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Tracking shipping's course to a zero emissions future



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2026

Dive in!

2 025 was quite a year for shipping's energy transition. It was supposed to be the breakthrough year, as almost everybody was expecting the International Maritime Organization to adopt a Net Zero Framework (NZF) that would set the industry on the path to its 2050 decarbonisation goal.

But then everything went a bit off-script as the (IMO) Marine Environment Protection Committee (MEPC) decided in October to postpone their vote on formally adopting the NZF for at least another year.

Some said this might be a blessing in disguise, as it would allow the MEPC to come back with a better, stronger solution. But it does rather leave the shipping industry hanging, still waiting for a clear signal on how to move forward.

Even while they are waiting for that clear signal, many within the industry are

continuing to roll out their plans for ships running with alternative fuels and new propulsion technologies in 2026 – and hoping that they will be aligned with the deferred IMO strategy.

In this year's ship.energy Survey we have invited our respondents to consider the likely impacts of the NZF hiatus, whilst also gauging the progress being made on the water and in the shipyards to build a net-zero fleet and fuelling infrastructure.

We also look at the current state of play in the 'conventional' bunker market – with our experts giving their views on the perennial concerns of quality, availability and pricing, as well as potential trends in both the supply and demand of marine fuels. We then asked them to consider how the shifting sands of geopolitics could affect shipping and bunkering before concluding with their wish list for 2026.

Contributors

Our pool of contributors for the ship.energy annual survey represents a broad cross section of the industry. Some participants answered the survey questions but chose not to make their comments public and we have, of course, respected their wishes.

We thank everyone for their contributions – and we are especially grateful to the following:



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Net-Zero progress?

We begin our survey with our respondents' views on the big talking point of 2025 – the postponed adoption of the Net-Zero Framework – and also ask them whether the onus is now on the EU to maintain the momentum on maritime decarbonisation

At its extraordinary meeting in October 2025, the Marine Environment Protection Committee (MEPC) chose to postpone making a decision on the adoption of the Net Zero Framework (NZF) for at least another year. Some saw this a major setback; others felt that it could perhaps be used as an opportunity to take stock and build a more robust consensus on how to go forward; everyone agreed that it was a key moment for the energy transition.

But while momentum may have stalled at the IMO, the European Union (EU) has still been forging ahead with its FuelEU Maritime (FEUM) and Emissions Trading System (EU ETS) regulations. Some see this as a positive development that will goad further action at the IMO; others are concerned that it could lead to regional fragmentation that will actually impede global progress.

Do you see the deferment of the NZF as a setback for shipping's energy transition?

First let's hear from those who said this was a set-back.

Anthony Mollet was concerned that: 'Now this has become such a political hot-potato and with new issues between the US and their global neighbours, it is hard to see how the IMO can recover this situation and bring all back to the table in a collaborative way. It is becoming more likely that regional environmental schemes could emerge, on the back of the success of the EU's work. But this will only create a splintered and even more complicated global picture.'

Sofia Fürstenberg Stott warned: 'There is a great risk that nations are walking away from the negotiations altogether, that the NZF is now being considered a "dead horse".

Further, that opportunistic nations are starting to collect a carbon tax for ships in their national jurisdictions.

'To get things back on track, there needs to be a serious effort in making options and consequences clear. Leadership! We need leadership that is values-driven.'

The current US administration made its objections to the NZF very clear, and certainly played a part in its deferment.

Adrian Tolson told us that: 'Without doubt the postponement is a setback and I feel we are all a little naïve for thinking that somehow shipping would avoid the same disruption that the current US administration has generated globally in many other sectors. Perhaps a lot of wishful thinking and a belief that some of the (not unreal) objections could be ignored. Perhaps it came down to real concerns around putting the IMO in charge of billions, but we cannot ignore the

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Allyson Browne

anti-climate change agenda that has gained force in many countries in recent years. I think we have lost time – hopefully less than 5 years – but perhaps not. The progress will continue – localised legislation, individual company targets and the consumer/public opinion will drive this – but IMO 2050 targets are probably off the table.’

Allyson Browne was among several survey respondents who raised concerns about the political forces influencing the decision-making process. ‘There is no denying that the postponement is a serious setback,’ she maintained, ‘and it is no secret why it happened. The delay reflects the outsized influence of fossil fuel-aligned petro-state interests and those intent on protecting incumbent fuel revenues. Their intentions are clear. We all know what sits behind this outcome: a deliberate effort to slow, dilute, or derail the transition to a zero-emission future.’

‘At this moment – when humanity has already exceeded six of nine planetary boundaries – it is unacceptable for a small group of obstructionist member states, including the United States, to dictate the pace of action. The climate crisis does not wait for political convenience, and global governance cannot continue to bend to those most invested in maintaining the status quo.’

‘Thankfully, not all U.S. ports are toeing the line of the Trump Administration. Ports including Port of Seattle, PortMiami, and the California gateways, Port of Los Angeles and Port of Long Beach, continue advancing shore power, electrification, clean energy integration, and alternative fuel readiness – despite federal inertia. Their leadership is profoundly meaningful in this moment and should not be overlooked.’

‘Now, the responsibility sits squarely with the IMO. It must deliver a credible NZF that

reflects the reality of what is already happening across the industry – and member states must be willing to stand up to fossil-aligned interests. The framework must serve the planet and future generations, not those seeking to prolong dependence on fuels that are fundamentally incompatible with a livable future.’

Davina Hurt also called for more push-back against the Trump Administration, both from within the industry and from political leaders in the US and other countries. ‘The decision to delay adoption of the NZF for one year introduces further uncertainty into the global shipping atmosphere at a moment when clarity is most needed,’ she said. ‘The shipping industry and environmental advocates – including Pacific Environment – have been notably aligned in calling for a global, predictable framework to reduce emissions given the scale of investment, infrastructure development, and fleet planning required for this transition is immense. Now, the industry is in limbo or in an unsure holding pattern, making near-term technology decisions more difficult and increasing the risk of fragmented or suboptimal investments that could slow progress over the longer term.’

‘At the same time, this delay has introduced an entirely new and destabilising variable of heightened global geopolitics tension. This will have a much larger impact than previously seen and is largely out of the hands of those typically driving the conversation and consensus forward. The global turbulence and erosion of diplomatic trust have reached the IMO, complicating what should be a collective response to a shared global challenge. What we don’t want to run the risk of is industry defaulting to low-cost pathways that ultimately fall short of the necessary long-term investments for this transition.’

Calling for an international effort, Hurt urged: ‘For the NZF to move ahead, a broader coalition of countries must be committed to moving it forward in the face of threats and diplomatic retaliation. That means a broad coalition of countries must see direct value for their people as well as economies, whether that is fighting climate change and sea level rise for small island states, developing an alternative fuel industry and jobs, or lessening the air pollution that impacts coastal communities around the world. Framing the transition not only as a climate obligation but as an economic and public health opportunity will be essential for adoption.’

‘The delay is serious, but it does not negate the underlying momentum toward decarbonisation. The technologies, economic drivers, and climate imperatives pushing shipping toward net zero remain firmly in place. The key risk is not a loss of ambition, but a loss of coordination – and that is something that can still be addressed. It is a chance for countries, industry leaders, and civil society to demonstrate leadership outside the formal IMO process – through bilateral agreements, pilot projects, fuel corridors, and domestic policies that keep investment flowing and signal continued commitment.’

However, she ended her response on an optimistic note: ‘Ultimately, this is a setback in timing, not in direction. Shipping’s energy transition is still necessary, inevitable, and achievable.’

Lukas Leppert warned that: ‘The postponement prolongs regulatory uncertainty and sets back essential economic investments, causing further emissions of greenhouse gases. But it also creates space to strengthen the framework’s technical integrity through advancing work on the

accompanying guidelines. A more robust outcome will depend on grounding the NZF in real-world emissions data, comprehensive life-cycle assessment, and full accounting of the climate impacts of all greenhouse gases – particularly those with an increased impact over shorter time horizons like methane. Over the coming year, independent evidence and transparency will be critical to ensure that the adopted framework delivers material GHG reductions and avoids reinforcing transition pathways that increase long-term climate and investment risk.'

Dr Sian Prior echoed the concerns about the regulatory uncertainty at a time when 'decisive action on short-lived climate pollutants is urgently needed', and added that: 'Clean Arctic Alliance's work at both the IMO and the Arctic Council has consistently highlighted the outsized role of black carbon and methane in accelerating Arctic warming. Without a clear, binding framework that addresses these pollutants alongside CO₂, the industry risks making investment decisions now that both prolong the use of fuels responsible for high emissions of black carbon and also move to fuels that simply replace one superpollutant (black carbon) with another (methane) and consequently undermine near-term climate protection in the Arctic.

'From the perspective of climate-vulnerable regions, progress through technical IMO committees – such as the Sub-Committee on Pollution Prevention and Response (PPR) – remains critical. Targeted fuel measures addressing superpollutants like black carbon can deliver near-term climate and health benefits, even while broader frameworks are under negotiation.'

Constance Dijkstra called for individual countries to keep pressing ahead, regardless of the NZF situation. 'Having an international framework that provides clear long-term decarbonisation targets with financial penalties is crucial to encourage ships to decarbonise. It would be a shame to settle for a weak deal,' she said. 'If that were the case, the IMO NZF should not be used to prevent countries from setting up their own legislation to accelerate the decarbonisation of ships and be more climate ambitious should they choose to do so.'

'Having an international framework that provides clear decarbonisation targets with financial penalties is crucial to encourage ships to decarbonise. If such a framework was not approved, it would send the wrong signal to the shipping industry, many of which have asked for such a deal for a while,' she said. 'But the IMO NZF should not be used to prevent countries from setting up their own legislation to accelerate the decarbonisation of ships, should they choose to do so.'

Andrew Dumbille emphasised the bigger environmental picture: 'The delay of the IMO's NZF highlights the urgent need to consider shipping within the full climate-biodiversity-pollution shipping nexus. Every year of regulatory uncertainty risks locking the industry into fossil and methane-based fuels, with disproportionate impacts on Arctic communities, Small Island Developing States, and port populations already exposed to pollution. This extra time should be used to integrate life-cycle emissions, short-lived climate pollutants, and safeguards for marine biodiversity, ensuring that the framework promotes a truly just and sustainable transition that addresses all aspects of the triple planetary crisis.'

Goran Dominioni warned that we shouldn't necessarily assume the 'extra time' will be put to good effect. 'While I agree that the postponement offers an opportunity to improve the approved draft amendments,' he said, 'there is no certainty that the text will not be watered down (or remain as it is). In the meantime, the industry is left with less certainty, which can hinder some investments. A positive aspect is that the postponement gives Member States more time to develop an informed opinion on the relevant guidelines, which are essential to the actual functioning of the NZF. However, even if adopted, improvements to MARPOL and the guidelines are always possible with sufficient political support, so the extra time is not a major advantage.'

Diane Gilpin lamented that: 'It was terrible to see years of painstaking work by dedicated professionals upended in such a crude way but it is just a delay, the targets remain in place. Wise leaders know the science hasn't changed, the energy transition must continue.'

'The most negative impact will be on the development of alternative fuels which require clear targets to attract the significant investment required. The key beneficiary is wind propulsion and energy efficiency solutions which offer no regrets transition opportunities – using less fuel of any flavour saves money and emissions. (Figuring out how to apportion benefits is a challenge being now being warmly embraced our learned legal friends.)

'In short: It's bad for the planet, good for wind propulsion.'

Gregory Dolan focused on what the NZF postponement could mean for methanol-fuelled shipping. 'Heading into the October MEPC extraordinary session,' he recounted, 'an inflection point was in sight. Shipping companies that had methanol-fuelled vessels on the water or in the shipyard were preparing to turn letters of intent for renewable methanol supply into binding offtake agreements. It was right there. Postponement of the NZF's adoption poured cold water on many of these negotiations.'

But, Dolan continued: 'There is a silver lining. We continue to see leadership with shipping companies continuing to order methanol-fuelled vessels and betting billions of dollars on these investments. At last count, Clarksons has methanol bunkering capability standing at 48 ports and growing. According to GENA Solutions, the pipeline of low-carbon and renewable methanol projects now totals 270 announced plants with total potential supply of 56.3 million metric tons by 2030. Progress continues, and when (hopefully not if) the NZF is adopted, these first movers will reap the benefits.'

Pekka Pakkanen was one of many who picked up on the dangers of a fragmented landscape without a strong global lead: 'The vote to delay the NZF regulations for another year will make progress on decarbonisation all the more challenging on a global scale. Without the right support, this fragmentation would delay decision-making and keep current uncertainties around monitoring and reporting unresolved for the people working in shipping.'

'It is vital that as an industry we get the NZF right, but the delay increases the risk of a patchwork of regional regulations, which complicates long-term investment decisions for shipowners and creates operational



complexity for crews and onshore teams. This is a set-back for unified action on meeting emissions targets across the maritime sector. That said, regulatory pressure has not eased.

‘From NAPA’s perspective, the priority remains ensuring that regulations for shipping decarbonisation can be implemented effectively with help of digital tools, supporting shipowners and operators with minimal operational disruption. While a global NZF is still needed, the current regulatory environ-

ment is already driving tangible emissions reductions. Existing regional frameworks such as FEUM and the EU ETS will play a more prominent role for longer, and continue to drive investment into vessel efficiencies, green technologies and digital reporting and monitoring capabilities, as these are becoming a must-have onboard. FEUM for example specifically supports the use of wind-assisted propulsion systems (WAPS) by offering a wind reward factor and wind propulsion goes hand-in-hand with digital voyage optimisation and weather routing.’

delay or something more permanent. That is all pretty clear and opinions abound on these three destinations as it does on how damaging this process has been to the credibility of the framework and indeed to the IMO itself and multilateralism more widely. ‘The work, however, continues on the GFI [Global Fuel Intensity] guidelines and details around the NZF reward system, etc. and this is one area of action that is important, as one of the core reasons stated by those actors prompting an adjournment was that there

commitment from all sides to relinquish those schemes if or when a robust international framework is delivered is a key precursor to an international system. Otherwise, there may need to be a form of clearing house for these multiple schemes to avoid all of the additional compliance complexity and avoid double or more levels of taxation until a widely accepted global system can be put in place.

‘Finally,’ Allwright concluded, ‘there is quite a level of “taking stock” underway in the industry and one strong trend that I have been picking up on is that many industry stakeholders are looking again at the low hanging fruits that have been rather neglected during the mainly alternative fuel driven discussions among maritime stakeholders and in the media. These include energy and vessel efficiency measures, voyage and operational optimisation and wind propulsion energy provision. These are increasingly being viewed as far less risky and commercially positive pathways that enable the industry to stay on track to meet the current IMO objectives for 2030 and 2040, while at the same time lowering dependency on fuel and helping de-risk and increasingly uncertain future.’

Koen Heesbeen said the NZF postponement was a setback ‘mainly because it prolongs uncertainty at the very moment shipping needs a credible, stable signal to move from pilots to scale’.

Drawing upon STX’s own experience across renewable fuels and compliance markets, Heesbeen warned that: ‘Unclear global rules translate quickly into deferred long-lead commitments, newbuild and retrofit strategies, bunkering investments, and, critically, long-term offtake contracts that underpin supply-chain buildout. The impact is most acute for capital-intensive pathways such as e-fuels, where uncertainty raises financing costs and delays final investment decisions.

‘In terms of timing,’ Heesbeen continued, ‘we see this as a material delay in policy certainty of at least one year, but with the potential to translate into a two- to three-year slowdown in parts of the fuel supply chain, given the time required to secure offtakes, reach FIDs, and deliver infrastructure. The good news is that this can be brought back on track if the industry and policymakers use additional time to strengthen the framework’s credibility and investability: deliver robust and harmonised MRV, ensure high-integrity crediting with clear rules on eligibility and stacking with regional regulations, provide a predictable compliance

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Gavin Allwright shared the concerns over fragmentation, but also came up with a proposal on how to resolve the potential problems this might cause. He told us: ‘The adjournment of the MEPC-ES2 meeting was certainly a setback for industry efforts overall to deliver on the IMO decarbonisation strategy agreed upon in 2023. The degree of severity will be determined in part by what happens this year and also the level of flexibility and resilience that there is within the IMO process itself but more importantly within the wider industry.

‘The decision to adjourn proceedings hasn’t changed the strategy, but it has delayed the implementation of one of the policy levers that was meant to deliver that. That has added to the uncertainty and risk involved in the investment decision-making process around alternative low emissions fuels which is a serious issue, especially with little indication if this will turn out to be a single 12-month adjournment, a multiple-year

was a lack of detail and clarity on how the system would work, the processes involved and the subsequent impacts.

‘There continues to be a majority in favour of the in-principle NZF, however political pressure meant that an adjournment became a favoured pressure release lever to agree to, rather than have to openly align with either camp and incur the consequences of such action.

‘I doubt that a major change will be made to the NZF approach, as any adapted approach that places a price on carbon is likely to face the same roadblocks. However, I thought that the NZF would come to a vote and be voted through, so my political weather vane is rusty at best. From our perspective we would favour a more “total cost” approach rather than one grounded in the volatile and far lower “market price” for energy sources, which includes all of the externalities, removes all of the direct and indirect subsidies and is delivered as a simple cost per ton of all climate impacting emissions, rather than just direct GHG emissions. This is unlikely to be adopted any time soon, however the principle behind this approach stands that we must gauge the total cost and impact of our actions if we are to avoid catastrophic climate, ocean and bio-diversity degradation.

‘One of the likely outcomes from this delay is that we will have a plethora of regional and national schemes that are then implemented and this will add complexity and cost to the industry. Therefore a solid

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trajectory, and coordinate internationally to minimise fragmentation.

'That said, this is not a stop sign. The transition will continue to be propelled by regional regulation, corporate targets and customer demand. The opportunity now is to use the additional time to deliver a framework the market can trust and finance, so that

such as EU regulations, remain in force and are expanding. Despite the postponement, the industry recognises that decarbonisation is inevitable, and many first movers are proceeding with pilot projects, technology trials, and early investments in anticipation of stricter regulations ahead.

'At the Global Centre for Maritime

The MEPC ES.2 was expected to mark a pivotal moment in international climate governance, through the adoption of a draft global maritime regulation, mandating emissions reductions across international shipping. The decision to delay a vote on adoption of the NZF risks undermining key targets established in the IMO's 2023 GHG Strategy and exacerbates misalignment between the framework's goals and the Paris Agreement's 1.5°C goal. It also prolongs regulatory uncertainty and stalls momentum towards investment in zero- and near-zero emission fuels. In practical terms, the adjournment leaves the door wide-open for another year of unabated emissions and halts the mobilisation of revenues that could support the sustainable energy transition and climate adaptation measures, particularly for developing countries.

'However, the delay is time-bound, and the NZF remains very much on the table. The year of adjournment presents a decisive window of opportunity for Member States to strengthen the draft amendment to ensure it is as ambitious as it needs to be. The active participation of Member States in ISWG20 discussions, which followed ES.2, signaled a continued willingness to engage on the NZF and refine key details to ensure smooth implementation. Advancing work on the guidelines and other implementing instruments may help to maintain momentum and build confidence to facilitate wider support for the NZF's adoption ahead of the resumed meeting in October 2026. It is imperative that Member States take the opportunity to continue engaging in such discussions. In particular, Member States and organisations may wish to utilise the one-year delay to clarify key details that have been subject to limited discussion to date. These key details include:

- Designing an equitable revenue distribution and fund governance framework: Enshrining principles of equity and fairness within the IMO NZF's operating rules will be essential to ensuring those most vulnerable to the impacts of both climate change and decarbonisation initiatives are not left behind during the maritime transition. The equitable design of the IMO NZF is essential to overcoming concerns about the NZF's disproportionate negative impacts on certain countries and regions and ultimately enabling a just and inclusive transition worldwide. Clear fund governance structures that guarantee inclusive representation, accessibility to funds, and equity-focused disbursement may help to strengthen confidence in the NZF's fairness and effectiveness, increasing

'The postponement of the IMO's NZF shows that IMO deliberations are no longer purely technical but now political, and member states will ultimately vote according to their own national interests'

Dr. Prapisala Thepsithar

when the IMO package is adopted it unlocks investment at scale, rather than deepening fragmentation and compliance complexity.'

Eirik Nyhus also made use of road travel analogies, telling us: 'The delay in decision making is certainly a setback, but in our view is more of a speedbump rather than hitting a brick wall.'

'The most immediate impact, given the reigning geopolitics and the IMO's decision making procedures, is that the probable entry into force date for any IMO regulation has been pushed back to 2029 at the earliest, very possibly even later.'

'With the present politics being what they are, we also consider it unlikely that an economic element can be a part of any agreed outcome, and that any framework that could reach agreement will need to be purely technical in nature.'

'But shipping's energy transition is driven by more than IMO regulations. The regulations served as an initial catalyst, but the transition has increasingly been propelled by commercial and financial pressures, as well as regional regulations. So, we do not see this as the end of decarbonisation, but rather a slowdown.'

Dr. Prapisala Thepsithar was another who believed that direction of travel, if not the pace, is still on course, as she commented: 'The postponement of the IMO's NZF shows that IMO deliberations are no longer purely technical but now political, and Member States will ultimately vote according to their own national interests. This adds further uncertainty to shipping's decarbonisation, which is already facing headwinds due to shifting fiscal priorities, regional policies, and geopolitical tensions.'

'Importantly, the IMO's 2023 GHG Strategy still stands, and regional efforts,

Decarbonisation (GCMD), we strongly believe that the industry's ultimate destination of net-zero emissions remains unchanged. Global consensus is very challenging, and policy framing, especially at the global scale, will take time. But there remains lots to do to ready the ecosystem for its eventual fuel transition. Standards based on clear lifecycle assessments, credible accounting of green attributes, and proven safety cases for new fuels provide the foundation of confidence for shipowners to adopt and financiers to invest, with or without a final IMO GHG emissions pricing mechanism in place.'

Sapphire Metcalf was also focusing on the long-term goal, as she judged that: 'The adjournment certainly represents a short-term setback, but not a complete derailment of the shipping sector's effort to decarbonise.'

'This delay should be used constructively. It is an opportunity for the industry, stakeholders, governments and associations to work more closely together and put forward a revised proposal that can secure broader support across IMO Member States'

Alexander Prokopakis

the likelihood of consensus at the next MEPC session.

