

BUNKERSPOT

BUNKERSPOT SURVEY 2023

A WORLD OF CHANGE?



INSIDE:

MIDDLE EAST BUNKERING
RISK MANAGEMENT
FUEL SMUGGLING
MARKET FOCUS: PERU



A matter of opinion

With so much going on in 2022, and 2023 likely to be just as eventful, we have presented the findings of the latest *Bunkerspot* annual survey in a series of separate, but interconnected, articles that will in turn focus on the ramifications of the war in Ukraine; the ongoing energy transition; marine fuel availability, quality and pricing; and political changes within the bunker industry

The defining moment for 2022 came on 24 February when, after months of sabre-rattling, Russia invaded Ukraine. A military operation which Russia's military strategists believed would be all over in a matter of weeks or even just days has since dragged on for months and may well pass its first anniversary without any sign of resolution.

This conflict has dominated the political agenda and also exerted a huge influence on the energy markets, sending oil and natural gas prices skyrocketing. The war also played its part in ratcheting up bunker prices. The price of high sulphur fuel oil (HSFO) in Rotterdam was about \$400 a tonne in mid-December 2021, but it surged vertiginously in the days following the invasion to peak at around \$740. Although bunker and crude prices have since eased down, they could shoot back up very quickly if the situation in Ukraine takes a turn for the worse and/or Russia decides to take some sort of drastic action.

Meanwhile, the pressure to act on climate change is continuing to build. 'Just Stop Oil' protesters, and the tabloid journalists who delight in tracking their movements, have

mostly focused on the aviation and road sectors rather than the maritime world and have stuck to gluing themselves to roads and racing cars rather than bunker barges. However, the better-informed NGOs are very aware of shipping's climate-impact and are, quite rightly, holding the industry to account.

The United Nations COP27 Climate Change Conference, which took place in Egypt in November 2022, was packed with maritime-related side-events and presentations. But will this translate into action? It is sometimes said that COP is where they talk the talk and, for maritime purposes, the IMO's MEPC is where they walk the walk, but did 2022's MEPCs 78 and 79 take us much farther forward?

And alongside all the worry about saving the planet from global war and warming, the bunker industry has had to keep calm and carry on with the more mundane issues involved in getting fuel onto ships. Fuel quality specifications, bunker suppliers' licensing, mass flow meters, credit management – these may not be stuff of mainstream media headlines, but they are vitally important to the bunker industry.

And so, without further ado, welcome to our 2023 *Bunkerspot* survey.

CONTRIBUTORS

Our pool of contributors for the *Bunkerspot* New Year survey represented 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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Words of war

We begin our *Bunkerspot* 2023 Survey with a look at the impact of the war in Ukraine

Russia's invasion of Ukraine was the headline story of 2022 and it is continuing to be a key factor in the world's energy markets – and so we made it the starting point for our survey questions. **The war in Ukraine has now been raging for a year. On 5 December, the European Union's sanctions on Russian crude oil exports came into effect, and sanctions on Russian oil products then followed on 5 February. Do you expect that the conflict – and the global community's sanctions on Russia – will continue to be a key factor for energy security and prices in 2023?**

Gavin Allwright of the *International Windship Association* believed the conflict has already had a profound impact – with more to come: 'The impact of the Ukraine crisis outside of the horrific human toll will likely be one of the defining events of the 2020s in Europe and worldwide. This impact will continue to be felt on a number of levels; the direct impact of sanctions and supply constrictions will drive prices higher and where markets have marginal pricing structures even a small amount of very expensive energy in the mix will keep prices high. However, a milder winter to date, reasonably well stocked reserves and growing efforts to diversify energy supplies are starting to show dividends on lowering wholesale prices gradually over the past month. The indirect impact on the markets is far harder to quantify, however it would seem that some of the risk and uncertainty has now been

priced in the mid-term. The elephant in the room is how will energy markets react if more strain is loaded on to a vulnerable situation. The uncertainty and risk of the conflict escalating and/or spreading further, the addition of another global energy crisis sparked by climatic conditions or conflict elsewhere, tightening of sanctions or some other black or grey swan event suggests that there will be instability in the energy markets in 2023.'

'Geo-politics and its impact on trade lanes for all kinds of shipped commodities will get ever more important in 2023'

Peter Sand, Chief Analyst, Xeneta

The Marine Fuels Alliance's **Anthony Mollet** was concise: 'Despite the end of winter in continental Europe, the strict sanctions and tightening of grip by Western nations on the Russian elite will no doubt continue and, therefore, the flow of energy from Russia will remain limited and impact price markets and trade patterns.'

Industry veteran and *Oxford Bunker Course* leader **Nigel Draffin** took a similar line, with more focus on natural gas: 'The loss of Russian gas supplies to Europe will continue the call on long haul and medium haul LNG imports to Europe from gas fields unaffected by sanctions

and it will take time for Russia to find routes to gas markets not affected by sanctions.'

Glander International Bunkering's Carsten Ladekjær pointed out that the world will not only have to adjust to the loss of Russian energy, but also Ukrainian grain: 'The ripple-effects of the Russia-Ukraine conflict will continue to make their mark well into 2023 and most likely beyond. Both countries have significant influence on world trade

and energy flows. Ukraine with their historical production and exports of vital grains, products & goods in general and Russia with their history of being one of the world's largest exporters of oil and gas products.'

2050 Marine Energy's **Adrian Tolson** pointed out that there are still many uncertainties: 'I think the relative price volatility and volatility between individual product prices will lessen as we become more adjusted to a temporary new normal with a war that grinds on. What could disrupt all this is a war that doesn't grind on as we predict and comes to

quicker resolution (good or bad) – although I think it unlikely that this changes the trajectory of sanctions policy. But how all this plays with a European and US recession and a booming post-Covid China – that's total guesswork!

Drew Marine's Albert Leyson offered a pragmatic perspective: 'Energy markets have a dynamic way of stabilising themselves, and in most cases, opportunities arise that benefit both the buyers and sellers, regardless of their position on the conflict.'

Xeneta's Peter Sand believed that the Ukraine situation has shown that 'geopolitics and its impact on trade lanes for all kinds of shipped commodities will get ever more important in 2023' As a consequence, we will see more being done 'in order to make supply chains more resilient, regardless of the root cause'.

For many environmental NGOs, the conflict in Ukraine and its impact on the energy market has highlighted the risks of relying on fossil fuels. **Elissama Menezes** of 'Say No to LNG' maintained: 'Even if we set LNG's environmental and climate costs aside, current geopolitical instabilities make it imprudent to consider further investments in fossil fuels altogether – including LNG. While Europe and the US are stepping up their plans to phase out (Russian) gas, it makes little sense for the shipping sector to increase its reliance on fossil gas. Gas – both in a natural form or liquefied – is risky, expensive, and will always remain volatile depending on global markets. Using more LNG as a shipping fuel would only contribute to global dependence on fossil fuels, further empowering exporting countries and potentially autocratic regimes.'

Diana Gilpin of the **Smart Green Shipping Alliance** felt that the conflict was putting more wind in the sails of the renewable energy sector: 'Russia's invasion of Ukraine has alerted people to the risks of exposure to imported fossil fuels. When supply is constrained by aggressive geopolitical acts fuel costs go up. Homegrown renewables like wind and solar whether they be for a nation

or on a ship give much better energy security and limit exposure to volatility in fuel markets. Going forward into a low emission future, primary renewables (wind, solar) provide a buffer against the considerably higher cost of secondary renewables (fuels made using wind or solar). This fuel price shock coupled with new IMO regulations has seen a significant uptick in commercial interest in wind-assist to improve assets commercial resilience.' Gilpin added that the conflict has not only affected the price and availability of oil and gas – but also other materials, such as aluminium, with an unfortunate knock-on effect for the Smart Green Shipping Alliance: 'We are building our first test FastRig, an automated, intelligent wingsail assessed to be able to save 20%+ fuel/GHG out of steel and aluminium,' explained Gilpin, but now: 'Price and availability issues for these materials in the global supply chain have made this more challenging. Ukraine was a key supplier of aluminium and this war affects global supply and price.' **In addition to being big oil and gas exporters, Russia's key energy companies also own, or part-own, refineries in other countries. Some European governments have taken on a 'trusteeship' role in a bid to ensure that these refineries can continue to be supplied with crude oil from non-Russian sources, as well as supporting efforts to find new, non-Russian owners. Do you expect that this will have an impact on the energy markets and fuel availability in 2023?**

Most of our respondents sidestepped this question – perhaps because it was a little too speculative and beset with too many unknowns. Among those who did venture an opinion, **Ladekjær** reasoned: 'Any continued disruption to past trade- and supply-flows of energy products is bound to have an impact of sorts. If there is one thing that we must learn from this conflict, it should be that uncertainty creates volatility and volatility can lead to supply-disruptions.'

For **Allwright**, this situation highlighted the fragility of our energy security: 'It is unclear how this will play out and whether this will have a major impact, however it does feed into the uncertainty in the markets and highlights the fundamental lack of diversity and resilience that the energy structures in Eastern and Central Europe in particular have.'

Draffin believed that the need to reduce the market's reliance on Russia will be significant because: 'Whilst alternative crude supplies will be available, this is also long haul and will command a price premium.'

Tolson felt that the Russian-owned refineries in EU countries are not 'significant enough in capacity to have a major impact' and added: 'I don't expect these assets will ever be returned to Russian ownership. If they are state owned or with some connection to the state, then I am sure they will be sold to be used for the rebuilding of Ukraine post war.'

Do you think that the high prices and concerns over natural gas availability that we saw in 2022, exacerbated by the Ukraine conflict, and the constraints on natural gas supply from Russia, could have a long-term impact on the take-up of LNG-fuelled vessels?

We asked this question because, while shipping companies continued to order more ships capable of running on LNG in 2022, it was reported that many of the dual-fuel vessels currently in operation were mainly running on fuel oil (rather than LNG). Furthermore, on 26 January (after all respondents had completed their

questionnaires) the Port of Rotterdam revealed that LNG bunker sales at the Netherlands bunker hub in 2022 were just 328,000 cubic metres (cbm),

'The ripple-effects of the Russia-Ukraine conflict will continue to make their mark well into 2023 and most likely beyond'

*Carsten Ladekjær,
CEO, Glander International Bunkering*



Carsten Ladekjær

which was down 45% on the 604,000 cbm delivered over the previous year.

Many of our respondents felt there may well be a long-term impact on LNG bunkering – but this was certainly not a unanimous view.

Ladekjær felt that LNG bunkering was still set for further growth, and he saw this as a positive development: 'The uptake of LNG paused in 2022 due to the current elevated gas prices. LNG can provide an immediate reduction in CO₂, has become increasingly available over the past few years, and through the potential inclusion of bio and e-methane may provide a valuable option for the long term decarbonisation of our industry.'

Steve Esau of **SEA-LNG** said: 'If 2022 was anything to go by then 2023 should be another strong year for LNG-fuelled vessel orders despite exceptionally high LNG prices and concerns over natural gas availability as seen in 2022.'

'Almost all new LNG-fuelled vessels being ordered are dual fuel, meaning that they have the option to run on LNG or traditional marine fuels, depending on cost but also compliance related issues. This dual fuel optionality has considerable commercial value.'

'Pressures on availability of LNG are likely to ease as more supply comes online in 2024/25. Longer term, compliance issues, such as the introduction of the IMO's CII, FuelEU Maritime and the inclusion of shipping in the EU ETS, are likely to become key factors in driving shipping companies' investment decisions. Here LNG is uniquely placed as the only scalable solution that offers immediate local and greenhouse gas emissions reductions and a pathway to decarbonisation through bio-LNG and renewable synthetic e-LNG.'

Draffin also believed that the recent high prices will not be a long-term inhibitor on LNG bunkering. 'The basic economics of gas extraction and the rebalancing of supply routeing will ease the prices in the medium term and the transitional benefits of LNG will re-assert themselves in the next couple of years,' he reasoned. 'All LNG fuelled ocean-going vessels are dual fuelled so they will stay with burning conventional fuels until the economics become balanced. Remember that under Tank to Wake, LNG has a CO₂ advantage and the high-pressure injection engine vessels have negligible methane slip.'

Drew Marine's **Albert Leyson** was another who believed that: 'The flexibility that dual-fuel vessels offer is a long-term investment especially in maintaining a ship's resale value.' But he added that: 'We still need more supply of green LNG.'

Like Esau, DNV's **Christos Chryssakis** focused on the order book: 'Despite very high

LNG prices over the past 18 months, approximately one third of the tonnage ordered in 2022 was with dual fuel LNG capability, excluding LNG carriers. This was mainly driven by large containers and PCTC vessels last year, but there was ordering of large tankers and bulk carriers with LNG as fuel in 2021. For these vessels LNG provides significant benefits both in terms of EEDI and CII, and sustained compliance with FuelEU Maritime rules. In parallel, the price of natural gas should normalise over the second half of this decade as additional production capacity comes online. Projections show that LNG fuel for ships should become competitive again by 2026 which aligns quite well with the delivery times for newbuilds ordered now.

'Russia's invasion of Ukraine has alerted people to the risks of exposure to imported fossil fuels'

Diane Gilpin, CEO, Smart Green Shipping Alliance

'The uptake of LNG as a marine fuel is an important step in the decarbonisation of shipping because it offers savings of approximately 15-20% in carbon emissions. In addition, the benefits in terms of reducing other emissions to air, especially particulate matter, which is attracting increasing scrutiny, are significant.'

'In the future LNG can be replaced with bio- or e-LNG, to further reduce emissions and ensure these vessels comply with future GHG requirements. Most of the vessels ordering LNG as fuel today are very large ones, using 2-stroke engines with low or no methane slip, while technology for reducing methane slip from smaller engines using exhaust gas after-treatment systems is also in development.'

Tolson said that: 'To add a dual fuel option to a new build vessel seems an affordable hedge for alternative fuel choice'. But it isn't all plain sailing for LNG: 'The shortage of LNG has had some conflicting impacts. Firstly, it's taken away the assurance that LNG will be the cheapest option to reduce CO₂ emissions – now it is rivalled as a choice by biofuel, reducing overall fuel consumption, carbon capture

and even potentially green fuels as choices. LNG was a choice that had an environmental impact – but now it's an expensive choice that has some (limited) environmental value and this will rattle confidence in choosing it for engines.'

'Secondly,' continued Tolson, 'this same price rise has shattered the investment proposition for many LNG bunkering options – what looked like a small and steady build of LNG bunkering volume in major ports is much less certain. It's hard to come up with a reasonable investment scenario for LNG infrastructure – except perhaps in low priced Henry Hub-based US markets.'

'Thirdly, and admittedly contradictory to the previous point, Europe has spent the last 10 months creating LNG import infrastructure not to support bunkering but to keep the lights and heat on. One assumes we will see more and more of this to move ahead away from Russia and provide Europe with an option prior to an accelerated decarbonisation agenda. This level of infrastructure will obviously help LNG bunkering – not that barges will get built but there will simply be more LNG and more LNG storage around – so one can imagine this might create a boom in LNG bunkering.'

Pulling all these strands together, Tolson said that: 'How all this plays out for long term LNG bunkering is uncertain – it's under severe pressure right now – but it could end up being an easier alternative in Europe in the future.'

But if LNG bunkering does continue to grow, Tolson posed the question: 'Is this a good thing?' And his answer was not a whole-hearted endorsement: 'LNG is not a solution for overall GHG emissions as we know and I am quite doubtful that bio-LNG will be available and segregated in such a way so as to become a shipping only solution. My guess is that bio-LNG will find its way into LNG supply improving GHG issues for LNG as a whole but not doing much for shipping. My feeling is that dual fuel ships will still be built and run on LNG and perhaps bio-LNG when they are cheap or available – but that the Russian shock will create an increased emphasis on finding a non-LNG alternative in the greener fuel category.'

'Overall, I think higher prices will shorten the time span and adoption of LNG as a bunker fuel – perhaps for those of us that used to see LNG as 10% of the bunker market by 2030 will now have to adjust this to a lesser percentage. LNG is now seen as much less reliable – not only in its availability but also in its GHG credentials – and on the margin this will discourage longer term adoption.'

Some of respondents were in no doubt that the price increases of 2022 made LNG bunkering a less attractive option – and, to borrow

a phrase from Shakespeare's *Hamlet*, they see this as a consummation devoutly to be wished.

Say No to LNG's **Menezes** noted that: 'With the Ukraine war exacerbating the tightening supply of natural gas since mid-2021, further pushing up LNG prices, more dual-fuel LNG-capable ships (i.e., ships that can choose to use fuel oil or LNG) are switching to using conventional fuel.'

After flagging up the steep drop in Rotterdam's bunker sales volumes in 2022 she continued: 'The war in Ukraine is showing no sign of ending soon. Climate concerns have led many nations to replace coal-fired power generation and/or home heating with gas-powered units. There are reasons to expect a tight supply of LNG will continue, and the price of LNG will remain higher than fuel oil for some time. Hence it's time to reconsider the actual CO₂ and clean air benefits of new LNG bunkering infrastructure.'

We will consider the environmental arguments regarding LNG bunkering in depth in our next section of the Survey, but in her response to this question Menezes said that she would welcome a halt in LNG bunkering's development because: 'LNG is risky and is incompatible with the Global Methane Pledge led by the USA and EU and signed by more than 100 countries at COP26, aiming to cut methane emissions by at least 30% below 2020 levels by 2030.'

Also picking up on LNG's methane emissions, **Allyson Browne** from the **NGO Pacific Environment** argued that: 'High prices and availability concerns aside, LNG poses significant risks to our climate, environment and the health of communities neighbouring LNG extraction, production, storage and consumption – including at ports bunkering LNG for ships. Ports and the shipping industry must focus investments on zero-emission ships, fuels and technology in order to eliminate their emissions by 2040.'

And her conclusion was adamant: 'At a time that we need to be drastically reducing and eliminating our greenhouse gas emissions – including CO₂ and CH₄ – we cannot have the global shipping industry investing in this false solution.'

Allwright said that 'the high prices and instability in the markets in 2022 will certainly have an impact on decision making around LNG', but he believed that it is 'the deliberations around how to assess carbon equivalency emissions that will likely have the more lasting impact'. While LNG is 'still viewed by much of the industry as the only mature alternative fuel option for decreasing emissions on a Tank to Wake basis', continued Allwright, it doesn't fare so well on a Well to Wake

basis. He also noted that: 'There seems to be a fairly healthy order book for LNG vessels and the potential for bio-LNG and other potential fuels that could be blended or use part of the existing infrastructure gives this fuel choice continued legs in the industry.'

