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- BHP - making LNG fuelled ships competitive
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How Stena Bulk makes decarbonisation add up

Stena Bulk is putting big money behind decarbonisation – with an agreement to build 3 methanol tankers, and a concept plan for a new type of vessel, the Infinity Max. We asked CEO Erik Hånell how decarbonisation can work financially

One of the biggest questions facing the tanker industry in 2021 is how decarbonisation can be paid for – and how the investors can be satisfied.

Stena Bulk of Sweden appears to have a clearer idea of the answer than most – it has just (Nov 2020) added a 3rd vessel to its order of methanol tankers, in a joint venture project with Swiss methanol producer Proman.

Tanker Operator asked president and CEO Erik Hånell how he thinks the financial sums can add up - and how the investors can be kept satisfied.

Erik Hånell, President and CEO of Stena Bulk

Mr Hånell's perspective, he told us, is that, "I don't think anyone has the answer". But if you (or your investors) believe that decarbonisation will happen, the next step is to set up some commercial options. "You have to follow quite a few pathways here at this stage, to be able to prepare yourself for what might come."

"It isn't just one pathway, it is a few, it depends what angles you are taking on it."

The conventional pathway is not really an option any more, he believes. "Would you build a traditional ship today which is run on fossil fuel? I'm sure there's speculators out there who would do it. [But] the high risk is that those ships would not be worth the value in 10 years from now, because of the situation we are seeing."

Investors see there may be new technical developments and regulations which change the landscape, "maybe not 100 per cent in line with how the world looks like today," he says.

"We have to find alternative fuels, alternative energy sources for traditional propulsion."

"If it's going to be ammonia, hydrogen, fuel cells, if its going to be methanol, or something else, remains to be seen. All of those should be explored.

But also, "we all have to work with what we see today."

"One of the pathways we have chosen to take is methanol. That, I think, has a very strong potential going forward."

Mr Hånell believes cost issues will sort themselves out. "When the world is hugely going for something, they will make sure not only that they develop it, but the cost will come down, otherwise they will not be able to compete. I would be surprised if we don't see a solution to that."

It would be useful if there were regulations creating a cost to carbon emissions, so that it would no longer be cheaper to use conventional (high carbon) fuels.

"To have a fair competition, it has to be a global situation, it doesn't stop you depending on where you live. That's what I think is most fair.

"The risk is you see all kinds of local regulations, in the US, other ports will come with their regulations. That's going to be very complicated for a ship operator to work around."

To help move maritime decarbonisation faster, Mr Hånell would like to see some firm prospects of how this will look like, what kind of calculations, and mechanisms this will use."

"We have a situation where people have hesitated to order ships - because they don't know what to build."

The requirements to make sustainability reports are changing every year, in terms of what you report and how you report. There should be a "generalised calculation and rules that actually apply worldwide," he said.

"I would rather like to see them tomorrow, but it is important that they are well thought through. We had a number of [regulatory] decisions in the last 10 years that had been not particularly thought through for shipping."

"We spend millions of dollars on things that are obsolete [by the time] you install them. Question marks are coming, are they really needed. It is very costly."

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Methanol project

The first announcement about the methanol project was made in November 2019, when Stena Bulk said its joint venture company with Proman Shipping of Switzerland ("Proman Stena Bulk Ltd") was building methanol tankers.

It had finalised an agreement with Guangzhou Shipyard in China to build two "IMOIIMeMAX" "methanol-ready" 49,900 dwt tankers, Stena ProPatria and the Stena ProMare, with the first due for delivery in the beginning of 2022.

Proman Shipping is part of Swiss integrated industrial group Proman, which is the world's second largest methanol producer.

These vessels are "amongst the most energy efficient mid-range tankers in existence", Stena said. They will be fitted with dual fuel engines and capable of running on methanol fuel. Stena said it offers a 95 per cent reduction in sulphur oxide (SOx) and particulate matter, and a 60 per cent reduction in nitrogen oxides (NOx) compared with regular marine fuel. It is able to comply with low sulphur fuel requirements under IMO's 2020 regulations.

Each vessel will use 12,500 tonnes per annum of methanol as a marine fuel, significantly reducing emissions in their normal commercial operations compared to conventional marine fuels.

The two ships will be 50:50 owned by Stena Bulk and Proman Shipping, and on long term charter to Proman Shipping.

This is a way of working Stena is comfortable with, where each party has "skin in the game," he says. "It helps companies to move ahead and bring everything forward. Especially today, the cooperation and collaborations in this world are more important than ever."

In November 2020, Proman Stena Bulk finalised an agreement to build an additional vessel, Stena Prosperous. The Stena Prosperous will initially be utilised by Stena Bulk within their traded pool of ships for a period of two to three years.

The vessel will therefore be the first methanol dual-fuel powered ship traded on the chemicals / Clean Petroleum Products (CPP) market by a conventional shipowner without an active contract to a methanol producer.

After this initial period, the Stena Prosperous will then enter into a long-term time charter with Proman Shipping.

Availability and cost

Stena said in April 2020 that methanol fuel was available in "more than 88 of the world's top 100 ports."

The ships are "dual fuel", so they can be run on low sulphur fuel oil if they have to, or some other new type of energy. But the company anticipates that methanol availability will increase.

"I would say it is like LNG propulsion, 10 years ago. The bunker stations were simply not there." Today, "you feel pretty confident you can find places."

There are a number of "e-methanol" projects going on around the world, which use CO2 reclaimed from being emitted into the atmosphere to make the methanol (perhaps from hydrogen from renewables). So the methanol becomes a net zero fuel.

Another interesting factor of methanol fuel is that you can get more power from the engine by adding water to it. By adding water, you reduce the charging air temperature. The water absorbs heat as it turns from liquid to a gas. This means you have a higher air charge density, so more oxygen is available for combustion. And when the water turns into a gas, it expands, giving extra torque on the piston.

The last step of process of manufacturing methanol can often be removing water, so if this does not need to be done, this can "save quite a lot of energy," he said.

So far, there have not been any suppliers providing methanol specifically for ship bunkers, so we don't know how much this would reduce the costs by.

"On our ships we can test different things going forward," he says.

InfinityMAX

In March 2021, Stena Bulk unveiled a concept design for a ship called InfinityMAX. With this ship design, large containers, which can carry either liquid or dry cargoes, are attached to the deck of the ship. For movement over smaller distances, these containers can float, and so be towed, by themselves.

A tank could be left in the port, depending on the best logistics arrangement. So it would only need a crane to lift it onto a ship, no pumping would be required.

Stena has been working on the project for 2 years. It builds on the IMOIIMAX parcel tanker design, which has 18 cargo tanks of 3,000 m3 capacity.

"I put Stena Teknik on it (Stena's department of maritime technical experts) and all the young guys in the company. The oldest is 32 years old. They put their heads together, this is the concept they came out with."

"It is a definitely a prototype, [to] a little bit push the boundaries and make people think."

"The major reason we put it out there is to push ourselves [to see] what can be done with ships today."

"With this concept you have specialised tanks that you are then using again and again."

The company is working out the best way to make all the compartments connect to each other and to the ship, in any weather.

The moveable tank idea might be "something we can already install on our existing ships," he said.

It would probably require more shipping companies to take interest before this could become something which is in general use. "We can easily see that it is very difficult to build up that logistic chain with only one company, this has to be a global development," he said.

As a design for a ship which can carry both dry and liquid cargoes, it continues the idea of the "OBO" or "oil bulk ore" vessel, a common design in 1955 to 1980, as a ship which could carry any bulk cargo, if the tanks were cleaned in between.

"You can pick up the slack from that type of ship. You cannot really say that the OBO ship was a success at the time," he said.

Culture

So why is Stena Bulk able to do things which no other company can do?

"That is the culture we are having," he says. "We want to be in the forefront for the development.

We are not succeeding every time. We are learning a lot every time we fail as well. That is definitely the approach we like to have. That is how we like people to look at us as well."

Mr Hånell's advice is "don't be shy, think about what is out there, use what kind of input you can get not just from our industry but from the rest of the world as well."

Stena Bulk has 72 ships in its fleet, including 23 suezmax, 30 medium range (including the "IMOIIMax vessels with 18 separate 3,000m3 tanks), 2 shuttle tankers, 1 Aframax, 3 LNG, and 10 P-MAX product tankers with two engines, and 3 "intermediates" of 17527 dwt. TO

Stena Bulk has 72 ships in its fleet, including 23 suezmax, 30 medium range (including the "IMOIIMax vessels with 18 separate 3,000m3 tanks), 2 shuttle tankers, 1 Aframax, 3 LNG, and 10 P-MAX product tankers with two engines, and 3 "intermediates" of 17527 dwt.

OCIMF - human factors, SIRE 2.0, piracy

The Oil Companies International Maritime Forum (OCIMF) March and April newsletters, included updates on human factors, SIRE 2.0, piracy in the Gulf of Guinea, and more. This is a quick summary

OCIMF's revised mission includes an aim "to consider Human Factors in everything we do." It has a Human Factors Committee which is "critical in ensuring we meet that commitment," said Rob Drysdale, Managing Director OCIMF.

The member representatives on the committee are a mix of subject matter experts and generalists with operational experience. "This balance enables the committee to provide robust yet practical human factors guidance and input to all our activities."

"They have already demonstrated their agility in developing COVID-19 related guidance, completed a draft element on human factors for future consideration in Tanker Management Self Assessment (TMSA) and are currently providing input to the SIRE 2.0 question set development and human factors related training for Inspectors."

"The shipping industry has a long way to go to embrace human factors, but we have made a promising start at OCIMF."

Ever Given

On the topic of the Ever Given grounding in the Suez Canal, Mr Drysdale noted, "it has provided subject matter for many discussions on LinkedIn and in the various press journals. Some of them have been quite humorous. That is okay as no one was injured and, as far as I know, there has been no environmental impact."

[But] "most of the discussions are speculative and working on assumed facts.

"While it is human nature to want to know what went wrong as soon as possible, it is wise to await the results of the investigation before considering what needs to be done to prevent a recurrence in the future."

SIRE 2.0

OCIMF is working to develop an updated and enhanced Ship Inspection Report Programme, called SIRE 2.0.

OCIMF will carry out trial SIRE 2.0 inspections onboard ships between April and Sept 2021, following remote training sessions with inspectors. The trial will test out the tools, processes, procedures and policies.

This includes new software, the inspection compiling process, the effectiveness of the question set and supporting guidance, the effectiveness of the inspector training, the processes for inspection booking and inspector allocation, and the processes for the Vessel Inspection Questionnaire (VIQ). In SIRE 2.0, shipboard inspections will be conducted using a mobile tablet.

Gulf of Guinea framework

OCIMF was pleased to see the announcement of the piracy Interregional Coordination Centre (ICC) in Yaoundé, Cameroon, and Nigeria, that they will "create a new international and regional framework to provide shared awareness and deconfliction of activities in the Gulf of Guinea."

It will "bring together regional, international, industry and NGO partners to advance and coordinate near term maritime activities with a view to working toward a set of common operational objectives in order to protect seafarers and ships operating off the coast of West and Central Africa," OCIMF said.

OCIMF's Human Factors Committee in virtual meeting

Rob Drysdale, managing director of OCIMF said, "This is a major initiative with G7++FOGG support and is in my view, exciting news."

https://nimasa.gov.ng/yaounde-icc-nimasa-communique/

Mooring Safety webinar

OCIMF participated in a webinar on mooring safety organised by the UK P+I club, which looked at OCIMF's Mooring Equipment Guidelines edition 4 (MEG4). It discussed various difficulties faced by members in complying with the guidelines, "such as compliance for existing vessels, gap analysis of MEG3 and MEG4, and snap-back zones."

There was discussion about maintenance of mooring machinery, inspection of ropes and wires, and discarding mooring ropes. The webinar looked at how "various bodies such as OCIMF, classification societies, IMO and shipyards" are working together to build mooring stations with the human element centre stage.

A video recording is at ukpandi.com under news and resources / video library

Mental health

OCIMF promoted a new shipboard mental health guide from the International Seafarers' Welfare and Assistance Network (ISWAN).

"ISWAN's series of Good Mental Health Guides offered seafarers evidence-based information about what can be done to protect and promote mental health at sea.. carefully considering ways in which strategies to maintain good mental health and promote wellbeing could be practiced on board," OCIMF said.

"This new guide builds on this by highlighting the critical role employers play in executing duty of care, through mitigating known risks where possible, and ensuring that systems, procedures and structures are in place to create a mentally healthy environment on board."

Meetings summary

The Publications & Advocacy Tankers, Barges and Terminal Interfaces (P&A TBT) Committee met on March 17-18, and discussed a recent fatality that was related to lifeboats on a member's offshore installation.

The Human Factors Functional Committee met on March 11. Work includes development of a OCIMF position paper on Human Factor considerations related to delayed crew changes during the Covid outbreak; finalisation of the OCIMF information paper TMSA Element on Human Factors, which is to be published Q2 2021; activities related to VIP [vessel inspection program] (SIRE 2.0) project.

