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Marine News

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On the Cover

The tug, towboat and barging sector is the heart of the United States' commercial maritime industry.

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Editor's Note

Eric Haun, Editor,
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What are some of the biggest and most important issues facing the tug, towboat and barge industry? That is the first question I asked in this month's Insights interview with American Waterways Operators president and CEO Jennifer Carpenter, who is without a doubt one of the strongest advocates for this vital sector—the heart of the commercial maritime industry. We go on to discuss everything from difficult regulatory changes, to technological advances helping to make what is already the most environmentally friendly form of cargo transport even cleaner and more efficient.

In terms of technological advances, there are a number of new solutions coming to market that promise to help vessel operators reduce their carbon footprint. Startup Amogy is working to convert a tug to run on its ammonia-to-power solution—a first of its kind project aiming to prove the zero-emissions technology in the maritime sector. The story starts on page 26.

These days, no discussion on "green" and U.S. maritime would be complete without the mention of offshore wind, which is ramping up to provide innumerable opportunities to a broad range of market players, one being American shipyards and their partners across the supply chain. This month's shipbuilding report outlines some of the top areas where business can be won (in offshore wind and elsewhere), as well as some of the market hurdles standing in the way.

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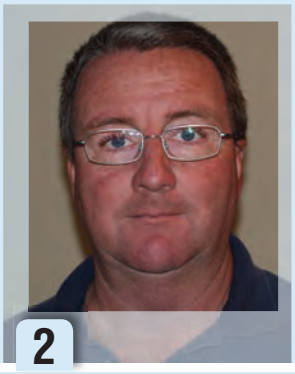
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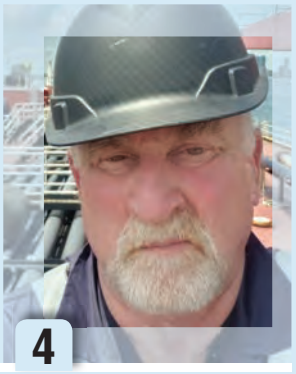
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By the Numbers

US Offshore Wind Pushing Forward, But Short-term Cost Concerns Linger

By Philip Lewis, director of research, Intelatus Global Partners

As we move through the first few months of 2023, we note both positive and negative trends developing in the U.S. offshore wind segment.

As an indication of the long-term sustainability of the offshore wind industry in the United States, federal agencies are finalizing the auction by the middle of this year of three Gulf of Mexico sites that will support a minimum of 3.6 gigawatts (GW) of offshore wind capacity. This capacity is likely to come onstream early in the next decade. Including the Gulf of Mexico sites, federal authorities will have leased sites with a cumulative generating capacity of 60 GW. Further, federal authorities to continue to refine eight potential lease areas in the Central Atlantic for auction in the first quarter of next year and are also analyzing suitable sites off Oregon and in the Gulf of Maine. Funding continues to be made available for the supply chain, port and transmission system development required to support the forecast offshore wind build-out.

Despite federal authorities auctioning sites with around 60 GW of potential to developers, till now only 17.5 GW of the capacity has secured offtake commitments from East Coast states. North and Mid-Atlantic States plan an additional 16 GW of offtakes in the short- to mid-term and have identified as much as a further 20 GW of longer-term capacity goals.

While the long-term foundations for the sector continue to solidify and support the deployment of 30 GW of offshore wind by 2030 and 110 GW by 2050, the short-term situation remains a concern. Ørsted, Avangrid, Dominion and the shareholders of SouthCoast Wind (formerly Mayflower), developers of around 20 GW of East Coast capacity, have recently reported worrying cost trends for their projects. We continue to watch for potential impacts on project schedules.

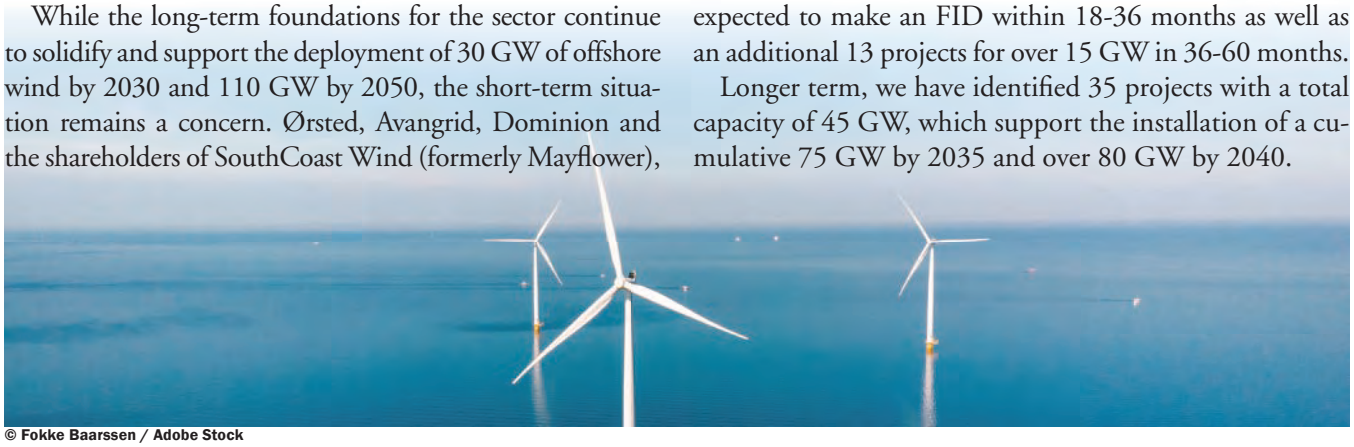
Our forecast accounts for close to 70 projects that will install over 78 GW of capacity in this and the next decade and a total 110 GW by 2050. The 78 GW forecast capacity will require capital expenditure amounting to over $240 billion to bring onstream, a recurring annual operations and maintenance spend of around $11 billion once delivered, and close to $35 billion of decommissioning expenditure at the end of commercial operations:

Two major Outer Continental Shelf (OCS) projects with around 940 megawatts (MW) of capacity have been permitted, taken a final investment decision (FID) and one has commenced offshore construction and the other is preparing for offshore construction.

The number of projects that are expected to make an FID within the next 18 months is 13 amounting to around 13 GW of capacity.

A further six projects with a capacity of close to 3 GW are expected to make an FID within 18-36 months as well as an additional 13 projects for over 15 GW in 36-60 months.

Longer term, we have identified 35 projects with a total capacity of 45 GW, which support the installation of a cumulative 75 GW by 2035 and over 80 GW by 2040.



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Jennifer Carpenter

President & CEO, The American Waterways Operators (AWO)

Jennifer Carpenter has been president and CEO of The American Waterways Operators (AWO) in January 2020, but her time with the national trade association representing the inland and coastal tugboat, towboat and barge industry dates back to 1990. This month, she weighs in on top challenges and opportunities currently present in the industry, from difficult regulatory changes to the uptake of cleaner vessel technologies.

AWO

What are some of the biggest and most important issues facing the tug, towboat and barge industry?

JC: Big picture, I feel like our industry has never been more relevant. Just think of everything that's going on in the country and in the world. We are in the thick of it. From security concerns. Our industry is just essential to national and homeland security. Sustainability. Our industry is the most fuel efficient, the most environmentally friendly way to move bulk commodities. Jobs, workforce, career development, diversity and inclusion. We have got tremendous jobs and really ladders of career opportunity on offer in this industry that are available to people who live anywhere in the country because you don't have to live where you work when you work on a vessel. So all of that is to say, I feel like our industry is just in the right place at the right time.

How do we keep it that way? Foundationally, we need continuing rock-solid support for the Jones Act. We need continuing investments in waterways infrastructure that enable us to keep moving commerce safely and efficiently and sustainably. Moving efficiently reduces idling and fuel usage, so it's totally part of the sustainability mix. We've got to keep our eye on the workforce development issues because I mentioned we've got these tremendous opportunities to offer, but if people don't know that our industry exists, then we've got a problem and we do have problems. We've got to cast a much wider net. We also need to work to make sure that there aren't barriers to people advancing through the industry. So those are things that I would highlight.

One of the issues that you mentioned is the Jones Act, and there are still some question marks around that in U.S. offshore wind. What does AWO hope to see on this front as the industry continues to build?

JC: I would start by saying there is way more that is settled here with respect to Jones Act applicability than there is not, because two years ago in the National Defense Authorization Act, Congress included a clarification to the Outer Continental Shelf Lands Act that said, U.S. laws, that includes the Jones Act, apply to renewable energy development on the outer continental shelf. So, what that means is, any kind of transportation between two points is going to be subject to the Jones Act.

So, what are AWOs expectations? Minimal expectation is that folks are going to comply with the law, and I do expect that. If there are any attempts to skirt the law, then we've got Customs and Border Protection, Jones Act Division of Enforcement, we've got the Coast Guard there to ensure that doesn't happen.

Beyond that, we are just excited about the opportunity that offshore wind provides. I've said this before, it is the biggest new market for the domestic maritime industry in a generation. There is huge opportunity, and we want to maximize that. Most of the vessels that are going to be needed to build out offshore wind in the U.S. are going to have to be Jones Act qualified, where there are things that are not considered transportation, they are industrial applications and they can be done with foreign vessels. We want to maximize the use of American vessels where they exist.

A third thing, not really Jones Act related, but just in terms of expectations and hopes related to offshore wind, there's a lot going on in the ocean as you know, and there's

an increasing amount. So we are strongly supportive of proactive collaboration and communication, both between federal agencies who own different pieces of the puzzle here. BOEM, which is doing the leasing, the Bureau of Ocean Energy Management. The Coast Guard, which is regulating navigation, safety. Wind developers, the industry. We need to work together so that we can maintain safe shipping lanes, safe transportation, even if there is more stuff out there in the ocean. We don't think this is a binary choice. You can have one, but you can't the other? No, we can have both. We just need to do some good, sound planning. We are encouraged that there is increasing recognition of that, but we need to keep it going.

Earlier you mentioned the fact that marine is the most sustainable form of transport for bulk commodities, but still we're seeing a lot of efforts across the industry to clean up even further with companies implementing or in some cases starting to explore new technologies to reduce their environmental footprint. From your point of view, do you think the industry needs to do more to accelerate these efforts? What can and should be done, and where do you see the greatest opportunities?

JC: Yeah, I think there is tremendous opportunity here. It was really, really gratifying to see in the Biden Administration's transportation decarbonization blueprint, that they recognized that moving more cargo by water is really part of the answer to decarbonizing, improving the sustainability of the transportation system generally. So at AWO, we're looking at this at three levels.

Step one, let's maximize the amount of cargo we move by water because that is way more efficient than doing it by rail or truck. Two, let's make sure that we are moving things by water in as sustainable way as possible. So that gets to some of the infrastructure investments that I'm talking about. Let's not have long queues at locks where we're waiting to go through and we're burning fuel while we wait. Those kinds of efficiency improvements are really helpful. Then third, at the individual vessel owner level, we want to make sure that we have policies, we have resources that are supporting companies in improving their environmental footprint, no matter their business drivers.

When you look at early adopters, when you look at some of the really cool, new technology that is being rolled out now, whether that is Crowley's eWolf, the electric tug that's going to be working in Southern California or the ACBL Maritime Partners, Hydrogen One, methanol to hydrogen on the Inland River System, other hybrid engine technology. We want to make sure that Coast Guard policies are nimbly adapted and they are not standing in the way of progress here. We want to support and encourage those early adopters because the whole industry is going to be able to learn from their leadership, and that's going to facilitate broader adoption of these technologies.

At the same time, vessels in our industry are long-lived assets. That is not a bad thing environmentally, that's actually a really good thing environmentally. This is not fast fashion for vessels. These things are built to last. So, what can be done and what companies are doing is looking to repower and upgrade existing engines. You can dramatically reduce the carbon footprint, the fuel usage of a diesel engine by going from a Tier 0 or 1 to a Tier 3 engine. Tier 4 generally is something you do with a new vessel because you're kind of building the engine room around that. There is so much that can be done to improve the sustainability of existing vessels through repowers.

