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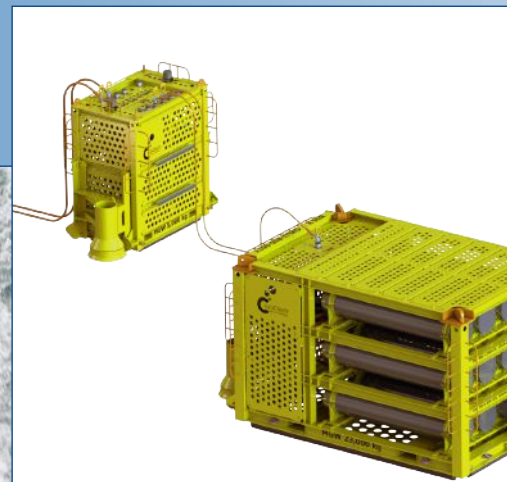
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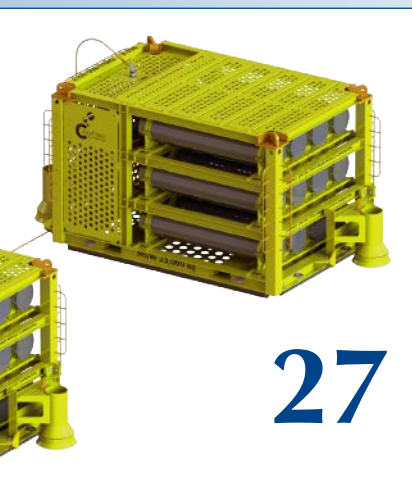
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COVER IMAGE

Mooring line control and measurement gear installed at a busy New Jersey port to safeguard and monitor integrated winch systems. (Credit: Rugged Controls)

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)) UN Ocean Investment Protocol. The European Investment Bank (EIB) has welcomed the launch of the United Nations Ocean Investment Protocol, a comprehensive new framework to align financial flows and business practices with the transition to a sustainable ocean economy. The protocol includes: holistic guidance for financial actors, data and disclosure recommendations, sector-specific roadmaps, policy and regulation support, and the catalytic role of development finance. As a knowledge partner in its development, the EIB recognizes the protocol as a vital guide to scaling finance for a healthy and resilient ocean. The United Nations Global Compact and the UN Environment Programme Finance Initiative (UNEP FI) unveiled the protocol, which builds on the UN Global Compact Sustainable Ocean Principles and UNEP FI's Sustainable Blue Economy Finance Principles. The Ocean Investment Protocol offers financial institutions, insurers, ocean industries, governments, and development finance institutions a clear pathway to achieve the UN Sustainable Development Goals (SDGs), including SDG14: "Life Below Water."

)) IMO Adopts Net-Zero Framework. The International Maritime Organization (IMO) has adopted a comprehensive legal framework to drive the decarbonization of global shipping. Accepted as draft guidelines during the 83rd session of the IMO's Marine Environment Protection Committee in April 2025, the Net-Zero Framework is expected to be formally adopted in October. If adopted, the protocol will enter into force in 2027 and aims to eliminate greenhouse gas emissions from international shipping by 2050. This move marks the first time a UN agency has imposed mandatory emissions limits on an entire industry, coupled with a binding global carbon pricing mechanism. The new rules will apply to all ocean-going vessels over 5,000 gross tonnage, representing roughly 85 percent of global shipping emissions. At the heart of the system is a hybrid model combining incentives and penalties: Ships that exceed emissions targets earn tradable carbon credits, while those that underperform face a tiered levy. Vessels in Tier 1—meeting the base target but with emissions above the direct compliance level—pay €100 per tonne of CO₂ equivalent (tCO₂e). Tier 2 ships, which meet only the minimum requirement, face a higher charge of €380/tCO₂e. Revenue will be directed to a newly established IMO Climate Fund to support green technologies and ensure a just transition for developing countries. The new rules create a strong market signal for climate-neutral fuels such as e-methanol and e-ammonia, produced using renewable electricity, according to the eFuel Alliance. These fuels can exempt vessels from carbon charges and generate substantial revenue through the sale of emissions credits.

