MARITIME REPORTER AND ENGINEERING NEWS

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February 2023

GOVERNMENT SHIPBUILDING

Industry preps for the surge

OFFSHORE WIND
The future is floating

FLOATING PRODUCTION
A banner year shaping for FPSOs, FLNGs & FSRUs

HYDROGEN
French project plows ahead

INTERVIEW
Jens Groth, CEO, Chris-Marine

Since 1939

Number 2 Volume 85

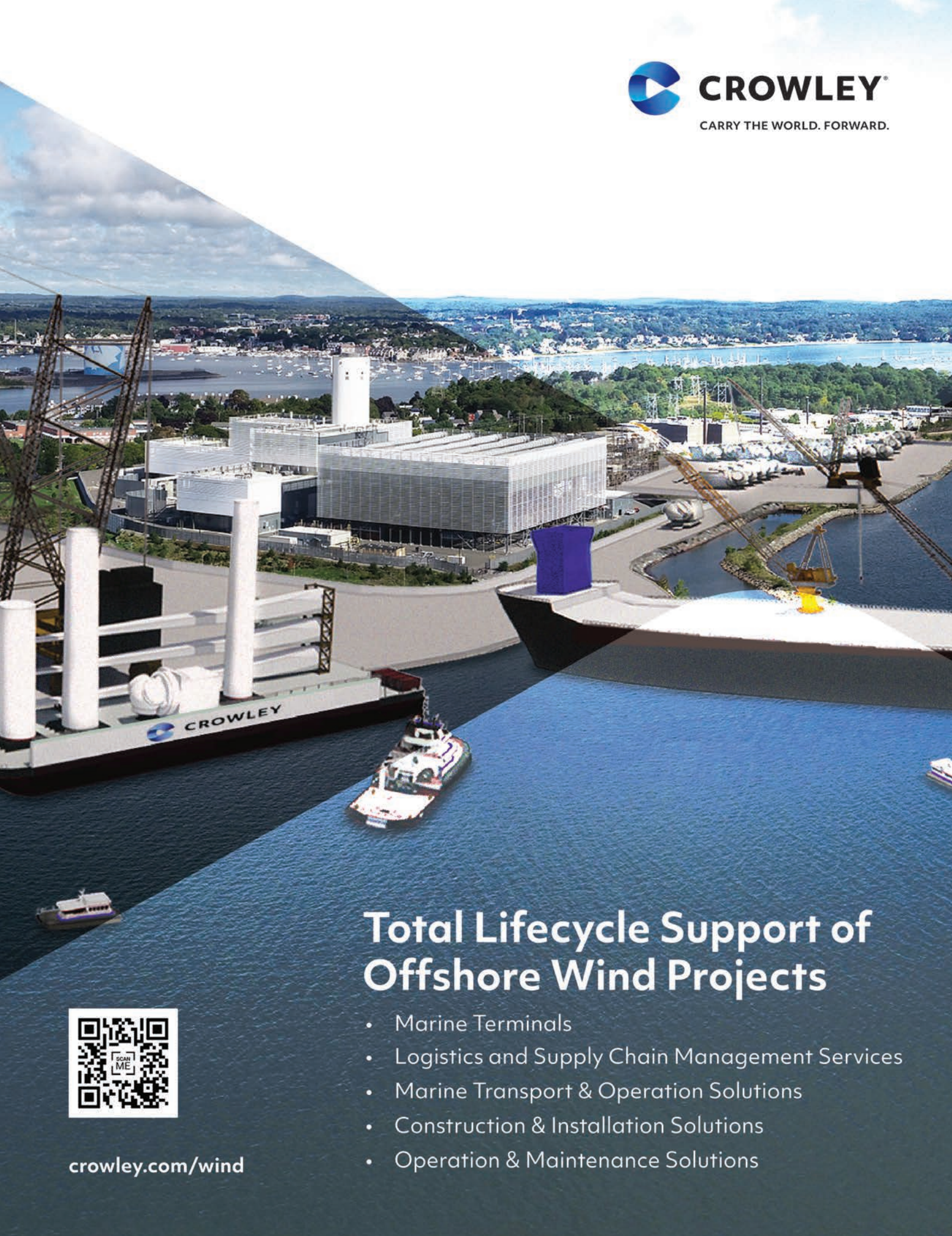
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Photo this Page:
Honing a 2-stroke cylinder liner. Credit: Chris-Marine

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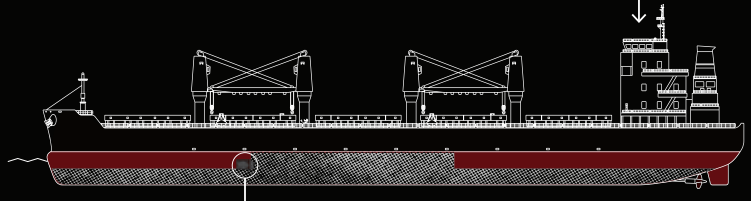

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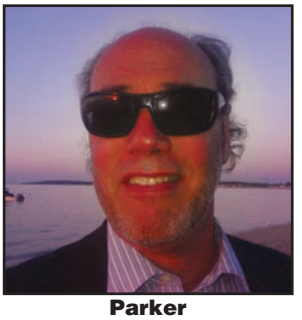

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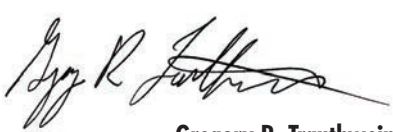
February 2023 marks the one-year anniversary of Russia's invasion of Ukraine, and with no end to the war in sight, this geopolitical upheaval and all of its tendrils across energy and shipping continues to reshape many of the markets we serve simultaneously.

One area that is particularly vibrant and growing is the naval construction and supply market, in the U.S. but also globally as many countries simultaneously seek to fortify defense of critical coastal and subsea infrastructure. After years of attrition, the U.S. Navy budget and fleet are growing again in unison. While we won't see the dedication to building navy ships in earnest as we did in the 1980s and the advent of the Reagan Administration's 600-ship navy, the current plan stands to have a fleet of 355 crewed ships + 150 uncrewed vessels. While the need is there, navy leadership has been vocal recently – particularly at the recent Surface Navy Association event in Washington, DC in January 2023 – questioning the ability of the industrial base to build assets quickly enough to address the myriad of challenges globally. The story on government shipbuilding starts on page 18.

Another strong and growing – albeit niche – market is the floating production sector, including FPSOs, FLNGs and FSRUs. While the market is small in the number of units ordered and delivered annually – with IMA/WER projecting between 9 to 11 to be ordered in all of 2023 – the projects in and of themselves are mammoth investments, approaching $3 billion for the largest units. A chief constraint in this market, which is finally coming out of the doldrums of a 6+ year decline in the price of oil and gas, is the availability of shipyards and project managers to successfully manage and deliver these multi-year, multi-billion dollar projects. Our coverage of floating production starts on page 22.

Last, but certainly not least, is our continuing coverage of the offshore wind sector here in the U.S. It's interesting to note that while the offshore wind fixed bottom segment is still in its infancy in this country, many developers and planners are already looking ahead to the advent of the floating wind sector, a technology development that will require significantly different maritime assets and capability for the construction, install and maintenance. In particular, floating wind will require some significant investment in port facilities and logistics, as the gigantic units will require a lot of space and even more deep water to get them built and in place. Paul Bartlett's floating wind coverage starts on page 30.



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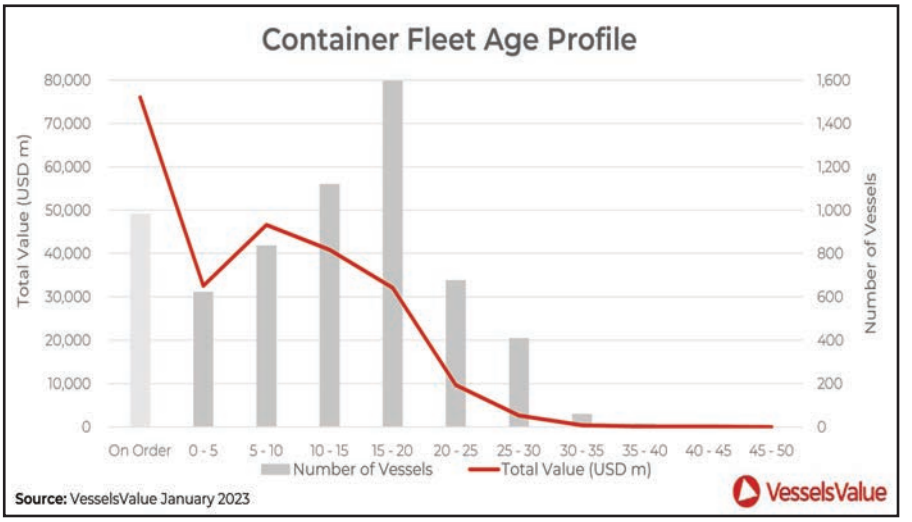
Container Ships Line Up

In 2021-22, "line up" in the containershipping industry meant line up and wait outside ports for days, if not weeks at a time awaiting a slot to unload. In '23 and beyond it might mean lining up for a slot at the scrapyard, as the once bullish sector has turned decidedly bearish as trade patterns change and global recession looms.

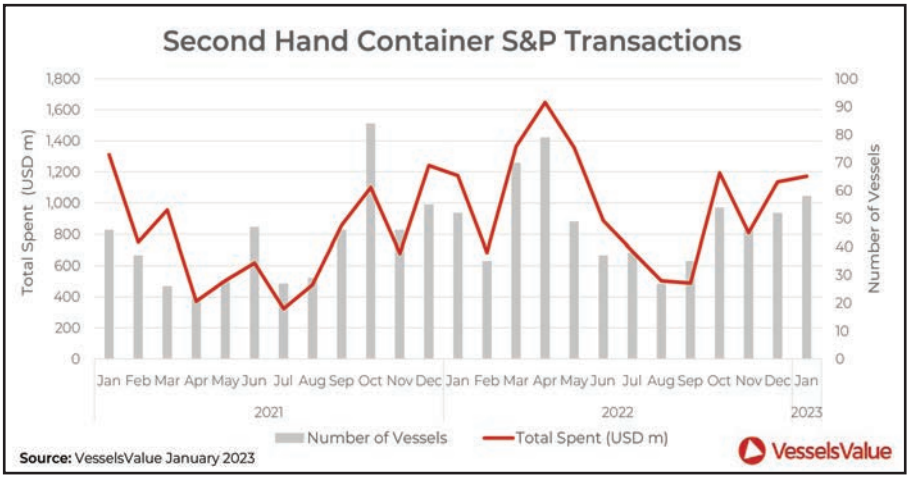
Container Age Profile

Age Group	# of Vessels	Total Value ($)
On Order	983	75,995
0 - 5	623	32,525
5 - 10	837	46,612
10 - 15	1,121	40,869
15 - 20	1,596	32,133
20 - 25	677	9,639
25 - 30	409	2,629
30 - 35	59	390
35 - 40	16	95
40 - 45	10	68
45 - 50	1	2
Grand Total	**6,332**	**240,957**



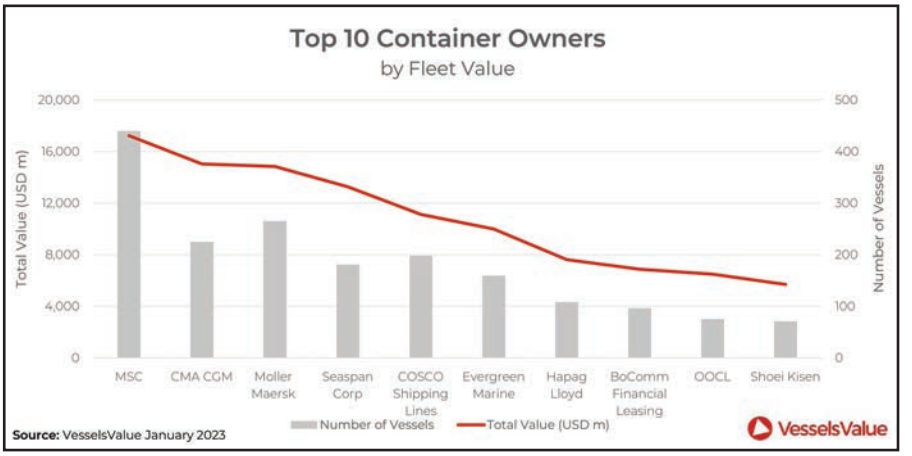
2nd Hand S&P Transactions

Sale Date	# of Vessels	Total Spent ($)
Jan '22	52	1,178
Feb '22	35	683
Mar '22	70	1,364
Apr '22	79	1,648
May '22	49	1,355
Jun '22	37	887
Jul '22	38	694
Aug '22	27	503
Sep '22	35	489
Oct '22	54	1,194
Nov '22	46	810
Dec '22	52	1,136
Jan '23	58	1,172



Top 10 Containership Owners by $

Company	# Vessels	Vaule ($)
MSC	440	17,223
CMA CGM	225	15,035
Moller Maersk	265	14,834
Seaspan Corp	181	13,249
COSCO Shipping Lines	198	11,115
Evergreen Marine	159	9,994
Hapag Lloyd	108	7,617
BoComm Financial	96	6,867
OOCL	75	6,475
Shoei Kisen	71	5,691
Grand Total	**1,818**	**108,099**



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Is it 'Real' or is it …

We've all been hearing so incredibly much about ChatGPT - its abilities, limitations, potential, promise and risks. So, let's talk about it as it relates to maritime training.