- Designing robust guidelines related to zero or near-zero (ZNZ) GHG emission technologies, fuels and/or energy sources: The adjournment period offers an important opportunity to enhance the technical robustness of the guidelines on ZNZ fuels and lifecycle GHG (LCA) analysis. Strengthening these elements will not only ensure environmental integrity but also help build confidence and consensus among Member States ahead of the NZF's reconsideration for adoption.

'Whether the delay translates into a major setback will depend on how effectively the intervening year is used. If Member States continue technical work, maintain coordinated climate diplomacy and political momentum, and counter attempts to dilute the NZF, the 2026 negotiations could deliver a more robust, credible, and equitable regulatory package.'

Let's hear now from some of the organisations that will be contributing to this upcoming technical work.

Alexander Döll said: 'The adjournment is certainly disappointing, as the industry has been waiting for a clear, global signal to guide long-term investment decisions. Shipping is a capital-intensive business, and regulatory certainty matters when owners are investing in vessels and fuel pathways that will operate for decades.'

'That said, it does not have to be seen as a setback. It can also be an opportunity to sharpen and clarify what the NZF is meant to deliver, both commercially and in terms of real emissions reductions. For an industry making long-term commitments, understanding how the framework will work in practice is just as important as agreeing on the level of ambition, particularly as progress continues on the water, in shipyards and across fuel supply chains.'

'Balancing commercial realities and day-to-day operational demands with long-term climate objectives is already challenging, and those challenges are intensified by economic uncertainty and geopolitical pressures. In that context, it is encouraging that key stakeholders remain engaged in the IMO process, signalling a continued commitment to reaching a multilateral solution. The additional time should now be used to ensure the NZF is robust, investible and capable of delivering real impact. Any effective mechanism will need to be straightforward to implement, help close the cost gap between conventional and low-carbon fuels,

and provide long-term certainty for investors, fuel producers and operators alike.

'As an organisation with consultative status at the IMO, the Methanol Institute is actively involved in a number of informal working groups, including on reward mechanisms and greenhouse fuel intensity guidelines. We see this period as an opportunity to bring practical, real-world experience into the process, helping to shape a framework that supports scalable solutions and long-term certainty.'

For **Steve Esau**, the NZF postponement is 'both a setback and an opportunity'. As he explained: 'A setback in the sense that it may have undermined some of the industry momentum towards decarbonisation, and the delay runs the risk of regulatory fragmentation.'

'An opportunity, in that it gives time for the industry to step back to come up with a more robust framework. Such a framework should be based on the following principles:

- There can only be one global decarbonisation framework for maritime, and all Member States should act accordingly. Any local or regional regulations should converge with IMO regulations, with no double compliance costs.
- Regulations should be goal-based, and technology-neutral and not be prescriptive.
- Early adopters should not be penalised for taking a leadership role. In particular, regulations should recognise that the life of a capital vessel often exceeds 20-25 years.
- Regulations should incentivise solutions that are practical, scalable and investible given current technologies and realistic technology pathways, and leveraging existing infrastructure.
- Regulations should allow for flexibility, recognising the need for shipping companies to consider fleet planning and to allow compliance pooling mechanisms.



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- Non-compliance with any established regulations must be dealt with in a realistic manner without creating undue financial burdens on the maritime industry. If funds are raised through compliance mechanisms, they should be hypothecated for re-investment in the maritime sector.'

Alexander Prokopakis looked at the role that the bunker industry can play in shaping the work going forward. He considers the NZF postponement was 'a delay in the process, but not a derailment of the energy transition', as he judged that: 'What it exposed is a disconnect between governments and industry. The MEPC meeting was extraordinary in every sense, with unprecedented dynamics that we have not seen at the IMO before.'

'This signals that governments failed to adequately listen to what industry has been asking for and IBIA supports: a framework that is ambitious, yes, but also workable, globally adoptable, and grounded in operational reality.'

'That said, this delay should be used constructively. It is an opportunity for the industry, stakeholders, governments and associations to work more closely together and put forward a revised proposal that can secure broader support across IMO Member States. An NZF that lacks wide adoption will not deliver decarbonisation – alignment and practicality are essential to get this back on track.'

For a view from the bunker supply community, we turn to **Jesper Sørensen**, who said: 'The IMO's decision not to adopt the NZF does represent a setback for the industry's decarbonisation as it prolongs uncertainty at a time when a clear signal of global partnership would have been a meaningful step forward. In an increasingly polarised world, the absence of alignment at the IMO level risks reinforcing fragmentation rather than accelerating collective progress.'

'Despite the IMO's decision, we should keep sight of the bigger goal: driving decarbonisation in the maritime sector. While the delay extends uncertainty around a global regulatory framework, it does not change the industry's direction of travel. Decarbonisation will continue, driven by regional regulations, the IMO's overarching GHG reduction goals and customer expectations. In the near term, the lack of a global framework will increase regulatory and operational complexity, but it also places greater emphasis on solutions that can be implemented today and deliver value in the long-term.'

'The alternative fuels pathway will remain dual track. Long-term alternative fuels are essential to meeting the IMO's 2050

ambitions, but in the short term many shipowners will prioritise solutions that deliver immediate emissions compliance at the lowest possible cost. Biofuels are well positioned in this context as a drop-in solution with growing availability. At KPI OceanConnect, our network of more than 200 biofuel supply locations worldwide gives operators flexibility to reduce emissions where and when they choose.'

'Experience, partnerships and financial strength will be key to maintaining momentum. The existing decarbonisation landscape is complex, and shipping doesn't stop. Delay will make life more complicated for shipowners that really just want to operate their businesses as sustainably as possible, without getting caught out by bewildering compliance requirements.'

'The alternative fuels pathway will remain dual track. Long-term alternative fuels are essential to meeting the IMO's 2050 ambitions, but in the short term many shipowners will prioritise solutions that deliver immediate emissions compliance at the lowest possible cost'

Jesper Sørensen

Now for the technology providers. **Victor Åkerlund** believed that: 'The IMO's decision at MEPC to postpone the NZF is a setback for the maritime industry, but not a defeat. The intensity of the opposition was apparent, as fossil-fuel-aligned states fought hard to obstruct progress, applying unusual levels of pressure to dilute or delay the framework. That resistance is telling. It reflects genuine concern within parts of the fossil fuel value chain about what a well-functioning global framework could mean for future demand.'

'At the same time, momentum is clearly shifting outside the IMO process. Across key regions we already see shipowners, fleet operators, and investors taking decisive steps to reduce greenhouse gas emissions and local pollution because it lowers their cost of compliance with existing regulations like EU ETS and FuelEU Maritime. Every commercial vessel with a fuel cell system adds confidence and makes the next decision easier. Momentum builds through success.'

And **John Bergman** told us: 'The IMO's decision to postpone voting on the NZF has left much of the industry facing prolonged uncertainty and a lack of clear direction. Breaking the deadlock will be based on being

willing to see the wood for the trees and recognise that the debate is not about "if" shipping will decarbonise but "how".'

'Taking a step back, the reality is that the IMO's latest decision is not a cancellation. The IMO's greenhouse gas strategy and 2050 decarbonisation target remain unchanged. EU regulations as well as technological solutions are also still in place and are driving emissions reduction. More alternative-fuel capable vessels are being ordered at scale, more pilot projects are maturing and more ports are offering low-emission fuels across the world.'

'While the delay of the NZF has caused uncertainty, it is still critical that the industry moves forward with developing the infrastructure that is required to deliver a decarbonised shipping industry.'

Kim Rosello said she didn't see the delay in NZF adoption as 'an automatic setback', as she reasoned that: 'Shipping is caught between economic reality, regulation and technology, and forcing a framework through before those pieces are better aligned could do more harm than good. If the extra time is used sensibly, it could lead to something more workable in practice rather than just well-intentioned on paper.'

We'll give the final word on this question to **Subajan Sivandran**, who said: 'While there is ongoing uncertainty around regulatory timelines and implementation, this should not be seen as a setback for shipping's energy transition. Since the introduction of the IMO's Revised GHG Strategy in 2023, the maritime industry has experienced a marked acceleration in the development of innovative clean technologies and enhanced digital systems, designed to support the industry's net zero ambition by 2050. A key priority must be ensuring that decisions are underpinned by robust, objective technical input. Maintaining momentum while aligning ambition with practical, deployable solutions capable of delivering near-term emissions reductions remains essential.'

Do you think that the EU ETS and FEUM measures have been introduced successfully – and do you think that they will continue to support maritime decarbonisation going forward?

Gregory Dolan gave an update on how things stand with EU ETS and FEUM, both in terms of their own implementation schedules and their higher profile in the light of the NZF postponement. ‘On New Year’s Day,’ he recounted, ‘the cost of diesel bunker fuel for ships touching EU ports became much more expensive. The EU-ETS went into full effect, with owners paying 100% of emissions compliance costs, a jump from 70% in 2025 and just 40% in 2024. We’ve seen the cost penalty per metric ton of VLSFO burned go from \$220 to \$319 at the turn of the calendar, while the compliance costs for MGO increased from \$224 to \$324. Given current Rotterdam bunker pricing, ETS fees bring the cost of burning VLSFO from \$412 to \$731, and for MGO the jump is from \$625 to a whopping \$949 per tonne!

‘This means that the ETS-driven economics for the use of renewable methanol have gotten a LOT more attractive. Ships burning bio-methanol or e-methanol do not pay these penalties, meaning that the green pre-

been adopted, this product might not have been bunkered in ports beyond China and Singapore. With EU-ETS and FEUM as the only framework in place, we may well see bio-methanol and e-methanol produced in China being shipped to Rotterdam for bunkering vessels plying European routes.’

Alexander Prokopakis judged that: ‘The EU measures have accelerated action and awareness around maritime emissions, but it is still too early to judge their long-term effectiveness or overall success. Implementation is ongoing, and many practical, commercial, and operational questions are still being worked through by the industry.’

‘IBIA has always supported global regulations developed at the IMO, as shipping is an international industry and global alignment is essential to avoid fragmentation. That remains our clear preference. At the same time, we recognise that regional and local measures can sometimes act as catalysts and help maintain momentum while global solutions are being negotiated.’

‘Looking ahead, mechanisms such as pooling may play a useful role in improving flexibility and compliance efficiency, but their impact will depend on how they evolve in practice. The delay in the IMO NZF reinforces the importance of ensuring that

EU regarding the potential future of these schemes.

‘At DNV,’ he continued, ‘we have a clear preference for global GHG regulations, but see little immediate likelihood of the EU regulations being aligned with the IMO, or even mothballed, as long as the IMO NZF remains in process. The mandated EU review processes of ETS and FEUM may instead lead to tightening if the IMO Member States are unable to agree on a path forward for IMO regulations.’

‘The ETS is of course impacted by the market price for EUAs and the possibility of the EU to influence the number of EUAs available each year. Pooling will remain a critical part of FEUM, ensuring that flexibility is there and making the overall attainment of decarbonisation targets as cost efficient as possible.’

Subajan Sivandran gave a measured response: ‘The EU measures have been introduced with the clear intent of accelerating progress and providing early signals to the market. To date, they have helped drive awareness and action across the sector. However, their continued effectiveness will depend on many factors, including alignment with incoming global IMO regulation, the availability and scalability of zero and near-zero carbon fuels, and a balanced approach that places equal emphasis on energy efficiency and fuel transition across the value chain.’

Lukas Leppert would like to see further progress. ‘The EU measures represent a meaningful step toward emissions accountability and will support driving the transformation by setting greenhouse gas intensity limits for shipping fuels and enforcing accountability through trading certificates,’ he said. ‘While their introduction has set the stage for combating climate change in shipping, they won’t be sufficient to achieve global climate targets, mainly the goal of limiting warming to 1.5°C. Major reductions in the GHG intensity of ships are postponed until the 2040s, allowing business as usual in the short term. Furthermore, accurate emission factors are essential to depict the effect of short-term climate pollutants like methane. The absence of a global regulation increases the importance of European regulation and should be developed further until a global equivalent is in effect.’

Allyson Browne was also looking for more. ‘The EU,’ she said, ‘has established a real-world proving ground: policy that forces the market to respond, exposes design gaps, and creates learnings that can strengthen global rules. EU ETS and FEUM are setting the rules

‘The EU measures represent a meaningful step toward emissions accountability and will support driving the transformation by setting greenhouse gas intensity limits for shipping fuels and enforcing accountability through trading certificates’

Lukas Leppert

mium has narrowed considerably. And when you add the cost of compliance increases from the FuelEU Maritime regulation which also entered into force on 1 January, renewable methanol becomes an attractive compliance option to the continued burning of diesel fuel and its rising emissions compliance burdens.

‘Globally, the NZF delay means the EU-ETS and FuelEU Maritime are the only regulations directly penalising diesel bunker fuel burning and improving the willingness to pay for shippers looking to use alternative fuels as a compliance option. On the renewable methanol front, China is expecting to add millions of metric tons to the market in the next few years. If the NZF had

regional regulations remain compatible with future global measures, rather than creating misalignment that could complicate the transition.’

Carlo Raucci was as succinct as he was positive: ‘The EU measures are having an impact and sending a clear signal to the market. Alignment with IMO will be desirable. EU ETS, FEUM and pooling will have a positive impact on the update of cleaner fuels.’

Eirik Nyhus believed EU ETS and FEUM will ‘continue to be drivers for maritime decarbonisation’, as he reasoned that: ‘The regulations have been in effect for a couple of years and the market is responding as hoped, although some industry stakeholders are looking for clearer signals from the

of the game for parts of the sector in ways that targets alone never could.

‘The opportunity now is for the EU bloc to remain strong, iterate quickly based on early implementation lessons (including cost impacts, administrative burden, and equitable participation), and use that learning to help steer the IMO toward a robust, credible NZF that can scale globally. In other words:

‘The EU direction has been right, early signals are encouraging, but sustained commitment across the entire ecosystem will be essential to secure long-term success’

Delphine Kaczorowski

the EU can help “show the work,” refine what needs refining, and pull the global system forward.

‘On pooling: flexibility mechanisms (banking/borrowing/pooling) are likely to be pivotal for cost management and participation as compliance obligations deepen, and the experience of making them work in practice should directly inform how a future global framework can be both ambitious and implementable.’

Goran Dominioni echoed the call for a concerted global effort: ‘While improvements to the EU ETS and FEUM are certainly possible, they represent a key policy driver for the sector’s energy transition. If progress at the IMO stalls further, the EU could try to work with other jurisdictions committed to shipping decarbonisation to form a “coalition of the willing”. This cooperation can help harmonise policies across jurisdictions, thereby reducing compliance costs for the sector while still providing the incentives to decarbonise.’

Delphine Kaczorowski looked at upcoming milestones for the EU regulations, and also flagged up their ‘political fragility’. She commented: ‘The EU direction has been right, early signals are encouraging, but sustained commitment across the entire ecosystem will be essential to secure long-term success. We

welcome the inclusion of the maritime sector in the EU ETS which sends a necessary signal to boost investment in the sector’s transition towards sustainable alternatives. The first year of implementation provides encouraging early signs with high compliance levels and shipping companies surrendering allowances covering more than 99% of their required emissions by the legal deadline. This points to a workable introduction of the maritime component of the EU ETS.

‘Following the gradual phase-in, January 2026 marked the next key milestone, with companies now required to cover 100% of compliance costs. This will be a crucial step in illustrating system’s effectiveness in driving change and investment decisions.

‘Looking ahead to the upcoming review of the EU ETS in 2026, and building on these early positive signals, it will be important not only to maintain the maritime mandate, but also to increase ambition. This should include:

- Expanding the scope to ships between 400 and 5,000 GT, which represent around 15% of total maritime emissions and are among the easiest to decarbonise due to the availability of technologies
- Capping a larger share of maritime emissions, while strengthening incentives such as earmarked recycled revenues from the ETS for the sector’s transition to renewable-hydrogen and electric-based solutions.

‘Taking these ambitious additions into consideration will be key in ensuring the IMO NZF does not lose momentum: the EU has shown its frontrunner role in the past. Now is not the time to renege on this role.

‘Closely linked to the EU ETS and the efforts to decarbonise the maritime sector is the FEUM. This regulation is, in certain respects, more ambitious than the current IMO NZF proposal. FEUM’s exclusion of first-generation biofuels and its stronger penalties directly incentivise the uptake of alternative fuels. This regulation must be preserved, and its future revision, set to be linked to the adoption of an IMO NZF, should ensure alignment and an opportunity to include stronger ambitions.

‘Despite these positive outcomes, the future of both legislations remains politically fragile. The current EU-level “simplification” narrative creates a risk that these mandates could be weakened or dismantled once re-opened. A re-opening ahead of an official review, under the guise of simplification, has a direct chilling effect on investments as regulatory uncertainty settles in.

‘The continuation of these files should not be taken for granted, while defending the acquis should be front and centre of any clean tech stakeholder. At international level, delays in the IMO NZF place these three key files for the maritime sector on a single, highly sensitive timeline. This raises the risk of complex interinstitutional bargaining across the revision of the files, which could undermine existing targets.

‘These EU mandates are essential to provide predictability and market stability for the sector to plan its green transition. Strong, coordinated efforts from policymakers and industry stakeholders alike will be critical to ensure that Europe not only retains these instruments, but uses them as a foundation to increase ambition in the years ahead.’

Davina Hurt addressed the role of the EU ETS and FEUM in the context of a global energy transition: ‘The EU’s FEUM and ETS have been an important and necessary step forward for the global shipping industry. A programme of this size and impact that serves as the inaugural regulation can have some initial adjustment challenges. However, the industry has largely demonstrated its capacity to adapt, plan, and respond when clear regulatory signals are provided. These measures have already begun to influence operational decisions, investment planning, and fuel strategies, underscoring the value of predictable, enforceable policy in driving change.

‘Critically, the EU measures also serve as an important backstop against global backsliding on climate action. At a time when some major IMO Member States – including Saudi Arabia and the





United States – have slowed or resisted progress on climate ambition, they provide clear goalposts for the industry to calibrate against. We expect the EU to continue its momentum on maritime decarbonisation, reinforce the credibility of maritime decarbonisation efforts, and signal that delay or obstruction at the global level will not halt progress. The ETS and FEUM can serve as a viable starting point for other jurisdictions looking to implement their own shipping policies.

‘Ultimately, the EU measures are not a substitute for global action – but they are a powerful catalyst. They demonstrate that ambitious maritime climate policy is both feasible and impactful, while keeping pressure on the international system to deliver. With continued refinement, strong environmental safeguards, and a clear focus on public health, equity, and climate justice, the EU ETS and FEUM can continue to support maritime decarbonisation and help pave the way toward a truly global solution.’

John Bergman was positive about the EU regulations, but emphasised the risk of fragmentation that so many respondents raised in response to our first question. ‘The EU’s measures have been introduced successfully and are changing behaviour across the maritime value chain,’ he said. ‘FEUM, which came into force in January 2025, provides a clear, gradually tightening trajectory for reducing the carbon intensity of marine fuels. This predictability is important: it allows owners and operators to plan investments, trial alternative fuels and build compliance strategies over time.’

‘EU ETS has also played a role in reinforcing the commercial case for decarbonisation by attaching a tangible cost to emissions. Together, EU ETS and FuelEU Maritime are accelerating emissions reduction and efficiency improvements, while encouraging the uptake of alternative fuels as one of the fastest routes to compliance.’

‘The delay in adopting the IMO’s NZF increases the risk of regulatory fragmentation, which may in turn heighten the importance of EU measures in the near term. In that context, the EU framework can continue to support decarbonisation by providing clarity and momentum until a global regime is agreed.’

Koen Heesbeen focused on the future. ‘The EU has introduced ETS maritime and FEUM in a broadly successful way: together they create both a carbon-cost signal (ETS) and a regulatory driver for progressively lower GHG emissions of the energy used on board (FuelEU), which can translate into real demand for low-GHG fuels and operational improvements,’ he said. ‘The remaining challenge is less the policy architecture and more the operational backbone, in particular aligning accounting approaches (tank-to-wake in ETS vs well-to-wake in FuelEU), and ensuring standardised, trusted proof for renewable fuels via RED sustainability rules and the Union Database, so compliance is scalable and investable.’

‘Looking ahead,’ he continued, ‘these measures should continue to support maritime decarbonisation if the EU focuses on coherence and market design: clearer guidance on how RED-compliant fuels are evidenced and recognised across both regimes; stable eligibility rules that do not undermine early investment; and strategic use of ETS revenues to de-risk fuel production and infrastructure. In that context, pooling becomes more than a flexibility tool and it can be an accelerator. If pooling is implemented with robust governance, verification, and low transaction costs, it can reward first movers, create liquidity for “over-compliance”, and help smooth the uneven pace of transition across fleets and routes, especially while supply remains constrained.’

‘Finally, the IMO NZF delay increases the importance of EU measures as the most bankable near-term signal, but also raises the premium on EU-IMO alignment: the EU should use this window to strengthen MRV, tighten integrity, and make pooling/certification frameworks interoperable with a future global system, so the eventual IMO package reduces fragmentation rather than adding another layer of complexity.’

Pekka Pakkanen looked at how shipowners are using digital tools to meet their new regulatory obligations. ‘Fundamentally,’ he said, ‘the EU measures that have been introduced have had a clear impact on the market. An industry that has traditionally been slow to adopt new technologies is now actively seeking solutions that can reduce compliance costs under both the EU ETS and FEUM. There will be, of course, administrative friction with both of these regulations, as shipowners and operators adapt to new compliance mechanisms. However, this burden is expected to ease over time as processes mature and digital solutions become more widely adopted. Our recent FuelEU Maritime seminar with Skuld P&I club and Ahti Climate held in Tokyo was overbooked within days, as we are seeing more and more companies reacting to the need to streamline compliance measures in light of these regulations. Early action creates competitive advantage, and many shipowners are already using NAPA’s FuelEU compliance module to help manage and optimise compliance.’

Dr. Prapisala Thepsithar flagged up the complementary nature of the regulations. ‘The EU ETS (from 1 Jan 2024) and FuelEU Maritime (from 1 Jan 2025) appear to have been introduced successfully, with a workable compliance framework now in place,’ she said. ‘Early indicators suggest limited market distortion, including unintended changes in shipping and port market behaviour driven by the regulation.’