)) International Marine Contractors Safety Statistics Report. The International Marine Contractors Association (IMCA) has published its annual Safety Statistics Report, showing that "line-of-fire" incidents remained the leading cause of lost-time injuries (LTIs) among IMCA marine contractor members in 2024, accounting for more than half (52 percent) of such injuries. The research, which IMCA has published each year since 1996, found that the total lost-time injury rate (LTIR) across its contributing members' onshore and offshore operations remained unchanged at 0.3 incidents per million hours worked. This follows steady improvements since 2010, when the LTIR was more than twice as high as recorded in 2024. Meanwhile, the total recordable injuries rate (TRIR) rose slightly, from 1.07 to 1.1 injuries per million hours worked, a pattern seen across the energy industry, although IMCA contractor members saw a small improvement in the TRIR recorded for offshore from 1.47 injuries per million hours worked in 2023, to 1.38 in 2024. Just over half (52 percent) of LTIs reported were line-of-fire injuries. Understanding the underlying causes of these accidents and how they can be reduced will be a priority for IMCA, working with its members and partner organizations, in 2025. Slips and trips were the second main cause of LTIs (22 percent of the total). The fatal accident rate decreased from 0.63 fatalities per 100 million hours worked in 2023 to 0.3 fatalities in 2024. For offshore workers, the rate fell from 0.41 in 2023 to 0.18 in 2024: the lowest fatality rate ever recorded by IMCA contractor members. This year's data were supplied by 198 of IMCA's contractor members, who between them submitted a record 1,015,000 hours of data.

)) First E-Boat Crosses from Europe to North Africa. A Swedish crew has successfully piloted a Candela C-8 foiling electric boat from Europe to North Africa, marking the first-ever intercontinental journey by an electric vessel. A Candela C-8 Polestar Edition completed the historic voyage from Sotogrande, Spain, to Ceuta, North Africa, a 24-nautical-mi. trip, in just over 1 hr., matching the speed of conventional fast ferries. After recharging, the vessel returned to the Spanish mainland the same day. This electric vessel flies through the water via two hydrofoils (underwater wings) beneath the surface that lift the C-8 above the water, drastically reducing drag and cutting energy consumption by 80 percent compared to conventional fast vessels. This breakthrough enables the long electric range needed to cross the Strait of Gibraltar—one of the world's busiest shipping lanes—for the first time. The record-setting voyage was undertaken to demonstrate the potential of Candela's new P-12 electric hydrofoil ferry to deliver clean, cost-efficient transport along the Spanish coast and across the Strait of Gibraltar. Today, this vital corridor, with more than 3.5 million annual crossings, is dominated by large diesel car ferries that primarily serve major hubs, making travel time-consuming for those living outside key terminals. Candela aims to complement these essential services by introducing fast, sustainable direct routes that expand access for underserved coastal communities. **ST**

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Optimizing Fossil Fuels Is the Fastest Way to Decarbonize

In the race to decarbonize maritime transport, the sector has become distracted by technologies that look good on paper but do little in practice. Too many current strategies are engineered to win headlines rather than reduce emissions. The fastest and most effective path forward is to focus on optimizing the fuels we are already using. That means improving combustion efficiency, measuring real output, and holding technologies to the same standard of performance and transparency.

The maritime industry continues to emphasize so-called transition fuels, such as biofuels. On the surface, these seem like a win. They are renewable, supported by incentives, and can be blended into existing systems. But the moment you factor in energy density and real combustion performance, the story falls apart. Most biofuels release less energy per unit mass than conventional marine diesel or heavy fuel oil, so vessels require more fuel to generate the same power, increasing fuel mass flow and emissions in real terms.

This is not decarbonization. It is accounting sleight of hand.

The more intelligent route is to optimize conventional fuels. Technologies such as hydrocarbon reformers and combustion conditioners are already delivering verified results. Fuelre4m's own platform, for instance, has demonstrated up to 20 percent reductions in fuel consumption and emissions, without the need for retrofits or operational change; no change to bunkering, no additional load on crew, and no impact on vessel scheduling.