Mark Williams of **ship.energy** and **Shipping Strategy** also expected to see 'bio LNG and synthetic fuels creep into the marine fuels market', which could both increase LNG's availability and 'green' credentials (for some people, at least). In Williams' estimation: 'LNG is the gateway fuel to bio and efuels, so I think it's a good thing even though LNG is a fossil fuel.'

Mollet considered that the Russian conflict had clearly affected the price of LNG, but there was less certainty on LNG bunkering's environmental impact. He noted the irony that: 'It

'Naturally, if the conflict was to finish there would be a massive boom in shipping and bunkering much as we saw after the first and second Gulf wars as Europe and US would seek to rebuild Ukraine and its economy. But at this moment this is pure wishful thinking – the conflict needs to end!'

Allwright told us: 'I can't see any major change on the horizon with both sides pretty well-entrenched in their positions and only indications of escalation at present. There may be a window for compromise given the international nature of shipping and the grain agreement that was reached, but 2023 doesn't seem to be a lucky year ahead – perhaps exhaustion on both sides may lead to some stability later in the year.'

Williams said that 'conversations with cli-

'Despite very high LNG prices over the past 18 months, approximately one third of the tonnage ordered in 2022 was with dual fuel LNG capability, excluding LNG carriers'

*Christos Chryssakis,
Business Development Manager, DNV*

seems just as the world made a conscious turn and shipowners secured investment for LNG and dual-fuelled ships, so conflicting and contrasting information and reports have emerged about the "clean" status of burning LNG.'

Do you expect that the Ukraine conflict will continue to have a major impact on shipping activity, and bunkering, in the Black Sea in 2023?

As one might have expected, all our respondents felt that the repercussions will continue. **Draffin** summed up the prevalent view: 'Until safe passage in the Black Sea can be assured, bunkering there will continue to suffer.' **Sand** warned that: 'If the war goes sour – then the business in Black Sea will be even more impacted than today.'

Ladekjær agreed: 'As long as the Black Sea remains to be part of a conflict zone and as long as sanctions are in place, it will continue to have a deep impact on shipping, bunkering and trade in general.' As did **Browne**: 'Economic activity in the region will continue to suffer from the conflict, and shipping and bunkering are no exception.'

Tolson lamented that the region 'will clearly take years to return to "normal" even after any conflict is over', and added:

ents in the region' suggest that 'steel shipments have collapsed from Ukraine and have fallen from Russia', and there is 'overall less shipping activity in Black Sea so the bunker market is affected.' He added that: 'This will last beyond the hot stage of the war, which may end up a frozen conflict with Ukraine unable to evict Russian forces from all occupied territory but Russia too weakened for the occupation of all of Ukraine.'

And finally, wrapping up this section of the Survey, **Mollet** said he expected to see a continuing impact which he believed will be 'down to several factors, not least the insurance headache for operating vessels in the Black Sea'. He continued: 'Product availability and presumably a drop in the number of ships going to the Black Sea for what was traditional and regular trading of goods (e.g., grain). It is more likely operators will seek to source bunkers elsewhere and reduce any time spent in Black Sea ports at such an uncertain time, with military operations happening at sea and in the air around the region. The level of checks bunker suppliers are having to make – or should be making – on all counterparties presently adds burden and time to normal trading and sales functions.'

In transit

In this section of the *Bunkerspot* Survey we invited our panel of experts to focus on the maritime world's energy transition



No survey on the current state of play on bunkering would be complete without a round-up of shipping's efforts to reduce its emissions through increased efficiency and the migration to new, cleaner fuels.

Shipping's decarbonisation was, of course, top of the agenda at the 79th meeting of the International Maritime Organization's (IMO) [Marine Environment Protection Committee](#) (MEPC 79) in December 2022 – and it was also a key talking point at the United Nations 27th Climate Change Conference (COP27) in Egypt in November.

In the months leading up to these gatherings, we saw a growing interest in (and commitment to) the concept of Green Shipping Corridors, as well as more shipping companies exploring the possibilities of 'alternative' marine fuels, electric propulsion, fuel cells and wind propulsion – which prompted our first question in this section of the survey: **Do you believe that, taken together, COP27 and MEPC 79 represented significant progress for maritime decarbonisation, and do you expect more progress at this year's COP28 in the UAE and MEPC80?**

Nigel Driffin questioned whether real progress was made at last year's COP27 and MEPC 79, but hoped for better things from this year's meetings: 'COP27 and MEPC79 had very limited impact but did give some direction which should allow the subsequent meeting to progress coordinated action on both the UNFCCC objectives and the decarbonisation of shipping. The MedSECA [Mediterranean Sulphur Emission Control Area] is a positive development but in view of the large coastal populations and the NOx contribution to GHG we need to see rapid movement to including the NOx Tier 3 in the Med area.'

Glander International Bunkering's **Carsten Ladekjær** took encouragement from 2022: 'Last year's events were all positive in advancing shipping's decarbonisation agenda. In some ways last year was setting the scene for 2023, when we expect some potentially very significant developments on this front, in particular around MEPC 80 and IMO's revised GHG Strategy.'

DNV's **Tore Longa** was looking forward to MEPC 80. 'MEPC 79 was never intended to be a meeting that was making any decisions on future GHG ambitions and regulations,' he explained. 'Therefore, MEPC 79 was, as expected, an extensive exchange of views on the scheduled revision of the IMO GHG Strategy. We expect that MEPC 80 in July will be a key meeting

and that a revised Strategy that strengthens IMO's GHG reduction ambitions will be released, as well as a preliminary decision on which further measures to develop, likely a carbon pricing scheme combined with a technical well-to-wake GHG fuel standard.

'Regarding COP,' Longa continued, 'these meetings may not have a direct impact on shipping regulations, but the side events have resulted in several interesting outcomes, in particular the [Clydebanks Declaration](#) on Green Corridors, the [Maritime Just Transition Task Force](#) at COP26, and the Green Shipping Challenge at COP27. We expect we could also see similar initiatives emerge

'The current CO₂-centric approach to shipping decarbonisation at the IMO has involuntarily increased methane emissions from shipping'

Elissama Menezes, Climate and Shipping Consultant, Global Director, Say No to LNG

from COP28. On other environmental topics, biofouling and black carbon may possibly see further progress.'

Elissama Menezes of Say No to LNG gave her take on proceedings: 'At COP27, efforts to reduce methane and other GHG emissions were put forward. Canada and the United States agreed to continue collaborating to reduce methane emissions from their respective oil and gas operations. There was also a joint Declaration from Energy Importers and Exporters on Reducing Greenhouse Gas Emissions from Fossil Fuels – Canada, the United States, the European Union, Japan, Norway, Singapore, and the United Kingdom.'

Focusing on the MEPC, Menezes added: 'The current CO₂-centric approach to shipping decarbonisation at the IMO has invol-

untarily increased methane emissions from shipping. However, there are several opportunities to include methane emissions in the IMO regulatory framework and current GHG reduction strategies discussions, including the marine fuel life cycle GHG assessment guidelines (MEPC 78), market-based measures, and methane slip in EEDI Phase 4 (ISWG-GHG 7/3 and MEPC 75/7/10).

'The outcome of the ISWG-13 and MEPC79 during the first two weeks of December was summarised in a draft text for the Revised Strategy that will guide the next policy development steps at the IMO (ISWG 14 and 15 and MEPC 8). There was strong support in the room from various countries for a more ambitious strategy, meaning a 1.5-aligned decarbonisation vision, a comprehensive well-to-wake approach to GHG reduction, and an equitable and just transition, so no one is left behind.'

Marie Cabbia Hubatova of [Environmental Defense Fund](#) told us that she would have liked to have seen 'more practical solutions put forward in 2022, as it would make this year's negotiations much easier'. Nevertheless, she believed that: '2023 will be a crucial year that will show whether shipping is a progressive, forward-looking sector ready to take responsibility for its own climate impact and support the global push toward decarbonisation. It is imperative that IMO strengthens its greenhouse gas strategy, bringing it fully into alignment with achieving 1.5°C temperature goal of the Paris Agreement, with strong yet practical short and mid-term targets

and measures. Additionally, it is not enough to achieve decarbonisation by itself.

To be truly responsive to the needs of civil society, the measures must also be fully protective of public health and sensitive ecosystems. Sustainable solutions to the climate crisis are

those which protect worker and community health in ports and on ships and which do not harm aquatic life or diminish biodiversity.'

Drew Marine's **Albert Leyson** believed that 'taken together' last year's COP and MEPC gatherings 'represented progress' – but exactly how significant this progress was 'remains to be seen in future amendments and interim ambitions between 2030 and 2050'.



Elissama Menezes

Leyson continued: 'For certain, future technology research and advances will shape additional measures that can be considered. I would like to have see more progress on regulating black carbon and fine particulate matter emissions, and limiting their direct potential warming contribution in the arctic as well as in the top of the atmosphere, perhaps starting with the atmosphere above existing ECAs.'

Allyson Browne of Pacific Environment agreed that we saw some key developments in 2022 – while history could be made over the coming year. 'COP27 saw many advancements for shipping,' judged Browne. 'At the World Leaders' Summit on 7 November, Norwegian Prime Minister Jonas Gahr Støre and US Special Presidential Envoy for Climate John Kerry chaired the launch of the Green Shipping Challenge. This US and Norway joint initiative encourages governments, ports and private sector companies to prepare commitments to spur the transition to green shipping.

'Countries, ports, and companies made more than 40 major announcements addressing innovations for ships, expansion in low- or zero-emission fuels, and policies to help promote the uptake of next-generation vessels. Secretary John Kerry summarised the historic significance of these commitments, highlighting that: "In Paris, no one talked about shipping."

'A few days later, President Biden reinforced the imperative to tackle emissions from the shipping sector during his presidential remarks at COP. He called on leaders to step up and accelerate action to "permanently bend the emissions curve ... That's the duty and responsibility of global leadership."

'At MEPC 79,' Browne continued, 'we were encouraged to see growing support from member states for a strengthening of the 2050 level of ambition and to include interim checkpoints, as well as an agreement for IMO to further consider measures to reduce the impact of Black Carbon emissions from ships operating in the Arctic. However, shipping decarbonisation must happen on a fast timeline to avoid the worst impacts of climate change. The IMO's

current greenhouse gas strategy to halve emissions from ships by 2050 is not aggressive enough. We must decarbonise fully by no later than 2040.'

Browne concluded her answer with a call for action: 'We look forward to MEPC 80 when the IMO has the opportu-

nity to achieve a historic moment by finalising a revised GHG strategy that leads the shipping industry into a zero-emissions future.'

For **Gavin Allwright** of the International Windship Association: 'MEPC 79 and COP 27 were always likely to be way points on the journey.' And this, Allwright argued, 'can certainly be taken as a failure as the need for swift and decisive action is ever more critical and there were no fundamental, shipping related decisions made'.

Allwright continued: 'This is compounded by the fact that even after a year of unprecedented climatic events there is still a general reluctance to squarely adopt a zero-emissions approach. This is not the time for a flawed net-zero approach or simply adopting zero-carbon measures; we have to adopt a holistic view of all emissions, whether those are direct or indirect greenhouse gases (GHG), whether they are climate forcers such as black carbon or like noise, VOC or other

Emissions Trading System] incorporating shipping soon and other national initiatives. I would say that MEPC80 will be a very significant pivot point for the industry with the adoption of the strategy and mid-/long- term measures, however there is still much work to do to bridge the gulf between the two camps in the deliberations and that will take guarantees of significant support to minimise impacts and the equitable distribution of revenues from MBMs [market-based measures] etc.'

Allwright added that he was 'less optimistic that the COP process is providing leadership with fine words stymied by entrenched vested interests or inertia from existing practices, infrastructure and so on. We have less than a decade of carbon budget left to remain within striking distance of limiting global warming to a 'relatively' safe 1.5°C and even at that level many LDC/SIDs will be significantly impacted and in many cases uninhabitable. The window for incremental, gradual and rel-

'2023 will be a crucial year that will show whether shipping is a progressive, forward-looking sector ready to take responsibility for its own climate impact and support the global push toward decarbonisation'

Marie Cabbia Hubatova, Director of Global Shipping, Environmental Defense Fund

pollutants that have a catastrophic effect on the ocean ecosystem and thus feed into the carbon sequestration and so on.'

However, Allwright was not despondent, as he pointed out that: 'Progress is being made in shipping, which has always been designated as a hard-to-abate sector and one that historically moves slowly. COP26 was something of a watershed moment, with a whole raft of initiatives launched or committed to and if you compare the shipping industry appetite for change in 2018 and today, there is really significant work underway.'

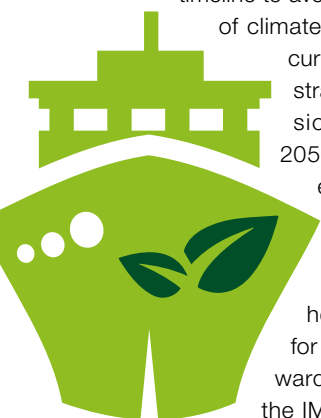
Allwright flagged up 'the growing interest in the Green Corridors initiative' as a good example of this and also noted the 'profusion of pilot projects around alternative fuels'.

'Some meat is being put on the bones,' he continued, 'but there has to be a step change in delivery. The EEXI [Energy Efficiency eXisting Ship Index] and CII [Carbon Intensity Indicator] will help move the needle, complemented by the EU ETS [European Union

actively low-cost change is rapidly closing and the climate impacts are only increasingly likely to be delivered in bursts, tipping points and crisis. The longer we wait, the more painful and more abrupt our actions will have to be.'

Xeneta's **Peter Sand** kept his answer brief: 'The COP did little – it's within the IMO the real work is done. Patience is required, but real progress is made. EEXI and CII are two solid examples of measures taken en route to reaching the main goal in 2050 and beyond.'

Diane Gilpin of the Smart Green Shipping Alliance pointed to the ticking clock and warned us that: 'Neither COP nor MEPC represents significant progress when measured against Intergovernmental Panel on Climate Change (IPCC) recommendations which advises emissions must be reduced by half by 2030 to stay within 'safe' levels of warming, as "limiting warming to around 1.5°C (2.7°F) requires global greenhouse gas emissions to peak before 2025 at the latest, and be reduced by 43%



by 2030; at the same time, methane would also need to be reduced by about a third.”

Touching on a theme that will be explored in depth later in this survey, Gilpin also maintained that: “Decarbonisation” is a term that limits ambition and allows other damaging fuels, such as LNG, which emits methane which is an 80+ times more potent greenhouse gas than carbon, to be presented as “cleaner”. The narrative must shift from “carbon” to “greenhouse gasses”.

There was also an interesting moment of connection between our respondents, as Gilpin argued that ‘UN agencies are being superseded by commercial action’, and **Mark Williams** of ship.energy and Shipping Strategy told that: ‘Generally I am not confident that inter-government discussions can move as fast as commercial actors can; the industry is already frustrated, waiting for the regulators to catch up.’

Chris Chatterton of The [Methanol Institute](#) felt that, while ‘many issues were tabled and expertly debated at length’, there ‘didn’t seem to be much in the way of “progress” at MEPC last year, ‘unless we consider that awareness was raised around CII shortcomings.’

Helpfully, Chatterton outlined what he would like to see: ‘Since we continue to assess alternative fuels and decarbonisation on a TTW [tank to wake] basis, then why not just place a limit on CO₂ at least (with the expectation that additional GHG will eventually be included, such as PM and NOx), similar to SOx, but attach a minimal, global carbon tax. The carbon tax could be adjusted upwards by flag States if they are willing to push their fleets further in the decarbonisation process, providing “incentives” for those who will decarbonise further than just the minimum levels. The CO₂ in question could also easily be made available as a “CO₂ equivalent”, furthering lowering emissions. Thus, it would be simply understood, immediately impactful and effective.’

2050 Marine Energy’s **Adrian Tolson** said that we saw ‘gradual’ but ‘not significant’ progress last year. ‘2022 was a highly disruptive year and perhaps we all anticipated that COP27 and MEPC79 would

remake the world with one stroke of the pen. So, from this point of view there would always be disappointment. We saw progress and given that 2022 didn’t do much else to progress the world we should probably be happy that decarbonisation was not totally abandoned for a philosophy of “drill baby, drill!”.

‘The confirmation of the MedSECA was important,’ Tolson judged. ‘From a bunkering point of view it is quite exciting in that in the relative shorter term it will remake the Med bunker market and provide lots of business opportunities. Equally important to immediate bunkering concerns and opportunity was the Fit for 55 package – marine fuels inclusion in the ETS has to be seen as a major disruptor for shipping and bunkering and almost as significant is the potential for a tax on bunker fuel variable between different states. Overall, less competitive and more complicated bun-

‘We expect that MEPC 80 in July will be a key meeting and that a revised Strategy that strengthens IMO’s GHG reduction ambitions will be released’

Tore Longa, Principal Consultant, DNV

kering in Europe – probably bad for shipowners but good for suppliers and consultants!’

We have seen a number of governments, port authorities, industry players and environmental groups lobby for Green Shipping Corridors as a way to kick-start nurture maritime decarbonisation, and a number of corridors have already been announced. So our next question was:

Do you see Green Shipping Corridors as a positive development?

This question was met with a predominantly positive response – although **Leysen** brought a dose of scepticism to the discussion, saying that: ‘Green Shipping Corridors are about as positive a development as any of the numerous eco labels that have been applied to sustainable seafood.’ But he conceded that: ‘They can certainly serve as one way to

kick-start pockets of decarbonisation corridor initiatives around the world as they await the establishment of more ECAs.’

Tolson was cautiously optimistic, as he felt that ‘everything is a little short on detail’. He continued: ‘My guess is that many are agreeing to this with no real idea as to what they are actually going to do or as to whether the Green Shipping Corridors are achievable. With real commitment and investment these are very interesting; but without this, they could be virtue signalling.’

Glander International Bunkering’s **Ladekjær** was emphatic: ‘I definitely like the idea of green corridors. In order to mobilise the green transition it makes good sense to kick-start it with some green hubs which can be front runners leading the way for others to follow. The shipping-industry will need billions if not trillions to decarbonise and it will take time. Therefore, in order to achieve the ambitious goals, and to prove the commercial viability of new solutions, the task will have to be solved piece by piece. I see green corridors as exactly that.