‘Looking ahead, these measures should continue to support maritime decarbonisation by targeting two key levers: EU ETS strengthens incentives for operational efficiency and emissions reduction through carbon pricing, while FuelEU accelerates fuel transition by tightening lifecycle (Well-to-Wake) GHG-intensity limits and encouraging supporting infrastructure (e.g., shore power). FuelEU’s pooling mechanism can further improve flexibility and cost-effectiveness by allowing compliance to be managed across a fleet (or between participating ships) and by rewarding early movers.’

‘Robust governance and verification are needed to ensure environmental integrity (accurate reporting, no double counting) and to avoid over-reliance on pooled surpluses that could delay broader fleet-wide learning and transition.’

‘A delay in the global net-zero framework could have mixed effects. On the one hand, it may increase the relative importance of EU measures as a leading driver of near-term action for EU-related trade. On the other hand, slower global alignment risks prolonging a fragmented regulatory landscape,’

increasing complexity and administrative burden for operators and potentially weakening investment confidence in scalable low-/zero-GHG fuel supply chains. Given that EU ETS affects approximately 30% of global tonnage, its impact is substantial. As other regions consider ETS and other pricing structures (with the UK already in place and Shanghai piloting a scheme, etc.), there is a risk these regional structures become entrenched.'

Gavin Allwright had some suggestions on how the regulations could be improved. 'While regional initiatives are not ideal,' he said, 'the delay and uncertainty at IMO have switched the spotlight back onto the EU ETS and FEUM and other regional and national initiatives.'

'There have been some teething problems with the reporting and some of the compliance issues for FEUM but on the whole I think these have been factored into ship-owners' business models for some time. The

from maritime payments for use in the maritime sector. This approach would also be further enhanced by the adoption of a LDC/SIDS support fund within that, so that proceeds garnered from international emissions could be returned to the most vulnerable and impacted regions, who in some/many cases bear the brunt of the increased costs too.

'It would make a lot of sense to see the FEUM framework adopt an energy centric stance, where non-liquid/gaseous energy sources such as wind propulsion are integrated fully into the formula and receive the same treatment as other energy sources, rather than the 1-5% additional reward that is currently available for wind propulsion installations which is impactful but set at a far lower rate than the 2x multiplier that is currently awarded for energy from Renewable Fuels from Non Biological Origins (RFNBOs).

'Both the EU ETS and FEUM would also serve better as climate measures if they

or services these smaller vessels and also stimulate the EU-based SMEs that are often leaders in cutting edge maritime technologies for these smaller vessel segments. Wind propulsion technology developers stand as a clear example of that.'

Other respondents also had some suggested additions and amendments for FEUM.

Dr. Sian Prior considered that: 'While the FEUM represents a meaningful step towards emissions accountability, it is currently inadequate in respect of superpollutant black carbon emissions. As black carbon is a particulate matter and not a gas, it isn't encompassed by the current regulations; however, FEUM includes a review clause which allows future consideration of inclusion of black carbon following review of the regulation. Inclusion of black carbon would require agreement on emission factors, and while there is variability and uncertainty, black carbon emission factors have now been developed and widely used.'

Meanwhile, **Constance Dijkstra** judged that: 'FEUM remains a valid policy that provides long term decarbonisation targets all the way to 2050 – a key element for long-term industry planning. Right now though, targets for green hydrogen fuels use remain ambiguous, and should be reinforced when the regulation gets to be reviewed in 2027.'

Steve Esau said that, while it is 'too early to judge the overall effectiveness of the regulations in terms of impact on technology and supply chain developments and investment', he does believe that: 'There needs to be a focus on the implementation of existing directives, in particular RED III:

- Development of clear, harmonised guidelines for bio-LNG certification, in particular as they relate to the mass balance chain of custody.
- Consistent development of RED III-related sustainability rules across Member States.

'The EU needs to focus on the development of the Energy Omnibus to secure regulatory coherence and simplification, including RED III, EU ETS and FuelEU Maritime, to enable the efficient, Union-wide uptake of low-carbon fuels. And by extension, the EU must ensure alignment with evolving IMO measures, prevent regulatory overlap or duplication, and support the development of a robust global framework capable of rendering parallel regional systems unnecessary.'

Anthony Mollet told us that: 'Generally speaking, the EU measures have been introduced successfully. However, it was apparent that, for a large number of shipping companies, it took a long time to get the required

'The EU has introduced ETS maritime and FEUM in a broadly successful way: together they create both a carbon-cost signal (ETS) and a regulatory driver for progressively lower GHG emissions of the energy used on board (FuelEU), which can translate into real demand for low-GHG fuels and operational improvements'

Koen Heesbeen

internalisation of costs into the price of fossil fuels is an important lever for encouraging the energy transition behaviour that is required, however each of these frameworks are not enough on their own or acting collectively currently to send a strong enough message to the market to switch wholesale to alternative low emissions energy sources. Having said that, there is a clear indicator light flashing on the bridge and we are seeing a shift in behaviour. Within the wind propulsion segment, the EU mechanism is not cited as the key reason for adoption of wind propulsion technologies, but it is very often a strong contributing factor for installations or the increased urgency for adopting the technology. It has also led quite a number of shipowners to assess or reassess the wind propulsion pathway.

'As the EU ETS and FEUM come up for review there are a number of approaches that would strengthen the efficacy of these regulations. Firstly, they would both be strengthened by earmarking the proceeds

were to include all GHG and non-GHG climate impacting emissions. This of course includes methane, but also indirect GHG or climate impacting emissions which have a substantial impact such as hydrogen, black carbon, PM, VOCs, etc. This also holds true for all emission reduction regulations.

'From an innovation promotion standpoint and taking a European industrial strategy perspective alongside further emissions abatement, both frameworks should also lower the threshold for ships to be included from 5,000 GT to something closer to the 400 GT mark. The impact of that change could be mitigated initially by returning a portion of the levy in way of subsidies to retrofit those smaller ships, often operated by smaller companies. If this lowering of the threshold was done, then this would assist in lowering emissions per ton/mile which is higher in short sea shipping, a form of transport that the EU would like to promote further, but it would also energise the shipbuilding industry in the EU that builds



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Registry Accounts set up across the Member States. This has naturally led some to believe there will be significant issues with data checking and attempts to impose penalties, given the apparent lack of manpower and processes to manage the sheer number of new accounts for ETS monitoring. Companies we have spoken to outside the EU are sceptical that ETS can be properly maintained and managed by the EU.'

Diane Gilpin had underlying concerns about the EU measures, as she explained: 'While the EU measures have been implemented successfully from an administrative perspective, their environmental effectiveness remains in doubt. The reliance on expensive, scarce alternative fuels to meet targets has enabled shipowners to simply pass compliance costs onto cargo owners and ultimately consumers, undermining the goal of the regulations and reinforcing shipping's "split incentive" problem.

'With the IMO NZF delay pushing potential global coordination to 2028 at earliest, this creates three years of regulatory uncertainty that particularly stalls long-term alternative fuel infrastructure investment.

'This situation seems unlikely to change until this "fuel-centric" view shifts to properly reward and prioritise close to market energy solutions such as wind propulsion. Regulations should be designed to specifically incentivise deployment of good-to-go fuel saving technologies that have an immediate emissions reduction impact. Until then FuelEU will likely generate revenue rather than the hoped-for significant climate impacts.'

In **Kim Rosello's** view: 'The EU has moved quickly, but the measures still feel unfinished and not always well joined up. The interaction between EU ETS and FuelEU can create unnecessary complexity for globally trading fleets. Going forward, the focus should be on making the system simpler and more coherent, with pooling and flexibility used properly rather than adding further layers of friction.'

We'll hear now from the bunker supply community.

Jesper Sørensen considered that: 'From the experience of a wide segment of ship owners, EU ETS and FuelEU Maritime have been rolled out fairly successfully. While implementation has not been without challenges, these measures demonstrate that with adequate preparation, clear strategy and the right support, compliance is achievable. In many cases, difficulties have stemmed less from the regulations themselves and more from late engagement or underestimation of the task involved. In that

sense, the EU experience reinforces a familiar lesson for shipping: failing to prepare is preparing to fail.

'Crucially, the EU measures support maritime decarbonisation and, for now, represent the only comprehensive regulatory framework actively driving emissions reductions in shipping. At a time when global alignment is unclear, the EU has shown leadership and provided a degree of certainty that allows operators to plan, invest and act.

'With the regulations set to remain in place, it's clear that in the future operators will need to work with trusted partners to access expert support and respond more effectively to complex regulations. As EUA demand rises year on year, having a clear, forward-looking strategy in place will be essential to managing cost exposure and avoiding

much earlier than required. With this backdrop, Titan has set up and manages its own FuelEU Maritime pool for customers.

'Looking ahead, there are still details for the EU Commission to focus on. For example, they can refine the tools used for managing a FuelEU pool and better define how its penalties will work in practice.'

We'll wrap up this section of the survey with **Alexander Döll's** observations. 'The EU deserves credit,' he began, 'for moving early and putting maritime emissions firmly on the policy agenda. Including shipping in the EU ETS and introducing FEUM have sent an important signal that emissions from international shipping can no longer be treated as someone else's problem.

'At the same time,' he continued, 'shipping is a global industry, and global challenges

'A globally aligned approach reduces the risk of fragmentation, creates a level playing field, and gives investors and operators clearer signals about where to place long-term bets'

Alexander Döll

unnecessary risk. For FEUM, while the most significant increases lie further ahead, the first compliance cycle is approaching its end, marking a critical moment for operators to engage with longer-term planning and reject short-term, reactive approaches. Early action provides greater flexibility and a wider range of compliance options.

'Vessel pooling for compliance with FEUM is definitely something operators should consider, but it can be challenging to identify opportunities for operators of smaller fleets. Compliance with both these regulations will not only be cheaper than paying penalties, but it will also protect against business disruption.'

In **Caspar Gooren's** estimation: 'FEUM and EU ETS are a powerful combination driving the uptake of green fuels like liquefied biomethane (LBM) and they will stay in the spotlight longer with the delay of the IMO NZF.

'Liquefied biomethane (LBM/bio-LNG) offers overcompliance with FEUM, giving shipowners pooling, banking and borrowing options. Pooling in particular can offer a commercial competitive advantage. Pooling over and under-compliant ships so the combined results offset individual deficits allocates a value to overcompliance and incentivises operators to start using LBM

ultimately require global solutions. That is why the work underway at the IMO on a NZF is so important. A globally aligned approach reduces the risk of fragmentation, creates a level playing field, and gives investors and operators clearer signals about where to place long-term bets.

'Looking at the EU measures specifically, both ETS and FuelEU will increase pressure on shipowners to reduce emissions, but their impact should be seen in context. The inclusion of shipping in the ETS adds a cost to continuing to use conventional fuels, but at current carbon prices that cost, while meaningful, is still not enough on its own to close the gap between fossil fuels and low- or zero-carbon alternatives. FuelEU Maritime, meanwhile, is designed as a long-term measure, with its strongest incentives to shift fuels coming later in the 2030s.

'Taken together,' Döll concluded, 'the EU framework helps push the industry in the right direction, but it is unlikely to deliver the full transition on its own. To accelerate real change this decade, regional measures need to be complemented by a clear, global framework that rewards early movers, supports scalable alternative fuels, and provides the long-term certainty the industry needs to invest with confidence.'

Alternative strategies



We ask our survey correspondents to identify which alternative fuels and energy sources appear to be making the most headway in establishing themselves in the marine sector

The global fleet of LNG-powered vessels continued to grow in 2025 and we have seen more methanol- and ammonia-powered (or at least methanol- and ammonia-ready) vessels hit the water.

On the supply side, LNG bunkering infrastructure has continued to grow, and the fuel's increased price competitiveness has meant that more dual-fuelled vessels have actually been running on LNG. We are also seeing more ports, such as California's Los Angeles and Long Beach, launch methanol bunkering feasibility studies. Furthermore, 'green ammonia' bunkering is beginning to feature in more green shipping corridor plans.

Which alternative liquid marine fuel do you think 'raised its game' the most in 2025?

Our most diplomatic answer came from **Carlo Raucci**, who said that: 'There might be different priorities among different organisations, so it depends. Overall, we need all of them to meet maritime decarbonisation goal by 2050.'

Methanol garnered the most votes from our respondents. LNG wasn't far behind (and is clearly in the lead in terms of ships on the water and the orderbook), but it also had its detractors.

Kim Rosello kept it brief: 'Methanol has made the most visible progress simply because it has moved beyond theory. We've seen ships delivered, projects move ahead and bunkering discussions become more practical. It's not a solution for everyone, but compared to other alternatives it currently feels more tangible and closer to real-world use.'

Putting the case for methanol in more depth, **Alexander Döll** said: 'If we step back from the headlines, what really matters is not which fuel topped the order book in a single year, but which fuel pathways continue to attract repeat orders and move from ambition to practical deployment.'

'In that context, methanol clearly raised its game in 2025. During the year, 59 methanol-fuelled vessels were delivered into the global fleet, more than doubling the number of methanol-powered ships in operation. While new orders slowed somewhat compared to previous years, the underlying capacity continued to grow, underscoring that deployment on the water is accelerating even when headline order numbers fluctuate.'

'LNG continued to account for the largest share of alternative fuel orders in 2025, for understandable reasons. It offers clear local air-quality benefits, fits well within established operational and financing

frameworks, and is supported by mature engine technology and an expanding bunkering network. At the same time, its climate benefits remain limited, which is why LNG is widely seen as a transitional or compliance-oriented solution rather than a long-term decarbonisation pathway.'

'Ammonia and hydrogen present a different picture. Both have long-term potential for deep decarbonisation, but challenges around fuel handling, safety, engine maturity and supply-chain readiness mean they remain largely confined to pilot projects, feasibility studies and green shipping corridor concepts rather than broad fleet deployment.'

'Against that broader system view, methanol's progress in 2025 was driven by practicality rather than hype. Methanol is liquid at ambient temperature, avoiding cryogenics and extreme pressures, and its storage, handling and bunkering are closer to conventional liquid fuels. Commercial dual-fuel methanol engines are already available and in operation, and existing global infrastructure can be adapted to support its use.'

'This shift became increasingly visible during the year. Methanol bunkering is now available in 16 ports worldwide, with a further

23 actively preparing to offer it. Singapore marked a particularly important milestone, with the TR19 methanol bunkering standard, the formal licensing framework for methanol bunker suppliers, the announcement of successful licence holders, and the completion of the port's first TR129 methanol bunkering trial in November 2025. Around 3,000 tonnes of methanol were bunkered from a tanker to a commercial container vessel, demonstrating that the regulatory and operational frameworks are ready to support scale. Licensed operations commenced from 1 January 2026. These developments demonstrated that both regulatory and operational frameworks are ready to support scale.

'The same trend is reflected in ordering patterns. By late 2025, industry trackers indicated that more than 450 methanol-capable vessels were either in operation or on order. While annual ordering volumes naturally fluctuate due to economic and geopolitical factors, the more meaningful signal is the consist-

on methanol's future prospects: 'The first LNG carriers launched in the 1960s used natural boil-off gas from their cargo tanks as fuel for steam turbines. The first purpose-built LNG-fuelled ships entered service in 2000. LNG as an alternative marine fuel has been decades in the making, and continues to lead the pack.

'On the methanol side, in 2015 the *Stena Germanica* became the first methanol-fuelled vessel, and was followed the next year by the first methanol tankers moving methanol from the cargo hold to a deck service tank and then into the engine room for propulsion. The world's first dual-fuel methanol container ship – the *Laura Maersk* – was officially christened in September 2023 in Copenhagen.

'By 2025 year's end, we had over 80 methanol-fuelled vessels on the water, with the orderbook at more than 450 ships. Last year, we saw the first launch of methanol-fuelled pure car carriers, VLCC, super yachts, service operation vessels, bulkers, and methanol retrofitted ships. The number of ports with methanol bunkering capability expanded to 48, with the Port of Singapore providing

represents an important step toward more sustainable shipping solutions for net zero emissions by 2050.

'Ammonia continues to hold long-term promise as a zero-carbon fuel, yet safety, engine readiness, and supply challenges remain substantial. Conversely, LNG has already been widely available with developed supply chains globally which points to why it was a prominent choice for initial carbon dioxide reductions, but the reality of methane slip across its distribution infrastructure as well as marine engines limits its climate and port-adjacent community health benefits, while increasingly raising questions about the long-term viability of new investments and the potential for stranded assets.

'Methanol's rise in 2025 reflects what is possible when industry momentum aligns with policy direction. The challenge now is to ensure that this momentum is harnessed to accelerate genuinely low- and zero-emission solutions, rather than reinforcing incremental or fossil-based substitutes. With clear standards, strong lifecycle accounting, and continued public oversight, methanol can help keep shipping moving forward while the sector builds toward a truly zero-emission future.'

Allyson Browne flagged up the work that is going on to develop methanol value chains. 'Methanol raised its game the most in 2025,' she reasoned, 'because progress was visible not only in vessel ordering, but in port-linked readiness including feasibility work, safety frameworks, and the commercial groundwork needed to move from a "future fuel" narrative to a deployable fuel pathway.'

'In the United States, this progress was evident at the San Pedro Bay port complex, where Port of Los Angeles and Port of Long Beach continue to signal a clear direction of travel toward alternative fuels, even amid federal policy uncertainty. Both ports are actively working with their Green Shipping Corridor partners in Shanghai.

'The Corridor's facilitator, C40 Cities, reported in October 2025 that the Port of Shanghai has already bunkered more than 47,000 tonnes of green methanol, while the Ports of Los Angeles and Long Beach are advancing preparations for a methanol pilot project. This combination of demonstrated scale in Shanghai and readiness activity in Southern California underscores that methanol is moving beyond pilots toward real-world deployment.

'By contrast, LNG is increasingly losing strategic ground. While it may appear competitive in the short term, it does not bring the industry meaningfully closer to net zero. Methane slip across the LNG value chain

'Methanol has made the most visible progress simply because it has moved beyond theory. We've seen ships delivered, projects move ahead and bunkering discussions become more practical'

Kim Rosello

ent, repeat commitment from major shipping lines to methanol-capable fleets.

'Overall, fuel choices are increasingly gravitating toward liquid fuels that integrate well with existing maritime systems while offering a credible pathway to low- and zero-carbon supply. In 2025, methanol moved beyond noise and into scaled, repeatable deployment – and in this sector, that is what real progress looks like.'

Gregory Dolan began by offering an historical perspective on LNG, before focusing

methanol bunker licences to three out of the first 13 companies that applied. More engine OEMs [original equipment manufacturers] announced commercial methanol offerings. Methanol producers partnered with bunker operators and shipping companies to offer plant-gate to on-board delivery value chains in Hong Kong, Shanghai and Tianjin. In 2025, methanol moved from upstart status to become a mainstream bunker fuel.'

Davina Hurt also focused on methanol's growing maturity. 'We have seen an increase in prevalence and implementation of methanol in 2025, particularly as a viable short- to mid-term alternative fuel solution,' she explained. 'There has been meaningful progress toward operational reality alongside advancements in standardisation, increased bunkering deployments and expanding adoption signals around the world. With DNV now rating methanol at a high technological readiness level, the industry should gain greater confidence in its near-term role in the transition. Methanol



fundamentally undermines its climate case, and continued investment risks locking the sector into infrastructure and vessels that are misaligned with long-term decarbonisation pathways. As the industry looks beyond transitional narratives, LNG's role as a "bridge fuel" is becoming harder to justify in a net-zero world.'

John Bergman brought us up-to-speed on the role that Auramarine has been playing to support methanol, and other fuel options. 'While we believe shipping's energy transition will be defined by a multi-fuel future,' he said, 'we have seen growing interest in methanol due to its promising GHG emissions reduction credentials. Methanol engines are already commercially available and in production, with many methanol vessels in operation and hundreds on order too. Its already well-established infrastructure makes it a relatively cost-efficient option as well.'

'At Auramarine, we were the first in the industry to develop a methanol Fuel Supply System back in 2022 and we've worked with several customers on methanol projects since.'

'Fuel choice is driven by a vessel's operating profile and there is no one-size-fits-all solution but whatever fuel ship owners opt for, our aim is to support them with solutions that improve safety, minimise risks and costs.'

Jesper Sørensen judged that: 'Biofuels raised their game the most in 2025, moving from purely a transition fuel to a central pillar of shipping's decarbonisation strategy. While LNG and methanol also continue to progress, biofuels have distinguished themselves through their scale, immediacy and commercial maturity.'

'Demand patterns underline this shift. In key hubs such as Singapore, procurement has moved rapidly from spot purchasing to about 80% being term contracts, reflecting growing confidence in biofuels as a reliable compliance option rather than a short-term trial. This is being reinforced by regulatory drivers such as FuelEU Maritime, with demand for B100 alone estimated to be between 500,000 metric tonnes and 750,000 metric tonnes in 2025.'

'That said,' Sørensen continued, 'LNG cannot be overlooked. The dual-fuel LNG order book continues to grow at pace, underlining strong owner confidence in LNG as part of the long-term fuel mix. DNV reported that for the first 9 months of 2025, out of the 192 new orders for alternative fuelled vessels, 121 were for LNG-fuelled vessels. For this potential to be fully realised, however, supply infrastructure must be encouraged to expand. Broader port support, including licensing, bunker availability and access to

loading slots, will be critical to ensure these vessels can operate on LNG.'

'While multiple fuels are progressing in parallel, biofuels have been the standout performer over the past year due to their readiness, availability and ability to deliver measurable decarbonisation now.'

As Sørensen pointed out, LNG cannot be overlooked – and many of our respondents felt that it continued to strengthen its case as a marine fuel in 2025.

Steve Esau said: 'Bunkering of liquefied biomethane (LBM, or bioLNG) has grown dramatically over the past year in Europe. This has been driven by companies' response to increasingly stringent EU regulations with large financial penalties, and important and innovative voluntary, customer-related commitments. Bio-LNG bunkering operations have already taken place in key ports across Belgium, France, Finland, Italy, Lithuania, the Netherlands, Norway, Spain, Sweden and the UK, involving at least 10

'Biofuels raised their game the most in 2025, moving from purely a transition fuel to a central pillar of shipping's decarbonisation strategy'

Jesper Sørensen

major bunker suppliers. Use of LBM is widespread, with bunkers being delivered to the cruise sector, container lines, ferries, OSVs, car carriers, tankers, bulkers and small-scale LNG carriers over the past 12 months.