ChatGPT is an application developed by OpenAI that can generate human-like text. It uses deep learning algorithms to understand and generate text and can be fine-tuned to specific tasks such as language translation, question answering, and text summarization. It can be used to generate a wide variety of text-based content, including articles, stories, and instructional materials.

What does this mean for training content? ChatGPT could potentially be used to generate training content for maritime workers by using its natural language generation capabilities to create written materials such as instructional manuals, procedures, and quizzes. The model can also generate spoken language by using text-to-speech technology to create audio training modules. The training content can be tailored to the specific needs of individual maritime workers, such as safety procedures for a particular type of vessel or information about the proper operation of specific equipment. Additionally, ChatGPT can be used to generate answers to frequently asked questions and possibly even generate simulations to test the workers' understanding of the material covered in the training.

There are many potential advantages to using ChatGPT to generate maritime training content. The first is speed. ChatGPT can quickly generate large amounts of training content, allowing for efficient creation of training materials. Also, ChatGPT can be fine-tuned to the specific needs of the mari-

time workers and the types of vessels they operate, generating content that is relevant and specific to their job. It generates a consistent level of detail, format, and quality of training materials, which can be critical for safety training. ChatGPT can also be used to generate content in multiple languages, which can be beneficial for training workers who speak different languages. It clearly can also do this much more cost effectively than hiring a team of writers or trainers.

But there are potential downsides as well. One is that the language model may not have a deep understanding of maritime operations and may produce inaccurate or misleading information. Additionally, the model may not be able to fully understand and incorporate the nuances and complexities of human communication, which could lead to confusion or misinterpretation among trainees. Finally, the model is based on patterns in the text it has been trained on, and therefore it may generate content that is offensive, biased or inappropriate.

There is so much more to discuss on this topic. Of course, one of the most interesting and telling experiments would be to try generating some training content using ChatGPT. You can look forward to this in the upcoming edition of Training Tips for Ships. **But until then, if you consider yourself a skeptic in terms of the ability of ChatGPT to write reasonable content, consider the following: the text above this paragraph was written by ChatGPT, not by me.** I simply asked it a few questions and pasted the answers above, for you. Instead of spending my usual 4+ hours writing this article, the total task took me about 30 minutes. Half to formulate the questions for ChatGPT, and half to make a few small edits. Whatever your view on this, make no mistake. Bob was never more correct than now - the times they are a-changin'.

Until next time, thank you for reading and sail safely!

The Author

Goldberg

Murray Goldberg is CEO of Marine Learning Systems.

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Only One Stupid Thing at a Time

By Rik van Hemmen

This story spans a long period of time, but begins with a note I received recently on an earlier column from a reader named Allan Berger.

He commented on the OODA loop concept in my "Pondering Truths in Design" column in the September *MREN* issue.

He provided his approach that closely follows the OODA loop concept, which follows the principle of always gathering all the facts before speaking.

That led to a discussion on decision making. Decision making is an extremely important concept that sets the course of human development, and is central to effective engineering.

"We only have a few rules around here, but we really enforce them."

There have been many efforts at developing decision making tools, some quite ancient like the Decalogue:

1. You shall have no other gods before Me.
2. You shall make no idols.
3. You shall not take the name of the Lord your God in vain.
4. Keep the Sabbath day holy.
5. Honor your father and your mother.
6. You shall not murder.
7. You shall not commit adultery.
8. You shall not steal.
9. You shall not bear false witness against your neighbor.
10. You shall not covet.

The whole story of the Decalogue is fascinating and just reading the Wikipedia article on the subject will undoubtedly shed some new light on anybody's understanding of this list, but just a single read makes it apparent that it is a decision making tool. What is clear though is that it not terribly useful for modern day engineering, although "you shall not steal and not bearing false witness" certainly should apply to Government Shipbuilding (and I mean that in all directions).

Many decades ago, in my more idealistic days, at the suggestion of a friend who told me that when he was young he got kicked out of church for suggesting that it was time for an update of the Bible, I tried my hand at a decalogue that would be a universal decision making tool and after a deep think came up with the following:

1. Things are always changing (change is constant)
2. First do no irreversible harm
3. Consider the cost of action through the entire chain
4. Look for efficiencies
5. Moderation
6. Communicate
7. Fairness from both points of view
8. Cooperate
9. Allow individual freedoms to an extreme if they do not harm others
10. One is personally responsible for actions on public knowledge

I was proud of my hard work and even introduced my kids to it. They never memorized them (that is genetic, I can't do rote memorization either), but as a parent I will venture to state that in general they are good at making complex decisions and appear to follow my decalogue. However, that is as

far as it went. I might have come down the mountain, but it turned out there was really no one there.

So one day my son was being wild and I said: "Hey Bud, do yourself a favor only do one stupid thing at a time". He looked at me, paused and said "OK," and dialed his wildness down to one stupid thing. Bizarrely that decision making tool stuck and my nieces and nephews and my kids' friends tell me they use it too.

At first glance "Only do one stupid thing at a time" has a weird indeterminate quality, but if you work with examples, it becomes brilliant. Underage drinking by itself is probably no big deal, but don't set off fireworks at the same time.

The trick is to recognize you are engaging a risk, and since you are engaging a risk you do not want to compound the risk by adding another risk. Once I even heard a kid say it when he was ready to snowboard on a steep run. I asked him where he got it, and it turned out he got it through my son's scout troop.

Weirdly the rule has worked its way back into my business and existed before I even knew it. Before I developed my decalogue, as a young salvage Naval Architect, I developed a salvage plan, and it involved many simultaneous steps to get it to work. The very experienced salvage master looked at it for a second and then said: "What the $%#@ do you think we are? The $%#@ing Navy? One step at a time."

Since everything in salvage carries risk, it simply translates to: Only do one stupid thing at a time.

We have thousands of years of experience that shows that, even with the fear of God, long lists of decision making rules are not that successful. We need to keep it short and whether one uses Allan Berger's rule or the "Only One Stupid Thing at a Time" rule (OOSTT?), decision making requires analysis of risks and sorting of risks. Risk in all of life is unavoidable, the winners manage risk, the losers don't. To quote another good one: Don't paint yourself into a corner and that goes for small personal decisions and for billion dollar Government Shipbuilding projects.

For each column I write, MREN has agreed to make a small donation to a charity of my choice. For this column I nominate Gapminder.org , Hans and Ole Rosling's brilliant decision making tool.

ALWAYS CLEAN HULLS
Prevent Transfer of Invasive Species

ARMACH ROBOTICS
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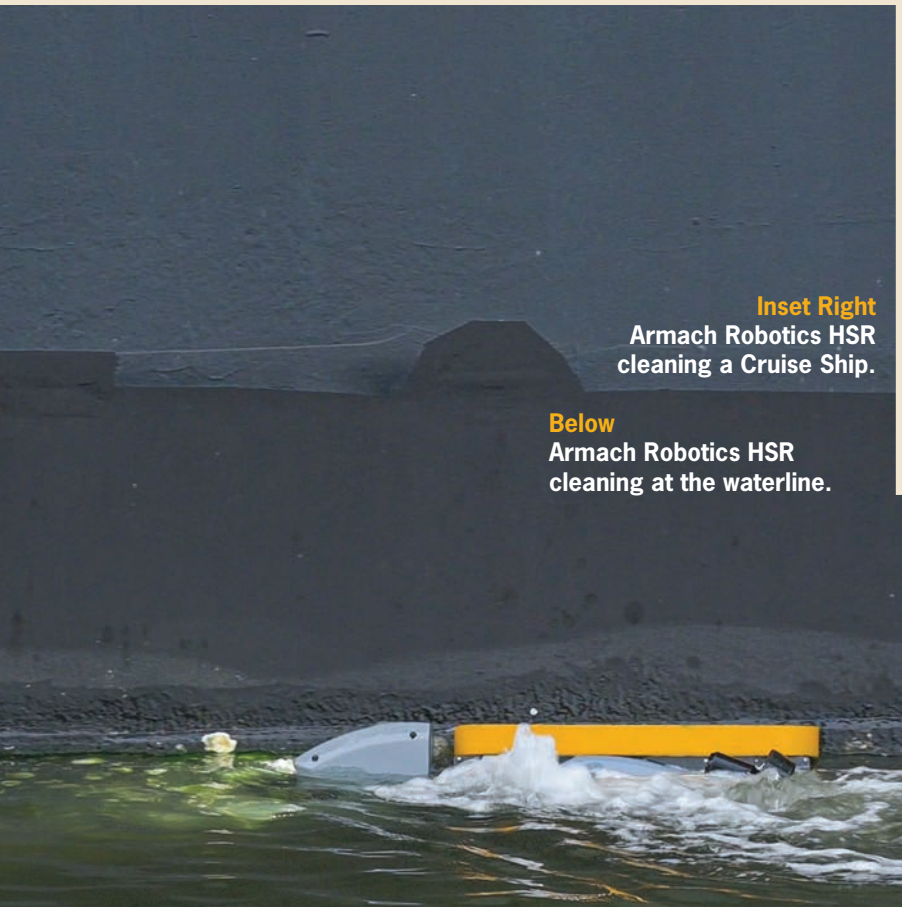
Advances in our technology driven hull cleaning service coupled with increased demand from industry continue to push Armach Robotics forward in 2023.

As the first month of 2023 passes behind us, the seascape for Armach and its proactive in-water hull cleaning solution is promising. The robotic and autonomous technologies have continued to advance to enable more efficient biofouling removal, while the regulatory frameworks evolve worldwide, putting the issue of biofouling management clearly on the radar screens across the maritime industry. Carbon emissions, fuel costs and biosecurity issues will push shipowners to ensure their hulls remain clean.

Over the past year, Armach made significant advancements in its Hull Service Robot (HSR), and completed their first commercial cleaning operations. These operations were a significant milestone for Armach, and marked the start of a new era for proactive in-water cleaning. A small operations team, with two HSRs and 1 van conducted multiple cleaning evolutions concurrent with other in port vessel operations, demonstrating the feasibility of using small autonomous robots in what has previously been an industrial scale domain. Using an inertial navigation system and forward looking sonar, the HSR was able to successfully operate in waters with near zero visibility. Being able to clean vessels in these conditions, where diver operated solutions are often not effective or available, will provide shipowners with more opportunities to bring their vessels to a clean hull condition.

Over the past few months, the autonomous capabilities of the HSR have allowed the operators to spend less time with their hands on the controls, and more time monitoring the observed condition of the vessels being cleaned. This will al-



Inset Right
Armach Robotics HSR cleaning a Cruise Ship.

Below
Armach Robotics HSR cleaning at the waterline.

All images courtesy Armach Robotics

Armach COO John Dunn, piloting the HSR from Plymouth HQ.

low for multiple HSRs to be monitored by one operator, improving the efficiency of the entire operations, while also ensuring that any issues or items of concern with the hull coating or underwater body are identified and properly documented in a post cleaning inspection report. To further improve the post cleaning reporting, Armach's engineers are prototyping a camera system solely focused on capturing the post cleaning hull condition, regardless of water clarity. Adding this feature will enable Armach to deliver a hull intelligence report that will benefit shipowners across the hull performance monitoring, maintenance and biosecurity compliance realms.

In December, Armach successfully demonstrated their over-the-horizon command and control system for the HSR. Using wireless technology, a pilot in Plymouth Massachusetts was able to pilot the HSR through a complete operations cycle (attach, navigate, clean, detach, return to pier) on a vessel in Virginia. Inclusion of this capability on the HSR will further increase operational flexibility, enabling the HSR to be deployed from onboard a vessel without requiring a pilot onsite. Advancements of this technology will be highlighted throughout the coming year.