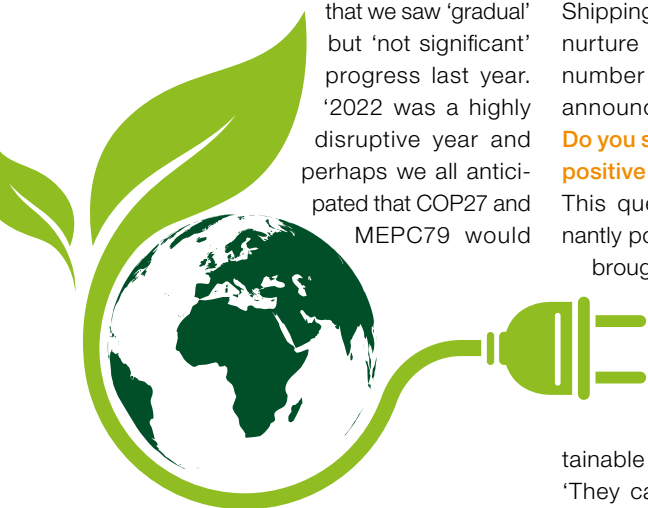
‘Once infrastructure and investments are made to facilitate a green corridor there are bound to be positive synergies and knock-on effects for adjacent port and industries as well. In order to decarbonise, the world must come together across industries and across geographical areas and countries.’

Draffin explained the concept and considered how it could be further developed: ‘Green shipping corridors aim to target routes with a high traffic density so making a greater impact on the total marine CO₂ emissions. Whilst this is an NGO led initiative, if supported by member states it can be expanded to areas rather than just fixed routes.’

Intent Communications’ Namrata Nadkarni, who chairs the Alternative Fuels Working Group for the [World Ports Climate Action Programme](#) (WPCAP), concurred: ‘While not the complete answer to decarbonising shipping, Green Corridors are good test beds to explore commercial, technical, technological and logistical factors that can then be scaled up for wider adoption.’

In **Sand’s** view: ‘Having these dedicated sand-boxes for carriers and operators to try it out to its full extent by 2027 is a very useful push. For the global shippers of containerised goods, it will also prove to be a relevant and much needed benchmark, for the cost involved in decarbonising the maritime supply chains.’

Chatterton said the Corridors are ‘absolutely’ a positive development. ‘Without these “test beds”,’ he explained, ‘we cannot accurately propose limits, estimate potential efficiency gains, or economics. Those willing to adopt risky investments



into lower carbon, alt fuels, should be rewarded for their pioneering efforts.'

Greg Dolan, also from The Methanol Institute, added some detail: 'The Green Shipping Corridors concept recognises that ports are vital to shipping's energy transition and their role in a net carbon neutral future is set to grow as more of the fuels needed to support a low carbon industry are produced in port locations. The concept is founded on the availability of low and carbon-neutral fuels at set points in the global logistic chain, giving owners confidence that the fuels they need will be available to bunker their vessels. In 2022, we saw ship-owners investing billions of dollars for orders of newbuild dual-fuel methanol vessels.

'Containerships, chemical and dry bulk carriers, Ro-Ros, and cruise ships set to operate on methanol will need to bunker fuel. While

emission fuels, because they allow for the multitude of barriers hindering the global uptake of zero-emission fuels (such as risk, costs and supply) to be addressed and resolved on a manageable scale. By focusing on a specific green corridor, the technical, practical, organisational, legal, political, and financial barriers can be identified and overcome by engaging and involving the relevant stakeholders, rather than on a global scale.'

And the benefits can be shared and passed onto other regions. 'Realising green corridors allow critical learnings to be generalised, applied, and scaled to a regional and global scale though diffusion,' said Endresen. 'The global proliferation of LNG-powered and battery-electric vessels, that built from the national interests of one country, expanded into the wider region, then onto the global arena, show how this can succeed in practice.

to evaluate the way we think about sustainable development and the environment beyond climate to help us build resilient, future-proof ports with flourishing communities.'

Browne was sure that 'Green Shipping Corridors are key to accelerating the zero-emission transition for shipping', because they show that 'collaboration between local and national governments, ports, and local communities is extremely important, as each of these players has tremendous power to drive the political will, funding and infrastructure needed to get us to zero-emission shipping.' And Pacific Environment, she told us, is already involved: 'Our Ports for People campaign's mission is to move ports from hotspots of fossil fuel pollution to thriving hubs of sustainable economic development and environmental protection. Our Ports Playbook for Zero-Emission Shipping calls on ports to make commitments, adopt policies and take progress actions towards shipping decarbonisation, with green shipping corridors as a key commitment for ports to make. In November 2022, we launched a new initiative to evaluate port progress on shipping decarbonisation, including work on green shipping corridors. In December 2022, we published a paper that builds on the green shipping corridor model: Beyond Corridors.'

Ana Laranjeira of **Opportunity Green** agreed that: 'Green Shipping Corridors are a positive development, and they have great potential to spur innovation and accelerate the decarbonisation of the shipping sector.' But she also emphasised the importance of the 'Equitable Transition', as 'we'll also want to ensure that these projects are well spread out across different geographies, and not overly concentrated in the Northern hemisphere'.

Wrapping up this section of the survey, **Allwright** said: 'On the whole, it is a positive development, but that opinion is delivered with certain caveats as we need to be mindful of what the green corridor is designed to deliver and for whom.'

Allwright gave a detailed response which could easily form the basis of a full *Bunkerspot* article in its own right. But here we will pick out his point (of particular importance to the IWSA) that we need to take an 'energy-centric', rather than just a narrow 'fuel-centric' view – so a 'consideration of wind propulsion technologies and currents should be incorporated into these corridor developments'.

With apologies to Allwright, the survey then took a decidedly fuel-centric focus, with a comparison of the contenders vying to replace today's conventional marine fuels.

In the light of developments in 2022, which of the alternative fuels do you think is now

'We look forward to MEPC 80 when the IMO has the opportunity to achieve a historic moment by finalising a revised GHG strategy that leads the shipping industry into a zero-emissions future'

Allyson Browne, Climate Campaign Manager, Ports, Pacific Environment

methanol storage capacity is widely available at more than 100 of the world's leading ports, our focus in 2023 will be in developing bunker solutions at key ports across the major shipping corridors to support the vessels set to launch this year and the next 2-3 years.'

Williams believed that Green Shipping Corridors can 'move the dial' and 'demonstrate that zero carbon shipping can be a reality'. He elaborated: 'They are practical experiments and therefore massively useful for learning. They will be an iterative process – we learn by doing. Where there are mature routes with homogenous cargoes, they can be developed quite fast – e.g. China-US for containers, W Australia – China for iron ore, Saudi-China for oil. They fit best with the liner business model though, as the liners know how much fuel they are going to need, when, and where.'

DNV's **Øyvind Endresen** was upbeat, assuring us that: 'We have already seen positive examples, going back to the short green shipping corridor established by Norled with the battery-powered ferry *Ampere* in February 2015.' For Endresen: 'Green Shipping Corridors can become key enablers to accelerate the uptake of zero-

'The Clydebank Declaration clearly demonstrates the political ambitions to establish green shipping corridors and the many announced initiatives (e.g. <https://greenshippingchallenge.org/cop27>) and plans similarly demonstrate the eagerness of industry actors to follow up on these ambitions. However, realising these ambitions will still take a great deal of work and cooperation.'

Cabbia Hubatova also wanted to see ambitions turn into action. 'Green corridors have the potential to play an important role in shipping's decarbonisation,' she said. 'However, if shipping is to decarbonise at the pace needed, we do not have time to waste. Proposed corridors must be something more than simple demonstration projects. There is an imperative to move swiftly to full scale deployment of ships and fuelling infrastructure across all major shipping segments and across all major global trade routes. Additionally, green corridors should be planned in a coordinated manner and developed with port communities in mind. Opportunities to improve air quality and reduce other local environmental impacts must be designed into projects. Done right, green corridors offer an excellent opportunity

the 'most likely' to replace traditional bunker fuel by the IMO's 2030 and 2050 GHG emissions reduction deadlines?

Anthony Mollet of the [Marine Fuels Alliance](#) gave us the shortest answer to any survey question: 'Biofuels.' **Leyson** also believed that 'biofuels are the front runner'. **Tolson** considered that all the vying alternatives will replace conventional marine fuels 'to a certain degree' – but the question is which will dominate? 'Short term,' he added, 'it's BIO and LNG (BioLNG if they can get it). Methanol seems to be in the lead as the green solution. Ammonia is still favoured; but I can't help believing that carbon capture solutions might curtail this progress (when – and if – it comes).'

Draffin picked out ammonia and methanol as the most likely fuels, adding: 'I see methanol overtaking LNG and ammonia growing from about 2028. However, both of these will need a real commitment to production of these from feedstock other than natural gas and coal.'

Williams gave a whistle-stop round-up: 'Bio diesel is not available in sufficient volumes. Ammonia is too toxic. H₂ is too far in the future. LNG is here today with bio and e-LNG to follow. Methanol is relatively safe to handle and ship. Yards are already building methanol-capable MR tankers in anticipation of increased trade.'

Chatterton expected to see: 'A bit of biofuel, with methanol now coming into the picture very strongly, yet LNG continuing to be taken up as ports and politicians have already sold themselves out on it unfortunately. Bio LNG may be something like biofuel – minimal at best.'

Steve Esau of SEA-LNG said: 'The industry will require a basket of fuels to meet emissions reductions targets by 2050. No one alternative fuel will completely replace traditional bunker fuel by the IMO's 2030 and 2050 GHG emissions reduction deadlines. Each fuel has its own advantages and disadvantages, but the front runner will likely depend on a number of factors including cost, availability, infrastructure, safety and regulations.'

'LNG combined with EEDI and potentially EEXI design measures can already meet current IMO 2030 targets for decarbonisation. The use of drop-in bio-LNG and renewable synthetic e-LNG, as and when it becomes available, mean that IMO 2050 targets are in reach.'

'LNG and its bio and synthetic derivatives offer significant advantages over other alternative fuels. LNG has a proven safety record, which benefits from operational experience, and it virtually eliminates SO_x, NO_x, and particulate matter. It also has a higher energy density than other alternative fuels – an important commercial consideration.'

'Other alternative fuels such as methanol, ammonia and hydrogen face the

common challenge of building the necessary production, transportation, storage and bunkering infrastructure. By contrast, LNG, bio-LNG and renewable synthetic e-LNG can all leverage existing infrastructure. Further, bio-LNG is among the most cost-effective alternative marine fuels, cheaper than biomethanol and electro-fuels, including e-methanol and e-ammonia.

'Ammonia as a marine fuel faces the following specific challenges. Ammonia-fuelled engines are in the early stages of development – there is great uncertainty relating to issues such as the quantities of pilot fuel (which needs to be green for net-zero) that will be needed; emissions of nitrous oxide

'While not the complete answer to decarbonising shipping, Green Corridors are good test beds to explore commercial, technical, technological and logistical factors that can then be scaled up for wider adoption'

*Namrata Nadkarni,
Founder and CEO, Intent Communications*

– an extremely powerful GHG, and dangerous ammonia slip. Ammonia is highly toxic and significant safety challenges for crew, bunker operators and port communities will need to be overcome for it to become a viable marine fuel. Ammonia has half the volumetric energy density of LNG which means larger fuel storage and less space for cargo.

'As regards to methanol, it is toxic (neurotoxic and hepatotoxic) and highly flammable with flammability limits far greater than those for LNG and ammonia. These risks coupled with the lack of experience for methanol as a marine bunker fuel result in safety challenges for crew members and bunker operators. It also has 2.5 times lower mass energy density as compared to LNG that means less cargo carrying capacity in order to maintain the same cruising range. The high cost and currently low availability of

renewable (bio and e-) methanol will also be a significant hurdle to be overcome for it to become a commercially viable maritime fuel.

'As for hydrogen,' Esau continued, 'hydrogen-fuelled engines and fuel cells are in the early stages of development. It is both highly flammable and very difficult to contain, representing a significant safety challenge for crew members and bunker operators. Both compressed and liquid hydrogen have very low energy densities – one quarter to one third of that of LNG, and tanks are extremely expensive because of ultra-high pressures (up to 700bar) / ultra-low temperatures (-253°C) needed.'

'Carbon-neutral fuel solutions will not arrive in a big-bang process, factors including fuel production, infrastructure for transportation, storage and bunkering, as well as engine technologies need time for development. Decarbonisation pathways, like the one offered by LNG are likely to take place incrementally as the carbon intensity of fuels are reduced over time by the addition of net-zero drop-ins. When looking at which fuels will replace fuel oil, the implications of each fuel's entire pathway must be understood.'

INTERTANKO's Dragos Rauta was also positive about LNG: 'While the availability of future fuels is still unknown, shipowners are planning for newbuildings with zero emission capability, allowing for changes in e-fuel availability during the vessel's lifetime. Although considered a transitional fuel, LNG currently appears to be the best option for owners to both reduce their GHG footprint and build e-fuel "ready" vessels. For sea-going ships, LNG seems to be the only available option for the near future.'

Some of our respondents were definitely not in favour of LNG. **Browne** was emphatic: 'Pacific Environment and its Ports for People campaign continues to push the shipping industry to end its reliance on fossil fuels and focus on transitioning to zero-emission electric and fuel solutions. We strongly oppose all fossil fuels – including LNG – and any fuels with fossil fuel feedstock. Now is the time to electrify everything with renewable electricity and to decarbonise what we cannot electrify with well-to-wake (WTW) zero-emission fuels.'

Cabbia Hubatova also focused on the importance of a WTW perspective: 'I think we will see a combination of fuels, and the forerunner will vary for different shipping segments. All fuels must be considered on a full lifecycle basis, including non-CO₂ greenhouse gases, black carbon and hydrogen's climate-warming effect. Moreover, we need to look beyond climate and consider a fuel's wider impact on the environment and human health. Each fuel has its pros and cons, whether it's

limited feedstock for biofuels and synthetic hydrocarbons, toxicity of ammonia or climate impact of hydrogen. The important point here is that we do not shy away from developing a full understanding of each fuel's total impact and design and implement regulatory frameworks and industrial operating practices that maximise benefits and minimise harms. This said, we take a dim view on LNG as a shipping fuel. Because of the methane emissions associated with the production and delivery of the gas, as well as onboard fugitive emissions, it offers no climate benefit over conventional fuel and has poor energy density.'

Nadkarni told us: 'I think there will be regional trends with individual fuels – with some gaining favour (particularly if there are government incentives) and others seen as not suitable for certain ports, which will diminish their appeal. Methanol, biofuels and LNG have a more immediate appeal – but there is strong support for hydrogen as a long-term solution – provided the costings work out.'

Continuing the 'no one size fits all' theme, **Mikael Wideskog** of **Wärtsilä Marine Power**, said: 'There is no silver bullet that will replace traditional bunker fuel, not least in the timeframe set for shipping to decarbonise.'

'The scaling up of low and zero-carbon fuels is moving in a positive direction but given the time that it will take for future fuel infrastructure to develop, vessels looking to reduce emissions immediately will most likely opt for LNG or drop-in fuels at least for the foreseeable future.'

'LNG as a marine fuel immediately reduces emissions, compared to fuel oil, and ensures compliance with other emissions reduction regulations – for example the IMO's global sulphur cap – while also leaving the door open to carbon-neutral options – such as bio-LNG, synthetic LNG and ammonia.'

'Drop-in renewable fuels will also be important in the short to medium term – particularly as blends. Without the need to modify engine components or refuelling infrastructure, drop-in biofuels and biogas are a viable way of lowering emissions without a capital-intensive fleet renewal or retrofitting.'

'Long term, the International Energy Agency (IEA) estimates that in maritime transport, up to 40%-45% of the energy consumption of ships may be covered by renewable ammonia in 2050.'

Wideskog continued: 'Unlocking the potential of these fuels will be driven by engine technology, which is Wärtsilä Marine Power's core focus. 2022 saw the launch

of two multi-fuel engines that allow complete fuel flexibility. Wärtsilä W46TS-DF and Wärtsilä 25 are dual-fuel engines capable of operating on diesel, LNG, or either gas or liquid carbon-neutral biofuels. They are centred on taking fuel efficiency to a new level to offer a futureproofed solution for ship owners to reach decarbonisation targets in future.'

'Wärtsilä 25 is intended to be the first Wärtsilä engine to run on ammonia as a fuel – which is also emerging as a viable pathway for decarbonisation. Technology development is currently underway at Wärtsilä with a technology concept likely to launch this year, followed by planned product release soon thereafter.'

'Methanol is another attractive option as it offers simple handling and storage, reliable combustion and can be carbon-neutral fuel when produced from renewable sources or captured carbon. Since 2015, Wärtsilä has already converted methanol-fuelled engines

'Marine fuels inclusion in the ETS has to be seen as a major disruptor for shipping and bunkering'

*Adrian Tolson, Owner,
2050 Marine Energy*

for Stena Line. More recently, we have introduced our Wärtsilä 32 methanol engine and developed MethanolPac that will cover the full scope of supply for onboard methanol fuel systems. This year will see a commercial newbuilding methanol engine in service.'

'The final step on shipping's journey to the IMO's GHG emissions reduction targets will be the use of clean fuels, either in whole or blended with conventional fuels or alternative power sources. The technology is available for full decarbonisation, but action is required sooner rather than later if we are to achieve it.'

Jesper Sørensen of **KPI OceanConnect** Singapore also called for a broader perspective: 'There is no single solution for achieving shipping decarbonisation – there will be multiple pathways for meeting the IMO's Greenhouse Gas (GHG) emissions targets as different fuels will be suited to different vessels and operational conditions.'

'The key is to create viable pathways

that are safe, cost effective and ultimately deliver GHG reductions reliably, which will be dependent on the viability, availability and bunkering infrastructure of future fuels.'

'In the short term (eight to 10 years), we are looking at biofuels and LNG as the most viable transitional fuels.'

'Currently,' continued Sørensen, 'biofuels have key characteristics that support the decarbonisation trajectory, including their ability to be used as a drop-in fuel within existing infrastructure, and in being compliant with regulations. Biofuels are currently the most progressive alternative fuel in Asia. However, there is still some reluctance to invest in sustainable biofuels due to their current high costs and global availability; many ship owners are currently not willing to pay this price until regulations are tightened or if there is further pressure from customers who are committed to driving sustainability into their supply chains.'

'LNG has a lower CO₂ coefficient compared to liquid fossil fuels used in shipping and has strong availability worldwide. That is why an increasing number of new-builds are using LNG engines, as it opens the door to fuels of the future with easy retrofits. However, while promising as a future fuel, methane slip from LNG remains an issue due to its high impact as a GHG. As LNG prices skyrocketed in early 2022, the market has been highly volatile, but its potential to reduce emissions through its ability to operate as bio-LNG, synthetic-LNG or in dual-fuel engines shows it to be a viable option to move shipping towards meeting the IMO's goals.'

'In the medium to long term, the industry is looking towards ammonia and methanol. However, ammonia is not yet commercially available, and will not have a biofuel option, but it is starting to gain traction as it can be considered zero-carbon if produced from renewable sources. Some bigger players in the market are investing heavily in methanol as a future fuel, however there is much more that needs to be done to bring it online.'

