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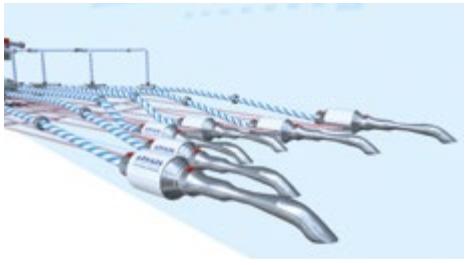

Accident report: a yacht sinks a tanker

A 63m superyacht hit the back of a small (348 GT) tanker causing it to sink, near Nassau, Bahamas. The tanker's AIS was off due to COVID restrictions impeding repairs. Neither vessel saw the other on radar

On December 23, 2021 at 10pm, a 63m superyacht, Utopia IV, hit the back of a small 348 GT product tanker, Tropic Breeze, causing it to sink, near Nassau, Bahamas. The tanker's AIS was not working, because it had a fault which could not be fixed, due to COVID restrictions making it impossible for a repair technician to attend the vessel.

The US National Transportation Safety Board determined the probable cause was the superyacht's crew "not maintaining a proper lookout" and so not identifying the tanker; a contributing cause was the tanker's bridge team not maintaining a proper lookout, since if they had noticed what was happening they might have alerted the yacht crew over radio or with a whistle.

However if the tanker's AIS unit had been working, the superyacht crew could have detected the tanker, and the tanker crew would have been able to see the yacht, it said.

After the casualty, investigators queried databases and found the AIS unit had not transmitted a position in 11 months.

Both vessels had radar but it appears they had not looked at it, since they did not see the other vessel until the collision happened.

At the time of the collision, the tanker's radar could not 'see' the superyacht, because it came in from directly behind, and a mast on the bridge blocked the radar's sweep behind the vessel. However NTSB noted that it is likely that the approach of the yacht would have been detected on radar, before it entered the blind spot area.

On the yacht, the captain had left the bridge shortly before the collision, leaving a bosun performing watch standing duties by himself. He was not credentialed as a watch officer and was not allowed by regulations to conn the vessel alone.

On the tanker, the master was in the rest room when the collision occurred, leaving an able seafarer on watch.

The tanker was built in 1989, and originally 135 feet long, and lengthened to 159 feet in 1997. So the double hull requirements of the 1990 Oil Pollution Act did not apply. It made semi-monthly runs from New Providence Island, Bahamas, to Great Stirrup Cay, Bahamas, with petroleum products. The company operated seven other ships.

The damage

The superyacht was travelling at 20 knots, the tanker at 5 knots, so the collision occurred at a relative speed of 15 knots. This was enough to cause 'minor' injuries to 3 crewmembers of the yacht.

The tanker's engine room flooded following the collision, and it consequently sank in 9,300 feet of water, with 156,500 gallons of petroleum cargo and fuel lost. All crewmembers abandoned ship and were rescued by a passing yacht.

The tanker was valued at $5.1 million. Lost cargo, valued at $343,881, was not recoverable.

The yacht sustained damage including ruptured hull plating above and below the waterline. Also fractured framing, a compromised double bottom ballast tank, damaged bridge windows, and dislodged and damaged hatches, fittings, and equipment. Total damages were estimated at $2.4 million.

The Tropic Breeze sinking by its stern about 15 minutes after the collision (image from NTSB report)

Tanker before the incident

On the day of the incident, the tanker departed Clifton Pier on New Providence island at 1800 at a speed of 5 knots, with a voyage estimated to take 12 hours. The master and an able seafarer were on watch on the bridge.

It was loaded with 100,000 gallons of high-sulphur marine gas oil (MGO), 22,000 gallons of ultra-low sulphur MGO, 20,000 gallons of gasoline, and 8,500 gallons of liquid petroleum gas. The vessel also carried 6,000 gallons of ultra-low sulphur MGO as bunkers. All but two cargo tanks were full.

The vessel had two radars. The master stated that one was off at the time, and the other was set to a 3-mile scale. The master had the radar set to alarm for targets within 2 miles.

The crew stated that the mast atop the bridge blocked the radar sweep aft, so the radar display showed a shadow area directly astern. The master stated that he did not see the yacht on the radar.

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Cover Image: A Samos Steamship VLCC. Samos Steamship is using the "SENSIB" fibre optic structural health monitoring system from Light Structures of Oslo on three Aframax newbuilds. **See page 21**

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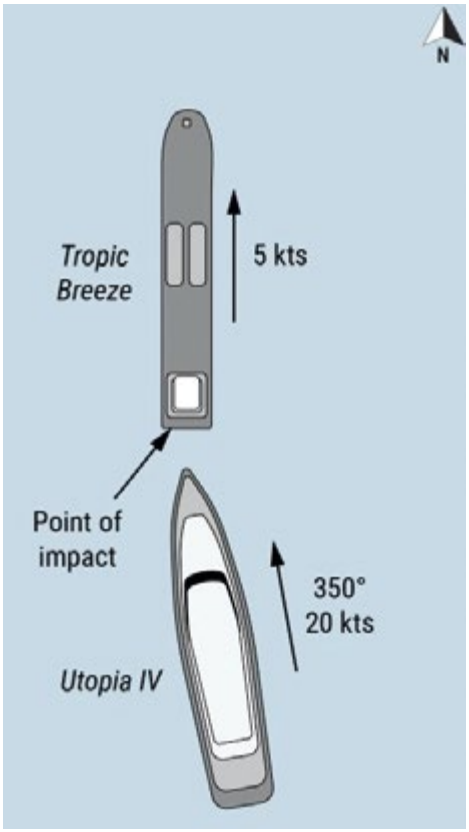


Approximate positions and headings of Utopia IV and Tropic Breeze before collision (not to scale). (Image from NTSB report)

The master had set up the autopilot earlier in the evening, and according to the AB, there were no course changes during his watch.

The able seaman left the tanker's bridge to do a round of checks at about 2155, looking at the engine room, navigation lights and alarm panels, and returned a few minutes later. Just before 22.00, the time of the collision, the tanker's master started toward his cabin, immediately aft of the bridge, to use the restroom.

Yacht before the incident

Meanwhile the superyacht departed from offshore Albany, New Providence island at 2030, toward Bimini Island, 160 miles away, at 20 knots. It had 12 seafarers and 7 passengers.

The yacht's bosun stated that the weather was clear, but bow spray made it more difficult to see outside from inside the wheelhouse and required intermittent use of bridge window wipers.

The display for one of the vessel's radars (S-band) was inoperative; the other radar (X-band) was set to a 3-mile scale.

About 2100, the captain stated that he left the wheelhouse with a radio to "check on the passengers." He returned to the wheelhouse before departing again at 2148 to check on the passengers.

Just before 2200, the time of the collision, the boson, now alone on the bridge, turned his attention to recording hourly log entries and navigation fix, with his back to the forward windows.

The captain told investigators he expected the bosun to manoeuvre as necessary for traffic; however, the bosun stated his understanding was that he first had to radio the captain to receive permission to manoeuvre the vessel.

The bosun told investigators that while he was alone in the wheelhouse after the captain's departure, he did not see any visual, radar, or AIS targets.

Collision

The collision happened at 2200. The yacht penetrated through the tanker's empty aft peak ballast tank, reported by the tanker operator to be 3.9 meters (12.9 feet) longitudinally (forward and aft), to the engine room, flooding both the tank and engine room.

Several of the yacht's crew were thrown to the deck or into bulkheads as it struck the tanker at a relative speed of about 15 knots; three crewmembers sustained minor injuries. The captain was in the main dining area and was thrown into the "forward bulkhead and door frame."

In the investigation analysis, NTSB noted that visibility conditions were good (10 miles), and the captain and bosun on the yacht should have been able to see the tanker's stern light as the yacht approached the tank vessel, even with bow spray on the windshield; however, neither reported seeing the tanker, indicating they were not maintaining a proper lookout through visual scanning.

"Because the [yacht] Utopia IV was traveling at 20 knots, it would have been prudent for the watch standers (captain and bosun) in the wheelhouse to be attentive in their lookout duties in order to mitigate the effects of the bow spray—perhaps by having a lookout with no other duties assigned," it said.

After the collision

The tanker's chief engineer investigated the damage. He found the engine room was flooding rapidly. He went to the bridge and reported the flooding to the master; he stated that he did not see the source of flooding, but the engine had stopped once it was submerged.

About 2215, 15 minutes after the collision, the captain made a VHF distress call and decided to abandon the vessel because he did not believe the vessel could survive a flooded engine room. The crew launched the rescue boat and a life raft. One or two crewmembers boarded the rescue boat, and the remainder of the crew boarded the life raft.

The yacht's chief engineer restarted the engines, which had shut down after the collision. The chief mate, who had come to the wheelhouse, made a distress call by VHF radio.

The yacht was manoeuvred to recover the tanker's crew, and the stern swim platform was lowered to allow them to board; however, sea swells and the height of the platform prevented them from boarding.

The nearby yacht Amara heard three VHF distress calls from the yacht (the crew on watch did not hear any from the tanker), and the Royal Bahamian Defense Forces also received the distress calls.

The Amara arrived on scene and dispatched the vessel's 38-foot-long tender (which the Amara had been towing) with a crew of three, who then recovered all of the tanker's crew from the life raft and rescue boat.

The crewmembers on the tender and the Amara's captain concurred it was not safe to get the tanker's crew aboard either the Amara or the collision yacht due to the sea state, so they were taken ashore to Lyford Cay Marina in Nassau via the tender, arriving about 0240.

The tanker continued to flood, and sank about 25 minutes after the collision. An alert from the vessel's Global Navigation Satellite System (GNSS)-enabled emergency position indicating radio beacon (EPIRB)was received by the Coast Guard's Rescue Coordination Center Miami at 2226.

After the Amara's crew were informed by the colliding yacht's crew that the vessel had a compromised hull, the Amara escorted the yacht to the Nassau cruise ship dock, arriving at 0240 before recovering its tender at 0300.

Causes

As the yacht approached the tanker from nearly directly astern, it was an overtaking vessel, and required by the COLREGS (collision regulations) to give way to the tank vessel.

However, because the watch standers on the yacht were not maintaining a proper lookout using all available means, they did not identify the risk of collision, NTSB said.

Although the yacht bore responsibility as the overtaking vessel to manoeuvre away from the tank vessel, once the yacht's intentions were unclear and a close-quarters situation had developed, the tank vessel should have taken action.

However, the watch standers on the tanker did not detect the yacht approaching. If they had seen the yacht, they likely would have signalled the potential danger in some way, whether by radio communication, whistle, or other means, NTSB said. So NTSB concluded that the tanker's watchkeepers were also not maintaining a proper lookout.

NTSB also determined that if the tanker's AIS unit had been working, it is likely the yacht would have detected the tanker before the collision, and the tanker would have been able to see the yacht's AIS signal.

This article is based on the NTSB report. The full text is online here

https://www.ntsb.gov/investigations/AccidentReports/Reports/MIR2229.pdf

News from OCIMF

OCIMF news over Nov-Jan includes its own governance system, phased deployment of SIRE 2.0, revised office matrix. It was pleased to see a reduction in piracy.

In 2023, OCIMF will introduce a new 'governance cycle' to focus on its own performance, with a series of monthly verifications "to assure our key processes are being effectively applied and provide evidence that organisational risks are well-managed," says Karen Davis, director of OCIMF.

"We will assess the work we are performing against actions planned, search for and identify error traps within our processes and strengthen our systems so that if we fail, we fail safely."

"We will be using the governance cycle to identify new or emerging threats which could impact our mission or scope of operation."

Ready for SIRE 2.0

In November, Karen Davis, director of OCIMF, announced that a "phased deployment of SIRE 2.0" was soon to start, in an effort to continue the downward trend of safety numbers.

"Over the years, oil spill numbers have decreased, and personal safety incident rates have dropped, but trends have plateaued," she said.

"We believe that further improvements to safety require investing effort in human factors."

The SIRE 2.0 inspection, in Ms Davis' perspective, gives crew a chance to demonstrate their knowledge and skills.

Ms Davis is aware of industry concerns about seafarer interviews. "Inspectors have been taught new behaviours and trained in a new approach to asking inspection questions," she writes. "They must show compassion for seafarer nerves and allow the seafarer time to respond to open-ended questions."

"As we work together through this disruption and valuable transformation, please have empathy for the crews taking part in the inspections, and for the inspectors who will carry out a new inspection protocol in a style that will be different from what was experienced over the last 30 years."

OCIMF has developed training videos as part of its support for inspectors, officers, crew, 'vetters' and operators for SIRE 2.0.

The videos explain the human factor and technical aspects of the SIRE 2.0 inspection from each stakeholder's perspective.

One set of videos is designed for viewing by ship staff, including onboard vessels; the other set of videos is for vetting managers in OCIMF member organisations, and staff in operators' offices who want to better understand how the inspection will change.

These videos can be accessed from the OCIMF website and can either be viewed on the webpage or downloaded for offline viewing.

New publications

OCIMF and CDI (Chemical Distribution Institute) have worked on a revision to the joint CDI/SIRE (Cat-1) Officer Matrix. Now complete, the update will be implemented from 24 April 2023. It brings the ranks used in alignment with terminology in the STCW convention. Another change is that operators can now identify a specific watchkeeping officer onboard. This is particularly relevant for those vessels where additional officers are present.