Equally significant to having an efficient and effective cleaning solution, new regulatory and economic factors will have a greater influence on biofouling management practices going forward. Whether its fuel savings, carbon emissions reduction, or biosecurity risk management, maintaining a clean hull will be more critical than ever to shipowners and operators.

In October 2022, the International Maritime Organization released its report *Analyzing the Impact of Marine Biofouling on the Energy Efficiency of Ships and the GHG Abatement Potential of Biofouling Management Measures,* which highlighted the significant fuel penalties caused by even a layer of slime on the hull. With fuel costs expected to remain high, a significant savings can be realized by frequently removing biofouling from the hull. 2023 also marks the implementation of the Energy Efficiency Existing Ship Index (EEXI), which requires shipowners to start collecting the data necessary to calculate the Carbon Intensity Indicator (CII) rating for their vessels. While penalties for vessels with poor ratings are still to be determined, shipowners have already started to employ a number of strategies to reduce their carbon footprint. Maintaining a clean hull should be at the top of the list, particularly given that the fuel costs savings can easily outweigh the cost of cleaning.

There have also been recent well publicized stories about cruise ships being denied entry to Australia and New Zealand ports due to fouling on their hulls. These countries have recently implemented policies for biosecurity requiring vessels arriving in their waters to prove that they are actively undertaking measures to maintain a clean hull. While Australia and New Zealand are the first, they will likely be followed by other countries as well.

Concurrent to all of this, there is significant effort worldwide ongoing to ensure that any in-water hull cleaning is performed in an environmentally friendly manner. While much of this work is still in development and may be subject to change, the guidelines and policies are being written to allow for, and even encourage, proactive cleaning of vessels meeting specific criteria. The IMO is working on guidelines that will be reviewed in April of 2023, while the US Environmental Protection Agency (EPA) just released its proposed supplement to the Vessel Incidental Discharge Act. While this will be a topic in and of itself in a future article, the EPA's proposal is recommending frequent cleaning of vessel hulls to avoid the buildup of significant growth. Their proposal also includes guidance on when capture of removed material is not needed (slime and light microfouling only) and when it is recommended (macrofouling, newly applied biocidal paint, or damaged paint). While this proposal is years from being law, it is encouraging to see a set of guidelines that is promoting and enabling frequent cleaning of vessels in US ports, supporting a larger agenda of decarbonizing the shipping industry.

The Author

Lander

Karl Lander is the Director, Regulatory Compliance and Outreach at Armach Robotics. He joined Armach following 4+ years with Greensea Systems, where he was Director, Hull Robotics.

Take a Hyke: *Swarm Tech for Ferries*

By Tom Ewing

Apps, big data, tech, software and cutting-edge innovation were hallmarks at last year's Sea Tech conference in Brest, France. During one session, for example, on electronic charting, the speakers made reference to "data as fuel." For vessel operations, data was called a resource just like diesel or LNG or lithium batteries. The reference was usually to big data, i.e., almost boundless information flowing like a gusher from a firehose, the new force driving applications to set routing, monitor fuel efficiency, optimize speeds, maximize safety and communications and allow real-time vessel controls and, critically, provide new social and entertainment possibilities for crews and families, not to mention emergency information. Looking for ways to exploit big data was an imperative for Sea Tech participants, with one notable being Hyke Ferries and its swarm technology.

"Swarm technology" was part of a discussion titled *"New Propulsion Systems For Low-Carbon Shipping."* The phrase was used by Jason McFarlane, Chief Technology Officer, Hyke, based in Norway. Hyke is working on "the next generation of waterborne mobility." Its goal: to "upgrade ferries into the modern world."

Hyke's ferries are solar-powered electric vessels designed with intelligent dockside charging solutions and autonomous technologies. Hyke's eventual goal is for completely autono-

Rendering of Hyke ferries working together.

All images courtesy Hyke Ferry

A rendering of the Hyke ferry, Arendal, Norway.

mous operations. These efforts, the company writes, "embody what mobility in a smart city is all about."

"Swarm technology," McFarlane explained, is the capability of an autonomous ferry fleet to network, communicate, respond and act together as market conditions demand.

"Swarm intelligence," McFarlane said, "is the collective behavior of decentralized, self-organized systems, also referred to as swarm robotics. In our application of swarm principles, the idea is that when operating in a fleet each ferry will collect information about its own state and situation in relation to both environment and passenger movements. The information from each ferry will be shared across the fleet and collectively the ferries will have the capability to dynamically adjust their routes to enable the most effective transport of passengers and goods with respect to waiting times and energy effectiveness."

Big data in the driver's seat.

Once the passenger surge declines, swarming ends, and each vessel reassigns itself, but staying in constant contact with, and responding to, supply and demand across the fleet and operating territory. McFarlane said Hyke is on schedule to launch the first new ferry in Fredrikstad, Norway in 2023. Covid caused some program delays, particularly with deliveries of equipment and materials. The Norwegian Maritime Authority will give final approval for passenger operations; that safety review has started. Hyke's goal is to provide autonomous operations in 2024. MacFarlane said autonomy is a high priority, but the first goal is to get underway. Startup is important for Hyke's larger business plan, McFarlane noted, because "there are many cities that do not have any urban city ferries, so we are in a way creating the market and we have a viable business case without autonomous operations."

Importantly, though, autonomy provides operational opportunities and lowers costs. In addition, McFarlane commented that "it addresses a growing problem – the lack of trained crews." He said that last summer one Norway ferry company in Oslo reduced routes because of crew shortages.

Also important is that the autonomous ferries will still have a crew member on board. That human could intervene in case of an emergency, either with the vessel or among the passengers. McFarlane said the crew member "would not take direct control over the vessel. Rather, they would have an interface to interact with the vessel by issuing specific commands and communicate with a remote operations center."

Swarm technology is expanding. Hyke was one of three groups chosen to deliver and operate four ferries along the Seine River during the 2024 Paris Olympics and Paralympics. The ferries will connect the municipalities of Juisy-sur-Orge, Ris-Orangis and Soisy-sur-Seine in the region Grand Paris Sud. (Hyke was named as one of ***Time Magazine's*** best inventions of 2022.)

HII photo by Chris Oxley

THE U.S. NAVY NEEDS MORE SHIPS, & NEEDS THE INDUSTRY "PICK UP THE PACE"

By Edward Lundquist

The demand for warships is strong, and the Navy continues to receive support from the Congress to build more ships. The Navy is working to achieve a fleet of about 355 ships, plus a fleet of about 150 unmanned vessels

But to achieve something close to that goal requires more than demand, and even more than money. For one thing, it requires an industrial base that can build, repair and sustain that fleet.

While Navy leadership acknowledges the challenges of a stressed supply chain, covid, and a workforce of experienced shipbuilders that is aging out, top Navy officials are impatient with the slow progress.

Congress has been supportive in funding new ships, but some experts question whether the industrial base can deliver them.

At the recent Surface Navy Association 35th Annual Symposium in Washington, Chief of Naval Operations Michael Gilday told industry to "pick up the pace."

"We're paying a lot of money, but we're not necessarily getting what we're paying for with respect to two or three ships per year," he said, referring to the three-per-year desired production rate for Arleigh Burke-class guided missile destroyers, as well as the two-per-year desired production rate for Virginia-class submarines. "I know that there are constraints with respect to the workforce. I know that we're trying to get after supply chain problems. We just need to do better."

More ships may look better on paper, but may not be realistic.

"If we buy ships at a rate faster than we can sustain, we're going to pay for it and I've just been unwilling to go down that path," Gilday said. "We're not going to have a Navy bigger than one we can sustain, bigger than one we can afford."

The Navy has more submarines under construction and order than it has in decades. The Navy wants two Virginia-class subs per year, but industry is only delivering at a rate of 1.2 a year.

U.S. Navy photo by Chief Mass Communication Specialist Amanda Gray/released

“We’re paying a lot of money, but we’re not necessarily getting what we’re paying for with respect to two or three ships per year.”

– Chief of Naval Operations Adm. Mike Gilday speaking during the Surface Navy Association’s 35th Annual National Symposium

“In five years, instead of delivering 10 fast attack submarines, I got six. Where’s the other four? My force is already four submarines short,” said Commander U.S. Fleet Forces Command Adm. Darryl Caudle at the SNA Symposium.

He also said maintenance availabilities were not being conducted on schedule, and he cited a shortage of ordnance for his ships. He said he was familiar with the excuses, but told the industry representatives “I am not forgiving the fact you’re not delivering the ordnance we need. This stuff about COVID, parts and supply chain — I don’t really care. We all have a tough job: I need SM-6s (missiles) delivered on time; I need more Mark 48s (torpedoes) delivered on time. We’re talking about war-fighting, national security, and going against a competitor here and a potential adversary that is like nothing we’ve ever seen. We can’t be dilly-dallying around with these deliveries.”

Caudle said the service is working internally to boost its readiness of its existing ships, including announcing this week the surface fleet would aim to have at least 75 mission-capable ships at all times to send on missions with little notice.

At the SNA symposium, Commander Naval Surface Forces Vice Adm. Ray Kitchener announced his new “North Star” to always have 75 mission-ready surface warships available for tasking. Those ships include Aegis guided missile cruisers and

HII Ingalls Shipbuilding

Chief of Naval Operations Admiral Michael Gilday to Huntington Ingalls Industries Ingalls Shipbuilding in Pascagoula, Miss., shipyard in January 2023 and toured several ships, including the first Flight III guided missile destroyer, Jack H. Lucas (DDG 125).

destroyers, littoral combat ships, mine countermeasures ships and amphibious ships.

Kitchener announced the establishment of Surface Readiness Groups in the fleet concentration areas to provide the staffing and support to the squadrons in order to keep ships battle ready. The Surface Readiness Groups will be properly resourced staffed with experts to ensure ships complete maintenance on time and are returned to fully-ready status as quickly as possible. That includes tracking maintenance availabilities, monitoring repair progress in shipyards and tracking and expediting critical parts.

SUBMARINES

Speaking at the Naval Submarine League 2022 symposium, Commander, Submarine Forces Atlantic, Vice Adm. Bill Houston commended the industry representatives in the room. "The submarines you deliver are exquisite."

Houston acknowledged that the Navy is now building the Virginia class and Virginia Payload Modules, as well as the 20,000-ton Columbia-class, with an industrial base that has actually shrunk.

But he urged industry to help the Navy build ships faster.

"To improve the operational availability of our SSNs, we're enhancing our new construction build rate to get to two per year, and deliver improved efficiency in our maintenance availabilities. We have to expedite those depot level availabilities at our public and our private shipyards, so we can get them back into operations," Houston said. "They are in high demand around the world."

Houston also said the Navy needs to look beyond the Virginia class. "It's time to begin the research and development to deliver the next SSN, with some key attributes. We need to increase speed, provide additional payload capacity, acoustic superiority—which include both sensors and quieting, and we need to improve operational availability."

UPDATING GOVERNMENT SHIPYARDS

While there is discussion of adding a fifth or even sixth public shipyard to do Navy work, the more pressing need to is to update the four existing yards to modern standards and capabilities. The Navy refers to its Shipyard Infrastructure Optimization Program's (SIOP)as a "once-in-a-century investment to reconfigure, modernize and optimize our four aging Naval Shipyards into new modern facilities."

The public shipyards, including the four naval ships yards in Maine, Virginia, Washington and Hawaii—which primarily perform work on nuclear-powered submarines and aircraft carriers, along with the Coast Guard Yard in Maryland, have been making improvements to modernize their facilities to be better able to support newer and ever-more complex platforms. Likewise, the commercial yards engaged in building and supporting naval ships have also made significant improvements to their infrastructure.

"SIOP will construct and recapitalize dry docks, recapitalize and reconfigure infrastructure, and modernize industrial plant equipment, in order to improve the timely return of ships and submarines back to the fleet following maintenance and modernization"

The Arleigh Burke-class guided missile destroyer Carl Levin (DDG-120) was delivered to the Navy at General Dynamics Bath Iron Works on Jan. 26th, 2023.

GDBIW

There are a number non-Navy government shipbuilding efforts underway.

• The Coast Guard also continues to build **National Security Cutters** at Inglalls Shipbuilding in Mississippi and Fast Response Cutter at Bollinger in Louisiana.

• The first four hulls of the new **Offshore Patrol Cutter** are being built at Eastern Shipbuilding in Florida, with the second group of hulls has been awarded to Austal USA in Alabama.

