammonia as the longer-term solution, but scale adoption won’t happen any time soon according to industry experts
  - Notably, just 10% of bulk operators have committed to decarbonization1
  - Container operators, particularly those shipping for consumer goods companies, highlight that increased demand for decarbonized supply chains has been a key driver in their transition efforts

Key messages *2/2*

- Uncertainty remains whether net-zero vessel growth will meet IMO 2030 targets, but recent non-linear growth trends are moving us closer
  - There's still uncertainty whether order book trends will meet the IMO's fuel uptake targets. Current projections are based on the average growth rate from the past five years and do not account for the recent shift towards non-linear trends
  - If non-linear growth continues, it could bring us closer to the target. However, no assumptions have been made about yard capacity, pricing, or the feasibility of sustaining this pace
  - Leading players highlight the importance of the IMO strategy in driving the recent non-linear trends but remain hesitant to meet IMO targets due to uncertainty over whether fuel supply will support net-zero ships, and that major emitters have yet to commit to decarbonization at scale
- Despite order book trends, operators warn the transition hangs in balance, as fuel supply is not taking off as expected
  - If all low carbon methanol projects pass FID, this would be sufficient to meet the lower bound of IMO 2030 fuel uptake target of 5%
  - However, progress to FID has been slow, as low carbon methanol supply with financial approval only accounts for 10% of 2030 the 5% target, with operators seeing a standstill past year
  - Producers point to the lack of supply developments driven by a reluctance of operators and investors to commit to the long-term, fixed-price offtake needed for final investment decision of most net-zero fuel projects
  - While biofuels are not expected to count toward IMO's net-zero fuel uptake target, companies are investing in biofuels to meet IMO's emission intensity targets
- Business point to the significant cost premium of fuels as the top barrier to scale supply
  - Operators are understandably reluctant to commit to the long-term offtake at the prices, 3-5x conventional fuels, needed by investors to enable FID, particularly in a globally competitive industry with only weak regulatory incentives to transition
  - Businesses warn that the cost disparity and uncertainty over future developments could cause the industry to miss its 2030 targets unless decisive government action is taken by 2025
- Companies cite unattractive business case, ammonia safety concerns, and lack of bunkering as top barriers holding back the shipping transition
- Policy interventions should focus on demand side incentives for investing in zero-emission ships, fuel supply development, bunkering infrastructure and ensuring a just transition

Confidence in a Paris-aligned transition for shipping is the lowest across sectors, but optimism has improved the past three years on policy action

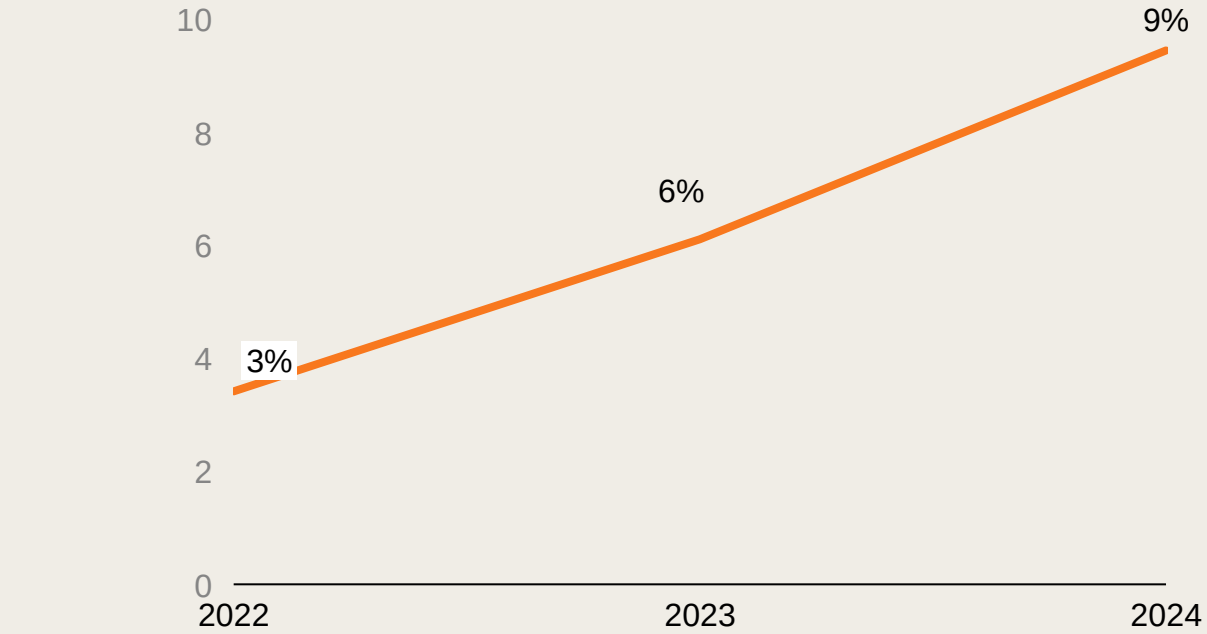
69% thought the sector was “not on track” for a Paris aligned transition