OCIMF will soon be launching the second edition of the International Safety Guide for Inland Navigation Tank-barges and Terminals (ISGINTT2). It will be available for free download from the OCIMF website on Feb 13.

It includes contributions from the Central Commission for the Navigation of the Rhine (CCNR), the European Chemical Industry Council (CEFIC), the European Barge Union (EBU), the European Skippers Organisation (ESO), FuelsEurope, the Federation of European Tank Storage (FETSA), the Oil Companies International Marine Forum (OCIMF), the Inland Waterways Transport Platform (IWT Platform) and the European Federation of Inland Ports (EFIP).

The transition period to the sixth edition of the Harmonised Vessel Particulars Questionnaire (HVPQ6) ended on Jan 6 2023, so all operators are now required to use this document for publishing 'particulars' for vessels in their fleets.

OCIMF has published updated guidelines for Covid-19 and inspections. They are co-written with the Chemical Distribution Institute (CDI) and INTERTANKO, with the goal of reducing the risk of transmission between the inspector and vessel's crew. They were updated in November 2022 to reflect "the changing situation".

"It is important to be aware that the level of Covid-19 infection varies significantly between countries and the level of infection within countries is subject to ongoing change," it says.

Piracy

OCIMF is pleased to see the International Chamber of Commerce's International Maritime Bureau (IMB) 2022 annual report on piracy, showing that maritime piracy and armed robbery attacks are at their lowest level since 1994.

In 2022, IMB's Piracy Reporting Centre (PRC) recorded 115 incidents of piracy and armed robbery against ships compared to 132 in 2021. Half occurred in Southeast Asian waters, particularly in the Singapore Straits, where incidents continue to rise. The incidents included 107 vessels boarded, two vessels hijacked, five attempted attacks and one vessel fired upon. In many cases vessels were either anchored or steaming when boarded, with nearly all the incidents occurring during the hours of darkness.

OCIMF is also pleased that the Indian Ocean High Risk Area (HRA) for piracy has been removed. "This marks the passage of a very successful period of threat mitigation for the maritime industry," it said.

However, "the guidance contained in BMP5 remains, along with the presence of international navies."

OCIMF participated in the "deep blue" exercise off the coast of Nigeria, in support of Nigeria LNG Limited (NLNG).

NLNG provided an LNG vessel in support of the first deployment of All Nigerian Deep Blue assets to showcase increased capability to combat maritime threats and in line with its partnership with the industry.

The event was held as part of a visit to Lagos by the IMO Secretary-General, who witnessed the exercise from a new Command and Control Centre.

Participants in OCIMF's South and Central America barging risk workshop

TO

Hellespont – how to sustain operations in difficult times

Shipping company Hellespont began operating tankers in 1955, and was once the operator of four ULCCs. CEO Phrixos Papachristidis explains how the company is sustaining its operations through difficult times

Hellespont Shipping is one of the longest established tanker operators still in operation. It was founded in Montreal, Canada, in 1946 by Phrixos B Papachristidis, father of the current chairman, Basil Phrixos Papachristidis. In 2011, Basil's son Phrixos B Papachristidis assumed position of Chief Executive Officer, based in Hamburg.

It began operating tankers in 1955 with an order of two handy size (under 60,000 dwt) tankers. Over the 67 years since then, it has owned 24 product/chemical carriers and 59 crude tankers, including four 440,000 dwt ULCCs, the largest double-hull tankers in the world.

Today the company does not own vessels, but provides technical management services to 18 vessels and its affiliated company Manila Ship Management & Manning provides crew management services to 65 vessels. The group has almost 100 staff.

The headquarters of the company were moved to Singapore in 2017. Other offices are in Hamburg, Athens and Manila.

Today its fleet comprises Suezmaxes and LR1 tankers, chemical tankers, container ships, platform supply vessels, as well as crew boats and a rescue vessel.

The general business development approach is to seek growth only where it suits the business, and maintain a focus on good personal relations with both crew and clients. It is an approach which is working in the ship management sector, even though it is often seen as one which is highly cost competitive and with large economies of scale, says Phrixos Papachristidis, CEO.

Phrixos B Papachristidis. CEO of Hellespont

As a smaller company with deep relationships in the industry, "we see ships or opportunities that are not widely circulated in the market," he says. "That's where companies like ours can really achieve something. We tend to look at smaller opportunities."

Hellespont did make an acquisition of another ship management company in early 2022, Thomas Schulte Shipmanagement, which took it into container ships for the first time.

"There are similar opportunities on our radar that we are looking at, for different ship types," Mr Papachristidis says.

"We would like to be able to offer our services of technical management and crewing across a broad spectrum of different ship types. We're running tankers, offshore vessels & container ships. We would like to add gas, other ship types as well."

The company is mainly looking at opportunities in the dry and offshore space at the moment but is ready for a tanker owning opportunity if it came up with the right price, structure and incentives, he says. "We would move for sure."

"We're very well positioned today to look at different opportunities. The ability to manage different ship types affords us access to different markets."

"At any given time, we're looking at taking in various tankers of different sizes for technical management on a third party basis," he says.

In the past Hellespont has provided construction supervision services to other shipping companies. "We'd like to grow that business as well."

Hellespont is ready to purchase vessels given the right opportunity. But arranging bank loans is getting harder, he says. "Everything that we're going through now, higher interest rates, inflation, has an effect on running ships, and an effect on ship financing."

Ship management competition

While ship management is often seen as a highly competitive sector which benefits from economies of scale, Mr Papachristidis notes that not every ship owner is looking for a large management company.

With the largest ship managers still only controlling a minority of the overall merchant fleet, there are plenty of owners looking elsewhere.

Many shipowners also prefer a ship management company they can have a strong personal relationship with, which can be harder for larger managers, he says.

And it is not always true that bigger means cheaper in ship management. "Smaller technical management companies can add value, delivering quality at competitive pricing," he says.

Also, while many ships are owned by large financial institutions who may prefer large ship managers, the opposite also happens, he says. Many ships are owned by smaller owners, who prefer smaller managers, where they can have a more personal relationship. "The industry is very relationship driven," he says.

Seafarers

One way Hellespont stays competitive is by attracting and recruiting the best crew, and focusing on training. The company's motto is "mariners with a mission".

"I like to think that's how we have managed to continue for 76 years," he says.

"The best investment operationally is in people. Incentivising people, shore side and onboard, to work as a team, to continuously improve the quality of the service, in whatever the market environment may be."

"We believe this investment in the training of our seafarers and their welfare is the best investment that we can make as ship managers," Mr Papachristidis says.

Hellespont has an affiliated company,

MANSHIP (Manila Shipmanagement and Manning Inc) which recruits crew in the Philippines and provides local training, through its own training centre.

"We're quite stringent, I would say, in our selection process."

Carbon

With the decarbonisation challenge, Mr Papachristidis says it is still too early to say what the best options for a shipowner are.

"Everyone seems to have a different opinion on the way forward, there's no one definitive propulsion solution for everyone. That creates uncertainties and challenges," he says. "There isn't one solution to this, at least not one that's identifiable in today's market."

"We spend a lot of time looking into this, reading about the subject, working with people, to try to understand individual requirements."

"I have my opinion what the outcome of the debate is going to be. My opinion doesn't really count when there's so much uncertainty. For us, it is more to try to understand what our customer wants, and what the end user wants, and work accordingly." TO

What we'll be discussing at Nor-Shipping

Emissions, and the role of banking and law firms in helping reduce them; connecting shipping companies with low carbon fuel suppliers; and doing more with partnerships. Themes likely to be explored further at Nor-Shipping

Senior shipping industry figures shared thoughts about the biggest issues in shipping at a press event in London in December, likely to be further discussed at the Nor-Shipping event in Oslo in early June.

Guy Platten, Secretary General of the International Chamber of Shipping, said that shipping had been discussed 'quite heavily' at the COP 27 UN climate event in Egypt in November 2022. A highlight was an event to launch a "Green Shipping Challenge", chaired by Prime Minister of Norway Jonas Gahr Støre and Special Presidential Envoy for Climate John Kerry.

As part of the Green Shipping Challenge, over 40 major announcements have been made by countries, ports, and companies. Topics include innovations for ships, expansion in low or zero emission fuels, and policies to help promote the uptake of next-generation vessels. The full list of announcements is at https://greenshippingchallenge.org/cop27/

Bank perspective

Leif Håkonsen, head of section – strategic business advisory, Ocean Industries with DNB Bank says his bank's approach with decarbonisation starts with selecting specific clients it wants to work with, rather than selecting transactions it wants to finance.

DNB is careful to be on the right side of decarbonisation, he said. "We are very concerned about getting a stamp of being a greenwashing bank."

However, DNB believes that oil and gas companies can be "part of the solution," not just a causer of climate change.

Mr Håkonsen sees start-ups as important in achieving decarbonisation, and sees that DNB can have a role in helping them find suitable markets which they had not considered. "Lots of small companies have very clever people that have not thought about scaling sideways," he said.

Wikborg Rein

Eleanor Midwinter, Partner with law firm Wikborg Rein, noted that with regulation, "it's important not to be too prescriptive."

"You can be as imaginative as you like, but no-one is imaginative enough to know what's going to happen in a few years," she said.

Ms Midwinter believes that it is useful for regulations to set a minimum standard, and environmental pressures also push companies to do something.

"There's always been cynics, people say there's always some ticking a box," she said. [But] "I'm very happy people were ticking boxes in the 80s and 90s. When people do the 'bare minimum', even then they have been forced to do the bare minimum."

"We can easily 'what-about' all of these things. Pressure that comes from [the threat of being accused of] greenwashing is relevant."

Ms Midwinter noted that there is a rise in shipping company clients asking about ammonia fuelled vessels. "We're having a lot more discussions about ammonia," she said.

DNV

Anders Mikkelsen, business development leader with DNV Maritime, said that DNV is playing a role connecting low carbon fuel supplies with the maritime sector.

"We're bringing in an oil major that wants to be a future 'clean fuel producer' and linking them up to a shipping company," he said. "We try to be a catalyst for partnership projects."

The energy producer can explain what kind of confirmed purchase volumes, or 'offtake', would be required to justify the necessary investment; the shipping company could explain which ports they would need the fuel to be made available, and how much they would need. So both sides can see if there is a way forward.

DNV often sets up collaborative groups in this way, including bringing together competitors, and trying to simulate how they could work together, he said.

Nor-Shipping

These are some of the topics which we can expect to see discussed at the Nor-Shipping event in Oslo in June, said Sidsel Norvik, commercial director of Nor-Shipping. The theme of Nor-shipping for 2023 is "partnership".

The theme of the previous Nor-Shipping event was "taking positive business action." This theme was chosen because people thought there was too much talk and not enough action on climate, noted Per Martin Tanggaard, Director External Relations with Nor-Shipping.

"We are an arena inviting the world to meet the right people and network to do the right partnerships," he says. "We try to put the right things together. That is our vision for Nor-Shipping."

TO

Will GHG regulations be tightened? – DNV perspective

Will IMO tighten GHG regulations? What will EU's ETS do to shipping? DNV's experts Eirik Nyhus and Tore Longva shared their perspectives on coming and expected regulatory changes to shipping and its emissions

IMO set its greenhouse gas (GHG) reduction goal in 2018 of a 50 per cent reduction in total emissions by 2050 compared to 2008 levels. It also agreed, in 2018, that the goal would be reviewed in 2023. So that review is about to happen.

It stated in 2018 that shipping would follow a "pathway of CO2 emissions reduction consistent with the Paris Agreement temperature goals" and it should reach zero emissions within this century, and as soon as possible.

"That language is a bit vague, but it was needed to bridge the gap between those who wanted decarbonisation by 2030 and those who were sceptical about pushing forward with decarbonisation at all," said Eirik Nyhus, director Environment with DNV, speaking at a DNV webinar.

So, IMO's Marine Environmental Protection Committee (MEPC) 79th session, held in London on Dec 12-16 2022, was particularly important, because it is one of the last meetings before IMO's big review and decision in 2023.

The December 2022 MEPC meeting was also the first in-person meeting since May 2019. Mr Nyhus believes that in-person meetings can be very helpful in getting agreement. "We are now able to read each other's body language, and try to hammer out those compromises, have those conversations that are necessary to move IMO forward on its GHG emissions," he said.

Mr Nyhus estimates that between two thirds and three quarters of the IMO delegations want full decarbonisation by 2050. The others say there should be an assessment first of whether this would be feasible. There is a question of whether more developed countries should contribute to the costs of less developed countries in decarbonisation.

IMO makes decisions by consensus, not by majority, he noted. "The fact that there's a majority does not necessarily mean a decision."

"We have some way to go to bridge the gap from 'doing nothing beyond what we already agreed,' and 'full decarbonisation,'" he said. "It is a challenging gap to bridge."

There will be another meeting in March 2023 "to try to hammer out compromises necessary to get to a target."

Carbon levies?

There are differing views within IMO on which regulatory measures should be used to achieve the target.

There was "some convergence" on the view that a market mechanism should be used, perhaps a levy on carbon emissions or a rebate for companies which reduce their emissions, Mr Nyhus said. There was not much support for an emissions trading system. "It looks like a levy is going to be the most likely outcome."