The Environmental Committee held a workshop in March to review the emerging risks and opportunities from the environmental bow tie.

The Programmes Committee met on March 30-31. It approved OCIMF Guidance on "audio or visual recording during an OCIMF programme inspection and programmes prioritisation matrix, risk bow ties and KPIs." The committee discussed and approved measures for "enhancing performance of OCIMF Marine Terminal and Information System (MTIS)."

The Engineering Expert Group met on Apr 20, the Innovation and Technology (IT) Expert Group on April 19, the Offshore Vessel Operations Expert Group on Apr 21-22, the Barges Expert Group on 22 April, the Floating Systems Expert Group on 26-27 April, and the Inspection Processes Expert Group on 29 April, and the Structures Expert Group on Apr 29. (All meetings virtual). TO

This article is a summary of the OCIMF March and April newsletters. The full text is online at **https://www.ocimf.org/news/newsletter.aspx**

BHP – making LNG fuelled ships competitive

BHP signed a 5 year contract for 5 LNG fuelled ore carriers – at a cost lower than using new vessels fuelled with VLSFO. Head of maritime Rashpal Singh Bhatti explained how it was done

Vessel charterer BHP of Australia signed a five year time charter contract for five LNG fuelled "Newcastlemax" very large ore carriers (VLOCs), carrying iron ore between Western Australia and China from 2022.

Rashpal Singh Bhatti, Vice President, Maritime & Supply Chain Excellence, BHP, explained how the business case for the vessels worked, in an International Chamber of Shipping webinar on March 10, "Legal, Stakeholder and Commercial Forces of Change - Lessons for Maritime".

BHP defines itself as "a world-leading resources company", formerly known as BHP Billiton. It is one of the largest bulk charterers in the world.

Mr Bhatti is effectively head of chartering, being accountable for BHP's marine freight requirements.

The Newcastlemax is a category of bulk carrier which is the largest size able to enter the port of Newcastle, Australia, with about 185,000 dwt, max beam 50m and max length 300m.

"The crux of this is that a LNG fuelled Newcastlemax will deliver a 35 per cent reduction in carbon, almost eliminate NOx and SOx," he said.

"We will do this at a cost lower than the reference case, the cost of a brand new Newcastlemax fuelled with VLSFO (very low sulphur fuel oil). This is a very important point."

"This is not just about the social value of reduction, this is about emission reduction and doing it economically and delivering shareholder value at the same time."

Project development

Work on the project began in 2018. At the time, companies in the shipping 'ecosystem', including banks, owners, managers and class, were thinking about LNG fuel. "But no-one was taking the bull by the horns, saying, 'what could this look like from an ecosystem perspective'. There was too much rhetoric about economics and emissions impact," he said.

A first question was whether it could be done from an engineering perspective. To answer this, "we took an ecosystem approach," he explained. "As BHP we don't have all the expertise in this area. We know what we want but we're not specialist LNG players, shipbuilders. We have to bring together many parts of the ecosystem, understand we're not the experts, and take a humble approach."

"We brought together class, shipyards, charterers, financiers. We said we'll put together a 'Green Corridor Joint Industry Project' to find out, can this be technically done."

"To our surprise, what we got back was technical data, commercial data, that took us the best part of nine months to decipher."

And the second question was what the economics would look like. The only way was to see what prices would actually be available from the market, both for vessels and for fuel.

BHP released a tender for a carrier for the vessels in July 2019. "We went out to many parts of the globe. We were overwhelmed by the response," he said.

The ship operations contract went to Eastern Pacific Shipping (EPS). Mr Bhatti said EPS "offered a competitive bid and an efficient vessel design with superior fuel efficiency and GHG emissions reductions."

The contract to supply the fuel went to Shell. "Shell has been fantastic in putting together the solution."

"We've taken an ecosystem approach in partnership with EPS and Shell, it is very well thought through," he said.

"MPA (Maritime and Port Authority) Singapore has been phenomenal in allowing us a significant amount of infrastructure and data to make this happen."

Moving forward

BHP's competitors have since followed. Dry bulk charterers FMG, Rio Tinto and Anglo American have since announced plans for dual fuel vessels. "That makes us very happy," he said.

"We feel we'll have a competitive advantage from a time perspective. But that's not what this is about. This is about taking this forward. As the largest bulk charterer in the world we feel we have a responsibility."

"Most importantly, this has been about capability and mindset change.

saying we think this can happen, but we know we can't do this alone. We will reach out to the market at large, bring the best players to the table and we will share value."

"The five Newcastlemaxes we will deliver early next year will become 10, 15, 20 and many more. That will be an industry phenomenon."

Speakers at the ICS webinar: Top: *Guy Platten, Secretary General, International Chamber of Shipping; Rashpal Singh Bhatti, VP Maritime & Supply Chain Excellence, BHP.* **Bottom:** *Christopher Rex, Head, Innovation & Research, Danish Ship Finance; Valentina Keys, Senior Associate, CMS LLP*

Is LNG the future?

Mr Bhatti was asked whether he was confident that the LNG fuelled ships would be viable for the typical life time of a ship, 20-30 years, when we may have zero carbon fuels coming onto the market by then.

"I think LNG will form part of the mix, what percent of the mix, I don't know, I don't think anybody knows," he replied. "I don't agree with the terminology 'transition fuel'."

"Until such time as the homogeneous fuel of choice is known, we'll have a heterogeneous set of fuels through the next couple of decades."

"To be the early adopters of LNG, to understand the fuel from a safety and economic perspective, can only be good."

"From a risk perspective, EPS is taking a very firm view that this fuel is here not as a transitional fuel but here for a long time to come."

"LNG we know is not the final solution. We'll have to find 3, 4, 5 solutions, work them in parallel, see in the 2030s which is the winner."

"These are dual fuel engines don't forget. If ammonia or hydrogen do become the fuel of choice, it is not that these vessels cannot be later retrofitted to use those fuels."

"People have really thought through the optionality and the risks, and made these vessels very fungible [interchangeable]."

Mr Bhatti believes that infrastructure will gradually be developed in ports around the world, to supply whichever fuel the maritime industry eventually chooses.

This is similar to how ports around the world developed berths and drafts capable of accepting capesize vessels, when these vessels became the norm around the world.

"Between public and private mechanisms that infrastructure does become the norm. I'm optimistic that will happen with LNG."

What charterers should do

Mr Bhatti was asked whether charterers like BHP would be willing to pay more than the minimum required, for decarbonised fuels.

"It is a great question and one I get asked a lot. I think that's probably the wrong way to look at it. It's a bit myopic to think, 'BHP are you going to pay'. It's about taking a broader approach to innovation," he replied.

"Ultimately it's a supply chain. If we're paying for something, the delivered cost [of transporting iron ore] will go to the steelmaker, the steelmaker will go to the automaker, the automaker will go to the consumer. It is not about who will pick up the cost."

"As the largest charterers in the world what is our responsibility set? To bring the best capabilities in the world together and deliver solution ahead of the game, which is what we've done with LNG ships."

"What is really important is to take an approach, analyse it with depth and with conviction, take that forward and manage your downside risk as much as you can."

"I don't think anybody would say there's no downside risk."

Mr Bhatti believes that the environmental incentive in itself should be enough to make it worthwhile investing in decarbonisation. "My view is, what more incentives do organisations, government and supply chains need than we have already, than to give the social endowment to people who come after us. I don't think a bigger incentive is required."

"Investors are looking for organisations that are taking a front-running approach to emissions reduction."

"We're about to work with a biofuel company in Singapore and Holland and think about how used cooking oil, which is very mixable with fuel oil, could become part of the supply chain solution."

"We're working with MPA in Singapore as part of R+D fund to think about how we take ammonia and some other fuel choices forward."

The developments are not just fuel related. "The number of vessels in shipyards looking at wind power as an assist is significant. Other vessel owners are looking at enhanced paint mechanisms that allow them to go through water with less friction."

New business models

"I certainly believe that the old model amortising a cape over 25 years and understanding the residual value, and your earnings assessment, that's a model which is well past us," Mr Bhatti added. "Any owners looking at that model as their investment criteria will probably have a surprise ahead of them."

"What is very clear, newbuilds they are thinking about need to be as option-friendly as possible. They need to build fungibility into their assets. That requires innovation, lateral thought."

"BHP works with some of the largest vessel owners in the world, we have this discussion with many of them. You won't be surprised to hear many have started to re-price their assets. They're not looking at 25 years anymore."

Market drivers

In terms of broader market drivers, "A carbon levy would be the right thing to do, as long as the governance of funds [means that they] would find themselves back into the right hands, [such as] organisations that are in R+D. We feel any kind of carbon levy needs to be well regulated and fair," Mr Bhatti said.

"If the European tax [ETS] scheme goes first, it could well be a fantastic ground for understanding how this could work, learning from that and taking that to a global model."

"The preference is that it is a global model and regulated by the IMO or another such body."

Another market driver is vessel rating schemes, such as RightShip, an organisation where Mr Bhatti serves as chairman. It is partly owned by BHP.

"RightShip takes a very standardised approach," he said. "In that space, we see far too many bespoke, fragmented ways of taking data to become information.

But to function as an effective market driver, there will need to be standard ways to measure energy efficiency of ships, he said. "If I think about simple things like sensors on vessels and data which comes from it, it will require a standard which will deliver a uniform approach, across tankers, containers. And that's not far away. I think there's a tipping point coming, and standards will be driven by private industry."

Danish Ship Finance

Also in the ICS webinar, Christopher Rex, Head of Innovation & Research at Danish Ship Finance, explained how decarbonisation could lead to a different financial model for owning vessels.

Today, many ship owning business models are based on making a margin from selling a vessel for more than you bought it for. The returns just from operating a vessel often do not provide a good enough cash flow to justify the investment.

This means that companies are not making money based on how well the vessels are being operated, but from how well they trade the vessels, he said.

But the move to decarbonisation may change this, since it is raising the costs of owning and operating ships.

"The big win is when we look at the next generation of vessels," he said.

Perhaps there will be opportunities to make money as the costs of "zero carbon fuels of the future" gradually reduce, as their scale increases.

"I believe we can re-introduce vessels as an attractive asset class when we digitalise and decarbonise our industry."

Perhaps the cost of owning vessels could be reduced by further standardisation of ships, allowing more economies of scale, and reducing maintenance costs.

The shipping industry might see a "new type of player", which "will not have the same attitude towards a legacy fleet."

TO

A video download of the meeting is available at: **https://attendee.gotowebinar.com/recording/7298683943037474832**

Update on worldwide piracy risks

An ICS webinar discussed piracy and security risks around the world, looking in particular at the Gulf of Guinea, with speakers from Risk Intelligence, IMB and Ince

Hans Tino Hansen, CEO of Danish consultancy Risk Intelligence, gave an overview of piracy and security risks to shipping around the world, speaking at an International Chamber of Shipping webinar, on Apr 28, "Maritime Security and Piracy."

He began the world tour with Europe, and tensions in the Black Sea, particularly the Sea of Azov, between East Crimea and Ukraine.

"Russia has put a restriction on government ships in the Sea of Azov. We've seen there's still commercial traffic going through the Kerch Strait (connecting the Sea of Azov to the Black Sea). The biggest risks to commercial shipping are indirect rather than direct ones, from being in the wrong place at the wrong time.

In the Eastern Mediterranean, there are disputes about oil and gas borders between Turkey, Greece and Cyprus. It does not directly affect shipping, but there is an indirect threat, with talk of electronic warfare, jamming GPS and communication systems.

In Libya, the situation appears to be approving, with an agreement on a new government, and "very few direct threats to ships calling at Libyan ports."

In the Middle East, a number of tankers are involved in sanctions-evading transport of Iranian crude to Syria.

We have conflict in Yemen, with one side supported by the Yemen Government, UAE, Saudi Arabia, and Houthis on the other side supported by Iran. "This conflict has a direct impact on shipping, if you are involved in moving Saudi oil and gas, and also to some extent UAE [oil and gas]," he said.

Connected to this, "you had the attacks on Greek tanker MT Agrari in November (2020), attack on BW Rhine in Jeddah in December."

"Another conflict is the ongoing Israeli and Iranian exchange. We have logged 19 incidents from Apr 2019 to Apr 2021, which is far more than is known in the general domain. They are mostly directed from the Israeli side, to hit and impact the Iranian export of crude."

"There's actually no direct impact or threat to commercial shipping - except if you are in the wrong point at the wrong time. They are acutely aware of who their targets are."

Looking at Asia, "the area of most tension is the South China Sea, however that is a very political domain, China is not interested in having any impact on trade," he said.

Gulf of Guinea

The biggest area of maritime security concern in the world is the Gulf of Guinea.

Julian Clark, global senior partner of Ince and Co, noted that 40 per cent of worldwide piracy incidents of the last two quarters (Oct 2020 – March 2021) were in Africa, and the majority were in the Gulf of Guinea. It has "a staggering effect on crews, 130 crew taken hostage in 2020 in 22 separate incidents."