43% of business respond that their confidence increased in government support past 3 years

Source: Business Breakthrough Barometer Sector Survey (N=250)

The shipping sector has responded with accelerating its commitments towards net-zero-capable vessels

Net zero-capable vessel[1] share of total vessel orderbook (% share of tonnage, 2022-'24)



	2022	2023	2024
Total orderbook, k vessels	6,003	5,252	5,539

- Business report great confidence in progress since 2023, but urgency of cementing global path for the industry to not miss the 2030 IMO target
- Shipping operators are increasingly turning to dual-fuel vessels as a short-term hedge

"All of our alternative fuelled vessel orders have dual fuel engines, a prudent and reasonable commercial decision given that; we have always been very aware of the difficulties of developing the necessary fuel supply."

HEAD OF GLOBAL PARTNERSHIPS, PUBLIC & REGULATORY AFFAIRS, SHIPPING COMPANY

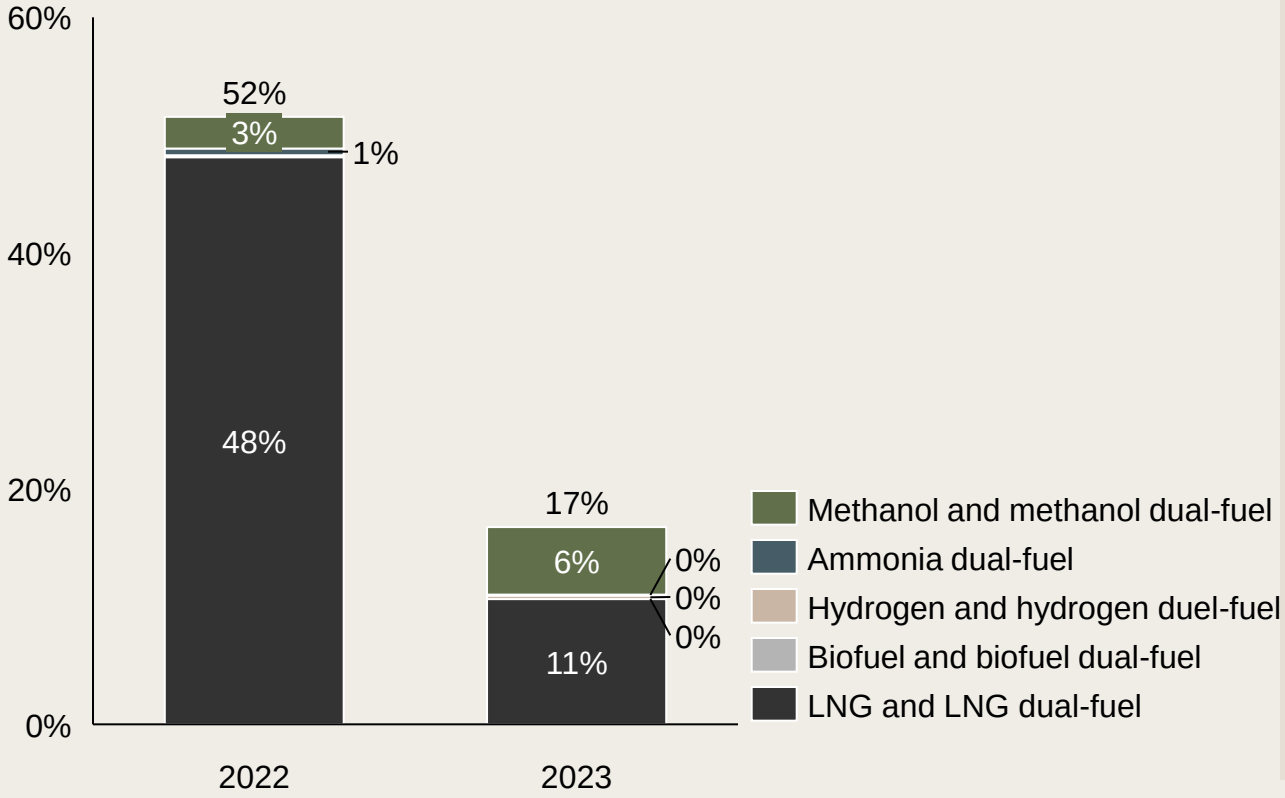
As soon as we started to order [green methanol enabled] vessels, other shipping companies have followed suit, solving the chicken and egg problem, creating demand to scale fuel production, but that has not happened due to the lack of playing field between green and fossil fuels."