There will need to be further meetings after the MEPC 80 in July 2023 about how that mechanism would work.

There was 'broad support' for the idea of a fuel standard for emissions, setting requirements of "CO2 equivalent intensity per energy unit" for the fuel consumed by your engines.

This will drive deployment of alternative fuels, "most likely starting with biofuels, eventually leading to the rollout of renewable fuels of non-bio origin," he said.

"We are going to see decisions on both of these almost certainly. A lot of work will be needed before we see the regulatory text."

There are decisions to be made on methodology for calculation of emissions.

IMO is working on guidelines for how to calculate 'well to wake' greenhouse gas emissions, with the first version expected to be available in July 2023. This will take into account emissions made, or CO2 absorbed from the atmosphere, between the 'well' [or where the fuel is grown], and the ship's 'tank'.

This is important for biofuels, which take CO2 out of the atmosphere when they are grown, but emit the same as conventional fuels in the ship's exhaust. So they show no improvement on conventional fuels if considered only on a 'tank to wake' basis. 'Well to wake' is also important for gas based fuels, to include methane leaked to the atmosphere in the gas production process (between well and tank).

Topics for the future

Many topics have been pushed into future meetings.

How the use of biofuels will be factored into CII, a "crucially important topic", was not discussed at MEPC 79 in great detail but is planned to be considered at MEPC 80 in 2023.

More work is planned on CII correction factors, but the discussion "did not go anywhere beyond contributing to an agreement that review of CII will start at MEPC 80, but conclusions should not be expected by 2025," he said.

In 2025, we should see work on enforcement mechanisms and expected CO2 reduction rates.

Discussion about onboard CO2 capture and storage (CCS) was deferred to MEPC 80. There were a number of papers, including some suggesting explicit 'carve outs' from emission requirements for companies which installed the technology. There were papers saying that IMO needs to "get to grips with the issue, develop a work process," Mr Nyhus said.

However, he thinks it very unlikely companies with onboard CCS would be able to remove captured CO2 from their CII calculation. 'Capturing' or separating out CO2 from the vessel's exhaust is one thing, but unless it can be permanently stored underground or utilised, it will ultimately need to be vented to the atmosphere, because it can't be stored in tanks forever.

"We will need to see systems where we can be sure that carbon is stored in geological formations or utilised under certain criteria, as a trigger point for IMO to be sure that the regulatory aspects can be taken forward," he said. That "is a stretch, because IMO doesn't do land-based regulations."

"It might be a while before we see that adequately captured in IMO regulations, to be honest."

"There was an agreement that IMO should further examine this matter. Discussions will continue at MEPC 80. [But] I suspect MEPC 80 is going to be pretty packed. I'm not sure to what extent we'll be able to discuss it there either, in which case it will slide further down the road."

A discussion about a Phase 4 of the Energy Efficiency Design Index (EEDI) "was pushed down the road."

There was a proposal that IMO should get involved in work to establish 'green corridors',

where two port hubs agree to make favourable conditions for low carbon shipping, such as by ensuring reliable supplies of low carbon fuels. But there was "significant opposition" to IMO's involvement, since it might be better arranged by the two countries directly. "I suspect it will pop up again at MEPC 80," he said.

MARPOL

There were discussions about MARPOL, the International Convention for the Prevention of Pollution from Ships, at MEPC.

A decision was made to make the whole Mediterranean a Sulphur Emissions Control Area (SECA) from May 1, 2025, with shipping companies having a choice of limiting their fuel to 0.1 per cent sulphur fuel or using scrubbers.

There were amendments agreed to a number of MARPOL annexes, including on regional reception facilities, garbage record books, fuel flashpoint information being included in the Bunker Delivery Note (BDN), and data about attained / required CII being included in the IMO Data Collection System.

For ballast water management, there are requirements to record any issues with systems in a record book. It was agreed the ballast tanks could be used to store 'grey water' (non hazardous wash water) and sewage. There was a discussion on how to handle ballast water in a port with challenging water properties, Tore Longva said.

CII clarifications

The DNV experts provided the audience with some clarifications about how CII works in the webinar, including the deadline for a failing ship to improve, and how tankers for storage handle CII.

A company getting an E rating for CII in 2023 could start implementing its 'corrective action plan' in 2024 but would not need to achieve CII compliance until 2025, said Tore Longva, principal consultant with DNV.

Tankers being used for storage calculate their CII the same as any other ship. The calculation is CO2 emitted divided by (cargo carried multiplied by miles carried). A tanker being used for storage will emit low amounts of CO2 since it does not use engines for propulsion, and would not have any miles. But the calculation result would not necessarily be in the A-C band. Since the numbers on the top and bottom of the formula both change, the end result is unpredictable.

There is an opt-out for ships which trade only domestically, which could be applied to vessels used only for storage.

If companies do not believe it is possible for their vessel to achieve a CII of C and have a valid reason, they should discuss with their flag state if their vessel can be treated differently, he said.

DNV's experts Eirik Nyhus and Tore Longva

EU ETS

Separately, the European Union hammered out an agreement on shipping and the Emission Trading Scheme, over the weekend of Dec 17-18 2022. There had been a provisional agreement two weeks prior, which was contingent on agreement being made on ETS in other industry sectors, which was made that weekend.

"All of this is subject to further work, we have not yet seen documents, we know there is technical work ongoing. But we think it will be identical to what we have today," Mr Nyhus said.

It will concern "ships above 5000 GT, transferring passengers and cargoes."

Companies will need to "surrender emission allowances," by April 30, 2025, based on data they reported for 2024. This is jargon for having emission trading scheme certificates in an account and giving them up. To get the certificates in their account, they can purchase them at the market price, or use other options on a secondary market, such as by trading in futures and options.

Offshore service vessels (OSVs) will be added to EU's MRV (monitoring, reporting and verification scheme) from 2025. In other words, they will be required to report emissions. They will then be subject to ETS, with a requirement to pay for emission credits, from 2027.

Similarly, all ships above 400 GT will be considered for inclusion in MRV from 2025 and in ETS by the end of 2026, he said. Methane and nitrous oxides, which are also greenhouse gases, will be added to MRV in 2024 and to ETS in 2026.

"We don't know how this is intended to be monitored and reported," he said. "The commission will be tasked to establish the right mechanisms; we have signals this will be by 1 Oct 2023."

It may be close to the system for the FuelEU standard, although this covers well to wake, while ETS is tank to wake.

ETS will apply to 50 per cent of CO2 emissions for ships going or leaving one European Economic Area (EEA) port, and 100 per cent of emission for ships whose voyages both start and end in an EEA port.

It will be phased in gradually, with companies required to pay for permits covering 40 per cent of their emissions in 2024, 70 per cent in 2025, and full coverage in 2026.

The money generated will be earmarked for shipping through an innovation fund. Shipping will be able to apply for some of this money to spend on technology development.

"We don't know what the allocation criteria will be, the intention will be to support alternative technology deployment," he said. "They can't use the money to support low carbon operations, such as subsidising the cost of low carbon fuels."

If the IMO also develops a carbon levy, it may operate independently of ETS. There are provisions in the ETS rules stating that the European Commission will re-assess if ETS is needed if an equivalent IMO system is in place. But it may be hard to see them as equivalent, because IMO is making a levy while EU has a trading scheme.

"It will be hard for the commission to say, IMO has come up with something as good as what we have in Europe," he said.

And ETS for shipping would generate Eur 10bn at a carbon price of Eur 100. "It is always hard to give up money. If ETS is mothballed, EU would not see that any more."

"So, I suspect we will see these two systems layered on top of each other. Unfortunately, I think that is the likely outcome."

EU has a guideline for biofuels and perhaps future 'electro fuels' made with renewable electricity, that they should be considered 'zero emission' under ETS, and so exempt from the need to buy certificates, if they provide at least a 70 per cent reduction in emission based on well to wake, Tore Longva added. TO

You can watch the webinar online here **https://www.dnv.com/maritime/webinars-and-videos/on-demand-webinars/MEPC-79-in-focus-revising-future-GHG-ambitions.html**

The risks of engine failures and blackouts

Losing engine or electrical power can lead to collisions or groundings, and expensive claims from cargo owners. A webinar organised by Britannia P+I club discussed how to reduce the risks of both power loss and big claims

Losing propulsion power on a ship can be a serious incident. In congested waters it can lead to a collision, and if near land it can lead to groundings. It can lead to cargo damage, if cargo needs refrigeration or gets delayed.

This can lead to big claims from parties affected. An entire waterway or canal can be put out of operation. Pollution clean-up and spill compensation costs "can be the most volatile," said Lionel Fernandes, marine engineer with consultancy TMC Marine, speaking at a webinar organised by the Britannia P+I Club, "Maintenance versus Claims", on December 1, 2022.

Loss of engine or generator power can be caused by fuel which is poor quality or contaminated, engine injectors or other components being worn out, or insufficient or ineffective maintenance of electronic and pneumatic control systems. "We had a case recently where a vessel had to be towed to a port of refuge due to a failure of one valve," he said.

Sometimes crew will try to re-start an engine using compressed air. But there can be a limit to how many engine starts which the stored compressed air can make, if it does not have time to be re-generated by a running engine.

Engine manufacturers recommend that engines are serviced every 2 or 5 years, usually done in dry dock, but sometimes it is not done, he said.

A temporary loss of the main power supply, but which can be rectified using an alternative power source, or a means of re-starting the generator, is termed a 'blackout'. If there is no means of starting an engine at all, it is termed a 'dead ship', he said.

Engine failures and blackouts can be more likely when a vessel is approaching a port, because this is when additional loads can be added to the electricity demand, such as thrusters and pumps, he said. This is also a time when there might be a switch to low sulphur fuel to comply with port regulations. There have been incidents of the switch to low sulphur fuel leading to engine problems.

A blackout can be caused by human error, someone simply switching the generator off, or the valve for fuel flow to it.

Reducing risks

A large number of blackouts are caused by electrical system failures, although they may be reported to be a result of starting up thrusters or machinery, he said.

One obvious step is to try to check that adequate power is available before a new electrical load is switched on.

Electrical switchboards can be inspected. Thermographic imaging can detect electrical equipment heating up which should not be.

Some companies do not do all the planned maintenance on the vessel that they are supposed to do, he said.

Other recommendations to minimise risk of blackouts and failures are to avoid doing maintenance on fuel systems when approaching a port.

You should ensure engineers are aware of how to isolate cylinders on the main engine in the event of failure.

You should wait for the results of tests on fuel oil to ensure that it is within specification before changing over to use this. You should not mix bunkers from two suppliers, he said.

You should not use a shaft generator when manoeuvring, because you need all the available power to move the ship at low speed.

He recommends you should also do the following.

Ensure alarm systems are regularly tested.

Ensure engineers are fully familiar with engine room systems and their pipelines, including the fuel change over procedures.

Ensure water is regularly drained from fuel oil tanks, in order to prevent water build up and carryover in the fuel and to lessen the risk of bacterial contamination / microbial infestation.

Establish a 'failure to start / blackout' checklist. This should include familiarisation with the operations.

Ensure weekly tests of the emergency generator are carried out with the battery charger disconnected from the mains. It is not unusual for the batteries to be flat / damaged, and this does not raise any alarm, he said.

Ensure all means of starting the emergency generator are available.

Ensure that the emergency generator is operated on load as close as possible to the maximum capacity at least once per month.

Ensure that any loss of power or propulsion incident is investigated, and a root cause determined, by properly trained personnel.

Lionel Fernandes, marine engineer with consultancy TMC Marine

After a problem

After any loss of power or propulsion, you should follow procedures in the company safety management system. The procedures may be in a separate emergency procedures manual, he said.

It is important to record the position and time in the deck and engine logbooks.

Emergency generators should automatically come 'on load' within 45 seconds, but this may not happen, for example if the switch has not been left in the 'auto' position.

It may be possible to start auxiliary engines using compressed air, if no electrical power is available.

As an emergency measure, it may be necessary to drop anchor to reduce the ship's speed, if this is the only alternative to running aground.

It is important to have good communication between the engine room and bridge.

Ultimately, "whether a blackout is a $5 or $50m event depend mainly on where the vessel is at the time," he said. If it happens in the open ocean, and the engine can be quickly restarted, there could be no costs at all.

By investigating all incidents and taking preventative and corrective action, it is much more likely that when an incident occurs the consequences will be reduced. "If an incident has occurred in benign conditions, it can and will happen again in conditions which are not so favourable," he said.

"All propulsion loss incidents should be treated

as a major incident and investigated as such," he said.

Causes of problems

There was one situation where an emergency generator failed to start, because a circuit breaker had not been installed properly, after it had been removed for a routine inspection the previous day, he said.

"The breaker was withdrawn by the chief engineer to inspect it, but it wasn't installed [back] in the right way. There was an interlock where you hear a click, and this wasn't done."

As a result, cooling water was overheated and a radiator exploded, so the emergency generator could not be used.

There was another vessel which was supplied by bunkers which contained 'cat fines', particles of spent catalyst, from the catalytic cracking process in a refinery. As a result of analysis of the bunker fuel, it was recommended that a purifier should be used, running at the right temperature. "We had a vessel which didn't follow these guidelines, resulting in high cat fines in the fuel," he said. This can be a cause of blackouts.

TMC Marine is a survey, consultancy and expert advice company and subsidiary of class society Bureau Veritas. It employs 90 consultants in 10 offices, he said.