Michael Howlett, director of the International Maritime Bureau (IMB) worldwide Piracy Reporting Centre, added that "these kidnappings are taking place at increasing distance from land. All sectors of shipping are being targeted. What we're seeing is a new modus operandi. It could be new gangs involved, it could be becoming more commercialised, it could be pure greed. The risk reward ratio is very heavily in favour of the pirates."

IMB did notice a lull in "meaningful" piracy activity between mid Feb and mid March, which coincided with Nigerian Navy operations to enhance security in the region. "Naval exercises such as these should be commended and sustained, as they clearly have an impact on the issue of piracy," he said.

"International naval assistance would also be greatly welcomed particularly in the short term. But ultimately Gulf of Guinea piracy is a regional issue that requires a regional solution."

Mr Clark added that individual coastal states in the region have shown a desire "to retain oversight of all piracy moves," which has prevented all the coastal states in the region doing something together.

Hans Tino Hansen of Risk Intelligence added that the countries do not see the issue as a particularly high priority. "Even in Nigeria combating piracy is not on the top 10 or top 15 strategic issues for the government."

Armed guards

Esben Poulsson, chair of the International Chamber of Shipping, raised the issue of whether having more armed guards onboard vessels in the Gulf of Guinea may solve the problem. "In the case of the Gulf of Aden [East Africa], there hasn't been a successful hijacking of any ship which had an armed guard onboard that I know about," he said.

Nigeria has continued to oppose commercial shipping companies having armed guards in its territorial waters.

Risk Intelligence's Hans Tino Hansen said that for East African piracy, the affected vessels do not call at local ports. In West Africa, in contrast, vessels are calling in ports and terminals in the region. This means that armed guards would be travelling to and from vessels via the country, probably with their weapons. This may be a factor in Nigeria's reluctance to accept them.

IMB's Michael Howlett replied that the increased naval presence in East Africa may have been a bigger factor in deterring pirates than armed guards.

A naval presence is ultimately the only force "which can actively disrupt and deter pirate activity," he said. ""What navies can do is different. They can actively search for pirate action groups, they can disable them, take them out of the theatre. This is what other actors cannot do."

Another issue is that Somali pirates would be deterred with warning shots and the knowledge that armed guards were onboard. "That's not the case for most people engaged in Nigerian piracy. We saw examples where they attacked [naval] escort vessels." TO

A video of the webinar is online at **https://attendee.gotowebinar.com/recording/3485508349760635151**

Is seafarer training keeping up with technology?

Is the training that seafarers are required to do, such as under STCW, keeping up with advances in technology? ICS held a webinar to discuss

The STCW (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers) is "frankly struggling to keep pace" with changes in technology on ships, said Espen Poulsson, chair of the International Chamber of Shipping, in his opening address to a webinar on Mar 24, "The Future Seafarer".

"There's an increasing gap between meeting regulatory requirements and what is required from seafarers in practice," he said.

Speakers included Mayte Medina, Chief of the Office of Merchant Mariner Credential, US Coast Guard, also chair of the IMO Human Element sub-committee and lead of the US delegation to IMO on safety and security; Gerrardo Borromeo, CEO of PTC Holdings, a company which manages a pool of 65,000 seafarers; and Stephen Cotton, general secretary of the International Transport Workers' Federation (ITF), a federation of transport workers' trade unions.

Mayte Medina

Mayte Medina said that IMO's development of training requirements follows work in other areas of IMO.

For example, once regulations are set about equipment which must be carried or ways vessels must be operated, and performance standards are defined, the work on training requirements follows.

"The model of how it's done, we wait for the other groups within IMO to develop performance standards. The training is the last thing that is developed.

"Most of the time we're running frantically to try to develop these training requirements, to implement them in time for when the equipment or requirements come into force."

"IMO is losing the battle of trying to keep up with technology when it comes to training."

For example, with ECDIS, IMO was "behind by 2 years" in developing training requirements. "That's something we're very aware of."

"Introducing technology is not something new at IMO, we've done that before. The problem is this is moving very fast now."

It may make sense to amend STCW so that it can be updated much faster, removing obsolete requirements and adding new ones, to address new and future technologies, she said.

"STCW has a number of requirements that are obsolete. They need to be removed, and in some cases, they need to be amended," she said.

"My favourite example is the requirements for [training for] radar, ECDIS and ARPA (Automatic radar plotting aid). There's no links in the convention within those [although a single device is used on the ship for all three]. Some administration provides separate training for each one. They could be provided as one training."

"The other thing we need to do is make sure that we make seafarers more technically savvy. We included the electrotechnical officer in the last review. We need to review those."

The structure of STCW, with a division into deck and engine, may also become outdated, for example if autonomous vessels become the norm. "We need to establish more of a multipurpose type of person, which I think is going to be key with automation in the future."

There are some flexibilities built into STCW. "There is a system for alternative certification, Chapter 7", she said.

Training models

The standard model for STCW maritime training is in a classroom, and classroom training was not available during the pandemic.

Many countries were trying to work out how to do virtual training. "We need to do that properly," she said. "Not every training is conducive to doing through virtual means. But some of it is."

There needs to be means to ensure the identity of whoever is taking a virtual course, if it includes an assessment.

"When it comes to sea service requirements, there's several studies which show simulator training can be equivalent to

Speakers at ICS webinar "The Future Seafarer".
Top row: *Gerardo Borromeo, CEO of PTC Holdings; Despina Panayiotou Theodosiou, CEO, Tototheo Maritime; Mayte Medina, Chief of the Office of Merchant Mariner Credential, US Coast Guard.*
Bottom row: *Stephen Cotton, general secretary of the International Transport Workers' Federation (ITF); Espen Poulsson, chair of the International Chamber of Shipping*

sea service. We are in urgent need of that. It is time we included simulators in the proper way," she said.

Simulator training can be included under the current convention via being accepted as an 'equivalent'.

Formal training should also be complemented by on the job training, and familiarization on board the vessel, "which is really the responsibility of shipowners," she said.

On the subject of leadership training, Ms Medina thinks company culture is a major part of it. "If the company doesn't have culture that promotes leadership at every level, I will never succeed as a leader," she said.

"Leadership is not only at the top level, but it is across the board, everyone is a leader within their specialty. We need to look at it from the beginning to end."

Gerardo Borromeo, PTC

Gerrardo Borromeo, CEO of PTC Holdings, a company which manages a pool of 65,000 seafarers, said he agrees that the education / training of seafarers "is going to have to change", as technology develops.

This training will be needed partly in order to ensure the industry can keep attracting the brightest people, he said.

However, he did not believe there will be a shortage of people from the Philippines who want to work on ships.

The maritime industry could also work more closely with academia, in particular training the next generation of maritime leaders.

"You talk to [maritime] corporate leaders, often the comment is "the [students are] not ready for what we're looking for."

The shipping industry wants people with the "flexibility to be able to learn as change happens."

Espen Poulsson, chair of the International Chamber of Shipping, agreed that it is important to narrow the gulf between academia and the real world. "I can't help but think, whenever I go to a university and listen to some lectures, which I enjoy doing, there's quite a gulf between the two."

Stephen Cotton

"If we want to develop employment opportunities for seafarers, we have to change the approach 'who's the cheapest seafarer'. If that's part of the rationale you'll never build a career path," said Stephen Cotton, General Secretary of the International Transport Workers' Federation (ITF), a global union federation of nearly 700 trade unions.

"ITF sometimes sees the worst of the worst, including [from] some shipowners."

Espen Poulsson, chair of the International Chamber of Shipping, responded that since shipping is a free marketplace, it is inevitable that cost "becomes a big issue".

Seafarers as key workers

Although it was a different subject, webinar participants felt it was important to address the big issue of the day for seafarers, the "lack of action by far too many governments", in recognizing seafarers as key workers, Mr Poulsson said. This means they are subject to too many Covid restrictions travelling to and from vessels.

ICS developed 12 protocols for ensuring safe crew changes and travel during the pandemic (MSC.1/Circ.1636) together with 15 other associations, and the protocols were adopted by IMO.

At the time of the webinar in March 2021, "less than half the countries that have ratified this, have recognized seafarers as key workers."

"Far too many seafarers still face too many difficulties getting home despite these efforts. Seafarers being out of sight and out of mind are simply forgotten."

"Despite some progress in the second half of last year [2020], the outbreak in South Africa, Brazil and UK has set us back."

"Responsible shipowners end up chartering airplanes and finding other innovative and expensive ways."

Stephen Cotton was able to compare the maritime industry approach with aviation, since his organisation ITF includes unions from both sectors in its membership.

Civil aviation has proven to be "very nationalistic with approach." The maritime sector is much more international, he said. "When it comes to mobilizing around UN bodies, maritime has been so much more led - by ICS, ITF in partnership with all those UN bodies."

But in the maritime sector at the moment, there is frustration with government and the level of bureaucracy, "and perhaps a degree of puzzlement".

"We can get people in the room, get statements signed, but they can't manage their own internal national challenges. Often that's because the departments responsible for transport are different to the departments responsible for managing health."

But the health department are happy to rely on seafarers to move the medical equipment and food that people need, he said.

On the plus side, Covid has given seafarers much more attention than they are used to. "It has been recognized that we are critical to the response to Covid," he said.

Mr Cotton called on charterers to do more, using the powers at their disposal. "I have to say to charterers in the audience, we are frustrated. We know you are trying to improve the situation, but - shipowners need you to collaborate with them to answer the questions."

The multinationals at the end of the chain, which have a direct relationship with consumers, "are demanding you respect human rights and due diligence."

We need to give seafarers confidence in how we tackle the process," he said.

TO

The Future Seafarer

- A video download of the meeting is available at:

https://attendee.gotowebinar.com/recording/3516352948681424647

How maritime risk is changing – ICS webinar

The maritime risk landscape is changing in multiple ways – much of it driven by Covid and environmental issues, and also cybersecurity. ICS held a webinar to discuss, with speakers from IGP&I, Marsh and Suardiaz Group

Covid has caused the maritime risk landscape to change in multiple ways, including that it leads to financial risks or withdrawals of insurance coverage. Environmental issues also change risks in multiple ways, including risks from people not being familiar with the new fuels and technologies, and from new regulation.

The International Chamber of Shipping put together an expert panel for a webinar on Apr 14 to discuss how shipping risks are changing. The participants were Nick Shaw, CEO, The International Group of P&I Clubs; Louise Nevill, CEO Marine and Cargo, Marsh Specialty; and Juan Riva Francos, CEO of shipowner Suardiaz Group.

The International Group of P&I Clubs has 13 of the largest P&I Clubs as members. Together these clubs provide around 90 per cent of the world's ocean going tonnage with marine liability cover. Liabilities above $10m are shared between club members, so individual members do not risk going out of business due to a single large claim.

Group members also share experiences, in a number of specialist committees. The members also have a very good view on the changing maritime risk picture from the claims submitted to them.

There are "a number of new and emerging risks which International Group is considering," said Nick Shaw, CEO of IGP&I.

Covid

IGP&I saw Covid as a major risk in multiple ways. Although so far, "apart from the crew change crisis," the shipping industry has managed the risks "pretty well," he said.

Some of the biggest claims came from cruise ships which were stranded for some time with passengers onboard.

A main risk for shipping after Covid is, "if the insurance markets take fright and start to impose too many exclusions on coverage available, as a result of what they perceive to be systemic risks."

"We will work very hard with those markets, to try to provide information and discuss with them, how cover can still be provided to enable global shipping still to trade, trying to proactively manage risks, and not reacting."

The global insurance system "is a very fragile system." It can break "if there's too much interference in one part of it, or something is taken away."

Mr Shaw was asked if he had seen any increase in incidents following the growth in remote inspections replacing physical inspections during the pandemic. "I'm not aware of any data that suggests that has been a major trend," he replied.

IGP&I set up a working group to address Covid related risks. The working group provided information to shipowners about changing port regulations for crew changes. It also shared detailed information about claims submitted. This helped the re-insurers to better assess the risk and have confidence that the situation was being managed.

Environment

One risk concern related to the environment is that regulations are implemented on a non-global basis, such as with the EU making its own rules for emissions.

"Our concern here is that where there's a lack of uniformity, that can lead to more difficult technical and commercial decisions for shipowners. We promote uniformity of regulation, [then] it is easier to manage risk, frankly," Mr Shaw said.

It is important that insurers don't withdraw offers of insurance for ships which don't meet high emissions standards, because those ships might then take out insurance which doesn't fully cover them, he said.

"You end up with a major situation where the marine environment is damaged and there isn't backup from insurance markets to pay for restoration."

"You can't cut shipowners at the knees and impose regulation which creates lots of obsolete vessels," he said. "That isn't going to work."

Cybersecurity

Another issue is the risk of cybersecurity attacks, such as ransomware.