HEAD OF GLOBAL PARTNERSHIPS, PUBLIC & REGULATORY AFFAIRS, SHIPPING COMPANY

Note: 1) While work is ongoing at the IMO to define net-zero fuels, the report includes methanol and ammonia vessels as net-zero capable as defined by the Global Maritime Forum but excludes net-zero ready vessels which can be converted to run on methanol and ammonia. 2024 is extrapolated to end 2024 using data up to August 2024 while total orderbook shows data for August 2024
Source: *Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough (2024)*; Business interviews; Bain analysis

Although methanol is gaining momentum, business leaders believe that multiple low-carbon fuel technologies will co-exist in the future

Alternate fuel technology share of total vessel orderbook (% of tonnage, 2022-2023)



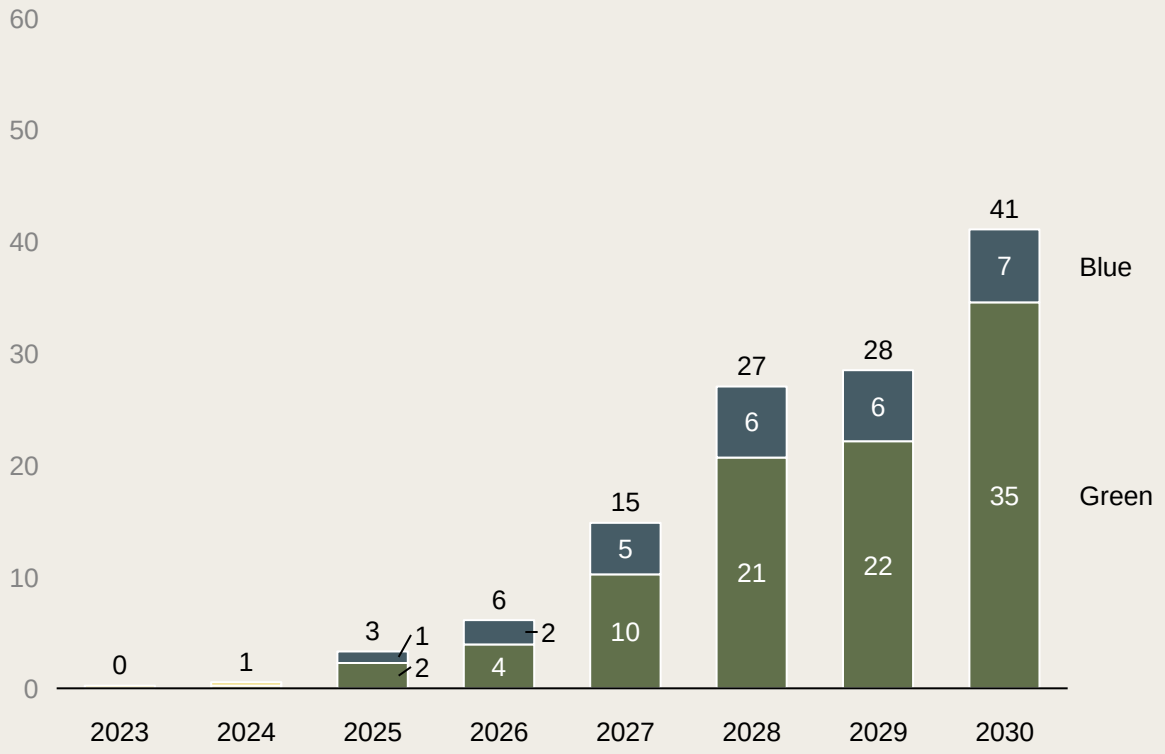
- Methanol orders driven primarily by container operators aiming to send a strong demand signal to fuel suppliers while hedging against longer-term regulatory risks
- This focus on methanol is not limited to Europe, as Wartsila's announced of a large Chinese order for methanol engines, signalling growing global demand
- In contrast, operators are more cautious about investing in LNG over the past year, with some business leaders attributing this shift to the recent IMO strategy, which, if fully implemented, could limit LNG to offering only short-term decarbonization impact
- Battery-electric propulsion has also rapidly gained traction over the last five years, particularly among ferries and cruise liners, offering increased energy efficiency, a lower carbon footprint, and cost-effectiveness. Engine manufacturers highlight that high utilization and longer dock times make electric drive an increasingly attractive option for short-distance routes

> Most ferry crossings take between 30 minutes and two hours, making ferries the prime ship type to adopt battery technology for propulsion.
>
> FERRY TRADE ASSOCIATION

Source: DNV AFI; *Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough* (2024); Business interviews; Bain analysis

Longer term, the industry recognize that methanol will be challenging to scale, but are concerned about pace of development of alternatives

Low carbon ammonia capacity[1] by start year as of 2024 August (in Mt, 2023-'30)