Reducing cargo claims

If you do have an engine failure or blackout which causes damages to cargo, for example due to lack of refrigeration or a delayed arrival of a cargo which has a limited life, the cargo owner will seek compensation from the shipowner. It is common to see claims for millions of dollars, says Michael Todd, fleet manager with Britannia P+I Club.

The normal legal route for doing this is to claim 'unseaworthiness', under the Hague-Visby Rules for international carriage of goods by sea, he says, since there has been a problem with a core part of the ship. "Cargo claimants will almost always open their attack against the ship by suggesting unseaworthiness," he said.

These rules state that shipowners must exercise due diligence at the beginning of a voyage to make a ship 'seaworthy', properly manned, equipped and supplied, and ensure the parts of the ship in which goods are carried are "fit and safe for their reception, carriage and preservation."

So if there is any equipment failure, the claimant will need to prove that it had a cause the shipowner should have known about, or it was not properly maintained.

Mr Todd recommends that shipowners are careful about providing any information relating to maintenance which could be used to make a case. "It will be used against us and is going to be damning evidence," he said.

If you do wish to provide maintenance records to support your case, then there is the question of putting them together.

Sometimes information is not recorded with sufficient detail, or is unreadable, showing a series of numbers and initials. "The only clue in many cases as to what the document is representing is a title at the top of the sheet. Sometimes you need a PhD to interpret them, or refer to several reports to begin to understand what is actually being reported."

Many crew consider that maintenance records are nothing to do with them. "That could not be further from the truth," he said. "Good housekeeping is the entire point of all of this."

If the claim goes to court, the judge and lawyers may not be seafaring experts. "They are well educated, but they are not used to terminology used by mariners. They are certainly not aware of some of the intricacies of the documents they are being shown."

You can watch the recording of the webinar online here **https://attendee.gotowebinar.com/recording/2082175283823971671**

Optimarin – planning BWTS takes 6 months

A project to retrofit a ballast water treatment system (BWTS) on a vessel requires 6 months of planning, says supplier Optimarin. This is what is involved.

When planning a ballast water treatment system retrofit, you should allow 6 months of engineering lead time before an installation, says ballast water technology company Optimarin.

"There are multiple considerations for a shipowner seeking to install a compliant BWTS in terms of system selection, yard capacity and future reliability to cut maintenance costs in the long run," says Leiv Kallestad, chief executive of Optimarin.

"Fast turnaround on installation is a priority to minimize vessel downtime."

The work starts with determining the right sort of BWTS, based on factors such as the size and type of vessel, classification, sailing pattern, and flag / port authority requirements. Then the system can be procured.

The next stage is to do a detailed inspection and to do site engineering, including looking at structural, pipe, electrical and other elements.

A 3D scan will be done. You will also do the detailed design engineering, using a digital tool. Work includes planning the piping and outfitting, making a bill of material needed, and doing pre-fabrication drawings. Class approval will be needed for the design.

For installing the system, several of Optimarin's customers have done an installation on a vessel while sailing. This could be an option if dry dock space is proving hard to find, the company says.

Some companies have seen logistical challenges with BWTS installation, including supply chain problems caused by Covid-19, and shortages of microchips and parts such as piping and cables.

After the system has been installed, it will need to be commissioned, and then given an initial survey to verify compliance with class and regulatory requirements

For the commissioning test, sampling and analysis of ballast water is required, to validate that the system functions according to performance standards. This testing is mandatory for all ships since June 1, 2022, under IMO regulations.

The testing is necessary to gain an International Ballast Water Management Certificate that shows compliance with the IMO's ballast water management convention set to enter into force in September 2024.

Optimarin can deliver its flexible, modular BWTS in 6-10 weeks, and can access available drydock capacity at one of its partner Newport Shipping's global network of fifteen affiliate yards, the company says.

The modular design of the system makes it adaptable for installation on different vessel types and deck configurations with limited space. Over 1,000 Optimarin BWTS have been installed to date, it says.

Risto Kariranta – BIMCO and getting more from CII

Risto Kariranta of Neste on how to fix BIMCO's CII clause proposal, why slow steaming doesn't always reduce consumption, why other 'consumers' can't be separated, how CII penalises lazy ships, and other CII matters

By Risto Kariranta, shipping performance manager for biofuels producer Neste

The basic idea of the BIMCO CII clause is to highlight the charterer's responsibility for the vessel's CII rating, and ultimately making them pay if efforts to improve it fail.

But the clause is far from being balanced in respecting the main responsibilities of the owners and charterers in a typical time charter.

These are the escalation methods in the proposed contract clause for when the CII score starts going down.

First, the owner sends the charterer an advance warning.

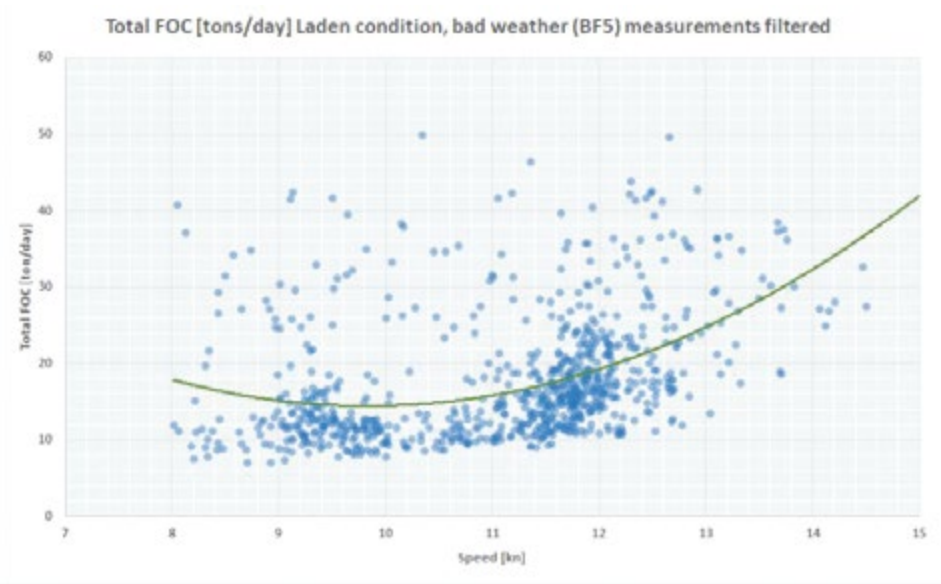
Second, the owner requests a written plan from the charterer for how to fix it with a two-day notice. The owner reviews the plan in two days. If it is good, they follow it. If it is not good, the owner reserves the right to slow steam, without breaching the other speed performance related charter party clauses.

Such escalation does not respect the practicalities of vessel operations. Which charterer would like to sign a ticking bomb that might lead to a forced slow steaming with a four-day notice?

Instead, we should more clearly separate the technical and operational performance, as CII is based on both.

Owners should be responsible for maintaining the technical performance in the same or better level during the charter. Charterers do not have tools for impacting that.

Instead of sudden escalation, we should enforce a continuous monitoring of CII. Weekly follow-up is a better basis for CII control compared to doing it only when things look bad. This would provide charterers with better predictability.



Daily fuel oil consumption (FOC) does not always decrease with lower speed

Plans should be made before things get bad. Why not request the corrective plans in the beginning of the charter, simply answering the question: what will we (together) do to improve CII if snow hits the fan, and what is the priority order of the actions in such a case?

Forced slow steaming should be completely removed from the text. Who wants to have a time-chartered vessel without schedule control? With that clause you ruin one of the cornerstones and reasons for having a time charter at all. Fixing a bad CII will not happen overnight by slow steaming anyway. It is not a silver bullet solution for reducing emissions.

Instead, there could be a longer period to get CII on track but leaving the freedom to the charterer to decide the actions. Defining a monetary penalty if level is not met.

Or, mandate the charterer to buy low GHG fuel for the vessel. That would work nicely with advanced, drop-in biofuels, if we would get the impact of those recognized in CII and IMO DCS.

Speed misconceptions

There is a misconception that speed reduction is a solution for always reducing fuel oil consumption and emissions.

We are accustomed to seeing nicely growing speed-consumption curves following power functions. But these often reflect only the propulsion consumption but leaving the other consumers out.

The graph shows daily fuel oil consumption (FOC) measurements vs speed for a product tanker. There is a minimum at the speed of slightly below 10 knots.

This can be explained by the other consumers. Ships like this typically have exhaust gas economizers and shaft generators for cargo heating and hotel power consumption, reducing the use of boilers and auxiliary generators.

Once the main engine load gets low,

typically the shaft generator needs to be switched off and auxiliaries started. The exhaust gas economizer heating is not sufficient anymore without additional boiler use. This setup provides local minimums to the total consumption curve that are vessel, cargo and condition specific.

Note, we cannot draw a conclusion from this that the most fuel and emission economical speed would be slightly below 10 knots. We need to take the idling consumption in the equation.

For example, if the average speed for just in time arrival would be 6 knots, total consumption for the voyage is the sea voyage consumption including all the consumers, and the idling consumption from waiting before accessing the port. Idling time gets longer as a function of the sea voyage speed.

Vessel optimal speed is a delicate matter and very hard to optimize to the last digit in a normal operation.

Only propulsion consumption?

Someone has proposed to IMO that we should consider only propulsion consumption and emissions in CII.

As we can see from the graph, we might sometimes produce more emissions by slowing down and reducing propulsion power as it increases the additional consumption needed for heating and hotel consumption.

Different energy consumers are cross-optimized and connected so tightly onboard a modern ship that separating those is not meaningful.

CII adjustments

When I read through the list of all adjustments and corrections for CII, I get a feeling similar to filling in a tax return. First they give you a terrible number, but then you can apply several small deductions and adjustments. After which, the number is still bad, but you feel much better after being able to deduct something.

The deductions can be divided into voyage adjustments and corrections.

Voyage "adjustments" mean that a part of a voyage can be excluded from the reporting for good reasons. You leave out the emissions of the 'adjustable voyage' part as well as the distance sailed. These are for sailing in ice conditions, or scenarios which may endanger safe navigation of a ship. Shuttle and STS transfers get an adjustment.

"Corrections" could be summarised as deductions for cargo related reasons, such as heating the cargo, refrigerating / cooling / reliquefying cargo, and the cargo discharging pump.

Other corrections are a capacity correction factor for ice-classed ships IA Super and IA; cubic capacity correction factors for chemical tankers; and a correction factor for ship specific voluntary structural enhancements. These factors are also in the EEXI/EEDI calculations.

For those of us working in the Arctic, ice-classed vessels get a correction, ice navigation [miles] are excluded, and the cargo heating correction is also significant. It is common that the added energy needed for cargo heating during winter is bigger than the ice-navigation surplus.

The hard work here is to keep track of the status of the vessel taking these deductions into account all the time.

CII and alternative fuels

Can you play CII with alternative fuels?

Short answer, no. Long answer: yes, but it is complex and expensive.

The CII calculations are based on the same methodologies for calculating each fuel's emission, based on the default emission factors, as in IMO DCS and EEDI calculations. Fuels having default factors include HFO, LFO, MDO/MGO, LPG, LNG, methanol and ethanol.

Out of these fuels, none is really directly compatible with the engines capable of burning an alternative, with the exception of dual fuel LNG vessels. This limits the possibility to use these as a flexible adjustment tool for CII.

But let's take a look at the numbers anyway.

Our sample vessel, a 50k DWT MR tanker, burns 30 tons of traditional fuel per day at sea at 12.5 knots and is at sea two thirds of the year.

The biggest CO2 and thus CII reduction potential by using LNG. However, it is currently expensive. The extra cost for reducing one ton of CO2 is close to $2k.

For biofuels, tank to wake emissions do not differ from the fossil solutions. The well-to-tank part would need to be included into the equation in order to get better numbers. IMO is working on life cycle assessment (LCA) figures of a wide selection of alternative fuels, including biofuels, but that work is not ready yet.

Even after that, CII needs to be changed to accept the use of IMO's LCA figures. We probably need to wait for some years. Although there have recently been some indications of verifiers accepting lower emission factors.

'Lazy ships' and CII

While a vessel is idling, in anchorage, drifting, or in port, it is, with limited exceptions, producing emissions. And it is not gaining any miles, which in CII is extremely valuable for keeping the rating low.

A study from Blue Sky Maritime Coalition, "A Perspective on IMO Efficiency Measures: Opportunities for Improvement", looked at a 16 MR vessel fleet. By comparing vessels in the fleet, it showed that CII is more dependent on the trading pattern than the technical performance of the ship.

One conclusion is that an incentive to keep the vessels moving increases the total emissions. This is true from an individual vessel perspective.

But when we look from a more holistic view, it is not the case as it drives the world fleet to be more active, meaning most probably, that we need proportionally less vessels in number for fulfilling our overall transportation needs.

It is the same mechanism that does not make slow steaming categorically a better option for reducing total emissions of the shipping, but only when applied without sacrificing the cargo transportation potential of a vessel.

This also makes JIT-arrival an extremely good tool for CII improvement.

The downside of this phenomenon is that it makes sailing with empty ships tempting, when the CII-rating of the vessel is not otherwise getting to the targeted level. In a ballast condition the vessel typically produces less emissions per ton mile and therefore it should bring your CII down.