• Birdon America Inc. received a $1.187 Billion contract in 2022 to design and build **27 Waterways Commerce Cutters (WCC)** for the U.S. Coast Guard (USCG). The WCC contract includes two classes of ships: the River Buoy Tender (WLR) and the Inland Construction Tender (WLIC). Birdon is partnering with Bollinger and Incat Crowther. Bollinger will deliver the hulls to Birdon, with the production activity taking place at Bollinger's Lockport, Louisiana, shipyard.

• The Coast Guard and Navy's integrated program office awarded VT Halter Marine Inc., of Pascagoula, Mississippi, a fixed price incentive (firm) contract for the detail design and construction of the lead PSC. Construction is underway, with delivery scheduled for 2025. Bollinger acquired VT Halter in November of 2022, with the shipyard now known as Bollinger Mississippi Shipbuilding.

• Another significant government ship program in the **National Security Multi-mission Vessel (NSMV)** being built at the Philly Shipyard for the Maritime Administration to support training at the state merchant marine academies. Steel was cut in January for the fourth NSMV, which is being built for Texas A&M Maritime University at Galveston.

• NOAA (National Oceanic and Atmospheric Administration) is building **two new oceanographic research ships**, which will be named Oceanographer and Discoverer. The $178 million detailed design and construction contract was awarded by the Navy to Thoma-Sea Marine Constructors, in Houma, Louisiana. Oceanographer is expected to deliver in 2025 and operate from Honolulu, Hawaii. Discoverer is expected to enter service in 2026 and will be homeported in Newport, Rhode Island. While Discoverer was initially intended replace NOAA's Okeanos Explorer research ship, NOAA has since decided to keep *Okeanos Explorer* in service.

FLOATING PRODUCTION:
OPPORTUNITIES ... & CHALLENGES ... ABOUND

Nothing inspires confidence in the energy markets like a high price per barrel, and a rebound to the $80-$100 range following six years in the doldrums is welcome news for the floating production sector, which are deep water, long-term, and expensive projects. 2022 was a banner year for the Floating Production sector, and '23 is shaping up even better, with IMA/WER projecting orders for 9 to 11 FPSOs, a few FLNGs and a handful of FSRUs, too. But while prospects are bright, a number of hurdles – from a dearth of qualified contractors to the energy transition to heightened environmental regulation – could put the sector back on ice.

By Greg Trauthwein

Oil prices in excess of $80/barrel, and the expectation that they will hold firm or rise in the near future, has helped to drive a strong recovery in the deep water sector and brightened prospects for capital expenditure for floating production systems, an energy segment that was on life support only a few years ago.

While oil majors are still holding back on major increases in capital spending, "this is changing," said Jim McCaul, IMA/WER, who has analyzed the floating production business since 1995 and recently released Annual Review and Five-Year Forecast of Orders for Floating Production System.

"Oil prices have risen to levels that support investment in new facilities and capex budgets are slowly expanding. The profit opportunities are too great to pass up."

Most recently, Reuters reported that Exxon Mobil was preparing to approve its fifth oil production project in Guyana and is considering taking additional exploration acreage, according to a Reuters report on OEDigital.com. [**https://www.oedigital.com/news/502185-exxon-set-to-order-fifth-guyana-fpso-sizing-up-more-blocks**]

This comes as global inflation takes a heavy toll, with the latest development expected to cost about 27% more than the last, which is due both to inflation and the increased size of the project.

The company's proposed fifth development, at an oilfield called Uaru, would pump about 250,000 barrels of oil per day at peak, for a development that is estimated to cost about $12.68 billion, according to an estimate prepared for Guyana's EPA. Exxon has submitted a development plan for the oilfield, and an initial construction contract was awarded last fall to Japan's Modec. This will mark Modec's debut in Guyana.

Exxon and its partners Hess and CNOOC Ltd. inaugurated Guyana's production in 2019 and today deliver all the oil output in the country, from its 10,347 sq. m. Stabroek block, via two FPSOs, the Liza Destiny and Liza Unity, both supplied by SBM Offshore.

Overall, orders for production floaters have returned to historic pace and a large backlog of deep water projects has developed. More than 200 projects in the planning stage are likely to require a floating production system for field development over the coming decade, according to the IMA/WER report, and the backlog includes about 60 projects requiring an FPSO within the next five years.

RIDING THE ROLLERCOASTER

Like the offshore oil and gas business itself, the market for floating production systems – projects that can easily exceed $10 billion, with the FPSO alone costing $2.5-$3 billion – has endured its fair share of high and lows over the past generation.

"I've watched this business grow from something like 60 FPSOs up to close to 200 today," said McCaul. "A lot of the [original] 60 are already gone, I've seen them come and go from the planning stage to the development stage to the installation stage to the decommissioning and scrapping stage. It's like old friends disappearing!"

McCaul said that the market had been in literal freefall since 2016 "when the Saudis decided to put all the American tight oil people out of business by driving the price of oil down and starving them from revenue. It didn't work, but the investment in the sector really began to fall off. Just as it was beginning to hum again, along came COVID and that knocked the business for a loop again."

Along the way, orders for floating production units have swung wildly, from up to 20 one year, down to zero the next.

"In 2021 we began to recover; '22 was a very good year [with orders for 11 FPSOs and FPUs combined]; '23 [and the foreseeable future] looks wonderful."

While the value of a single FPSO contract [$2.5-$3B] is astronomical in traditional commercial shipbuilding contract terms, McCaul noted that further growth in '22 was muted by a capacity problem – both in terms of human capital to effectively bid and manage a multi-billion, multi-year projects, plus a physical limitation in the number of shipyards that have drydocks big enough to accommodate the units.

"There are only so many contractors that can take these orders, as first of all, the unit itself, the FPSO is complicated,

and the new ones are very large," said McCaul, noting that when he started covering the market in the mid-1990s, 60,000 bpd output was typical, whereas the units coming online today are in the 250,000 bpd range.

This effectively raises the scale exponentially on revenue, but also on technical complexity.

"They [the oil majors] have difficulty getting people and companies to bid the contract. There's been a number of tenders that have been canceled because they haven't had enough bids. I think in 2022, the orders would've increased faster if capacity had been available."

... AND THEN THERE IS GAS ...

The wildcard since Russia invaded Ukraine in early 2022 is gas, as Russia sought from the beginning to use energy security as a weapon across Europe, by curtailing and eventually shutting off the pipeline to the continent. Common logic suggested that an energy-starved Europe would cave on sanctions, particularly as the winter months came and energy prices soared.

But a funny thing happened: a warmer than usual winter (so far) conspired to help moderate gas prices, and Europe aggressively moved to bring LNG import facilities online to move its supplies from pipeline to ship delivery.

"The floating storage regasification unit (FSRU) business is booming, it's taking off like a bullet due to the Russian cut-off of pipeline gas to Europe," said McCaul. "[The Russian gas cut-off] threw Europe into crisis mode, and that crisis mode has European governance encouraging companies, if not to do it directly themselves, to have terminals where you can bring LNG into Europe. The whole slew of orders, since March 2022. They got them so quickly that it was unbelievable."

Citing a "tremendous increase in the need for LNG globally," McCaul expects many new FSRU orders globally in '23 and beyond. McCaul expects FSRU orders globally over the next few years to be very strong. All of the FSRUs that were being used temporarily for LNG transport were vacuumed up in Q2 after the Russian gas pipeline cutoff. "Supplying FSRUs is going to be a good business over the next five years. We see this as a tremendous market. But yard space for a newbuild FSRU will be a constraint. Yards are full of LNG carrier work and the queue for a new FSRU will be pretty long -- 2026+ to get delivery. But could be a great opportunity for LNG owners with older carriers that can be repurposed in a repair yard for terminal use."

O&G & ENERGY TRANSITION: IT'S COMPLICATED

As if the traditional market and geopolitical forces aren't detrimental enough to accurately predicting the speed, pace, and direction of oil and gas prices, enter a still relatively new

force: energy transition.

The world, from governments to corporations to consumers, continues to push the envelope on the development and deployment of renewable energy, with the Wall Street Journal reporting recently that 10% of all motor vehicles sold in 2022 were electric.

That said, the world remains a solid generation or two away from a significant divorce from traditional fossil fuels, and as Russia's war in Ukraine has proven, energy security tops most countries' agendas.

"The transition, the talk of transition, the prospect of transition from fossil fuels does not exactly encourage companies to make the large investment in something that's going to be operating for 20-25 years," said McCaul.

"These projects, like the one that Exxon Mobil is doing Guyana, that's its fifth $12-13 billion project. It takes a bit of hope to invest in something that's going to cost $12 billion when everybody talks about getting rid of oil."

Ultimately though, it comes down to the balance sheet, and big oil lost a literal fortune and amassed considerable debt in the six years before 2021. Highly leveraged and unwilling – or unable– to reward shareholders with stock buybacks and dividends, fiscal discipline came into vogue, effectively muting investment in new tech and projects, said McCaul.

In step with the energy transition, legislators globally are ratcheting up pressure via environmental legislation which, at best, will increase the cost of the project; at worst, will delay, suspend or shut it down altogether.

This is happening right now in Australia, where the Barossa project is delayed. Late last year, the Australian court ruled against Santos, telling the company it had not consulted "all the indigenous people on the Tiwi Islands … for its environmental plan," Reuters reported.

According to McCaul, delays like Barossa are unusual, for an offshore project to progress to this stage, then "out of the woodwork someone says it didn't pass all of the environmental tests. Then all of a sudden everything's back to zero," in terms of environmental approvals.

Regardless, Santos reported in December 2022 that it was applying for fresh approvals, and first gas remains on track for 1H '25.

All-in-all, McCaul is cautiously optimistic that, despite challenges, 2023 will end up being a solid year for floating production orders.

"We think maybe 15 could be ordered, but we don't think 15 will be ordered because [of the limiting factors on the contractor side]," McCaul summarized.

"Realistically, we're looking at about nine to 11 FPSOs and a couple of FPUs ordered in 2023," in addition to a few more FLNGs and a handful of new FSRUs if yard space is available."

PUSHING THE ENVELOPE: A H2 PROJECT HIGHLIGHTS FRENCH TEAMWORK ON ALT-ENERGY

By Tom Ewing

At the Sea Tech Week Maritime Transport conference this past September, held in Brest, France, there was no shortage of big-picture, creative ideas pertaining to maritime shipping and alternative energy.

One such project, Seaguel, was presented as part of a larger discussion on hydrogen (H2) as maritime fuel. The full session was titled "Distributing Hydrogen from Offshore Wind Farms as a Fuel for Ships." The topic was developed by France Energies Marines (FEM), a public-private R&D collaborative focused on offshore renewable energy.

Right now, Seaguel is a just a concept, but it demonstrates the kind of broad, transformative thinking that's occurring in France and Europe, ideas that, yes, are still on the horizon, but considered advanced enough to warrant detailed thinking, and worth drawing some early resources. On another level, Seaguel exemplifies the broad energy coalitions developing in France. These coalitions are looking for outcomes sooner, not later. Members expect real world results in the next few years, not decades.

Importantly, H2 assumes a critical role within a hoped-for, non-fossil fuel world. The European Union has numerous hydrogen strategies and timetables. The ideas within the Seaguel proposal are not isolated; rather they align with creative ideas, and optimism, about H2 potentials.

Supporters of H2 as fuel cite important strengths. First, there's an endless supply – hydrogen is everywhere. Second, H2 has an established industrial track record and an established, although more limited, energy track record. Third, if it can be produced at scale, safely and economically and without greenhouse gases (so-called "green hydrogen"), the move to H2 can take advantage, at least initially, of many existing energy resources and infrastructure, such as pipelines and

Gwenaelle Benoit,
Offshore & New Energies
Project Manager, at Sofresid.

Davit Otarishvili,
Business Development
Manager Offshore with RWE.

storage. Finally, in its use and combustion, many experts cite familiar and common characteristics between natural gas and H2 – except, of course, that H2 does not emit any greenhouse gases, at least directly. (However, leaks are a concern because H2 can increase concentrations of other GHG, e.g., methane.)

Of course, a H2 reality check is always in order: to grapple with and surmount H2's challenges will require money, engineering and public policies at worldwide scale and steadfast commitment, unlike any previous global effort. To be clear, H2 backers today are not working on final challenges. To the contrary, the road ahead is an extremely challenging and entangled pathway. In a recent briefing by the Environmental and Energy Study Institute (EESI), Dr. Bryan Pivovar, a Senior Research Fellow with the US National Renewable Energy Laboratory said that "infrastructure needs are a major obstacle (for H2) and require an investment on the trillion-dollar order of magnitude." Additionally, there are complicated electric distribution issues that bedevil electrolysis dependent on fluctuating energy sources like wind.