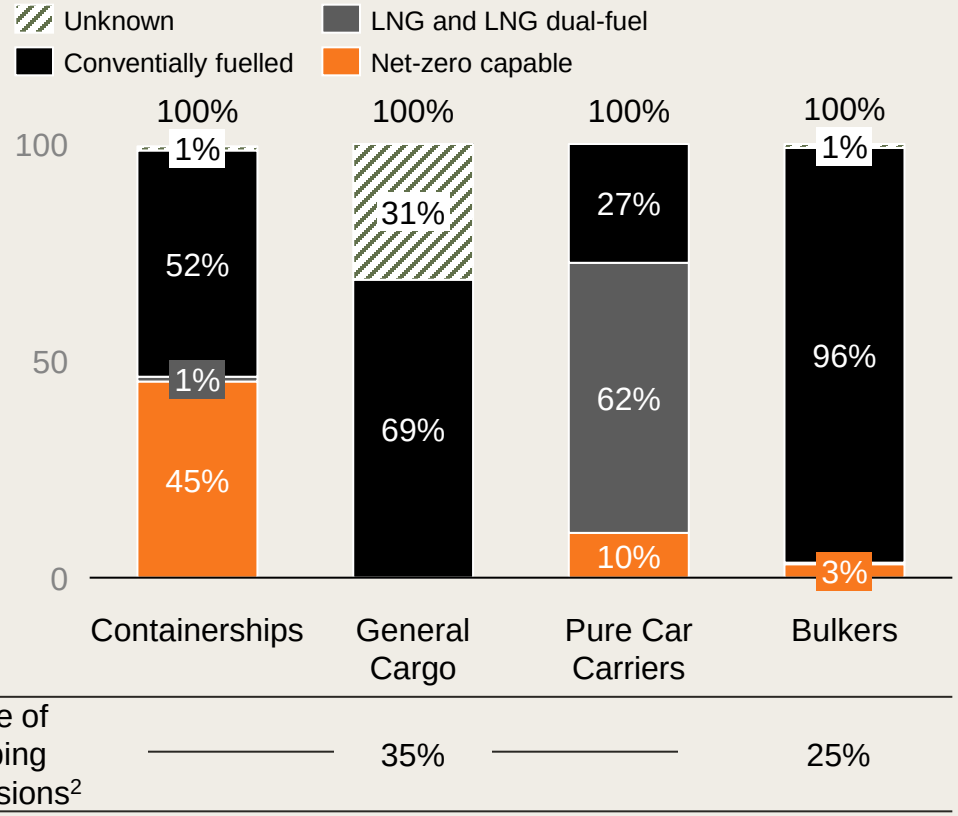
- Shipping industry leaders point to the long-term potential for ammonia, seeing the bulk of Chinese and South Korean investments into net-zero technology
- While business are more positive of the fuel supply developments of clean ammonia, the industry at large remain concerned about addressing safety concerns despite the successful launch of the first dual-fuelled ammonia vessel and the IMO releasing ammonia safety guidelines later this year
- With orders of ammonia vessels just taking off, sector leaders are doubtful that scale adoption will begin to take off within the next decade

> Ammonia has some serious safety concerns; I do not see maritime adoption until more than 10 years in future.
>
> CEO, HYDROGEN TECHNOLOGY PROVIDER

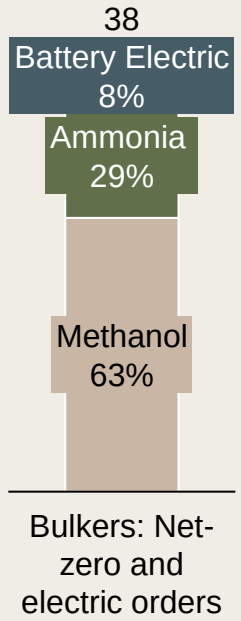
Note: 1) Showing plant max capacity.
Source: GlobalData; Global Maritime Forum; UMAS; Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping; GlobalData Hydrogen Plant database (August 2024 update); Business interviews; Bain analysis

Business recognize there is a divide within the sector, as bulk carriers have yet to invest in decarbonization at scale

Alternative orderbook breakdown by alternate fuel type (% of tonnage, 2023)



Net-zero fueled bulk carrier orders (#, as of Aug' 24)



- While 45% of containership orders are net-zero-capable, only 3% of the bulker orderbook is equipped to run on low-carbon fuels
- Among those bulk carriers transitioning, ~30% are betting on ammonia as the longer-term solution, but scale adoption won't happen any time soon according to industry experts
- Notably, just 10% of bulk operators have committed to decarbonization[1]
- Container operators, particularly those shipping for consumer goods companies, highlight that increased demand for decarbonized supply chains has been a key driver in their transition efforts