"The threat of cyber isn't completely new, but I think the insurance industry and re-insurers are looking closely at that [now] to assess the risk."

One question is "whether there are manual overrides on vessels" (which can be activated if an automated system gets hacked). Another question is, "are there backup solutions which can operate immediately."

However, "we did a data trawl last year which said there had been no claims with a cyber element," he said.

Guy Platten, Secretary General of the International Chamber of Shipping, moderating the webinar, noted that was "really interesting. Maybe shipping companies are adopting and getting robust systems in place?"

Mr Shaw replied, "we're on a journey, there will be attacks on vessels, but [the outcome] depends on the resilience of the system and backup plans. "We're led by classification societies on that. They are looking at that very closely."

Other risks

"Another big issue is a possible rise of geopolitical tensions, and increased use of sanctions by governments. China has started its own sanctions issues. We think this is unlikely to go away. There's a growing threat of US–China tensions leading to more uncertainty," Mr Shaw said.

Hopes are that the mutual need between US and China will stop them from trying to hurt each other too much, he said.

Another issue being considered is whether risks increase if vessel sizes get bigger, perhaps driven by an enviromental drive to reduce emissions per ton mile. "In our view I think it's too early to reach any firm conclusions," he said. "We are monitoring that."

The group also did research on incidents with vessel pilots, looking at 20 years of data. "There's some really good data coming out of that, how we can improve pilotage, and the interaction between vessel and pilot. We've just published a training animation video looking at lessons learned."

Another issue is deaths in enclosed spaces, of both seafarers and people attending in port.

At the IGP&I, "we're there to support shipowner members and ensure they get necessary guidance," he said.

Shipowners want to feel they can trust insurance companies and markets to work with them, and not just slam on new 'exclusions' if any new risks emerge in future.

"We need insurance markets to assess the risk with us, look at the data and help make constructive solutions," he said.

Marsh

Louise Nevill, CEO Marine and Cargo, Marsh Specialty," said that COVID 19 has increased risks to shipping in many ways. "The majority probably weren't as prepared for what's happened as we should have been."

Marsh Speciality is a division of insurance brokers Marsh which looks at "specialty risks" (unique requirements). Marsh co-publishes the "Global Maritime Issues Monitor", together with the Global Maritime Forum, and the International Union of Marine Insurance.

In the latest (2020) edition, issues described as being of high impact and likelihood, and where the industry is least prepared, included pandemics, a global economic crisis, decarbonisation of shipping / new environmental regulation, and big data, AI and cyber security.

Some of these risks of particular concern, "would not have appeared 'red' five years ago, and some we wouldn't have thought about 18 months ago," she said.

One of the highest perceived risks is that the pandemic leads to an economic crisis, which could impact shipping's risk in a multitude of ways. There could be further consolidation of companies, more likelihood of bankruptcies, more difficulty securing finance, and perhaps a failure to invest adequately in shipping overall.

In the survey, "93 per cent said the pandemic made a global economic crisis more likely," she said.

"We could see a post pandemic disparity between companies out of lockdown, with cases under control, and those stuck in a vicious cycle. Some economies [may] remain severely impacted with no obvious end in sight."

"There could be increased nationalism, more political interference in trade. Geopolitical tension could well be enhanced as a result of Covid."

"Decarbonisation of shipping is ranked number two [highest perceived risk], 2 years in a row. You don't have to go back that far for it not to be recognised as a risk at all."

"The industry is still not entirely sure which technology will be adopted. LNG is viewed by many as an interim solution. The end answer could be ammonia, hydrogen or battery cells."

"The industry is having to hold back investment decisions until there's more clarity."

Screenshot from the ICS webinar on Apr 4, "risk and shipping". Top: *Nick Shaw, The International Group of P&I Clubs; Guy Platten, ICS.* **Bottom:** *Louise Nevill, Marsh; Juan Riva Francos, Suardiaz Group.*

Some insurers are bringing ESG factors into the choice of insurance policies they issue, stating they will no longer write new insurance for oil sands production or thermal coal power plants, she said.

Some insurers are refusing cover for vessels which are heading for breakup in countries which are not signatories to the Hong Kong Ship Recycling Convention. Insurers may also refuse to cover vessels which do not meet EEXI (energy efficiency on existing ships index) standards.

But it is important that insurers "move with the times", and offer insurance for emerging risks.

Ms Nevill was asked how much insurers had prepared for pandemics, or other 'black swan' events.

She said Marsh had modelled many different scenarios, including pandemics and solar flares. "but we got the quantum [size of the risk] really quite wrong."

She was asked how insurers balance the need to charge high prices to cover some unknown risks, and how they keep prices low to attract business.

"We're in a relatively hard market in insurance at the moment," she replied. "it is all about supply and demand. There are more customers and fewer underwriters, so prices are driven up."

"Then everyone gets quite excited, new investors start coming in, new underwriters start coming in, and the tables start to turn."

"You've got to know when you're about to tip the balance between profit and loss and take the appropriate measures. But it doesn't often happen. Underwriters keep following the cycle down and red ink starts hitting the balance sheet."

Suardiaz Group

Juan Riva Francos, CEO of roro and car carrier company Suardiaz Group, and a former European Community Shipowners' Associations president, said uncertainty "is not something new for those of us in this business."

"[but] I think the pressure is getting more and more unbearable."

As an example of an unexpected risk, Mr Francos' car carriers business is impacted by the shortage of microchips for car manufacturing, which is leading to stops in car production in some plants. This shortage is created by the increased demand from PCs from people working at home during the Covid period.

Another possible impact from Covid is that it may lead companies to consider shortening their supply chains. We will still depend on China, but to a lesser extent," he said.

Decarbonisation drives a number of risks, including regulatory change, and challenges meeting demands from shippers that goods are transported with a lower carbon footprint. We still don't know what technologies will be used in future, but shipowners need to commit money to build ships which need a payback over 20 years, he said.

"The main risk is for those who don't realise that business as usual is no longer an option in maritime transport," he said. "We don't need a plan B only, we need plan C and D."

"There is a cost to all that flexibility - I wonder if customers are willing to pay."

Mr Francos said there should be comprehensive analysis of new fuels like ammonia, to avoid the risk of companies pursuing fuel choices which don't work well.

Shipping companies need to find ways to balance their 'traditional' side, relying on many years of experience, with an exploration of new technologies, he said.

Machine learning

Speakers were asked how much machine

learning can be used to help assess risk. Ms Nevill replied that assessing risks is the foundation of the insurance business, and companies are increasing the amount of data they use to do this.

"One view is there are no bad risks, only bad pricing. Companies could technically accommodate most risks so long as they find a good match in price."

"Until recently most insurers relied on traditional methods - such as historical data and loss history. But this is changing. The majority of underwriters now use extra data such as frequency of port calls and miles travelled."

Machine learning could be used as part of methods in calculating risks, including analysing historic, static or behavioural data, and running models through multiple iterations to see the likelihood of different outcomes, she said.

We have already seen the launch of the first "digital and algorithmically-driven Lloyd's of London syndicate".

"But there's still an underwriter at the end of the process sense checking the output," she said.

AI based tools might also be used to make it more efficient to settle and pay claims, and detect fraud.

"We need to continue to put more technology behind the shipping industry. We all need to get a better understanding to get maximum value for all of our clients," she said.

Nick Shaw from the International Group of P&I Clubs said, "every club in the international group has data analysts and actuaries to help them with processes, looking at risks, assessing claims, using that to help them with pricing for shipowners."

Data is shared between clubs where there is an argument that it can be used to improve safety, for example in pilotage and enclosed spaces.

Juan Riva Francos, CEO Suardiaz Group said that he anticipates data analytics being used to optimise supply chains, support condition based maintenance of ship equipment, and help reduce the bureaucratic burden and duplicated work on board.

Extreme weather risks

Speakers were asked how they see the risks caused by actual climate change – such as more extreme weather.

Extreme weather conditions could lead to more vessel re-routing, speed reductions, actual damage, and an impact on maritime choke points, said Marsh's Ms Nevill. It could lead to geopolitical tensions. "There's going to be more for us to think about unfortunately."

IGP&I's Mr Shaw said that any increase in direct risks from climate may affect ports more than ships. Ships are already "built to withstand most severe weather conditions. With improved technology and data on meteorological factors, ships can move from ports quite readily, where they see an extreme weather event materialising."

Suardiaz Group's Mr Francos said that climate problems may affect shipping more when it leads to problems with infrastructure, "as you saw in the incident in the Suez Canal."

Attraction of seafaring

Mr Francos was asked about the attractiveness of shipping as a career, and how a shortage of seafarers might affect shipping risks.

One of the negatives for people considering seafaring is the restrictions on mobility. These are not due only to the pandemic, they have been increasing since around 2000, he said.

"A few years ago I went to deliver final degree awards to a few nautical graduates. The vast majority didn't intend to navigate at all. Either they were already in a company on shore, or waiting to finish 12 months at sea to look for land work."

"The problem is that the idea of being a seafarer as a vocation has been lost. The maritime profession has been losing attractiveness for young Europeans. That is something we will need to deal with in the short term."

TO

This article is based on an ICS webinar "risk and shipping" on Apr 14. You can download a video here

https://attendee.gotowebinar.com/recording/579218741773935368

How BSM manages vessel performance

Managing vessel performance for a large fleet involves developing the right management systems, not just getting an understanding of individual vessels. We spoke to Bernhard Schulte Shipmanagement (BSM) about it

Bernhard Schulte Shipmanagement (BSM) manages a fleet of 600 vessels, including over 170 chemical, product and crude tankers of all sizes. For BSM, managing vessel performance is not just about understanding individual vessels, it is about managing the whole fleet.

We spoke to Frank Paleokrassas, head of Data Governance & Analytics with BSM, to find out how this works.

BSM has established a centre of excellence / expertise for vessel performance, which focusses on building tools and systems, staffed by vessel performance specialists.

But the actual responsibility and accountability for vessel performance is taken by the people who make day to day decisions about how they are operated. Such as the technical superintendents and other members of the "fleet teams".

It means that the focus of the vessel performance specialists is on building tools which can empower decision-making and allow the fleet teams can use "to manage the performance of the ships by themselves," Mr Paleokrassas says.

In addition, the company has a network of 12 "performance leaders", each supporting the performance of 36 ships in their offices. The performance leaders are a "network of experts that act as a channel for communication."

These people also gather feedback from the fleet team members who are using the tools, so they can be continuously improved.

The tools are continuously refined, to gradually increase the amount of explainability and interpretability they provide, to people who are not performance professionals.

Many large shipowners have taken a different approach, taking performance management responsibility away from the day-to-day fleet management team, and making it the responsibility of a centralised performance team. "This is against our principal way of thinking, against our overall strategy," he says.

Measuring performance

The company developed KPIs which could be

used as an objective description of performance. "We are able to get a single number representing the performance of each ship," Mr Paleokrassas says.

It produces a pyramid of KPIs, which ultimately roll up to a single number for the ship, and then a single number for the fleet.

This gives the whole company visibility as to whether the situation is improving, and how fast.

The superintendents themselves can be given a vessel performance score based on the vessels they are looking after.

Over time, BSM may wish to adjust the weightings that the various components contribute to the final score, as different areas may become more important.

Further dimensions are being added to the system.

The digital twins built for every ship in BSM's fleet was used as a basis for calculating the vessel's EEXI (Energy Efficiency of Existing Ships Index). The company already produced preliminary EEXI figures for its entire fleet back in January and now awaits the regulation to be finalised in June.

EEXI only covers the vessel design itself (basically, its fuel consumption per ton miles, under reference conditions). Aspects of the operation, such as routing, are not covered.

EEXI is everyone's headache right now," he says. "There's a looming deadline, 2023."

The CII (IMO's Carbon Intensity Index) is also coming into play at the same time, (a requirement to report the carbon emissions per unit of transport work). BSM's fleet operational data will be used for CII reporting, pending finalisation of the exact regulatory requirements.

Data reporting and analytics

The primary source of data input is still manual reporting, such as in the noon day report. Automated data collection / telemetry, where available, is in addition, adding a level of granularity.

There is a wide diversity between vessels in the company's fleet, of what sensors and other equipment they have onboard. The fleet includes ships with different sizes, types, propulsion arrangements, machinery arrangements, and now some with dual fuel, adding to the complexity.

"We have to account for every single ship in our fleet irrespective of its age and type," he says.

Presentation of the data is also very important. "For me, everything that we do here must drive decision making in the most objective manner possible. In order to do this, the information presented must be simple and clear."

One way to simplify is to set a benchmark, or point of reference, and then people can see if they are ahead or behind it. Or to show things as simple percentages.

BSM has reached a point where it can make a static comparison of a ship's performance with what would be expected, based on its digital twin.

"Unless you embed explainability into technical analytics, you always need time and functional knowledge to understand what you're looking at Is it positive, is it negative?"

Data quality is critical to all of this. "It has been my personal quest to improve our data quality over the last few years," he said. "We do implement further and further measures to improve."