How can we support that? I was just down in Houston with AWO members for our Midwest Ohio Valley and Southern region this week, and people were taking serious notes as a representative from the Texas Council on Environmental Quality was talking about having $43 million available for engine repowers. We've got a great opportunity to do the both-and here, supporting the early adopters in experimenting with new technologies, alternative fuels, and at the same time helping to use more efficient forms of existing technology, which taken together dramatically reduce the environmental footprint of the fleet overall.

Looking back to last year, inland operators faced a great deal of challenges relating to the historic low water levels. What can and should be done to ensure smoother sailing in the future?

JC: When I was down in Houston recently, we had a panel of Coast Guard and Corps and industry folks sharing their reflections on the experience of the 2022 low water. The absolute consensus was that despite the severity of the situ-

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ation, we made out so much better in 2022 than we did in say 2012. Not only because of the really good communication structures that were in place, but also because the Corps took steps to improve the river through draining structures and things like that, removal of rock pinnacles. This was a Lower Miss rather than a Mid Miss situation. We had more nimble redeployment of dredges and buoy tenders. That's the kind of thing that we're going to need more of.

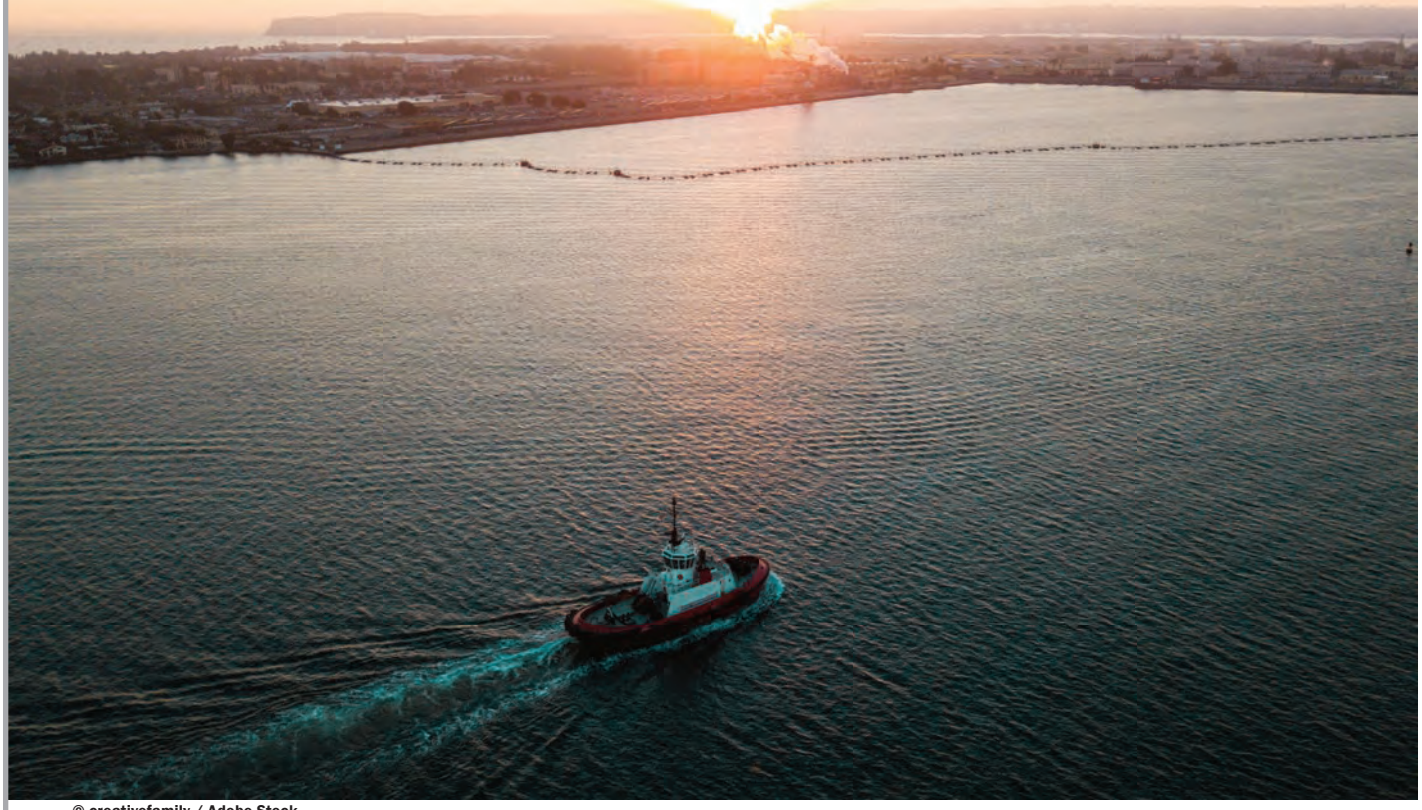
The ultimate solution there was we needed more rain, and eventually we got it. But with really close, good communication, and then anticipating that water levels rise and fall, we can keep commerce moving. We did keep commerce moving through that really significant situation last fall through nimble redeployment of assets. We have to keep that coming.

First of all, we have to make sure we have the assets: that the Corps has its dredges, that the Coast Guard has modern, efficient buoy tenders that are not always in the shipyard because they're breaking down, and that we're moving them where they need to be. All of those things can help prepare us for future eventualities.

One other thing I want to mention, because I feel like this was maybe not immediately focused on. The focus, was of course dredging the main channel, keeping that open, obviously critically important. A point failure was severe shoaling at ports and terminals. If I can't load the barge to nine and a half feet because the terminal won't allow me to load it past eight feet because it is desperately in need of dredging, then that's the limiting factor. So really making sure that we're able to pay attention to all parts of the system because they work together to keep traffic moving.

Looking at the West Coast, what's your take on the current CARB situation? From your point of view, what's the sensible solution going forward?

JC: A state by state regulatory patchwork is not the right way to regulate an industry in interstate commerce. Unfortunately, we've seen that movie before, and it doesn't end well. Step one, I would say, no more CARBs. We don't want other states to follow this example. It is much more productive to really systematically, systemically look at infrastructure, funding and other improvements that facili-



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tate adoption of greener technology.

We got what we got in California, so what should happen now? I think at a minimum we're going to need an extension of the compliance timeline, additional funding for engine repowers and a simple step: articulated tug, barge units are not harbor craft. They should not be regulated as harbor craft. They should be regulated like tankers in the at-berth rule. So those are three things that should happen now.

Do you think it's even possible for the industry to comply given the supply chain challenges, shipyard capacity, state of technology and other factors?

JC: I think that the timeline is going to have to be changed. Unfortunately, a lot of these points were made during the rulemaking process and did not get the hearing that they needed. Unfortunately, we're going to now have an after-the-fact realization that some things are going to have to change. On the one hand, better late than never. On the other, that's just terrible from an investment predictability standpoint. When you're a vessel owner and you're going to be making investments in long life assets like vessels, engine technology, things that they take time to order, you need to plan shipyard periods for installation, crews need to be trained, we've got to have the shore site infrastructure, et cetera. It's just so much better to carefully think that all through and potentially have a longer timeline that is more realistic and better thought out, then we can plan for it and meet it.

That's what we did with Subchapter M. That's what we did with the phase out of single home vessels. We said, here's the goal, here's where we want to be. Let's develop a realistic timeline, and there aren't going to be extensions. When you don't do that, then you find yourself saying, "Oh, we're going to need to issue an exemption or an extension here because this isn't available." That's not the optimal way to do it. It's going to be the necessary way to do it if there aren't some regulatory changes made, but it's certainly not the best way to do it.

Looking across the industry, what are some other important regulatory issues that AWO is currently paying attention to?

JC: We mentioned some of the big ones in workforce and sustainability. I would be remiss if I didn't mention Subchapter M. It was a huge achievement on the part of vessel owners and mariners throughout our industry to meet the July 2022 100% COI deadline, really without a hitch as far as commerce is concerned. They worked hard, they spent a lot of money, they put in tremendous amounts of effort. There was no interruption of commerce. They got it done.

We're not done with Subchapter M. There are going to be dry dock and internal structural exams, COI renewals every five years. It's going to be really important to have very good communication with the Coast Guard. Very good planning for shipyard periods, continued focus on the Coast Guard's part on consistent, practical interpretation, uniform enforcement as we move forward.

For AWO, as an organization, what is its top priorities for the coming six to 12 months and what's being done to address these?

JC: Education, education, education of new members of Congress. We've got about 80 new members between the House and the Senate. There is so much to love about our industry in terms of security benefits, economic benefits, career opportunities, sustainability benefits. We have to tell that story. So job one is educating new policy makers, existing policy makers who find themselves in different jobs.

What is our message? Our message is rock solid support for the Jones Act. Our message is invest in and maintain our waterways infrastructure, work with us to attract, retain and develop the maritime workforce of the future. Let's work together to improve the sustainability of the transportation system by moving more cargo by water, by doing that more efficiently and by supporting companies in their efforts to improve their own environmental footprint.

I'm so optimistic about the relevance of our industry to our country's current and future challenges. Our commitment at AWO is really to advocate for them, to provide resources for members, to amplify their voice as they look to really support their customers and our country, and taking advantage of these new opportunities. We greatly value collaboration with public and private stakeholders, allies, coalition partners, to get that done because the issues are bigger than any one industry or organization.

Column

Decarbonization

Zero-emission Port Vehicles Key to Decarbonization

By Jacob Whitson, CORE Program Manager, CALSTART

Ports are high-polluting environments, with lots of diesel-powered off-road vehicles in operation, working day and night. This makes the maritime industry a key player in the decarbonization of off-road transport, with companies and authorities seeking new ways to reduce emissions and encourage greater use of zero-carbon machines. Off-road electrification is progressing rapidly, particularly within certain categories of cargo handling, such as forklifts.

The need to tackle high port emissions

According to the U.S. Environmental Protection Agency (EPA), emissions from port operations expose millions of people living in close proximity to these operations to harmful levels of air pollution. Emissions associated with diesel engines have been linked to a range of serious health conditions, including heart and lung disease, cancer, and respiratory illnesses, particularly in younger and older people. This is in addition to the negative effects on the global climate made by CO2 from these diesel emissions.

Reducing maritime emissions levels is, therefore, a focus of zero-carbon efforts and agencies are looking at where zero-emission technology can best be used at ports, including the electrification of off-road vehicles. A study carried out in 2013 by the International Council on Clean Transportation (ICCT) discovered "the ports of Seattle/Tacoma and San Francisco have the highest rates in the [U.S.] of early deaths per 100,000 residents from port pollution, more than double the global average" (Stand.earth, 2022).

What options are there for electrification of port equipment?

Ports present a range of opportunities for electrification, with many of them being trialed by anchorages. Options include cargo-handling equipment such as yard trucks, forklifts, drayage trucks, and port cranes. One of the most effective opportunities for reducing emissions at ports is "cold ironing," in which docked ships are powered from the shore by an electrical power source on the quayside, eliminating the need to run the diesel engines.

The cargo-handling equipment (CHE) category comprises off-road equipment, as well as equipment in intermodal rail yards or ports used to lift and move cargo, and sometimes that employed for repair or maintenance purposes. Many off-road vehicles in this category are suitable for electrification; some electrified versions, such as forklifts and yard trucks, are already in use.

Port electrification challenges still exist

According to the California Air Resources Board's (CARB) 2022 Heavy-Duty Investment Strategy, infrastructure and cost are the two main market barriers for off-road equipment electrification (CARB, 2022). Charging infrastructure is essential to the success of electrification projects, and some heavy-duty equipment used at ports, such as some of the largest cranes, requires particularly high charging rates, which can involve specialist installation.

However, battery-swapping solutions and high-power charging, up to 1.5 megawatts, are being explored (McKinsey, 2019), while hydrogen fuel-cell options may offer an alternative to batteries, particularly if remote hydrogen generation can be developed. There are also ways of reducing the impact on productivity from slow charging downtime, including the installation of new, very large fast-charging systems, allowing for charging during loading and unloading or even during operation. Pantographs paired with renewable power generation can provide an ideal zero-carbon charging option, but are currently prohibitively expensive in most cases. There are also growing options for hybrid-

electric technologies, which can offer improved efficiency and lower energy costs than traditional ICE vehicles.