To get serious about emissions, the sector must move away from legacy metrics such as specific fuel oil consumption (SFOC). SFOC has turned into a flawed approximation that averages behavior and hides inefficiencies. It does not account for actual output, nor does it track variations in power delivery under real-world conditions. The only metric that matters is: fuel in, power out. Why are engine manufacturers let off the hook by not being forced to report the actual power and efficiency of their engines on real, used fuels?

The only meaningful measurement of performance is what happens at the shaft. That means tracking torque, shaft RPM, net thrust, delivered power and mass fuel flow as standard. This is how we uncover inefficiencies, benchmark optimization technologies and expose underperformance. These parameters tell us what the engine is really doing, how much force is being applied to move the ship, and how much fuel is being burned to do it.

If these metrics became the regulatory standard, we would immediately reveal gaps in fuel and propulsion efficiency across the fleet. We would identify the true cost of "low-energy" fuels and expose the operational impact of degraded engine performance. Better still, we would unlock immediate emissions savings at no capital cost. This is proven, accessible and measurable.

Critically, this approach gives the industry time. Time to test new fuels properly. Time to work out bunkering logistics for ammonia or hydrogen. Time to develop propulsion systems delivering reliable thrust at scale. But all of this is only worthwhile if future fuels are held to the same measurement standards: power output, fuel flow, torque, thrust; not extrapolated claims or idealized simulations. Until we bring rigor and real metrics to the center of emissions reduction strategy, we will keep wasting money and time.

Optimizing fossil fuels is not a step backward. It represents progress that can happen right now. It reduces emissions, lowers operating costs, demands accountability. And it creates the space we need to build the technologies of tomorrow on a foundation of real, measurable performance, not promises.

The future will be clean. But right now, we must be accurate. **ST**

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Instrumentation: Measurement, Processing & Analysis

***Undersea Defense Technology (UDT), March 25-27, Oslo, Norway*

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Electronic Charting/Vessel Management/
Ports & Harbors/Dredging/Homeland Security

***Ocean Business, April 8-10, Southampton, U.K.*

APRIL

Offshore Technology/Alternative Energy & Ocean Engineering

MAY

Communications, Telemetry, Data Processing

***OCEANS 2025 Brest, June 16-19, Brest, France*

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Deck Gear, Cable, Connectors, Power Systems & Salvage