'Hydrogen will be the basis of many future fuels, produced by a process of electrolysis of water using renewable energy to ensure it is carbon neutral. As a result, around four-fifths of the cost of future fuels will come from the same source.'

'Defining which alternative fuels will be most common will be dependent on how our partnerships are structured and built with clients, suppliers and vendors. Central to this is utilising our in-depth knowledge of the future fuels market and the multiple pathways available to support our customers through the transformation. We will continue to closely monitor the developments of alternative fuels to ensure



we are providing the right products and transitional and future fuels solutions for customers, whether they decide to bunker biofuels, LNG, methanol, ammonia or hydrogen.'

Also offering a perspective from the supply side of the industry, **Ladekjær** commented: 'LNG and biofuels are good candidates for transitional pathways moving towards 2030. We are also optimistic that green methanol will play a role in reaching 2030 goals, but there are undoubtedly still some challenges around the scaling of this solution. Longer term toward 2050 we're seeing an increased focus towards e-fuels. In this arena, e-methanol and e-LNG may become available and commercially viable alternatives, but the big unknown lies in the technical and operational application of ammonia as marine fuel. If the challenges around ammonia can be successfully resolved, then there are coherent reasons as to why this could take a significant share of the market by 2050.'

'The window for incremental, gradual and relatively low-cost change is rapidly closing and the climate impacts are only increasingly likely to be delivered in bursts, tipping points and crisis'

Gavin Allwright, Secretary General, International Windship Association

Gilpin was forthright: 'We need to be crystal clear: alternative fuels cannot address the need to reduce emissions in the short term in a way that can keep global temperature increases below 1.5 degrees. Only wind-assist can do that.' And she questioned whether any of the touted alternative fuels was a clear winner: 'Obviously LNG (which is not a "green" fuel, it is a dangerous fossil fuel) has some advocates as it is available. Methanol looks like it's taking a bit of lead because Maersk have been public about its adoption, but availability of "green" methanol is very limited. The production facility Maersk invested in will only produce a fraction of the green fuel it needs for its own fleet.'

Allwright pointed out that the IWSA is 'fuel-agnostic as wind propulsion is compatible with all of them' – but then offered a full-some appraisal based on five key criteria:

'1 Safety – these considerations are paramount onboard a ship. Ensuring that crews, passengers, goods and ports are all ensured safety whether from accidental spills, fugi-

tive emissions, extreme cases such as collision, fire, explosion or engine/power loss etc.'

'2 Climate impact – this is obviously a critical area. We must look at the well-to-wake impacts of all fuels, the provenance of the supply and the full gamut of impacts, not solely direct, carbon-based impacts. All of these fuels emit, we will be able to capture, scrub or minimise those emissions onboard, but that will not so easily be secured in the up and down stream. Full lifecycle assessment of fuels is important but it is difficult to understand why there is continued resistance to doing this on both a 100 year and 20 year global warming potential, especially when the latter also aligns fairly closely with the lifespan of many vessels and also with the likelihood of climatic tipping points being breached – without this, then any fuel moving in front of another could likely fall foul of this change in assessment that is increasingly becoming evident.

'We must also consider accidents, spills

and fire emissions and their impact on the ocean environment as carbon sequestering by marine flora and fauna are absolutely critical to the Earth's ability to mitigate emissions.

'3 Infrastructure – many advocates talk of utilising existing infrastructure and that is an important consideration. However, if we are to have three, four or five different fuels that aren't currently bunkered extensively and perhaps different size or operational vessels are using different bunkers then there will need to be a huge amount of additional investment and retrofitting existing systems and specialist training in handling these as fuels and not as cargo.

'4 Renewable energy and supply – Over the last few decades, renewable energy has only barely kept pace with demand and the next three decades will see demand for clean energy skyrocket. The current supplies of most fuels are virtually all produced from fossil fuel derived energy or feedstock and their production is highly energy intensive. So, where will the energy come from and how much will we be able to secure and at what price?

'5 Full lifecycle assessment – this is obviously linked to climate impacts, but we need to be looking at the full life of not just the fuels but also the technologies in use and the end-of-use of various potentially toxic and dangerous fuels. One discussion is not being had at present is what a 30-year-old, heavily chartered vessel using alternative fuels looks like near the end of its operational life. Will these vessels continue to be safe, clean and operating well?'

Allwright concluded by noting that: 'With all of the above criteria in mind, it is early days to predict which fuel will be the likely winner as goal posts will likely shift and we need a level playing field in impact assessment to fully understand the outcome over the next decade let alone 2050.'

Our next question was something of a mop-up operation: **Which alternative fuel do you believe has lost ground in 2022?**

Again, LNG proved to be the issue that divides the room. As the answers to the previous question showed, many of our respondents were very positive about LNG's bunkering credentials, but it was also the fuel with the most mentions here.

In **Cabbia Hubatova's** view: 'Fossil fuels, especially LNG, have lost ground and this trend will continue more rapidly in the future, particularly as the IMO's greenhouse gas strategy revision strengthens the ambition this year.'

Browne concurred: 'LNG is a dangerous, potent and false solution. Beyond its climate and public health impacts as a fossil fuel that emits methane gas, LNG also suffered in the market in 2022. The World Bank has already cautioned against investing in LNG, calling it a dead end that will only delay the transition to sustainable fuels in coming years. The industry should heed this warning, listen to the science and leave natural gas where it belongs: in the ground.'

Draffin believed: 'LNG has limited impact on CO₂ emissions and until significant Bio LNG production comes on stream it is unlikely to move beyond a 5% to 7% market share. It does still remain a viable alternative during the 2030s.'

Mollet also felt that LNG had fallen back in 2022 'owing to price, the conflict in Ukraine and new doubts about its "green" credentials'.

Leyson and **Sand** both thought that hydrogen had lost some ground as a future marine fuel in 2022, while **Williams** reported that Shipping Strategy's Dry Cargo and Container decarb surveys 'suggest that ammonia is losing ground to methanol as fuel of choice'.

Tolson didn't include hydrogen in his evaluation – as he doubted whether it was ever an option for big ships – and concluded that LNG

was 'both a beneficiary and a loser from 2022 – shorter term it continues to grow, but longer term everyone seems desperate to replace it.'

We'll finish this section with two contrasting views. Rather than pick out one fuel, **Gilpin** warned that: 'All of them come with problems.' Meanwhile, **Ladekjær** judged that: '2022 was broadly positive for all alternative fuels. Given the scale of the challenge of decarbonising shipping, it is clear that our industry will need to embrace all alternative fuels if we are to meet our environmental targets.'

While LNG seems to be most controversial of the alternative marine fuels, biofuels' green credentials have also come under scrutiny, as we discovered with our next question: **Do you believe that there might be some operational and regulatory challenges to using biofuels?**

Answering in the affirmative, **Draffin** explained: 'There are significant issues in understanding the "well to wake", or more correctly the Life Cycle Assessment, of bio fuels; and there are complications over the mix of different bio feedstocks on the footprint of bio fuels, the processing methods and on the method of categorising their NOx emissions.'

Tolson believed that the operational and regulatory challenges for bunkering with biofuels are 'minor only', but 'alas feedstock supply is just too short'. He added: 'Bio should be the leader – if only we had another planet, we could colonise to produce more of it!'

Sørensen also flagged up the availability issue. 'There is already some regulation that plays against sustainable biofuels – most notably RED III where the EU Parliament voted to allow the continuation of certain feedstocks that may not be completely sustainable,' he noted. 'This highlights the importance of having a strict criteria and verification process to ensure biofuels are sourced sustainably.'

'From an operational point of view, supply and availability will pose challenges. First generation feedstock is commercially unsustainable at the moment, and there are concerns that there is not enough second and third generation feedstock to satisfy demand. This is partially due to the fact that shipping is competing with other transport segments for sustainable feedstock.'

'Uptake for biofuels in Europe remains strong, with an increasing number of companies trialing the fuel. However, greater incentives across the globe will remain pivotal in the scaling up of sustainable, drop-in biofuels.'

'When looking at Asia, there are regulations in place for biofuels in relation to 'allowance'. In Singapore, there is currently a maximum allowance of 24% of biofuels in a bunker blend, which is lower than

in Europe or the US. We expect Singapore to take the lead in establishing a framework for biofuels in line with its ambition of being a global pioneer for future fuels.'

'The key characteristic of bio-fuel is that it can drop-in to tanks without any engine modifications and is applicable for most vessels, but its uptake will be dependent on price and availability.'

Ladekjær reminded us that: 'All alternative and supplementary fuels have their own operational challenges. Biofuels are no exception.' But having said that, he continued: 'Biofuels can be used in most vessels with little or no added investment required onboard. So, low capital expenditure and high commercial readiness. I do not foresee too many regulatory challenges ahead for sustainable biofuels. The main chal-

'Our focus in 2023 will be in developing bunker solutions at key ports across the major shipping corridors to support the vessels set to launch this year and the next 2-3 years'

*Greg Dolan,
Chief Executive Officer,
The Methanol Institute*

lenges going forward will therefore likely continue to be price and availability as I see it.'

Wideskog gave a finely-balanced answer that took into account availability, sustainability and practicality: 'Drop-in biofuels are already playing a valuable role in reducing shipping's emissions. Not only do they reduce CO₂, SOx and NOx emissions but they drop-in to tanks without engine or infrastructure modifications.'

'For these reasons, more and more industry players are investing in biofuel to make an immediate decarbonisation impact. Holland America Line's is one of the latest ship owners to invest in biofuel onboard its vessel *Volendam*. The Wärtsilä ZA40 engine was used, powered with GoodFuels' sustainable biofuel to achieve a 78% reduction in CO₂ emissions and a significant reduction in NOx and SOx emissions. This partnership is one of

the prime examples reinforcing biofuels position as a valuable option in decarbonisation.'

'We are seeing some regulatory bodies play against the sustainability of biofuel, which may ultimately impact its uptake for shipping. The European Parliament, for example, voted on the revision of the EU [Renewable Energy Directive](#) (RED III) where forest biomass will continue to be used as a feedstock for biofuels.'

'Here is where regulation will be needed to ensure that biofuels are sourced from sustainable streams and verified carefully.'

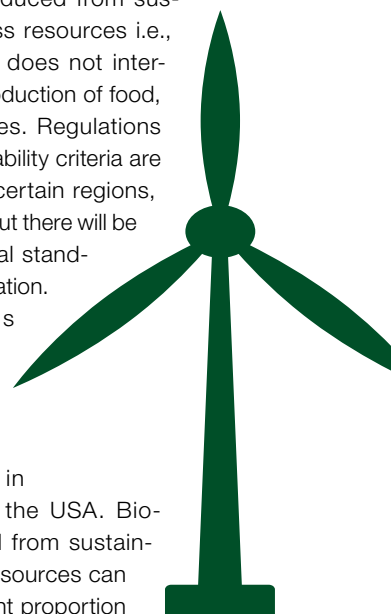
'In addition,' continued Wideskog, 'there may be limitations on the scaling up of biofuels, but this is likely to differ region-to-region. For example, there is currently a maximum allowance of 24% of biofuels in a bunker blend in Singapore, which is lower than in Europe or the US. This regulation could have an operational impact if a vessel sails across these continents and requires bunkering facilities for biofuels. That said, the global biofuels market is expected to grow which will support the availability of the fuel for shipping in major ports.'

Esau considered: 'On the operational side, there are issues associated with the use of biofuels such as degradation over time, microbial growth, different cloud points compared with traditional marine fuels and corrosion. By contrast, bio-LNG, or liquefied biomethane, is effectively chemically identical fossil LNG and can be used directly in existing LNG-fuelled engines and supply infrastructure without any modifications.'

'The IMO does not have a specific view on bio-LNG, but it views biofuels in general as a suitable option for the existing fleet due to their drop-in nature and blending capabilities.'

'The key regulatory challenges to the use of biofuels or biogas will be associated with sustainability issues. Specifically, they need to be produced from sustainable biomass resources i.e., biomass which does not interfere with the production of food, fodder and fibres. Regulations defining sustainability criteria are well defined in certain regions, such as the EU but there will be a need for global standards and certification.'

'Bio-LNG is commercially available now and is being used as a drop-in marine fuel in Europe and in the USA. Bio-LNG, produced from sustainable biomass resources can meet a significant proportion



'Green Shipping Corridors can become key enablers to accelerate the uptake of zero-emission fuels, because they allow for the multitude of barriers hindering the global uptake of zero-emission fuels (such as risk, costs and supply) to be addressed and resolved on a manageable scale'

Øyvind Endresen, Environmental Consultant, DNV

of future shipping demand even when considering growing demand for biomass from other sectors such as heat and power, industry, aviation and heavy-duty road transportation.

'Biofuels are also commercially available for shipping, but potential availability is challenged because of limitations in sustainable feedstocks.'

DNV's **Tore Longa** offered some practical feedback: 'There may be some operation challenges with some biofuels, but currently most reports indicate that when properly made, these fuels are highly compatible with existing machinery. The Unified Interpretation on use of biofuel blends up to 30% removed one barrier related to NOx emissions, but the key challenge remains around the sustainability of biofuel, in particular the issue of direct and indirect land use.'

'IMO is currently working on a guideline to assess the lifecycle emission and other sustainability aspects of fuels and we expect to see further progress on this matter in 2023. The EU has come much farther on defining sustainable biofuels and we expect such fuels to be considered as "zero emission" in the EU ETS when shipping is included in the upcoming update to the directive.'

There were misgivings over biofuel's overall impact. **Cabbia Hubatova** insisted: 'Biofuels must be produced from sustainable feedstock to deliver any climate and environmental benefits. The aviation sector is addressing this issue through standards set by the International Civil Aviation Organization. IMO should adopt a similar framework to ensure the use of biofuels in shipping doesn't cause adverse climate and environmental impacts.'

Gilpin also raised concerns that 'biofuel production requires valuable land that should be used for food production', while **Browne** maintained: 'Biofuels including ethanol and biodiesel are another false solution for fuelling ships. These fuels are often blended with fossil fuels and require organic matter

(biomass) feedstock. With climate change increasingly affecting global food supply systems, we must preserve and prioritise agricultural land to grow food, not biomass feedstock. Moreover, biofuels necessitate the use of bioenergy carbon capture and storage (BECCS) to capture the CO₂ that plants release in the fermentation process. We should not prioritise fuel options that would further increase demand for these solutions. Committing to biofuels will detour us on our path to zero-emission fuels, and the climate crisis is too urgent not to go as directly and as rapidly as possible toward renewable electrification, wind propulsion, batteries and green hydrogen-based fuels.'

Many of the answers to our previous questions referenced lifecycle analysis, so now we tackled the issue head-on: **Do you believe that it is important to focus on well to wake rather than tank to wake emissions when assessing the environmental impacts of the various marine fuels?**

In **Sand's** opinion: 'If all the focus is fixed on tank-to-wake, the whole point is missed – for the long-term objectives. Short-term and interims can use tank-to-wake, but with a disclaimer saying that is comes with noticeable strings attached.'

Ladekjær quipped: 'To quote our IBIA Chair, "not to consider well to wake is like borrowing from Peter to pay Paul". In other words, we risk fooling ourselves and actually ending up increasing our carbon footprint rather than reducing it. The challenge is the deep complexity in measuring well to wake compared to the much more simple tank to wake measures.'

Williams had no doubts: 'Full supply chain analysis is part of the Scope 1, 2, 3 format. No avoiding it.'

Esau agreed: 'To understand the GHG emissions associated with each alternative fuel pathway, it is crucial that their climate impact is measured on a full-lifecycle, well-to-wake basis. Evaluating the emissions of alternative fuels solely based on their usage (tank-to-wake) would not take into account the emissions generated during their production, which can be significant for cer-

tain synthetic fuels. A prime example being ammonia produced from fossil fuels, which may not emit CO₂ during usage, but the process of producing ammonia is highly energy-intensive, resulting in higher emissions than conventional fuels such as VLSFO when evaluated on a well-to-wake basis.

Esau continued: 'As we know, LNG provides immediate GHG reductions of up to 23% on a well-to-wake basis. While fossil methanol emissions are 14% higher than VLSFO on a full lifecycle basis; for ammonia the corresponding number is 47%. This is likely to mean owners and operators choosing methanol and ammonia pathways will be forced to continue using VLSFO, postponing emissions reduction for several years.'

'This means that these alternative fuels cannot replace VLSFO until enough renewable energy capacity has been built to produce them at scale, and it means that shipping will continue to emit carbon at VLSFO levels while we wait for them to become available.'

Nadkarni balanced idealistic goals with pragmatism: 'Protecting the environment is a shared responsibility that must be taken very seriously. I think that in the long term, we will need to consider well to wake emissions, since this will be the most holistic approach to fighting climate change. But at the moment, even tank to wake is progress.'

Draffin took a similar view: '"Tank to wake" is an IMO stop gap to get a regulation in place quickly, but we cannot ignore the upstream impact of production of these fuels. Note that "Well to Wake" is seen by some as confusing, especially when looking at fuels which are not produced from crude oil or natural gas. The Global Maritime Forum uses the "Field to Wake" example for biofuels. That is why UNFCCC works with various models covering the three stages of Life Cycle Assessment.'

Chatterton judged that: 'Well to wake considers the entire upstream production cycles of fuels and thus gives a clearer picture of the environmental profile of fuels. Furthermore, by placing sole emphasis on combustion emissions, we are sending signals to the industry to invest in fuels which don't contain carbon upon combustion but could still be very

harmful to the environment due to upstream inputs. Moreover, a holistic approach in the form of WTW ensures that the risks associated with decarbonisation are spread among entities across the entire fuel supply chain.'

Dolan added: 'The tank-to-wake approach undisputedly places the burden of greenhouse gas emissions from combustion solely on ship owners, considering carbon on a tank-to-wake basis while disregarding other GHGs. It implies that to achieve decarbonisation, ship owners are held wholly responsible for ensuring decarbonization of the sector. A well-to-wake approach is bound to extend the burden to fuel suppliers, power generators, port authorities and national governments, as it recognises that emissions from the marine sector are derived from elsewhere than aboard the ships themselves.