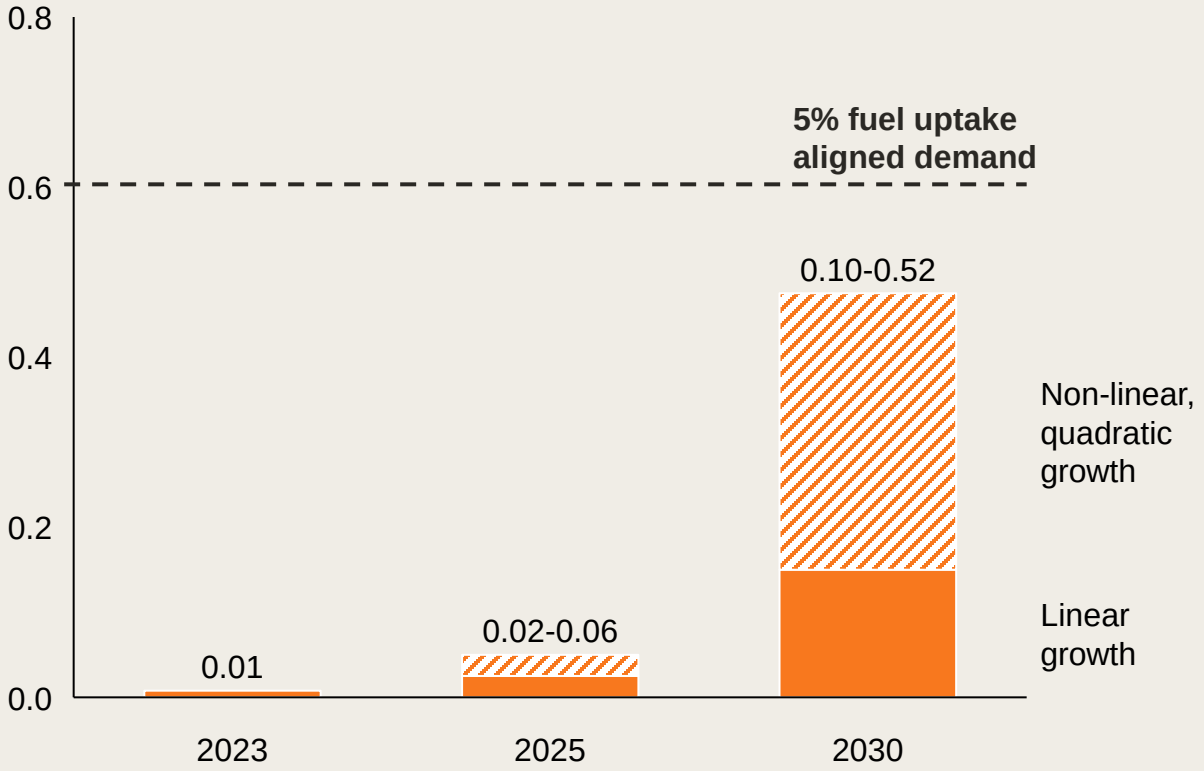
"We see some large global cargo owners, particularly those with public and ambitious decarbonization pledges, showing a greater willingness to pay for the extra cost of green shipping services but there are yet too few. Most of our customers are not willing to pay 3-4x premium for green fuels. Therefore, levelling bridging the price gap between fossil and green is going to the main factor that will allow shipping to decarbonize on time."

HEAD OF GLOBAL PARTNERSHIPS, PUBLIC & REGULATORY AFFAIRS, SHIPPING COMPANY

Note: 1) Share of operators pledging to either IMO or Net-zero targets, Data as of 2022; 2) As of 2023, remaining emissions driven by short-sea, tankers and cruises
Source: DNV AFI; Clarksons; *Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough* (2024); Lit. search; Business interviews; Bain analysis

Uncertainty remains whether net-zero vessel growth will meet IMO 2030 targets, but recent non-linear growth trends are moving us closer

Estimated total potential net-zero capable vessels and implied fuel demand based on fleet growth[1] (in EJ, 2023-2030)



- There's still uncertainty whether order book trends will meet the IMO's fuel uptake targets. Current projections are based on the average growth rate from the past five years and do not account for the recent shift towards non-linear trends
- If non-linear growth continues, it could bring us closer to the target. However, no assumptions have been made about yard capacity, pricing, or the feasibility of sustaining this pace
- Leading players highlight the importance of the IMO strategy in driving the recent non-linear trends but remain hesitant to meet IMO targets due to uncertainty over whether fuel supply will support net-zero ships, and that major emitters have yet to commit to decarbonization at scale

"We are already signing some long-term offtake agreements with energy suppliers but the price gap between current bunker fuels and zero or near zero fuels make the scalability very difficult. It is apparent that more needs to be done to overcome the barriers hindering projects seeking to scale zero-emission marine fuel supply to FID."