****IMAGE 2025**, August 24-29, Houston, Texas

AUGUST

Ocean Resources Development & Coastal Zone Management

****MAST AUKUS 2025**, September 3-4, Glasgow, Scotland, U.K.

****OCEANS 2025 Great Lakes**, September 29-October 2,
Navy Pier, Chicago, Illinois

SEPTEMBER

Geophysical Exploration/Seafloor Engineering

OCTOBER

Environmental Monitoring, Remote Sensing & Pollution Control

****CLEAN GULF**, November 18-20, New Orleans, Louisiana

****Offshore Energy**, November 25-26, Amsterdam, The Netherlands

NOVEMBER

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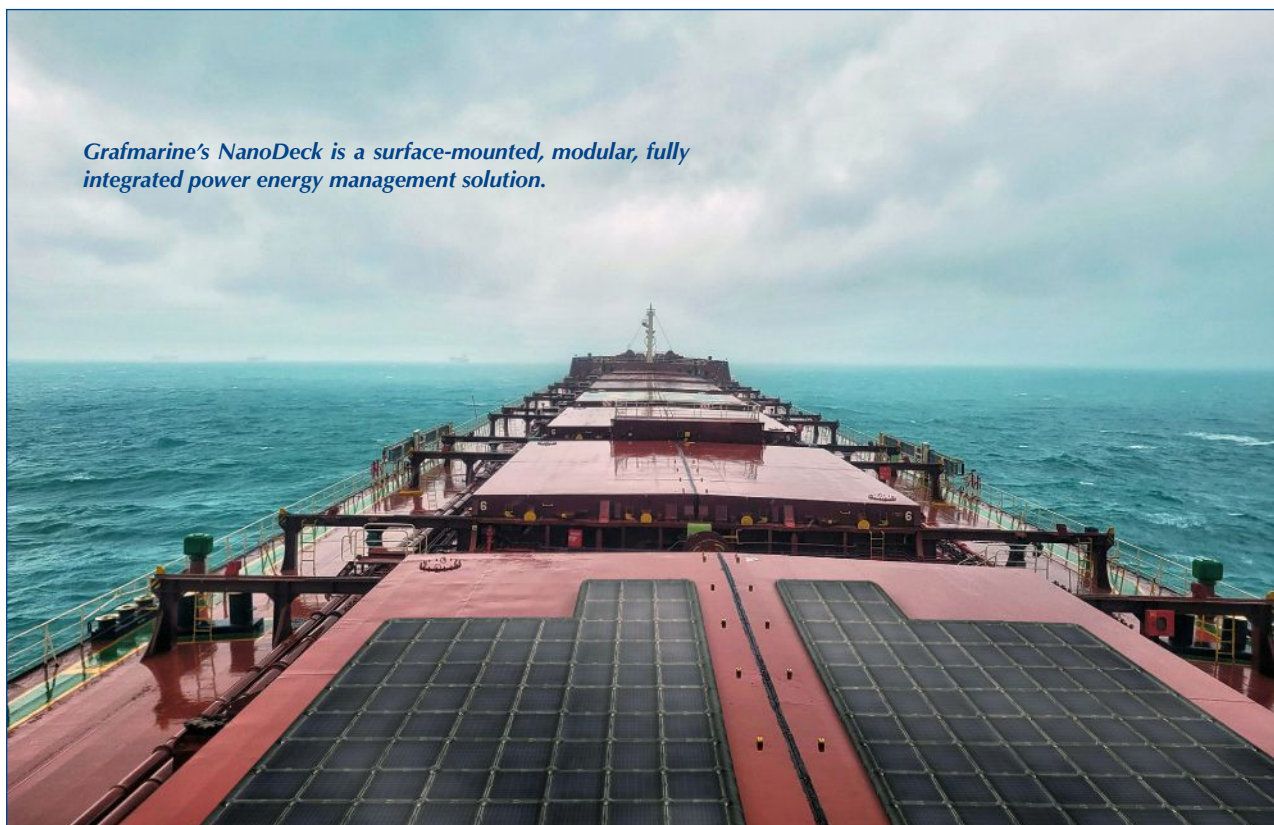
of Serving the Global Ocean Community

Solar Power Advances

Modular System Generates Onboard Renewable Energy

By Nigel Marc Roberts

Grafmarine's NanoDeck is a surface-mounted, modular, fully integrated power energy management solution.



The shipping industry, long dependent on fossil fuels, is confronted with the dual challenge of meeting increasing transport demands—the sector enables the movement of more than 80 percent of global trade—while aligning with international climate objectives.

Reducing carbon emissions is no longer a peripheral concern—it has become a central pillar of future competitiveness and compliance. From adopting alternative fuels to optimizing vessel design and implementing advanced energy management systems, businesses within

the shipping industry are becoming increasingly aware of the need to operate in a more environmentally responsible manner.

As scrutiny from regulators, investors, and consumers intensifies, shipping companies are exploring more viable energy alternatives that not only reduce emissions but also offer long-term operational reliability.

One compelling solution is solar energy. According to the International Energy Agency (IEA), solar power accounts for 15.3 percent of the world's renewable energy.



The AI-driven platform NanoPredict is designed to optimize how vessels generate, store and use renewable energy at sea, enhancing the overall performance of the NanoDeck system.

It is particularly attractive for integration into shipboard power systems due to its abundance, reliability and zero-emission profile.

While solar power is already well established in terrestrial applications, its adaptation to marine environments presents several challenges. However, recent advancements in photovoltaic technology, energy storage, and hybrid propulsion systems are making it increasingly feasible to integrate solar arrays even on larger vessels and commercial fleets, meaning it also offers substantial opportunities.

In fact, the sector's traditional image as slow to innovate is being challenged by a new wave of innovation. Despite being a hard-to-abate industry, shipping is witnessing an acceleration in the adoption of clean technologies. This is reshaping industry standards and fostering a culture of innovation aimed at enhancing efficiency, reducing emissions, and optimizing operations.