'A holistic approach will further ensure that risks are more evenly spread, allow for carbon offset schemes, deepening collaboration, and will additionally prevent global decarbonisation policy from becoming fragmented as vessel owners potentially move outside tightly regulated regions to lower their fuel costs. At the same time, this will ensure that those who are compliant and invest in resources to decarbonise are not rendered uncompetitive – thus a level playing field is ensured. Finally, a tank-

to-wake approach would require shipowners to adopt fuels with no carbon in their molecules regardless of the feedstocks used to produce these fuels, while a well-to-wake approach creates an "all-of-the-above" framework by encouraging the use of low carbon

would be zero, but analysis on a well-to-wake basis might show no benefit or even a net negative in climate terms. Or biofuels where we need to ensure that increased production does not lead to greater deforestation, or the loss of land that could more

'While the availability of future fuels is still unknown, shipowners are planning for newbuildings with zero emission capability, allowing for changes in e-fuel availability during the vessel's lifetime'

Dragos Rauta, Technical Director, INTERTANKO

and net carbon neutral fuels like methanol.'

DNV's **Eirik Ovrum** joined in the call for WTW because 'the complexity of the challenge and the many different industries and stakeholders that need to work together to solve it, means that to succeed we need a complete picture of the benefits and drawbacks of any given fuel'.

Ovrum said this 'complete picture' would be useful for 'hydrogen derived from fossil sources, the predominant source of hydrogen today, where tank-to-wake emissions

productively be used for food production. Otherwise, we risk making choices that might be sub-optimal, or ultimately even counterproductive to decarbonisation goals.'

Allwright also argued in favour of a full WTW approach, adding: 'Of course, keep an eye on tank-to-wake as this is our direct responsibility; however shipping can't take a position where it is adopting fuels that are significantly impactful either up or downstream. This is hugely counter-productive

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tive and could be incredibly dangerous as adopting climate forcing fuels at this critical knife-edge for the climate has the potential to push things over a “tipping point”, engaging natural environmental feedback loops in which further human action to restrict emissions will be virtually irrelevant. The need to adopt a “Total Cost of Ownership” approach in tandem with the well-to-wake approach is very important, not solely a life cycle assessment of the fuels as is the consideration of the 20-year global warming potential, otherwise choices will also inevitably lead to dead ends, stranded assets and heightened costs.’

Rauta considered how TWT and WTW can offer different perspectives on fuels: ‘Tank-to-Wake, ammonia and hydrogen appear good options, but both require vast amounts of energy from fossil fuels to produce. A Well-to-Wake approach to carbon-free fuels, such as e-ammonia or e-methanol, involves using renewable energy, but at levels way beyond current worldwide production.

‘Producing e-ammonia from e-hydrogen (through electrolysis) is a practical alternative for shipping and delivers the most significant reduction in GHG emissions. However, to provide shipping with sufficient e-ammonia, the total production of green hydrogen must be around 200 million tons

per year, some 200 times the annual production in 2021. Increasing production to supply enough renewable energy to produce e-ammonia, in the quantities required to power shipping and meet zero-emission targets by 2050, would require an estimated \$2.3-\$3.7 trillion in capital expenditure.’

Leyson offered an interesting angle, saying that: ‘As a systems engineer, I believe there is value in measuring *both* sets of emissions to establish the basis for developing future, perhaps even separate, regulations for each system.’

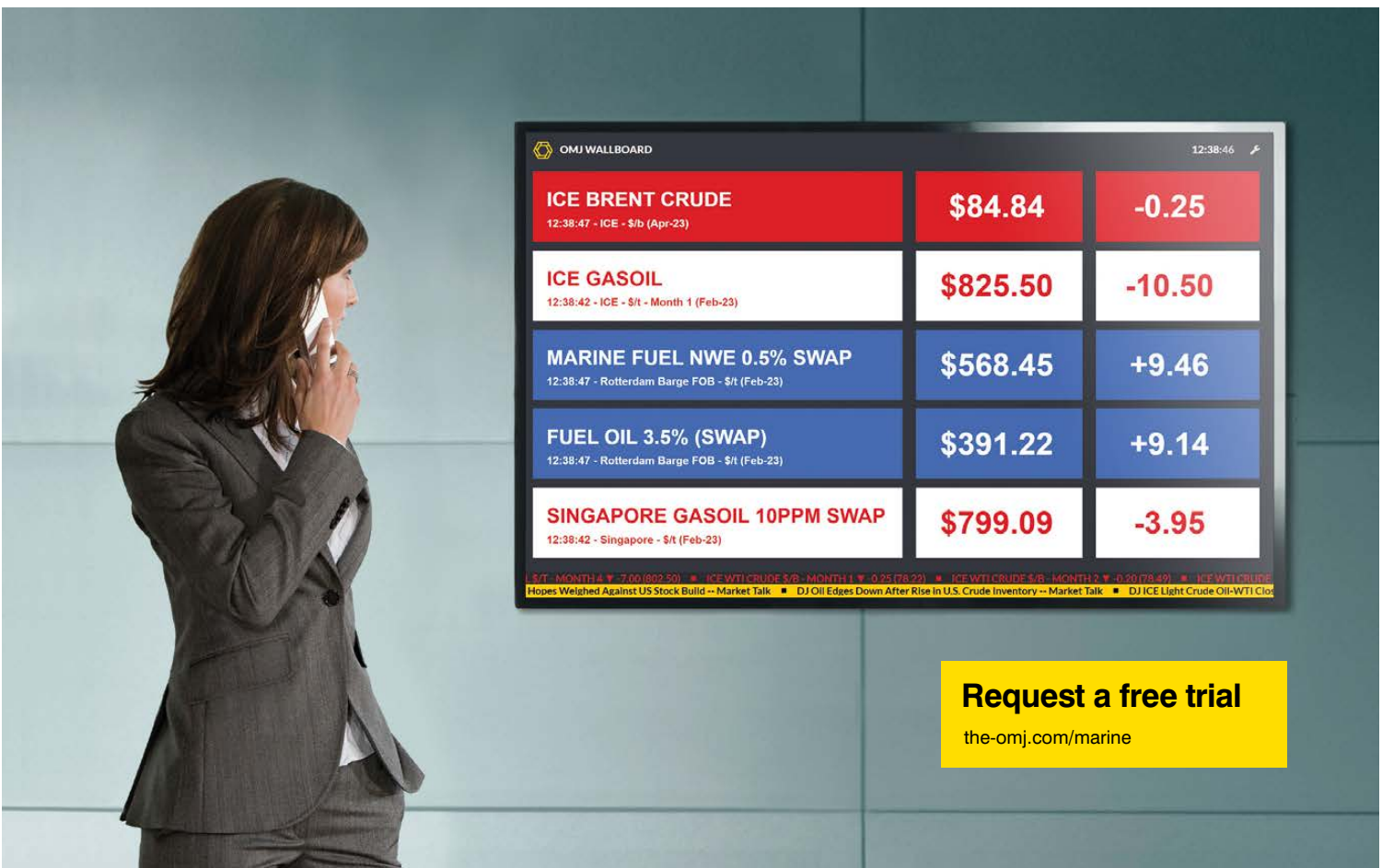
As one would expect, the environmental NGOs taking part in the survey favoured a WTW approach. **Cabbia Hubatova** believed: ‘To decarbonise shipping we must consider emissions from the whole lifecycle perspective. All the alternative fuels currently on the table have more and less sustainable options and some of them are much worse for the climate than traditional bunker fuels. Using these dirty options would mean that the sector’s true climate impact would increase and would ultimately hinder the global effort to decarbonise and prevent a climate disaster.’

Browne agreed: ‘We must consider the full well-to-wake emissions of marine fuels in our environmental impact assessments of these solutions. This is the only

way to capture fully the environmental impact of these solutions and to ensure we are choosing the cleanest and quickest path to decarbonise the shipping industry.’

Menezes went into more detail: ‘One of the candidate short-term measures in the IMO Initial GHG Strategy is to develop robust lifecycle GHG/carbon intensity guidelines for all types of fuels. The lifecycle assessment (LCA) is a method to assess GHG emissions from fuel production to the end-use by a vessel (Well-to-Wake). LCA guidelines, elements and general principles include emissions scope, global warming potential time horizon, accounting principles, and fuels sustainability criteria. WTW GHG regulation is a crucial step to have in place to undermine the credit LNG gets from the CO₂-centric accountancy currently in use. During the revision of the strategy, the IMO must calculate WTW CO₂-e emissions using both GWP100 and GWP20, include CH₄ in CO₂e calculations, and quantify or otherwise account for indirect land use change (ILUC) emissions.’

Laranjeira was another WTW proponent – and offered suggestions on how the IMO could facilitate this: ‘Either the shipping industry takes a sure route to ineffective stranded assets, or we change course towards truly zero emissions solutions. My preference lies



OMJ WALLBOARD 12:38:46

ICE BRENT CRUDE 12:38:47 - ICE - \$/b (Apr-23)	\$84.84	-0.25
ICE GASOIL 12:38:42 - ICE - \$/t - Month 1 (Feb-23)	\$825.50	-10.50
MARINE FUEL NWE 0.5% SWAP 12:38:47 - Rotterdam Barge FOB - \$/t (Feb-23)	\$568.45	+9.46
FUEL OIL 3.5% (SWAP) 12:38:47 - Rotterdam Barge FOB - \$/t (Feb-23)	\$391.22	+9.14
SINGAPORE GASOIL 10PPM SWAP 12:38:42 - Singapore - \$/t (Feb-23)	\$799.09	-3.95

ICE - \$/t - MONTH 4 ▼ 7.00 (802.50) • ICE WTI CRUDE \$/b - MONTH 1 ▼ 0.25 (78.22) • ICE WTI CRUDE \$/b - MONTH 2 ▼ 0.50 (75.49) • ICE WTI CRUDE
Hopes Weighed Against US Stock Build -- Market Talk • DJ Oil Edges Down After Rise in U.S. Crude Inventory -- Market Talk • DJ ICE Light Crude Oil-WTI Clob

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on the latter, but we won't get there without a full lifecycle (well to wake) approach.

'This couldn't be any clearer than when seeing LNG – a fossil fuel, made of 70%-100% methane – labeled as a leading alternative fuel for shipping's decarbonisation. As aptly demonstrated by the International Council on Clean Transportation (ICCT), on a well to wake basis, LNG's methane emissions can result in higher well to wake carbon dioxide-equivalent emissions than conventional marine fuels. This is the kind of critical information that would be left out if only tank to wake emissions are considered. And even on this basis, LNG still only attains a mere 20%-30% CO₂ reduction when compared to HFO or MGO, while still emitting significant amounts of methane.

'If shipping is to have a chance at keeping to 1.5°C,' Laranjeira continued, 'both its upstream emissions and downstream emissions must be considered. This is not to say that it's on the shipping industry to take over the reins of the energy sector and do the work for them. But knowingly ignoring these emissions will incentivise the use of alternative fuels that have high emissions on land (e.g., non-green ammonia, LNG), and thereby result in virtually no emission reduction overall. The IMO can regulate the emissions from the land-side production of fuels by ensuring those emissions are adequately priced or via standards, much like there are standards for emissions from the oil ships use at the moment, even though the refining of that oil takes place on land.

'Truly zero-emissions alternative fuels are not yet sufficiently mature or / and commercially viable, as currently there is no regulation to encourage this switch. Shipping companies will not switch to more expensive fuel without a reason to do so, especially when currently they can pass on the cost of their pollution for free. But we should also ensure there are

cuts in emissions immediately via doubling down on energy efficiency, and embracing innovative wind propulsion (after all, the best fuel is the one that does not get used). And we can continue to pro-

gress on Green Corridors that demonstrate the viability of technologies, and expand new markets for them, across different geographies. Investors can put their money on solutions that will stand the test of time and pave the way for the shipping sector to effectively phase out its emissions. And, last but not least, the IMO can and must ensure the transition is a just and equitable one as it adopts the regulations that will unlock all this progress. What we cannot do is ignore our sector's upstream emissions, and pretend it is not our problem. Climate change is everyone's problem.'

Of course, alongside the transition to 'cleaner' fuels, the maritime industry has also been looking at cleaner and/or more efficient propulsion technologies to help reduce emissions. **Did we see significant progress on technologies such as maritime electrification (and batteries), fuel cells, and wind propulsion/ wind assistance in 2022?**

Allwright gave us the IWSA perspective: 'While there have been advances in the electrification, batteries and fuel cell spheres, I can speak authoritatively regarding the significant progress in the wind propulsion sector. 2022 has seen a number of milestones reached, with 23 large vessels installed with wind-assist systems, two more wind ready and at least three additional installations pending in early 2023. These vessels are a mix of new builds and retrofits, and the vessels added this year topped 1 million DWT of shipping with wind-assist systems installed, and the announced build and installation schedule will double the number of vessels this year and triple the tonnage.

'There has also been significant diffusion of systems into various ship segments. The industry needs a minimum of three points of reference for each of the technologies and we have seen that reached in rotors, suction wings and hard sails this year with others to follow in 2023, but also three points of reference for wind propulsion usage in vessel segments is also important, again 2022 saw the tanker, bulk and Ro-Ro segments join the general cargo segment in this important milestone.

'Along with this significant growth in the number of ships, installations, tonnage and diffusion across segments we are also seeing other indicators. There has been a trend of increased collaboration and partnerships, as OEMs search out production partners and the investment in production facilities and fabrication lines. Geographical diffusion is also underway, with a growth in interest in Asia after the last few years of R&D

and demonstrator growth in Europe. Some European production lines have relocated to the region, along with homegrown projects in China, South Korea and Japan in full swing.

'There is also a clear change in perspective and understanding of the benefits of "no regret" technologies such as wind propulsion from larger stakeholders in the industry from engagement from a growing number of large shipowners, charterers and shipyards.

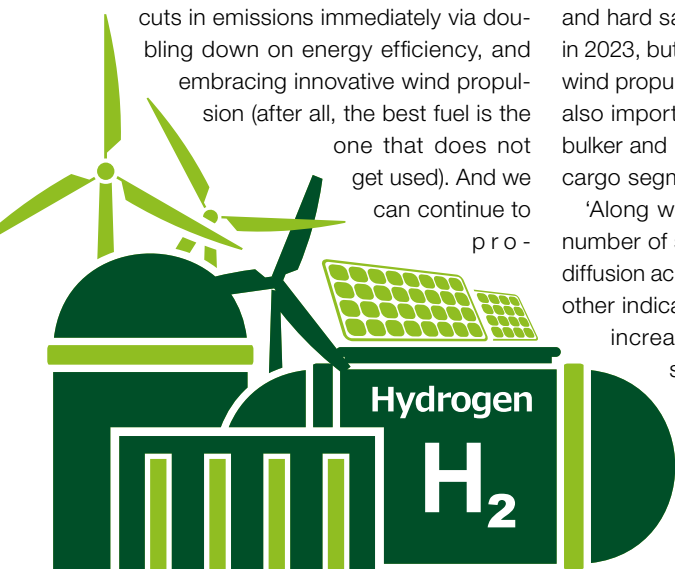
'We are also starting to see the interest in making multiple installations across fleets rather than single vessels and this, along with the learning curve and economies of scale, herald the reduction of production costs and ultimately the reduction of prices for technology, just as fuel prices will be rising due to carbon pricing or the adoption of new fuels and regulation starts to bite.'

'As for 2023,' concluded Allwright, 'keep an eye on the swathe of installations, but also the announcements of primary wind vessel builds, wind propulsion container vessel designs and orders for larger, more optimised systems.'

Gilpin – another wind-advocate – offered some first-hand testimony: 'At Smart Green Shipping we've definitely experienced a significant lift in interest in FastRigs, our retrofittable, intelligent wingsails. Progressive ship owners are responding to increased pressure from cargo owners who seek to reduce their Tier 3 emissions and are looking for cost-effective solutions to new regulations – CII, EEXI, EU ETS, etc. – and increased fuel costs. They recognise that wind is free, available exclusively to their own vessels, is never going to be subject to the vagaries of commodity markets which can be sent into chaos by geo-political upheavals like the Russian invasion of Ukraine. These same smart shipowners see that whatever flavour of "green" fuel "wins" they will be more expensive and by installing wind-assist devices they are mitigating cost risks and improving their commercial resilience.'

DNV's Hasso Hoffmeister was also predicting fair winds in 2023: 'The last several years have seen growing interest in wind assisted propulsion (WAP) technologies, but 2022 felt like activity really ramped up to a new level. We saw a number of owners opt for their first pilots, with possible newbuilds and retrofits planned based on the success of the installations, use in operation, and efficiency benefits.

'This demand has also seen several different designers bring new concepts to market and rolled out in pilots. These projects are sure to draw even more attention to the sector and at DNV we rolled out updated technical standards and new services to support these developments, especially around questions of compliance and regulatory guidance.



'2023 looks to be a possible record setting year for WAPs with some projecting that the number of installations will double – so overall favourable winds ahead!'

Nadkarni told us: 'There is significant investment being made into technologies to help maritime decarbonise and an increasing number of owners are taking a hybrid approach. The fact of the matter is that reducing the consumption of any fossil fuel – even greener fossil fuels – will benefit the environment, and these technologies are an important part of the equation. Shore power solutions are gaining traction (particularly in the EU) and products such as WindWings and FastRigs are seeing higher levels of interest.'

Draffin agreed that there have been 'significant developments', and especially on smaller vessels such as tugs and ferries. 'This will encourage more ambitious developments in hybrid solutions for larger vessels,' said Draffin, adding that he expected to see 'much more use of fuel cells, high density batteries, solar arrays and wind assistance'.

Ladekjær was also encouraged by the 'growing interest' in new solutions and 'in particular around technologies that can be cumulative in their impact'. He added: 'For newbuild vessels, the inclusion of design measures such as Mewis Ducts, air lubrication, propeller boss cap fins, and indeed rotor sails could add up to a very significant efficiency improvement.'

Wideskog took a broad view of the technologies on offer: 'While the industry waits for zero-carbon fuels to become readily and globally available, reducing base-load consumption should be part of any decarbonisation strategy. There is already the opportunity for investment in upgradable technology, that allows fuel flexibility and long-term compatibility with future fuels.'

'Efficiency-boosting and exhaust gas abatement technology – including carbon capture and storage technology – are viable options to the market today for both retrofit and newbuilds. Hybridisation, propulsion system improvements, ESDs, air lubrication, wind assists and advanced scrubbers all present additional avenues for near-term benefits.'

'Cruise line Fast Ferries has seen the benefits of installing our energy-saving EnergoProFin propeller cap which enables higher propulsion efficiency and reduces fuel consumption. In the short term, this will make it easier for the vessel to comply with EEXI and CII regulations, and in the long term it will be increasingly valuable for reducing fuel costs.'

Wideskog concluded: 'Hybridised and electrified propulsion solutions combined with alternative fuels provide owners with a solid, flexible foundation for the future. So,

in taking the step to install efficiency-boosting and exhaust gas abatement technology, one can genuinely futureproof assets while awaiting the availability of cleaner fuels.'