The future of maritime electrification: the Beachhead Model

The Beachhead Model, conceptualized by CALSTART and CARB, attempts to provide some of the answers to challenges that remain when it comes to fully electrifying larger off-road equipment (CARB, 2022). It demonstrates that electrification of larger equipment and more difficult-to-electrify segments can be achieved and accelerated by using small-equipment electrification as a starting point.

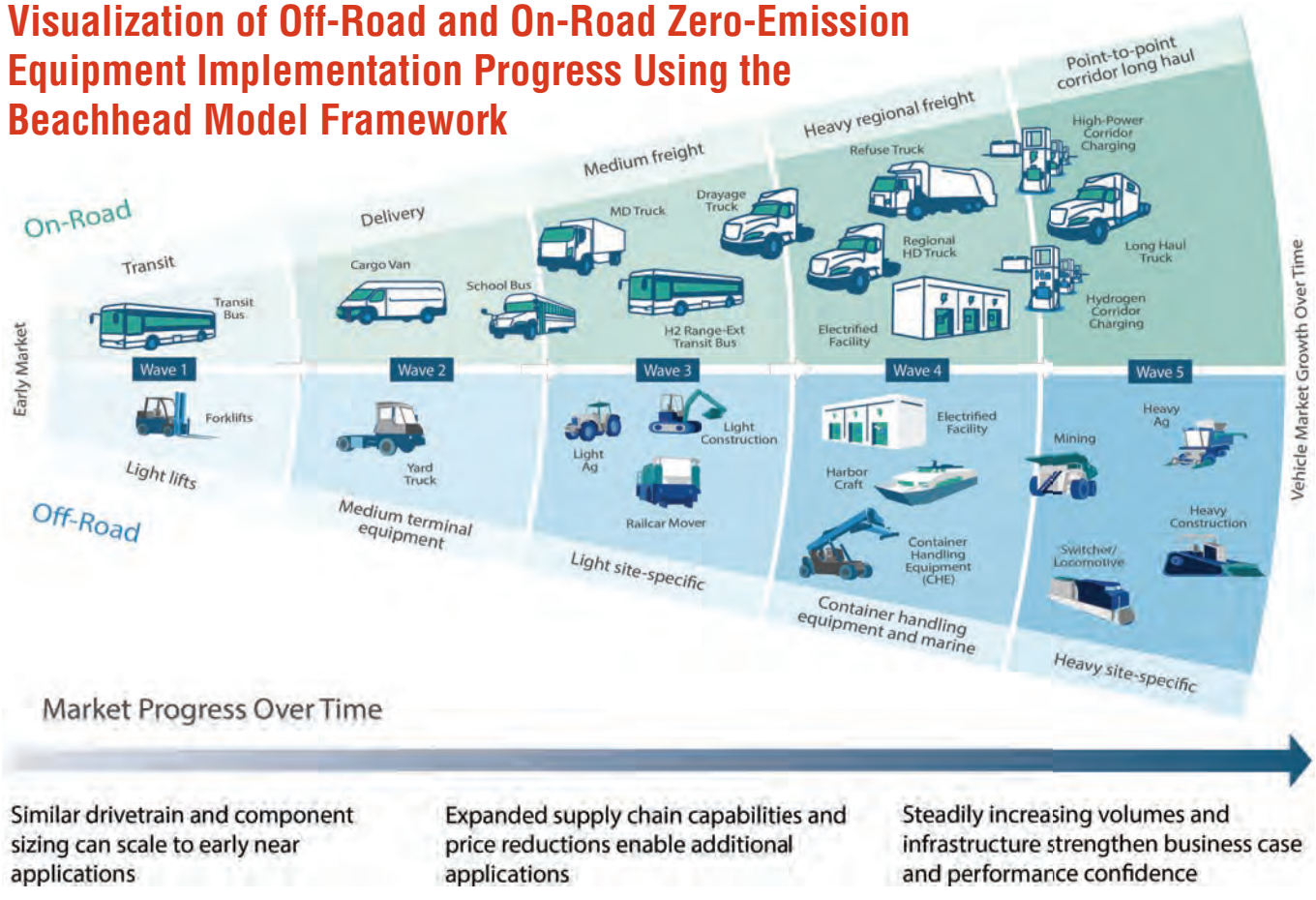
The electrification of large fleets of compact equipment brings about key benefits that make the electrification of larger equipment more likely, including R&D spending in the electrified segment, expansion of charging infrastructure, and winning-over of employees or companies. Each wave of development has a ripple effect on the next and, from the diagram above, it can be seen that development of off-road electrification has already reached Wave 4.

This process of electrifying larger off-road vehicles is expected to continue as batteries become faster, safer, more powerful, and less expensive (CALSTART & CARB, 2022). Progress is already leading to longer operating times, expanding the range of vehicles suitable for electrification, and demonstrating that electrifying heavy off-road equipment is achievable. The Beachhead strategy has proven successful in addressing the challenges of and eliminating key barriers to electrifying off-road equipment, with improvements in infrastructure at locations such as ports and airports expected to lead to wider implementation in the future.

Incentives will accelerate move to electrified ports

In the U.S., California is leading the way in the electrification of off-road vehicles, including those used at ports. California Governor Gavin Newsom's 2021 Executive Order N-79-20 sets a deadline of 2035 for all sales of off-road equipment in California to shift entirely to zero-emission models. The ground-breaking state legislation is expected to influence electrification legislation, incentives, and uptake across North America. Related to this, California's $273 million Clean Off-Road Equipment (CORE) Voucher Incentive Project, which covers a range of vehicle and equipment types, provides a discount on the sale or

Visualization of Off-Road and On-Road Zero-Emission Equipment Implementation Progress Using the Beachhead Model Framework



CALSTART & CARB, 2022

lease price of zero-emission equipment, with no scrappage requirement. There is also further CORE funding available for machines deployed in disadvantaged communities, and for charging and fueling infrastructure.

The U.S. is also seeing a growing body of national legislation aimed at promoting zero-emission machines, such as the Inflation Reduction Act of 2022, the Diesel Emission Reduction Act (DERA), and the U.S. National Blueprint for Transportation Decarbonization. Coupled with legislation, incentives will play a crucial role in offsetting the relatively high initial outlay for electrified off-road equipment purchases. For example, DERA's objective is to fund cost-effective projects, such as equipment replacement and retrofits, targeted at communities disproportionately affected by emissions, such as those near ports.

San Pedro Bay Ports takes action to decarbonize

Comprising the Ports of Long Beach and Los Angeles, San Pedro Bay Ports has set an ambitious target of emission-free goods movement by 2030, with the infrastructure and equipment associated with the project expected to cost as much as $14 billion. The twin port complex's 2021 clean air assessment revealed the four main categories of port equipment were dominated by ICE technology (San Pedro Bay Ports, 2021), including 1,615 yard tractors (80% powered by diesel engines), 560 forklifts (nearly 40% heavy-capacity diesels), 159 RTG cranes (almost wholly powered by diesel engines), and 389 container handlers. It should be noted, however, that 23% of the cranes used advanced ICE/hybrid electric technology, which reduces emissions and delivers higher operational efficiency.

The figures from San Pedro Bay Ports demonstrate the potential for decarbonization of off-road vehicles in ports and the scale of work needed to move toward zero-emission powertrains. However, in the 2021 assessment, the ports authority also noted at least 20 pieces of battery-electric or fuel-cell electric cargo-handling equipment were either in full deployment or in the pilot stage, including yard tractors, container handlers, and large-capacity forklifts.

Batteries alone unlikely to deliver full decarbonization

As demonstrated by San Pedro Bay Ports, the path towards decarbonization of off-road vehicles in the maritime industry is unlikely to be achieved using battery power alone. There will undoubtedly be some types of heavy equipment used at ports that are not suitable for a purely electric option because of factors such as range, charging times, or power density.

In these cases, developments in hydrogen fuel-cell tech-

nology can provide the zero-emission solution required. In the U.S., the Department of Energy is allocating $8 billion for the development of "Hydrogen Hubs" across the country and some OEMs already have hydrogen fuel-cell off-road vehicles in the demonstration phase. Anticipated future developments in hydrogen refueling infrastructure could overcome some of the key technological barriers to adoption, although concerns remain about the cost and current carbon footprint of producing hydrogen fuel.

The path to decarbonization of maritime off-road vehicles

Electrification presents a range of benefits beyond significant environmental and health advantages. Because battery-electric equipment (Raftery, 2018) has around 20 parts in the drivetrain, compared with more than 2,000 parts for internal combustion engines, it requires near-zero maintenance and has almost no breakdowns. This in addition to reduced running costs and dramatically lower noise and vibration levels. In fact, repair and maintenance costs of battery-electric equipment is often almost half the price compared to corresponding ICE models (Office of Energy Efficiency and Renewable Energy, 2021).

Legislators, relevant agencies, and the maritime sector are all working together to encourage greater uptake of zero-emission off-road vehicles at ports. High levels of pollution and the health impact on those living near ports, as well as those ports' heightened carbon-emissions levels, makes the maritime industry a key focus of efforts to decarbonize off-road transportation. In port cities and states such as California in particular, legislators are implementing measures to hasten the adoption of battery-electric, hybrid, and hydrogen fuel-cell vehicles.

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BW Ideol

Floating Offshore Wind – New Seascape, New Challenges

By Tom Ewing

Offshore wind energy planners are giving close review to fixed-tower systems in order to extend lessons learned to floating wind towers, under development now. In the U.S., floating towers have been most closely associated with plans for new wind energy areas (WEA) in the Pacific, off of California and maybe Oregon and Washington. But important research is also taking place in Maine, at the University of Maine, because of deep ocean Atlantic areas there, and floating towers may also be used in the Gulf of Mexico.

As most readers likely know, floating wind energy turbines offer the chance to take advantage of rich wind areas in waters too deep for fixed turbine construction. Floating towers, though, present new and different and additional technical and maritime challenges. Once resolved, however, floating technology would make accessible WEAs with strong and constant wind energy.

This emerging industry and technology were the focus of the most recent annual Floating Wind Solutions (FWS) conference held in Houston, January 30 – February 1. The FWS conferences provide an opportunity for project leaders to focus on the industrialization and com-

W.F. Baird & Associates

"Risks in terms of search and rescue are complex and very much depend on experience from real world operations, not computer models."

– Larry Wise, Senior Coastal Marine Engineer, W.F. Baird & Associates

mercialization of floating wind energy. Interest is growing - 850 people, from over 400 different global companies, attended FWS '23; that's up from 600 people at FWS '22 and 400 at FWS '21. Organizers expect over 1,000 at the 2024 event. The U.S. DOE maintains a link to the conference and provides a registration link on its website, although DOE does not have a formal role within the conference organization and presentations.

The 2023 conference started with a series of presentations headlined "Floating Wind: Transfer Learnings of Deepwater Development." This category included a session on environmental and regulatory issues. Larry Wise, Senior Coastal Marine Engineer with W.F. Baird & Associates, based in Houston, presented a discussion on "Navigation Safety Considerations and Permitting for a Floating Wind Project in USA." Wise has been part of the research team at the University of Maine Aqua Ventus project, also known now as the New England Aqua Ventus project because of additional partners and expanded project scope.

Wise first referenced the requirements set within a Navigation Safety Risk Assessment (NRSA) which identifies and evaluates a project's hazards and risks to vessel navigation. BOEM requires an NSRA for offshore projects. The central document here is the USCG's Navigation and Vessel Inspection Circular No. 01-19, "Guidance on the Coast Guard's Roles and Responsibilities for Offshore Renewable Energy Installations." Wise said the NSRA tells the Coast Guard what objects will be placed in the waterway. He added that various states may also require additional permits or approvals, particularly within a state's three-mile offshore ocean boundary.

Traffic analysis is done using AIS – automatic identification systems – data. AIS tells what kind of ships are in a proposed WEA and the vessels' locations.

The NSRA outlines the steps needed to avoid and minimize navigation conflicts. This is critical not just for safety but, Wise added, because it impacts the layout of the project within the WEA and the profitability of the project. Wise said that developing clear and unambiguous warning systems is a challenge within a floating wind tower project area. Avoidance measures – for fixed or floating projects – can include navigation lanes, setbacks and safe access for fishing vessels.