Industry's Environmental Impact

Despite shipping being the most carbon-efficient mode of freight transport on a per tonne-kilometer basis, outperforming road, rail, and air in terms of emissions efficiency, the sheer size of global trade results in a significant environmental impact. The sector is currently responsible for approximately 3 percent of global annual CO₂ emissions, but as international trade volumes continue to rise, this figure is expected to grow, unless substantial decarbonization measures are implemented.

In response to the sector's environmental impact, regulatory frameworks are evolving at pace. The Inter-

national Maritime Organization (IMO) has adopted a comprehensive strategy aimed at curbing greenhouse gas emissions from international shipping. Key targets include improving carbon intensity by 40 percent by 2030 and achieving net-zero greenhouse gas emissions from international shipping by or around 2050.

Achieving meaningful emissions reductions will require coordinated action across the value chain. Shipbuilders, engine manufacturers, fuel producers, port authorities, and shipping companies must work collaboratively to accelerate innovation and meet the IMO's targets.

Exploring Solar for Shipping

In the drive toward decarbonizing shipping, a wide range of emerging technologies is providing shipping stakeholders with tools to incrementally reduce emissions. Solutions such as vessel design optimization, wind-assisted propulsion, intelligent automation, and advanced routing software have already demonstrated the potential to cut fuel consumption and associated emissions by 5 to 25 percent. As the industry pushes toward more ambitious climate targets, these measures won't be enough.

With a growing need for more transformative, low- or zero-carbon energy solutions, solar is increasingly being considered an attractive solution for the shipping industry. However, it is often regarded as a challenging, technically complex and capital-intensive undertaking.

For one, the marine environment imposes harsh operational conditions. Exposure to saltwater, high humidity,



(Left) An example of a NanoDeck configuration, comprising eight tiles with 600-V power output for high-solar locations. (Below) Recycled fishing net edge wave deflectors reusing plastic sea waste.

and mechanical vibrations can degrade standard solar panel performance and reduce system life span.

Space is another critical limitation: the surface area available on ships is often insufficient to support the scale of standard photovoltaic arrays needed for primary propulsion, limiting their use to auxiliary systems, unless combined with hybrid configurations.

However, significant technological strides are beginning to shift the equation in favor of maritime solar adoption. Advances in materials science and engineering are yielding more robust, efficient and cost-effective solar technologies specifically designed for maritime applications.

For example, breakthroughs in photovoltaics have seen the development of lightweight, flexible, and corrosion-resistant solar panels, which have improved the feasibility of integrating solar arrays on commercial and passenger vessels.

Simultaneously, improvements in storage and energy management technologies are enabling ships to store and deploy solar energy more efficiently, reducing dependency on fossil fuels.

While challenges remain, innovative solar solutions can revolutionize the way ships are powered, leading to cleaner, more sustainable maritime travel that aligns with global environmental targets while reducing costs.

Pioneering Energy Management

In response to the urgent need for decarbonization within the maritime sector, the U.K.-based renewable energy firm Grafmarine has developed a novel approach to clean energy generation and storage designed specifically for the operational and environmental demands of shipping. The company's NanoDeck system is an adaptable, modular solar energy platform engineered to operate in some of the world's most challenging marine conditions.