Browne focused on progress on the US West Coast: 'This year, we saw a strong Commercial Harbor Craft regulation and zero-emission mandate for ferries adopted by the California Air Resources Board. It is the strongest commercial harbour craft public health regulation and the first zero-emissions mandate for ferries in the United States. The technology for zero-emission harbour craft exists and boats and ships must transition off fossil fuels. San Francisco Bay already has its first zero-emission passenger ferry and we are expecting the first electric tug boat in the Port of San Diego this year.'

'Methanol is another attractive option as it offers simple handling and storage, reliable combustion and can be carbon-neutral fuel when produced from renewable sources or captured carbon'

Mikael Wideskog, Director, Sustainable Fuels and Decarbonisation, Wärtsilä Marine Power

Williams agreed that there has been more progress 'at the theoretical level and with prototypes', but added that: 'The bottleneck is funding.'

Looking to be as topical as possible, our next question focused on the new IMO regulations that have just come into force. **Do you believe that the IMO's CII and EEXI regulations, which came into effect on 1 January 2023, will have a significant impact on operations in the shipping industry?**

Leyson was convinced of the regulations' importance: 'I believe these new regulations will begin to change how operators view their carbon intensity and vessel efficiency because both can be measured, recorded and possibly more scrutinised. I think the days of talking green, but not buying or behaving green are coming to an end, especially as the next generation of younger, and more environmentally conscious stakeholders come into the workforce.'

DNV's **Fabian Kock** saw this as a landmark moment: 'For the first time in international shipping a reduction of the carbon intensity is being applied retroactively to all ships in operation and not only on newbuild ships. Therefore, the CII and the EEXI will not only

have a significant impact on the operation of ships, but also on the design of ships in operation, as ships in operation will also need to apply alterations in order to comply with the requirements. In the majority of cases ships will utilise power limitation solutions, which can only be released in emergency situations. Such design changes will also have a significant impact on the operation of the vessel, thus supporting the reductions in the operational carbon intensity required by the CII.'

Martin Taylor of **LR Digital Solutions Division** and **OneOcean** was positive: 'These new amendments to **MARPOL Annex VI** take important steps towards making our industry more environmentally friendly and that is commendable. Many in our industry were probably not prepared to take on this challenge but

that is to be expected as these regulations are meant to be disruptive and compel change.

'Shipping is one of the purest supply and demand markets there is, and the tension between all players is what drives it forward. All stakeholders within the maritime ecosystem will be affected by CII and EEXI requirements, not just owners and operators. It will take time to see how everyone will adjust; there are some competing requirements that will need to be resolved. We can expect that eventually the industry will course correct but, in the meantime, there will be contractual and commercial disputes, as well as critiques of the effectiveness of requirements.'

'One thing that is certain is that access to data will be vital. Companies with digital maturity and the ability to gather, analyse, report on and action data, will be better positioned to comply with reporting requirements. Regulations are expected to become more stringent in the years to come, and this will necessitate a better, smarter way of working for all.'

Esau considered the practical implications, telling us that CII 'is set to shake up the vessel efficiency and emissions clauses in the charter party agreements'. He continued: 'SEA-LNG analysis has found that

LNG-fuelled vessels will be able to continue operating as normal under the system until after 2030, while fossil LNG blended with bio-LNG and renewable synthetic LNG will further extend compliance to 2050 and beyond.

'Retrofit of LNG dual-fuelled engines on a conventionally fuelled ship can improve CII ratings substantially, giving and maintaining a one to two grade improvement over alternatives throughout the remaining lifetime of the vessel.

Esau also believed that the EEXI regulations will have 'major implications for ship owners'. He explained: 'EEXI is a metric that determines energy efficiency and carbon emissions, and ship owners will need to comply with the limits defined by the IMO. The required EEXI value is determined by the ship type, the ship's capacity and its propulsion system. LNG retrofitting could be among the most effective ways for ship owners to achieve EEXI targets. A dual-fuel retrofit project on a ship's main propulsion engines can provide between 20%-25% lower EEXI.

'For owners,' Esau advised, 'modernising a ship through retrofit can be carried out more quickly than building a new vessel. New vessels typically take around two years to build. Accessing and scheduling work with a retrofit yard is often easier, as they have more capacity than newbuild yards. Retrofitting can also be arranged as part of a scheduled drydock call for a vessel meaning out of service time is reduced across the entire project.'

Wideskog also focused on the strategies that the shipping community can use for CII compliance. 'Several fairly consistent estimates have been made regarding the impact of the CII on existing fleets,' he reported. 'For example, an initial analysis conducted by ABS using 2019 EU-MRV data suggests that to achieve A, B or C ratings by the end of 2030, 92% of the container ship fleet will require operational change.

From Wärtsilä's perspective, Wideskog said: 'We are confident that shipowners and operators will take definitive steps in improving the emissions performance of their vessels in line with CII requirements. However, their decarbonisation pathway over the next decade is going to be fraught with commercial risk. For tankers and bulkers, for example, which are designed to sail at low speed, engine power limitation solutions may offer limited benefits in terms of commercial flexibility and attractiveness to charterers.

'We believe that there is a fuel and technology strategy to suit every vessel. The challenge is to find it, and Wärtsilä is ideally placed to help de-risk this process. Shipowners need to understand that decarbonisation is a continuum. The final step is 100% use of alternative

fuels, but there are many intermediate steps to get there. For example, this could entail using LNG with energy saving devices (ESDs). This could be an important step towards remaining competitive in the future fuels era.'

And help is at hand, Wideskog assured us: 'Wärtsilä is supporting with CII compliance by providing a tool that can simulate the effects of different combinations of energy saving technologies, power-limitation solutions and future fuels on CII performance. The result is an unbiased, transparent evaluation – based on highly accurate data modelling – of the optimal solutions that can align with both compliance and commercial goals.'

'The last several years have seen growing interest in wind assisted propulsion technologies, but 2022 felt like activity really ramped up to a new level'

Hasso Hoffmeister, Senior Principal Engineer, DNV

Mollet sounded a note of caution: 'I sense from companies I engage with that this date for the new regulation has come around rather quickly and people are not sufficiently prepared, informed or truly aware of the impact and implications around CII. There are businesses offering consultancy and solutions, but they tell me only now, in January 2023, are companies contacting them for advice and support. Like with the Green Corridor initiative, this is another "one of many" solutions that should be considered in context of the wider impact and where, exactly, the environmental benefits are being achieved.'

Draffin also had concerns. 'The majority of the world fleet constructed prior the entry into force of EEDI [Energy Efficiency Design Index] is unable to meet the EEXI requirements by their first survey after Jan 2023 by any means other than power limitation,' he said. 'Some owners may choose a "wait and see" approach to enforcement. If they do go down the power limitation route than this will cause some issues with fleet supply/demand balance.'

Of course, the introduction of the new regulations at the start of this year will not be the end of story. Once they have bedded down, their impact will be reviewed – by no later than 2026 – and there are likely be revisions. Indeed, **Tolson** said that he was 'expecting significant revisions', and added: 'It did seem that as the passage of these measures became imminent then many concerns were raised particularly regarding CII and what it meant for operations/viability of existing tonnage.

These concerns were surely there before – but there seems to be a deluge of complaints now. I am not sure how much operations in the industry have been impacted so far – but I do note that the measures have significantly increased interest in biofuels for shipping – one of the ways you can quickly (but expensively) make an old ship seem new again!'

While **Ladekjær** was pleased that 'CII & EEXI will definitely contribute to the transition in their own right' – he agreed that: 'As with many new complex and untested regulations they likely will need revisions as we go.' He added: 'It is also worth noting that some larger shipowners have already

voiced their concerns over the current version. No doubt some shipping operators were better prepared than others.'

Cabbia Hubatova also flagged up the issue of future revisions – but she was hoping that these will bring more ambition to the regulations. 'These short-term measures were adopted by IMO in 2021 and are meant to kickstart the shipping sector's decarbonisation,' she explained. 'Through the creation of transparent and recognisable labels for ship carbon intensity and technical efficiency, CII and EEXI should help incentivise much needed green investments. We have witnessed signs of frustration from parts of the industry towards the imperfections of CII, which are understandable, but we expect implementation to be relatively smooth.

'A more pressing issue,' Cabbia Hubatova continued, 'is getting the right level of ambition in CII and EEXI. Without enough ambition, ships will not get the retrofits required to operate optimally in this decade. IMO can address this by raising the bar post-2026, for example by setting reduction factors in line with a strong 2030 climate goal.'

Menezes was also asking for more: 'Currently, the EEDI only covers CO₂ emissions. The updated EEDI (phase 4) offers an opportunity to regulate CO₂e based on 20-year global warming potential on a tank-to-wake basis.

'EEDI regulation of CO₂e based on 20-year global warming potential on a tank-to-wake basis would encourage using LNG low-

methane-slip engines. This would have climate benefits. For example, had all of the LNG-fuelled ships covered by the EU MRV been fuelled instead with methanol, their WTW CO₂e20 emissions would have been 36% lower, according to the ICCT. If the EEDI fails to adopt CO₂e under phase 4, LNG high-methane-slip engines will be rewarded for their high methane emissions.'

Browne said that we should not lose sight of the primary objective. 'Carbon intensity is a useful metric,' she said, 'but it is imperative that shipping companies focus mainly on reducing overall GHG emissions to zero. If carbon intensity gradually decreases but overall emissions continue to increase in the freight transport sector, the world will not be able to avoid the worst impacts of climate change. Incremental improvements to the energy efficiency of ships are not enough; zero-emission technologies and fuels have to be introduced and scaled up in the coming decade. It would be useful if the Sea Cargo Charter framework also included a score that reflects a signatory's absolute emissions.'

For **Allwright**, the new regulations are 'a mixed bag'. 'EEXI is a relatively well understood entity and the impact and approach required to be compliant with the regulation can be achieved through EPL or with other available measures, including wind propulsion systems that also may enable speeds to be maintained on some vessel types. As we all know, CII is a far more contentious regulation as it is a wholly operational index and can lead to varied and at times contradictory outcomes and many segments of the industry are uncomfortable, irritated or set against this measure as it stands today.'

Allwright also believed that 'there will be many calls for significant revisions prior to 2026'. From the wind propulsion perspective, he added: 'The introduction of a set of robust teeth into the mechanism will be a very important provision to raise the ambition, not simply the imposition of an

enhanced **SEEMP** and also help protect first movers and further incentivise early adopters. We need carrot to go along with the stick and support from MBM revenue will help soften the blow, of course, with wind propulsion as the only zero-emission propulsion power solution which holds out a return on investment, there are already a few carrots on offer prior to that.'

Gilpin pointed out that: 'In and of themselves the measures may be insufficient, difficult to work with, but we have had decades of debate about how to reduce emissions from the sector so perhaps deeper engagement earlier may be useful learning for the future.' Meanwhile, she was also pleased to report that the new regulations were having a 'significant impact' for the Smart Green Shipping Alliance. 'As a wind-assist systems provider, we are experiencing a really strong and positive response,' she said. 'Ship owners are human – they are parents, grandparents, educated and aware people – and they know that the climate crisis must be addressed urgently. But they need a framework, a stimulus that doesn't disadvantage them in a competitive market. Wind is a no-regrets solution that reduces opex, future proofs their assets and ensures that emissions from the sector are reduced in line with **IPCC** recommendations.'

Next, we shifted the focus from the IMO to another political body, the European Union (EU). **Has the European Union's involvement with maritime decarbonisation – particularly through the inclusion of shipping in its Emissions Trading System (ETS) and Fit for 55 package – been a positive development?**

Cabbia-Hubatova believed: 'The EU's action when it comes to shipping decarbonisation is positive, both regionally and globally. Within the regional context, it will provide a path for phased decarbonisation as well as a funding mechanism to assist industry and member states in achieving emission reduction objectives.'

Sørensen assured us: 'KPI OceanConnect fully supports the greening of shipping, and that any regulation should create a level playing field for all stakeholders.'

'Europe's maritime sector has accelerated its decarbonisation actions over the last few years following the European Parliament's climate change targets. The EU's Fit for 55 package is set to include shipping into the EU Emissions Trading System (ETS) from 2024, so managing shipping's carbon footprint will become essential.'

'EU ETS places significant pressure on ship owners and operators to put in place an

energy strategy that not only ensures compliance and quality fuel supply, but also provides financing at the right price and with a full assessment of counterparty risk. If navigated poorly, the EU's regulatory framework could have a huge impact on the profitability, efficiency, sustainability and competitiveness of an owner's operations.'

'While EU ETS will make the industry more focused on its emissions goals to ensure compliance, shipping companies must consider their decarbonisation pathway carefully, with a real understanding of their emissions output and a clear future fuels strategy.'

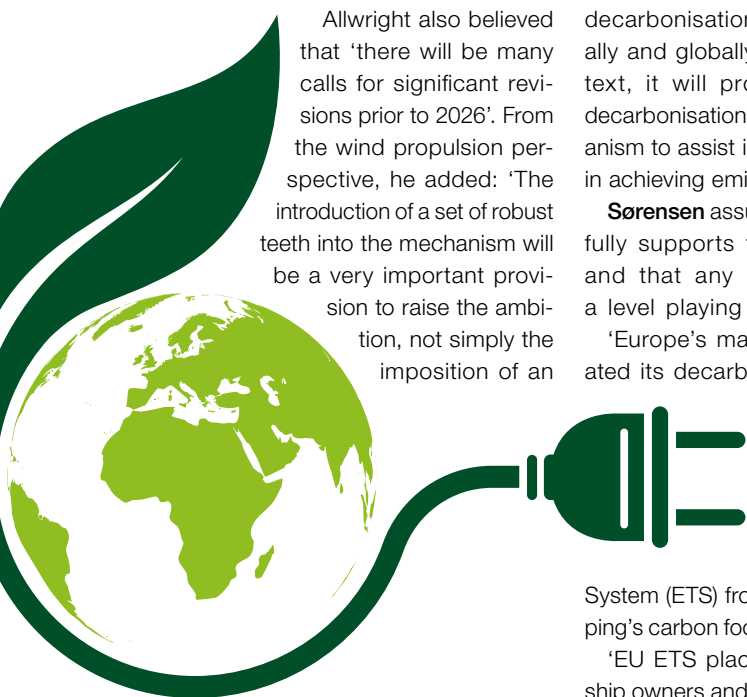
Ladekjær believed that: 'The inclusion of shipping in the EU ETS and Fit for 55 is what many shipowners have been craving for.' He continued: 'Without a level playing field for market participants it is very difficult for green front runners to make a business case out of being first movers. By setting a regulatory framework EU is providing a direction and not least a level playing field for market participants, and thereby providing a real incentive for all stakeholders to make investments both onshore and offshore in the green transition.'

Esau welcomed the EU developments, but flagged up the importance of synchronicity with IMO regulations. 'We see the European Union's involvement with maritime decarbonisation, specifically through the inclusion of shipping in its Emissions Trading System (ETS) and Fit for 55 package, as a positive development,' he said. 'The **FuelEU Maritime proposal** accelerates the adoption of renewable and low-carbon fuels and technologies in the industry by increasing GHG intensity limits for on-board energy use over time. LNG enables vessels to be compliant with the proposed legislation until 2035, using a 10% drop-in blend of bio-LNG extends compliance until about 2040. After 2040, wider production and commercial availability of the net-zero drop-in fuels bio-LNG and renewable synthetic e-LNG, will mean green fuel blends can be increased to meet tightening restrictions.'

Esau continued: 'LNG will be favoured over traditional oil-based marine fuels under the proposed revisions to EU ETS as the reductions in GHG emissions it offers right now will give ship operators a competitive advantage. In addition, bio-LNG provides an opportunity for operators to significantly reduce exposure to CO₂ taxes under the scheme.'

'However, the challenge it presents the shipping industry is one of regulatory fragmentation. Shipping is a global industry and having the IMO and the European Union proposing regulations which are not synchronised will result in great complexity and cost for the industry.'

For other respondents it was more a



case of the EU setting the pace, rather than falling out of step with IMO efforts.

Mollet believed the EU's involvement 'sets the stepping stone for international regulations or even other intra-regional/national regulations to come in force following a similar suit'. He added: 'The EU is fortunate enough to have the resources and political willingness to enforce the ratification of such regulations. Both the EU ETS and FuelEU Maritime regulations under the [Fit for 55](#) package will gradually force owners to appraise measures of reducing onboard energy demand and investments in new technologies and fuels with lower GHG intensity.'

Draffin also believed that: 'The EU position may encourage IMO to examine this as a lever to keep the 2030 and 2050 ambitions on track.' And **Browne** too judged that the EU has taken the 'critical first-mover steps to address shipping emissions on a regional basis'. She added: 'We applaud the efforts by the European Union to account for these emissions in the ETS and to impose decarbonisation mandates through the FuelEU maritime programme. We hope that other countries including the US will follow suit in taking the steps necessary to reduce and eliminate port and ship pollution and emissions. Beyond national and regional action, we must make global progress to address this industry's egregious climate impact. The IMO Marine Environment Protection Committee (MEPC) should take lessons learned from these market and policy developments as it works to revise its GHG strategy this year.'

There were some misgivings. **Leyson** said he is 'not a big proponent of emission trading systems because the overall emissions benefits can be considered to be less than optimal'. He explained why: 'In the end, consumers end up paying more for energy without directly realising the environmental or health benefits. However, if a green fund were established to subsidise lower carbon fuels sourced and delivered from developing countries through infrastructure development, then I would support it.'

Meanwhile, **Allwright** said that he would 'prefer to await a well-designed international MBM system that has the blessing of all delegations at the IMO and one that will deliver finance and support for all lesser developed regions, technology segments and vulnerable smaller shipowners.' However, he conceded: 'That system is still quite a way off and will require a new revenue collection mechanism and if that is some form of circular levy that is returned to the industry in part or whole, then an equitable, just, fair and transparent system for allocating those revenues will also need

to be developed for revenues in the tens or hundreds of billions per year to be dispersed.'

He added: 'The inclusion of shipping into the EU ETS and the other aspects of the Fit for 55 package, especially the [Fuel EU Maritime](#) provisions, are a welcome start but still relatively weak, especially at their inception. These regional solutions will have international, non-EU reach which is frustrating and possibly discriminatory to many non-EU actors that will have to pay these dues and while that this

'If shipping is to have a chance at keeping to 1.5°C, both its upstream emissions and downstream emissions must be considered'

*Ana Laranjeira,
Shipping Manager,
Opportunity Green*

is not ideal, these measures will in effect set a benchmark or possible template for IMO deliberations and possible alignment in the future.'

Allwright raised the subject of MBMs, which segues to our next question. **What MBMs do you think would be most effective in encouraging shipping to switch to lower carbon fuels, given their likely high price point in relation to conventional bunker fuels?**

Draffin called for a realistically priced carbon levy, while **Williams** maintained that: 'Only carbon tax or contracts for difference will really work.'