'The growing liquidity of the market in Europe is demonstrated by the recent introduction of LBM bunker price assessments by price reporting agencies S&P Platts and Argus. Outside Europe we are seeing the emergence of bio-LNG bunkering for voluntary commitments, for example in the US.'

Koen Heesbeen was forthright: 'LNG clearly led in 2025 with the largest number of ships in service and on order among alternative fuels. It made up the majority of new alternative-fuel ship orders and has an established user base. In 2024 methanol was clearly seen as "the rising star", it had the most rapid increase in uptake (from virtually zero to dozens of ships in service and hundreds on order). In 2025, methanol kept momentum but lost some more ground to

LNG. Biofuels were used by more ships overall (via blending in conventional engines), while ammonia and hydrogen had negligible commercial uptake in 2025 beyond a few demonstration vessels. Overall, LNG maintained the widest adoption while methanol continued to develop and mature.'

Jason Stefanatos flagged up LNG, but he felt that all the main alternative fuels have been making progress, as he explained: '2025 was the year that the FuelEU kicked in, driving shipowners and operators toward low-GHG fuels. Interestingly, all alternative fuels raised their game in one way or another.'

'Biofuels had a sharp rise in interest and consumption, emerging as the most popular drop-in solution for FuelEU compliance, used under pooling schemes.'

'LNG maintained its position as the leader in the orderbook for alternative-fuelled vessels, despite ongoing IMO debates about fossil fuel factors. The industry's confidence in LNG stems from its being the most mature technology, the gradual establishment of infrastructure, and the potential pathway toward renewable natural gas.'

'Methanol saw its first significant wave of bulk carrier orders, linked to China's strategic push for green methanol production and bunkering infrastructure.'

'Ammonia also made notable progress, with the first orders placed and initial engine testing underway.'

Subajan Sivandran gave some historical context to LNG's current status, as he reminded us that: 'Uncertainty surrounding the introduction of the IMO's Net-Zero Framework (NZF) dominated much of the 2025 agenda. Central to that debate was the continued development of LNG pathways to support the maritime industry's decarbonisation objectives. Having been used within the industry for almost 60 years, LNG has a proven safety record, with well-established standards, guidelines, and operating protocols. The scaling of LNG bunkering – with bunkering capabilities becoming established at approximately 200 ports worldwide – has provided several key operational lessons in areas such as safety, handling, transportation, and infrastructure development that can be applied to more nascent alternative fuel technologies.'

'Furthermore, the use of LNG within maritime operations is set to increase over the coming years. The LNG newbuilding orderbook represents around 44% of the current fleet, with 332 ships under construction. Crucially, continued LNG deployment can support the development of bio-LNG and e-LNG in the future, which represents a potentially viable decarbonisation pathway.'

‘Bureau Veritas Marine & Offshore (BV) has continued to facilitate the scaling of LNG by granting Approval in Principle (AiP) to the latest innovations in LNG technology, such as HD Hyundai Heavy Industries’ (HD HHI) new 200K LNG carrier design which includes optimised hull performance to maximise cargo tank capacity, whilst providing improved design and production efficiencies.’

Anthony Mollet pointed to LNG’s head-start on the other fuels. ‘Despite still being classed as fossil fuel, LNG does have lower GHG emissions on a well-to-wake basis,’ he said. ‘LNG is a mature fuel, already established and so uptake in the marketplace is easier. The infrastructure is mature and in key bunkering hubs.’

‘Other fuels have been prominent in media and are being discussed in more detail at conferences. However, most have yet to really enter the supply market to any great extent.’

Alexander Prokopakis ticked both LNG and biofuels and told us: ‘I’ll pick two, because in reality both showed uptake in 2025.’

‘Biofuels stood out as a practical, near-term solution, delivering emissions reductions today using existing vessels and infrastructure. Also LNG (including bio-LNG) continued to gain ground thanks to expanding bunkering infrastructure, improved price competitiveness, and more dual-fuel vessels actually operating on LNG.’

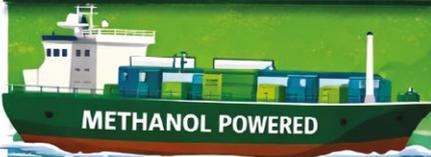
‘IBIA is fuel-agnostic and supports progress across all alternative fuels. However, not all fuels are moving at the same speed, and in 2025 biofuels and LNG were the ones translating readiness into real-world use.’

‘While the industry is moving towards decarbonisation and alternative fuels, traditional fuel oil remains a cornerstone for global shipping. With roughly half of new build orders still specifying conventional fuel oil, it’s clear that the existing fleet will remain operational for decades. As an association, our role is to ensure that the industry’s needs are met safely and efficiently while maintaining high standards for safety, compliance, and environmental responsibility.’

Dr. Prapisala Thepsithar also flagged up LNG and biofuels, as she explained: ‘Among these fuels, LNG “raised its game” the most in 2025, as reflected in the order-book, expanding bunkering infrastructure, and rising bunkering volumes. This was supported by a reliable supply (underpinned by proven global reserves) and occasionally competitive pricing that encouraged greater LNG utilisation. However, the adoption of its lower-carbon counterpart, bio-LNG, remains

Which alternative liquid marine fuel “raised its game” the most in 2025?

Methanol Makes Progress



-  450+ methanol-capable ships on order or in operation
-  Expanded bunkering ports in 2025
-  Growing production of green methanol

LNG Still Strong



-  Largest share of new fuel orders
-  200+ LNG bunkering ports worldwide

Biofuels Gain Ground



-  Rapid rise in biofuel use
-  Key compliance option in 2025

Ammonia Emerging



-  Pilot projects & feasibility studies
-  Green corridors in development

slow due to limited port availability/ supply, and ongoing concerns about methane slip and lifecycle GHG performance may dampen momentum.

‘In parallel,’ she continued, ‘biofuels (especially drop-in blends such as FAME-based marine biofuels) are gaining momentum because they are commercially available today, can be integrated into existing bunker infrastructure and shipboard fuel systems with limited changes (within OEM/ quality limits), and can deliver immediate GHG-intensity improvements – particularly valuable as compliance pressure increases (e.g., EU-related requirements and broader decarbonisation targets).’

Adrian Tolson covered all the main contenders on his report card, saying: ‘I think LNG (and bio-LNG) was the only fuel to really leap forward – and that’s an exaggeration as the execution of supply infrastructure is still a bottleneck. The rest (even bio) seemed to mark time and ammonia and hydrogen lost a little. The positive thing is that all these fuels still exist as options and that none are abandoned. The methanol picture – or rather the

ethanol picture – is interesting, with the US and Brazil pushing ethanol as a marine fuel and with concerns over Chinese green methanol as market dominant the option of tonnage running off both ethanol and methanol is being considered. Not sure if this is a viable approach or that truly sustainable ethanol is even a real thing, but it will add to the patchwork of alternative fuels and keep the conference circuit lively.’

Gavin Allwright also offered a multi-fuel overview. ‘While we [at the International Windship Association] don’t closely track these fuels and the technologies and supply chains they require, it would seem that 2025 saw quite a lot of focus once again on the LNG/bio LNG pathway and newbuild ship order numbers seem to bear that out. Biofuels have continued on the trajectory that was already quite well established in 2024, however the growth in ammonia and methanol interest has waxed and waned throughout the year and while more vessels are coming online that are capable of using these fuels, the offtake agreements have stalled, partly due to the IMO situation and

● the ship.energy survey 2026: alternative fuels and energy sources

the costs involved. Hydrogen seems to again to have continued with pilots and some short sea applications, but hasn't seemed to have hit any significant industry wide milestones over the last 12 months.'

Caspar Gooren reported that: 'At Titan, we're open to all fuels that can substantially decarbonise the shipping industry, but we recognise the methane decarbonisation pathway via LNG, liquefied biomethane (LBM/bio-LNG) and e-methane as the most realistic route today. 2025 only further cemented this belief – as prices remained stable, bunkering infrastructure expanded, and innovations eliminating methane slip continued. Shipowners also recognise this progress, as shown by ongoing orders for LNG dual fuel vessels.'

'Based on LNG's strong foundation, LBM raised its game significantly in 2025 and we expect even more growth in 2026. Last year, LBM became a larger proportion of Titan's bunker deliveries and this trend has also played out more broadly.'

'Biomethane has the most realistic chance of meeting shipping demand. Of the biogas fuels, it is the most widely available and has the highest energy density. Plus, ship operators need the least of it to meet decarbonisation targets. This is because grey LNG already offers greenhouse gas (GHG) emissions reductions over fuel oil. On the contrary, grey ammonia, methanol and hydrogen – the direct counterparts to traditional LNG – actually emit higher well-to-wake emissions than fuel oil.'

'Biomethane has the most realistic chance of meeting shipping demand. Of the biogas fuels, it is the most widely available and has the highest energy density'

Caspar Gooren

As we mentioned at the top of this article, LNG drew a mixed response from our respondents – some of whom questioned its billing as an alternative, clean (or cleaner) fuel.

After noting that 'due in part to the NZF drawback, biofuels are appearing as a safer bet', **Sofia Fürstenberg Stott** said: 'LNG is

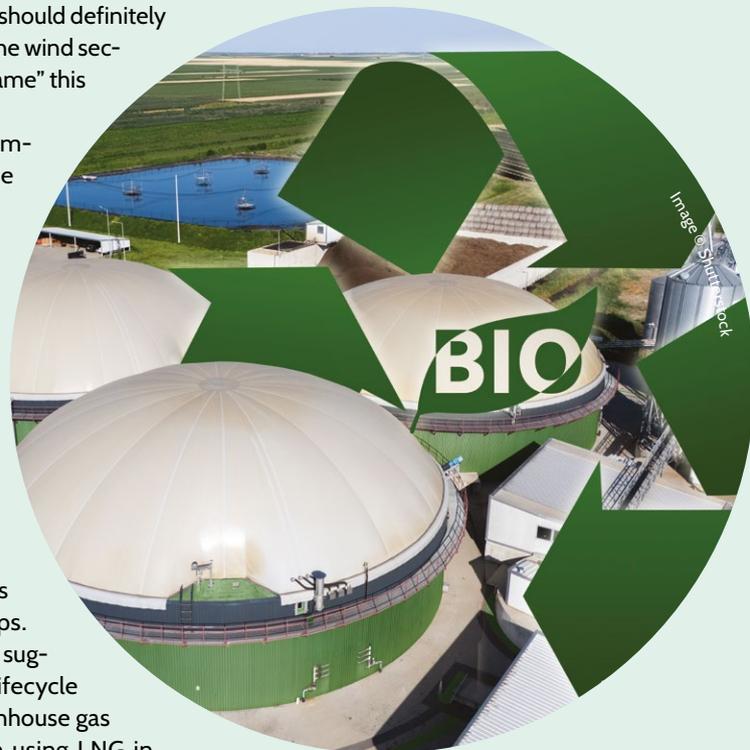
– in my book – not a cleaner fuel, and should maybe not deserve a spot on this list. The problem I have though, is that policy makers are focusing on the CO₂ footprint to evaluate the benefit of these fuels, not taking into account the energy (green or not) that was required to produce it. Those owners who combine the fuel shift with wind installations are doing what I would have done if I had ships myself. This list should definitely include wind! And it was the wind sector that really "raised its game" this year.'

Dominika Leitane commented: 'Against the backdrop of a growing global LNG-powered fleet, 2025 also saw an intensifying scrutiny of LNG's environmental credentials. A strong body of scientific evidence suggests that LNG, compared to conventional fuels such as marine gas oil, causes an increase in greenhouse gas emissions when used in cruise ships. More generally, evidence suggests that there are no lifecycle benefits in terms of greenhouse gas emissions savings when using LNG in shipping.'

'In 2025,' she continued, 'environmental organisations and campaign groups continued to probe LNG's lifecycle impacts, including methane slip, leading to increased legal scrutiny. For example, following complaints from Opportunity Green, the UK's Advertising Standards Authority (ASA) ruled that several cruise ticket sellers had breached advertising rules by promoting LNG as an 'eco-friendly' or 'the world's cleanest' marine fuel. The ASA ruled that this was likely to mislead consumers, noting that LNG was a fossil fuel with potentially negative environmental impacts, such as methane slip and leakage. The advertisements had to be removed, setting a strong precedent for environmental claims about LNG in advertising. This heightened regulatory attention signals that, rather than "raising its game", fossil LNG is facing higher scrutiny as an alternative or transition fuel.'

Andrew Dumbrille took a similar view, saying that: 'While LNG and biofuels are gaining deployment, their life-cycle impacts – including methane slip and land-use change – pose serious risks to both climate and ocean health. From a shipping nexus perspective, these fuels can exacerbate

pollution burdens in coastal communities and undermine biodiversity, climate change, and food security. The priority should be on fuels and operational pathways that deliver immediate reductions in greenhouse gases, black carbon, and other pollutants, while also presenting a realistic long-term solution to avoid infrastructure lock-ins.'



Dr. Sian Prior also flagged up the issue of methane slip and the need for new 'fuel pathways', as she maintained: 'Claims around alternative fuels need to be assessed against their real climate impacts, not just deployment levels. Increased use of LNG does not represent climate progress when methane slip and life-cycle emissions are taken into account – particularly in the Arctic, where the superpollutants methane and black carbon drive rapid warming. We continue to underline the importance of fuel pathways that deliver immediate reductions in black carbon and avoid locking in fossil fuel dependence under the guise of transition. We also encourage reducing demand and reliance on fuels through energy efficiency measures and alternative forms of propulsion including in particular wind-assisted propulsion.'

Alan Jones was our only survey respondent who singled out ammonia's progress. He explained that: 'The Decarb Hub has most understanding of ammonia given our ongoing work on Process Safety Management, Human Factor impacts from design, and training and competencies. Ammonia made

important advances during 2025, particularly in terms of vessel “readiness”, regulatory development and its growing prominence in green corridor planning, alongside early green ammonia bunkering demonstrations.

‘However,’ he continued, ‘the number of ammonia-fuelled vessels actually in operation remains very limited, meaning its progress is still largely preparatory. LNG continued to expand in fleet numbers and bunkering availability and benefited from improved price competitiveness in some markets, but this largely represented continued consolidation rather than a step-change. Hydrogen and biofuels remained relevant but showed less acceleration in deep-sea adoption over the year.’

Like Jones, **Constance Dijkstra** drew upon ongoing research, as she informed us that: ‘T&E looked at green e-fuels projects in Europe that could serve the maritime sector. The listed projects could produce 3.6 million tonnes of oil equivalent (Mtoe) by 2032, but less than 5% is dedicated primarily to shipping, and only a small portion of those volumes is linked to operational projects. This is a shame given some e-fuels will be needed – especially for ocean-going vessels that cannot be directly electrified. This shows the necessity of setting up support structures, and reinforcing regulations to enable the development of green e-fuels for the maritime sector.’

Will we see a significant proportion of the global fleet equipped with wind assistance technologies by 2030?

In their enthusiasm for wind propulsion, some of our respondents rather jumped the gun by making the case for wind in our alternative liquid fuels section – but now we are giving them the chance to fill their sails.

Gavin Allwright got off to a flying start, as he reported that: ‘The numbers of wind-installed ships reached 85 large ships (excluding a dozen older traditionally rigged cruise vessels) along with 12 wind-ready vessels by the end of 2025. This is the equivalent of just over 5 million DWT with some form of wind propulsion system onboard. At this level, there is still a long way to go to become a “significant” number of ships out of a fleet of 60,000-100,000 ships. However the pipeline of orders is over 120 ships to be installed of which two-thirds will be delivered in 2026 or early 2027. But more significantly perhaps for wider scaling and dissemination of the technology is that production capacity is growing quickly (500 units + annually) and the lead time for retrofits is coming down driven in part by that

capacity growth, in part by some standardisation of size/design of some technologies but also by the shipyards gaining a substantial amount of installation experience too.

‘We see the numbers of installations roughly doubling each year going forward, thus 100 ships in total will have been installed by the end Q1 2026, and 100 ships will be installed in the following 12 months. Thus by the end of 2026/early 2027 we should see many of the foundations in place for a market inflexion point, where the upswing of the innovation “S-curve” really kicks in – driven by multiple demonstrator vessels in many sub-segments of the market, increased standardisation of verification methods, a growth in available performance data, increased production capacity, lower lead times and costs starting to come down, to name a few.

‘With that trajectory in mind and the key sectors of growth being the tanker, bulker, Ro-Ro and general cargo ship segments, we are likely to see that growth curve continue to accelerate – 200 (26/27), 400 (27/28), 800 (28/29), 1,600 (29/30) and 3,200 (30/31). These will include both wind-assist ships and primary wind ships, the latter of which are seeing a surge of designs and builds currently too, though from a narrower base.

‘Of course, many factors can impact these numbers, and indeed the COVID experience delayed this growth curve for at least 18 months. However, at 3,000+ ships in 2030/31, this would represent roughly 5% of the fleet installed, which is roughly where LNG stands today, so significant but with a step change required to really impact emissions above the roughly 1% of fleet emission that this level of installation would deliver and contribute substantially lower costs across the fleet.

‘On a final note, the wind propulsion technologies themselves and which ones will likely be predominant over the next five years is both difficult to predict and in some ways misses the point of this stage of wind propulsion development. Currently, with around 100 ships in the market, any sizeable fleet order of 5, 10, 20+ ships tends to skew the deployment numbers for any given system uptake and thus gives an inaccurate snapshot picture. Currently rotor sails, suction sail and rigid/wing sails are growth segments, however developments in the soft sail and kite segments will be increasingly coming online throughout the next 12-18 months and could deliver additional effective solutions across a range of segments.’

Emphasising that wind is a form of energy, not just an energy-saving device, **Diane Gilpin** maintained that: ‘Wind propulsion

is the smart way to drive the energy transition in global shipping. We urgently need to shift away from the prevailing “fuel-centric” mindset. Wind is energy, it powers ships. We need to stop framing wind propulsion as an “energy efficiency” solution – that position assumes that the only energy ships can use is fuel.

‘Global trade was built on wind power and the post carbon world can run on digitally enabled renewable energy solutions.

‘We need to recognise that wind enables greater commercial and operational certainty to ship owners, operators, charterers. It is free, abundant and exclusively available for ships equipped to harness it.

‘Wind is energy, it powers ships. We need to stop framing wind propulsion as an “energy efficiency” solution – that position assumes that the only energy ships can use is fuel’

Diane Gilpin

‘Figuring out how to quantify the value of wind on any ship on any route is an industry challenge. Lack of trust in claims based on different metrics from different providers with different types of wind propulsion devices is a brake on development.

‘From its inception SGS [Smart Green Shipping] designed its whole system solution to address this specific challenge and we are now able to guarantee performance so we lower the barriers to entry so significantly that adopting FastRig becomes an attractive proposition even for a risk-averse owner.’

Pekka Pakkanen looked at some of the factors that helped to boost the interest as wind, observing that: ‘Full wind propulsion and wind-assisted propulsion systems (WAPS) are becoming more attractive to fleet operators in tandem with the regulations such as FuelEU Maritime (FEUM) and the EU Emissions Trading System (EU ETS), which are helping to demonstrate their value. FEUM is going one step further and incentivising the use of them with its wind reward factor. Like with most emerging technologies, what will be vital to their success is optimising their usage.

‘Digital voyage optimisation software and



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advanced weather routing will become all the more critical, and we have been working with fleets that are installing the technology to make sure the sails installed are delivering the forecasted emissions reductions. In practice, voyage optimisation and WAPS are highly complementary, strengthening both the environmental and commercial return on investment. Up to 12% emissions reductions can be gained from efficient weather routing of the 28% that has been attributed to rotor sails. By 2030, we expect the return on investment for WAPS, both in terms of cash and carbon, will continue to increase and more and more ship operators will invest.'

Subajan Sivandran also flagged up the regulatory incentives and looked ahead to new technological developments. 'With the introduction of regulatory provisions within the last decade, such as CII, EEDI and EEXI, the prominence of wind propulsion systems in supporting compliance is expected to increase,' he said. 'Most significantly, Fuel EU Maritime, introduced in January 2025, includes a specific incentive mechanism – the wind reward factor – which can reduce a shipowner's calculated GHG intensity by up to 5% when wind power systems account for 15% or more of total propulsion energy.'

'One key area of strength for WPS is the development of hybrid systems that integrate wind propulsion with other low-carbon technologies. A recent example of such innovations is Dalian Shipbuilding Industry's (DSIC) new wind-assisted LNG carrier concept, which has received BV's AiP for low-carbon operations. This innovative concept establishes the viability of integrating wind-assisted propulsion into mainstream carrier operations.'

'By combining wind power with complementary low-carbon energy sources, these hybrid systems have the potential to create more efficient and reliable propulsion and energy generation solutions for ships. Furthermore, the role of wind propulsion could expand beyond just ship propulsion, by harnessing wind energy to generate onboard electricity, or to support the production of hydrogen, which will help to further diversify the applications and benefits of wind power within the maritime industry.'

Hasso Hoffmeister emphasised just how quickly the industry's perception of wind propulsion has changed. 'Only a few years

ago,' he reminded us, 'WAPS were considered pioneering technology – but they have now matured into reliable and commercially viable solutions. In 2026 we'll almost certainly see 100 vessels equipped with WAPS globally, which will be a significant milestone and signal strong growth for the years ahead.'