But Pivovar also commented that "at NREL, the 2010s is seen as the decade of wind and solar, and the 2020s is expected to be the decade of hydrogen."

Seaguel was conceptually developed by Sofresid Engineering, a French firm with offices in Brest and other coastal cities. Sofresid is a subsidiary of Saipem, an Italian multinational energy services company. Renewable hydrogen is one pillar within Sofresid's overall approach to an energy transition; the other pillars are marine renewable energy, e-fuels and biofuels, carbon capture and green ships.

Gwenaelle Benoit, Offshore & New Energies Project Manager and colleague Emeline Belin, Business Developer presented the Seaguel project at SeaTech.

Seaguel started in response to an inquiry from an offshore windfarm operator seeking to avoid fossil fuel for the windfarm's support vessels.

The operator wanted refueling at sea, to avoid back and forth trips from ports to work areas. In response to email questions, Benoit said a goal for offshore windfarm operators is maintaining a carbon footprint at or below 6g of carbon for every KW hour of electricity.

Benoit was asked how fuel transfer might actually work, whether a ship would dock at a H2 station. She said that different transfer systems, e.g., directly from a facility to a vessel or through a discharge buoy, are under consideration. Additionally, local regulations for H2 transfer at sea may determine a final choice. Best practices for refueling remain a top focus for engineers.

Benoit was asked about the state of the tech required for Seaguel. Offshore windfarms, of course, are well established but are expanded projects, like H2 production, kept in check because equipment isn't available? Benoit said that depends on the equipment, which she described as available "at various maturity levels." For some processes, e.g., reverse osmosis of seawater or compression, she said engineers could

use equipment on the market today. She added that for Seaguel "the plan is to use off-the shelf equipment in order to be ready sooner." Operation at sea, however, presents new challenges, particularly compact configurations for offshore structures. For safety, Seaguel envisions remote, autonomous controls. "Remote control, however" Benoit said, "is still under development," but added that, "Sofresid has extensive experience on unmanned operations in offshore oil and gas fields."

Benoit said many companies are tracking related research on the performance and endurance of equipment necessary for harsh marine environments. She referenced the ground-breaking work by Lhyfe which inaugurated the world's first offshore renewable H2 production pilot project in September.

Seaguel's timeline starts in September 2022. "Middle term" goals are anticipated around 2024-2028 and, as presented at Sea Tech, pertain to upscaling and increased storage capacity and optimizing the gas station and exploring fueling possibilities beyond the windfarm project.

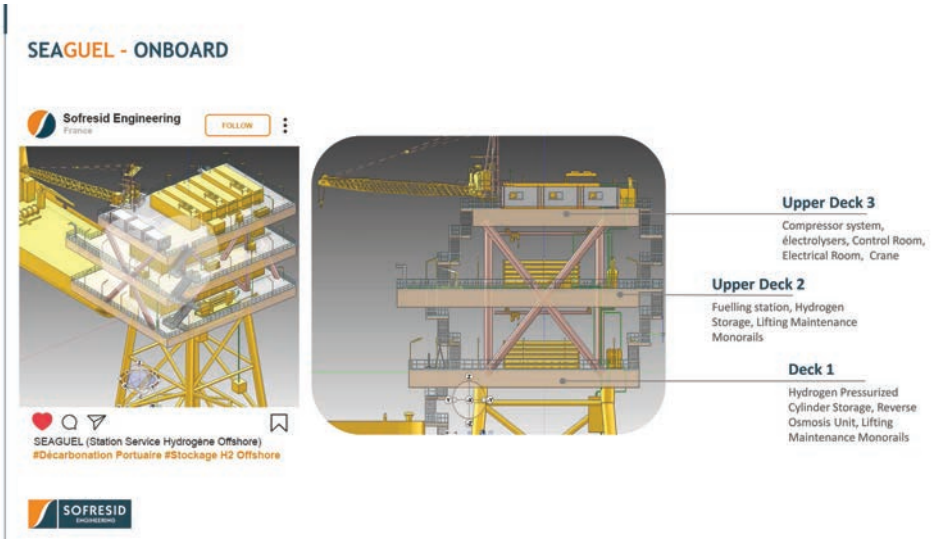
"Long term" goals, after 2028, will address diversification, a bunkering station and possible extension to offer e-fuels derived from green hydrogen. Benoit said engineers are "considering a wider use to refuel other types of vessels with H2 and in the future diversify with other H2 derivatives such as methanol or ammonia or inorganic liquid carriers."

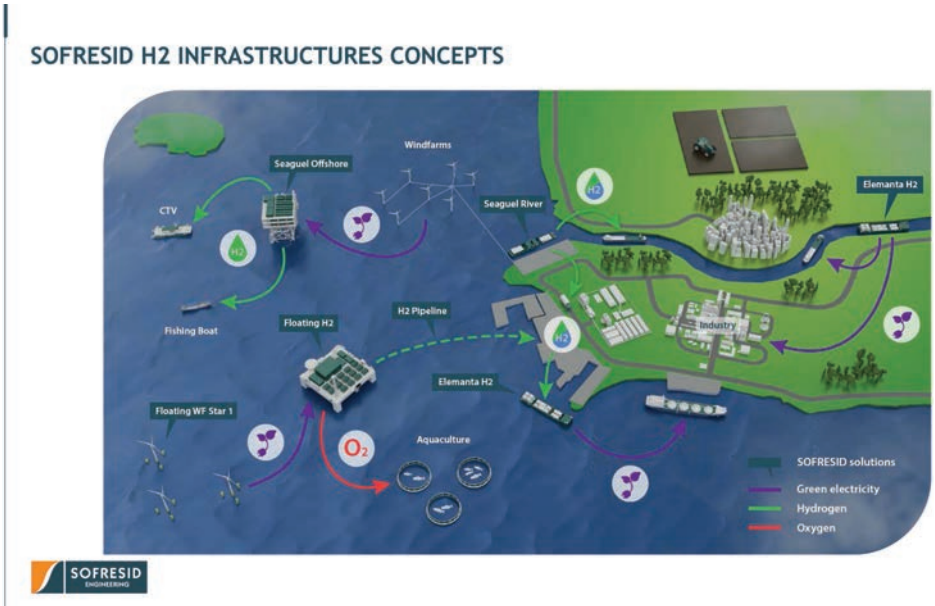
If offshore wind can indeed be harnessed to produce, store and transfer H2 that accomplishment would get the world pretty close to the ancient philosophers' dreams of perpetual motion. Using wind as the prime mover checks a most critical box: green hydrogen. As envisioned, Benoit said the Seaguel station has a 5MW-H2 production capacity, about an average production of 2 tons/day H2. Because wind is intermittent electrolysis could stop and start. Storage would provide a sufficient margin to ensure H2 availability.

The possibilities inherent in a project like Seaguel extend beyond providing green energy to one wind farm. Multiple H2 production sites could mean that H2 becomes available at a scale impacting the broader economy.

Note some of the ideas within the illustration "H2 Infrastructure Concepts." Since hydrogen production presents risks, placement offshore becomes a safety factor. If vessels refueled at sea and underwater pipelines delivered product to landside facilities, such as industrial customers, production could be kept away from cities and residential areas.

Also noteworthy within the Concepts drawing is the inclusion of the Elemanta H2, another example of creative thinking in France pertaining to hydrogen. The E-H2 is a power barge designed to use H2 to deliver power to vessels at quay – cold ironing. The E-H2 results from a consortium of French companies with maritime and hydrogen expertise. Sofresid Engineering owns the Elementa concept; it is also designer and architect. Future versions will enable H2 bunkering to refuel vessels. The consortium seeks to standardize these H2 port operations. Again, these are not just futuristic dreams: Benoit said an E-H2 demonstra-





tion project is planned for 2023.

Like many early ideas, Seaguel's trajectory has shifted. Benoit said the windfarm operator has stepped back, but Sofresid is keeping it active. Current efforts are focused on scaling up from 5MW production to 500MW to better evaluate project economics. Next year Sofresid plans to collaborate with other research partners, working towards a demonstration at sea by the end of 2025 or early 2026.

Davit Otarishvili is a Business Development Manager Offshore with RWE, one of Germany's largest green electricity generation and green hydrogen producer companies. Otarishvili participated in the Sea Tech session, focusing on development opportunities. RWE is a member of France Energie Marine. RWE is involved in more than 30 green H2 projects worldwide, including the Aqua-Ventus project which seeks to establish electrolysis units in the North Sea by 2035, units capable of producing 1 million metric tons of green hydrogen, and a Netherlands project called "H2opZee" focusing on offshore H2 production and possible reuse of existing pipelines.

In an interview Otarishvili did not sugar-coat the technical hurdles that stand between ideas about H2 today and actual use within a relatively short timeline, say, by 2030. Otarishvili said that new demands from the transportation sector are central to expanding H2 opportunities. Transport demands - not just from ships, of course - are expected to be at a scale that will draw the huge investments necessary to build and operate the requisite H2 infrastructure. Otarishvili said recent US policy moves on H2 are particularly promising.

Energy subsidies also present challenges. For example, wind generation now is largely committed to public utility markets because the costs are subsidized by ratepayers and state and federal taxes and energy credits. There are singular offtake agreements, with major companies, for example, seeking to establish a green profile, but offshore publicly subsidized windfarms aren't merchant plants, with power sold to the highest bidder, e.g., someone who wants to use green energy to produce H2. Dedicated generation could emerge but absent a regulatory framework the business case is difficult. Otarishvili said that under normal conditions industries pay around $1.55/kg for "grey hydrogen." Offshore green H2, delivered, costs between $8-$10/kg. That delta has to be addressed. If H2 is a larger public policy goal, should it be subsidized in a way that is similar to offshore wind subsidies?

It's Otarishvili's view that "if things go in the right direction, we should be on the right road by 2030." He noted that H2 by itself may not be the only endpoint. Opportunities are emerging in the maritime sector for methanol and ammonia, relatively new fuels linked to hydrogen projects and production.

To help take some of the guess work out of hydrogen decisions France Energie Marine has undertaken a project called OPHARM – "Offshore production of hydrogen analysis and roadmap." The goal is a set of decision-making tools for offshore renewable hydrogen production, with a focus on wind farms.

Marie Robert is offshore renewable energy research project manager at FEM. She presented the OPHARM project at Sea Tech. The model will present comparative analyses for costs, carbon footprint, H2 carriers and energy efficiency. The aim is to identify favorable outcomes.

Topics of particular interest include:

- Location and sizing of the electrolyzer
- How to transport the H2 product
- Distance from coast
- Production priorities: electricity vs. H2, and exporting one only after certain production goals are met for the priority product.

Again, French energy planners want answers sooner, not later. Marie Robert said an initial version of OPHARM will be ready in March 2023. It will likely start to make difficult decisions about H2 much clearer.

CREST Wind

CREST Wind, a joint venture between Crowley and ESVAGT, has selected Fincantieri Marine Group to build a service operation vessel for operations in the U.S. offshore wind sector.

FRONTIERS EXTEND AS DEVELOPERS EYE FLOATING WIND POTENTIAL

America may have only entered the offshore wind sector recently, but it is wasting no time in playing catch-up. The White House has set targets of 30 GW of offshore wind capacity by 2030 and 110 GW by 2050. The focus so far has centred on bottom-fixed installations, but the prospect of higher energy yields in deeper waters where the wind blows stronger and longer now beckon. The White House has also set a floating wind deployment target of 15 GW by 2035.

By Paul Bartlett

From a standing start, there are immense challenges in America's offshore wind development. Rich in oil and gas, renewables remained marginal until the Biden Administration took office. Now, offshore wind is a key focus as the US plays catch-up with wind developers in Europe and Asia.

Inflation and higher interest rates may be changing the economics on which developers base their investment decisions, but it has not shaken their ambitions. The months ahead promise to yield a series of announcements relating to offshore wind developments. Permitting for close to 5 GW of projects is likely by the end of the year, and federal authorities plan to auction leases containing more than 15 GW in the Gulf of Mexico, the Central Atlantic and offshore Oregon.

A recent report produced by Intelatus Global Partners, an energy consultancy, revealed 70 US offshore wind projects involving the installation of around 78 GW of capacity between now and 2040. The Intelatus study reveals that no fewer than 32 projects, with total planned capacity of almost 30 GW, are expected to receive final investment decisions (FIDs) within the next five years. They include five demonstration sites on both coasts.