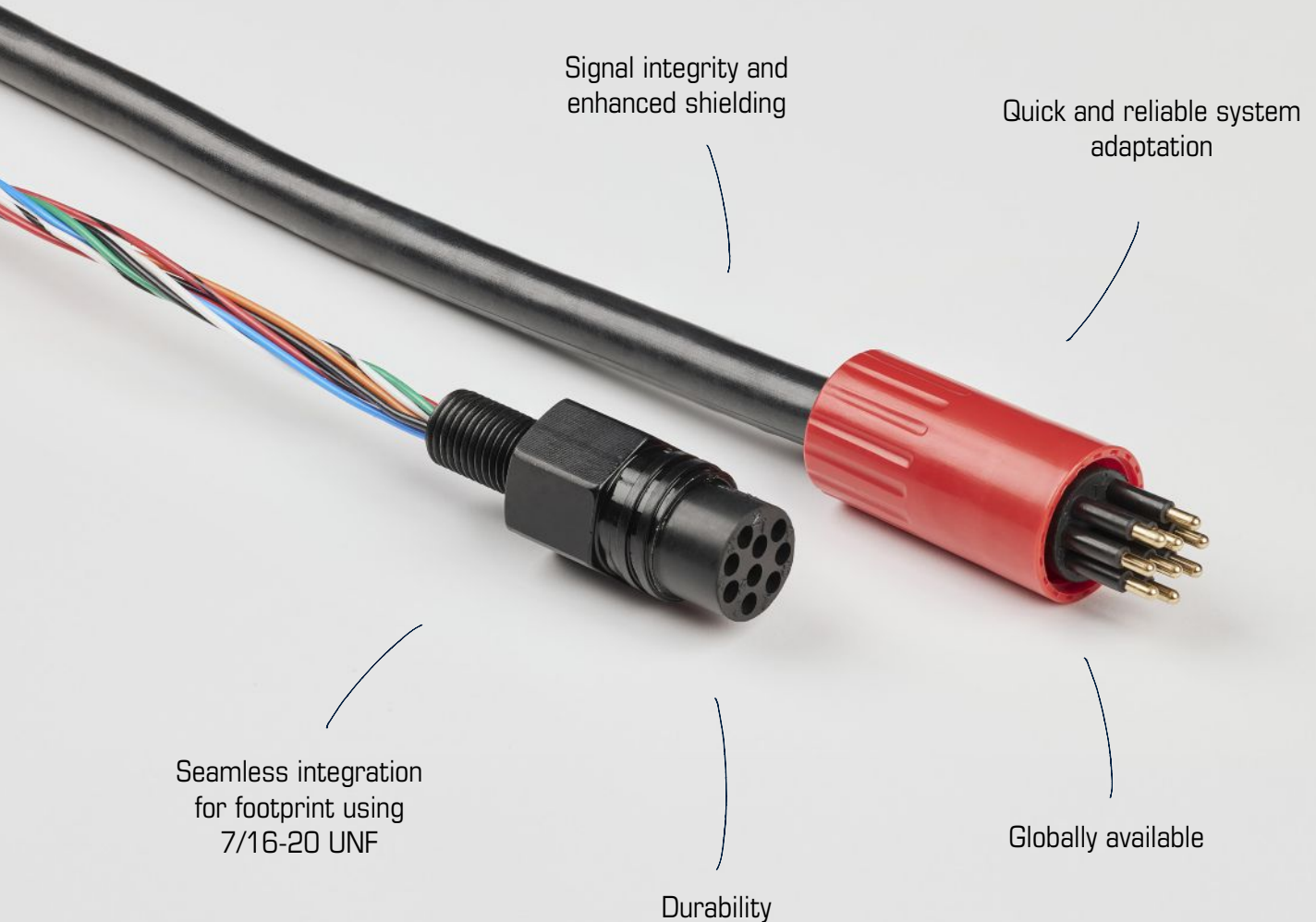
Composed of interlinked tiles made from advanced silicon- and perovskite-based photovoltaic materials, the system converts flat surfaces, such as vessel decks, port structures, or offshore platforms, into intelligent energy hubs. The interlinked tiles combine solar power generation with hybrid storage technologies that include supercapacitors and grid-grade batteries, enabling rapid, reliable power availability across a variety of operational scenarios.

Designed with maritime resilience in mind, the tiles are bonded and mounted directly on a vessel's deck and constructed from reinforced composite materials that offer exceptional durability, corrosion resistance, and mechanical strength. This makes them particularly well suited for long-term deployment in saltwater environments.

The system's modular construction allows for straightforward retrofitting on existing fleets and seamless integration into the build process of new vessels. Crucially, each tile operates as an independent energy node,



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NanoDeck 600-V energy assessment system installed on bulk carrier en route from China to Australia, March 2025.



which can be clustered for greater capacity or replaced individually without disrupting the system. Tiles can also be moved around the ship, individually replaced when damaged, or upgraded.