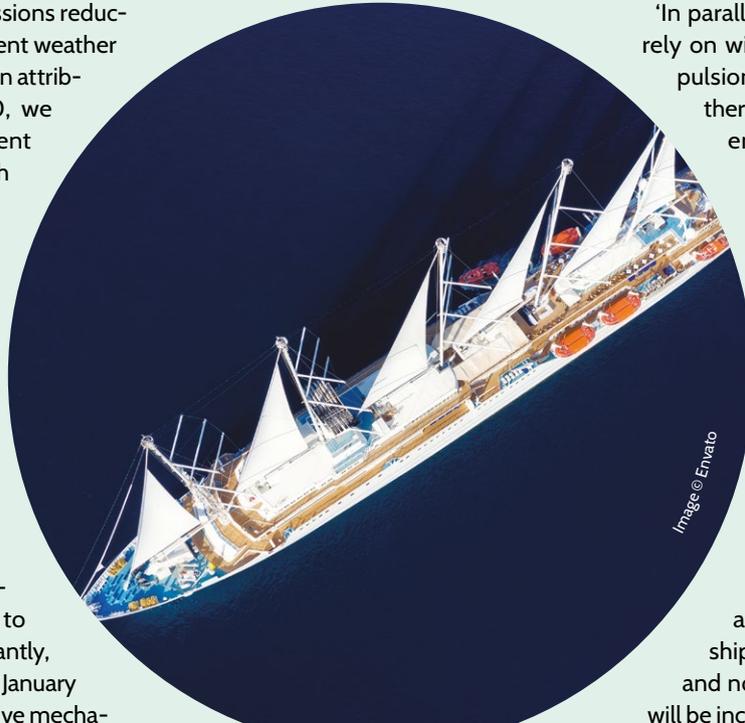


Image © Envato

'We are rapidly moving to a situation where WAPS become one of the default technologies shipowners consider when planning newbuilds'

Hasso Hoffmeister

'WAPS providers have been gathering extensive operational experience, and based on the lessons learned, are ready to deliver their second-generation products, focusing on improved performance, higher reliability, and better system integration.'

'I think we are rapidly moving to a situation where WAPS become one of the default technologies shipowners consider when planning newbuilds – at least for certain vessel segment and routes. Their modular nature allows shipowners to achieve immediate fuel and emission savings while maintaining flexibility for the future.'

'One key enabler of this development has been the evolution of technical standards.'

By reducing uncertainty in the viability of the technology, they have built up market acceptance. DNV's rules and guidelines have supported providers, designers, and shipowners by offering structured tools to confirm operational safety and to evaluate performance both at the design stage and during operation.'

'In parallel, vessel concepts designed to rely on wind as the main source of propulsion are gaining momentum. Here there is potential for fuel savings and emission reductions exceeding 50%, although their application is likely limited, at least initially, to lighter vessels.'

Wind propulsion certainly gets the thumbs-up from climate NGOs.

Davine Hurt said: 'We [Pacific Environment] expect to see exponential growth for wind-assisted propulsion technology in the immediate future as fleets look to hedge on fuel investments and the industry matures and knowledge diffuses across shipping sectors. Energy efficiency and non-fuel propulsion technologies will be increasingly important as the global fuel landscape remains in limbo under current geopolitics, of which wind can provide much greater fuel savings than other technologies available now.'

Lukas Leppert judged that: 'Wind-propulsion will be an essential technology in the short and long term to reduce the energy requirements of shipping. Already today the technology allows ships to cut the costs of burning fuels while reducing their emissions. These effects will only become more advantageous in the future as costs of alternative fuels and GHG emissions rise while wind offers free and clean energy.'

Andrew Dumbrille saw wind as a win-win proposition on multiple fronts, because: 'Wind-assisted technologies are a zero-emission solution that delivers immediate co-benefits across climate, biodiversity, and local communities. Slowing vessels and integrating wind propulsion reduces underwater noise, lowers fuel demand, and limits port-area pollution – benefits that disproportionately support populations in climate-vulnerable regions. Adoption by 2030 could meaningfully shift shipping toward pathways that meet net-zero goals while safeguarding marine ecosystems.'

Allyson Browne believed that: 'Based on the direction of the market and what wind-assist actors are projecting, it is plausible

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to see wind-assist installed on the order of ~10,000 ships by 2030, concentrated especially in bulkers and tankers, which implies meaningful penetration in those segments even if not uniform across the whole fleet.

'More importantly,' she continued, 'WAP should be framed as part of a broader energy efficiency push that is essential for meeting nearer-term IMO goals. Efficiency is one of the few levers that can scale quickly enough this decade, and WAP is available today, including for retrofits. The retrofit angle matters: ships have 20-30 year useful lives, and we cannot "wait out" fleet turnover while expecting emissions to fall fast enough.'

'Analyses show retrofit wind solutions can deliver measurable fuel and emissions savings and meaningfully support 2030 targets, especially when combined with operational measures and other efficiency upgrades.'

Dr. Prapisa Thepsithar would like to see an accelerated take-up, as she noted that: 'WAPS are gaining traction as a crucial decarbonisation lever in the maritime industry today, but uptake has not yet reached the levels needed to meet regulatory targets.'

'According to World Bank's report, *Keys to energy efficient shipping*, as of Q1 2025 only 71 large commercial vessels worldwide were equipped with WAPS, concentrated mainly in bulk carriers, tankers, and a few other segments. This low installed base underscores the challenge of scaling to a "significant proportion" of the global fleet within five years.'

'Based on the report's modelling, we could realistically expect 5% of eligible ships (vessels for which a given energy-efficiency

measure is technically applicable and feasible) to be equipped with some form of wind-assist technology, with much higher penetration in segments, like bulk carriers and tankers.'

'These sectors are particularly well-suited because they operate on long routes and are very fuel-cost sensitive. In practice, most of these installations will probably be rotor sails, because they're relatively easy to retrofit and already proven at scale.'

Goran Dominiononi summarised the prevailing opinion among our respondents in saying that: 'The economic case for this technology is quite clear for a good share of the fleet.'

However, **Kim Rosello** pointed out that there will be some exceptions. 'It works well in certain trades and vessel types,' she maintained, 'but it's not something that can be applied universally without compromise. By 2030, adoption is more likely to be meaningful in specific niches rather than across a large proportion of the global fleet.'

Alexander Prokopakis expressed a similar view, as he noted: 'We are clearly seeing growing interest and uptake of wind assistance technologies, both in newbuilds and retrofits, and the orderbook suggests this trend will continue. However, whether this will translate into a significant proportion of the global fleet by 2030 remains uncertain.'

'Adoption will depend on vessel type, trade, operational profiles, and proven performance at scale. IBIA sees wind assistance as a promising solution for specific segments, but not yet one where outcomes at fleet-wide level can be predicted with confidence within this timeframe.'

Anthony Mollet also noted that: 'Not all ship types are suited for installations and those doing shorter voyages may not be so willing. Longer, deep sea shipping routes may likely see an uptake. There is the consideration of upfront costs and investment alongside competing solutions with biofuels, battery powered ships, etc.'

Do you expect to see nuclear-powered vessels entering the global commercial fleet by 2040?

Most of our respondents took a cautious line on this question.

Eirik Ovrum, however, answered with a 'yes', as he reported that: 'Pilots of nuclear powered merchant ships should hit the waters in the 2030s, possibly by 2035 or at least the latter part of that decade. In an optimistic take on realism, the first commercially ordered nuclear powered ships could enter the world fleet by 2040.'

Carlo Raucci said this 'could technically

be possible'. His colleague at the Decarb Hub **Alan Jones** went into more detail, saying: 'Based on the concept work that is currently being conducted there is the potential that nuclear propulsion could be poised to move from concept to reality in commercial shipping within the next two to three decades, particularly in segments where its unique advantages outweigh challenges, but it will start small and focused rather than as a mainstream fuel choice due to the technology advances required and the safety processes that need to be developed and implemented.'

'Pilots of nuclear powered merchant ships should hit the waters in the 2030s, possibly by 2035 or at least the latter part of that decade'

Eirik Ovrum

Subajan Sivandran also adduced ongoing research to tell us that: 'In its recent report *Maritime Nuclear Development*, BV has detailed how technical viability, combined with significant technological improvements in the new generation of reactors (Gen. IV), could lead to the first Small Modular Reactors (SMRs) being deployed in maritime applications from as early as the mid-2030s, with the first nuclear-propelled pilot vessels featuring Gen.IV technology being fully deployed by 2045.'

'However, the barrier to the integration of nuclear propulsion systems within commercial maritime operations is not one of technological immaturity but rather the need for an update of requisite insurance and liability provisions, alongside wider regulatory and port-entry frameworks. The International Maritime Organization's (IMO) SOLAS Code of Safety for Nuclear Merchant Ships is based solely on Pressurized Water Reactors (PWR) designs, currently used in nuclear state navies, and is stuck in the 1980s context, when it was ratified. Further complexity is found in the lack of harmonised regulatory frameworks to govern the use of nuclear propulsion technologies in commercial maritime operations.'

'BV is continuing to support this effort by recently joining 30 other European companies from the international nuclear and maritime sectors in signing the Declaration

World Bank Report: Keys to energy efficient shipping



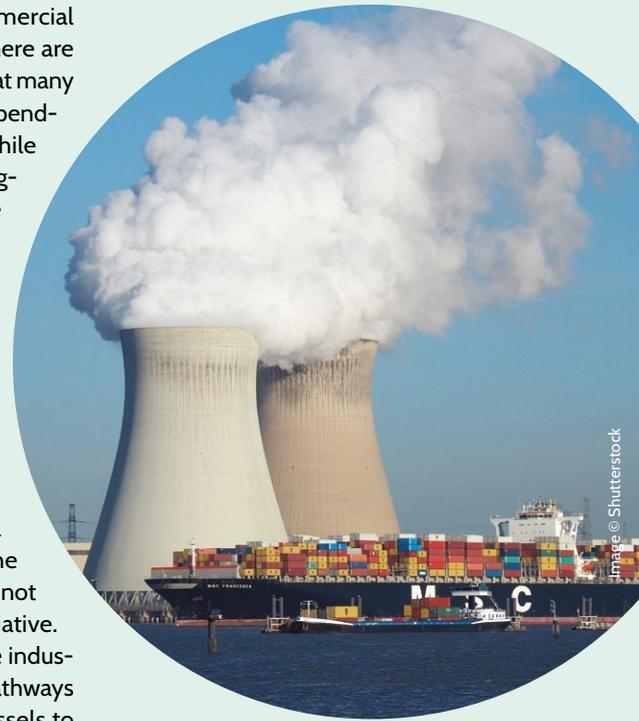
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for Accelerating Nuclear for Maritime Applications during the World Nuclear Exhibition, in Paris. This initiative will support close collaboration between international stakeholders across the nuclear, maritime, research, financial and regulatory communities to advance the safe and sustainable use of nuclear technologies for maritime decarbonisation.'

Gavin Allwright said: 'I would expect a number of pilot vessels to be in operation in 2040 considering the large amount of funding going into the sector and the support garnered from a number of stakeholders in the industry, however I think that there is a fairly lengthy process of proving the new SMR designs work commercially on land first and then a process of marinising those designs. Safety and security considerations will continue to be key concerns as will the perception among the public of nuclear-powered commercial ships coming into port cities. This will likely restrict the uptake and dissemination of this technology, though there is a sizeable amount of pitching of the technology pathway underway and this has led to a raised profile over the last 12 months in particular, thus it proves attitudes can and will change, something that we are seeing quite strongly in the resurgence of wind propulsion technologies, which has taken over a decade to build.'

power for decades. But for a commercial fleet to be in operation by 2040 there are non-insignificant regulatory hurdles at many levels (global, national, and local depending on jurisdiction). In addition, while nuclear has backing from certain segments of the industry, a key hurdle identified by class societies is public perception, government buy in, and the necessary workforce of expert seafarers to sail these ships. For a commercial vessel or fleet to call at ports and berth close to communities, there will have to be significant change in public acceptance of nuclear technology.

'Discussions around a potential US-UK "nuclear corridor" are in the exploratory and conceptual phase, not an active commercial shipping initiative. Governments, regulators, and some industry actors are examining whether pathways could exist for nuclear-powered vessels to operate between specific ports under tightly controlled conditions. This includes early conversations around regulatory compatibility, safety oversight, liability, and Port State control – not fleet deployment or commercial roll-out. There is currently no agreed framework, no approved commercial vessels, no port access guarantees, and no timeline for deployment.'



– but then perhaps the fossil lobby would push back.'

Alexander Prokopakis took a pragmatic view: 'There is an interest in nuclear propulsion within parts of the maritime sector, but as of today there are still no commercial vessels in operation and no clear regulatory or safety framework in place.'

'While research and discussion are ongoing, the pace of development remains uncertain. Whether nuclear-powered vessels will enter the global commercial fleet by 2040 will depend on regulatory acceptance, safety standards, political support, and public perception, all of which are still unresolved.'

Those who answered this question with a No included **Sofia Fürstenberg Stott**, who concluded that: 'The port infrastructure will be problematic and too costly.'

Anthony Mollet believed that: 'Probably too many issues remain with public opinion which will impact decision making by Port Authorities and Regulatory bodies.'

In **Diane Gilpin's** judgement: 'The barriers to uptake of nuclear power will be mighty difficult to overcome. We've heard a lot of positive chat about nuclear, it makes us as a society feel good to believe in a big silver bullet solution (like alternative fuels?!) but I just can't see the policy and legislative landscape shifting fast enough.'

'In any event all proven available technologies (wind, hull coatings, route optimisation) should be deployed as fast as possible to reduce the size of the global challenge of the climate emergency. It buys time for the more exotic solutions.'

'There is an interest in nuclear propulsion within parts of the maritime sector, but as of today there are still no commercial vessels in operation and no clear regulatory or safety framework in place'

Alexander Prokopakis

Many of our respondents answered this question with a Don't Know, as they felt that there were still too many issues to resolve and hurdles to clear.

Kim Rosello spoke for many in saying: 'There's clearly more discussion around nuclear than there was a few years ago, but there are still major hurdles. Regulation, insurance and public acceptance are all unresolved, and until those are addressed it's hard to be confident about commercial deployment. It's possible, but the timeline remains very uncertain.'

Davina Hurt commented: 'There has been increasing attention paid to nuclear-powered vessels. Nuclear propulsion is not a new concept – military vessels and a small number of specialised ships have operated with nuclear

Allyson Browne noted that: 'Interest in nuclear-powered vessels surged in 2025, but the path to commercial deployment is still heavily constrained by safety regulation, liability/insurance, Port State acceptance, waste handling, and geopolitical risk. Nuclear may appear first in narrow, state-backed or highly controlled contexts, but it is not a substitute for urgent, scalable actions available in its current forms.'

Adrian Tolson had doubts over the timeline. 'I can see some initial efforts and development – but commercially operating within 14 years!' he said. 'Honestly, it seems an innovative approach that could be taken for a possible revitalisation of the US fleet – and it would be a more comfortable fit within current US political views on green hydrogen

Did we see significant progress on maritime electrification in 2025?

Eirik Ovrum gave the most upbeat response, as he judged that: ‘The technology and its implementation is moving steadily forward, with ever larger battery installations and an expanding network of shore power being available for shipping.’

Andrew Dumbrille began by explaining why he believes the technology is gaining traction before outlining the scale of growth: ‘Electrification delivers concrete, near-term benefits that address shipping at the intersection of climate, pollution, people, and biodiversity. These include lower greenhouse gas emissions, reduced marine pollution, improved air quality in ports and for seafarers, less underwater noise, lowering operating costs, and greater overall efficiency. Critically, electrification future-proofs shipping operations – both on land and at sea – against tightening decarbonisation mandates. With so many co-benefits, it’s no surprise the market is responding: recent analysis shows the global electric ship market will grow from \$4.85 billion in 2025 to \$18.39 billion by 2032. Investing in propulsion systems that concurrently deliver environmental and economic gains challenges the false trade-offs informing policy decisions.’

In **Subajan Sivandran’s** estimation: ‘Progress on maritime electrification continued in 2025, particularly through the growing adoption of battery-based Energy Storage Systems (ESS) in both hybrid and fully electric vessel configurations. Enabled by advances in high energy-density lithium-ion (Li-ion) batteries, ESS deployment has expanded steadily across multiple vessel segments. Industry data indicates that approximately 90 vessels are currently operating on pure battery power, with a further 50 vessels in the orderbook, while more than 550 vessels are in service using hybrid battery propulsion supported by ESS, with an additional 400 vessels scheduled for construction.’

‘In parallel, onshore power supply (OPS) has become an increasingly established solution within major ports, driven primarily by air-quality and emissions-reduction requirements. While OPS deployment remains uneven across regions, access to shore power represents a practical and impactful means of reducing emissions at berth, particularly for larger vessels that cannot be fully electrified during sea passage.’

‘As highlighted in BV’s technical paper, *Maritime Electrification: Maritime Battery Systems and Onshore Power Supply*, the

continued scaling of ESS and OPS will depend not only on technology maturity, but also on the development of clear and consistent safety and regulatory frameworks that build confidence across the industry’.

Victor Åkerlund reported that: ‘2025 clearly showed meaningful progress in maritime electrification and OPS expansion continues. However, port grid constraints remain a major bottleneck: when multiple vessels connect simultaneously, peak demand can exceed local grid capacity. That’s why hydrogen fuel cell-powered shore power is gaining traction as a way to deliver clean electricity locally while reducing grid reinforcement needs.’

‘2025 clearly showed meaningful progress in maritime electrification and OPS expansion continues. However, port grid constraints remain a major bottleneck: when multiple vessels connect simultaneously, peak demand can exceed local grid capacity’

Victor Åkerlund

‘At the same time, hydrogen fuel cell marine systems matured significantly in 2025, including key class-approval milestones (e.g., Lloyd’s Register type approval for our [PowerCell] MS225 system) and movement into larger, scalable installations. Megawatt-scale orders demonstrated growing confidence in scalable clean power architectures, accelerating adoption of fuel-cell-based auxiliary power and propulsion-capable configurations.’

Lukas Leppert agreed that major progress was made last year on the electrification of maritime transport, which he said could be split into three areas of application. ‘Firstly,’ he explained, ‘shore-side electricity is a low-hanging fruit, allowing ships to use energy from the grid while in port. Necessary infrastructure becomes more common in both larger and smaller ports and the electricity mix of the grid provides a growing percentage of stable renewable energy.’

‘Secondly, smaller vessels and ferries that regularly stop in ports and operate close to the shore can be run solely on battery-powered propulsion, especially if combined with wind-assisted propulsion technology and advancements in energy efficiency. These major developments allow cutting fuels completely, requiring neither form of fossil energy nor complex and expensive production pathways of alternative fuels. Especially

for connections of small islands requiring short-sea shipping, these advancements are a game-changer.’

‘Lastly, even the largest ships like container vessels can profit from installing batteries onboard, enabling peak-shaving during periods of high energy demand and therefore cutting their fuel consumption. Altogether, electrification can play a massive role for the decarbonisation of maritime transport and future developments in battery technology will only provide better and cheaper solutions.’

Davina Hurt also welcomed progress on all fronts. ‘For shore power technology,’ she noted, ‘there has been increasing coverage

across ports and terminals installing shore-side infrastructure as well as mandates for ships to utilise shore power. It is the gold standard for reducing emissions and air pollution at berth and is becoming the universal solution and a baseline expectation for modern port operations.’

‘At the same time,’ she continued, ‘2025 showed how electrification can be extended and strengthened through complementary technologies, including battery-fuel cell “stack” configurations and hybrid systems. These technologies expand the applicability of electrification while preserving its core advantages, particularly for vessels with more demanding operational profiles.’

‘We also saw continued progress on battery-powered propulsion, particularly in the passenger vessel segment alongside emerging projects in China piloting and deploying batteries on inland cargo vessels. These real-world applications are critically important. Operational experience, data sharing, and the development of best practices will be essential to informing future regulatory standards, safety requirements, and scaling strategies.’

Allyson Browne made the point that: ‘Crucially, electrification progress is global.’ As she explained: ‘Ports in North America, Europe, and Asia are expanding shore power, investing in grid upgrades and conversion

capacity, and integrating electrification into broader port energy strategies.

'We are seeing this in leading European hubs like Rotterdam (with a defined shore power strategy), Barcelona (with a comprehensive energy transition plan), and in ports such as Gothenburg investing in power infrastructure to enable widespread OPS connections.

'We also see significant momentum in Asia, including major corridor activity involving Shanghai and the California gateways, where shore power capability has been expanded and used as a cornerstone measure.

'The most encouraging trend is the mindset shift: ports are increasingly owning their potential as energy hubs, engaging more deeply with utilities, regulators, technology providers, and communities. That systems view is expanding the coalition of "doers" and accelerating the transition.'

Nobody had anything negative to say about the technology itself, but some of our respondents felt that the pace of change hasn't been enough – and the technology is not yet ready for all sectors of the shipping industry.

Alexander Prokopakis judged that: 'Progress continues, but it is mainly limited to short-sea shipping and specific port

applications rather than at a global fleet level.'

Kim Rosello concurred, adding that: 'For deep-sea shipping, the limitations around batteries, infrastructure and cost are still significant. Electrification is moving forward, but only within a fairly narrow operational scope.'

We will wrap up this question on electrification, and the alternative fuels and energy section as a whole, with this response from **Gavin Allwright**, who said that: 'The only reason that I answer this with a "No" is that we haven't seen "significant" progress. There have been technology advances which are of course welcome but there hasn't been a step-change for technologies that have been in the market for 20 years. Shore power is still patchy and of course where it is not mandated the cost of the provided power has led to limited uptake on a commercial basis. The EU will of course mandate this from 2030 in major ports and EU wide by 2035 and this may lead to significant change, along with China having adopted measures requiring newly built terminals to be equipped with shore power and existing terminals to progressively implement it.



'For batteries, there has been steady growth over the past decade and an uptick in installations, especially hybrid vessels, but these are mainly short sea shipping, inland vessels and passenger vessels. The potential for larger, blue ocean vessels is still to be realised.'



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Practical matters

Our focus now turns to fuel quality trends for both conventional and biofuel blends, availability issues in ports around the world, price patterns and potential changes to the world bunkering map



While the shipping world may be gearing up to use alternative fuels, for now the vast majority of the global fleet is still running on conventional fuel – and shipowners still have to focus on obtaining sufficient quantities of fuel that is fit for purpose.

Have there been quality trends with any of the traditional marine fossil fuel grades in 2025?

This question did not elicit many answers – which could mean that the bunker fuels had a very clean bill of health last year; or some of our respondents were in a reticent mood.

Of those who said that they had seen, or heard of, quality issues, **Anthony Mollet** told us that he had heard reports of issues ‘specifically with ULSFO’ [ultra low sulphur fuel oil] and added that: ‘Since 1 May [2025] and the new Mediterranean Sea Emission Control Area for Sulphur Oxides (Med ECA), we have sighted evidence of issues with Pour Point in particular.’