It needs an understanding that data is never completely perfect, so if your operation data quality is low there is a level of uncertainty and risk in any decision made using it.

Sharing data

BSM is exploring ways to make data transparent and readily available to customers (shipowners), which they can pass on to their own customers (charterers). There are often hurdles or complications which come up in discussions about doing this, but "I think this will be the way going forward," he says.

Shipowners and charterers often spend large amounts of time in discussion about the amount of fuel used by a vessel in the voyage, and charterers make claims when they believe it has been overconsuming. But this discussion ultimately achieves very little in the goal of decarbonisation and achieving better operations, he says.

Some owners and charterers are asking for more granular data about vessel performance than daily (noon day report).

Shipowners can also use the data to help make decisions about spending on energy saving devices, sensors and other equipment for the ship. As a third party shipmanager, BSM does not make such decisions itself, instead proposing expert recommendations to its customers

The data can also show shipowners how their vessel ranks with other similar vessels in the fleet.

Digital technology

All of BSM's performance data is managed in a single software system.

The software separates data about voyage performance (such as hull and propeller maintenance) and machinery performance (operation of the main and auxiliary engines, power management, lubricants), rolling the data up to make a KPI for each.

Bernhard Schulte Shipmanagement maintains digital models, or "digital twins" of all of the ships in its management, which also include information about how each vessel is expected to perform. So far this data is drawn from the ship's dimensions, machinery characteristics, shop tests, model tests, sea trials and hydrostatic data. The scope is continuously expanding.

BSM's sister company, MariApps, has developed its own corporate resources planning system, "SmartPAL", described as a complete ship management software.

Frank Paleokrassas, head of Data Governance & Analytics with BSM

In 2019, BSM embarked on a joint venture with a Finnish company called Navidium, to build technology to help gather data from vessels, acting as BSM's preferred vendor. It has installed telemetry systems on 50 ships so far. The vessel data is provided on a minute by minute basis.

BSM is also building its own weather routing and voyage optimisation system as part of its joint venture with Navidium.

There is a big focus on developing predictive and prescriptive analytics tools, to try to predict what will happen and how problems can be avoided.

BSM expects to be focussing in 2021 on "edge analytics", doing analytics processing onboard the vessel, rather than taking all the data to a central data centre for processing.

This means that the results of the processing can be made available directly to the crew, rather than communicated to the crew by the superintendent. With shore processing, "the superintendent has to go back to the ship to advise them on what needs to happen. This introduces a degree of delay."

"We are moving towards doing all of this analysis onboard. Basically we're going to use the same algorithms, with some small computers. It will give up to the minute advice to the people that are able to affect optimisation, i.e. our crews."

Market incentives

In terms of the market incentives for the efforts, Mr Paleokrassas says that for ship managers, there are rarely any carrots (rewards for achieving higher performance than is required). Normally it is just sticks (complaints about targets not met).

Many schemes, including the Poseidon Principles, are ultimately only about ensuring that the vessels comply with regulations, such as the decarbonisation trajectory required by IMO, he says.

This means that when the company considers a decarbonisation project which may take a large investment, there are no clear ways to recoup this, such as from shipowners or charterers. "There have always been discussions [about market rewards], I have never so far seen them materialise." TO

Advice about drug smuggling on ships

There have been a number of cases of drug smugglers concealing drugs on merchant vessels, leading to difficulties to seafarers. Security consultancy Dryad Global shares their advice. ***By Dryad Global***

Illicit drug producers continue to develop complex trafficking patterns, targeting commercial vessels and their crew to transit their supply through multiple stopover and transit points.

Despite the existence of IMO frameworks to protect crew when under investigation, unknowing seafarers and masters have been detained for extended periods of time in relation to drug trafficking incidents.

The areas under highest risk are in West Africa (Cape Verde and Nigeria); India, Pakistan and Myanmar; and many countries in central and south America - Mexico, Bahamas, Jamaica, Haiti, Dominican Republic, Honduras, Costa Rica, Belize, Guatemala, El Salvador, Nicaragua, Panama, Colombia, Venezuela, Ecuador, Brazil, Peru and Bolivia.

But also, the globalised nature of drug-smuggling operations makes vessels possible targets across Africa, Europe, North America and Asia, operating out of areas which may not be directly affiliated with drug production.

Choosing a target

Targeting methodology by drug traffickers has become increasingly complex.

A methodology common in Latin America is to attach drug-filled containers to the bottom of ship hulls with rope, commonly referred to as the 'torpedo method'.

Methodologies in Europe and MENA countries are largely concealment within legitimate cargo and the container structures themselves.

Common methodologies globally usually involve the use of crew and port staff facilitating trafficking operations, as seen through incidents involving container ships MSC Gayane, MSC Carlotta and (general cargo ship) MV ESER.

Drug traffickers have disguised themselves as port officials and stevedores to bring packages on board, marking cargo containers as checked with replicated official seals. Then they store the packages in engine rooms, or restricted areas of a vessel which are unlikely to be checked.

Other reported but less common methods involve concealing drugs in water inlets, rudder trunks, rudder/propeller stern frames and fuel tanks of commercial vessels.

Before port calls

Before port calls, crew and personnel should be aware that drug cartels may establish communication in an attempt to befriend or achieve a level of cooperation in drug smuggling operations.

The risks involved in establishing/continuing communication with these groups are extensive, but put at risk the safety and wellbeing of all those on board.

All crew should be briefed and reminded of the risks involved with engaging in these group's operations, highlighting the risks to their personal safety and well-being.

Mitigation in port

Single entry points onto the vessel should be strictly enforced, limiting vessel access to essential personnel only.

Pre-arranged logbooks should be kept at the single point of entry/exit, and all external persons must record their appropriate details and paperwork, verified by crew before boarding.

The Master or Chief Officer should be informed if the watch is uncertain as to whether an individual has legitimate reasons to be onboard.

Partial restrictions to movement aboard the vessel by external persons should be enforced, restricting movement in engine rooms, holds, stores and other areas of vulnerability.

A crew member or watchman should be present where visiting personnel/stevedores are aboard the vessel, keeping areas of activity under surveillance and reporting any suspicious behaviour to the Master or Chief Officer.

Watchmen should be aware of all approaching smaller vessels in the vicinity of the docked vessel, particularly after-hours under darkness.

Surrounding waters should be well lit, recognising smugglers may target the hull and rudder of a docked vessel to store and transport drugs.

Floodlights should be considered to supplement to primary illumination systems, particularly if there is concern over a suspicious vessel or individual.

During cargo operations

During cargo operations, partial vessel searches should be performed, with a full vessel search conducted when operations are completed.

To ensure effectiveness, vessel searches should be divided between crew and cross checked, rotated randomly by the ship security officer.

While movement aboard the vessel should be restricted at port, personnel should assume visiting persons have unrestricted access to the vessel when searching.

Some circumstances may prompt a reactive search, particularly unauthorised personnel on board, personnel carrying parcels, entry points temporarily unmonitored, evidence of disturbed stowage, missing keys, or evidence of tampering with tank tops, boat covers and unlocked restricted areas.

In addition to looking for illegal substances, the crew should be on the lookout for stowaways.

When leaving port, inflatables and skiffs may approach a vessel to retrieve drugs attached to the external hull to avoid detection from coast guard and police forces patrolling the immediate coast.

If you find drugs

IMO outlines the following information under Resolution FAL.9(34), the Guidelines for the Prevention and Suppression of the Smuggling of Drugs.

Another person must witness the position of a suspicious package or bag before taking any action. If possible, take photographs of the package or bag as it was found. Handle as little as possible and remember there may be fingerprint evidence on the package or bag.

Where necessary, remove the goods to a safe place under lock and key. Guard if necessary.

If at sea, record any discovery in the ship's log. Include as much detail as possible.

Do not disclose the find, and limit information to persons who need to know.

Notify the competent authorities at the next port of call before entering territorial waters. Failure to do so could result in charges of drug trafficking. Do not allow crew members to disembark before being interviewed by the competent authorities.

Dryad Global are experts in global issues and maritime security risk management. See **https://dryadglobal.com**

Maritime catering – going back to the basics

Many vessel crew have poor health for reasons which may be related to nutrition, such as high blood sugar or diabetes, says maritime catering consultancy MCTC. The answer may be to go back to the food which our grandparents ate – and it is not as impractical as many believe

Too many crewmembers today have high blood sugar or diabetes, says Christian Ioannou, Managing Director of international catering management and training provider MCTC, and a fully trained restaurant chef.

The reason may be that they are eating too much processed convenience food, which is high in salt, sugar and preservatives. "Our body cannot metabolise the intake of sugar and digest the preservatives," he says.

MCTC would like ships to go back to the basics, with cooks onboard making food with fresh ingredients, just like they did 30-40 years ago before convenience foods were widely available.

Many people believe this is impractical, or that ship crew should not expect healthy living, Mr Ioannou says. So the company has a mission to prove them wrong.

MCTC has 600 vessels under contract for catering management / catering competency management, of which 60-70 per cent are tankers. It started in business in 2013.

Filipino cuisine

When MCTC holds training sessions with Filipino cooks, it always asks them to compare the food they eat today with the food their grandparents ate. The answer is that the meals have the same name, but today, they are made from powders, while their grandparents would have used fresh ingredients.

For example, Filipino kare kare is an oxtail stew with a peanut based sauce, with sautéed vegetables like bok choy, eggplant, string beans, daikon or banana flower added. Now it is provided as "Kare Kare mix".

Christian Ioannou, managing director, MCTC

Sinigang soup is a slow cooked dish containing large chunks of meat or seafood, and vegetables. "Today, seafarers are still eating what they call Sinigang soup, but making it from a powder," Mr Ioannou says.

"The problem is not from the initial dishes, it is that everything is now being packaged."

Maritime tradition

Some in the industry believe that seafarers should not expect healthy food, because that is how the industry is.

"I visited a vessel a few years ago and met a captain, I would say an old-fashioned captain. He asked me, 'who told you we want to eat healthy?' My question back was, 'what about the other 23 crew members onboard. Were any of them asked if they want to eat healthy?'".

The millennial generation, from which many seafarers today are drawn from, include increasing numbers of vegetarians. They may also take care of what they eat in other areas.

Good nutrition should also help seafarers maintain energy and concentration levels better.

So if shipping companies want a young energetic crew, they may want to change a few elements of maritime tradition, Mr Ioannou says.

"It somehow has become the norm in shipping – to be fed wrongly, rather than taking care of nutrition of crew onboard," he says.

Misconceptions

Some efforts to improve food are a little misguided. Some owners have suggested reducing the amount of rice, because as a carbohydrate, it converts into sugar. "We tell them they are barking up the wrong tree," he says. "The real sugar which needs to be avoided is the sugar which can't be seen."

Another misconception is that healthy living is like going on a diet. "We are not putting anybody on a diet," he said.

We can also discuss reducing the levels of meat in diets without needing to eliminate it. There has traditionally been a lot of meat in seafarer diets, Mr Ioannou says. This

can be backed up by a belief that "we need excessive quantities of animal protein to sustain ourselves," he says. "It is not entirely correct."

One possible misconception is that ships should have lots of processed food, because much of the food onboard ships needs to be frozen, and frozen food is often processed.

"People often equate frozen and processed, that's one of the things we are getting a lot. Frozen and processed are two different things," Mr Ioannou says. "You can freeze vegetables."

To determine if food is processed, you just need to read the labels, to see how much preservatives, sugar and salt has been added to it. "We urge people to start reading the labels," he says.

Many people, including seafarers, believe that when their energy levels are down, it is good to eat foods high in sugar, such as chocolate, to get them up again. "It may be up for a few minutes but goes down rapidly," he says.

People should seek out fruits, rather than food with refined sugar. "The good thing with consuming natural sugars like fructose, it takes much longer for the body to break it down. You can store energy for a longer period of time. During night shift, seafarers should eat fruit to keep their energy going."

A common belief is that convenience foods are cheaper. MCTC has done extensive analysis to demonstrate that this is not true, the opposite in fact.

If shipping companies treat the galley the same as they treat any other department of the company (i.e. with activities structured using procedures), and training the cooks how to cook with raw ingredients, they could save between 15 to 20 per cent of the budget.

A curiosity of shipboard catering is that it often ends up as a "one man show", Mr Ioannou says. A certain cook likes to order certain provisions, and is given a budget, which could be as much as $15,000.

But after a crew change, another cook comes onboard who wants to buy a completely different menu.

"I've been personally on many vessels

Cooked onboard a vessel – entries in a MCTC cooking competition

Cooked onboard a vessel – entries in a MCTC cooking competition

where I was asking the cooks about a particular item in the fridge, and they say, this is from the previous cook," Mr Ioannou says.

Needless to say, this leads to wastage of food.

In contrast, restaurants (not on ships) typically take great care over food wastage, Mr Ioannou says. "When I used to be a chef in Germany, the first thing the executive chef was looking at, when coming into the kitchen, was not what we were cooking, but what we were throwing away."