Wise listed other navigation impacts from wind towers including radar degradation, electromagnetic interference, noise and, of course, visual and line-of-sight problems because of new structures and construction equipment. He said that corridor widths between turbines are based on a number of considerations including power generation requirements, vessel navigation, commercial fishing, search and rescue, existing surface and sub-surface infrastructure, and seabed conditions. Lane width analyses are

Figure 1

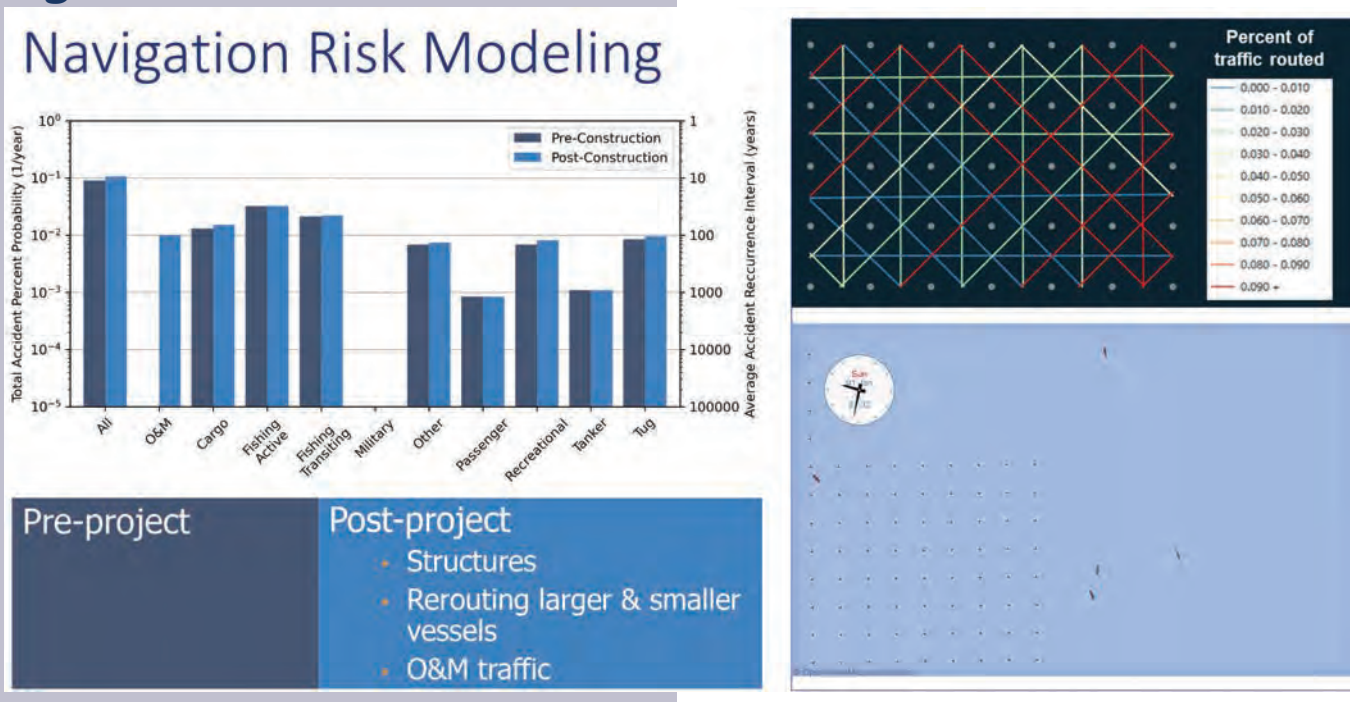
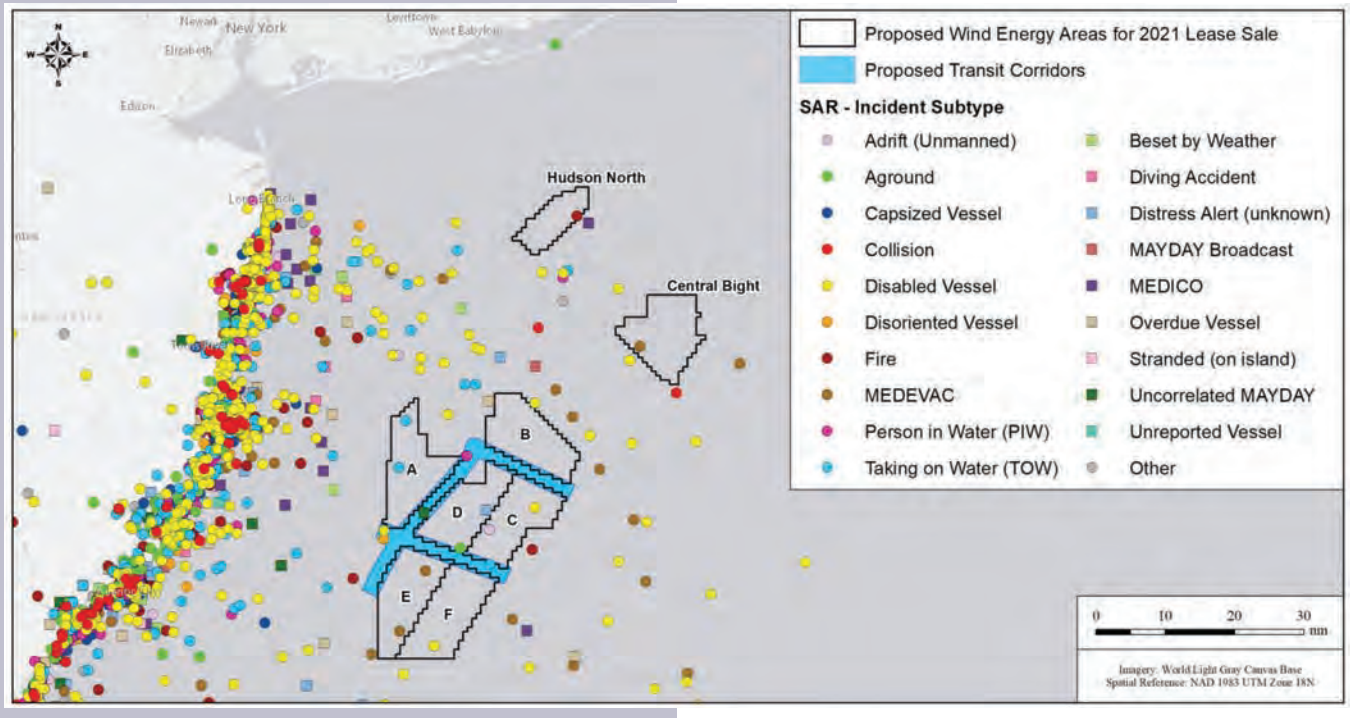


Figure 2



based on European experiences and documents. For reference, Wise cited the "White Paper on Offshore Wind Energy" written by the Netherlands' Ministry of Infrastructure and the Environment and The Ministry of Economic Affairs in 2014.

Readers may recall that in February 2022 the National Academy of Sciences released a study sponsored by BOEM that documented how wind towers degrade maritime radar. Turbines clutter a radar's display, resulting in an ambiguous and confusing picture for the operator, according to the NAS report.

Wise was asked about developments pertaining to radar-wind turbine impacts. He cited the NAS February 2022 report as the latest guidance and that the report includes a number of recommendations for testing, data collection and evaluation.

Mitigating radar impacts remains a high-level focus for a number of federal agencies, including the Departments of Defense and Energy as well as for NOAA and BOEM. The exact status of this work, however, at least since last February, isn't clear. A BOEM spokesperson said that BOEM now uses the NAS report for environmental studies; specific questions about follow up, though, were referred to the Coast Guard.

DOE has a website for the "Wind Turbine-Radar Interference Mitigation Working Group." The Department of Homeland Security, which includes the Coast Guard, is listed as a Working Group "observer," not a direct participant.

A DOE web page explains that a Memorandum of Understanding,

first signed in 2014, was updated this year - in 2023, but the link to the MOU posted on the website does not detail this recent work. Importantly, DOE's goal – by 2025 – is to accomplish the following:

- *Address wind turbine radar interference as an impact to critical radar missions;*
- *Ensure the long-term resilience of radar operations in the presence of wind turbines, and,*
- *Remove radar interference as an impediment to future wind energy development.*

Wise said that port activities need to be part of a wind energy project analyses. Port officials need to know where construction will occur and how a port's operational issues may be impacted. Risk modeling estimates whether and how navigational risks will increase once a project is complete. Wise said that most models show only a slight increase in risks for ports from OSW fixed-structure projects (see figure 1).

After referencing fundamental issues within fixed-tower WEAs Wise turned to some of the unique challenges from the navigational footprint of floating towers. He said the work at the University of Maine Aqua Ventus project has been helpful in assessing and addressing floating tower impacts.

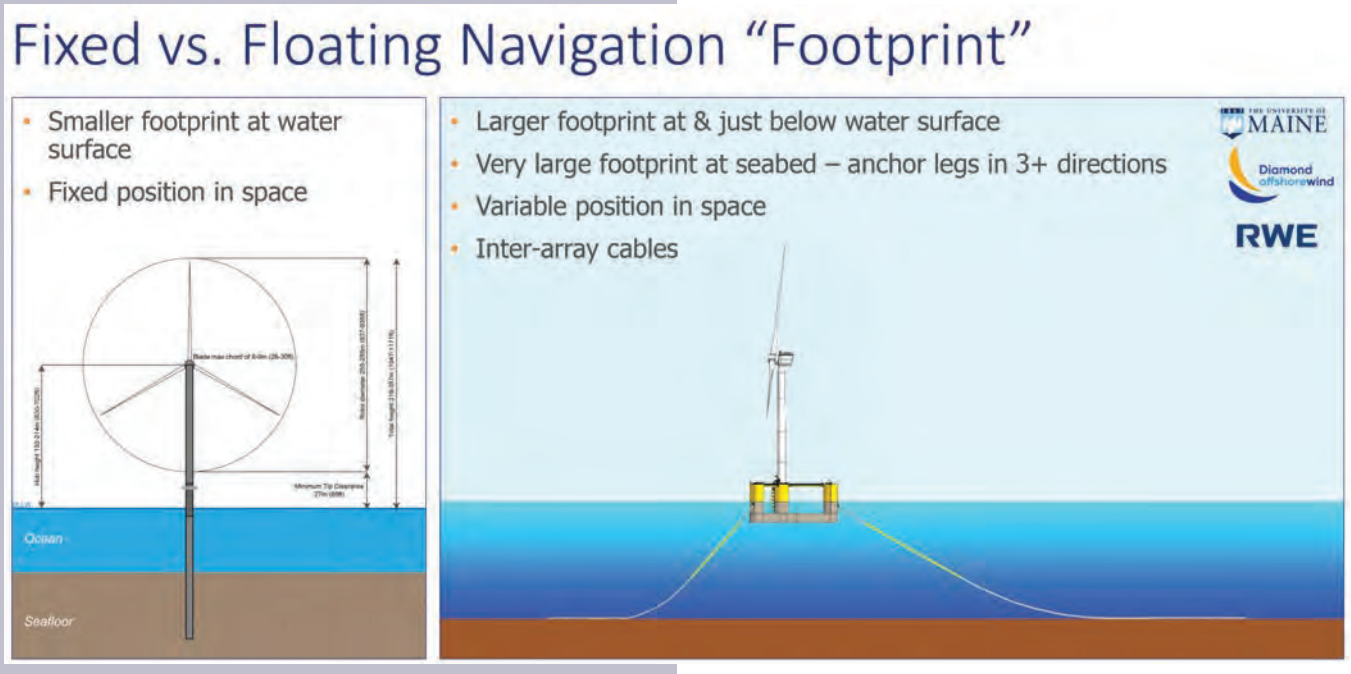
Wise gave particular attention to emergency response capabilities within project areas. Emergency response, of course, includes events in which people are in direct and immediate danger – man-overboard, for example, or taking-on-water or collisions – events demanding a no-wait response despite weather and ocean conditions. Other emergencies may not present immediate life-death outcomes but still demand immediate action – an oil spill, for example, or loss of power or a stranded, drifting vessel.

The point is that for first responders' access and transit through an OSW area are critical parts of up-front planning (see figure 2, presenting 20 years of maritime emergency data off of New Jersey).