Then we end up with an equation of whether the penalty of a bad CII-rating is worse than the cost of this empty movement. It could be significant if the markets do not want vessels with a bad CII.

Speed control

Speed control will be the sledgehammer in the CII toolbox. In most cases, reducing speed to a certain limit reduces fuel consumption and thus emissions.

For example, for a MR tanker on its way from mid Pacific to Singapore. With 13.5 knots, the CII for this vessel would make 5.0

CII. With 10.5 knots CII is only 3.7.

Of course, we cannot just order ships to do 10.5 knots to get CIIs down. That would probably lead to loss of transportation capacity, missing loading/discharging dates and create a need for more vessels.

But if we play this smart and adjust the speed to the minimum required for the loading days or discharge window, we can gain a lot simply by being actively on top of the voyage progress.

In our own Porvoo terminal we apply JIT arrivals for our time chartered fleet. We have got even older tankers to A-level in CII. There are also more scalable tools for optimizing the arrival times in development, such as Blue Visby.

"Redeliver vessel in a C class"

We have seen the first CII clauses for longer time charter parties, requesting us as charterers to redeliver the vessel minimum in a C class.

From a charterer point of view, it is a bit of an uncomfortable situation.

We get limited information about the vessels' current CII-levels. And even if we get it, our trade is most probably something

Risto-Juhani Kariranta, shipping performance manager for Neste

completely different, giving no guarantees of CII remaining the same in our operations.

Weather routing

Weather routing should be among the clear winners in CII reduction measures. It reduces the total fuel consumption and CO2 emissions for the voyage. It can also add miles.

For example, we have a medium size tanker sailing from Vancouver to Singapore. The shortest route hits the strong Kuroshio currents in the coast of Japan. The weather routing avoids those by adding 150 miles to the total voyage length.

Arrival time is the same, fuel oil consumption is twenty tons less, equalling 62 tons in CO2 emissions. Ton miles increased from 357 million to 365 million.

The result is that CII is down by 4 per cent, from 5.4 to 5.2.

No harm for the operations, same arrival time, saved fuel costs, and the charterer got some nice margin for the CII delivery requirement.

Risto-Juhani Kariranta works as a shipping performance manager for worlds' biggest producer of renewable diesel, Neste, based in Finland, and also has his own consultancy, Ahti Consulting, providing services for related to emission regulation, such as CII, EU ETS and FuelEU Maritime, compliance, for shipping performance improvements, shipping IT development and decarbonisation, see **www.ahti.io**

No clear answer on which future fuel

We still lack clear insights into how much volume of various low carbon fuels will be available in future, and there are many questions about the role of wind assisted propulsion, biofuels and atomic energy, says DNV

The availability of alternative fuels is the biggest hurdle for maritime decarbonisation, says Knut Ørbeck-Nilssen, Chief Executive Officer, Maritime, DNV.

"Technologies will be available this decade, I am pretty confident. The same cannot be said for fuels."

We should adopt the alternative fuels which are available now or likely to be available soon, rather than waiting for the perfect solution, he believes. "We have no time to waste. Action is much more valuable than ambitious declarations about the end state," he said.

The shipping industry needs answers to questions such as which choices of fuel will prove to be viable, and whether their production and infrastructure is scalable, he says.

The industry needs to know how much biofuel will be available from a sustainable feedstock, and what role wind assisted propulsion and atomic energy could have.

"There are no silver bullet answers. Uncertainties around price and availability means there is no clear winner," he said. "We are most likely heading for a multi-fuel future."

"Reducing our footprint will rely on building solutions that match the individual needs of different segments, trading routes, cargo owners, financiers, regulators and other stakeholders."

Whatever happens, shipping companies are advised to be as energy efficient as possible, and maintain some ability to switch between fuels, he said.

The shipping industry needs new fuels to be made available in large volumes in ports, and the necessary infrastructure in place. Perhaps it needs stronger co-operation with energy producers and fuel providers, he said.

Ports must also contribute, in providing fuel storage and bunkering facilities, and battery charging facilities. 'Green financing' from banks can help get the ball rolling.

Governments should create mechanisms to incentivise the first companies to participate in the future 'green shipping corridors', where low carbon fuels are made available at multiple points.

A network of green shipping corridors, covering both sea and land logistics, can "form the foundation of a global low carbon fuel market," he said.

DNV's future forecasts

The 6th edition of DNV's 2050 Maritime Forecast, published in 2022, showed that while the direction of decarbonisation is clear, the pace is not, said Eirik Ovrum, Principal Consultant, Environment Advisory, DNV, and author of the report.

While IMO has agreed its targets need strengthening, it has not yet agreed on how much, he said. It is also important that IMO develops ways to analyse fuels over the full production and combustion chain, or 'well to wake', so that the CO2 absorbed when growing biofuels is taken into account.

DNV anticipates that it will be necessary for 5 per cent of all maritime fuel to be carbon neutral by 2030, if the industry as a whole will see 40 per cent reduction in emissions by 2030, he said.

Looking at the vessel order books, the number of ships being ordered running on 'alternative fuels' has tripled since 2019. An astonishing 30 per cent of today's order book can operate on LNG fuel, he said.

In terms of 'future' fuel technologies expected in the next 3-8 years, methanol is the "most developed", he said. "Ammonia is next in line".

"Onboard carbon capture and storage is coming as well."

Both 'blue' fuels and onboard carbon capture will need a large scale build up of CO2 sequestration infrastructure, he said.

If enough sustainable biomass is available

to make biofuels for shipping, that will be a preferred option, because it can be easily converted into energy dense fuels, such as bio LNG, biomethane and biodiesel.

It would be better if the world's sustainable biomass fuel could be reserved for shipping and aviation and other 'hard to abate' sectors, he said, rather than other uses which could also use batteries.

Meanwhile, we should expect renewable electricity use to be prioritised for where it has the biggest emission reduction potential. This is probably where renewable electricity directly replaces fossil electricity – and not shipping.

Producing maritime fuels from renewable electricity, known as 'electro fuels', is a process with a low efficiency, he said. But on the plus side it is possible to make low carbon 'drop in' fuels this way, which will be attractive to shipowners.

Decarbonisation is not just about lower emission fuels, it can also be about speed reduction and energy efficiency measures, he said.

DNV has established an "Alternative Fuels Insight Portal", online at dnv.com/AFI.

It aims to provide information about land based infrastructure for alternative fuels as information emerges. Also data about production capacity, distribution and bunkering infrastructure, to help shipping companies make choices.

It will track the yearly uptake of different fuels and compare different parts of the world.

Engine maker's perspective

"In our view, LNG and methanol are the ones to go for, if you want to take a choice today," said Alexander Feindt, Business Development Manager, Marine Four-Stroke, MAN Energy Solutions, a maritime engine manufacturer. "We have methanol ready concepts available, [and for] fuel with bio components."

Those are the options you have as an operator. Other options will play a role after 3-5 years," he said.

"Decarbonisation will not fail because of technology," he said. "We see the bottleneck somewhere else, production infrastructure of green fuel options."

It is not necessarily helpful to talk about which fuels are better than others, because the right answer may depend on what available in your part of the world, Mr Feindt said. "We talk about the importance of flexibility and optionality, and how you compare options."

MAN has done an analysis together with DNV about retrofit costs, which found that retrofitting a vessel with LNG is 20 per cent more expensive than a conventional retrofit; and methanol is 10 per cent more expensive.

MSC perspective

"We have to focus today on what we can do today," said Bud Darr, group executive vice president for maritime policy and government affairs with cruise and container shipping company MSC Group.

"I think we need multiple fuels, there's not any one single answer for any fleet."

"In the cruise side of our business, we've made a significant commitment to LNG. That starts with fossil LNG which is available now, the technology is pretty mature. We're progressing onto bio or synthetic form [LNG] to keep that molecule viable."

"That's not at the expense of methanol, we think that has a future role to play."

"We'll be able to facilitate a transition to green methanol when it is available at scale, should that prove to be the best option. The barriers to retrofitting methanol are less than the barriers to LNG."

"We have a big enough fleet where we can try multiple options and develop our strategy as we go."

"This is going to turn on fuel availability. If you want a methanol capable ship you can get it today, but it doesn't mean you have the fuel," he said.

"We need to have an open mind about a range of fuels, we're going to need quite a few fuels in the mix."

"There's a bio feed stock required for progressing from conventional sources of LNG to a bio form of that."

There will also be competition from other industry sectors for the same feedstocks. "There's only so much of that to go around," he said.

"We need these fuels, although the shipping industry may only be 4 per cent of the fuel market."

"Building flexibility is a critically important point while we have this uncertainty today," said Mr Darr. "We're looking at a range of ways to accomplish that."

"The most important fuel selection in 2030 may not be the right choice in 2040."

"I think its important to keep an open mind on this, make the best investment choices we can make today. Neither shipowners or engine OEMs will control which fuels make it into production in the larger volumes the soonest, how effective they will be, [and if the] regulatory landscape accommodates the benefits."

"There may be more than one or two decision points through the lifetime of the ship." TO

You can watch the webinar online at **https://www.dnv.com/maritime/webinars-and-videos/on-demand-webinars/alternative-fuels-online-conference-2022.html**

How banks are driving decarbonisation

Major maritime banks have announced their intension to decarbonise their portfolios, such as under the Poseidon Principles. But how can this be done if there is not yet such thing as a decarbonised vessel?

Major maritime banks, in initiatives such as the Poseidon Principles, have expressed their ambition to decarbonise their shipping loan portfolios, reaching net zero by 2050. How can they do it?

"All the banks are making a commitment to decarbonise," said Paul Taylor, Global Head of Maritime Industries, Société Générale Investment Bank, speaking at the DNV Future Fuels event in November 2022. "It is easier said than done, particularly when the [necessary] technologies are not in force."

30 banks have signed up to the Poseidon Principles, under which they agree to report the carbon intensity of their portfolios regularly, so everybody can see if they are on target or not. But the only way they can do it is to "have stringent origination policy for new business," Mr Taylor said. In other words, they will only accept new loan applications if they are for ships with lower carbon emissions.

For banks, "it will mean walking away from some business that we would have done in previous years and decades," he said.

Banks may choose to work closely only with clients who are also committed to a strategy to reach net zero by 2050.

Given that low carbon ships and fuels are not yet available, it may make sense not to set too high targets in this decade (the 2020s), to give time for the technologies and infrastructure to be planned for, he said.

Some people are saying that achieving net zero by 2050 for shipping is impossible, and banks are just putting themselves out of business by setting this requirement, particularly as it is beyond what is required of the industry under regulations, noted Jan-Henrik Hübner, Global Head of Shipping Advisory, DNV.

Paul Taylor, Global Head of Maritime Industries, Société Générale Investment Bank

Mr Taylor replied that anyone saying this has "an incredible negative view. Probably someone who is not particularly involved in the energy transition."

"Let's be honest, 2050 net zero is a real ambition. It is not going to be very easy. I believe in it, I think it is realistic," he said.

The next decade may be the hardest, when low carbon fuels are not available, yet ships still need to reduce their emissions. "It is going to be very difficult for shipping companies and capital providers to align their portfolios," he said.

It is possible that some banks may prefer to leave the shipping industry altogether than finance higher carbon ships, he said.

Some banks may develop advisory arms, helping shipping company clients move to new segments of the industry, such as related to CO2 transportation and wind farm construction, he said. "The opportunities are vast for the banks which are embracing the transition and change."

"Let's go to lunch with anyone who thinks net zero by 2050 is impossible," added Chris Wright, director strategic and capital advisory, maritime, for Société Générale. "The climate can't afford to wait. We should have a serious conversation with anyone who is not willing to concede the target."

The bank is already having tough conversations with its clients, and also having tough conversations internally, about how much is achievable.

Already, banks can see that they are not achieving their Poseidon goals. "Vessels are largely in misalignment under the Poseidon principles," he said. "We need to encourage owners to upgrade them, think about additional on deck additions, such as 'on ship CO2 capture', consider renewing the fleet."

New fuels

The speakers were asked for their perspective on alternative fuels, given that shipping companies will only be able to reduce emissions by about 20 per cent without them.

Mr Wright said that he recently conducted a poll on LinkedIn of what shipping people were most interested in, and found the highest interest was in ammonia and LNG. They were "well ahead of methanol and hydrogen."

While the bank is 'agnostic' to the choice of technology shipowners make, it is not agnostic to the financial impact of their choices. That means it has to take an interst in technical aspects.

"We believe ammonia is a huge part of the future mix," he said. The downsides, from the bank's perspective, is that it does not expect an ammonia engine to be ready to install until late 2025. There are safety concerns, and a larger fuel tank is needed.

Mr Wright is pleased to see vessels being built which are 'ammonia ready'. "That can range from 'having space allocated to a larger tank' to 'being able to do an engine retrofit.'

Mr Wright notes that the prices of future fuels still look up to 6 times higher than conventional fuel, although this difference is reduced by current high oil and LNG prices. "We predict they will come down as technology advances," he said.

We should also not underestimate the role LNG can play, Mr Taylor added, even though we accept it is a 'transitional' fuel. "LNG can play a vital role over the next decade and beyond."

"Methane slip has been an issue, this is being addressed. Many parties believe methane slip is something that is solved by the end of the decade. We need to be sure there's a common view on whether methane slip is an issue going forward."