Catering management

MCTC's catering management program involves working together with shipboard cooks and suppliers to ensure deliveries of fresh food.

It has a network of suppliers around the world, which are audited to make sure their supplies are up to standard.

Ships are typically supplied with food every 2 weeks, and fresh vegetables and fruits should be able to last that long without being frozen.

The company has an in-house nutritionist, with a role of ensuring all dietary requests are taken care of, reviewing supplies which have been ordered, and ensuring there is enough inventory onboard.

MCTC has a goal to keep ready-made processed food away from vessels. "Slowly, with the collaboration and the education of the catering staff, we reduce the supply of ready convenience food."

"We guarantee we can eliminate fast food within the first year of our collaboration," he says.

Achieving this also requires the cooks onboard to buy into this goal, since they do much of the ordering of food.

MCTC keeps in close communication with cooks onboard, helping them plan their orders and meals. "Our approach is purely on people, not just on a budget."

"When we founded MCTC - it was always our vision to be one of those who transforms the industry into a healthier and happier place to work."

MCTC offers a free catering competency development program together with its catering management program, encouraging crews to think like nutritionists.

It employs coaches, who are in regular communication with cooks onboard the vessels it works with.

These coaches explain to the cooks how important they are for the wellbeing of crew mates. "You're not just a person onboard the vessel. You're the one who is feeding everyone on board the vessel."

MCTC also runs an annual cooking competition, to motivate seafarers to show how they have become "high calibre chefs," with their work judged by sending photographs to a panel.

The cooks are invited to show their own recipes, bring their own twist on a well-known recipe, or create a work of art with food and complex recipes.

Cooks were challenged with making short crust pastry and a filling.

"The annual Cooking Competition is designed to highlight the sophisticated level of training that galley crew receive as well as inject some fun into the kitchen," said Tonia Drousiotou, Culinary Training Consultant at MCTC.

TO

Concerns about ship power limits

There are concerns that if engines are de-rated to meet emission requirements, navigators may not have the power they need at short notice. A Nautical Institute webinar on March 11 discussed the issue

"If you need full power, most mariners overwhelmingly would like it immediately," said David Patraiko, director of projects of the Nautical Institute.

He was introducing a webinar organised by the Nautical Institute, discussing concerns that the de-rating of ships' engines (intentionally reducing the power of engines to meet emission requirements) may mean seafarers have difficulties getting out of a tricky situation.

The regulations do allow for ships engines to revert to full power in a safety critical situation, but this could take a few minutes delay, while seeking authorisation from the captain, entering a password in an electronic system, or making a mechanical adjustment.

An audience poll asked the mariner participants how long they would be comfortable waiting for full power when they need it. 60 per cent said they would like full power to be available immediately, and a further 24 per cent said they could wait up to 5 minutes.

The audience was then asked to select 3 situations out of 5 when they might need full power.

The responses were heavy weather coastal 70%; heavy weather anchorage 54%; breaking out of synchronous or parametric rolling 53%; heavy weather offshore 46%; heavy weather in port 45%.

Capt Dennis Barber, a Maritime Consultant, who is unusual in being both a former master mariner and a naval architect, explained why it was an important issue to address.

He has participated in IMO discussions about engine de-rating, in his role as member of the Royal Institute of Naval Architects (RINA) IMO Committee.

He heard people make comments about the need to ensure that seafarers cannot interfere with any system. "I thought, this is not good."

Mr Barber explained why seafarers might need large amounts of engine power with no advance warning, with one of his own experiences as a captain.

"I found myself going into an anchorage, it was somewhat crowded, with a very large ship (Capesize). The weather was very good. But the tide was extremely strong."

"As I came to the point, it needed a lot of power to get this thing swinging round, to the point where I can drop the anchor without losing it. If I hadn't had the power, it would have been quite nasty."

"Quite near, the water was not deep enough to keep the ship afloat. It would have turned to a salvage contract."

"I didn't see, coming in, how much the turn was going to affect it."

"Things happen you don't expect to happen. Someone does something on another ship and makes you want to do something quickly. Instantaneity is something which really should be available to the master."

"I've seen some very frustrating moments. You need to get out of where you are. You imagine being in your car, you put your foot on the pedal and find there's a brick underneath it. You wouldn't be too pleased. It is very frustrating to push the lever and realise it is not going up."

Most of the discussion at IMO is about legal issues, says Captain Barber, basing his opinion on "sitting there for 30 years on and off with different delegations."

"Rarely does the seafarer come into this other than, 'can he be trusted to do this'. I spend a lot of time saying, 'yes he can'. After all, the charterer wants the master to keep his fuel consumption down. That has been driving masters for many years. They are people who have got to account for all the fuel they've used."

Captain Barber's interest in naval architecture goes back to his time at sea, where, he says, "I got frustrated about who designed this thing. That was 1980."

Captain Barber decided that the best path might be to become a naval architect himself, to try to design vessels which seemed better from the seafarers' point of view.

Screenshot from the Nautical Institute webinar "Ship's power limitation".
Top: *Edwin Pang, consulting naval architect; David Patraiko, Nautical Institute. Bottom: Robert McCabe, Nautical Institute IMO committee; Dennis Barber, maritime consultant*

One audience member added that such "torque load programs" had caused many issues for pilots, particularly if the pilot is not warned about a delimiting system in advance.

How it might work

Capt Robert McCabe, a Past President of the Nautical Institute and current chairman of its IMO Committee, discussed how a de-rating system might work, from a seafarer's perspective.

An engine power limit implemented to meet emissions regulations for existing ships (EEXI) is "overridable for the purpose of security, safety of the ship or saving life."

There are many situations where seafarers might know well in advance they will need extra power for safety reasons, and have time to make arrangements. But there are also situations where they need immediate access to power. "They can't be going through an approval process to get it," he said.

In most cases, the master will need to give the approval, but the master may not be immediately available.

The Nautical Institute is also concerned about how the issue is presented to crew.

"We don't want a situation where the bridge team are reluctant to access the power," he said. "We want the language to be right, so people know it is OK to use that power when it is needed."

Once seafarers have obtained the necessary approval, they still need to change the system which limits the engine.

Modern engines can usually have their limits set by electronic control, and so this limit can also be removed electronically.

Some people say that there could be a requirement to enter a password to access more power. "What if you can't find the password? There's got to be better ways," he said.

Older engines are limited by some manual method, such as a stop screw on the governor (the technology which maintains the speed of the engine).

Then there's the question of how the override should be reset afterwards. Some procedures may require that the resetting is witnessed by a representative of the shipping company, which may be tricky to arrange.

De-rating background

De-rating may need explanation for some readers.

The speed of a vessel, and the power output by its engine, increases with the cube of fuel consumption. So roughly speaking you need 4 x as much fuel to get 2 x as much speed.

De-rating is not about reducing speed in general, it is about removing the ability to access the top end of the power. Many vessels would rarely use this top speed anyway. But some vessels may be inclined to use the power and go faster if it is available, or they could be required to do so under the terms of their contract.

The vessel's energy efficiency index (EEXI / EEDI) has the power of the ship as one of its calculation factors, so reducing the power is a way to get a better index.

The full equation is more complex than most readers will need to understand, but a simplified version is that the index is calculated based on 75 per cent of your installed power, multiplied by a carbon factor, relating to the amount of CO2 emitted with the fuel which you are using. You add to that a factor for your auxiliary power, which can be approximated at 5 per cent of your installed power, times a carbon factor.

This index is then divided by your deadweight, so it is an emission factor per tonne.

The purpose of EEXI / EEDI is to drive a steady reduction in the power of ships, and so the fuel consumption.

Under EEDI, for new build tankers and bulk carriers, the required index is tightened by 10 per cent in phase 1 (2015-2019), 20 per cent in phase 2 (2020 to 2024), and 30 per cent in phase 3 (2025 onwards). The reduction factor is lower for vessels under 20,000 dwt.

Similar requirements are being made for existing ships under EEXI, although the time period is different. Entry into force is expected to be in Q4 of 2022, with an exact date to be confirmed in June 2021.

An example of a method of de-rating is taking one of 10 cylinders on a 2 stroke engine out of use.

This means that the engine has a reduced torque output, and a lower revolutions per minute.

Power problems in 2011

De-rating first came to be used in 2011-2012, a time of very high oil prices of around $110 a barrel (current price is around $60).

"Slowing down saved a huge amount of fuel that made the difference between survival and going bankrupt for a number of companies where fuel cost had gone bankrupt," said Edwin Pang, chairman of the RINA IMO Committee, and a consulting naval architect.

Looking at a plot of main engine revs per minute (RPM) by delivery year for 50,000 DWT tankers, you can see that when bunker prices got very expensive around 2012, the RPM of engines "dropped quite dramatically," Mr Pang said.

But there were complaints of poor manoeuvring characteristics of these vessels.

As a result, engine manufacturer MAN issued a recommendation for a wider "Light running margin" in 2014. The light running margin is defined as the difference between the engine curve and the propeller curve, of what percentage of the SMCR (specified maximum continuous rating, or maximum output) you are using.

MAN advised a 4-10 per cent "light running margin", whereas before it had been 3-7 per cent.

The purpose is to make up for a propeller having to do more work than expected, due to rougher weather than in the test conditions, which are usually "light running" conditions – i.e. with minimum resistance from weather and waves, or ice and shallower water.

A low light running margin is the reason why many ships have problems manoeuvring at slow speeds, particularly when the ships have been de-rated, but keep their large propellers.

"Companies should have updated their designs, so you have more torque at low revs," Mr Pang said.

MAN issued a YouTube video explaining light running margins further which is online here www.youtube.com/watch?v=C7e6RLMk5e8

De-rating plans

Shipping company engine de-rating plans so far have a wide range of limits, from a "handful of percent" up to 40 per cent, Mr Tang said.

Older ships, such as those built before slow steaming was introduced in 2008, often have higher power, and so will be more likely to need larger limitations.

Many vessels are already operating at much lower than 75 per cent of their maximum power (MCR) – there are container ships operating most of the time at 50 per cent, and bulkers at 60 to 75 per cent, he said.

But EEXI actually imposes a limit, making higher speeds no longer available, should they be wanted.

RightShip, which describes itself as a "maritime due diligence organisation" founded by dry shippers BHP and Rio Tinto, gives vessels a rating (for the purposes of assessment by charterers) which includes engine power limits as a factor. In this case the engine power limit cannot be switched off (or over-ridden) at all, Mr Pang said.

TO

Nakashima Propeller acquires Becker Marine

Nakashima Propeller of Okayama, Japan, has acquired Becker Marine Systems of Germany. The two companies will retain their identifies but work closer together on more efficient propeller and rudder packages

Nakashima Propeller Co Ltd of Okayama, Japan, has acquired a majority holding in Becker Marine Systems (BMS) of Hamburg, Germany, a company which makes rudders for ships and energy saving devices, including the "Mewis Duct".

The two companies will each retain their name and management, and no information will be disclosed about the size of the deal.

Through the partnership, the companies will work closer together to combine propellers, rudders and Mewis Duct devices (which channel water under the hull of the ship), which could lead to further optimisation in propulsive performance, says Takayoshi Nakashima, President of Nakashima Propeller.

Nakashima has been working with BMS since 1978, acting as exclusive distributor to the Japanese market. This has given the two companies a long time to build up trust between the management teams, he says.

Nakashima Propeller was established in 1926. It makes fixed pitch propellers for ocean going vessels, including for very large container ships, ultra large (24,000 TEU), big ships (15,000 TEU), smaller vessels (3,000 TEU) and feeder vessels, 1800 TEU. It provides and services a range of energy saving devices and thrusters from other companies.

Becker Marine Systems was founded in 1948, and makes rudders and other energy saving devices for ships of all sizes. Both companies are family businesses.

With both companies working together, they should be better able to develop packages for the "aft area" of ships, for reduced or zero emissions, says Dirk Lehmann, co-managing director of Becker.

Can providing a propeller and rudder in one package achieve more fuel efficiency?

One reason for the merger is to give both companies additional strength at a difficult market time. "Over the last 4 years - the shipbuilding industry went through a rather deep and bad crisis, with very few new buildings, a very difficult market environment," says Henning Kuhlmann, joint managing director of BMS. "It was difficult to survive in this industry for many companies.

The goal of the merger is adding technical solutions to make a bigger picture, rather than to reduce cost, such as through headcount reductions, he says.

"I strongly believe that the relationship and trust which both families and management teams built over 40 years enables us to reach this agreement successfully," said Mr Nakashima.

But also, the two companies anticipate a growing market in emissions reduction technologies, on both newbuilds and existing vessels.

The two companies anticipate providing a rudder and propeller together as a fully tested "optimised manoeuvring and propulsion package" for all kinds of vessels.

This year, BMS plans to roll out its first range of rotary steering gears to control the rudder systems, in a way that enables propulsion to be enhanced. It is looking into wind technology.