Wise said floating towers present a much larger footprint compared to fixed towers. Floating towers will have anchor lines in many directions. But floating turbines will still move to some degree, even though that movement is limited. Floating towers will be linked by an inner array of cables between the turbines (see figure 3). Hence the concerns about access and navigation for emergency crews.

In response to questions, Wise said he does not anticipate much difference in impacts to search and rescue

Figure 3



operations with fixed versus floating wind projects. He said anchor chains will need to be avoided – generally affecting surface vessels within <30m of a structure. Lane widths, though, will likely be the same. He said that "risks in terms of search and rescue are complex and very much depend on experience from real world operations, not computer models."

One open question is how all of this linked equipment should best be marked? Finding the right answers, Wise said, is part of the work going on with Aqua Ventus. If everything gets marked, Wise said that raises concerns about too much clutter, that mariners may turn off radar and other equipment because signals are overwhelming.

Wise said this is particularly important for commercial fishing because fishers are more likely to work within WEAs not just transit through. Wise referenced work with lobster fisherman in Maine, seeking their advice about keeping transit corridors safe but without overloading warning devices or systems, inadvertently creating a deluge of information for humans and machines that just might be ignored after a while.

Wise said the lobster fishers preferred a less-is-more approach: don't mark each individual anchor, for example. These issues also extend to the dynamic export cables which deliver power from the turbines to equipment on shore. Wise said "sector lighting" approaches are under review, which he said could include placing a red light over the dynamic cables.

Again, though, he repeated the same concern: as more and more lights are set in more and more places the seascape could get more confusing, not less. He referenced added concern about recreational mariners who don't have the same level of training and experience as commercial mariners.

And he added another note of caution. The references within his presentation were for pilot projects. He said that once these projects "move to scale, to a full array of turbines, you can see the challenge" from anchors going in multiple directions. Another issue is how or whether all of this equipment might be included – or should be included – in nautical charts. Wise again referenced concern that mariners might start to turn off charting systems because of clutter and then miss critical safety information.

Going forward, Wise said that efforts to find the best answers to these questions about how the seascape looks within floating wind towers remains a focus for New England Aqua Ventus researchers. Another goal is to develop systems consistent with international standards so that all captains are familiar with warning signs and messages when vessels enter U.S. waters.

The American Waterways Operators was asked about how they are prioritizing concerns associated with floating wind towers. A spokesman noted that, indeed, these issues are being tracked but that floating towers are likely still quite a few years away from construction. And AWO members have a rather straightforward position: avoid transiting among floating turbines. AWO's primary focus is that regulatory authorities establish fairways that are wide enough to avoid any turbine-cable risks. The group is confident that these wide passageways will be set. Another concern, although admittedly more remote, is that a turbine breaks free and becomes a hazard in a fairway. AWO is following developments on both the West Coast and the Gulf of Maine.

All images: Amogy

Ammonia-powered Tug Conversion Underway

A first-of-its-kind ammonia-powered, zero-emission tugboat will be put to the test by Brooklyn, N.Y.-based startup Amogy in late 2023.

By Eric Haun

Having already successfully demonstrated its technology on an aerial drone, tractor and semi-truck, the ammonia power solutions company revealed in early March that it is retrofitting a scaled up 1-megawatt (MW) version of its ammonia-to-power system onto a tug at Feeney Shipyard in Kingston, N.Y. as a test run for its emissions-slashing power and propulsion technology in the commercial maritime sector.

Once installed, Amogy's onboard solution will feed liquid ammonia through its cracking modules integrated into a hybrid fuel cell system that will provide zero-carbon power to the vessel's electric motors. Ammonia, which does not emit CO2 when used as a fuel, has been gaining interest in the maritime industry as stakeholders explore options to decarbonize vessel operations. Green ammonia produced with renewable energy results in zero well-to-wake greenhouse gas emissions.

"There are different renewable energy options to decarbonize many different mobility applications. For example, batteries are a solution to electrify consumer vehicles, which is possible because you can always recharge the vehicle overnight. However, maritime vessels require very high energy density when it comes to fuel," said Seonghoon Woo, CEO of Amogy. "Therefore, the industry really needs a renewable fuel that is highly energy dense in its liquid phase."

Woo founded Amogy in 2020 alongside three fellow MIT PhD alumni. To date, the company has raised $209 million in funding, including $139 million announced on March 22 through a Series B-1 fundraising led by SK Innovation with global investors such as Temasek,

Korea Zinc, Saudi Aramco's Aramco Ventures, AP Ventures, MOL PLUS, Yanmar Ventures, Zeon Ventures and DCVC. Amazon's Climate Pledge Fund has also invested in the company.

"[The tug conversion] is the first milestone of many you will see from Amogy in accelerating the accessibility and scalability of clean energy in the global maritime industry," Woo said, noting the tug will be trialed later this year ahead of targeted commercialization in 2024.

The vessel being used for the retrofit and trials is a 105-foot tugboat built in 1957 and previously used to transport petroleum products. Asked why the vessel was chosen, Woo said, "The technical reason, first of all, is that the vessel is equipped with an electric powertrain, which we can benefit from because our technology is also generating electric power—not using diesel, but using ammonia as a fuel. . . The second reason is that the size works perfectly with our scale-up plan." The tug's 1 MW system will be roughly three times more powerful than Amogy's previous trial system in the semi truck.

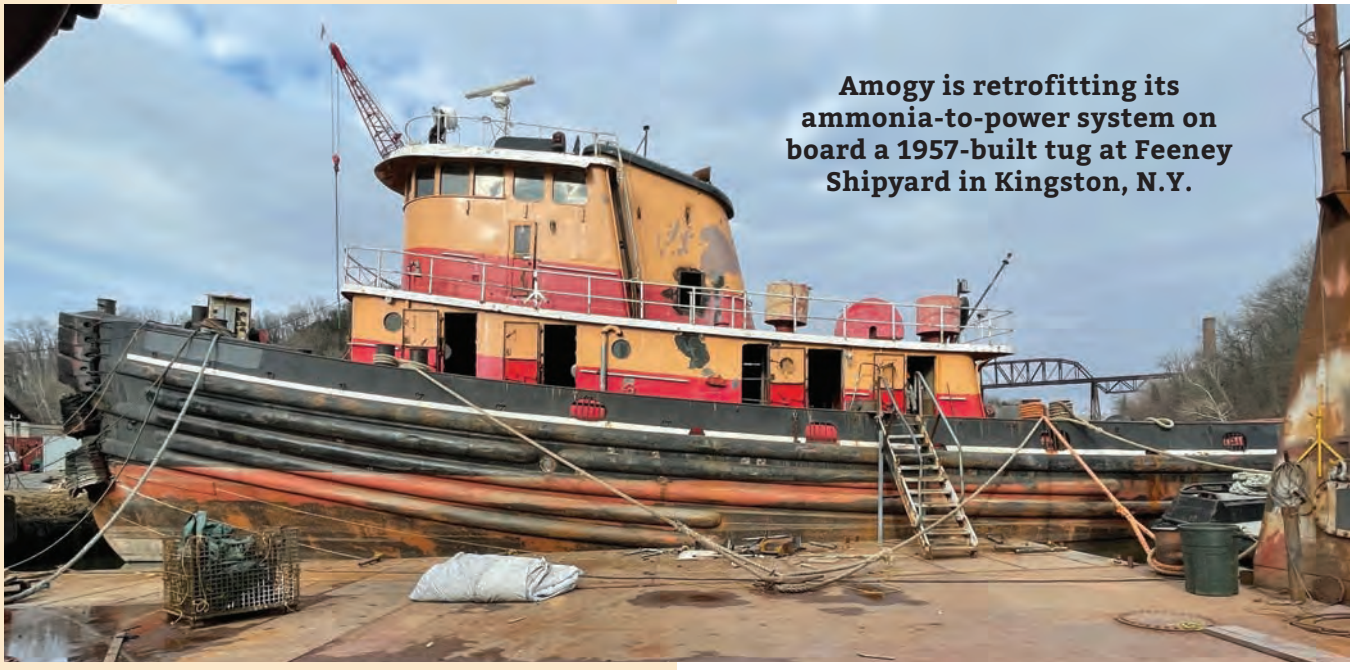
Feeney Shipyard, from whom Amogy sourced the tugboat, is leading retrofitting construction, engine removal and more under supervision of C-Job Naval Architects, the Netherlands-based independent ship design company integrating the ammonia system. Other partners contributing to the project include Norwegian electrical systems integrator Seam, which will deliver the power system, integrated automation system and safety system through its e-SEAMatic brand, as well as a battery system and electrical motor for main propulsion. Also involved is Unique Technical Solutions (UTS), the U.S.-based electrical and systems integrator from Amogy's prior demonstrations, for the electrical and systems work involved in scaling up the powerpack for pre-commercial use.

The vessel's new fuel tanks will be based on existing ammonia cargo tanks and fill roughly the same space previously carved out for diesel storage, Woo said. "But we are increasing the tank size by probably 20% or 30% to accommodate more fuel," he added. Power and voyage endurance capabilities will be nearly equivalent to those of the diesel-powered tug, and Amogy's system will be able to provide a continuous power for about 8 to 10 hours.

Norway's Yara Clean Ammonia (YCA), one of the world's largest ammonia producers, and the largest trader

"Vessels built today will be on the water for another 20 or 25 years at least, so we have to start the decarbonization cycle today to reach our goal by 2050."

– Seonghoon Woo, CEO, Amogy



Amogy is retrofitting its ammonia-to-power system on board a 1957-built tug at Feeney Shipyard in Kingston, N.Y.

and shipper of ammonia around the world, will provide green ammonia for the demonstration. YCA is currently building an ammonia bunkering network in Scandinavia with the first bunker barge scheduled to enter service in 2024. The project partners are still working out how Amogy's converted tug will be bunkered, whether from a barge-based or shoreside solution.

Already a globally-traded commodity backed by existing infrastructure and transportation networks, the global market for green ammonia is expected to grow significantly in the coming years to help meet decarbonization goals in many industries, including transportation and shipping.

But often when ammonia is discussed as a marine fuel, questions arise about its handling challenges and poten-

tial dangers for crew members. When asked about these concerns, Woo noted that the company is working with the U.S. Coast Guard and partnering with classification society DNV to ensure alignment with all maritime safety standards. Amogy's solution also has approval in principle (AIP) from classification society Lloyd's Register.

"DNV has been working with Amogy since December 2021, focusing on the safety aspects of the development of their ammonia system," said Hans-Christian Wintervoll, DNV's senior consultant in maritime environmental technology. "A high-level feasibility study was executed in early 2022, and Amogy has shown great momentum in development from that point, through the HAZID [hazard identification] workshop in June the same year, to the HAZOP [hazard and operability analysis] workshop in January this year."

Woo added that "Ammonia has been transported on board cargo vessels as a commodity for longer than probably four or five decades. Because of [this], there are well-established safety measures and protocols on how to store and transport ammonia, which we are basically piggybacking on."

Amogy said it intends to run the converted tug through its paces later in 2023 in upstate New York, pending further safety testing and regulatory discussions.

In addition, Amogy announced in late 2022 that it is partnering with Southern Devall (formerly Southern Towing Company & Devall Towing) to deploy its technology in an ammonia tank barge in 2023. The project is currently in the design phase.

In terms of other market opportunities, Woo said Amogy sees potential for its technology in both the retrofit and newbuild markets, eventually scaling to 10+ MW systems to power larger oceangoing ships.

Woo said Amogy is committed to working with collaborators and stakeholders to reach the industry's urgent decarbonization targets. "With the strong push from regulators as well as governments in the States, we all know that we have to really reach net zero by 2050, which has to be the case for maritime shipping as well," he said. "Vessels built today will be on the water for another 20 or 25 years at least, so we have to start the decarbonization cycle today to reach our goal by 2050."

Philly Shipyard

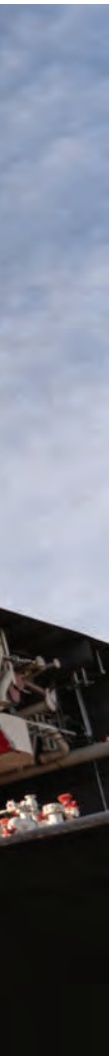
2023 U.S. SHIPBUILDING REPORT

By Eric Haun

Much has changed since *Marine News*' 2022 shipbuilding report published in March last year, and business opportunities in certain market segments continue to grow. But the shipyards that are looking to cash in are still facing many of the same challenges.