Charybdis will be the first WTIV ever built in the United States and one of the largest globally. The vessel's main crane will have a boom length of 426 feet and an expected lifting capacity of 2,200 tons.

Dominion Energy

European bidders

Floating wind, however, is still at an early stage. Five sites in federal waters off the Californian coast have recently been auctioned, with capacity estimates ranging from 4.5 GW, according to the Bureau of Energy Management (BOEM), to 8 GW, a developer estimate. Interest shown by European bidders was notable, with Avangrid, Copenhagen Investment Partners, Equinor, Hexicon, Iberdrola, and Ørsted all keen for a seat at the table.

The procedures required in the permitting process for floating installations – including site assessments, construction and operation plans, and technical and environmental reviews – are likely to take most of this decade. First power is unlikely before 2032.

Other floating sites on the BOEM's list, according to Intelatus data, include two deepwater locations in the Central Atlantic region; Coos Bay and Brookings off the coast of Oregon; and the Gulf of Maine's commercial lease within the next two years. These facilities are likely to have total capacity of more than 6 GW.

Although fixed-bottom wind farms in water depths of up to about 200 feet are the first priority, long lead times for floating facilities mean there is no time to lose. On a global basis, there are so far only four multi-turbine floating farms in operation – in Scotland, Norway, and Portugal. They are located in relatively shallow waters, with Equinor's 88MW Hywind Tampen at just less than 700 feet. Some of the deepest farms could eventually be sited in water depths up to 3,500 feet.

Help or hindrance?

A handful of law firms already specialize in the complex nuances of the US Merchant Marine Act 1920 or the Jones Act as most people know it. It has far-reaching implications for near-shore and floating wind developments, both for US-based developers and service providers, and foreign companies looking for a slice of American action.

However, a serious shortage of installation vessels, support ships, and service vessel sector could become a major constraint on sector development, particularly with respect to the large, powerful and highly sophisticated subsea vessels required for deep water installations.

Philip Lewis, a specialist in offshore wind at Intelatus, points out that there are just two Jones Act-compliant offshore wind installation vessels under construction in American shipyards at present. One is the first offshore wind installation vessel, Charybdis, currently being built at Keppel AmFELS in Brownsville, Texas. As a jack-up, she will be suitable for fixed-bottom installations in water depths up to about 200 feet. A second ship, a rock installation vessel, is under construction to an Ulstein design at Philly Shipyard.

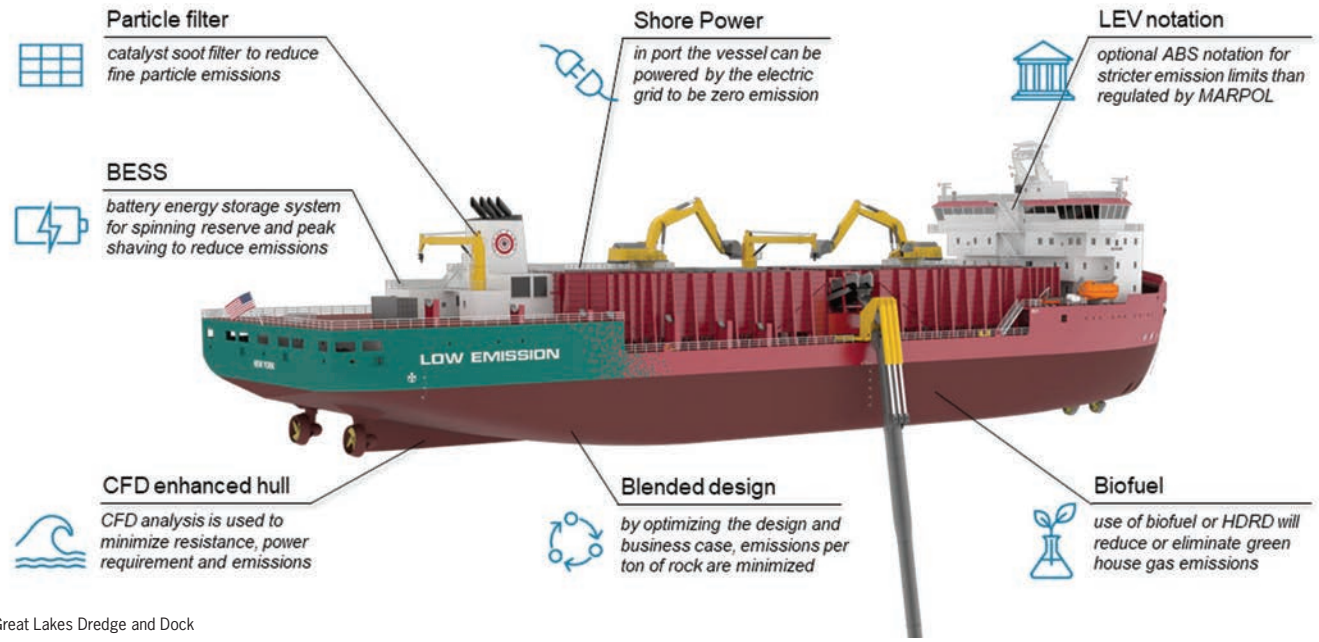
There are three SOVs under construction, including one recently ordered by Crest, a joint venture established in 2022 between Crowley and Denmark's Esvagt. The vessel, being built at Fincantieri Marine, will enter into a long-term charter with Germany's Siemens Gamesa Renewable Energy on delivery and will be deployed on the Dominion Energy Coastal Virginia Offshore Wind farm. There are also three Jones Act-compliant crew transfer vessels (CTVs) in operation and 14 under construction.

However, there are few ships, so far, either designed or under construction, for the deepwater floating wind sector although there are a few large anchor handlers and subsea construction vessels that could be available. And although the issues are different, there are also regulatory challenges on the Outer Continental Shelf further from shore.

According to Lewis, much depends on key words in the Jones Act such as 'pristine' and 'coastwise'. If the seabed has remained untouched and is in 'pristine' condition – in other words, without subsea constructions, pipelines, cables, etc – it is generally not covered by the Jones Act.

The term 'coastwise' refers to any vessel, equipment or installation component that may have touched the America

GLDD worked with Ulstein Design and Solutions B.V. to design and develop the first U.S.-flagged Jones Act compliant, inclined fallpipe vessel for subsea rock installation vessel to be built at Philly Shipyard.



Great Lakes Dredge and Dock

Edison Chouest Offshore is building and will operate the first-ever U.S.-flagged Jones Act-compliant SOV.

Image Edison Chouest Offshore

coast. Therefore, components supplied from overseas in a foreign-owned and flagged vessel could be delivered directly to an offshore wind farm without contravening the rules.

Under Jones Act regulations, therefore, a foreign-flagged cable layer loaded with all the cable required to complete an offshore lay could be deployed off the US coast or could take on its first cable load in a US port. However, it could not return to port for more cable. It is understood, but not confirmed by lawyers, that the vessel might have to take on bunkers by way of a ship-to-ship transfer. These requirements are currently being challenged in US courts.

These are just some of the practical and regulatory challenges facing offshore wind developers.

Fiscal stimulus

The sector may be encountering serious headwinds in terms of rising development costs but it has also received a shot in the arm from new supportive legislation. In August, President Biden signed the Inflation Reduction Act which, some say, is transforming the backdrop for equipment suppliers. It supports them by providing a tax credit, known as an advance manufacturing production credit (AMPC), for US renewable components.

The legislation also encourages renewable energy developers to buy equipment from US suppliers by giving additional tax incentives provided they meet certain domestic content requirements. According to analysis by Scotland's Wood Mackenzie, offshore wind projects installed before 2025 must source 20% of all equipment in the US. This rises to 55% in 2027. Meanwhile, 100% of steel and iron construction materials must be made in the US.

"We assess the Act will greatly aid the expansion of renewables equipment manufacturing capacity," Wood Mac said in a briefing note, "though specific opportunities will vary from segment to segment."

Other fiscal measures provide further support. They include tax equity finance, a type of project financing which incorporates tax deductions and tax credits through a combination of cash flow from projects and federal tax benefits.

Then there is an amendment to the National Defense Authorization Act which requires crews working offshore on Outer Continental Shelf renewable energy projects either to match the flag of the vessel or to be citizens or permanent residents of the US. However, while this provision was designed to support seafarers and ensure no unfair labor competition, critics say that there are neither the vessels nor the seagoing personnel available in sufficient number to undertake the scale of offshore wind development envisaged. Heather Zichal, CEO of the American Clean Power Association, described the amendment as 'a gut punch to offshore wind projects'.

There is huge potential in the American offshore floating wind sector but many challenges lie ahead.

Running Clean
Engine Maintenance with Chris-Marine CEO Jens Groth

All images courtesy Chris-Marine

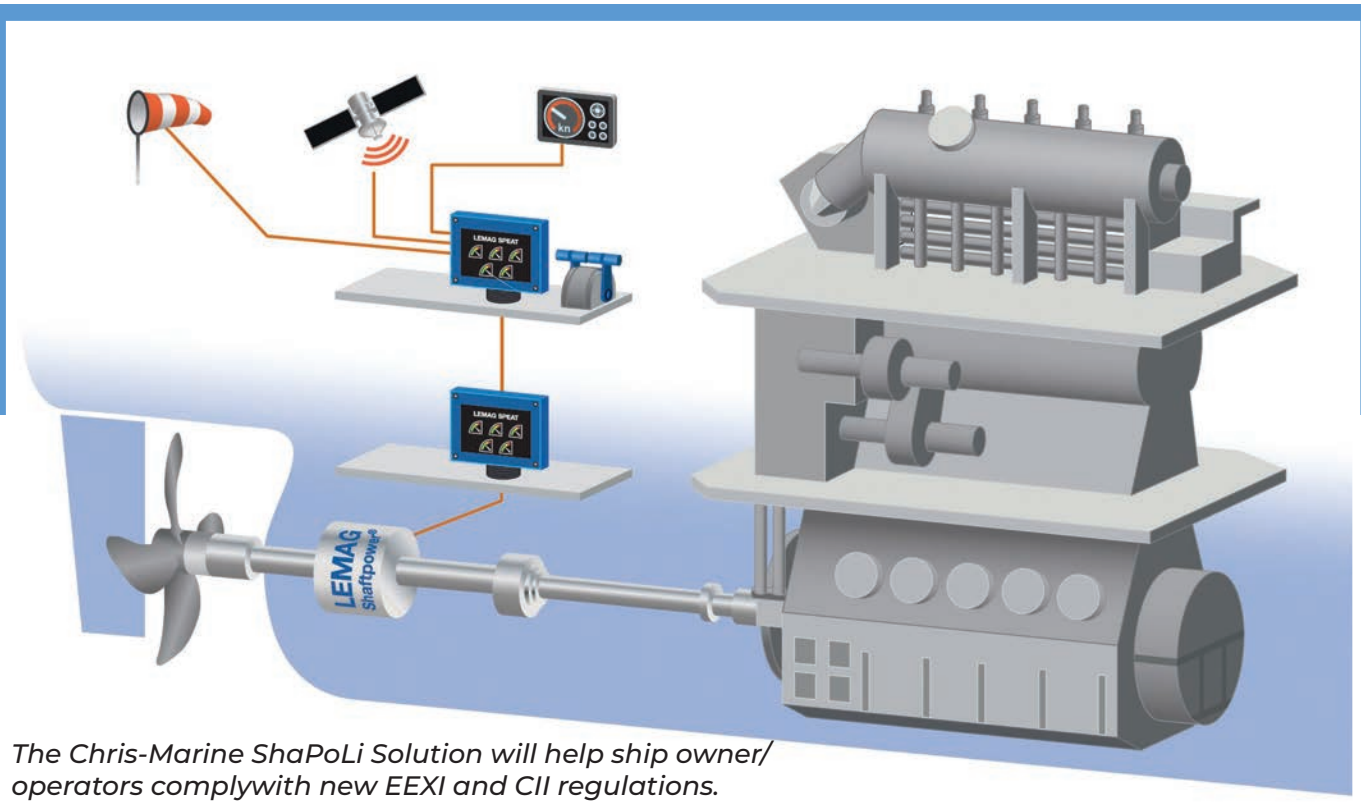
Malmö, Sweden-based Chris-Marine is long-tenured in the business of keeping ship engines running smoothly, efficiently. Led by its energetic young CEO Jens Groth, this 60-year-old- company finds itself in transition: firmly rooted in its traditional business of creating the tools and technique to keep commercial ship engines running, but at the same time transitioning its revenue to include services, particularly as ships at sea increasingly run with fewer, less experienced crew. Add new mandates from IMO aimed at cutting ship emissions, and Chris-Marine today finds itself front and center in the discussion on EEXI requirements to limit CO2 emissions with limits on shaft power output, courtesy of its recently launched Shaft Power Limitation (ShaPoLi) solution.