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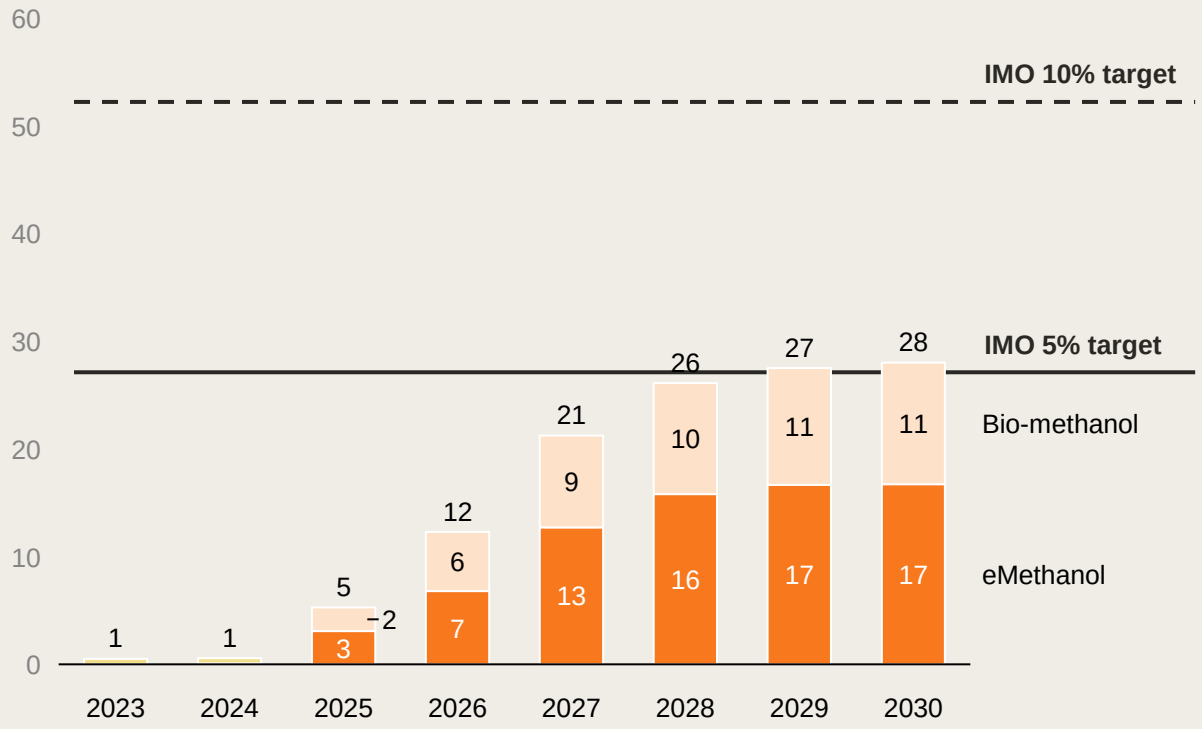
Note: 1) Projections are made by taking into account the historical growth rate of each type of fuelled fleet in GT terms, including the trend in the order book, and projecting linearly towards 2025 and 2030, see *Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough* (2024) for detailed calculations | Source: *Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough* (2024); Clarksons World Fleet Register; Business interviews; Bain analysis

Despite order book trends, operators warn the transition hang in balance, as fuel supply is not taking off as expected

Renewable methanol pipeline capacity by start year as of 2024 August
(in Mt, 2023-'30)



- If all low carbon methanol projects pass FID, this would be sufficient to meet the lower bound of IMO 2030 fuel uptake target of 5%
- However, progress to FID has been slow, as low carbon methanol supply with FID only accounting for 10% of the 2030 5% target, with operators seeing a standstill past year
- Producers point to the lack of supply developments driven by a reluctance of operators and investors to commit to the long-term, fixed-price offtake needed for final investment decision of most net-zero fuel projects
- While biofuels are not expected to count toward IMO's net-zero fuel uptake target, companies are investing in biofuels to meet IMO's emission intensity targets

"Our industry needs mechanisms that can bridge the transition from fossil-based to zero or near zero fuels without causing inflationary pressure and while maintaining competitive fairness."