For example, many American shipyards and their partners throughout the shipbuilding supply chain are still finding it difficult to attract and retain the workers they need. If you're a skilled craftsperson looking for a job in shipbuilding, you're in luck, because there are plenty of openings at shipyards across the country. Job fairs and hiring events are becoming more commonplace, while some yards, such as HII's Ingalls Shipbuilding, are getting creative. The Pascagoula, Miss., shipbuilder has opened an on-site Chick-fil-A and is offering Wi-Fi to help woo the next generation of shipyard workers.

In addition, the impacts of historically high inflation are being felt across sectors, placing pressure on shipyards, which tend to engage in fixed-price contracting. Going forward, cost concerns could potentially stall some newbuild



order plans, or in the case of offshore wind, lead operators to examine retrofit options over the previously preferred newbuilds. But in most instances, vessels still need to be built; they're just going to be more expensive.

At the close of 2022, Philly Shipyard in Philadelphia reported a record high order backlog of more than $2.1 billion, with contracts to build the Maritime Administration's (MARAD) five National Security Multi-Mission Vessels (NSMV), a subsea rock installation vessel for Great Lakes Dredge & Dock and three 3,600 TEU Aloha Class LNG-fueled containerships for Matson for deliveries scheduled out to 2027. But the builder warned in its Q4 2022 report that its "forecast continues to be negatively impacted by significant delays, productivity loss and increased costs, including costs of labor, materials and logistics issues." Philly Shipyard said it expects COVID-19 impacts such as "risks to human capital resources arising from vaccine mandates, supply chain constraints, labor and raw materials shortages and inflation" will continue even as the pandemic retreats.

Certainly, supply chains have improved some over the past 12 months, but the situation is still far from perfect, with long lead times and delays hindering newbuild projects of all shapes and sizes. A builder of rigid hull inflatable boats (RHIB) recently told ***Marine News*** it had to swap the brand of outboards it typically uses for most builds because it simply couldn't source the volume it needs.

Asked about supply chain concerns, Garrett Rice, president at Master Boat Builders in Coden, Ala., said, "We've run into some issues, but nothing that has been insurmountable. We've been able to work our way through it and find the product where we need to get it and when we need to get it. The supply chain is just tough in general. Building series of boats is always nice because you have that long backlog. But right now, in order to meet schedule, we've even had to buy a lot of material up front for multiple boats: four, five, six at a time. Get it all to the yard, pay for it all up front. That way we have security in the fact that we have it when we need it.

"Four years ago, we would order [certain items] and say deliver it on four-month intervals, and there'd be no issue. They'd deliver it every four months or three months, whatever the schedule dictated," Rice said. "But now, we just don't have that trust in the supply chain that when we need to get it, it's going to be available. So, we're having to place large orders, store things ourselves, get a lot of equipment here early, which is good for the customer, but it's just different than it once was."

GOING GREEN

Master Boat Builders, which has been delivering a steady stream of tugs, with a number of new orders on the books—including vessels for Bay Houston Towing, Suderman & Young and Moran Towing—has as emerged as one of the U.S. yards helping to lead the charge toward greener vessel operations. Notably, it is currently building Crowley's eWolf, the first zero-emissions, all-electric ship assist tug in the United States. The highly anticipated 82-foot harbor tug is expected to be completed and ready for service at the Port of San Diego later this year.

Another first-of-its-kind vessel currently under construction and designed for cleaner operations is Maritime Partners' Hydrogen One towboat, being built at Intracoastal Iron Works in Bourg, La. The groundbreaking vessel will run on emissions-reducing methanol-to-hydrogen generator technology—without diesel propulsion, for operator American Commercial Barge Line (ACBL). ACBL has recently order two other notable vessels: an EPA Tier 4 retractable towboat from Bayou La Batre, Ala. shipbuilder Steiner Construction Company, and an 11,000 horsepower (HP) class towboat from C&C Marine and Repair in Belle Chasse, La. For delivery in Q4 2023 and Q3 2024 respectively.

But nowhere has the "green" shift been more apparent than in the passenger vessel sector (covered extensively in the February 2023 edition of ***Marine News***). In January, the Federal Transit Administration (FTA) announced $384.4 million in grant awards to 23 projects in 11 states and the U.S. Virgin Islands to expand and improve the nation's ferry service, as well as accelerate the transition to zero emission transportation.

In addition, The San Francisco Bay Area Water Emergency Transportation Authority (WETA) is currently investigating both clean marine propulsion technology and shoreside infrastructure needs as it expects to order only zero-emission passenger ferries going forward.

Up the coast, the Washington State DOT (WSDOT) will launch a competitive bid process for the construction of its next hybrid-electric ferries after negotiations stalled with shipbuilder Vigor over cot and contracting disagreements. The five vessels will be bid out as a single program

WindServe Marine

Senesco Marine is building crew transfer vessels for fellow Reinauer company WindServe Marine, an early entrant to the United States fast-growing offshore wind industry.

to Washington shipbuilders, though other yards outside the state could potentially compete for the project if local bids come in at too high a price. The state estimates the program to be worth about $1 billion.

Along the East Coast, Casco Bay Line (serving islands in coastal Maine, out of Portland) selected Senesco Marine to build a double ended hybrid electric ferry to replace an existing diesel vessel. The North Kingston, R.I. shipyard has also been selected to build a hybrid-electric passenger/vehicle ferry for the Maine State Ferry Service (MSFS). And slated to come online in NYC is a new zero-emissions electric high-speed ferry operated by New York Cruise Lines subsidiary New York Water Taxi on the Hudson River between Brooklyn and Manhattan. The carbon-fiber vessel is scheduled for launch in 2024, though a builder has yet to be announced.

The Texas Department of Transportation (DOT) will be taking delivery in 2023 of Esperanza "Hope" Andrade, a double ended vessel built at the Gulf Island Fabricators facility in Louisiana, with batteries to supplement its diesel electric powerplant.

THE RISE OF OFFSHORE WIND

Unprecedented opportunities also exist in the United States' fast-growing offshore wind industry, where a large number of new vessels will be needed to support the construction and operation of wind farms due to sprout up in several U.S. regions.

"The foundations are firmly in place to support the de-

Eastern Shipbuilding Group is building a new auto and passenger ferry for the Bridgeport & Port Jefferson Steamboat Company.

EBDG

ployment of 30 gigawatts (GW) of offshore wind by 2030 and 110 GW by 2050," said Phil Lewis, director of research at Intelatus Global Partners. "Yet despite the demand drivers and local content preferences supported by the Jones Act, there has been relatively limited newbuilding activity for crew transfer vessels (CTV) and service operations vessels (SOV) in the U.S."

Several U.S. shipbuilders are already active building CTVs, including Blount Boats and Senseco Marine in Rhode Island, Gladding-Hearn Shipbuilding in Massachusetts, St. Johns Ship Building in Florida and Gulf Craft in Louisiana, but Lewis noted that each has certain capacity limitations and that the demand for these vessels will be strong—potentially hundreds over the coming decade. Lewis and Intelatus have identified at least 30 other U.S. shipyards capable of building CTVs to meet this demand.

In the SOV segment, Edison Chouest Offshore is building two vessels across its Gulf Coast shipyards, and Fincantieri Bay Shipbuilding is building another in Sturgeon Bay, Wis. for Crowley's CREST Wind joint venture with ESVAGT. Lewis said he anticipates further SOV activity for a broad spectrum of U.S. yards and suppliers in the coming years.

To date, just one yard, Keppel AmFELS in Brownsville, Texas, is building a Jones Act-compliant wind turbine installation vessel (WTIV), Charybdis for Dominion Energy. It is currently expected that most foundation and turbine installation work will be performed by foreign flagged ships supported by Jones Act tug and barge feeder spreads, presenting yet another

Philly Shipyard is currently building MARAD's National Security Multi-Mission Vessels, which will serve as training ships for the nation's state maritime academies.

Philly Shipyard

opportunity for U.S. shipyards. Kirby Marine Offshore, for example, has committed to build two feeder barge and diesel-electric hybrid tugboat units for its partnership with Maersk.

While the industry continues to battle significant economic headwinds, tax credits in the Biden administration's Inflation Reduction Act (IRA) combined with new funding initiatives for offshore wind vessels could help investors to commit to new construction. MARAD last year announced the designation of offshore wind vessels as Vessels of National Interest for support through the Federal Ship Financing Program, giving these applications priority for review and funding. "The program assists the domestic shipbuilding industry, providing support for U.S. shipyards to modernize their facilities, to build and retrofit vessels, and to assist U.S shipowners to cost-effectively obtain domestically produced new vessels," the White House said.

GOVERNMENT SHIPBUILDING

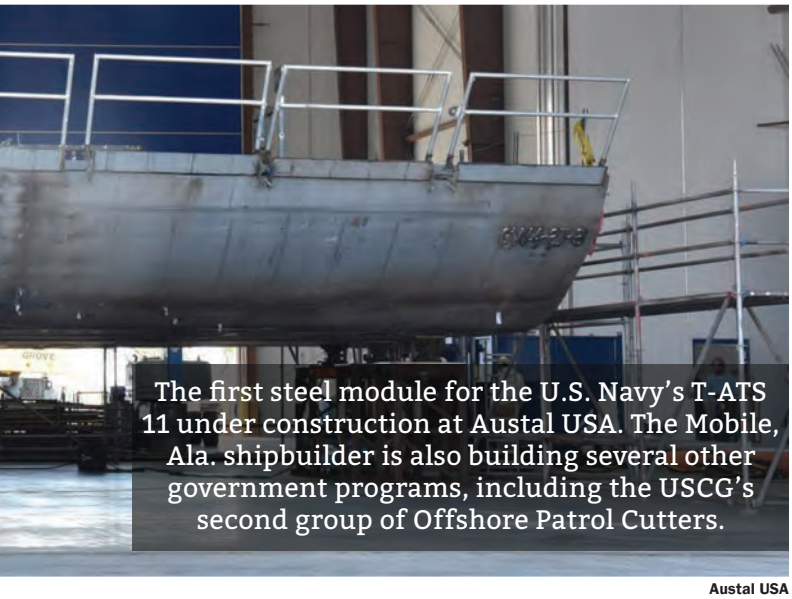
In addition to commercial work, America's shipyards are also building vessels for the U.S. Navy, U.S. Coast Guard, U.S. Army, National Oceanic and Atmospheric Administration (NOAA), MARAD, local and state government customers. Notable shipbuilding programs include the aforementioned NSMVs under construction at Philly Shipyard; a pair of NOAA oceanographic research ships, Oceanographer and Discoverer, being built by Thoma-Sea Marine Constructors, in Houma, La. for respective deliveries in

2025 and 2026; and the Polar Security Cutter program underway at Bollinger Mississippi Shipbuilding (previously VT Halter Marine) in Pascagoula, Miss.—the series' first vessel Polar Sentinel is scheduled to be launched in 2025.

In June last year, Mobile, Ala. shipbuilder Austal USA was awarded a contract to build up to 11 medium-endurance Offshore Patrol Cutters (OPC) for the U.S. Coast Guard. The initial $208.26 million award supports detail design and long lead-time material for one OPC, with options for production of up to 10 additional vessels, the Coast Guard announced on Thursday. The deal could be worth up to $3.33 billion if all options are exercised. Meanwhile, the first four Heritage class OPCs are being built by Eastern Shipbuilding Group in Florida.

Among other noteworthy government shipbuilding programs awarded over the last 12 months is Denver-based Birdon America, Inc.'s contract awarded in October 2022 for the detail design and construction for the Coast Guard's new river buoy and inland construction tenders. The deal includes options for the construction of a total of 16 river buoy tenders and 11 inland construction tenders, and the total contract value is estimated at $1.19 billion if all line items are exercised. Louisiana-based Bollinger Shipyards has been subcontracted to build the hulls.

Government shipbuilding programs, as well as other vessel types such as pilot boats, patrol and fast craft will be covered in great depth in future issues of ***Marine News***, so stay tuned.