Jason Miles drew on Quadrise’s data to tell us: ‘Our analysis indicates that quality trends

for high sulphur fuel oils (HSFO) were generally similar in 2025 compared with 2024, with a slight global improvement in fuel quality – only 2.6% tested over 95% overall confidence level, vs 2.9% previously, meaning these fuels failed ISO 4259 and were therefore off spec. However, Singapore and Amsterdam-Rotterdam-Antwerp (ARA) have been impacted by higher than usual off-spec notices as a result of ash and sodium, which is likely due to an increase in Middle East-based supplies.

‘Very low sulphur fuel oil (VLSFO) has been largely unchanged (2.1%), with most off-spec results coming as a result of higher sulphur and water than specifications permit.

ARA as a region appears to have fared slightly worse than others such as Singapore, due to potential barge contamination issues as a result of barges handling both HSFO and VLSFO cargoes.

‘Marine gasoil (MGO) quality events have also increased this year, mostly due to flash point (33%) and sulphur (22%) exceedances – with flash point issues of particular concern in the Mediterranean. ULSFO has also emerged as a new market following the introduction of the Med ECA in 2025. An increasing number of suppliers of ULSFO entering the market has created a consequent rise in quality issues, mainly due to sulphur exceedances above 0.1%S.’

‘While overall fuel quality and compliance with sulphur regulations remained high globally, there were regional issues such as increased sediment levels, chemical contamination, and variability in VLSFO blends’

John Bergman

'MGO quality events have also increased this year, mostly due to flash point (33%) and sulphur (22%) exceedances – with flash point issues of particular concern in the Mediterranean'

Jason Miles

John Bergman reported that: 'In 2025, there were observable quality trends in traditional marine fossil fuel grades. While overall fuel quality and compliance with sulphur regulations remained high globally, there were regional issues such as increased sediment levels, chemical contamination, and variability in VLSFO blends. These trends were influenced by evolving regulations (like the Mediterranean SECA), changes in blending practices, and geopolitical factors affecting supply chains.'

Kim Rosello said that: 'We [Paratus & Partners] haven't seen any clear, wide-spread quality trends ourselves. That said, owners continue to raise concerns around consistency and off-spec fuel. Most issues still appear to be isolated rather than systemic, but it remains an area that needs close attention.'

Have there been quality trends with marine biofuel grades in 2025?

With the spotlight now on biofuels, Jason Miles told us that: 'The main issues that we [Quadrise] have noted with regards to marine biofuel grades in 2025 relate predominantly to B100, B30 with LSMGO, and to a lesser extent VLSFO. Reports show that 15-16% of samples from these biofuel grades have exceeded pour point limits (for DMA this is -6°C winter, and 12°C in summer). Measured TAN values are also typically higher than DMA, signalling some oxidation that leads to the formation of fatty acids.'

John Bergman reported that: 'In 2025, marine biofuel grades – especially FAME-based blends up to B30 and renewable diesel (HVO) – demonstrated high fuel quality and compliance. Testing showed no systemic operational issues, with sulphur content well below regulatory limits and stability, viscosity, and sediment levels within acceptable ranges. Quality challenges like cold flow

properties and microbial growth were effectively managed through proper handling and updated standards (ISO 8217:2024).'

Anthony Mollet recounted that: 'From people we speak to, we are not hearing any evidence of quality issues – especially given a lot of small volume bunker supplies of biofuels are taking place.'

Adrian Tolson prefaced his answer by conceding that he 'doesn't spend enough time with quality issues to make a super intelligent comment here', but nevertheless observed that: 'The incidence of claims seems to have declined overall from everything I have read – which is no surprise given greater vigilance from testing agencies/port authorities (primarily Singapore).'

'It could also be a factor,' he continued, 'that more fuel oil is available from simpler refineries processing higher quality crude (often sanctioned). It could also be that the newer refineries are designed to produce a consistent specification fuel oil (VLSFO or HSFO) that is considered a real product rather than the historic view of fuel oil as by-product needing to be disposed of.'

Jesper Sørensen spends plenty of time on this subject in his role at KPI OceanConnect, and was able to report that: 'Based on our experience, there are very few issues with biofuels; they perform consistently and reliably when supplied and managed correctly.'

'We have delivered more than 650 biofuel supplies to over 272 vessels, covering more than 20 different biofuel grades across 94 ports worldwide. Across this volume and diversity of operations, we have not encountered systemic or recurring quality issues. Biofuels are increasingly and widely available and, with the right feedstock selection and certification, provide a reliable decarbonisation solution.'

Alexander Prokopakis said that 'no clear or consistent global trends have emerged' with regard to quality issues with biofuels, but he pointed out that the 'data remains fragmented and experience varies widely by fuel type, blend, and region'.

Dr. Prapisala Thepsithar gave us an overview on both conventional fuels and bio blends. 'While GCMD does not have first-hand global statistics on fuel quality across ports,' she said, 'we have not encountered significant quality issues with VLSFO, HSFO or biofuels in our pilots and trials to date.'

'That said, in the public domain I have seen recurring warnings of VLSFO quality incidents – particularly cases involving elevated catalytic fines and phenolic compounds.'

'In addition, I have also noted reports of increasing off-spec HSFO, evident from a rise in quality notification in Singapore and

the ARA region. In these cases, elevated ash is often cited as a leading contributor, reflecting the growing prevalence of heavier, metal-rich components in HSFO blending. Collectively, these trends reinforce the need for robust quality management as the marine fuel quality landscape continues to evolve with global situation.'

'In contrast, there has not been a clear upward trend observed in biofuel-related quality incidents so far, including last year, despite the overall increase in maritime biofuel consumption.'

'As demand for biofuel scales,' she warned, 'there is a risk of greater variability in products entering the supply chain – potentially including unconventional blends and inconsistent specifications. The industry should therefore strengthen technical understanding and adopt a more systematic, holistic approach to biofuel introduction – covering fuel quality, handling, storage, compatibility, testing, and end-to-end operational practices.'

'As demand for biofuel scales, there is a risk of greater variability in products entering the supply chain – potentially including unconventional blends and inconsistent specifications'

Dr. Prapisala Thepsithar

Is there sufficient availability of HSFO, VLSFO, MGO and biofuels in the main bunkering ports to meet the industry's needs for the different grades?

Let's first hear from a supplier. 'At present,' Jesper Sørensen reported, 'there is sufficient availability of HSFO, VLSFO, MGO and biofuels across the main bunkering ports to meet current industry demand. From a volume perspective, supply is broadly adequate and operators are generally able to source the grades they require without material disruption.'

'That said, supply is highly concentrated in the major hubs of Singapore and the ARA region, when what is needed is greater coverage in global ports. Building out this needed infrastructure and improving coverage across

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a wider range of ports will remain a work in progress.'

Anthony Mollet said that: 'Supplies of HSFO have increased, and pricing suggests availability is not an issue. Also for biofuels, again given volume requests are relatively low, we are not hearing evidence of shortages. Lead times are of course a different

'Supply is highly concentrated in the major hubs of Singapore and the ARA region, when what is needed is greater coverage in global ports'

Jesper Sørensen

factor for the biofuels and blends, but not shortages owing to demand, per se.'

Jason Miles said there had been sufficient availability, adding that: 'Prices during the year have indicated this trend for most of 2025, although the lack of Russian crude and products hasn't helped Northwest Europe. HSFO (385 ports and growing, according to Integr8, with 35-28% coming from Singapore) is not as available globally as VLSFO (680 ports) or MGO/MDO (703 ports) in 2025.

Alexander Prokopakis gave a positive report: 'In the main bunkering hubs, availability of HSFO, VLSFO, MGO and biofuels is generally sufficient to meet current industry demand. While regional and operational constraints can still arise, supply in core ports has remained broadly stable.'

Kim Rosello also noted that availability hasn't been an issue in the main bunkering centres. Furthermore, she added that: 'Where problems arise, they tend to be more about quality, traceability, confidence or waiting times in the product rather than outright shortages. That could change over time as refinery capacity shifts, but for now supply itself has generally held up.'

Dr. Prapisala Thepsithar noted that fuel availability was good in 2025 and also gave us an indication of what to expect in 2026. 'Across major bunkering hubs, I do not foresee availability constraints for HSFO, VLSFO, and MGO to meet current industry demand across grades,' she said. 'These fuels remain embedded in established refining and distribution networks, and major ports typically

have multiple suppliers, storage capacity, and logistics arrangements in place to support supply reliably.

'Biofuels bunkering is also becoming increasingly available in major ports – often as blends with conventional fuels – but consistent supply at scale is still concentrated in regions of production. Availability depends on blending and storage logistics, certification requirements, commercial demand, and sustainable supply volumes. As a result, end-users may experience variability in lead times, blend options, and pricing between ports.

'Looking ahead, refinery conversions and closures – more likely over the medium to long term rather than the next few years – could tighten supply in certain markets, particularly for specific blending components.

'In the near term, however, conventional marine fuel availability in major hubs is likely to remain adequate due to global trade flows and the ability to redistribute supply. The more likely challenges are localised tightness and higher price volatility, rather than a widespread inability to source HSFO/VLSFO/MGO, while biofuel availability is expected to remain the more location-dependent element until regulations are further firmed up and, in turn, production capacity and bunkering networks scale more consistently.'

Have there been significant changes in the price differentials between VLSFO, HSFO, MGO/MDO and biofuels in 2025, and do you expect this trend to continue in 2026?

Jason Miles reported that: 'Prices for conventional marine fuels have declined during the year in line with the oil price as a result of ongoing geopolitical instability. However, the price differentials between MGO/MDO against HSFO and VLSFO have widened, which is notable for Quadrise due to the resulting effects this has on refinery residue values, which impacts MSAR and bioMSAR production.

'Throughout 2025 the price of Advanced FAME steadily declined within ARA. However, the Quadrise team has noticed a recent correction in prices in 2026 compared to early 2025 levels. This shift can potentially be attributed to EU ETS – which expanded in January 2026 to require shipowners to surrender allowances for 70% of reported CO₂ emissions from 2025, an increase from 40% – and Fuel EU Maritime regulatory requirements for 2026. EU ETS prices have also crept up during 2025 from \$70 to \$100/mt CO₂.'

Adrian Tolson said that: 'All three fossil prices in actual dollars have seemingly traded quite close together. I am guessing

this is partly due to depressed crude prices. VLSFO demand generally seems to be lower and HSFO prices higher as that demand increases. The good old Hi5 spread we used to talk about a lot has been much tighter.

'In terms of biofuels, it still seems to be a battle over feedstock. If you have it (sustainable, etc.) prices can be reasonable although incentives seem to be being pulled/reduced. In other areas where feedstock is not so available or not easily segregated or where there are conflicting definitions of sustainability then prices seem high – this is a US problem!'

Looking for trends and market drivers, **Kim Rosello** judged that: 'Price differentials continue to be driven by regional factors, regulation and refinery dynamics rather than any single structural change. Volatility is likely to remain, but it's difficult to point to a clear long-term trend at this stage.'

Alexander Prokopakis noted that: 'Price differentials between conventional fuels and biofuels continued to fluctuate in 2025, driven by regional supply dynamics, regulatory costs, and feedstock availability. While volatility is likely to persist into 2026, differentials will remain highly port- and market-specific rather than following a single global trend.'

In the true spirit of an annual survey, **Dr Prapisala Thepsithar** looked first at the year just passed, and then at the year to come. 'In 2025,' she began, 'I observed a noticeable shift in price differentials: conventional fossil-based marine fuels (i.e., VLSFO, HSFO, MGO) generally softened compared with 2024 levels, while biofuels remained at a premium and, in many cases, became more expensive – widening the spread versus conventional grades. This is consistent with biofuels being driven more by limited supply, certification/compliance value, and increasing demand, while conventional fuels are more exposed to broader crude/product market dynamics.

'Looking ahead to 2026, I would expect this general pattern to continue under a "status quo" geopolitical environment, i.e., conventional marine fuel prices remaining comparatively soft while biofuel premiums persist. However, the outlook is inherently uncertain, as oil prices are highly sensitive to geopolitical developments and resulting impacts on crude and product supply chains, refining utilisation, freight, and regional dislocations. As a result, while the directional trend may hold, the magnitude of the spreads could still shift materially depending on how geopolitical and market conditions evolve.'

Jesper Sørensen also looked fore and aft. 'In 2025, we observed notable shifts in price

differentials across conventional and biofuel grades,' he reported. 'The spread between B30 FAME and VLSFO largely traded within a \$200–250/mt range for much of the year, before dropping below \$200/mt toward year-end in the ARA market. The UCOME–VLSFO spread remained relatively stable at around \$350/mt for most of the year, while the spread to MGO showed a clear downward trend.

'Looking ahead to 2026, pricing dynamics are likely to be influenced by new subsidy rules as well as the mandatory introduction of mass flow meters, which will require a short recalibration period and may temporarily affect pricing and spreads.'

Will there be a shift in bunker demand – in terms of both individual ports and geographical regions – over the next few years?

Adrian Tolson detected an eastward shift, telling us: 'It's still generally about Asia increasing its percentage of the global bunker market on an aggregate basis year by year. I think this is being helped along with the growth of alternative fuels as well – if only because there are less challenges to deployment in Asia, whether by supporting regulation, government assistance, in building infrastructure, less political opposition and a longer-term strategic view and plan on climate change.'

In **Davina Hurt's** view: 'Over the next few years, bunker demand at individual ports and across regions will likely be shaped by operational and geopolitical forces – any rerouting linked to conflicts in the Middle East and Ukraine, as well as bunkering prices and fuel quality.

'Over the medium to longer term, however, bunker demand is likely to shift more structurally based on evolving fuel strategies, regulatory requirements, and the availability of alternative fuels at specific ports. As shipping begins to diversify away from conventional fuels, ports that are able to offer compliant, reliable, and lower-emission fuel options will become more attractive bunkering hubs. Many alternative fuels also have lower energy density compared to traditional bunker fuels, which can require more frequent refuelling and may further reshape bunkering patterns across regions.

'Taken together,' Hurt concluded, 'these dynamics suggest a gradual but meaningful rebalancing of bunker demand.'

Allyson Browne also believed that the energy transition will spur a fuel demand shift, telling us: 'I expect to see gradual demand shifts toward ports that offer regulatory

certainty, fuel optionality, and energy services beyond conventional bunkering, including shore power availability and infrastructure readiness for low- and zero-emission fuels. Ports that invest early in electrification and clean fuel pathways will increasingly capture demand and associated value.'

Jason Stefanatos felt that changes in trade routes and commercial line could influence a shift in bunker demand, but added that 'this remains too uncertain to analyse in detail'. He added that: 'Regarding new low-GHG fuels, if future demand (and supply) increase significantly, it is likely that large ports will dominate bunkering operations. The infrastructure required for these fuels is costly, making it unrealistic for small and medium-sized ports to invest in the early years. Consequently, major ports are expected to capture a substantial share of the new fuel bunkering market.'

Jason Miles gave the Quadrise perspective: 'We've already seen a significant decline in VLSFO sales within the Mediterranean during 2025, falling from 60% at the start of the year to under 35% by the summer. This shift is driven primarily by the introduction of the Med ECA regulation. This mostly relates to MGO (which has seen an increase in regional market share from 13% to >30%) but also ULSFO. Similar effects should be expected as ECAs are implemented in other regions.

'We anticipate that HSFO demand will remain strong throughout 2026, supported by widespread scrubber implementation, as it continues to be the cheapest and most abundant fuel source. ECA and EU Legislation targeting CO₂ reductions in the EU will inevitably continue to drive the increased use of B100 as an alternative to MGO/ULSFO for vessels operating within

Marine Fuel Supply Realities in 2025

Conventional Bunkering



Most of the Global Fleet STILL RUNNING ON TRADITIONAL FUELS
HSFO, VLSFO, MGO & ULSFO

Fuel Quality Concerns



OFF-SPEC RISKS
Sediment, Contaminants & Flash Point Issues

Biofuel Blending



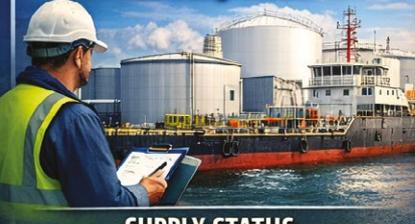
BIO GRADES ON THE RISE
Pour Point & Stability Challenges

Compliance Shifts



MED ECA IMPACT
Switching to MGO & ULSFO

Availability Check



SUPPLY STATUS
Regional Access & Traceability

Price Volatility



MARKET SWINGS
HSFO vs VLSFO vs BIOFUELS

● the ship.energy survey 2026: fuel quality, availability and pricing

European waters, as net costs after environmental penalties can be lower.'

Kim Rosello agreed that there will be a shift in bunker demand, but she judged that: 'The shift is likely to be more about fuel type than total volume. We're already seeing increased interest in blended fuels in certain regions where regulation creates an incentive to manage carbon intensity. That could concentrate demand in ports with the infrastructure and oversight to support blending properly.'

Sofia Fürstenberg Stott said that: 'For regional trades, we may see a regionalisation of fuel strategies – i.e. short-sea shipping fleets collaborating to share risk, developing regional net zero fuel infrastructure.'

Anthony Mollet judged that: 'More major ports appear to be adapting to changes in market requirements with biofuels becoming more available. Otherwise, I do not see evidence of any significant changes in regions with perhaps the exception of growth of biofuels in China and South East Asia.'

Jesper Sørensen's answer managed to encapsulate all the main themes raised by our respondents. 'We expect a continued shift in bunker demand across both individual ports and wider geographical regions

'Over the next few years, bunker demand at individual ports and geographic regions will likely be driven by operational and geopolitical forces'

Davina Hurt

over the coming years,' he said. 'This is not a sudden change, but rather an extension of trends already underway, as supply and demand progressively diversify beyond traditional hubs, driven by evolving trade patterns, geopolitical tension, regulatory pressures, and the development of alternative fuels and infrastructure in new locations.'

Alexander Prokopakis felt that there will be no near-term shift in the geography of the market, as he judged that: 'The main bunkering hubs and trading routes are expected to remain largely unchanged. While some

shifts in volumes between ports and regions may occur, these are likely to be incremental rather than structural.'

Meanwhile, Carlo Raucci said that a major shift was, in the near-term, 'unlikely, as this requires large investments in infrastructure which take time for deployment'.

We will close with these thoughts from Dr. Prapisala Thepsithar: 'Over the next few years, we do not expect a major shift in overall bunker demand across individual ports or geographical regions. Bunkering patterns are primarily anchored to established trade routes, port infrastructure, supplier depth, and pricing competitiveness, and these factors typically change only gradually.'

'A meaningful redistribution of bunker demand would more likely occur only if there is a strong regulatory push that creates sustained and sizeable demand for low- or zero-GHG fuels, coupled with major investments that concentrate green fuel production and bunkering infrastructure in specific regions. Without that combination – i.e., clear policy signals, firm demand pull, and scaled supply and infrastructure – we expect the current bunkering hubs and regional demand patterns to remain broadly stable in the near term.'

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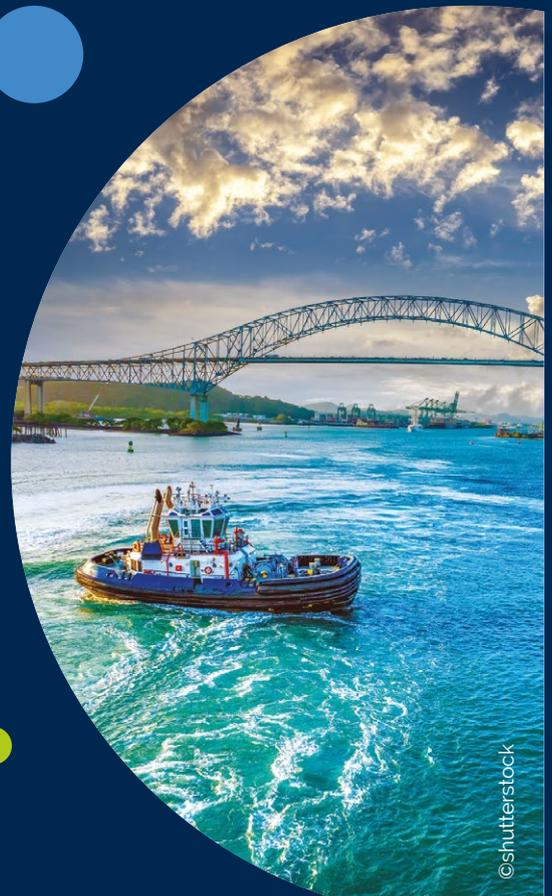
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Open questions



Mass flow meters, bunker licensing schemes and digitalisation have all been trumpeted as examples of how the bunker industry is looking to make itself more accountable and open to scrutiny – but are they really living up to their billing?

The Ports of Rotterdam and Antwerp-Bruges made the use of mass flow meters (MFMs) compulsory for bunker deliveries from the start of 2026. MFMs have already been compulsory in Singapore, and Port of Sohar in Oman mandated their use from January 2025.

Is the momentum is now building for MFMs to become mandatory, or standard practice, in other bunkering hubs?

Jesper Sørensen was clearly in favour, as he told us that KPI OceanConnect sees 'momentum building for MFMs to become standard practice', as he explained: 'A growing focus on transparency, accuracy and alignment between suppliers and customers means the industry must embrace them. MFMs are an important solution for improving measurement integrity, reducing disputes and claims and building confidence across all participants in the bunker supply chain, particularly as regulation and reporting requirements increase.'

'To enable MFMs to deliver their full value, deployment must be supported by clear regulatory frameworks, independent oversight and well-defined dispute resolution mechanisms. Where these elements are in place, we see MFMs playing a meaningful role in aligning commercial interests, protecting all parties and strengthening trust between parties.'

'As more bunkering hubs look to enhance transparency and standardisation, MFMs are and should continue to be positioned

to become a key enabler of a more reliable, transparent and professional bunkering ecosystem.'

Kim Rosello believed that: 'The direction of travel is fairly clear. With MFMs already established in Singapore and becoming mandatory in parts of Europe, their wider adoption feels increasingly inevitable. As transparency improves, disputes become harder to justify.'

Alexander Prokopakis reported that: 'Ports and stakeholders are discussing MFMs more openly. As carbon pricing and emissions reporting become more prominent, accurate and transparent measurement of supplied fuels will be increasingly important, supporting wider adoption as standard practice.'