Allwright also picked up on the discussions around the use of 'contracts of difference' to help incentivise the uptake of renewable energy derived fuels, and considered: 'If that is developed as a fuel-centred system that only benefits commoditised, storable energy sources then this would immediately discriminate against non-fuel energy sources such as wind propulsion which would receive no benefit, whereas the, admittedly more complex, application of a 'Total Cost of Ownership' model would factor in all energy sources and costs involved, a far more holistic and inclusive method of incentivising the transition.'

For **Mollet**: 'The MBM that would be most effective to support a fuel switch to low and zero carbon fuels is not only to put a carbon

price on fossil fuels but to also incentivise the supply of such fuels within the marketplace. The EU ETS, the ETD, and any other national mandates that incentivise the supply of low and zero carbon fuels into marine use all contribute towards bringing the price spread vs conventional fuels down and closer to parity.'

In **Ladekjær's** view: 'A carbon levy could be a good way to pave way for the green transition. If you are charging those with a high carbon footprint, and subsequently pass on the same funds to those who invest in green, you even out the imbalance. The real questions would be around how this kind of measure can be enforced, who would be responsible for collection of funds and of course who decides on what and where the ensuing funds can be spent.'

Cabbia-Hubatova also favoured a levy – with a proviso. 'A carbon levy seems like the most feasible option due to its relatively easy operationality and minimal administrative burden,' she said. 'But, to deliver the emission reductions needed, the levy will have to be set at a high-enough level to drive the uptake of likely more expensive fuels. For example, the Marshall Islands have proposed a \$100 USD/ton levy which would go some way towards closing the gap. Such carbon levy will have to be regularly reviewed and increased if necessary.'

'Any carbon pricing mechanism must, however, be accompanied by a comprehensive policy package covering related issues such as fuel standards, energy efficiency or life-cycle accounting of fuels' climate impact. It must also address equity concerns, using the funds collected to deliver a level playing field and equal opportunities for disadvantaged countries, especially small island developing states and least developed countries.'

Tolson said that he remained 'a believer in a *global* GHG/carbon emissions cap and trade system for shipping' – but he doubted that we would ever see this.

Leyson offered some suggestions on how the system could be improved: 'Encouraging shipping to bunker alternative fuels from developing countries ripe for infrastructure investment could possibly help lower the price point and bring a direct economic benefit. Developing advanced bunkering infrastructure further may further increase already inflated price points.'

Menezes also focused on the transformative use of MBMs, commenting: 'MBMs set a price on GHG emissions, providing an economic incentive for the maritime industry to reduce its fuel consumption by investing in fuel efficiency. MBMs can also generate funds to support SIDS, LDCs, and

Indigenous peoples affected by the maritime industry to adapt to climate change and invest in zero-emissions technologies.

'Reducing methane emissions is a low-hanging fruit that significantly impacts GHG emissions with the potential to avoid about a 0.3°C increase in global temperature. This is crucial to achieving the Paris Agreement temperature goal of 1.5°C. Methane emissions regulations through MBMs will ensure accountability from the shipping sector for its climate impacts. In summary, methane emissions must be included in CO₂e calculations, incorporated in the MBMs, and aligned with the Marshall Islands and Solomon Islands proposal (ISWG-GHG 13/3/7).'

Wrapping up this section, **Laranjeira** told us: 'Without the timely adoption of a basket of GHG regulations at the IMO that includes global market-based measures, I personally don't see how we'll be able to effectively phase out shipping emissions, in line with the Paris Agreement temperature goal of 1.5°C.

'Particularly, we need a measure that: i) efficiently addresses the price differential between conventional fuels and sustainable alternative fuels, by adequately pricing lifecycle GHG emissions; ii) the potential to generate revenues that can spearhead an equitable transition for all; and, iii) the ability to provide predictability to industry, decision-makers, and incentivise early-movers. I find all of these elements in the IMO proposal for a global emissions levy for shipping put forward by the Marshall Islands and the Solomon Islands.

'With a starting point of US\$100 per tonne of GHG (increasing every five years), it sends a strong market signal to invest in zero emission solutions for the sector, while providing clarity and predictability to decision-makers. When it comes to the revenues generated by this levy, the aim is for these to go towards supporting climate change mitigation and adaptation in vulnerable countries, to enable an equitable transition; and to fund innovative R&D for new technologies and fuels, to address market barriers and failures preventing the technological change and cost reduction needed to fully decarbonise the sector.

'Market-based measures are never not contentious,' **Laranjeira** continued. 'But the truth is that support for such a mechanism to be adopted at the IMO is growing fast – from influential industry players and States, to the [UN Special Rapporteur](#) on Human Rights and the

Environment. Climate Vulnerable Countries are finding their voices in the IMO on this matter too and increasingly demanding that the shipping industry, at the very least, begin to pay for its pollution. 2023 has all the potential to be a big year to push forward with this.'

For our final question in this section of the Survey, we asked: **Does the inclusion of shipping in the EU ETS (and the proliferation of other national emissions trading schemes) spell the end of any such system on a global scale (under an IMO mandate)?**

Quite a few of our respondents had rather let slip their views on this topic in their answers to our previous questions, but it still provoked some strong responses.

Cabbia Hubatova responded with an emphatic: 'Not at all!' – and explained why: 'There is still significant pressure within IMO for the inclusion of market-based measures within the revised strategy. Ongoing discussions in IMO have shifted to the measures' design and implementation, rather than whether they should be included at all. Indeed, much of the pressure for high-ambition market-based measures comes from EU member states. Many developing states also support the measures in principle, as the revenue could be used to help fund the price gap with zero-carbon fuels and the development of technology or infrastructure to ensure an equitable transition to more sustainable shipping fuels.'

Sand also said No, but added: 'It is very inconvenient for everyone to have more and more local and regional regulation – as opposed to purely global.' **Tolson** said that: 'As we are unlikely to see [such a system] globally then I guess we have to depend on regional initiatives.' While **Leyson** said that regional regulations can 'eventually become adopted as global mandates by hook or by crook'.

Chatterton felt that the EU initiatives did not preclude the development of a global scheme, but warned: 'If it isn't implemented and enforced soon, entire countries will take their own path and then it will be too late to change to something else.'

Ladekjær was optimistic, and pointed out that we have precedents for EU initiatives supporting rather than hindering global efforts: 'I hope and believe that it [the inclusion of shipping in the EU ETS] will help

and guide the IMO rather than work against it. We can compare it with the ECA and SECA which are also regional rather than global regulations. They did not prevent the IMO 2020 Marpol Annex VI from happening globally.'

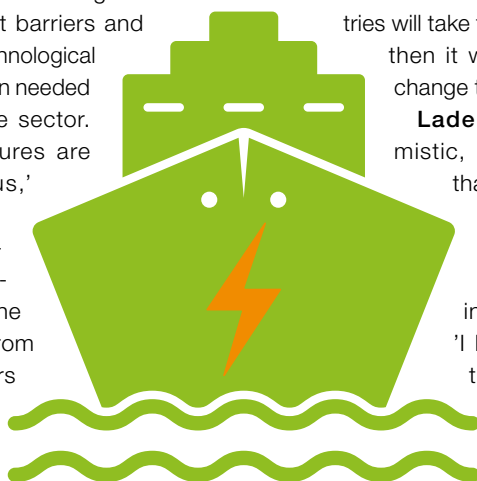
Mollet also judged that: 'It is highly unlikely that the inclusion of shipping in the EU ETS spells the end of any such system on a global scale. The layers of maritime regulations are applicable in pecking order namely, international, intra-regional, domestic, and local.

'Any new international regulations that are enforced supersede of any intra-regional or domestic regulations, without implying that these are cancelled out. There will just be additional layers of regulation in some regions, should the IMO also come forward with international regulations. Under Fit for 55, the EU has already stated that the suggested regulations will come into force in absence of international regulations and will be reviewed/removed once international action is taken.'

Williams noted: 'There is international agreement NOT to tax marine and aviation fuel – just swap that to an agreement to tax them globally at the point of sale. There will be some disruption but that's going to be the case anyway either through decarbonisation or through climate change. No avoiding the pain!

Browne urged: 'The IMO can act this year in its revised GHG strategy to impose standards and decarbonisation requirements on a global scale. MEPC should consider the state, national and regional bloc (EU) policies that have been implemented to address shipping emissions to ensure that its policies do not result in overlapping, under- or double-counting of emissions.'

We'll give final word in this section of the Survey to **Allwright**, who told us: 'A well-crafted, global system that enables all entities to move quickly in the reduction of emissions is a vitally important step. However, as mentioned earlier, that system takes time to design and implement. Do we need to move faster, of course, but equally the IMO and the shipping industry is showing an increase in speed that was unthinkable even two or three years ago. That doesn't match the level of urgency required but when it comes to the levels of revenue we are talking about, the EU already has the mechanism, the checks and balances in place and a large staff centrally and in member states to implement and enforce this. The international system and the IMO are a different entity that has never implemented something of this nature and at this scale, so a level of prudence and caution is needed in these early stages, but I would say that the early caution should then be matched by very ambitious mid-term targets for the 2025-2030 period.'



Trend spotting

The famous Hi5 spread, scrubbers, off-spec fuels and biorefineries all make an appearance in this section of the Survey, which focuses on fuel quality, pricing and availability issues

Given everything that has happened since this decade began – with War and Pestilence much to the fore – the introduction of the International Maritime Organization's (IMO) 0.50% global sulphur cap on 1 January 2020 seems like a very long time ago, but it was a hugely important moment for the bunker industry. So our first question in this section of the survey was: **When the sulphur cap was first introduced, there was speculation that very low sulphur fuel oil (VLSFO) might be the marine fuel grade most likely to be associated with off spec / quality issues. Does your experience over the past three years bear this out?**

Nigel Draffin said that VLSFO has not been the problem fuel some might have feared: 'Other than the issues during the first quarter of 2020, most of the serious quality issues have involved high sulphur fuel oil (HSFO). Whilst there are still issues over stability and "shelf life" of VLSFO most problems I have seen in the last 12 months have been related to difficulties in ensuring correct treatment on board. 50 years ago, the variation in viscosity and density of the fuels of each grade lifted worldwide was large but managed on board. Since the mid-1980s the fuel grades had minimal variation in viscosity and density and I wonder if this consistency has been taken for granted on board?'

2050 Marine Energy's **Adrian Tolson** replied: 'I guess it depends on what you consider "off-spec". With testing, we see off-spec in sulphur, and we see it regarding sediment and occasionally pour point. We also see more unexplained consequences of fuels creating problems even when they fall within specification – perhaps because standard ISO specs particularly in the area of stability remain inadequate? Obviously, sulphur needs to be within the limit but generally the other spec issues that have developed have been manageable from a quality point of view.'

Tolson continued: 'HSFO continues to

create more of a problem even as its reduced level of usage because it can contain many potential compounds which can be seriously harmful to engines. VLSFO is a better cleaner fuel – so less issues. HSFO usage with scrubbers is a very profitable endeavour and will no doubt continue – but not without risk as we saw in Singapore at the beginning of 2022.'

Offering a supplier's perspective, **Jesper Sørensen** of **KPI OceanConnect** Singapore reported: 'Overall, we have seen a healthy market for VLSFO, and in most cases it remains a stable, compliant and on-spec fuel option for ship owners. Many of the industry's predictions in the lead up to IMO 2020 did not come to pass, and this is a positive sign that our industry can embrace market transformations.'

Ladekjær of **Glander International Bunkering** concurred. 'Considering the amount of the business we're doing, the quality issues we've been facing have been quite negligible,' he said. 'Overall and in general VLSFOs are stable, sulphur compliant and on spec. So, in conclusion the concerns that

'We have found that borderline fuels that meet the spec have led to operational issues which necessitated the use of fuel stabiliser-type additives'

Albert Leyson, Global Business Manager – Fuel | Product Management, Drew Marine USA

many of us had leading up to the IMO 2020 launch have proven to be relatively groundless and this is of course a very positive thing.'

The **Marine Fuel Alliance's** **Anthony Mollet** told us that: 'From my previous role with a physical supplier in the Mediterranean, I cannot recall many examples of off spec product. We had very few off spec issues at all, either with the incoming cargoes or what we supplied. Sulphur and water limits were the only issues we experienced, otherwise VLSFO quality and stability was very good in general throughout 2020/2021.'

However, **Drew Marine's** **Albert Leyson** answered: 'Yes and no' to this question, adding that: 'As a global fuel additive supplier, we have found that borderline fuels that meet the spec have led to operational issues which necessitated the use of fuel stabiliser-type additives.'

Do you believe that, overall, there is sufficient availability of HSFO, VLSFO and MGO in the main bunkering ports to meet the industry's needs for the different grades?

Tolson pointed that the past 12 months have been eventful and therefore: 'We have seen some interesting disruptions to flows of VLSFO and HSFO in 2022 due to the Russian invasion of Ukraine that have created some supply issues in particular ports. I think those dependent on VLSFO from the Black Sea have many challenges right now.'

He continued: MGO prices are showing extreme differences globally – with some regions (North America!) being very high priced while others seem quite cheap. There is no question that war has created some market distortions – not the least of which is that Asia is overall much cheaper for bunkers than it used to be – that must be where that Russian oil is going. Beyond this factor it seems there is fuel available where it is required – except where demand simply does not support its supply.' Wrapping up, Tolson said that: 'There remain many ports with no HSFO which simply don't have that many scrubbed vessels calling or with limited infrastructure to support mul-

'Overall, we have seen a healthy market for VLSFO, and in most cases it remains a stable, compliant and on-spec fuel option for ship owners. Many of the industry's predictions in the lead up to IMO 2020 did not come to pass, and this is a positive sign that our industry can embrace market transformations'

Jesper Sørensen, Managing Director at KPI OceanConnect Singapore

tiple grades – some owners might complain about this but most have adapted by now.'

Xeneta's Peter Sand said that: 'The price tells you that there has been no obvious mismatch between demand and supply – for HSFO. But for VLSFO, this could have been the case in some places, or it might just be traders and suppliers taking advantage of the uncertainty around this (still fairly new) product.'

Mollet commented: 'From experience, I do not have any belief that there was shortage of product in any of the main or smaller regional ports. In general, availability of VLSFO, HSFO and MGO has been in line with demand.'

Ladekjær offered reassurance: 'In a liberal and open market supply will always follow demand. So, on the whole it is my clear impression that demand is met by now. You will of course always be able to find a customer who would like more selection than what is readily available everywhere, but overall supply meets demand.'

Leyson answered a question with a question: 'Typically, the viscosity of bunkers delivered are much lower than the viscosity grade on the BDN [Bunker Delivery Note]. The fuel would obviously meet the viscosity spec maximum. So would this indicate that certain ports have inadequate supply of proper VLSFO-RM whereby the tested viscosity matched the BDN viscosity outright? I really don't know.'

With her role as the Chair of the World Ports Climate Action Programme's (WPCAP) Alternative Fuels Working Group to the fore, Intent Communication's **Namrata Nadkarni** shifted the focus of this question onto the availability of greener options and told us: 'The most important thing when it comes to shipowners going green is proper planning. For this to be effective, information about fuel availability (including specific grades), indicative pricing and access to technologies such as shore power would be key. Tools like the upcoming Port Readiness Framework would facilitate these conversations – particularly for future fuels (vs those mentioned in your question) and ensure that the information was readily accessible. Information

about fuel availability could also underpin conversations about "book and claim" in situations where a specific grade of fuel was available at one port but not another.'

Next, we moved on from availability to talk about fuel prices, and more specifically differentials, and we prompted our respondents to consider changing patterns in crude runs and refinery operations as well as the impact on scrubbers on the demand for HSFO.

There have been some significant changes in the price differential between VLSFO and HSFO in 2022. Do you expect this trend to continue in 2023?

Sørensen gave a broad overview: 'In 2022, the fuel spread differential decreased throughout the year and is expected to remain the same in 2023. There is currently a low demand for both products as bunker rates have dropped and the global economy is expected to weaken further. Russian products may find their way into the market, so overall we do not believe there will be any disruptions on the supply side.'

'In addition, due to the weak economic forecast, the uptake of scrubbers for newbuilds will be limited. CO₂ (rather than SOx) is the focus, and many owners are now looking to long-term solutions for decarbonisation with alternative fuels for their newbuilds. With all this in mind, we do not expect the differential to change in 2023.'

'Shifting trading patterns has created volatility in the marine fuels market, as well as increased complexities and risk within the sector globally. With these changing dynamics in the marine fuels market, it reinforces the importance of having a financially strong, knowledgeable partner with a global reach.'

Ladekjær expected to see continued volatility, and added: 'Amongst others, the phase out of refined products from Russia into Europe will contribute to this. So, we're expecting elevated spreads and a forward curve in backwardation whilst we're heading into 2023.'

Draffin ran the numbers: 'The differential in 2020 averaged \$80 a tonne in Rotterdam, it rose in 2021 to \$110 a tonne and the average for 2022 to date (Dec) is \$220 a tonne.'

This is most apparent in the second half of 2022 and most likely linked to the significant change in the ratio of distillate prices to that of HSFO. In both Rotterdam and Singapore we used to see distillate prices at 135% to 150% of the price of HSFO, but since Q2 of 2022 we now see distillate prices now at 225% to 260% of the price of HSFO.'

Tolson advised: 'The Hi5 been narrowing recently with the overall price of crude falling – so spreads in actual dollars are considerably lower as we start 2023 than last year. On the other hand, we continue to see pressure on diesel which has tended to keep this spread wider in some locations as this favours a higher VLSFO price. I think the upward pressure on diesel will diminish and so this should lead to a generally narrower spread for 2023. Still profitable enough for scrubbers though.'

Sand told us that: 'In the longer run, the spread should come down – to around the pre-pandemic level which was about \$100 a tonne +/-20%.'

Picking up on our prompt on scrubbers, **Mollet** judged: 'If the price of HSFO remains competitive, more operators will look for ways to purchase and burn it. There will remain a supply of HSFO in the market for many years to come and it is also evident the uptake of scrubber technology is strong, suggesting that more owners are looking for ways to buy the cheaper fuel and manage accordingly.'

Our next question brought us back to the biofuels debate, with a particular focus on the supply side.

There has been a trend over the past few years for converting some refineries into biorefineries. Do you expect this trend will have a significant impact on the availability of marine fuel?

'Yes, the trend will continue,' said **Tolson**. 'Renewable diesel and biodiesel will remain in demand as we decarbonise land-based transportation. Some locations may find themselves short of fossil supply but hopefully this is offset as shipping transitions into the lower carbon alternatives produced at these refineries or to other lower carbon alternatives.'