The system is available through lease or purchase, lowering the capital barrier to adoption and enabling operators to upgrade components as technology evolves without significant additional investment.

Essentially, the scalable platform converts and stores energy to provide continuous power at sea, in port or anywhere off-grid up to 600 V. It reduces operating costs, optimizes energy efficiency and lowers carbon emissions. In fact, digital testing has shown that NanoDeck could save up to 10 percent of the fuel on an oil tanker—equivalent to up to 10 tonnes of heavy fuel oil per day—with the potential to increase to 40 percent over five years through system scaling and continuous technological improvement.

With an estimated 100,000 ships currently active and generating nearly 940 million tonnes of greenhouse gas emissions annually, technologies such as NanoDeck, the only fully integrated power energy management solution currently available to the shipping industry, represent a promising step toward meeting global climate objectives while enhancing operational resilience within the shipping sector.

Extending Solar Beyond Ships

One of NanoDeck's most significant advantages lies in its compatibility with other decarbonization pathways. It is designed to complement existing propulsion technologies and emerging green fuels, such as ammo-

nia, methanol, and hydrogen, and can operate alongside wind-assisted propulsion. This makes it a versatile addition to any sustainability strategy, particularly at a time when the industry is exploring hybrid energy configurations to bridge the transition to zero-emission operations.

While vessels attract most of the attention in discussions about decarbonization, emissions generated during port operations remain a substantial and often overlooked contributor to pollution/greenhouse gases. Research shows that up to 85 percent of emissions from tankers occurs while docked in ports, often within proximity of dense urban areas.

As pressure mounts to reduce maritime emissions, attention should be paid to port infrastructure as an area where transformative sustainability gains can be achieved. The integration of renewable energy systems, particularly solar technologies, offers a viable solution. Platforms such as NanoDeck can be deployed across port surfaces. Its solid-state, plug-and-play architecture allows for installation across diverse environments, including buildings, dock structures and dedicated energy zones, to generate clean, decentralized power. This not only reduces the carbon footprint of port operations but also enables ships to shut down their engines while docked and draw power from the port's renewable grid.

AI-Powered Energy Management

The integration of artificial intelligence (AI) is widespread across all industries and sectors, and shipping is no exception.

Grafmarine offers an AI-driven platform, known as NanoPredict, which is designed to optimize how vessels



generate, store and use renewable energy at sea, enhancing the overall performance of the NanoDeck system.

The platform leverages more than two decades of global weather data across key shipping corridors to forecast environmental conditions and dynamically adjust energy use. This predictive capability enables vessels to adjust power deployment in real time, ensuring that stored energy is used at the most effective points during a voyage.

For instance, vessels that spend significant time anchored or waiting for port access—estimated at up to 40 percent of operational time for some ships—can utilize stored solar energy to reduce reliance on auxiliary engines, achieving fuel savings of up to 10 percent. When paired with NanoDeck's clean energy generation, the combined system can reduce total fuel consumption by up to 20 percent, depending on the vessel type and operational profile.

AI's role extends beyond efficiency gains. By embedding intelligent automation into onboard energy systems, NanoPredict transforms what has traditionally been a reactive approach to shipboard energy management into a proactive, data-informed strategy. It provides actionable insights that support long-term strategic decisions on voyage planning, energy storage sizing and maintenance scheduling. This approach not only supports compliance with evolving emissions regulations but also improves cost predictability and asset performance.

As the shipping sector looks to decarbonize while maintaining operational efficiency, the integration of AI systems represents a forward-looking solution with both immediate and long-term value.

Responsible Manufacturing

The IMO has emphasized the importance of life cycle thinking in ship design, maintenance and dismantling as part of a holistic approach to decarbonization. As such, circular economy practices are increasingly being considered for achieving net-zero targets.

Grafmarine's commitment to sustainability is deeply rooted in the principles of the circular economy. In an industry traditionally driven by linear production and disposal models, it believes that the adoption of circular practices presents a vital opportunity to reduce environmental impact while creating long-term economic value.

The company's approach focuses on designing systems for durability, reusability, and end-of-life recyclability, while simultaneously minimizing resource inputs and emissions during manufacturing. This strategy not only aligns with global climate goals but also addresses the growing demand for responsible and traceable material sourcing in maritime supply chains.