How to get a loan

Société Générale is very keen to partner with the right shipowners, understand their strategy, and help them adopt new fuels through its lending.

"We are very keen on supporting first movers, whether first movers who decide to go out and create their own market, buy methanol container ships, or offtake a material part of green ammonia. You will see banks including us following and ushering these kind of people forward."

"We can start to think about how we can get closer towards green ship financing. The better the economics get, the more chance that happens."

"We, as a bank, spend a lot of time developing a story with a client, before we think about providing a loan," he said.

And as with any lending, the bank needs some reassurance that the loan can be repaid, with good reasons why it can predict stable earnings for a few years. "If you have a ship to be ordered, finance in place, a charterer in place, you have the bones of something which can lead to the investment being made," he said.

The bank faces much higher 'technological risk' with its loans than it has ever done before, he said.

Biofuels, wind and nuclear

Biofuel for shipping can be an option in the short and medium term. Wind is coming out now, and nuclear may work in the future. Speakers at the DNV Alternative Fuel conference discussed where we are with it

While we see an increasing number of biofuel suppliers and products, the question of how much biofuel could ultimately be generated remains the key question, we heard at the DNV Alternative Fuels conference.

There are some challenges with biofuels which shipping companies need to be aware of. The biofuels market does not function in a conventional way, with many elements making up the biofuel price. There is also uncertainty about how regulations may be changed to accommodate biofuels, including IMO's CII and the EU ETS scheme. In operations, "waxing" can happen when the fuel drops in temperature.

United European Car Carriers (UECC) has made steps to use biofuel as a major fuel, on the basis that it could be the best way to meet decarbonisation requirements, since the fuel is already available in moderate volumes, said Daniel Gent, Energy & Sustainability Manager with UECC.

That said, securing larger volumes of supply has been a major challenge so far. "Volumes were difficult to source on a prolonged trial basis," he said. We didn't want to take a delivery of 400 tonnes, make a press release, then not do anything else," he said.

Goodfuels, a biofuel supplier to the maritime industry, has seen the market evolve from a niche to more mainstream over the past few years, said Bernard van Haeringen, Commercial Manager, GoodFuels. Goodfuels' feedstock is currently waste oils and fats.

Northwest Europe is a major market, but not the only one. "Demand in Singapore has grown, and in other places," he said. "Regulators are moving towards making steps, making it easier for shipowners to adopt."

Goodfuels only uses fuels which offer 80-90 per cent CO2 reduction, and fuels which don't compete with the food industry, or lead to deforestation.

Biofuel is unique among alternative fuels in that it can be 'dropped in' to the existing fuel systems and make an immediate impact, he said.

One factor impacting supply to the maritime sector is that road transport is moving away from diesel due to concerns about other environmental factors. Road diesel contains some biofuel, which could then be made available for shipping, he said.

Goodfuels tests the 'homogeneousness' (standard specification) of fuels before bunkering, and tests the compatibility with the shipowners engine.

Shipowners should be aware that there is a lack of quality procedures or quality control standards," he said.

Often during trials, Goodfuels will send technical staff onboard to talk to crews, for example to help them set the right settings on their fuel purifier, and help them feel more comfortable with it, he said.

Goodfuels has just completed a project to add a tracer to the biofuel before it is blended with the conventional fuel. This makes it possible to tell afterwards how much biofuel is in the blend.

Biogas

Biogas – mainly methane with a plant based origin - could be an ideal zero carbon fuel for shipping, if it was available in sufficient quantities.

Annual production in Europe for 2022 was 18.4 billion cubic metres (bcm), according to the European Biogas Association Statistical Report, published in December 2022. It also showed a 20 per cent increase in biogas production over 2021.

By comparison, total EU gas consumption in 2022 was 415 bcm. So the biogas production was 4.4 per cent of European consumption (18.4/415). Russia provided 137 bcm of gas in 2021.

EBA further forecasts that there could be 35 bcm of biogas produced annually by 2030 and 95 bcm by 2050, with some studies estimating potential production of 176 bcm, said Anna Venturini, Policy Officer, European Biogas Association (EBA).

Looking specifically at biomethane, made by putting biogas through a purification process, there was also a 20 per cent growth in 2021, with 3.5bcm produced. Greater expansion is expected in the 2022 figures, due to a large number of biomethane plants (184) starting production in 2021.

Daniel Gent, Energy & Sustainability Manager with UECC.

Fuel costs

The costs of basic biofuels can be inflated by "pinch points in the value chain", said Giacomo Boati, Executive Director – Consulting, Oil Markets Midstream and Downstream, with S&P Global Commodity Insights. As these pinch points are reduced, costs may start to decline.

However for advanced biofuels, such as making biofuel from forestry residue, the main cost is the capex in processing plant and logistics systems, he said. The costs of these technologies can be expected to only 'mildly decline'. Perhaps there won't be significant cost reduction until the end of the 2020s, he said.

For synthetic fuels, made with renewable electricity, there is also significant capex investment. But with renewable projects getting bigger and bigger, and much investment in technology development, we may also see these costs come down, "in the second part of the 2020s".

But Mr Boati cautioned that many of the technologies are very mature. "It's not like a breakthrough innovation is expected to come onstream in the foreseeable future." And the lowest cost sites for renewables have already

been exploited, such as locations for onshore wind.

Rotor sails for wind

Perspectives on rotor sails for wind propulsion were provided by Jukka Kuuskoski, chief sales officer with rotor sales company Norsepower Oy of Helsinki, Finland.

Rotor sails are vertical cylindrical shaped devices which spin. They create thrust in the same way that a spinning cricket ball generates its own thrust, due to the pressure difference between the side it is spinning towards, and the side it is spinning away from. This is known as the "Magnus Effect". The vessel gets thrusted in a direction 90 degrees from the wind.

Norsepower's sails have been installed on ferries, ro-ros, tankers, bulk carriers and cruise ships, Mr Kuuskoski said. The company has been in business for 10 years and has 30 employees. Annual fuel savings of 5 to 25 per cent are possible.

Jukka Kuuskoski, chief sales officer, Norsepower Oy

Many global shipping routes provide strong and favourable winds for rotor sails, such as crossing the North and South Atlantic, or the North Pacific, he said. Vessels operating near the equator, in the Mediterranean or Suez Canal, typically see less windy conditions.

There is less opportunity for vessels moving closer to the equator, or in the Med or Suez Canal.

One example installation, made in May 2020, is on a a ferry running between Denmark and Germany, the Scandlines M/S Copenhagen, he said. It found CO2 emissions reduced by 4 per cent.

Other example installations were a ro-ro vessel with two x 35m high, 5m diameter rotor sails, installed in Dec 2020, with a mechanism to let the sails be brought down when it goes under a bridge. Also bulk carrier Sea Zhoushan, operated by Pan Ocean Ship Management, where the sails tip to allow cargo hatches to be opened.

Two 35m x 5m sails were scheduled to be installed on the MV Delphine, the "world's largest short sea ro-ro vessel', at the end of 2022, with estimated fuel and emission reduction of 7-10 per cent.

For Norway's CO2 capture and storage project Northern Lights, there will be CO2 carriers ordered from Chinese Dalian Shipbuilding, with one rotor sail on each ship, he said.

Nuclear

Nuclear power has been used on naval ships for decades, but that does not mean it would be easy to install on commercial ships. To get there, nuclear power would need to be developed in a different way, said Mikal Boe, founder and CEO of Core Power, a company developing nuclear power technology for shipping.

Ports would need to be comfortable welcoming nuclear powered ships. They would also need to be mass manufactured assembled systems, to keep the costs affordable for the commercial sector, he said.

Core Power is developing reactor designs which do not operate under pressure, so that even if the reactor explodes, there would be no rapid expulsion of dangerous material. Even if there is an accident, it would be safe to stand next to a vessel, he said.

The fast molten salt reactor might be appropriate for shipping. This runs at ambient pressure. It has a liquid fuel, which also serves as the coolant. The majority of the reactor waste is consumed in the reactor. It can run 30 years without refuelling, and be topped up while running at full power, rather than have to stop the reactor to refuel. It can provide 20 to 70 MW of electricity.

The micro heat pipe reactor might also work for shipping. It fits into a container slightly larger than a 20 foot shipping container. It can provide 2-8 MW of reliable power over a 8-10 year life cycle. At the end of its life it can be swapped with another containerised system, he said. TO

Rolling out hydrogen and ammonia

Hydrogen and ammonia fuels see big interest and technology development. The question is when they can be rolled out and used. We heard an update at DNV's Alternative Fuels Online Conference in November

While we see an increasing number of biofuel suppliers and products, the question of how much biofuel could ultimately be generated remains the key question, we heard at the DNV Alternative Fuels conference.

Hydrogen and hydrogen based fuels, such as ammonia, are seen by many to be the most likely zero carbon fuel choice. But there are questions about how fast they can be made available. Also, whether shipping companies will adopt them, considering that other fuels, such as methanol, are easier to use onboard.

There is already much hydrogen production in the world, for use making fertilisers and in refineries, although this is nearly all made from fossil fuels, so CO2 is emitted in the production.

Sverre Alvik, director of DNV's Energy Transition Outlook research program

But many producers are looking for ways to develop zero carbon hydrogen, with no carbon emitted when combusted or produced, said Sverre Alvik, director of DNV's Energy Transition Outlook research program, speaking at DNV's Alternative Fuels Conference in November 2022. It might prove attractive for many fuel consuming industries, not just shipping.

There are two pathways for zero carbon hydrogen, either using renewable energy ('green') or with fossil gas plus CO2 sequestration ('blue'). While some people may be keen to see green 'win', Mr Alvik stressed that both will be needed, so competition between them is not helpful. "Blue hydrogen has an important part of the hydrogen mix," he said.

For green hydrogen, a main factor in the total cost is the cost of electrolysers, which apply electricity from renewables to water, splitting into hydrogen and oxygen. Mr Alvik notes that some forecasters have predicted that they could be made cheaply in China. But these might not be "the high quality electrolysers we need in the future," he said. "Prices will be lower and lower, but not very low."

The next issue to consider is how hydrogen would be transported. We may see hydrogen transported relatively short distances between countries by pipeline, such as green hydrogen made with solar power in North Africa and sent to mainland Europe. Or blue hydrogen generated in Norway and transported by pipeline to Northern Europe.

If hydrogen is to be carried longer distances than are practical with pipelines, it is likely to be converted to ammonia and loaded on a ship.

Then, we have the issue that carrying hydrogen by ship is not very practical because as a gas it has a very large volume, and as a liquid it needs to be cooled to minus -273 C.

"Long distance transport of hydrogen is very challenging, whether with pipelines or ships. We don't think that's likely to happen," he said.

However ammonia (NH4), which can be made from hydrogen, is still zero carbon and better suited for long distance transport.

For ammonia transport by ship, it is very important to understand the safety challenges, said Christos Chryssakis, Business Development Manager, Maritime, DNV. "Ammonia is a very toxic fuel."

Ammonia can be combusted directly in an engine, although not the ship engines we currently have. DNV expects maritime ammonia engine technology to be ready in 2-3 years, he said.

Hydrogen based fuels could be used more efficiently onboard ships if they are run through fuel cells to make electrical power to drive motors, rather than burned directly in combustion engines. They can also reduce pollution and noise, Mr Chryssakis said. Fuel cells could be run on hydrogen, methanol and 'maybe' ammonia.

Altogether, DNV currently forecasts that 5 per cent of the world's energy demand will be provided in the form of hydrogen in 2050. This is a "third of what it should be," Mr Alvik asserted.

How long to adopt?

A big question about ammonia and hydrogen is how long it might take for the supply infrastructure to become available, and for shipping companies to switch to using it. People are looking to the roll-out of LNG, to see if there are any lessons to learn.

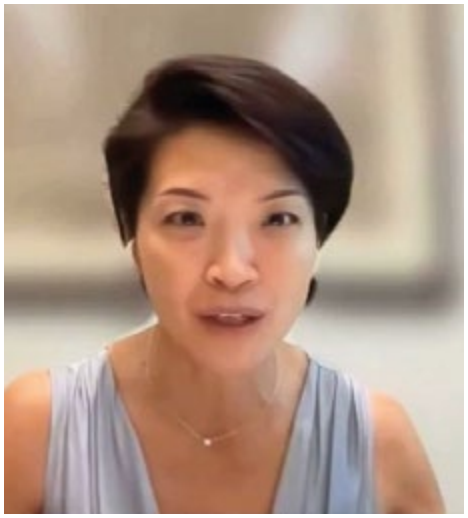
Shipping companies have had many commercial incentives for adopting LNG fuel over the past decades, noted Espen Gjerde, Senior Vice President, New Energy with Norwegian maritime group Wilh. Wilhelmsen Holding. His company operates 160 car carriers and ro-ro vessels, among other activities.

20 years ago, the cost of LNG was similar to conventional fuels, but there was an expectation that the cost would go down further over time, he said.

"Oil and gas producers were investing in production, distribution, infrastructure. We saw they gave chartering contracts for shipowners that wanted to use LNG on their vessels."

There was also much interest in the way LNG fuel could help reduce other emissions, such as NOx and SOx. Bank funding was available in Norway at discounted rates.