The first steel module for the U.S. Navy's T-ATS 11 under construction at Austal USA. The Mobile, Ala. shipbuilder is also building several other government programs, including the USCG's second group of Offshore Patrol Cutters.

Austal USA

Tech File
Software

Fuel Savings Are Just a 'Nudge' Away

BY ERIC HAUN

The commercial maritime industry is hard at work developing, testing and implementing new and innovative technologies to limit its environmental impacts. While much of the effort has focused on physical solutions such as improved hull design, cleaner burning engines and alternative fuels—all of which are important components of the industry's decarbonization journey—software firm Signol has its sights set on helping vessel owners and operators reap the rewards of behavioral efficiencies.

The U.K.-based company has developed a solution that leverages big data and behavioral science best practices to "nudge" captains to operate their vessels more efficiently, reducing fuel consumption, operating costs and emissions. Signol has been moving into maritime after its start in the aviation industry, saving Virgin Atlantic more than $6 million in fuel costs and 24,000 metric tons of CO2 emissions during an eight-month trial.

Young Brothers, a tug and barge carrier that transports ocean cargo between the Hawaiian Islands, recently trialed Signol's software during a first-of-its-kind pilot program partly sponsored by Elemental Excelerator, the Honolulu-based climate tech accelerator and investor. The five-month trial ran from June to October 202, marking Signol's first for tugs following successful test runs aboard larger ships such as tankers, bulker carriers and containerships.

Signol went live on six Young Brothers tugs and had 24 participating captains and engineers throughout the program. Enrolled captains received personalized goals, motivational reports on their performance and impromptu notifications via email. They were also given access to the Signol web app, where they could review and reflect upon their own individual performance.

"Signol recognizes that captains of tugboats are experts in their field, where they understand their vessels and the

Young Brothers

ways it operates above everyone else. Signol nudges on the resultant fuel savings from actions giving captains and engineers the motivation to make the adjustments," a company spokesperson told Marine News. "During the trial, Signol also nudged port managers on departure time ensuring that tug barges were leaving on time, reducing the pressure on the captains during the voyage."

Achieved savings were significant. During the period Signol was in use, fuel consumption was reduced by 39,000 gallons compared to similar journeys made in the previous year – a reduction of approximately 5.45%, or equivalent to avoiding the emission of 478 metric tons of CO2. The results were calculated by analyzing specific weather-adjusted vessel performance, cargo weight and voyage route to reach a comparison of fuel consumption for each tug-voyage combination year-on-year. The vast majority of captains involved in the trial improved their performance, with the most significant gains coming from those toward the bottom of the historic performance bell curve, Signol said. Marking another sign of success, Young Brothers plans to continue utilizing the program, the company added.

As a nudge technology, Signol's a human-centered solution specializes in workforce communications. The company describes its user experience as friendly, positive and engaging. "We are able to set personalized, data-driven goals and communicate proactively and effectively by employing behavioral change methods. Captains can then review and reflect upon their performance at regular times, then act upon their targets without sacrificing safety," the spokesperson said. "Signol is continuously optimizing content and timing to motivate each enrolled individual in achieving their carbon saving targets."

Navy Taps Digital Tools for Frigate Bridge Design

The U.S. Navy is leveraging state-of-the-art digital technologies to improve features on board its newest warship class

Constellation class frigate (FFG) principals from across the surface Navy force, Naval Sea Systems Command engineering directorate and program offices, and industry gathered at the Mariner Skills Training Center Pacific in San Diego, in February to demonstrate the value of digital tools for providing real-time design feedback of the future Constellation class (FFG 62) pilot house arrangements.

By reutilizing design artifacts, the Constellation class frigate program office constructed a live, virtual bridge environment to provide the first glimpses into the general pilot house arrangements and how crews will interact with those arrangements under differing watchstanding conditions. Post-command representatives from in-service surface ship classes, including Arleigh Burke (DDG 51) and Zumwalt (DDG 1000) class guided missile destroyers, San Antonio class amphibious transport docks (LPD 17), and Freedom variant littoral combat ships (LCS), conducted the bridge validation event to gather design and operational feedback.

According to the Navy, the event shows the continuing partnership between the FFG acquisition community, its industry partners, and the eventual fleet operators.

U.S. Navy rendering of behind the aft navigation console on the FFG 62 model.

U.S. Navy

"Shipbuilding is hard, and shipbuilding is a team sport," said Capt. Kevin Smith, Constellation class frigate program manager. "By providing the forum and the tools to receive and incorporate feedback, we are able to expand the program's reach and the depth of experience to ensure we deliver a world-class warship with world-class safety in navigation and operation."

The Navy said its frigate program office is undertaking a transformational approach to ship design, production and sustainment.

"Within the program office, we recognize that the data we generate from day one has a purpose and utility that will be carried through the life of the program," said Jonas Brown, director of product support and readiness for the frigate program. "This event was a showcase that demonstrates how we connect detail design and production artifacts together with manpower, training and sustainment concepts to create a digital engineering capability that modernizes Navy shipbuilding processes."

As the program matures, the expansion of digital offerings will include design, production, test and logistics support information, ultimately setting the roadmap for the management of lifecycle data and a virtual model throughout the entire service life of the frigates.

The Constellation class frigates is being built at Fincantieri Marinette Marine in Wisconsin, and will deliver in 2026. The builder officially commenced construction on the series' first vessel in August 2022.

Program Executive Office, Unmanned and Small Combatants (PEO USC) oversees the Constellation Class Frigate program office (PMS 515) charged with the design, development and construction of the Navy's newest warship class.

Offshore Vessel Charging System Passes Harbor Tests

U.K.-based marine electrical engineering company MJR Power and Automation announced the successful harbor trials of its platform-mounted automated offshore power and charging system.

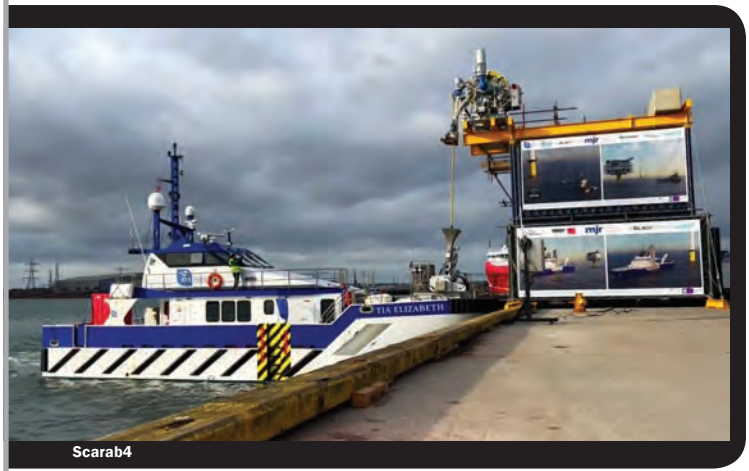
The solution is designed to convert energy delivered directly from offshore wind farms, and enable all heavy hybrid and electric crew transfer vessels (CTV) and other offshore support vessels to connect and get powered by electricity generated directly by offshore wind turbines.

The company said the system will also enable offshore power to be supplied to other support vessels allowing them to turn off their diesel generators while standing by, in the same way, that they can connect to shore power.

MJR Power and Automation claims the system will revolutionize the marine sector by enabling the transition to hybrid and fully electric vessels for zero-emission operations.

The harbor trials were conducted in the Port of Blyth using the TIA Elizabeth CTV owned and operated by Tidal Transit.

According to MJR Power and Automation, the set-up at the port replicated the installation of the offshore power and charging system on an offshore wind turbine and/or substation, validating the safe connection, mooring, and charging of battery bank installed on the CTV.



Scarab4

"With safety embedded throughout the system, all interconnection, mooring, automation, monitoring, and safety systems, including wireless communication and emergency disconnection, were vigorously tested and validated during the trails," MJR Power and Automation said.

Speaking about the successful trial, Paul Cairns, managing director at MJR said, "By providing a solution to power vessels and charge batteries in the field—primarily during periods when they would otherwise be idle—MJR's offshore power and charging system will prove to be a key enabler for the large-scale deployment of eCTVs and larger electric hybrid vessels across the offshore sector.

"Put simply, if 50% of the U.K.'s CTV fleet converted to electric operation, this would eliminate approximately 131,100 tonnes of CO2 each year," Cairns continued. "These figures are staggering and highlight that such technology, and the adoption of it, will be pivotal in reducing emissions in the field and helping owners, operators and governments to achieve their net zero targets."

MJR's solution is among several similar offshore charging stations being developed for offshore operations, including the Stillstrom charging buoy from Maersk Supply Service, a part of A.P. Moller-Maersk, demonstrated with Ørsted to supply overnight power to one of offshore wind leader's service operations vessels (SOV).

With successful harbor trials now complete, MJR said it will now demobilize the equipment and prepare for installation on an operational offshore wind farm substation in the North Sea. The company did not say when the system would be installed offshore.

In addition to charging CTVs, with a maximum charging time of two hours, MJR said it was also developing a similar system delivering higher powers for providing offshore power and charging for larger vessels, including SOVs.

Vessels

ACBL 11,000HP Towboat

CT Marine

Jeffersonville, Ind. based American Commercial Barge Line (ACBL) announced it has signed a contract with Belle Chasse, La. shipyard C&C Marine and Repair to build a 11,000 horsepower (HP) class towboat.

Designed by Portland, Maine-based CT Marine, the twin-screw towboat will measure 198 feet long, with 50-foot beam and 12-foot depth. With accommodations for a crew of up to 12, the vessel incorporates a floating, spring-mounted superstructure for additional onboard comfort. Its pilothouse eyeline will be 47 feet above the water.

The mighty vessel will be powered by two Louisiana CAT-supplied Caterpillar C280-12 main engines producing approximately 11,000 HP, paired with two Reintjes WAF 6755 reduction gears from Karl Senner, LLC. Generator power will come from three Caterpillar 275 kW generators. The towboat will be outfitted with CT Marine CT28-SL nozzles housing 124-inch diameter stainless-steel, five-blade fixed pitch propellers and features Twin-DIFF flanking and steering rudder systems.

Scheduled for delivery in the third quarter of 2024, the newbuild will operate on ACBL's mainline network pushing up to 56 barges, averaging approximately 75,000 tons of cargo.

Fire Island Maid

Fire Island Ferries has taken delivery of its newest vessel, Fire Island Maid, designed by Elliott Bay Design Group (EBDG) and built by Metal Shark in Bayou La Batre, Ala.

The 70- by 23-foot multipurpose vehicle ferry features a steel hull and aluminum superstructure and is equipped with a hydraulic ramp for loading and unloading heavy equipment. The reinforced deck is capable of supporting fully loaded concrete trucks and general cargo up to 100,000 pounds. The aft pilot house accommodates two crew and up to six passengers (assumed to be in their vehicles). The vessel's lightship weight is 160,000 pounds so it can be hauled with the Fire Island Ferries' existing lift.

The ferry is powered by twin Cummins QSL9 Tier 3 marine engines with ZF Marine CruiseCommand control system and Twin Disc transmissions. Electrical power is provided by a Cummins Onan MDK generator.

Fire Island Ferries provides passenger and freight shipping services from Bay Shore, New York to several communities along the Great South Bay of Fire Island.

EBDG

Vessels

Crescent River Port Pilots Order Two Vessels

Snow & Company

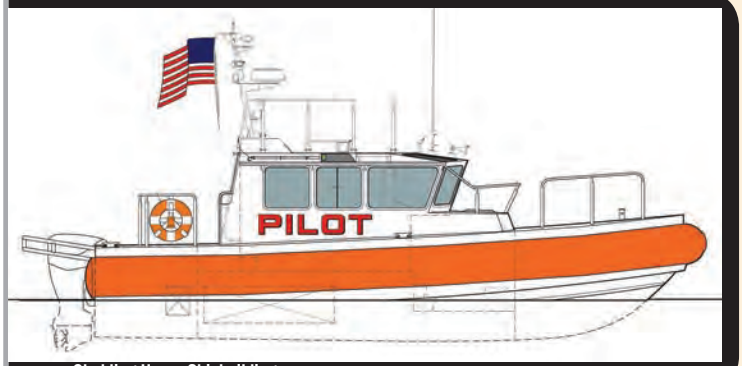
Seattle shipbuilder Snow & Company announced it has been awarded a contract to build a pair of 50-foot pilot boats for the Crescent River Port Pilots' Association, based in Louisiana.