Becker also anticipates growing its Japanese market following the merger. Becker's core business is already in Asia, because it has the largest share of world shipbuilding. Nakashima's core market is Japan, since it is based there.

The two companies are keen to build market share in South Korea.

More for tankers

The partnership offers potential benefits to tanker operators, if it can develop ways to achieve further fuel optimisation by having the rudder and propeller designed to better work together.

Becker makes a "full spade rudder", where all of the rudder which is downstream of the propeller is angled, not just part of the rudder. The full spade design "transforms a much higher proportion of propeller thrust into lift than a conventional semi-spade rudder," Becker says.

Having a full spade rudder, together with an energy saving device such as Mewis Duct, and a propeller, can achieve improvements in energy efficiency.

Dirk Lehmann and Henning Kuhlmann, joint managing directors of BMS

To improve the designs, both companies undertake computational fluid dynamics, modelling the flow of water across their rudders and propellers.

Tankers and bulk carriers have a higher "block coefficient" (the ratio of the underwater volume of a ship to the volume of a rectangular block), or in other words they are "more shoebox like". This means that there can be bigger benefits to combining the rudder and propeller, having everything in one line, says BMS' Henning Kuhlmann.

With the addition of "very clever and very good control systems" it should be possible to provide a complete "motion control package", for both retrofit and newbuildings, and suitable for the largest vessels, he says.

"We learned we can only do so if we merge both companies on a shareholder level."

De-rating

Companies doing engine de-rating (purposefully weakening the maximum power of their engines to comply with IMO emission requirements) may find that their propeller is now too 'strong' for the engine. The larger the propeller, the more engine power you need to turn it.

This can be compared to starting your car engine in fifth gear. "This is not possible - your motor will die," says Mr Kuhlmann.

So you may want to retrofit your propeller at the same time as de-rating the engine.

But if you fit an energy saving device like Mewis Duct, you can get better performance from your engine – which could be an alternative to de-rating, or a partial alternative. Becker says a Mewis Duct can achieve energy savings up to 8 per cent. TO

Can inert gas systems be included in decarbonisation drives?

Inert gas systems themselves use energy. The gas needs to be provided for inerting at the same time as the tanks are emptied, and inert gas cannot be stored onboard, with the volumes so large. Sometimes gas or fuel is burned specifically to create the gas. So are they are target for decarbonisation drives?

Being a reader of Tanker Operator magazine, you probably know that the purpose of inert gas is to prevent an explosion in the cargo tanks. An explosion can happen when there is oxygen together with a hydrocarbon. So inert gas must have oxygen below a certain level, about 11 per cent by volume.

This can be achieved by using exhaust gas from the engine or boiler, because the oxygen in the air has already combusted with the gas to form carbon dioxide, it cannot react again.

Some inert gas system manufacturers we spoke to for this article said that the market is highly competitive, with nearly all systems installed at the newbuilding stage, rather than replaced over the life of the vessel. Shipyards are in a strong negotiating position to push down prices, or drive for commodity products.

If shipowners wish to have a gas inerting system with special environmental features, they must pay the shipyard extra for this.

Inert gas on tankers can be sourced from the ship's main auxiliary boiler, or an independent inert gas generator, burning gas just for this

The exhaust from a diesel generator is usually under 5 per cent oxygen. It is first passed through a scrubbing tower where it is cleaned and cooled with seawater.

Chemical tankers sometimes use pure nitrogen for inert gas, where there are concerns that standard hydrocarbon flue gases could contaminate the cargo. These systems are more expensive.

Inert gas drives different steels

In December 2020, DNV said that pitting corrosion on tanks is being caused by "aggressive chemicals contained in the inert gas".

This is a bigger problem in double hull tankers, DNV said, because in single hull tankers, the seawater is closer to the cargo tanks. It can cool the tanks down and slow down bacterial growth. On double hull tankers, the cargo is able to get warmer, which is better condition for microorganisms to thrive and cause corrosion.

Three Japanese steel manufacturers, JFE Steel Corporation, Nippon Steel Corporation and Kobe Steel, Ltd, submitted a proposal to IMO to accept the use of more corrosion resistant steels in crude oil tanks. Consequently, IMO issued a new "Performance Standard for Alternative Means of Corrosion Protection for Cargo Oil Tanks of Crude Oil Tankers" in 2010.

DNV has since revised its relevant ship construction rules to incorporate corrosion-resistant steels for cargo tanks, and recently added the new classifier "CA" (for "corrosion protection by alternate means") to its existing corrosion protection class notation. This new notation is labelled "COAT-PSPC (CA)" and was announced in July 2020.

Alfa Laval

Alfa Laval makes an Alfa Laval Automatic Fuel Efficiency Module (AFEM) which can be integrated into inert gas generators on product tankers, reducing fuel consumption by generating the exact amount of inert gas required, so no unnecessary fuel is used.

It can reduce fuel consumption by as much as 40 per ecnt, the company says.

The module is not so much a piece of equipment, more an adjustment to the combustion control in the inert gas generator.

A two year pilot project was run with Italian tanker operator Navigazione Montanari S.p.A, where it found it could reduce fuel by 30 per cent. The system was tested on 40,000 DWT product carrier Valle di Navarra, built in 2002, carrying gasooil and gasoline cargo, and discharging up to 3 times per week.

In one customer example, the customer was consuming 148 tonnes of fuel over 18 months, and anticipated saving 68 tonnes, or 46 per cent, from the AFEM.

It works together with Alfa Laval combustion units, which burn gas to make the inert gas.

The module includes a control panel, a fuel oil pump, an oxygen analyser, a burner actuator, and a burner oil supply line modification kit.

Alfa Laval says it is not aware of any corrosion problems being caused by flue gas from its inert gas generators, because they have systems to treat any harmful contamination.

Wärtsilä / Saacke

In February 2021, ship equipment / power systems company Wärtsilä signed a 'strategic partnership' with marine firing plans manufacturer Saacke, to combine their offerings for inert gas systems for the LNG carrier and LPG carrier markets.

Wärtsilä has over 50 years experience making inert gas systems, with 2,500 vessels on its reference list, including crude oil tankers, product tankers, chemical carriers and for LPG and LNG gas carries and FPSOs.

The companies will work together to provide a package for shipyards and shipowners.

They will look in particular at combining Saacke's gas combustion units with Wartsila's inert gas systems.

The agreement covers SAACKE's Boilers, Exhaust Gas Economizers (which use heat in exhaust gas to make steam), and air-cooled Gas Combustion Units. On the Wartsila side, it covers Wärtsilä's Inert Gas Systems and combined Inert Gas & Gas Combustion Units.

Wärtsilä will make its Flue Gas system available to SAACKE, making it possible for a single delivery of a combined Boiler and Flue Gas System. Putting this in a package should be a means of improving system performance and reducing cost.

Wartsila recently added a system for regulating the inert gas system based on the tank pressure. This means that the system optimises the gas production to only produce the necessary amount of inert gas to maintain the tank pressure.

The company claims that its burner / scrubber unit uses less deck space than any other known design. This reduced space requirement is achieved by having the combustion chamber located concentrically inside the scrubber unit, for cleaning the flue gas immediately after it is crated.

Scanjet

Scanjet of Sweden provides the Scanjet Feen Inert Gas Generating system, which combusts gas specifically to make inert gas. There are blowers to transport the inert gas through the system into the cargo tanks.

It also offers a flue gas system (F-IGS), a multi inert gas generator (M-IGG), an inert gas generator for LPG carriers (IGG-L).

It also offers nitrogen inert gas systems (usually used on chemical tankers). It has a system which separates nitrogen from air using membranes, and a system which separates nitrogen from air using pressure swing adsorbation. This separates gases on the basis that different gases tend to be attracted to different solid surfaces more or less strongly.

All the main components are manufactured in house. Scanjet has been making inert gas generators and systems for 20 years.

The inert gas generating system can control the amount of inert gas which is needed, based on monitoring the cargo discharge rate. This minimises the amount of fuel which is used, and avoids excess inert gas being vented to the atmosphere.

In case of system failure, the system can be manually operated.

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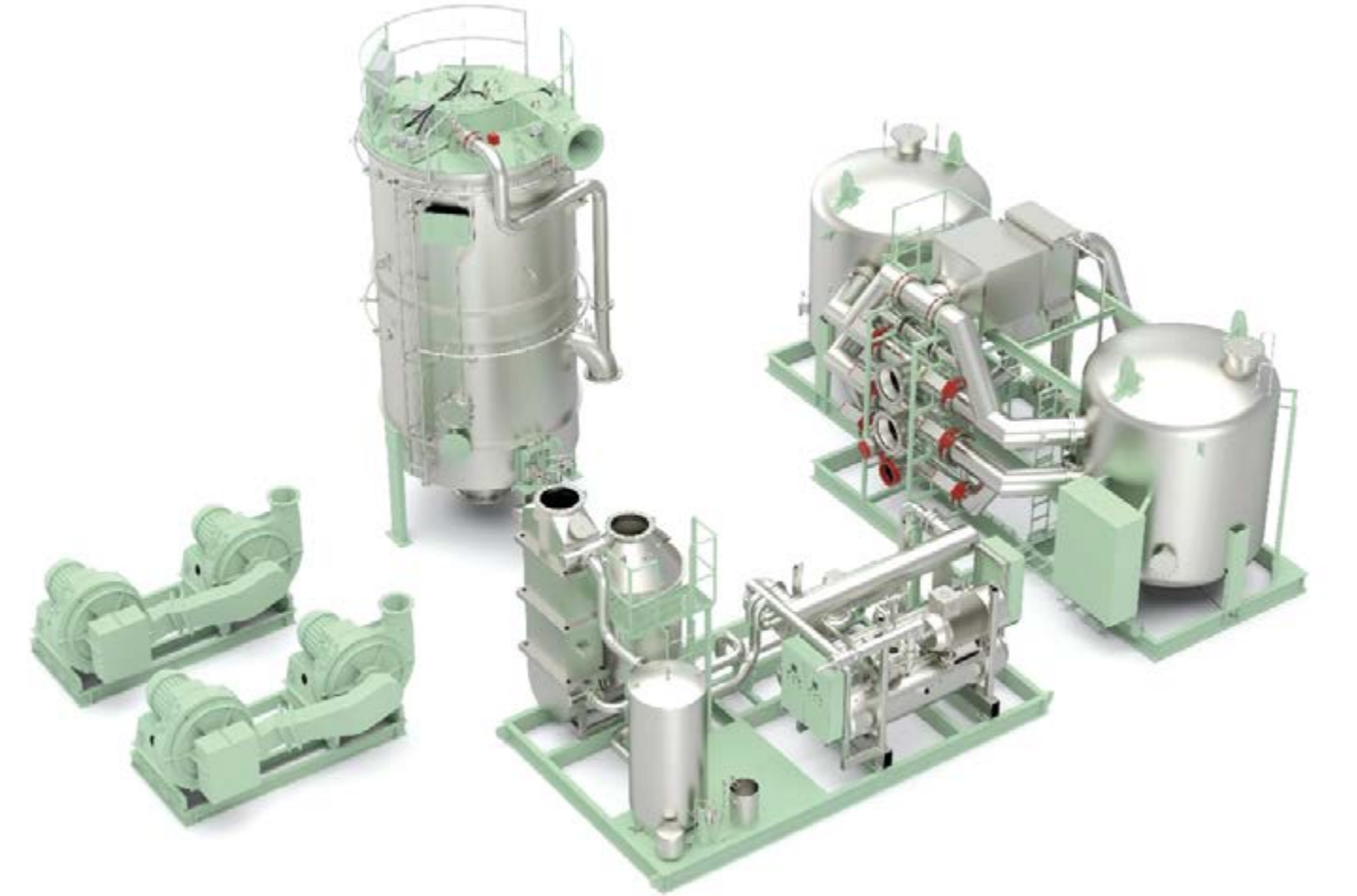

Wärtsilä's main components for its Inert Gas and combined Inert Gas / Gas Combustion Unit system. @Wärtsilä Gas Solutions

Managing cyber risks of ECDIS

There have been concerns raised in the industry about cyber risks of 'operational technology' onboard ships, such as ECDIS. We talked to Navtor, one of the world's leading ECDIS technology companies, about how the risks can be best managed

There have been concerns raised in the shipping industry about the cybersecurity risks of operational technology, such as the Electronic Chart Display and Information System (ECDIS). We talked to Navtor, one of the world's leading ECDIS technology companies and chart suppliers, about the best ways the risks can be managed.

The main cyber concerns are that the ECDIS operating system software can be corrupted or get a virus, a virus can be introduced using a USB stick, and the charts can be corrupted. But all of these risks can be mitigated easily by using modern technology and following procedures.

Perhaps more importantly, it should be possible to show this to other people with a stakeholding in maritime safety, such as insurers, authorities and charterers, that the ECDIS is being managed in a way which eliminates cyber risks.