Despite this, it still took over 10 years for LNG to be adopted, noted



Prof Lynn Loo, CEO, Global Centre for Maritime Decarbonisation (screenshot from webinar)

But it should be possible to develop ammonia and hydrogen markets faster, he said. "We've got fundamentally different drivers in the market. The real requestion in my mind is how quickly will these fuels scale."

Ammonia safety

Ammonia fuel comes with big safety concerns. Prof. Lynn Loo, CEO, Global Centre for Maritime Decarbonisation, noted that ammonia can be deadly at just 35 parts per million in the air.

The safety requirements to handle it as a marine fuel need to be more stringent than requirements to carry it as cargo, since the cargo will be transferred at different rates and in different places, she said.

GCMD has commissioned a safety study to define the 'safety envelope' and 'operations envelope' (limitations) for ammonia bunkering. However this study has not yet identified any "showstoppers" – reason ammonia cannot be used as a fuel, she said.

Is maritime mismatched?

Torben Nørgaard, Head of Energy and Fuels with the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping, noted that energy suppliers are gearing up to provide blue ammonia, while the maritime industry appears to be planning more for carbon based fuels. So there is something of a mismatch.

"We had a little look at the balance between investments on the vessel side, and investments by project developers looking to supply the energy for the various segments."

"There is a disconnect between available fuels and demand for fuel. Shipping is investing more in carbon based fuels, methanol and methane."

Shipping may also be investing on the expectation of getting a higher volume of these carbon based fuels than upstream developers will be able to deliver, he said.

"The disconnect is a bit linked to the fact that we are falling short on policies and risk mitigation mechanisms to align the investment upstream with investment on the vessel."

"There's a lot of work needs to be done, a lot of integration horizontally that needs to happen."

Ammonia as a fuel pathway will "have to be unlocked," he said.

"It is a scale energy carrier. It comes at a competitive production cost. Ammonia is the world's biggest [volume] chemical."

Many industries other than shipping are looking at ways to adopt zero carbon hydrogen and ammonia, he said. "Markets to replace grey ammonia in fertiliser and power plants are being matured."

"We need to ensure the maritime industry is able to build into that marketplace, aggregating the demand signals," he said.

Multiple fuel pathways are required if we have a chance of reaching the Paris agreement goals, he said. And the safety challenge of ammonia needs to be addressed, not taken as an obstacle.

Prof. Lynn Loo of GCMD noted that methanol has advantages over ammonia to shipping companies, because they can handle it with existing infrastructure; although ammonia may be easier to produce.

Adrian MacMillan, Head of New Energy Shipping Business Development, with Woodside Energy of Australia, agreed that there is a risk of a disconnect between maritime fuel producers and fuel consumers (shipowners / cargo owners).

He noted that there is a need to count the carbon costs for the whole supply chain of fuel production when assessing the carbon emissions of fuels, including emissions from transport, storage and operating bunkering vessels. Vessels are unlikely to be bunkered in the same places that fuel is being produced.

"Each of those activities have a carbon intensity associated with them.

we need to be sure we follow the molecules through the supply chain and understand the process," he said. "It is important that people have confidence in the data which comes with the fuels."

Green corridors

Prof Loo noted that the green corridors idea, where two ports or countries agree to provide low carbon fuels at each end of the 'corridor', can be an opportunity for different governments to harmonise incentives, regulation and policy.

However she noted that not everybody sees them in the same way. "Green corridors mean slightly different things to different people," she said. "Green corridors is a more macro concept."

Producing low carbon ammonia

The technology for producing blue and green ammonia is "quite mature, but requires scaling, industrialisation and cost reduction," said Ole Alexander Bull Dehn, Ammonia Commercial Manager, Yara Clean Ammonia.

"For the first movers it will be more expensive."

Yara "wants to take the lead in this," he said. "We want to enable ammonia as a maritime fuel."

Yara's core business is making agricultural fertiliser, and manufacturing ammonia which is used to make it. It is one of the world's largest producers of ammonia, with a global manufacturing and supply chain in place. It is also one of the largest ammonia traders, he said.

To deliver ammonia to vessels, in April 2022 it announced that it had developed an ammonia bunker barge concept, with a 'pre-order' of 'up to' 15 units, to work on Scandinavian coastlines.

It is also a co-owner, along with Aker Clean Hydrogen and Statkraft, in in Norway's HEGRA project to supply 500,000 MT a year of green ammonia by 2026. There was a pilot project in summer 2022 to produce 25 MT.

For blue ammonia, it is connecting its ammonia production with Norway's Longship carbon capture and storage project.

Yara is developing lifecycle analysis of its fuels, so people can see exactly how much carbon was emitted at all stages. Although so far there is no clear regulation or methodology for doing it, he said. "I don't think it should be up to the shipowners to define this or to compare. Ideally this should be regulated."

There might also be some kind of offset, where a company pays for green ammonia delivered in one location, and uses grey ammonia elsewhere with a 'green' certificate. "There will be a standard but maybe not from day one," he said.

Tanker technology news

Fibre optic health monitoring, hydrogen transport by ship markets, new breakaway coupling for tanker hoses

Samos Steamship is using a fibre optic structural health monitoring system on three Aframax newbuilds.

The system, "SENSFIB", from Oslo company Light Structures AS, was selected by shipbuilder Sumitomo Heavy Industries Marine and Engineering (SHI-ME).

SENSIB has already been installed on the first two vessels in the series, due for delivery in Q2 and Q3 2023.

The system monitors the forces on the vessel structure, such as whipping, slamming and shearing.

There are dedicated systems for hull stress monitoring, FPSO monitoring, ice load monitoring, and sloshing monitoring.

The crew can see how big the forces are, as the impacts happen, and consider if the vessel can be operated in a different way to reduce these forces, and improve operational safety.

The system can be used to monitor health over the longer term, so the operator can make sure vessels are structurally healthy and operating within design tolerances.

There are new class notations which accept this structural data in decisions to potentially reduce the amount of drydock surveys a vessel must undertake, says Goetz Vogelmann, sales director, Light Structures.

Light Structures was founded in 2001 as a spin-off from the Norwegian Defence Research Establishment.

Research on market for hydrogen transport by ship

Rethink Technology Research of Bristol, UK, has published a report about how much hydrogen will need to be transported around the world in future, both in pipelines and in "liquid organic hydrogen carriers" (tankers). The report is called "Pipelines and hydrogen ships to dominate H2 distribution."

It predicts that the cost of transporting hydrogen may make up over 50 per cent of the cost of providing hydrogen to a customer, with less than 50 per cent being the cost of producing it.

It predicts that importing hydrogen to resource-rich countries will add between $0.50 and $1.86 per kilogram, depending on the distance and the means through which it can be transported.

The cost of producing hydrogen might be $2.60 per kg in places with poor access to renewable energy, such as Germany, but they could be as low as $1.20 per kg for countries with good sun and wind such as Australia. This gap in cost will make it worthwhile shipping hydrogen.

The Gall Thomson breakaway coupling

Pipelines may be the cost effective means of delivery for distances up to 5,000km, and shipping will be used for longer distances.

Pipeline transport costs, including the costs of building the pipeline, could be $0.54 per kg per 1000km. These costs could reduce by 45 per cent if gas pipelines can be repurposed for hydrogen.

Transporting hydrogen by ship could cost $1.45 per kg, for a distance of 7,000km.

Hydrogen transported by ship is likely to be converted into a form easier to carry, for example as ammonia or in a liquid organic hydrogen carrier. The cost of these approaches will depend on how efficiently hydrogen can be 'packed' and 'unpacked' from its respective carrier.

For hydrogen to be carried as a cooled gas (as LNG is now), there will be big engineering challenges, and also big 'boil off losses' as some of the hydrogen turns from liquid to gas.

By 2050, Rethink forecasts that 735m tonnes of green (renewable electricity sourced) hydrogen will be produced every year.

Breakaway Coupling

Gall Thomson Environmental Ltd, a company based in Great Yarmouth, UK, part of the Trelleborg Group, has launched a new version of its marine breakaway coupling (MBC).

Its hose breakaway couplings are used on FPSOs and tankers. They are designed to separate and close in an emergency, such as vessel drift or pressure surge events. The vessels can move apart but nothing is spilt.

The new version 'PetalC', reduces axial loads on exposed breakstuds by 30 percent.

It also reduces the length of the coupling by 60 per cent. This length reduction is achieved by elements of the 'cartridge profile' inside the hose.

The body size is smaller than the diameter of the hose flange, minimizing the risk of external impact and abrasion damage.

It is an evolution of the standard "Petal Valve" MBC which the company makes, which has been in use for over 40 years, during which time it has been activated over 340 times and supplied to over 50 FPSOs.

The Petal Valve system also sometimes needs 'transit bolts' during reeling and deployment of the hose. The PetalC system reduces the needs for transit bolts.

Both systems are powered by the energy of oil flowing through the pipeline acting on the assembly, to instigate shut-off during an emergency. No external power source is needed. This reduces the level of risk and management complexity.

The PetalC has been extensively tested with the assistance of Dunlop Oil and Marine and independently witnessed by Lloyds Register.

Although PetalC has been specifically designed for use with FPSO export reeled hoses, it can be used in any floating liquid cargo transfer applications.

Hull air lubrication with no compressors

Armada Technologies is developing a hull air lubrication system which does not need any compressors, instead using the force of the vessel through the water and low energy pumps and blowers to generate the bubbles ***By Andrew Marshall, CEO, Ecochlor***

A second-generation hull air lubrication system (ALS) is on the horizon.

It has no compressors, would require lower power consumption than the first generation, and has a tight control of bubble dynamics regardless of vessel type, speed or weather conditions.

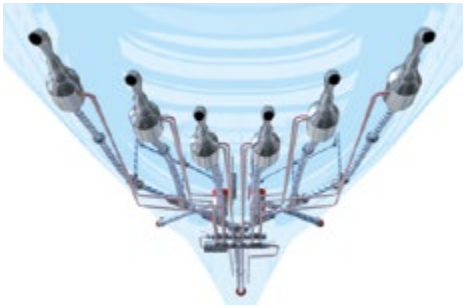
The general principle behind an ALS is the delivery of bubbles under the ship's hull to create a layer of aerated water.

This reduces friction between the hull and seawater, and consequently reduces fuel consumption and emissions.

Most ALS use compressors operated continuously to replenish the air needed.

They have to mechanically force air to the hull bottom, up to 23 meters on a fully laden VLCC.

They normally have no means to optimize performance apart from increasing vessel speed. This might even increase fuel consumption under some conditions.



The Armada system

Armada Technologies is bringing a different process to market, for the production of the bubbles needed for hull air lubrication.

The system uses the vessel's own forward motion to drive water through a series of openings in the bow region of the vessel. These openings direct system water through branch lines to venturis and injectors that then "passively" deliver an optimal air/water mix (rather than simply air) for hull lubrication.

The system utilises a small number of low energy pumps and blowers to deliver optimal system control in certain operational conditions of speed, draft and sea state.

This method of injection allows for tight control over bubble property, dynamics and air concentration.

"We kept hearing that owners don't like the expense of compressors that operate continuously on their vessels," says Roger Armson, COO of Armada. "This prompted us to look at other options to generate an air/water mix for an air lubrication system."

"Like many optimized enviro-technologies, Armada's ALS takes a lesson from nature to inform its design. We took inspiration from the duck and how trapping a layer of air within their plumage, enables them to glide across water quicker whilst expending less energy. We applied these principles to develop a cost-effective, passive air lubrication system using a venturi system."

"The design allows for greater system control over the water and air, whether in shallow draft, deep draft, high speed or slow speed," adds Alex Routledge, CEO of Armada. "It is my understanding that no other ALS has the potential controllability that the Armada system offers. Without that controllability, those systems could be at the mercy of factors that are out of their control, such as weather conditions and ordered ship speed."

The controllability also makes it easier to operate the system at lower speeds, he says. "This is important [with] the ongoing prevalence of slow steaming across the world merchant fleet. Having an ALS work well in laden condition, but become inoperable at slow speed ballast legs, destroys any return on investment assessment.

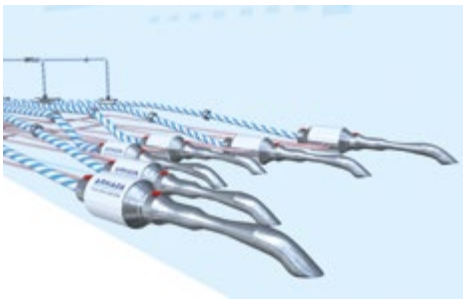
Testing

In September 2022, the system went through HYKAT (Hydrodynamic and cavitation tunnel) testing at the Hamburg Ship Model Basin (HSVA), one of the world's leading pressurized cavitation tunnel testing facilities.

The results proved that passive aeration is viable and offers a credible double-digit on-plate drag reduction.

"We delivered a stable, well engaged and high-quality rigid carpet of aerated water into the boundary layer and significant on-plate reduction was recorded," Mr Routledge says.

"We were able to identify a drag reduction sweet spot, where two identified hydrodynamic phenomena were effectively balanced within each and every operating condition."



"This points to the importance of an automation system to ensure that the system is performing at its absolute best in varying circumstances at sea."

Less moving parts

The system also has less moving parts, making it more reliable and easier to install, maintain and operate.