Designed by U.K.-based Camarc Design, the all-aluminum vessels have a refined hull with enhanced fuel efficiencies and reduced slamming accelerations, which provide excellent all-around seakeeping capabilities and a pilot specific shape to facilitate safe boarding operations.

The vessels will be powered by twin Volvo Penta D13-800 EPA Tier 3 marine diesel engines, twin Hamilton Jet HJ403 waterjets with two station AVX express controls, and Twin Disc MGX5136SC marine gears. This combination allows for high performance maneuverability with an expected top speed of 35 knots, according to the builder.

Vessels

New Launch for St Johns Bar Pilots



Gladding-Hearn Shipbuilding

Gladding-Hearn Shipbuilding, Duclos Corporation, has received an order from the St. Johns Bar Pilots for a new high-speed launch. The newbuild, to be based on the Somerset, Mass. shipbuilder's 40-foot Resilient Class pilot boat introduced in 2005, is scheduled to be delivered to the Florida-based pilots in mid-2024—the pilots' fourth Gladding-Hearn pilot boat since 1962.

Designed by Ray Hunt Design, the all-aluminum launch measures 35 feet overall. It has a 13-foot beam, including the foam collar, and a 3-foot draft. The deep-V hull features a steep 24-degree dead-rise at the transom that increases to a very fine entry forward. A flat chine and multiple spray-rails provide an efficient running surface and deflect spray away from the collar to produce a dryer ride and reduce collar maintenance. The perimeter of the launch will be fitted with large foam-collar fendering system. A heavy-duty pipe guard will be installed behind the engines.

The new vessel is powered by twin Cox CXO300, 300hp diesel outboards, each turning a 16-inch stainless steel propellor. Fuel capacity is 300 gallons. A Zipwake interceptor trim-control system will be installed on the transom. Top speed will reach over 35 knots. A Northern Lights 5 kW generator will produce electricity.

Angel Island

A ferry servicing California's Angel Island State Park will be converted to operate as the state's first zero-emission, electric propulsion short-route passenger vessel beginning in 2024.

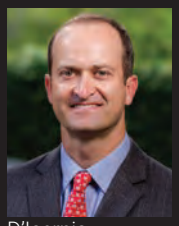
Pacific Gas and Electric Company (PG&E) announced it is partnering with the Angel Island-Tiburon Ferry Company (Angel Island Ferry) to support the electrification of The Angel Island vessel.

PG&E's Electric Vehicle (EV) Fleet Program helps medium- and heavy-duty fleet customers easily and cost-effectively install charging infrastructure via comprehensive construction support and financial incentives. Through the collaboration with Angel Island Ferry, PG&E plans to bolster electricity transmission to the ferry terminal and support the installation of charging infrastructure to help power the 59-foot, 400-passenger vessel for its ferry service, sunset cruises and chartered events.

California-based Green Yachts has been selected to transform The Angel Island to an electric propulsion vessel.

Angel Island Ferry

People & Companies


D'Isernia


Lindholm


Ryan


Peacock


Collins


Gard


DiFulgo


Hunsucker


Heil


Nelson

D'Isernia Takes the Helm at Eastern

Eastern Shipbuilding Group, Inc. (ESG) announced Joey D'Isernia has been appointed CEO and chairman of the board, succeeding company founder Brian D'Isernia, who is retiring after more than 46 years in the role.

Cargotec Taps Lindholm as CEO

Cargotec's board of directors has appointed Casimir Lindholm to succeed Mika Vehviläinen as the company's president and CEO, effective April 1, 2023.

ABS Names Ryan CTO

ABS appointed Patrick Ryan as chief technology officer to support continued development of ABS as a maritime technology leader.

Ports of Indiana Names New CEO

Ports of Indiana has named Jody Peacock as the new chief executive officer for the statewide port authority which operates three ports on the Ohio River and Lake Michigan.

SCA Taps Collins as Senior Defense Advisor

The Shipbuilders Council of America (SCA), the national association representing the U.S. shipbuilding, maintenance and repair industry, today announced Frank Collins as Senior Defense Advisor.

Campbell Promotes Statler

Campbell Transportation Company, Inc. has promoted Gary Statler to senior vice president of river operations, effective March 1, 2023.

Gard Joins ACBL

American Commercial Barge Line announce it has hired Joel Gard as senior vice president of its newly established Interchange & Logistics business unit.

Hornblower Hires DiFulgo

Hornblower Group announced Karen DiFulgo has joined the company as chief people officer.

Kohler Promotes Hunsucker

Kohler announced the appointment of Charles Hunsucker to the role of president - Kohler Power Systems.

Heil Joins Crowley as VP

Crowley has appointed Clay Heil as vice president of global government relations.

SJSB Promotes Nelson

St. Johns Ship Building announced it has appointed Nick Nelson as its first HSE officer.

Furuno USA Hires Two

Furuno USA has hired two new sales associates: Philip Sweeny will cover the Gulf of Mexico and Inland Rivers regions, and Adrian Navarro will cover the Southeast region.

Marine News 2023 Editorial Calendar

January 2023

Ad close Jan. 4

E-Magazine Edition:

U.S. Offshore Wind:

Shipbuilding, Ports & Logistics

February 2023

Ad close Jan. 20

Power & Propulsion

- Passenger Vessels
- Mariner Training & Education
- Safety Equipment

Event Distribution

PVA Maritrends: Feb 2-5, Long Beach, CA

CMA: Mar 28-30, Stamford, CT

IPF Wind: March 28-30, Baltimore, MD

Ferry Safety & Technology: April 1, New York, NY

March 2023

Ad close Feb. 28

E-Magazine Edition:

U.S. Inland Waterways Transport: Operations, Infrastructure & Dredging

April 2023

Ad close Mar. 17

Towboats, Tugs & Barges

- 2023 Shipbuilding Report
- Navigation Technology
- U.S. Offshore Wind

Event Distribution:

OTC: May 1-4, Houston, TX

SeaWork: June 13-15, Southampton, UK

Inland Marine Expo: May 31-June 2, Nashville, TN

May 2023

Ad close April 21

E-Magazine Edition:

U.S. Maritime Workforce: From Offshore to Inland Waterways & Shipyards

June 2023

Ad close May 19

Combat & Patrol Craft

- Navy & Coast Guard Shipbuilding
- Autonomous Vessels
- Dredging

Event Distribution:

WEDA Dredging Summit: July 17-20, Las Vegas, NV

Multi-Agency Craft Conference: Dates & Location TBD

July 2023

Ad close June 22

E-Magazine Edition:

The Green Marine Annual: New Products & Innovations

August 2023

Ad close July 21

Boatbuilding & Repair

- Naval Architecture & Marine Engineering
- Shipyard Equipment
- Workboat Communications

Event Distribution:

SNAME Maritime Convention : Dates & Location TBD

September 2023

Ad close Aug. 25

E-Magazine Edition:

Fast Craft: Patrol, Fire, Police, Pilot Boats & Ferries

October 2023

Ad close Sept. 18

Offshore Energy

- Vessel Repair & Conversion
- Electrification & Alternative Fuels
- Deck Machinery & Cranes

Event Distribution:

Clean Gulf: November. Dates TBD,

Electric & Hybrid Marine World Expo: Dates TBD

Houston, Texas

November 2023

Ad close Oct. 20

The Workboat Edition

- Top Vessels of 2023
- Power & Propulsion Technology
- U.S. Shipyards

Event Distribution:

International WorkBoat Show: Dates TBD, New Orleans, LA

December 2023

Ad close Nov. 30

E-Magazine Edition:

Workboat Technology: Best Marine Technology & Service Innovations of 2023

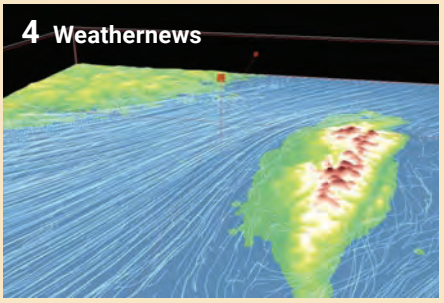
Products

1 In-Mar Solutions

2 VETUS Maxwell

3 HamiltonJet

4 Weathernews



5 EMUGE-FRANKEN USA

1. In-Mar Solutions: Wynn Marine Pantograph Heavy Duty Window Wipers

Wynn Type C (internal motor) and Type D (external motor) Straight Line Wipers offer the most advanced design of linear action window wiping systems for marine and other specialized applications. Optimum window coverage can be achieved and enhanced by utilizing a twin-bladed or dual-arm/blade design.

www.inmarsystems.com

2. VETUS Wind Turbine Hatches

Rugged, heavy-duty hatches built to withstand tough conditions of either onshore or offshore wind production environments; produced to highest quality design standards and to offer ease of installation.

Innovative designs, low profile with anodized aluminum frames in multiple sizes and optional configurations. Can be opened from inside or outside. Hatches can be shut completely watertight or secured with small air gap for ventilation.

https://vetus.com/usa/

3. HTX47 Waterjet

HamiltonJet said its new HTX47 waterjet has improved upon its previous jet model to offer a more seamless installation experience. Its new compact inboard footprint design and fully integrated hydraulics system ensures faster installation in the vessel. HTX47 new hydrodynamic design delivers 4% more high-speed efficiency, a 16% increase in peak bollard pull, and offers better operation at minimum speed, according to the manufacturer. It also features enhanced corrosion protection for more durability and expanded impeller rating range for greater compatibility for a wider range of engines.

4. ANEMOI

Weathernews' new ANEMOI service provides 1km-mesh wind and wave data to assist in planning of offshore work related to the construction of wind power generation facilities. The solution is designed to provide wind and wave forecasts as well as information on meteorological risks, such as lightning strikes and typhoons. Ørsted embraced the use of ANEMOI in March 2022 at its construction site off the shores of Taiwan as a pilot and has since decided to use ANEMOI to assist its construction, maintenance and other offshore work related to the Greater Changhua 1 & 2a Offshore wind farms.

5. EMUGE MultiDRILL

EMUGE-FRANKEN USA has introduced a full line of 3XD and 5XD solid carbide multipurpose drills suited for a wide range of materials and applications typically found in high mix – low volume job shop environments. EMUGE MultiDRILL is made of a sub-micro grain carbide grade that is harder than conventional grades, and it features advanced TIALN-T63 coating utilizing nano-layer technology with surface hardness exceeding standard TIALN-based coatings. Featuring cutting edges with a convex geometry, MultiDRILL has higher chip shearing ability and a tightly controlled edge preparation process. In addition, the drill is self-centering, and a double margin design helps stabilize in the cut.

Marine Marketplace

NEW PRODUCTS

NEW PRODUCTS

ADVERTISER INDEX

Page	Company	Website	Phone#
29	Ahead Sanitation	www.aheadsanitationsystems.com	(337) 330-4407
23	All American Marine	www.AllAmericanMarine.com	(360) 647-7602
27	Arcosa Marine	www.arcosamarine.com	(615) 400-4373
19	Conrad Industries	www.conradindustries.com	(985) 384-3060
41	Creative Systems	www.ghsport.com	(360) 385-6212
33	Cygnus Instruments LTD	www.cygnusinstruments.com	(410) 267-9771
C2	David Clark Company	www.davidclark.com	(508) 751-5800
35	Ebac Systems	www.ebacusa.com	(757) 873-6800
33	Environmental Marine, Inc.	www.envmar.com	(606) 561-4697
25	Gladding Hearn	www.gladding-hearn.com	(508) 676-8596
15	Incat Crowther	www.incatcrowther.com	+61 (2) 9450 0447 ext 216
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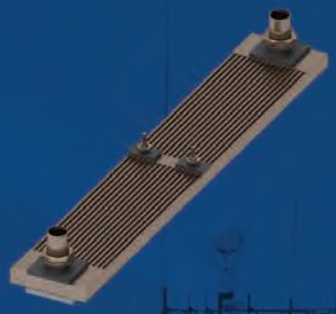

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