HEAD OF GLOBAL PARTNERSHIPS, PUBLIC & REGULATORY AFFAIRS, SHIPPING COMPANY

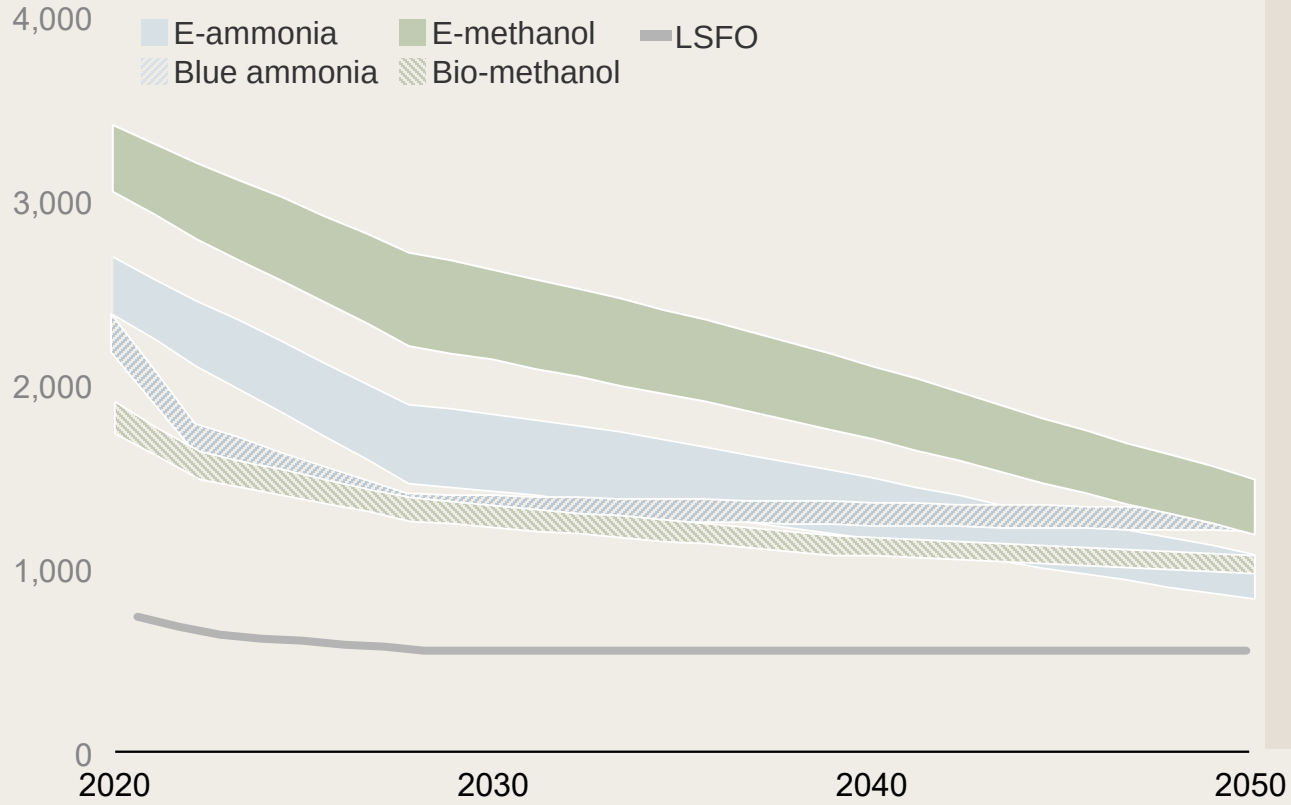
Our highest estimate puts fuel supply just in reach of the 5-10% goal in 2030, but it is with a lot of uncertainty of how the pipeline develops.

DR DOMAGOJ BARESIC, RESEARCH FELLOW, UCL ENERGY INSTITUTE

Note: 1) Showing plant max capacity
Source: Global Maritime Forum; UMAS; Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping; Methanol institute; Business interviews; Bain analysis

Business point to the significant cost premium of fuels as the top barrier to scale supply

Indicative total fuel cost forecast (excl. subsidies)[1] (USD / Ton LSFO equivalent[2], 2023-2050)



- Operators are understandably reluctant to commit to the long-term offtake at the prices, 3-5x conventional fuels, needed by investors to enable FID, particularly in a globally competitive industry with only weak regulatory incentives to transition
- Businesses warn that the cost disparity and uncertainty over future developments could cause the industry to miss its 2030 targets unless decisive government action is taken by 2025

"At the moment, the 170+ member states of the International Maritime Organization (IMO) – the UN body that regulates the shipping industry – are negotiating a global regulatory framework to bridge the price gap between fossil and green fuels. An agreement is expected in April 2025, giving us only six months to convince decision-makers that we need a feebate mechanism that applies fees to fossil fuels and reallocate these fees to green fuels."