To put people's concerns at rest, the whole system needs to be demonstrably secure. There is no means for any hack or corruption to occur in chart data as it flows between the hydrographic office, the electronic chart supplier and the vessel systems. There is tight control over what data can enter the ECDIS system so that only correct software updates, charts, chart updates and chart licenses are allowed. The ECDIS is running an up to date operations system with the latest patches.

But it is still important that everybody involved has some understanding of the risks, as with any other risk in shipping. It is important that seafarers have training in the basics of cybersecurity, says Anders Holme, CTO, NAVTOR.

Anders Holme, CTO, NAVTOR

Old operating systems

The biggest potential risk with ECDIS probably comes from the use of old equipment with operating systems which have not been updated.

Chart display systems are computers, which use the same operating systems which are in a PC.

The first systems, type approved in 1999, ran the Windows versions which were being used at the time.

You wouldn't use 1999 Windows systems in the office, partly due to the cybersecurity concerns, with systems no longer being provided by patches by Microsoft. Most companies would not allow this. Shipping companies should not do so either.

It is rare for ships today to use ECDIS systems with old operating systems, says Tor Svanes, CEO of Navtor. This is much to do with today's cyber risk management processes.

Every ECDIS manufacturer must make sure they keep the ECDIS software updated, Mr Svanes says.

This can be done either with personnel who go onboard after a certain amount of time to update and check the systems, or it can be done remotely, as we do with our home and office Windows computers.

When shipping companies consider a new ECDIS supplier, the ease and security of the maintenance service should be a major factor.

There is an increasing trend for ECDIS companies to use Linux rather than Windows for the operating system, says Bjørn Kristian Sæstad, Chief Quality Officer & Chief Business Development Officer OEM at NAVTOR.

But there is no clear answer as to whether Windows or Linux are safer from viruses. Arguably, the Windows community has a higher vigilance about viruses, says Anders Holme, CTO of Navtor.

Perhaps the legal requirement to update ECDIS operating systems is not crystal clear, since once a system was given a "type approval" certificate, it is valid for life.

But there is a reasonably clear obligation, since ensuring up to date operating system software is one of the most important cyber security risks, which should be considered in any risk assessment, which shipping companies are required to do.

Tor Svanes, CEO of Navtor

In addition, SOLAS Chapter V/27 says that nautical charts "shall be adequate and up to date". If the ECDIS is running older software, it may not be able to display the chart information fully, even if the chart files themselves are up to date. For example newer features like Particularly Sensitive Areas (PSSA) and Archipelagic Sea Lanes (ASL) maye not display on older ECDIS software, according to a 2016 paper by Lucian Indries of the University of Oslo (Candidate number: 8008).

Further performance standards and guidance for ECDIS systems were published by IMO, including MSC.232(82) (2006), IMO SN.1/Circ.266/Rev.1 (2010) and IMO MSC.1/Circ.1503 (2015). It states that ECDIS software "should be kept up to date such that it is capable of displaying up-to-date electronic charts correctly according to the latest version of IHO's chart content and display standards." This language is "guidance" though, not legally binding.

USB sticks and connectivity

A second concern is that viruses can be introduced with USB sticks. This concern is heightened if an older Windows version is being used for the chart display system, because there are many viruses in circulation which can attack old Windows versions.

It is not usually practical to disable USB drives on ECDIS systems, because they may be the only way to update the software and put in new virus updates (although Navtor has an alternate system for chart updates, described below).

Many chart suppliers send chart updates by

e-mail attachment, which means copying them into the ECDIS with a USB stick, or by a CD.

Data communication is also needed to 'unlock' new chart files, when a vessel is going to a new area. The chart is already stored onboard the ECDIS, but the shipping company pays for a permit to view the chart. For smaller distributors, these permits would typically be sent by e-mail, and need copying onto a USB stick.

But shipping companies should have strict procedures about how USB sticks can be used with an ECDIS, as should any service personnel who come onboard to update the software.

The USB stick used for updating ECDIS systems should not be used for anything else. "If you take that stick and use it for storing movies, pictures and whatever you do, then there is a risk," Mr Holme says. It also means a violation of procedures.

This memory stick should also only be inserted into computers with well managed security, such as virus scans and up to date operating systems.

ECDIS systems are not allowed to be connected directly to an internet communications system. There are strict rules about how they can be connected.

"Just to have one ECDIS connected to another ECDIS, even without the internet, is [subject to] very strict [regulation], whatever you do regarding communication," says Bjørn Kristian Sæstad of NAVTOR.

Hacking chart data

A third concern is that the chart data itself can be hacked. For example, an enterprising and vicious hacker may wish to send chart data to a ship which indicates deep water in a part of the sea where, in reality, there is a shallow rock. So there needs to be a secure communications chain from the chart supplier to the ship.

A chart supplier such as Navtor does not verify the accuracy of the data itself – this is the responsibility of the hydrographic office which supplies it. In the same way, it is the hydrographic office's responsibility to ensure that data on their paper charts is correct.

But the chart supplier will ensure that the data cannot be corrupted or hacked on its way to the vessel. Navtor's data is protected using S-63, an International Hydrographic Organization (IHO) standard for encrypting, securing and compressing electronic navigational chart (ENC) data.

NAVTOR NavBox

Chart mistakes and inaccuracies made by hydrographic offices are rare, but they do happen. In one example, " a customer said there is something wrong here in the Port of Rotterdam. We took action and found the problem," Mr Svanes says.

Note that when this happens, digital systems can be updated much faster than paper charts. "All vessels can be updated in hours," Mr Holme says.

There is a secondary means of verifying that chart data has not been corrupted, because the ECDIS will show radar images overlayed on the chart. For example, the radar image of land will show on top of the chart showing land. If there is corruption with the chart data, they are not aligned.

The ECDIS will also sound an alarm if it identifies a problem with data input. "This is in the specification for ECDIS," Mr Svanes says.

Electronic safer than paper

Some people may argue that the cybersecurity risks of ECDIS, although very small, mean they outweigh the benefits of using electronic charts over paper, or that paper charts should still be carried as a contingency.

But paper charts come with risks which electronic charts don't have. "Paper can burn, or get water spilled on it," says Navtor's Anders Holme.

Updating digital systems, and receiving new charts, was also much easier to do than with paper charts during the COVID era, when it was harder to arrange physical deliveries to the ship, he says.

Backup to ECDIS

Under the ECDIS regulations in place since the 1990s, shipping companies cannot rely on just one ECDIS unit – they need to have a backup system. This can be a second ECDIS, or paper charts.

It would be easier for shipping companies if the backup could be a second ECDIS, so then they do not need to have to handle paper charts onboard.

Navtor provides a "planning station", a software tool which can be used for planning routes, which uses the same ENC charts. A popular option is to use it with a 46 inch touch screen.

This planning station can also function as a third back-up, because it runs on the same software kernel and charts as the actual ECDIS system.

"Even if you have a double ECDIS and there is something wrong in both of them, you still have the planning station with the ENC. You have the backup to the backup," Mr Svanes says.

Bjørn Kristian Sæstad, Chief Business Development Officer OEM, NAVTOR.

Navtor's Navbox

Navtor provides its own device to manage the connectivity between the ECDIS and the satellite communications system and the cloud, called the "Navbox".

This is a physical device onboard the ship, which plugs into both the ECDIS and the satellite communications system.

It ensures that only bona fide chart updates, sent from Navtor, via Navtor's cloud system, can be uploaded onto the ECDIS. So it allows the ECDIS to be connected to a network in a secure way, avoiding the need for USB sticks.

The connection between the ECDIS and the Navbox is set up with secure APIs, which ensure that only the right chart content can be exchanged.

So we can describe the Navbox solution as end to end secure, without needing any extra policies / procedures.

The Navbox is certified to meet the IEC 61162-460 standard, for cybersecurity in Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 460: Multiple talkers and multiple listeners – Ethernet interconnection – Safety and security.

The Navbox itself is a PC but which has its own mechanisms to only read certain content. It is possible to plug a USB stick into the Navbox, but it will only read the chart files from the USB stick.

Navbox is a component of a "fully enclosed solution" – connecting only to Navtor's "Navcloud", only with fully encrypted and authenticated communication. "you can't talk to it through any other channels," says Mr Holme. And the data communication Navtor makes to the Navcloud is also very strictly controlled.

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Filters in ballast water systems

Filters for ballast water systems may not be a legal requirement, but they may prove very helpful, particularly if the vessel is loading ballast in sediment-rich waters. We spoke to filter system manufacturer Filtersafe

It may make a lot of sense for tanker operators to consider the sediment in the ballast water they load onto vessels, and whether they should filter it out, says Mark Riggio, head of marine at filter systems manufacturer Filtersafe.

The regulations for ballast water systems require a system which is approved to kill organisms and remove sediment to a certain level, and has been tested in factory conditions to ensure that it can do that.

But the only ships which don't need filters are very large vessels, trading between large deep water ports, where there isn't a lot of sediment in the water being collected for ballast, Mr Riggio says.

Particularly high levels of sediment are likely if you trade in rivers, deltas, or shallow harbors where flowing water and run-off may impact water or where the ship's uptakes may be close to the bottom. "And this is where most cargo is being discharged," he says.

The ballast water regulations do include requirements about sediment levels in ballast water being discharged. The full name of the regulations is "International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM)".

There are a number of ballast water systems which are type approved for use without a filter. But tanker operators not using filters may find that their ballast tanks slowly collect a layer of sediment at the bottom, which cannot be pumped out, so it must be removed at dry dock.

"In dry dock, you end up shovelling 6-8 inches of sediment at the bottom of the tanks," he says.

This is dead weight that the vessel needs to carry. But an additional concern is that this sediment may be classed as hazardous waste in future, so incur high disposal fees. Its disposal regulations could be similar to those for bilge water. Also, the waste disposal contractor may be chosen by the dry dock yard, putting the shipowner in a poor position to negotiate the fee.

A Filtersafe filter

Tankers may need two dry dock visits every five years. For many tanker operators, their next visit will be the first visit they make after installing the ballast water system (since the systems were installed at their previous dry dock), and so the first time they learn about sediment levels in their tanks, he says.

Ballast testing

Ballast water systems are thoroughly tested by the IMO and testing facilities before they are approved to be installed on ships. This test "has the highest challenge conditions. We want to stress the system and make sure it works. This is done in a scientific lab," Mr Riggio says.

But if the system needs to be tested after being installed on a ship, the test might not be so rigorous. Companies may schedule a test while the ship has its most competent crew, on a route which is less demanding from a ballast water perspective.

For example if the ship is transiting equatorial waters, the high temperatures may kill the organisms, so no-one will know if the ballast water system is not working.

"A shipboard test is good but it's a limited test. There's a whole lot that can go into gaming the test to make sure that you pass," he said.

A better filter

If tanker operators are persuaded about the need for a filter system, the next question is what kind of system to use.

The filters are used when the ballast water is being loaded. This has to happen at the same time as the tanker is being discharged (with the ballast water taking the place of the removed cargo in keeping the vessel stable).

If the filter system is not able to filter ballast water at the rate needed to balance the rate the cargo is being discharged, then discharging needs to be stopped to catch up.

Port facilities tend to really dislike tankers giving them a variable flow rate of cargo, Mr Riggio says. So this would happen if "you can't bring ballast on fast enough."

Tanker operators need a filter which will give them predictable results and predictable flow rates.

Just with any filter, the flow rate will decline if it is clogged – and so to be predictable there needs to be a reliable way to remove the sediment.

Filtersafe's system

One of the big differences between a poor and good quality filter is the cleaning system, because a filter can only maintain maximum flow rate if it is free of debris, Mr Riggio says.

The Filtersafe product has its own automatic cleaning system.

The ballast water being loaded comes in through the inlet to the filter from the inside of the cylindrical filter mesh. It passes through the screen and into the tank.

The cleaning process is initiated when a pressure sensor detects a higher pressure inside the screen than outside, indicating that water is not flowing freely through the screen.

A suction pump is activated, which sucks clean water back across the filter mesh, through precision designed cleaning nozzles, and back to the seawater source that the water came from, taking the sediment with it."

Any sediment which has built up on the screen is drawn through the suction nozzle down a pipe and back to the sea it was originally taken from.

Also, to improve durability of the filter, Filtersafe has removed 316L grade stainless steel and switched to 904L grade stainless steel, which is up to 82% more durable than 316L.

It has 3 configurations, labelled "regular", "turbo", and super turbo" giving different levels of cleaning capability, using more nozzles.

It has been tested at solids levels of up to 2500 mg (2.5g)/ litre.

The system is used for 25 per cent of all ballast water worldwide. In the maritime industry, its systems are used by ballast water system suppliers Wartsila, Techcross, Ecochlor and Evoqua.

Filtersafe makes filtration systems in a variety of sizes, for a variety of industries other than shipping – including oil and gas, agriculture, desalination, and other industry.

The company is headquartered in North Israel, and has offices in Pittsburgh (USA), Brazil, Chile, Hamburg (Germany), Netherlands, Russia, Hong Kong, Singapore, Beijing, and South Australia. TO

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