I think overall (as we saw with IMO 2020) choosing the right and best priced bunkering port became more complicated – it will become more complicated in future as some supply locations are challenged to maintain price competitive supply. No surprise that the shipping industry is focused on optimisation tools to help calculate the price/quality/availability/emissions picture for all the bunkering options they have. Simpler back of the envelope choices of the past might be more difficult – we'll need to hand this over to an algorithm!

Draffin did not expect to see a significant impact in the short term: 'Bio fuel refineries use a variety of processes, some of which are similar to processes used in a modern complex petroleum refinery such as distillation and production of syngas. I think it is unlikely to see current complex refineries switching over to manufacture of biofuels in the short term. Issues of cost, the loss of income during any

the Survey, we returned to the IMO 2020 topic, but also invited some more speculation on new fuels and demand trends.

Do you believe that we may see a shift in bunker demand – in terms of both individual ports and geographical regions – over the next few years as a result of IMO 2020?

Mollet was circumspect: 'This could depend on several factors, not least the shift in trade and cargoes from Russian ports and the Black Sea. Natural demand will shift accordingly and could impact bunkering hubs such as Istanbul.

'Equally, if the Green Corridors increase and additional environmental regulations or imposed, then again, there will be a natural shift for operators to seek fuel supply from different ports and regions.'

Tolson considered: 'If we ignore the war in Ukraine – a big ask – then I think we had already seen demand shifting because of IMO 2020 – clearly China and the AG have taken

become more attractive bunker locations due to their availability and pricing of VLSFO.'

Sørensen was looking ahead: 'For KPI OceanConnect, IMO 2020 was just the beginning of shipping's evolutionary journey, and one that has played an important role.

'The real shift in bunker demand will be driven from developments with alternative fuels. It is widely known that the infrastructure required for alternative fuels is currently lacking, and it is important to lay the proper foundations to ensure success in the long term. Major hubs will continue to bunker a variety of fuels, including traditional fuels, going forward as they have been for the past three years since IMO 2020.

'Marine fuel providers have an important role to play in ensuring shipping has the energy it needs to run its fleet sustainability and guide customers through these market transformations.

'At KPI OceanConnect,' Sørensen continued, 'we are exploring the development of different fuels through our future fuels division, and fully expect our bunker sales mix to be very different in 2030 and 2050. We already have partnerships with several customers where we are looking at how we can further innovate and add more value to the targets in the value chain. We will see increasing numbers of trials, partnerships and joint ventures designed to drive collaboration and develop alternative fuel technologies.'

Leyson felt that we could see changes 'as early adopters of alternate fuels such as biodiesels execute their business plans to shake up the traditional bunker business', and added: 'To minimise freight, developing countries with low priced bio components may see an increase in demand.'

Diane Gilpin of the [Smart Green Shipping Alliance](#) told us: 'I believe we'll install a lot of wind-assist in the next decade and reduce overall net demand for all bunkers. Once we start seeing new builds with integrated wind-assisted we might see more than half the power requirement coming from wind on smaller ships. This will reduce dependency on bunkers and so reduce the amount and frequency of bunkering needed. The climate crisis will certainly impact global trade patterns with more near-shoring and local production being initiated. These profound changes will initiate transformative innovation across the global shipping system.'

And finally, **Williams** expected to see new trends in bunker demand – not as a result of IMO 2020, but 'definitely as a consequence of deglobalisation, demographic change, digitalisation and decarbonisation'.

'There will remain a supply of HSFO in the market for many years to come and it is also evident the uptake of scrubber technology is strong, suggesting that more owners are looking for ways to buy the cheaper fuel and manage accordingly'

*Anthony Mollet, Executive Officer,
Marine Fuels Alliance*

conversion and the time taken which would be over years rather than months. Some smaller, older installations, already slated for decommissioning can prove useful as candidates for conversion but their repurposing would be unlikely to disrupt the availability of conventional fuels in the next 15 years.'

Ladekjær concurred: 'I do not foresee the conversion of traditional refineries into bio becoming a sizeable challenge for availability of VLSFO at least short term. Bearing in mind that VLSFO is more a commodity than for example HSFO (which is more a residue product), and as such I therefore think product flows will find their way as long as there is demand. On a positive note, the world will need more biofuel, so overall I believe that shipping will mostly benefit from this transition.'

Taking a long term view, **Mark Williams** of [Shipping Strategy](#) and [ship.energy](#) said: 'I think that traditional marine fuel oils will become scarcer over time, especially as they get taxed more.'

In our final question for this section of

on and continue to take on an increasing significance in global bunker demand. If anything, the war has supported some of these demand shifts – which might revert back in a post war world. The question in my mind is whether these current changes in the international bunker market are more or less permanent – is it likely after all that Europe will buy a lot of Russian crude or oil products in the future?'

Draffin said: 'I expect that HSFO availability will become concentrated at hub ports close to refining centres or having significant oil storage facilities except where the vessel calling profile includes numbers of larger vessels equipped with EGCS such as larger bulk carriers, tankers and container ships. So the change will be a gradual drop in demand overall but a continued shift to VLSFO and LSMGO in ports that cannot justify HSFO import and storage.'

Ladekjær commented: 'I believe that changes caused by IMO 2020 have already taken place and that the bunker markets have fully adjusted to this by now. In general, places like China and Brazil have

Checks and balances

We conclude our 2023 outlook with a look at some of the tools and initiatives that, depending on your point of view, either help regulate, control and protect players in the bunker industry – or add extra levels of complexity

Even in the best of times, there will always be financial casualties in the shipping and bunkering sectors, as companies over-extend themselves and/or make questionable decisions. And with all the turmoil of the past few years – with the build-back from COVID-19, the Ukraine war, and a slow-down in the rate of global economic growth being among the most obvious pressure points – there are likely to be some casualties in 2023. So we asked: **Do you believe that most players in the bunker industry have adequate credit management and debt recovery measures in place?**

Draffin warned: 'The scale of supply chain disruptions and the potential for further conflicts could impact large players, especially as the larger fleets are no longer as diverse and more dependent on a single sector of shipping. This makes the credit risk larger and less easy to adjust in fast moving situations.'

2050 Marine Energy's **Tolson** was more optimistic: 'Record profits in 2022 and good profits in 2020 and 2021 will take some time to unwind. Most suppliers (and for that matter most shipowners) have stronger balance sheets and reserves than

ever before. I don't think we will see many problems in 2023 – famous last words!'

Jesper Sørensen of KPI OceanConnect Singapore stressed the importance of due diligence: 'When a market is highly volatile – as the bunker industry has experienced in the past few years – it pays to have a consultative, financially strong partner that can help to set a strategy to effectively manage risk.'

'Not conducting the right due diligence on your counterparties – including their financial strength, credit insurance, and how they manage risk and handle invoices – and cutting corners on hedging and procurement strategies could put your company at significant risk.'

'In recent months, the marine fuels market has seen an increase in the number of traders acting in a single chain, which in turn increases the counterparty chain. If payment terms do not align between the physical supplier and the end customer, a small trader may require another trader within the counterparty chain to finance the deal. This creates a high level of uncertainty for the customer and increased risk for the supplier, as well as reducing transparency and efficiency in the entire fuel supply chain.'

'With this latest trend and ongoing invoice pledging remaining as pressure points for

many buyers – especially as many smaller companies may not be able to cover their credit risk – the need for counterparty risk assessment has become more important than ever.'

Sørensen advised: 'To avoid financial casualties, ensure capital access, and manage risk effectively, forensic due diligence is required. For buyers, this should start with asking the right questions of their counterparts to ensure they will receive the right marine fuel solutions for their fleets.'

'There are three advantages to be gained from hedging and risk management; reduced volatility reduces cost of capital; knowing there will be no abrupt cost increases, which means that they can more easily plan ahead; and by smoothing out revenue and expenses they know they will not need to borrow on unfavourable terms because they have good liquidity.'

'Increased collaboration and transparency within the marine fuels supply chain and working with the right partners that have in-depth knowledge, global scale and financial strength are essential for developing and implementing the right energy procurement strategy for ship owners and operators.'

Glander International Bunkering's **Ladekjær** called for vigilance: 'With lower oil prices in 2023 and reduced freight rates in some seg-



ments, credit facilities will need to be trimmed and adjusted accordingly. Lower freight could mean increased default-ratios, so companies providing credit within the maritime industry will need to be alert and on their toes. There may be new entry players within bunker-market, who still have to learn the ropes in terms of having a tight and agile credit management system in place, and they may potentially be in for surprises in 2023. Time will tell.'

Anthony Mollet of the Marine Fuels Alliance felt many in the industry are not as well prepared as they think they are. 'If we consider bunker suppliers,' he said, 'then most would probably argue they do have "adequate" credit management and debt recovery measures in place. Few would openly admit they do not. However, as we at the MFA are establishing, it is proving to be the case that many do not have policies and procedures that are "fit for purpose" for their actual business operation. Simply having a relationship or a rolling contract with a credit reporting company or debt agency (or relying on your lawyer) is not sufficient. We have introduced new expert Partners to several MFA members to highlight gaps in their procedures and alternate ways of managing credit, risk and debt recovery.'

Mark Williams of Shipping Strategy and ship.energy was cautious – saying that while he didn't know if bunker players have adequate measures in place, 'past experience suggests not'.

We now turned to safeguarding systems of a very different kind: mass flow meters (MFMs). With the Port Authorities of Rotterdam and Antwerp-Bruges now set to join Singapore in making the use of MFMs compulsory for bunker deliveries, we asked:

Do you believe that the momentum is now building for MFM technology to become mandatory, or standard practice, in more bunkering hubs?

All the respondents who answered this question were in favour of MFMs – and most of them also expect to see more uptake. Xeneta's **Peter Sand** said: 'It would be nice if it could become mandatory – but I can imagine "standard practice" in main ports is "as good as it gets"'. **Ladekjær**, meanwhile, said he 'really didn't know' if more ports will follow suit on MFMs but he 'certainly hoped so'.

Draffin said: 'MFM technology is not perfect and there is still human behaviour in the system but it is more secure and reliable than traditional measurement. The buyers see fewer quantity disputes and the suppliers see improved time efficiency.'

Tolson was enthusiastic: 'I believe the momentum is very strong. Quite apart from the obvious benefits of not paying for what you

'If we could see one change come to pass in the bunker industry in 2023, it would be clear and joined up global policies and regulation for decarbonisation of the shipping industry'

*Steve Esau,
COO, SEA-LNG*

don't receive, today's digitally oriented financial and regulatory world is rapidly demanding more transparency and accuracy, and this requires MFMs on barges and accurate consumption monitoring on vessels. The bigger ports and the regulators themselves realise this and will make changes.

'Some jurisdictions and locations for multiple reasons will be much more challenging,' he continued, 'but the fact that by the beginning of 2024 about 30% of global bunkers could be delivered using properly certified MFMs means the momentum is unavoidable. In addition, current initiatives for MFM introduction are being spearheaded by today's physical supply bunker majors – notably Trafigura and Mercuria – additionally sup-

How this will pan out in terms of uptake and regulation in other bunkering ports is to be seen. Other industry stakeholders including surveying companies, have their voice too and are standing up for their history of quality and professional service in the area of measuring and calculating bunker volumes supplied. It is also the view of a great deal of bunker suppliers that they feel like they are the "baddies" and it is they who are being penalised and attributed the blame for quantity issues in bunkering. Concerns about the ships' crew behaviour and quantity disputes being the fault of the receiving vessel must also be taken into consideration, before bunker suppliers are forced to invest heavily in technology and be deemed to be the ones paying for the problem to be solved.'

In addition to opting to mandate MFMs, the Port of Rotterdam implemented a bunker licensing scheme and of course Singapore has been issuing bunker licences for many years now. So our next question was: **Do you believe that more ports will look to implement bunker licensing schemes over the next few years?**

Our respondents generally took a positive view of licensing, but some felt that ports would take a 'wait and see' approach.

'There will be a lot of focus on how this is implemented in Rotterdam,' said **Mollet**. 'A great deal of research and analysis will need to be done. This is of course a major bunkering hub, so if it is rolled out successfully, then there should be fewer barriers for the equivalent process to be adopted elsewhere. Each Port Authority must be allowed to make its own assessment basis the companies

'The scale of supply chain disruptions and the potential for further conflicts could impact large players, especially as the larger fleets are no longer as diverse and more dependent on a single sector of shipping. This makes the credit risk larger and less easy to adjust in fast moving situations'

Nigel Draffin

ported but perhaps not so aggressively by Vitol and Glencore. These companies are not only suppliers but control significant shipping assets which creates its own momentum.'

Mollet took an even-handed standpoint: 'There is certainly momentum for technology such as MFMs to become mandatory.

registered at their ports, their performance and what are the main issues that affects bunker operators in each location specifically. This may not be a one-fits-all solution.'

Tolson pointed out that: 'Ideally, this should work hand in hand with a MFM measurement system. In fact, many would say MFMs

mean nothing unless they come with a robust licensing (and penalty) system. But getting licensing implemented might be challenging in some locations and so it's possible or likely that supplier voluntary systems might develop – with outside verification of course.'

Ladekjær said that he didn't know if other ports would follow suit, but one could hope that they will. While Drew Marine's **Albert Leyson** judged that: 'To maintain their leadership position, it would not be a surprise if other ports join the club in MFM.'

Draffin felt that there will be more take-up: 'There is a realisation that licensing schemes are attractive to the ship operators and enable port authorities to monitor and if necessary act against poor performing suppliers in their port. Whilst, for some ports there are issues with interaction between the responsibilities of different regulators and in all ports there is a cost to operate a scheme, the overall advantage is an improved reputation and more visiting ships.'

Our final two questions were both curve balls to mix things up a bit. Firstly, we picked a topic which remains a talking-point in the UK (if not perhaps the rest of the world): **Do you believe that 'Brexit' (the UK's exit from the European Union) has been a success – particularly in terms of its impact on shipping, transport, energy or bunkering?** **Tolson** answered with a 'NO!', but declined to elaborate as he felt there are better informed people who can comment. Also in the No camp, **Draffin** said: 'Brexit and the difficulties in establishing the "routine" Customs procedures that were in place prior the UK's entry into the Common Market mean that short sea shipping continues to be disrupted. It has not had so much impact on long haul shipping.'

Sand was unequivocal: 'For trade of any kind, Brexit is a UK/European disaster.' According to the Smart Green Shipping Alliance's **Diane Gilpin**: 'Brexit has isolated the UK from its nearest trading partner, has excluded the UK from participation in EU innovation funding programs which have not been replicated by the UK government efficiently enough. Whilst we are seeing billions of euros being invested in waterborne transport whole system solutions via the EU, despite the best efforts of the civil servants in the DfT it's a struggle for the UK to keep up, despite being brilliantly placed to deliver innovative maritime solutions. In the long term this will leave the country at a profound disadvantage having to buy-in clean, green solutions so the job and wealth creation benefits reside overseas.'

Williams described the Brexit vote as 'an act of national self-harm' and 'another symptom of the national nervous breakdown

that has been convulsing the UK since the Somme in 1916'. (History buffs will recall that the Brexit vote took place just a few days before the centenary of the WWI battle).

Famously, the UK electorate split 52/48 in favour of leaving the EU in 2016, but Brexit captured no votes on this 2023 poll.

And so to our final, wishful-thinking question to wrap up our annual *Bunkerspot* Survey: **If you could see one change – however improbable – come to pass in the bunker industry in 2023, what would it be?**

Ladekjær shared with us: 'We could hope that IMO will improve their carbon neutral aspiration for 2050 in 2023.' **Williams** wished for: 'Transparency and accountability.'

Draffin was asking for something similar, delivered in a practical measure: 'For regulators, ship owners and suppliers to agree that whether the sample is taken at the barge end of the hose or the ship end

'With lower oil prices in 2023 and reduced freight rates in some segments, credit facilities will need to be trimmed and adjusted accordingly'

Carsten Ladekjær, CEO, Glander International Bunkering

of the hose, for any delivery of more than a few tonnes will make no difference to the quality of the sample as long as the correct procedure is used. In fact, with some deliveries to large oil tankers and large bulk carriers when in ballast condition, the barge end of the hose is more reliable. The original BP trials of MFM in 2002 were an effort to do away with transferring personnel between ship and barge after they experienced a fatal accident, surely we can use technology to permit remote monitoring of the sampling?'

Leyson said: 'It would be interesting to see DEI [diversity, equity and inclusion] principles applied to the bunker industry.'

As the Executive Officer of the Marine Fuels Alliance, **Mollet** had a wish-list which could also double as a personal to-do list: 'Greater engagement and collaboration between physical suppliers and bunker buyers / end users. Small, medium and inde-

pendent suppliers have to feel they have a voice and that their opinions are heard and acted upon. As larger traders and ship owner / operators consolidate and develop large-volume procurement systems, the needs of the physical barge operator and supplier must also be taken into account, when discussing matters such as mandatory technology, licensing schemes and regulations.'

Unsurprisingly, action on climate change was high on many respondents' agendas. **Gilpin** told us: 'Smart Green Shipping is working towards 100% renewable ships – that is both energy and materials – to be operational by 2030. They will have the potential to profoundly change the way shipping works through new 'circular' business models that values the whole lifecycle of a ship, increases sea-days and so earnings potential.'

Allyson Browne from Pacific Environment reported: 'We are urging the US federal government and California to develop and implement regulations to eliminate emissions from shipping by 2040, including zero-emission fuel standards for all ocean-going vessels. California has already taken leadership steps to reduce air quality pollutants and emissions from this industry, and it can build on this leadership by regulating OGV fuels. Given the urgency of the climate crisis and the harmful impact of port and ship pollution, we must work swiftly to put shipping on a path to decarbonise by 2040.'

Aladdin-style, **Tolson** claimed three wishes: 'A timeline for global emissions trading system to incentivise decarbonisation. A timeline for all major ports to adopt MFMs – and of course, to quote Miss World 1975 – "World Peace" – but if all these came about what would a consultant do for a living?'

And finally, in the spirit of world peace and reconciliation, we will close with these words from SEA LNG's **Steve Esau**. As some of the responses to our Survey question have clearly demonstrated, there is a very important debate to be had around the use of LNG as a marine fuel – which has been argued on both sides with conviction and passion – but we suspect that no one could take issue with Esau's parting wish: 'If we could see one change come to pass in the bunker industry in 2023, it would be clear and joined up global policies and regulation for decarbonisation of the shipping industry. These policies and regulations should set out a clear long-term pathway but should be goal-based and technology neutral. This should give the ship owners, OEMs, ports, infrastructure developers and energy suppliers the certainty they need to make the \$trillion investments needed to tackle the existential challenge we face.'