"Looking at it from the superintendent's perspective, they're thinking, how much more stress is there going to be for my crew on board the ship to maintain this, how much of a headache is this going to be when I have to fit this alongside 200 other maintenance repair items in the shipyard," Mr Routledge says.

The Armada System has less moving parts because it only needs small capacity blowers not big compressors. Also, it needs less power. 50 per cent of the installation can be done with a riding crew, he says.

CII

As shipowners are investigating a giant pool of potential energy efficient technologies, the improvements make the Armada system an ideal contender to help improve CII scores, Mr Routledge says.

"The [technologies] that will stand out will be the equipment that is simple to operate, are not CAPEX or OPEX heavy and can make a major contribution to the whole ship's carbon reduction package," says Armada's David Swindells.

Armada Technologies is an affiliate of the Ecochlor EcoOne Marine Technology Group

OrbitMI – a new weather route as many times as you want

OrbitMI's Weather+ cloud based ship routing service allows you to get a new route for your vessel as many times as you want for a monthly fee, so you can adapt to changing weather conditions

The Weather+ cloud based ship routing system, from maritime software company OrbitMI, allows shipping companies to request a new route any time they want through an automated system, paying a monthly fee per vessel.

So it should be more convenient than traditional ship routing services, where companies might typically pay for each route they receive, and only get one route for each voyage. Traditionally, ship routing is done by (human) consultants working with the shore based office.

With the opportunity to get a new route as many times as they want, shipping companies can get new routes which adapt to changing weather conditions without having to worry about the cost.

Regular routing updates can be popular with seafarers, who often prefer getting a route update once a day, rather than a route for the next three weeks of voyage, says Slavisa Djokic, VP engineering with OrbitMI.

Having the service should help persuade shipowners to do vessel routing for shorter voyages, and voyages closer to shore, when the financial return on routing services can be perceived to be less.

Tanker operator Stena Bulk is already using the service, and a number of other companies are running trials.

The cost of the service is described as being in the "hundreds of dollars per month per ship" range.

The route is provided 7 days into the future because this is roughly how far today's weather forecasting can see into the future with reasonable accuracy. The weather information used for the route is provided by weather information provider DTN.

A free "try before you buy" pilot is offered, so companies do not have to pay anything at all until they see value in the service, says David Levy, chief marketing officer, OrbitMI.

When the cost of the service is compared to the savings from using the recommended route, "We're seeing 10, 30 x return on investment," he says.

"It's like you have a weather service at your beck and call at all times."

Many other companies offer weather routing services and software, but this is the only system which works on continually updated cloud data, which can be accessed at any time for a monthly fee, Mr Levy says.

Other benefits

Shipping companies can use the service to see routes optimised for fuel use, emissions, estimated time of arrival or speed.

The routing service can be used as a simulator and decision support tool. You can see, for example, what would happen if you depart at a different time, or what the consequences of choosing a different speed would be. You could assess multiple route options to see how they would affect vessel earnings or CII score.

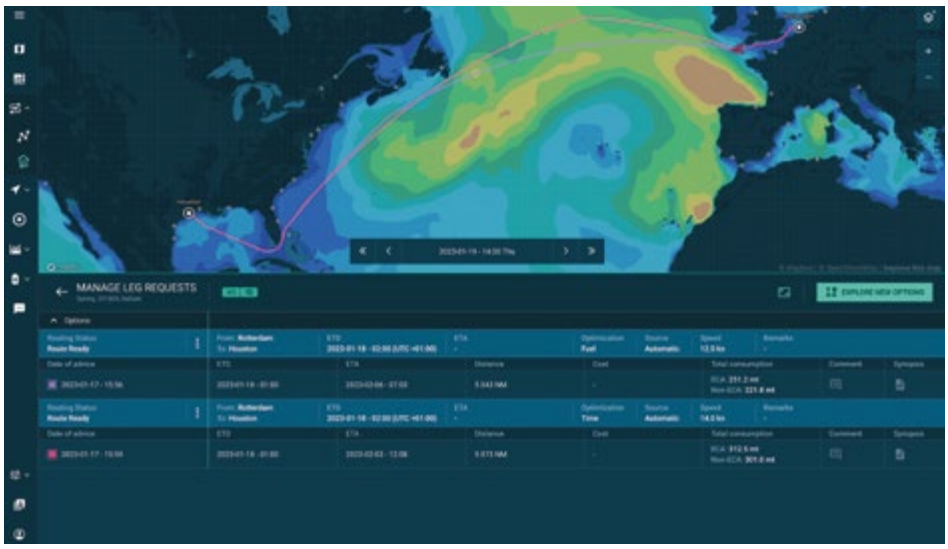
Routing requests can be made at any time via the software, taking into account the vessel's daily costs, the fuel used, the fuel price and required speed.

The software can generate warnings where needed, for example if the proposed route covers waters which may be shallower than the vessel can safely use.

The advice can be passed to the captain as an e-mail, with a pdf showing the map, for illustrative purposes. Also, a data file showing where the vessel would be at various points in each day during the next 7 days, such as 5 points every 24 hours, which can be entered manually into a navigation system.

The underlying OrbitMI platform brings in data from a number of integrated systems, including for weather, vessel performance management, CII management, vessel tracking, analytics, chartering and compliance, says Mr Djokic.

OrbitMI is a pure 'software as a service' company, there is no software installed on the customers' PCs.



Get as many routes as you want and try different scenarios – here, the shortest route (purple) from Rotterdam to Houston has the vessel spending much more time in an emission control area, so the slightly longer route (red) may cost much less

NAPA – how to make ship design more collaborative

More collaborative working between the various parties involved in ship design could make it easier to design more energy efficient ships, says maritime software company NAPA.

The ship design process, like most design processes, involves coming up with an outline design and then adding detail or other factors to it as the design work progresses.

For example, a designer may determine later in the design process that a certain area of the ship needs to be stronger, and so add extra steel support.

But for the most energy efficient ship, it is better if this doesn't happen, because if you have more steel than you need, it means more weight to the vessel and more fuel needed to propel it. The most energy efficient design probably gets everything right in the first stage.

Meanwhile, the quest for more efficient ships is adding complexity to the design in other ways. The vessel may need much larger tanks due to lower energy density of a low carbon fuel. Companies may want to maintain an option to add wind propulsion. And the choice of wind propulsion system may depend on the strength of wind in the region where the vessel is operating, which is not known at this stage.

It all means that better collaboration in the design process between all the parties involved, or who have different areas of expertise, and as early as possible in the process, would help make a more efficient design, says Janne Huotari, Senior Research and Development Engineer with Finnish maritime software company NAPA. Mr Huotari has a PhD in alternative ship energy systems.

Janne Huotari, Senior Research and Development Engineer, NAPA

NAPA provides software for ship design, safety and stability, and voyage optimisation.

Companies might want to plan for the ship to be capable to run on different fuels in the future. For example, if they want the option of running the ship on ammonia, they might choose an ammonia-ready engine in the future, and a ship design capable of handling it.

Predicting operational efficiency

With the increased industry focus on vessel efficiency, designers want to make the most accurate possible predictions of how a certain ship design will perform.

Up to now, design criteria has largely been concerned with structural strength, buoyancy, and a little with propulsion efficiency. But it may be that certain designs are a few percentage points better, Mr Huotari says.

The energy performance of a certain ship design will also depend on the weather conditions where the ship will operate, which is not usually known at the time it is being designed. There are some exceptions, such as offshore support vessels being designed to operate in a certain part of the world.

Ship designers are increasingly able to access real ship performance data, so they can see how this relates to the design choices, he says.

Wind propulsion

While only very few vessels are being built with wind propulsion today, many owners would like the option of adding it later, Mr Huotari says.

In practice, this might mean having an arrangement of piping on the deck which would leave space for some kind of sail to be added later, he says.

The technology is still seen as being in the early stage, and there are not yet any standard ways to consider how it should be incorporated into a design.

"Wind propulsion is a quite hard design problem, because you're going to want to have some estimate how useful that wind propulsion will be," he says. "For that, you're going to need to analyse what the wind conditions are along the route, so you can simulate how much wind propulsion you're going to get."

Normally in ship design it might be the provider of the wind technology which runs a simulation of how their system works, and this simulation would then need to be incorporated into the overall design.

"So, again something where multiple different stakeholders have to come together," he says.

Maersk Tankers reported 8.2 per cent savings on fuel on a tanker fitted with two rotor sales, in a trial in 2019, a big enough saving to be significant.

3D model-based approval

To support collaboration, NAPA has developed a "3D model-based approval" software platform, where designers, shipyards and classification societies can see the proposed design as a 3D model, see alternative options, make comments, and ultimately approve it.

NAPA is working with a number of classification societies, including DNV, Class NK and BV, on 3DMBA. The collaboration is done via sharing files in the open .ocx format, or using its online platform NAPA Viewer. This enables higher data security than traditional file transfers, NAPA says.

Classification societies have a role in the process of approving the design on behalf of regulators and insurers. It is still common today for class societies to demand 2D drawings to use to review a design, Mr Huotari says.

The designer generates these from their 3D model. The class society takes the drawings and builds their own 3D model out of them. This is extra work, and all error prone, and the extra steps are an obstacle to collaborative working

All users need to log into an online NAPA tool called "NAPA Viewer" to see the model. Whilst some people might prefer if the model

was exchanged as a file which could be viewed on any software, there is not yet any universally used standard data format for 3D models for ships, Mr Huotari says.

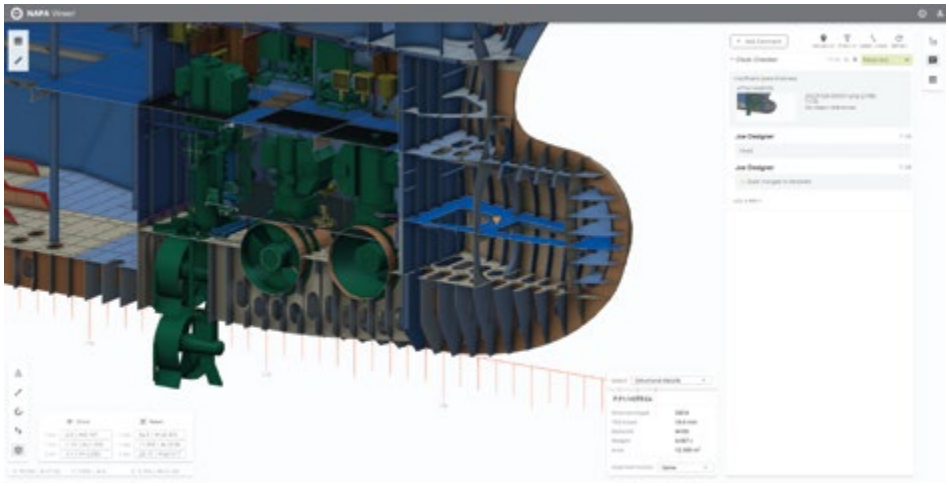
However, NAPA software is the most commonly used in the industry, particularly in the preliminary design stage, he says.

New design technology

NAPA is also developing new digital technology methods to improve design.

It is working together with Japanese shipyard Sumitomo Heavy Industries Marine and Engineering to develop automated tools to find the optimum structure of a tanker, looking at the midship section. It found it was possible to make big time savings this way, as well as developing new possibilities for hull weight reduction, cost reduction and performance improvement.

This method means that new competencies may be required for designers (i.e., software skills such as design standardisation and system design).



The NAPA Viewer software for collaboration on ship design

It is also developing ways to utilize methodology called "Finite Element Meshing (FEM) analysis" in structural design. This is a method of breaking down a complex structural design into small components and analysing whether this small component of the structure will be able to take the required stresses.

Such analysis might impact the stability and efficiency of the whole structure. It is a way of finding the weakest point of any proposed design. TO

Zeaborn's experience with vessel routing

Dariusz Pawel Jaszczyk, master of tanker Louie, operated by Zeaborn Tankers, has made a strong recommendation for Wartsila's Fleet Optimisation Solution (FOS) in a recording posted on YouTube by Wartsila.

The tanker has three separate ECDIS systems onboard, plus one tablet computer which can be used for navigation by someone standing on the bridge wings, including by pilots.

Captain Jaszczyk has been working on tankers for 25 years, and as a master since 2014.

He says that with FOS, all the data for planning and execution of a voyage can be collected in one place, and made available very easily.

Capt Jaszczyk and Second officer Arkadiy Semenov

"Everything can be reached in no time," he says.

"It makes a huge difference comparing to the time the job was done on paper," he says. "Now it is double click on the mouse and it is almost done. The FOS system is another step in the digitalisation of the navigation process."

The data can be used to help save fuel, something which is increasingly demanded by ship managers, charterers and owners, he says.

Seafarers can use a tablet computer application as part of the FOS system. Captain Jaszczyk says he finds this very helpful when standing on the bridge wing during manoeuvring operations.

Johannes Lada, technical superintendent with Zeaborn Tankers, adds that the FOS system should help improve safety, including from supporting passage planning.

Its weather routing and optimisation is "preventing all possible failures which could happen during the ongoing passage planning," he says. It was previously done manually.

Crew onboard the Zeaborn

Second officer Arkadiy Semenov adds that the software is "giving big value every day," and helping reduce the time taken for tasks. "It is really good, I can say, 'nice program,'" he says. TO

You can watch the video (3 mins) here **https://www.youtube.com/watch?v=k1VcaTXz5AY**

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