He also had some news to impart, telling us that: 'Further indications on market direction are expected from the results of the IBIA-BIMCO follow up survey on bunker licensing and MFMs.'

Allyson Browne was a supporter, as she believed that: 'MFMs reduce disputes, improve transparency, and professionalise market practice. That is good for market integrity and ultimately for trust, efficiency, and accountability across the fuel supply chain.'

Adrian Tolson felt that: 'The verdict on the MFM introduction to Rotterdam and Antwerp is still complicated, but it's a very positive step and despite some challenges it should be viewed that way. I think it will ultimately be successful, and my guess is that

this will help MFMs become standard practice for the majority of bunker ports.'

However, he did add that: 'It's impossible to see mandatory MFMs for all bunker deliveries – the world is not homogenous enough particularly where it comes to the interaction of port authorities, governments, legal systems, etc.'

Anthony Mollet judged that it's still 'too early to say' what the level of MFM engagement will be in other ports. He added that: 'It will be of great interest to see bunker quantity claims and outcomes thereof, over the coming year, to see the impact they have on major bunkering ports where suppliers have MFMs. It is highly likely they will become more standard, but this will be evidence-based in my opinion. There are of course the

'The verdict on the MFM introduction to Rotterdam and Antwerp is still complicated, but it's a very positive step and despite some challenges it should be viewed that way'

Adrian Tolson

upfront costs for terminals and suppliers to manage. But as increasing research and positive promotion by the likes of BIMCO and classification societies is published, then the move towards a mandatory requirement in more ports is inevitable.'

Some of our respondents also considered how MFM's and other metering technology could complement the energy transition.

In **Gregory Dolan's** view: 'As ports develop bunkering guidance for alternative fuels like methanol, we've seen tools like mass flow meters become state-of-the-art requirements. This technology push can have unintended consequences as well. The Port of Singapore is requiring methanol vapour recovery for bunker operations, which may be state-of-the-art, but provides

questionable benefits while as much as doubling the cost of methanol bunker operations compared with other ports.'

We will close with these observations from **Dr. Prapisala Thepsithar**: 'Although some industry stakeholders continue to rely on current practices such as tank gauging and manual recording due to practical reasons, I believe momentum is building for MFM's to become standard practice – and potentially mandatory – in other major bunkering hubs, supported by the successful implementation in Singapore. While implementation requires upfront investment (metering equipment, calibration/verification regimes, procedures, and training), MFM's offer clear operational and commercial benefits: more accurate measurement of delivered quantity,

tamper-resistant and auditable records, and improved transparency that can reduce disputes and deter fraud.

'MFM's are also aligned with the industry's direction of travel. As alternative/green fuels scale up, stakeholders will need stronger measurement integrity and traceability to support certification, compliance reporting, and confidence in bunker deliveries. In this sense, MFM's can go hand-in-hand with broader digitalisation – enabling better data capture, reporting, and governance across the bunkering value chain.'

Are other ports likely to follow Singapore and Rotterdam in implementing bunker licensing schemes over the next few years?

Almost everyone who answered this question felt that licensing schemes will be appearing in more ports.

For **Kim Rosello**, it was a question of when, not if. 'It may not happen everywhere or all at once,' she reasoned, 'but some form of licensing or control feels unavoidable. As regulation tightens and data requirements increase, ports and authorities will want more oversight of bunker supply chains to maintain credibility and enforce standards.'

In **Allyson Browne's** view: 'Licensing is increasingly viewed as a market-shaping tool, one that raises standards on safety, competence, transparency, and accountability. Ports with strong governance capacity and a desire to be "trusted hubs" are likely to follow. The direction of travel in leading ports is toward more structured oversight, not less.'

Anthony Mollet believed that: 'The industry is not regulated sufficiently, and licensing schemes are a major and logical step

'The industry is not regulated sufficiently, and licensing schemes are a major and logical step forward. The precedents set by those major ports who have introduced licensing make it easier for others to follow'

Anthony Mollet

forward. The precedents set by those major ports who have introduced licensing make it easier for others to follow. There is potential for new fees and revenue and of course, the data capture and reporting is key for ports marketing their business.'

Adrian Tolson tempered his answer, saying: 'If we are just talking licensing schemes, then for sure we will see these develop – licensing schemes can after all cover a multitude of sins(!) – some are good and some not so good. If we are talking a fully comprehensive licensing scheme as we see in Singapore involving MFMs, etc., then I would expect to see these develop mostly in Asia (China and Hong Kong, Korea, etc.) but other jurisdictions may surprise because of their particular circumstances. I think that all the Americas will be laggards in this. It's quite hard to see as we progress down the path of decarbonisation and transparency with MFMs, digital bunkering, etc. how a serious licensing scheme can be avoided...but we may be surprised.'

Alexander Prokopakis had a clear view: 'Tighter control over supplies will be more relevant than ever and Port Authorities will need to act to remain competitive.'

Gregory Dolan focused on how licensing schemes could be broadened to support the energy transition. 'Last November,' he reminded us, 'the Maritime and Port Authority of Singapore awarded methanol bunkering licences to three of 13 applicants, valid from 1 January 2026 to 31 December 2030. MPA saw the granting of these bunker licences as a means to implement end-to-end methanol bunkering supply solutions. The granting of such licences provides added quality assurance and a focus on safe handling. Particularly for alternative marine fuels, by offering bunkering licences port operators can turn sustainability goals into concrete commercial success.'

Dr. Prapisala Thepsithar said that she was 'not sure' about the wider take-up of bunker licensing, as she judged that: 'Some major hubs may adopt licensing to improve transparency, safety, and fuel-quality governance, especially as green fuels grow. Meanwhile, other ports may not prioritise it due to administrative burden and enforcement capacity constraints.'

Would mandatory electronic bunker delivery notes (eBDNs) be a positive development for the bunker industry?

The MPA required all Singapore bunker suppliers to issue electronic bunker delivery notes (eBDNs) from 1 April 2025 and other ports may follow suit.

Jesper Sørensen reported that KPI OceanConnect sees this as a positive move, as he explained that: 'The digital and IoT infrastructure required for monitoring and reporting is already largely in place, and mandating eBDNs will accelerate adoption, improve documentation control and reduce manual errors across the bunkering value chain. It also enhances transparency, efficiency and trust between all parties involved.'

'KPI OceanConnect has been actively contributing to the development and adoption of eBDNs and has been leading on this through strategic collaboration. As early as 2024, we worked with Pacific International Lines and SGTraDex to support the integration of digital bunkering documentation into live operations.'

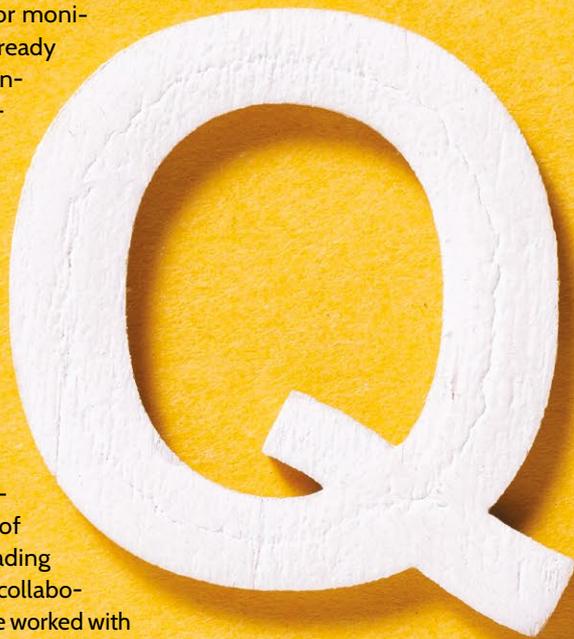
'This work builds on Singapore's position as the first port globally to implement eBDNs and demonstrates how industry partnerships can translate digital standards into practical, scalable solutions.'

Most of our respondents focused on the practical benefits. **Goran Dominiononi** flagged up the 'efficiency gains'. **Allyson Browne** said that: 'Digital bunkering improves traceability, reduces disputes, and lays the foundation for fuel certification, emissions accounting, and a more transparent market. Singapore's move to require eBDNs from 1 April 2025 is a clear signal of where leading hubs are heading.'

For **Kim Rosello**: 'eBDNs are a sensible step forward. They reduce paperwork disputes, improve traceability and sit naturally alongside other transparency measures such as MFMs. Over time, they should make compliance and reporting less painful rather than more.'

Alexander Prokopakis said mandatory eBDNs will 'improve transparency, reduce administrative errors, and streamline reporting processes, making operations more efficient and reliable'.

Dr. Prapisala Thepsithar concurred on the transparency and efficiency benefits of mandatory eBDNs, and added that: 'They enable digital integration, as eBDNs can be more readily linked with other systems (e.g., MFM readings, lab results, and invoicing/ERP platforms), supporting end-to-end digitalisation and more robust record-keeping.'



'eBDNs are a sensible step forward. They reduce paperwork disputes, improve traceability and sit naturally alongside other transparency measures such as MFMs'

Kim Rosello

'This strengthens traceability and data integrity, which will be increasingly critical as alternative and "green" fuels scale up – helping to substantiate sustainability claims, support compliance reporting, and build confidence that the decarbonisation transition is genuine and auditable.'

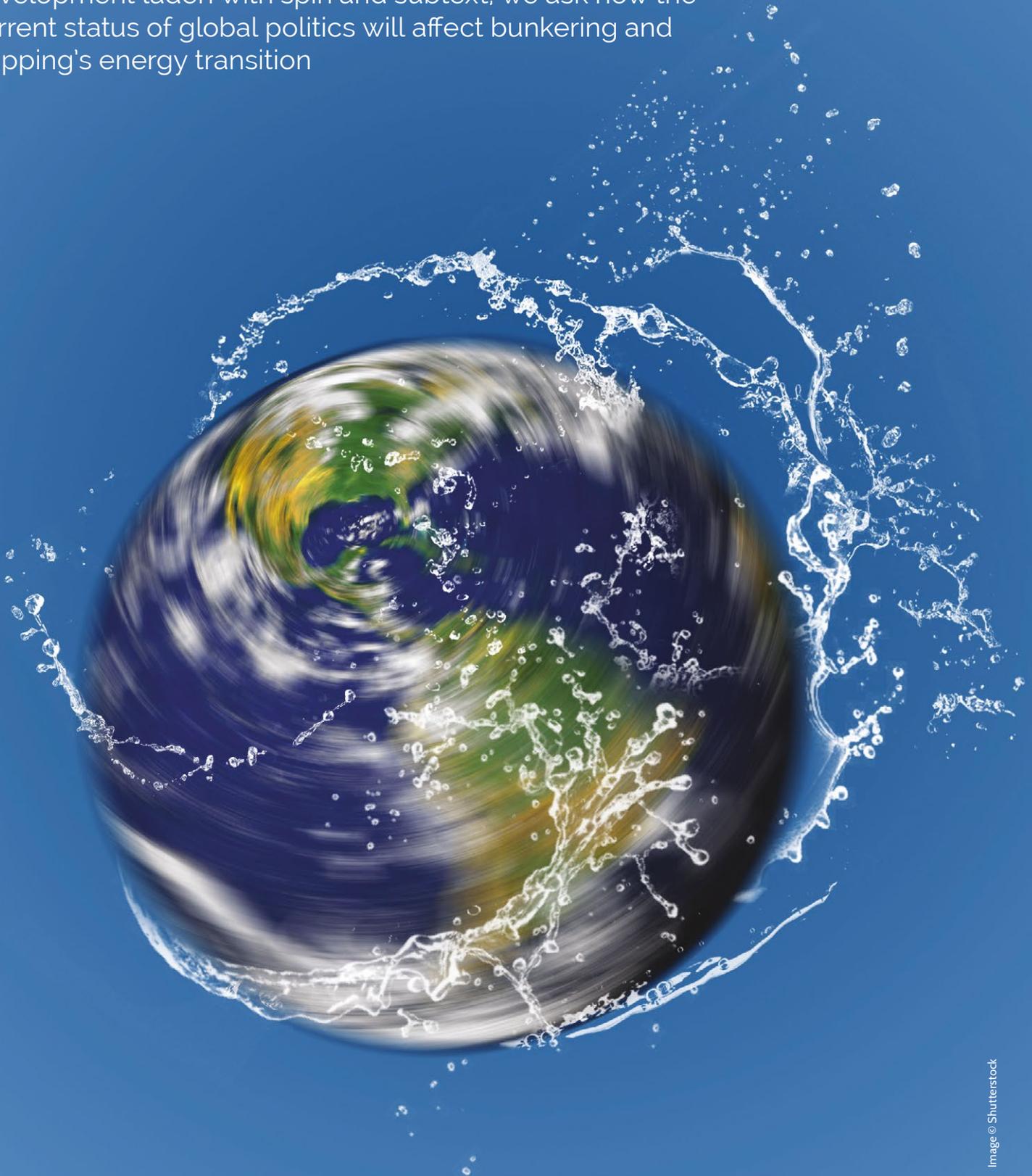
There were some notes of caution.

Adrian Tolson considered the eBDNs are a 'positive and essential longer-term development', but he felt that 'the adoption rates will disappoint'.

Anthony Mollet felt that it was 'too early to tell' whether mandatory eBDNs would be successful at other ports, as he believed that 'we do not have sufficient data and feedback to say at this stage', so 'further research into eBDN performance, claims and outcomes will be necessary to truly understand impact'.

World in a spin

With change coming at an ever faster pace and every new development laden with spin and subtext, we ask how the current status of global politics will affect bunkering and shipping's energy transition



As expected, Donald Trump's second term as US President has precipitated a major shift in the country's policy on climate change and its stance on the International Maritime Organization's (IMO) decarbonisation objectives. Opinions differ over the extent to which the Marine Environment Protection Committee's (MEPC) decision to delay the Net Zero Framework (NZF) can be attributed to pressure from the US delegation, but most believe that it was a factor.

Meanwhile, the conflicts in Ukraine and the Middle East continue, with no immediate likelihood of resolution.

Overall, the global political outlook remains volatile. This makes it difficult for an industry like shipping – which is so closely tied to international trade – to make long- or even short-term plans. But this is a predicament that shipping has faced many times before.

'While the current US President's stance may influence specific policies in the short term, I don't expect it to derail the overall trajectory of global decarbonisation. The momentum is already set, and shipping will continue to move forward, albeit potentially at a slightly slower pace'

Alexander Prokopakis

Will the US President's stance on climate change have a continuing impact on global decarbonisation initiatives – including the IMO's NZF?

This question drew a resounding Yes response from all our respondents.

Allyson Browne made her position clear: 'President Trump is using the bully pulpit to undermine global decarbonisation efforts in very concrete ways: by weakening U.S. climate commitments, signaling retreat from multilateral cooperation, and emboldening fossil fuel interests that seek to delay or dilute international action. This posture has a chilling effect well beyond U.S. borders, creating uncertainty and cover for other resistant member states at the IMO. This dynamic has reinforced the influence of entrenched, fossil fuel-aligned member states determined to preserve the status quo and their stranglehold on the global economy through legacy fuel reserves – a reality that must be confronted head-on in 2026 through the delivery of a credible NZF.'

Davina Hurt was succinct: 'The US President's stance on climate change can have a continuing and significant impact on global decarbonisation initiatives, including the IMO's NZF, given the United States' political influence within international institutions and global markets.'

Adrian Tolson said: 'It's clear that the US administration's efforts derailed the NZF – some opposition jumped on the bandwagon, but the US was driving. The administration's stance will not change and the NZF is likely to be set back significantly (for a number of years?) before returning with a different look.'

'Even countries who became oppositional to the NZF are not denying the danger of climate change and so efforts will continue (as has been predicted) on a more localised level. So this is not the end of efforts to decarbonise shipping but a setback.'

There was some good news. 'On a more positive note,' Tolson continued, 'if I look at the US I do not entirely see it as oppositional to decarbonisation – although motivations are complicated. Export efforts and domestic politics really do favour LNG and biofuels including Bio-ethanol or Bio-methanol, so any role they can play in marine decarbonisation is interesting. The very fact that HR 1986 (Renewable Fuel for Ocean-Going Vessels Act) is even being considered makes one optimistic – perhaps we will all be surprised!'

Diane Gilpin was also looking for the chink of sunlight, but warned that the clock is ticking. 'The US position changes the global mood music,' she said, 'but smart commercial

operators know these things are transitory, have resilience strategies and stick to them.'

'Nonetheless,' she continued, 'it's a terrifyingly dangerous brake on addressing the climate emergency. The science is clear, we'll be breaching the 2015 Paris 1.5°C goal a decade earlier – that is in the next 4 years – than anticipated causing irreversible changes to human health, food supply, water security and economic growth – and so global shipping. Which is why the smart operators stand fast!'

In **Koen Heesbeen's** estimation: 'The stance of a U.S. Administration can have a continuing and material influence on global decarbonisation initiatives, including discussions within the IMO. The delay of the NZF vote at the October MEPC illustrates how differing national perspectives or priorities can affect the pace and structure of multilateral outcomes.'

'The MEPC discussions highlighted that concerns raised by the U.S. delegation, particularly around the design and economic impacts of a global levy-style mechanism, remain an important factor in the broader negotiation dynamic. These concerns, while not necessarily new, are now a prominent consideration for decision makers and market participants as discussions continue.'

'That said, the impact is not one-directional. A U.S. administration can simultaneously oppose a levy-style global mechanism while supporting policies that accelerate decarbonisation via domestic fuel competitiveness, which may steer negotiations toward crediting, portfolio approaches and technology-neutral compliance designs rather than a single global carbon pricing mechanism.'

'The launch of the *American Biofuels Maritime Initiative* (ABMI) reflects this approach. ABMI is a coalition of U.S. bio-energy stakeholders focused on accelerating the deployment of American-produced renewable fuels in the maritime sector, including ethanol, biomethane/bio-LNG, biodiesel and renewable diesel. The initiative positions these fuels as scalable, cost-competitive tools to decarbonise shipping while supporting and growing domestic industry.'

'In this context, U.S. participation may continue to influence how future IMO measures recognise, credit, and incentivise different fuel pathways, particularly those aligned with existing and emerging supply chains. While the global political environment remains volatile, the shipping industry has historically adapted to such conditions, and investment decisions increasingly reflect a range of regulatory and market signals rather than reliance on a single policy outcome.'

● the ship.energy survey 2026: political concerns

Some of our respondents called on other countries to counter-balance the US influence.

Anthony Mollet believed that: 'Donald Trump holds significant political clout with countries he knows he wants onside. We have several more years of his Presidency, years in which EU and other regional powers have to make bold plans and make them happen.'

Lukas Leppert said: 'The USA has made it clear repeatedly that they won't support climate policies. They have withdrawn from a multitude of international organisations working on the topic. We expect them to continue opposing decarbonisation initiatives like the NZF and to put further pressure on the IMO and its Member States. But the USA represents only a single member state, and the outcome of the negotiations will depend on the whole room. The EU, Pacific Island states, and other ambitious states worldwide can counter US influence.'

Em Fenton felt that multinational counter-balancing efforts are already underway, telling us: 'It is without question that when one of the world's largest-emitting countries walks away from international responsibilities on climate change there are global impacts. But what we have seen in the aftermath of this action is an increasingly coordinated and determined multilateral effort to continue forging ahead. That is why there was a delay outcome in October last year, rather than a complete abandonment of the process.'

While acknowledging that 'the US stance on climate change is likely to slow down or weaken global decarbonisation initiatives, including the NZF', **Goran Dominioni** reminded us that: 'COP30 and ISWG-GHG20 show that many countries remain committed to addressing climate change within and outside the shipping sector. In the absence of effective global initiatives, the case for sub-global action (ideally coordinated across jurisdictions) may become stronger.'

However, **Gregory Dolan** pointed out the current US administration does have some allies on the climate issue. 'Unfortunately,' he explained, 'US President Donald Trump is not the only one who views the NZF simply as a carbon tax on marine fuels. Many of the petrostates who also voted to postpone want to maintain the diesel bunker status quo and the expansion of LNG. If the IMO concludes its coffee break in October, it's hard to see Trump and others changing their tune. Further work at the IMO to bring greater technical clarity to the Framework is critical, but we may end up waiting for the

2028 five-year review of the 2023 Strategy as the hook for adoption, which coincides with Trump's exit stage right.'

Gavin Allwright was another who pointed out that Donald Trump is not acting in isolation. 'If we are restricting the comments to "climate change",' he began, 'then of course the US President gives voice to climate change scepticism (i.e. it is occurring

'The US position changes the global mood music, but smart commercial operators know these things are transitory, have resilience strategies and stick to them'

Diane Gilpin

naturally but not human induced) or outright denial, that it is a "hoax" or a "con job".

'However, this is not an isolated, individual view, indeed it is a growing phenomenon once again globally, not just in the US, and if we add in "climate delayers" then we have quite a potent brew pushing back against the drive towards Net Zero worldwide. Donald Trump, as the elected representative of the people of America, is expressing views of a significant portion of the population there and that is having a significant chilling effect. As I write, the US has just withdrawn from a further 66 international, multilateral organisations, including institutions that are critical to scientific and environmental cooperation, such as the UN Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC).

'Will this lead to lasting damage to global decarbonisation efforts? In the short term there is little doubt that is true and 2025 has borne that out, however the question is how resilient are these global institutions

and can the multilateral processes continue to function and more importantly deliver. I am optimistic that they can deliver on the decarbonisation agenda in the medium term, partly because it also makes commercial sense when it comes to the uptake of renewable energy.

'In maritime, whether the current format of the IMO NZF survives or a revised framework is designed, that commercial imperative will remain,' Allwright continued. 'We need to reframe the debate. Currently, the framing of this debate is that we need a huge roll out of new, low carbon fuels and that this is going to be a multi-decade endeavour that will cost US\$1-2 trillion and we will need a substantial price on carbon to deliver this.'

'This has attracted the ire of the US President and his legion of followers. However, harnessing the commercial imperative could fundamentally change this – an emphasis on energy and vessel efficiency (20%+ saving in fuel), voyage and operational optimisation (20%+ saving in fuel) and wind propulsion (20%+ energy provision) would deliver the lion's share of the 2040 IMO goals, while saving money once these measures pay for themselves in a few years, and thus strengthening the bottom line for those operators that implement these changes.'