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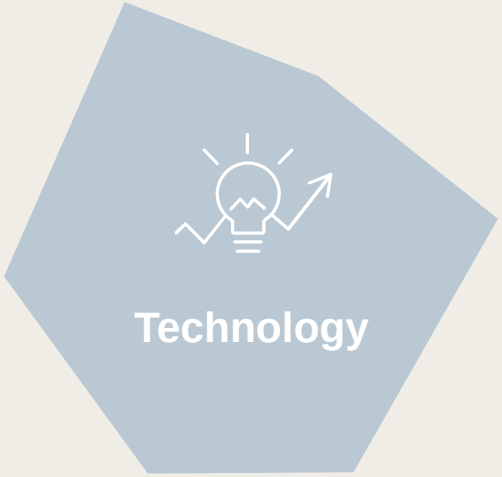
Note: 1) Does not include subsidies, cost compared for fuel produced in Europe, plant lifetime assumed 30 years, WACC = 5.5%, cost of electricity 65 $ / MW in 2023 declining to 27 $ / MW in 2050; 2) Adjusted for energy density for fuel
Source: GlobalData; Global Maritime Forum; UMAS; Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping; Business interviews; Bain analysis

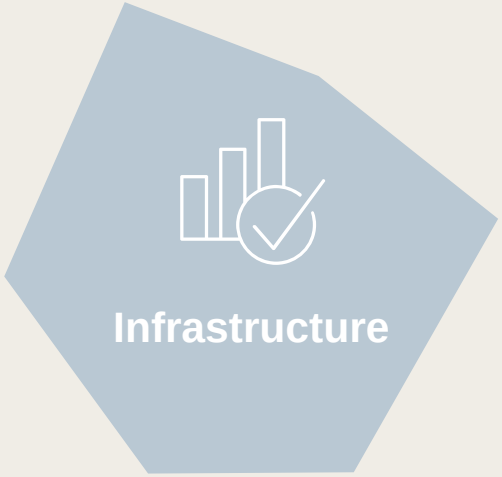
Companies cite unattractive business case, ammonia safety concerns, and lack of bunkering as top barriers holding back the shipping transition

Operators point to the significant cost premium of net-zero fuels as the top barrier to scale supply and demand, as e-fuel costs are 3-5 times that of conventional fuels

Due to the cost premium, operators are unable to commit to long-term offtake agreements at the prices needed by investors give financial approval to supply projects



Companies constantly point out that ammonia safety concerns are holding back further investments, where further developments are needed to allow companies leverage ammonia as a scalable fuel option

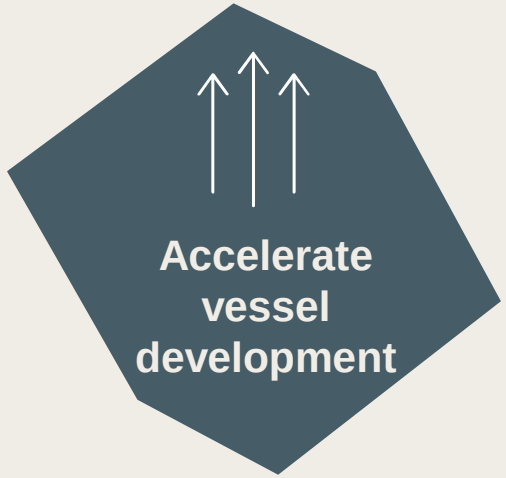


Bunkering infrastructure commitments increased as green corridor commitments doubled, however, there has been limited progress on deployment, resulting in ship operators exploring the possibility of setting up green bunkering infrastructure themselves

Fuel handling concerns persist due to the lack of global net-zero fuel standards, but progress is expected as the IMO is set to release ammonia safety guidelines later this year

Policy interventions should focus on demand side incentives, fuel supply development, bunkering and ensuring a just and equitable transition

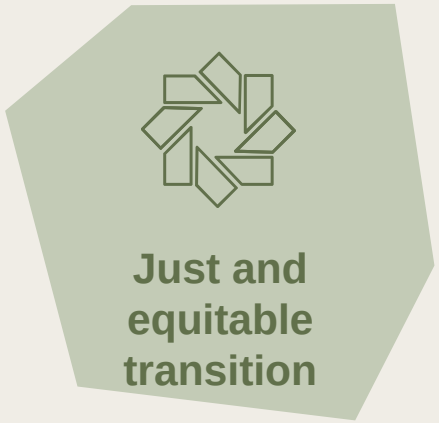
Policy focus
National | International



- Businesses request R&D support on development efforts of ammonia vessels and its safety concerns to accelerate the timespan to when it can contribute to the transition

- Companies see the most pressing need as addressing the net-zero fuel cost gap, highlighting incentive-linked demand aggregation, global fuel standard mandates and GHG pricing as key measures to bridge the gap to willingness-to-pay
- Incentives for net-zero fuel supply is required to de-risk investments into new capacity (e.g. revenue certainty)

- Port obligations to deploy net-zero fuel bunkering infrastructure is needed to enable net-zero shipping routes
- Shipping operators point to port access restrictions, based on fuel use or GHG emissions, with differentiated harbouring fees depending on the vessel type, to incentivise net-zero fuel investment



- Businesses are calling for flexibility mechanisms and revenue disbursements to support vulnerable countries in accelerating their efforts to transition, while also helping them adapt to and mitigate the negative impacts of climate change

Thank *You*

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