"Chris-Marine is, and has always been, a manufacturer of tools for repair and service of big diesel engines," said Groth, noting that the company is historically conservative by nature, which has enabled the company to thrive and grow for more than have a century, weathering the maritime industry's notorious cyclical swings. "Our prime customers [are traditionally] shipping companies, but that has expanded into diesel-driven power plants as well. Competence around maintenance, repair, service of diesel engines; that is the basics of our products. That's where we come from the last 60 years. But in recent years, we're also moving more and more into the monitoring side, digitalization."

Maintaining engines onboard ships is particularly topical as part of the automation and autonomy discussion, as the size of crews have been shrinking for years, and the quantity and quality of technical competence onboard has dropped too. Chris-Marine, in turn, has been challenged itself to deploy digital solutions across its tool sets, making them easier to use, getting quality results even when used by less-skilled hands. "We come from a 100% product run company, which was moving more and more into service with our tools," said Groth. "This was [so we could be] super good at using our tools so we could improve them. But within the last five to seven years, we have moved more into consultancy, to partner with our customers because we have so much know-how about diesel engine maintenance and repairs. More and more shipowners have asked us to come and do the service instead of them buying the tool."

The Energy Transition

While there is a fixation on energy transition in the maritime sector, finding suitable alternative fuels to help dramatically reduce emissions from commercial ships and boats at sea, the path forward is neither straight nor short as every action has a reaction. Sometimes have results what can be dramatic and unexpected.



The Chris-Marine ShaPoLi Solution will help ship owner/ operators complywith new EEXI and CII regulations.

Groth and his Chris-Marine team aim to get in on the ground floor, and enjoy close relationships with several OEM engine designers to ensure that it is developing the tools needed to work on the power plants of tomorrow.

"One area we see changing is fuel technology, due to the fact that heavy fuel oil with high sulfur content is being reduced or removed, with alternative fuels coming up," said Groth. "Every time you introduce a new fuel into the combustion chamber, you change the environment of the combustion area." This sometimes results in unintended consequences, such as when the sulfur cap came into effect and several engine types had problems with their cylinder liners. "So we developed several products for monitoring the condition of the cylinder liners," said Groth, which teamed well with its line-up of tools designed to restore the correct geometry and cylinder liner surface.

Changing the fuel also can have dramatic impact on the fuel injectors. "When you change fuel, obviously you change the fuel injectors and that means a lot of new technology is coming out of our Danish office. And this year we had a big technology development within exactly this area."

So Chris-Marine is engaged from the beginning, understanding the new technical parameters of the engines and their components, creating the tools and technique to help make them operational again when something inevitably fails.

Enter ShaPoLi

Increasingly Chris-Marine has become a part of the decarbonization discussion, as the IMO has set the target to mitigate CO2 emissions from ships by at least 40% by 2030 compared to 2008 levels. To meet this target, IMO has adopted EEXI and CII, a set of amendments to existing regulations to reduce greenhouse gas emissions from vessels.

Chris-Marine developed a ShaPoLi, a solution that will enable existing ships to meet the minimal energy efficiency level to comply with the upcoming regulations.

"With the new [EEXI & CII] regulations coming into play, shipowners have to find a solution to comply," said Groth. "There are basically two types of products that can assist: Engine Power Limitation (EPL) and ShaPoLi."

In simple terms, EPL is analogous to putting a brick under your gas pedal, limiting the amount of throttle you can give on the highway, for example.

"ShaPoLi is more advanced," said Groth, "We have a torque meter constantly monitoring the torque on the shaft, and on top of that, we have developed a control system that constantly monitors the torque. If you are going above the limit allowed within the EEXI framework, you'll get an alarm on the bridge. It can fully automatic, or you can have it where the crew can react and override it," which could be needed in the case of saving life at sea, or securing the ship from piracy or severe weather. The keys to the ShaPoLi system are it provides better

"If you maintain your engine well, you get the best running engine and the best running engine has the least emissions."

– Jens Groth, CEO, Chris-Marine

control of speed and power date, and there is no need to modify the machinery. The solution will help customers to comply with the EEXI regulations and also help them monitor and optimize their ship CII ratings in the future.

The Path Ahead

Keeping Chris-Marine and its global operations on its steady growth pattern is a continual challenge, particularly when it comes to attracting and retaining personnel. Groth said the challenge is significant as "we are a traditional company engaged in a conservative market. We are not Google or Ikea or Mercedes. We are Chris-Marine, and we are proud of where we come from; but if you want to climb the career ladder super quick and you want to become a manager of 50 people within three years, this is not the place."

But it can offer the allure of being a company with global operations, serving to keep one of the world's key industrial sectors up and running.

At the helm of Chris-Marine since 2015, Groth has been on a mission to grow the business both organically and via acquisition. One of the key acquisitions happened just one year later, when in 2016 Chris-Marine acquired the monitoring products from German company LEMAG, now Chris-Marine Germany. Chris-Marine also opened a new company in the Florida, during the pandemic, as it has a strong customer base in the cruise lines. While the timing was unfortunate, the end result is a stronger Chris-Marine today, with a key new presence located in Pompano Beach, FL, in close proximity to a strong customer base.

Globally Chris-Marine has eight companies, with its headquarters in Sweden and a physical presence in China, Denmark, Ecuador, Germany, India, Singapore and the U.S.

"[Before the pandemic] it was easier to convince a customer to pay for us flying from Copenhagen to Mozambique, or Siberia or Shanghai," said Groth, which is a trend on the decline both from the monetary aspect but also the environmental implications. "It's more important [than ever] for us to be closer to our customers."

Automatic honing of cylinder liner with digital data control

Five minutes with EBDG President Robert Ekse

Late last year we caught up with Robert Ekse, President, Elliott Bay Design Group (EBDG), for his take on how the Future Fuels debate is effectively shaping maritime technology development and vessel investment.

Most reading this know the EBDG name, but can you give us a quick update?

Elliott Bay Design Group has been around for a long time, [at first] primarily focused on ferry design and refurbishment. We've branched out over the years in many different directions, including tugs and barges and other workboats. Elliott Bay brings a small company feel and communication style to an otherwise fairly crowded market.

When I say 'alternative fuels,' what's the first thing that comes to mind?

Unfortunately, there's no single answer, which can be frustrating for operators. But the reality is that there is no one fit, because of the diversity of boats and routes. Our focus is to open the dialog and have a conversation around the options. [Putting it in terms of the automobile industry], if I commute in my car for three hours a day, I can't buy a Nissan Leaf. That car may have 120 miles of range, and it's not going to suit my needs if I don't have charging stations along the way.

That's a similar challenge to vessel operators. The all-electric solution may not work for them. Point-to-point short distances, the kind of energy that we're talking about is difficult

Image courtesy EBDG

to solve when those distances grow, and the power requirements skyrocket.

Then you have legislation which at times seems to leap-frog technology ...

California is leading the way with some legislation that is controversial at times. The technology is working towards those [emission reduction] goals and results, but there's a struggle because there's a big learning curve. There are many questions: What's out that that can fit into the maritime industry? What's right for my company? Should I have an all-electric vessel, or should I look at ammonia, methanol, hydrogen or some kind of hybrid? What are my goals, and do those power systems actually get me to my goals? Maybe it's a contract where you have to lower your emissions by X. Or is it a corporate-driven mandate saying fleet-wide emissions are going to be down by X by 2050? Or maybe it's a goal to achieve funding. Those variables change the conversation in getting to a result, and in turn the equipment that they have in their boat.

So, how pervasive is this emission reduction discussion with your clients today?

It's on everyone's mind, whether that is a discussion around the alternative fuel that is right for me, or how can I continue to run my equipment 'as is' and survive the legislation that's coming? In fact, what legislation is coming? The maritime industry is a very efficient industry.

It's efficient in ton per mile and passenger mile. Any way you measure it, compared to over-the-road transportation, it wins hands down. There's a lot of products, material and people that gets moved over the water in our river and coastal water systems. So how does that drive a conversation if the motivation is to replace equipment, but we're already running fairly efficiently? Many are asking "why are we talking about this with the marine industry?"

Then there are a lot of small companies that don't have the financial wherewithal to even consider some kind of replacement; and they look at their equipment and they see waste if they need to essentially throw away. It's a difficult conversation, and it's challenging from many different perspectives. But every project has at least one conversation [focused on future fuels].

As this topic transforms the industry, how does it transform EBDG?

It's really about getting with the technical providers and helping them navigate R&D expenditures. Whether it's a methanol generator or it is some kind of ammonia technology, none of this is past the test [phase]. We, our employees, need to be involved with those [companies and] developing.

We're aiming to partner with these folks, to help our people understand what they're developing, to create some dialog around the challenges that might be in the integration portion of that technology development.

That's what we can do to help: to have awareness around the new technology development, so we better understand how that might fit into a client's platform.

Tech Files

The month's best technical innovations

Intellian

Intellian Expands XEO Series

Intellian expanded its XEO Series, a Ku/Ka electronically switching dual-band multi-orbit VSAT antennas, with the addition of the X100D and X150D. The XEO Series were first unveiled in March 2022, leading to Intellian's design of the X100D, available later this month, and the X150D, launching in early Q3 2023. According to the company, the XEO Series are the world's first commercially available Ka/Ku-band through a single feed, electronically switchable, multi-orbit antennas, making them ideal for customers requiring high-bandwidth, availability and maximum agility.

WinGD

Ammonia to the Fore

WinGD and CMB.TECH announced plans to collaborate on a fleet of ammonia fueled bulk carriers. The pair signed an agreement on the development of ammonia-fueled two-stroke engines, aiming to install the ammonia dual-fuel X72DF engine on a series of ten x 210,000 DWT bulk carriers to be built at a Chinese shipyard in 2025 and 2026.

CMB.TECH will support WinGD in establishing its ammonia-fueled engine concept for a large bore engine. CMB.TECH has significant insight into alternative fuels and builds, designs, owns and operates large marine and industrial applications that run on hydrogen and ammonia.

Survitec

Survitec's 'Life Ark'

Survitec said its new Marine Evacuation System (MES) Life Ark, a helical slide-based MES for small to medium-sized passenger vessels, has received full-type approval from Bureau Veritas.

Life Ark is designed for vessels with a freeboard height of up to 23m and passenger capacities ranging from 300 to 1,500. Using the fully enclosed, dry-shod helical (spiral) slide design inherent to Survitec's popular Marin Ark 2 MES and Seahaven AES, Life Ark ensures a safe, rapid and comfortable descent for people of all ages and abilities. There is no restriction on the size of individual users, and crew can ascend the slide to assist passengers if necessary.

Glamox

Glamox in Offshore Wind

Glamox AS inked contracts to provide its marine lighting for four wind turbine commissioning and service operation vessels for Integrated Wind Solutions (IWS) Fleet AS of Norway, and two wind turbine installation vessels for Cadeler A/S. These orders underline the spectacular growth in the market for offshore windfarms and the specialist ships needed to construct and support them. For IWS Glamox will provide navigation and signal lights, search lights, and LED lighting for an initial four commissioning service operation vessels (CSOV). The total number of light points per vessel is around 2,500.

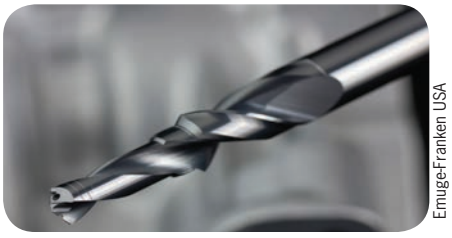
Raytheon Anschütz

NautoPilot 5000NX

Raytheon Anschütz launched NautoPilot 5000NX, a new autopilot for ships which the company says combines unique algorithms for precise steering performance with a wide range of fuel-saving features. NautoPilot 5000NX displays all navigational information on a 7-inch graphical touchscreen.

NautoPilot 5000NX's fuel-saving features include:

- Economy mode.
- Course Control mode.
- The Toe Angle function.
- Heading and Rudder Plot.



Emuge-Franken USA

PunchDrill: Drilling Tool Tech

Emuge-Franken USA introduced PunchDrill, a new drill design offering high feed drilling which doubles the feed rate compared to standard drills without increasing the axial force or spindle speed. PunchDrill reduces machining forces and optimizes chip-breaking, producing cycle time savings of 50% or more when machining cast aluminum alloys with at least 7% Si content and magnesium alloys. EMUGE PunchDrill results in shorter machining times, fewer tool changes, and high metal removal rates, in addition to higher productivity and reduced power consumption.