'That is a pitch that most business people can get on board with, and the President certainly prides himself on being an "astute" businessman. The question then is whether climate change denial is an ideological core belief or simply being used as a convenient lever with which to generate commercial and political advantage in the short term. The answer to that question will help determine the longer term impact of these views.'

Of course, politics moves in cycles. Presidents and their administrations come and go, and political agendas are always subject to change.

**Opportunity Green report:
Global shipping: mega profits, micro taxes**

<https://bit.ly/4qHbeZA>





Alexander Prokopakis believed that: 'While the current US President's stance may influence specific policies in the short term, I don't expect it to derail the overall trajectory of global decarbonisation. The momentum is already set, and shipping will continue to move forward, albeit potentially at a slightly slower pace.'

Will we see further disruption to the shipping and energy industries as a result of the conflicts in the Middle East and Ukraine?

Kim Rosello reminded us that: 'Disruption has always been part of the normal operating environment rather than an exception. Conflicts and sanctions have always routinely affected routing, insurance, fuel supply and costs, and that uncertainty will never go away.'

Allyson Browne said: 'Ongoing conflicts in the Middle East and Ukraine will continue to disrupt shipping routes, insurance markets, fuel pricing, and energy security. In addition, geopolitical uncertainty related to the U.S.'s military action in Venezuela, including sanctions dynamics and supply volatility, remains a persistent risk factor for global energy markets and downstream shipping impacts.'

'Taken together, these pressures reinforce that disruption is no longer episodic but structural. For shipping, this underscores

the urgency of improving resilience through diversification, efficiency, and reduced dependence on geopolitically volatile fossil fuel supply chains.'

Davina Hurt agreed that the conflicts will continue to lead to security risks, price volatility, and supply chain instability – but also pointed out that: 'These disruptions also reinforce the strategic importance of accelerating the energy transition, strengthening resilience while reducing exposure to volatile fuel markets.'

Alexander Prokopakis judged that: 'While tensions appear to be de-escalating (now, at the time of answering), we are at a critical juncture, and I expect the first half of the year will clarify the direction. We all hope the conflicts ease, but the ongoing disruptions continue to impact shipping and the wider energy sector.'

Gavin Allwright urged us to remember the people affected most directly by the conflict and disruption, and 'understand and appreciate the challenge, risk and sacrifice that our seafarers endure daily to keep our global economy ticking over and vital trade flowing'.

He continued: 'We should also never lose sight of the tremendous impact these conflicts have on the lives and livelihoods of the people in the afflicted countries but also in the wider regions – these events are horrific and need to end.'

'Without a divining rod, I think that we are looking at very unsettled and volatile regions that may have periods of relative calm but then interjected with upheavals, escalation and contagion. This unpredictability is very challenging for the shipping and energy industries to read with energy, food and transit pinch points directly affected in these regions. This is also leading to longer term corrosive developments such as the continuation of the shadow fleet operations which undermines trust and safety, illicit fuel trading which unsettles markets and also criminalises crews and the risks to seafarer health and security which have knock on effects in recruitment and retention.'

Aoife O'Leary said that: 'With the NZF hanging in the balance at the IMO, the lack of taxation that the shipping sector pays could come back up the agenda. In our report, *Global shipping: mega profits, micro taxes*, Opportunity Green demonstrated that tonnage taxes allow the industry to pay a lower effective rate of tax than is standard across other industries: the 10 largest companies paid only \$30bn in tax from 2019-2023, creating an effective tax rate of just 9.7%, which is far below the global cooperation tax rate of 21.5%.'

'Turmoil in the shipping industry (lock-down disrupting supply chains, Panama Canal droughts, Houthi attacks) has often

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led to high profits, especially in the container industry. Worldwide governments are looking to secure further public financing as the cost of living continues to bite, so governments might readily identify shipping as an industry not yet paying for its pollution (at least outside of the EU) which also pays little by way of taxation.'

'We are looking at very unsettled and volatile regions that may have periods of relative calm but then interjected with upheavals, escalation and contagion. This unpredictability is very challenging for the shipping and energy industries to read with energy, food and transit pinch points directly affected in these regions'

Gavin Allwright

Anthony Mollet warned that: 'The ability for radical groups in places like Yemen to cause such major disruption seemed too easy and extremely effective. Increasing tension and now protests in Iran could lead to the regime taking action on international shipping in the Gulf and through the straits. I do not think we would be too surprised if this happened. The Dark and Grey Fleet continues to be a significant problem and how companies manage relations and trade with such ships and their cargoes will remain a major focus in 2026.'

Adrian Tolson flagged up just how difficult it is to answer questions of this nature, as there have already been 'lots of changes' since we sent out the survey to our respondents, and there will be 'lots more changes in the coming months'.

And that point leads us on neatly to our next question.

Are we likely to see a new political concern that will affect international trade, shipping and bunkering in 2026?

We'll stick with **Adrian Tolson**, who gave us a rundown of potential trouble spots, topped by Venezuela, Colombia and Cuba, and then followed by Greenland and Taiwan. He added that: 'I'm sure I am forgetting a hot spot or two – I feel we are on a course for increased geopolitical disruption in the next 2-3 years – my imagination is not wide enough to foresee what the impacts might be!'

Diane Gilpin also flagged up Venezuela and Greenland. **Sofia Fürstenberg Stott** did likewise, and added Cuba for good measure.

Rather than singling out any specific concerns, **Allyson Browne** made the general observation that: 'Trade fragmentation through tariffs, industrial policy, sanctions dynamics, or strategic competition over critical inputs remains a credible risk. Disruptions may come not only from physical conflict, but from policy and economic instruments

that reshape trade flows and supply chains quickly.'

Koen Heesbeen also offered a broader perspective. 'While it is impossible to predict specific events,' he said, 'it is reasonable to expect that geopolitical and trade-policy developments could continue to influence international trade flows in 2026, with knock-on effects for shipping and bunkering. Risks may arise from renewed or emerging tensions between major economies, changes in sanctions or tariff regimes, instability affecting key maritime corridors or broader security and cyber considerations. In a sector as globally interconnected as shipping, even localised developments can translate into route changes, cost volatility and shifting fuel demand patterns. This underlines the importance of maintaining flexibility, transparency and resilience across supply chains, while supporting international cooperation and predictable, rules-based frameworks that help markets manage uncertainty.'

After pointing out that 'it's difficult to predict where the next major issue will emerge', **Kim Rosello** emphasised that: 'Much will depend on how current conflicts evolve and how resilient supply chains continue to be.'

Anthony Mollet said that it is frightening to consider what or where the next flash-points might be, but he did offer a few pointers on what might lie ahead: 'If Trump pursues his Greenland policy as he appears determined to do, this could lead China to make new physical approaches on Taiwan which would of course create a new political concern and immediate impact to shipping and trade routes. In today's world, disruption

to international trade appears to be persistent. Before, isolated shocks would affect prices and perhaps relations between a few countries. The multi-layered and more far-reaching problems in 2026 and beyond will cause new problems and harder challenges to resolve.'

Gavin Allwright warned that: 'The relatively settled period of international relations that we have enjoyed since the end of the Cold War has finally come to a pointed end'.

He continued: 'Commentators have stated that many regions are now in a "pre-war" mindset whether that is in relation to the European context or wider afield, where decision making is dominated by national interest, asset protection and risk exposure mitigation. This is the kind of mindset that we would like to be seeing around the climate crisis, but that is not the case. Will that translate into trade wars, cyber conflict or hot war situations is an open question, but the indicators are everywhere that this is becoming the new normal or at least the new expectation and the likelihood of new flash points or the reignition of old ones is growing.'

'Shipping is of course very vulnerable to these developments especially when we list the flash points – we have the Middle East turmoil having affected energy supplies and the Suez transit. The Ukraine conflict has been metastasising with incursions into the Baltic as well as the Black Sea disruption and the energy and grain supply disruption is feeding instability elsewhere. New conflict areas such as the Caribbean/Venezuela and securing the approaches to the Panama

'Countries and companies that have been driving public policy around climate control are now talking more about economic growth needs. The policy pendulum is swinging from renewable green to the almighty monetary green'

Gregory Dolan

Canal, the Taiwan Straits and surrounding region along with the South China Sea could be other areas of disruption in the coming year or two and of course we have the increased geo-political interest in the Arctic and Greenland.'

Gregory Dolan brought us back to bunkering, saying: 'President Trump's aggressive lobbying against the IMO NZF and carbon hoax claims may be indicative of a broader trend. Countries and companies that have been driving public policy around climate control are now talking more about economic growth needs. The policy pendulum is swinging from renewable green to the almighty monetary green.'

We will close this section with an observation from **Alexander Prokopakis**: 'Political concerns are always present, and any new developments could significantly impact shipping, international trade, and, of course, bunkering. With the ongoing situations in Ukraine, the Middle East, and trade tensions, the environment remains fragile. We can only hope that no further escalations arise in 2026.'

If you could have one wish granted for 2026, what would it be?

As is now becoming a tradition with the ship.energy survey, we will gather up the short answers first:

Allyson Browne: 'That the IMO delivers a credible NZF – because the IMO cannot continue to allow delay while the planet burns.'

Jason Stefanatos: 'Regulatory clarity and long-term target setting as essential elements to enable decision-makers to act confidently and drive the industry forward.'

Eirik Ovrum: 'More flexibility in Chain-of-Custody models for shipping fuels in the coming IMO LCA guidelines, going beyond the mass balancing in the EU regulations.'

Carlo Rucci: 'Green fuel production for maritime use reaching FID [final investment decision].'

Goran Dominioni: 'The continued functioning of multilateralism within MEPC and the full recognition of its value.'

Dr. Sian Prior: 'Progress to be made on a mandatory approach to reducing emissions from Arctic shipping of black carbon. It's been on IMO's agenda now for 15 years – it's time to take action, and to start reducing shipping's Arctic impact.'

Kim Rosello: 'A genuine focus on moving small modular reactor technology from discussion into implementation. That means less resistance to change, fewer institutional roadblocks, and more alignment between

regulators, industry and policymakers around practical progress.'

Alexander Prokopakis: 'To see strong collaboration among all stakeholders in the shipping and energy sectors, coupled with continued investment in people. Building skills, knowledge, and partnerships will be key to driving progress and meeting the industry's goals.'

The wishes are getting a little longer now.

Andrew Dumbrille: 'That the IMO includes a people- and nature-centered approach to setting rules for global shipping, and requires that shipping routes and operations are governed with Indigenous and coastal community consent and leadership. This approach would ensure marine biodiversity is protected and local harms like air pollution, noise, spills, and disruption to food security and livelihoods fall fast.'

Davina Hurt: 'That future generations will one day look back and recognise this as the moment we chose to act – not because every pathway was perfectly defined or every framework fully settled, but because the consequences of waiting were far greater than the risks of moving forward with a framework.'

Anthony Mollet: 'Clarity over chaos! Clear global standards (fuel specs, safety rules, certification, and documentation) to reduce growing fragmentation across ports and regions.'

'Investment confidence – suppliers, bunker traders, shipowners, and ports to finally have the certainty needed to invest in infrastructure for new fuels and green initiatives.'

Gregory Dolan: 'Let's keep our vision on the horizon. The shipping industry can't afford to let the IMO NZF postponement

that preserve the spirit of ambition and justice that the IMO committed to in their 2023 Greenhouse Gas strategy. That outcome would cement this year as the year that multilateralism, justice and climate action prevailed.'

Dr. Prapisala Thepsithar: 'That the maritime industry's transition to zero- and near-zero fuel shipping goes beyond a series of pilots and becomes a normal, repeatable business across at least a few major corridors and that the IMO framework is clear and strong enough for companies and countries to stop waiting for regulatory certainty and start building solutions and infrastructure at scale.'

Diane Gilpin: 'FastRoute, the ITTC validated wind propulsion prediction tool, becomes the de facto standard for verifying commercial performance from wind propulsion. It gives the market confidence to adopt wind, unlocks the cost savings for owner/operators, rapidly reduces GHGs and delivers energy security in this increasingly uncertain world.'

Some of our respondents went into more depth in explaining their wishes and also revisited their lists from the 2025 survey.

'Last year,' **Gavin Allwright** reminded us, 'my wish was for a global price on carbon, so I won't repeat that one. I would say that my wish for this year has been touched on in one of my earlier answers. That wish is for the shipping industry and policy makers to pivot and throw their sustained weight behind the pathway of least resistance to decarbonisation – an emphasis on energy and vessel efficiency (20%+ saving in fuel), voyage and operational optimisation (20%+ saving in fuel) and wind propulsion (20%+

'What's needed now is less procrastination and more planning. Compliance should not be treated as a last-minute regulatory exercise, but as part of a broader commercial and operational strategy'

Jesper Sørensen

serve as an excuse to lose momentum. Continued leadership from fuel producers, ports, bunkerers, shipping companies, banks, insurers, NGOs, trade associations, and politicians is needed to keep the industry heading in the right direction.'

Em Fenton: 'The resumed MEPC ES.2 session to witness the adoption of the NZF, along with a suite of associated guidelines

energy provision).

'These collectively deliver these impactful reductions quickly and not only at zero-cost over the mid-term, but actually make money for shipowners by reducing fuel consumption over the medium term. This approach should also integrate seafarers at the core of the energy transition ensuring safety and resilience and also should

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support the delivery of these solutions to LDCs and SIDS ensuring a “Just and Equitable Transition”.

‘The new fuels will of course need support in the mid- to long-term and provision needs to be there for those. However, we must remember that climate change, the ocean emergency and bio-diversity loss do not follow a linear, gentle pathway but rather leap forward in a series of cliff edges and tipping points. All pollutant emissions are cumulative and compound over time, thus early reductions have a far higher value than ones delivered later in the 2030s or 2040s. This approach also buys time for new technologies and ensures that we get the transition right first time as there are no prizes for second place in this Year of the Horse.’

Koen Heesbeen was hoping for ‘a clear, globally aligned pathway that makes maritime decarbonisation truly investable, so ambition translates into action at scale.’ He continued: ‘That means an internationally coherent framework, grounded in robust MRV, high-integrity certification and predictable demand signals that rewards real emissions reductions and gives fuel producers, shipowners, charterers, ports and bunker suppliers the confidence to commit, build and deliver.’

‘As a market participant active across environmental commodities and renewable fuel value chains, STX aims to bridge policy intent and commercial execution. Our wish is a level playing field where transparent rules let markets do what they do best: mobilise capital, scale credible solutions and accelerate the transition for all actors. And the prize is bigger than our industry: because shipping underpins global trade and everyday supply chains, getting this right means cleaner air and lower

emissions without sacrificing reliability or affordability, stronger energy security, and a transition that society can trust, proving that we can decarbonise in a way that is practical, fair and genuinely transformative.’

Caspar Gooren went for a double request: ‘We would like to see two changes to EU regulations in 2026 and beyond. Firstly, there is evidence, for example from *Rystad*

‘If 2026 can provide a stable regulatory direction, the industry will respond and continue turning ambition into real action on the water’

Alexander Döll

Energy’s 2025 report, that the EU overestimates methane leakage in LNG marine fuel supply chains. The study, using certified data from the upstream infrastructure supplying maritime, finds that the average well-to-tank emissions are 4.6 gCO₂e/MJ lower than the EU uses in FuelEU Maritime. Using certified data would not only enhance the accuracy of these figures but also ensure clean supply chains are recognised and rewarded. If default emissions factors continue to be used, they must be regularly updated to reflect the reality.

‘Secondly, we hope to soon see policymakers at the Dutch Ministry for Infrastructure and Water Management allow European green gas and mass balancing via the terminal route. The terminal route – the import of green gas via the grid and its liquefaction at LNG terminals – is a sustainable, cost-efficient, verifiable, and scalable way of delivering LBM and e-methane.’

Gooren continued: ‘The European Commission is currently reviewing the harmonious implementation of the revised Renewable Energy Directive (RED III) and has reiterated its support for the terminal route. The commission highlighted that LNG

and biomethane are recognised as part of the same product group, allowing them to be part of the same mass-balancing system within the integrated infrastructure. Germany and Belgium allow this route, and we hope the Dutch review will reflect the EU’s stance soon. Breaking down this barrier to a fungible biomethane market will help to ensure The Netherlands can offer green fuels at a competitive price.’

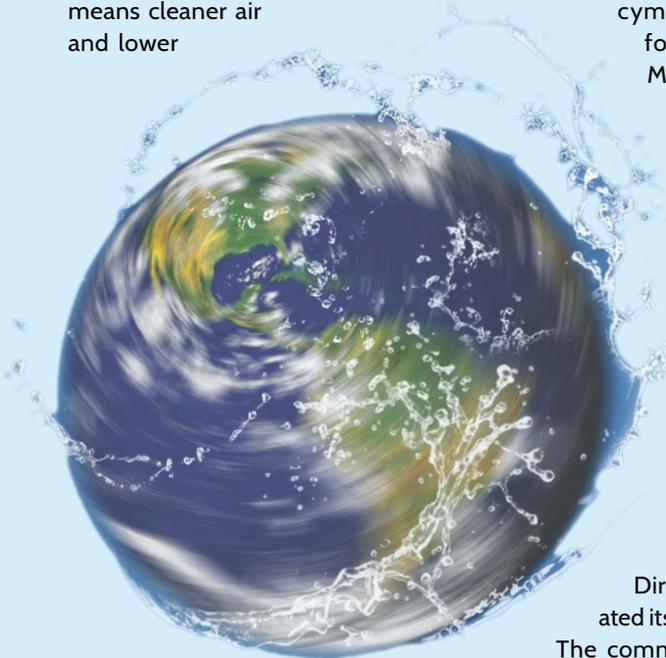
Jesper Sørensen wanted to see the shipping industry ‘stop postponing decarbonisation action and start acting with intent’.

He explained that: ‘As FuelEU Maritime approaches the end of its first compliance cycle, we are already seeing a familiar pattern: companies delaying action, borrowing at high cost to cover compliance gaps, or accepting penalties as a short-term work-around. We saw the same dynamic with EU ETS, where lack of preparation ultimately proved more expensive than early engagement. Kicking the can down the road does not remove the obligation; it simply narrows future options and increases cost and risk.’

‘What’s needed now is less procrastination and more planning. Compliance should not be treated as a last-minute regulatory exercise, but as part of a broader commercial and operational strategy. Cost is often cited as a barrier to paying for carbon emissions, yet after paying fines, non-compliant operators still have to pay their carbon costs. Fines are not an alternative to compliance, and this needs to be understood otherwise the cost of doing business will be crippling for many shipowners and operators.’

John Bergman was looking for ‘deeper partnerships and more collaboration and planning on alternative fuels’. He maintained that: ‘As fuel options multiply and regulatory expectations evolve, the challenge is no longer just choosing the “right” fuel, but designing long-term strategies that account for system integration, safety, crew readiness, maintenance and future adaptability. This is where experience and collaboration add real value. A Finnish saying captures it well that “well planned is half done” – careful, early planning reduces risk, costs and creates the flexibility operators need, particularly at a time of uncertainty.’

‘Stronger partnerships between shipowners, fuel producers, technology providers, system engineers and beyond can turn complexity into progress. By sharing expertise, aligning on long-term goals and planning together, the industry can move faster, invest with greater confidence, and build resilient solutions that support safe, compliant and sustainable operations well beyond 2026.’





Pekka Pakkanen called for ‘deeper collaboration globally to incentivise decarbonisation’, because he believed that: ‘Working with partners is essential not only to deliver tailored solutions, but to innovate together and push practical implementation further. Wind-assisted propulsion is a good example: while it can significantly reduce marine fuel consumption on its own, its full potential is realised when close collaboration with fleets and wind-assisted propulsion system manufacturers is combined with effective voyage optimisation and advanced weather routing.

‘In the case of maritime decarbonisation, the scale of the challenge is too great for companies to tackle alone. At NAPA, solutions are typically developed in close cooperation with end users and partners, ensuring they reflect real operational needs and deliver measurable value in practice. Through this approach, shipping can become more efficient, better optimised and safer, while making meaningful progress towards long-term sustainability’.

Alexander Döll said that: ‘If I could have one wish granted for 2026, it would be regulatory clarity that gives the industry confidence to keep moving forward.

‘Shipping is being asked to balance commercial realities and day-to-day operational

demands with long-term decarbonisation goals, at a time of economic uncertainty, geopolitical tensions and rapidly evolving regulations. That combination is testing the industry’s resilience. What shipowners and fuel suppliers need is not perfection, but a clear and credible framework that allows them to make investment decisions with confidence.

‘Above all, my wish is that the industry does not slow down or lose focus while waiting for that clarity. Too much progress has already been made, and the need for decisive, collective action has never been greater. If 2026 can provide a stable regulatory direction, the industry will respond and continue turning ambition into real action on the water.’

Adrian Tolson said that he would like to see the shipping industry ‘stay on the decarbonisation path; accept a delay for some years; go ahead with regional efforts; and then force maritime nations to come together when the political winds are with us to create a net zero viable path.’

He added: ‘IMO still fulfills a role – perhaps not creating incentives but pushing more stringent GHG requirement on owners, etc. Let logic and what is possible rule and determine small victories such as biofuels in the US (fingers crossed).

‘We will get more victories as the weather gets odder and the summers get hotter.

‘Above all I wish for politicians and people to realise that our main energy focus should be “electrons not molecules”.’

(For those of us who are not so well-up on our particle physics, this phrase means we should switch our focus from the combustion of physical matter (molecules and fuels) to the generation and use of electrical charges (electrons and energy).)

Tolson concluded with some thoughts on IBIA, telling us: ‘We have made great strides this decade. We are at the table and will continue to be. Lots of challenges ahead for the board but I think we can lead on supply chain transparency, digitalisation, etc., future proofing the important last mile, without losing focus on any IMO developments.’

We didn’t exhaust all our stock of short and snappy answers at the top of this list. Instead, we kept back this cracker from **Sofia Fürstenberg Stott**, whose wishes for 2026 are: ‘More solutions-oriented, less BS. More curiosity, more empathy.’

We hope that this year’s survey answers have excited your curiosity and engendered some empathy. Many of our respondents have focused on finding solutions rather than dwelling on problems – and we have at least tried to keep the BS to a minimum!