In the Shipyard

Latest Deliveries, Contracts and Designs

SHI Delivers LNG Pair to MISC

Image courtesy MISC

MISC welcomed two of its latest new generation of Liquefied Natural Gas (LNG) carriers, Seri Damai and Seri Daya to its fleet of LNG carriers. These 174,000 CBM LNG carriers were built for MISC by Samsung Heavy Industries Co., Ltd. (SHI) and classed by ABS. Upon their delivery, these new LNG carriers will be on long-term charters to ExxonMobil's wholly-owned subsidiary, SeaRiver Maritime LLC (SRM) and will be managed by Eaglestar Shipmanagenent (S) Pte. Ltd. With the addition of Seri Damai and Seri Daya MISC now has 31 LNG carriers in its GAS Business, in addition to six Very Large Ethane Carriers (VLECs) and two LNG Floating Storage Units (FSUs), which has a combined deadweight tonnage (dwt) capacity of over two million tons.

Seri Damai and Seri Daya feature technology to cater to the growing needs for safe, reliable and energy-efficient solutions in the transportation of LNG. The LNG carriers have enhanced cargo tank insulation with the GTT Mark-III Flex PLUS cargo containment system which is designed to reduce the boil-off rate to 0.07% of cargo volume per day for improved efficiency. Powered by WinGD X-DF propulsion, the vessels fulfill the IMO Tier-III emission requirements without any external exhaust gas after-treatment system. It also complies with the EEXI standard while the eco-efficient vessels are also certified with ENVIRO Notation, a voluntary adoption of integrating ABS requirements with international conventions for environmental protection.

At the forefront of digital and smart shipping technology, Seri Damai and Seri Daya use the Samsung SVESSEL technology for enhanced safety and efficiency through remote monitoring of vessel performance and operations.

Quinto orders Inland Tanker from Concordia Damen

Dutch inland shipping yard Concordia Damen was commissioned to build and equip an inland shipping tanker for Quinto Scheepvaart B.V. from Zwijndrecht, an order that also Quinto's switch from container shipping to tanker shipping. 'Quinto Scheepvaart' has opted for a tanker of the Parsifal type, a new generation of mineral (oil and light chemicals) tankers that Concordia Damen has developed internally, with several already operational. The tanker measures 110 x 11.45m and has a large carrying capacity at a very shallow draft (2,875 tons at 3.25m). According to the shipyard, the efficient hull shape creates an optimal 'speed-power curve'. The ship reaches a high speed with a relatively low power: more than 22 km per hour with 2 x 500 kW engines. The stern side installation will be split into two 'houses'; a house for the family and a house for the crew. In addition, the design is adapted on a number of points to the specific wishes of the owner. CCM3, part of the Concordia Damen Shipbuilding, was chosen for the installation and finishing of the vessel. "We had been planning to go into tanker shipping for some time. We came to Werkendam for repairs and were interested in the Parsifal tankers," said inland navigation entrepreneur, Luit Nanninga of Quinto. "After a conversation with managing director Chris Kornet, we visited the shipyard and viewed the ships. What particularly appealed to us was that this type was designed in such a way that it combines low resistance and a shallow draft with a large cargo capacity." Parsifal inland tankers are designed in such a way that the type of propulsion per ship can be adapted to the wishes of the customer: diesel-electric, diesel-direct or LNG-electric. That also happened here. The ship, with its home port of Zwijndrecht, near Rotterdam, will sail with Caterpillar engines and is Stage V compliant. The tanker is expected to be delivered within a year, in December 2023.

Image courtesy Damen

In the Shipyard

Latest Deliveries, Contracts and Designs

RoRo Ferry MV Tennor Ocean sets Sail

Image courtesy FSG

MV Tennor Ocean, newbuilding 782, from Germany's shipyard Flensburger Schiffbau-Gesellschaft recently set off on test voyage on the North Sea and Baltic Sea. The 210-m RoRo ferry is on the move to Dock 3 at Lloyd Werft. During its week-long stay there, the shipbuilders of Flensburger Schiffbau-Gesellschaft (FSG) carried out the remaining work on the ship's hull to optimize the performance data. Afterwards it set out on a multi-day test voyage on the North Sea and the Baltic Sea. Already during the voyage from Flensburg to Bremerhaven, the 2.11-m-high folding mast was tested. It has been newly developed by FSG for this type of ship and enables the passage through the Kiel Canal, which connects the Baltic and the North Sea. In this waterway, the mast height of a ship may not exceed 40m above the water level. MV Tennor Ocean is able to accommodate 279 truck trailers on more than 4,000 lane meters spread over four decks. The RoRo type 4100, which was developed by FSG and has already been built several times by the shipyard, is characterized by particularly low fuel consumption.

Image courtesy NYK

AiP for A-FSRB

ClassNK issued an Approval in Principle (AiP) for an ammonia floating storage and regasification barge (A-FSRB) jointly developed by NYK Line, Nihon Shipyard Co., Ltd. (NSY), and IHI Corporation (IHI), reportedly the world's first AiP for A-FSRBs handling ammonia as cargo. It is an offshore floating facility that can receive and store ammonia that has been transported via ship as a liquid, warm and regasify ammonia according to demand, and then send it to a pipeline onshore. According to three companies, the A-FSRB offers the advantages of shorter construction time and lower costs in comparison to the construction of onshore storage tanks and regasification plants.

Maritime's Top Threats in '23

By Rich Soja, North American Head of Marine, Allianz Global Corporate & Specialty

Allianz just released its 12th Risk Barometer, an annual corporate risk survey incorporating the views of 2,712 risk management experts in 94 countries and territories, including CEOs, risk managers, brokers and insurance experts. The overall global results reveal Cyber incidents and Business interruption as the biggest company concerns for the second year in succession. Macroeconomic developments such as inflation, financial market volatility and a looming recession rose to the third spot followed by the impact of the Energy crisis, a new entry in the fourth spot globally.

Fire and Explosions

For the marine and shipping industries, Fire and Explosions lead the rankings of threats keeping management up at night with 29% of responses, up from the third spot last year. While fire risks are often well understood and typically well risk managed, they remain a significant cause of business interruption and supply chain disruption. Commercial insurance claims analysis by Allianz shows that fire is the largest single cause of corporate insurance losses, accounting for 21% of the value of 500,000+ insurance industry claims over the past five years (equivalent to $19.5B).

Although shipping losses have more than halved over the past decade, fires on board vessels remain among the biggest safety issues for the maritime industry. AGCS analysis of over 240,000 marine insurance industry claims between January 1, 2017, and December 31, 2021, worth approximately $10B in value, shows that these are the most expensive cause of loss, accounting for 18% of the value of all claims.

As recent events have demonstrated, roll-on roll-off (ro-ro) car carriers, the largest of which can hold as many as 8,000 vehicles, can be susceptible to fire risks, while there have also been a number of blazes on container ships and in warehouses.

For shipping companies, the transport and storage of lithium-ion batteries are an increasing cause of concern. Insurers have long warned clients about the potential dangers that lithium-ion batteries can pose for the shipping and wider logistics industries, whether they are being transported inside electric vehicles or as standalone cargo, if they are not handled, stored or transported correctly, with fire being a significant hazard.

With the incessant increase in global demand for lithium-ion batteries, this risk is only going to escalate for the industry. Regularly assessing and updating prudent fire mitigation practices, including preventative measures, fire extinguishing methods and contingency planning, remain essential for all maritime businesses and their partners to lower the risk of loss from an incident.

Changes in Legislation and Regulation

A new entry hit the Risk Barometer's second spot for marine and shipping companies this year. Changes in legislation and regulation received 25% of industry responses. These include trade wars and tariffs, economic sanctions, protectionism and Euro-zone disintegration. Given the global nature of the shipping industry, it is no wonder this risk is top of mind with our clients.

Within this category is the rapidly changing and evolving regulatory landscape on decarbonization of the shipping industry and the subsequent challenges this poses to shipping companies. The International Maritime Organization's (IMO) new regulation for global shipping fleets to measure and improve the carbon intensity indicators is a recent example. It is widely expected that the IMO is likely to revise the overall emission's target for the shipping industry in the near future. The Net Zero Insurance Alliance (NZIA) has also released the target-setting protocol under its commitment to achieve net zero by 2050.

Cyber Incidents

Digital and disruption dangers continue to impact marine and shipping companies with Cyber incidents, such as IT outages, ransomware attacks or data breaches, ranking the third most feared threat for the industry in 2023. According to the Allianz Cyber Center of Competence, the frequency of ransomware attacks remains elevated in 2023, while the average cost of a data breach is at an all-time high at $4.35mn and expected to surpass $5mn in 2023.

The conflict in Ukraine and wider geopolitical tensions are heightening the risk of a large-scale cyber-attack by state-sponsored actors. In addition, there is also a growing shortage of cyber security professionals, which brings challenges when it comes to improving security for all industries, including marine and shipping.

According to Allianz Risk Barometer respondents, a data breach is the exposure which concerns companies most (53%), given data privacy and protection is one of the key cyber risks and related legislation has toughened globally in recent years. Such incidents can

Although shipping losses have more than halved over the past decade, ***fires on board vessels remain among the biggest safety issues for the maritime industry.*** *AGCS analysis of over 240,000 marine insurance industry claims between January 1, 2017, and December 31, 2021, worth approximately $10B in value, shows that these are the most expensive cause of loss, accounting for 18% of the value of all claims.*

result in significant notification costs, fines and penalties, and also lead to litigation or demands for compensation from affected customers, suppliers and data breach victims, notwithstanding any reputational damage to the impacted company.

Business Interruption

For maritime businesses, 2023 is likely to be another year of heightened risks for business interruption, which ranked as number four for the industry, down from the top spot last year. Despite positive moves to diversify business models and supply chains since the pandemic, businesses continue to experience significant disruption around the world. Covid-19 came as a massive shock, creating global shortages, delays and higher prices, while the war in Ukraine triggered an energy crisis, turbocharging inflation.

Natural Catastrophes

Rounding out the top five risks for marine and shipping companies is Natural catastrophes, down from the number two spot last year. Perhaps the drop in rankings for nat cat is no surprise – war in Ukraine, an energy crisis, and the fallout from the Covid-19 pandemic, including inflation and supply chain disruptions, have tested business resources and commanded attention.

There is no room for complacency, however, as we witnessed in 2022 a single event can cause losses in the billions of dollars. Although, the Atlantic hurricane season for 2022 was near average after six years of above-average activity, estimates show insured losses from natural catastrophes continue to be above the 10-year average of $81bn, at $115bn. Hurricane Ian, which struck Florida in September, was the year's costliest nat cat event, with an estimated insured loss of $50-$65bn, which would rank as the second costliest hurricane of all-time.

Developing De-risking Actions

There is little doubt that recent disruptions have increased awareness around BI and supply chain risk and that companies and governments are taking action to build resilience and de-risk. The Allianz Risk Barometer results show that companies have begun to diversify their businesses and supply chains, as well as stepping up risk management. More time and money are being invested into looking into and documenting the supply chain strategies of businesses. Companies that have suffered disruption are now improving transparency and data on supply chain risks.

According to respondents, the most common action taken by companies to de-risk supply chains and make them more resilient is to develop alternative and/or multiple suppliers – although this can be a lengthy process and is not without its own pitfalls – while broadening geographical diversification of supplier networks in response to geopolitical trends is the third most common action. The war in Ukraine has been an eye opener for many, demonstrating how a conflict can result in shortages and price increases for raw materials, raising awareness of the need to be more sophisticated in understanding which components and materials are critical, where they are sourced, as well as how to secure them.

Another positive development is an enhanced focus on business continuity management. Initiating and/ or improving this is the second most common action companies are taking to de-risk, according to the Allianz Risk Barometer. Whether it is planning for the fallout from a cyber-attack or a natural catastrophe, business leaders increasingly see the value in investing more time and money in understanding what business continuity planning can achieve. Companies need to constantly review this across the whole organization, given BI risk is not typically fixed on a particular trigger, location or product but can originate from various areas, crossing sites and continents.

Despite such progress, many companies have yet to improve supply chain transparency or are not able to provide good quality data or willing to engage with the relevant stakeholders to obtain it. This is usually due to a lack of awareness among companies that have not experienced disruption and still see this as a remote possibility. But when disruption happens, it can have catastrophic consequences, which is why insurers must continue to bring knowledge and raise awareness for their marine and shipping clients, given the growing connectivity between many organizations.

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