It is estimated that more than 640,000 tonnes of commercial fishing equipment, including nets, lines and traps, are discarded at sea every year. These materials represent a significant environmental hazard, but, for Grafmarine, they are also a largely untapped resource.

The company is currently prototyping the use of recycled net fibers and post-consumer plastics in the production of its solar tiles. By repurposing high-strength polymer waste, it is not only preventing marine pollution but also reducing the need for virgin materials and the emissions associated with their extraction and processing.

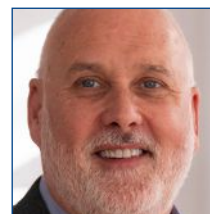
Looking Ahead

Historically dependent on fossil fuels, shipping has contributed significantly to greenhouse gas emissions. However, the maritime industry is undergoing a fundamental transition as it aligns itself with global climate objectives and the urgent need to decarbonize.

Driven by regulatory frameworks, economic pressures and technological innovation, the sector is shifting toward a more sustainable future. Solar energy, alongside other emerging low- and zero-carbon technologies, plays an increasingly vital role in this transformation.

The adoption of modular solar technologies, such as Grafmarine's NanoDeck platform, illustrates how renewable energy can be practically deployed across vessels and port infrastructure to reduce emissions, enhance energy efficiency, and create operational cost savings. **ST**

Nigel Marc Roberts is the CEO of Grafmarine.



High-Speed Internet for a Small Town

Subsea Cable Introduces Broadband to Tiny Maine Island

By Bob Munoz • Gavin Tully

Isle au Haut, a small Island off the coast of Maine, is home to approximately 75 year-round residents and around 250 in the summer. It's small, it's tight-knit, it's quaint—in fact, around half of the island's 100-sq. mi. land mass is part of Acadia National Park. It has a one-room schoolhouse (with currently seven students) and is only accessible from the U.S. mainland via a 45-min. ferry ride.

Until recently, it also completely lacked access to broadband internet. It took a village, and more, to get connected.

A Hometown Challenge

Recognizing that high-speed internet is necessary to remain a viable year-round community, the town formed a broadband committee in 2016. The goal was to find a way to bring universal fiber-to-the-home broadband to the island, replacing a microwave link and DSL service that left most of the island “under-” or “unserved,” as defined by the federal Infrastructure Investment and Jobs Act. The legislation deems an “unserved” location as one with no broadband service at all, or with internet service offering speeds below 25/3 Mbps. It defines an “underserved” location as one without broadband service offering speeds of at least 100/20 Mbps.

The previous internet service relied on a microwave tower located close to the town center, and performance was impacted by rain, snow, or fog—all common realities on Isle au Haut. From the microwave tower, the signal was distributed by copper DSL lines, through which the signal significantly deteriorated over distance, leaving only a trickle of service at the furthest points.



Isle au Haut installed its first subsea telecommunications in November 2024. The 10-km submarine cable now connects Isle au Haut to Stonington on Deer Isle, which has terrestrial connections to the U.S. mainland. (Credit: Donna Hopkins, Isle au Haut Broadband Committee)



*View of Isle au Haut (Robinson Point) Light.
(Credit: Bob Munoz, Pioneer Consulting)*

sought to build a future-proof system while avoiding large microwave towers that would disrupt natural vistas near Acadia National Park.

Funding

Funding for this project came in the form of a \$1.2 million grant from the National Telecommunications and Information Administration and the state of Maine, as part of a larger \$28 million grant being administered by the Maine Connectivity Authority to support broadband expansion into underserved, especially rural, communities.

Building the Team

Axiom Technologies was brought on to spearhead the project, having designed and constructed more than 100 access points that connect more than 2,500 sq. mi. across rural Maine.

The impact was severe, especially for those not living in the center of town. One small business owner who lives at the far end of the island reported that it took 10 min. to upload one new picture to her website. As for the town's seven students, most did not have internet access at home, significantly hampering assignments, projects and research. In an age of telecommuting, a lack of reliable internet makes it hard for a place like Isle au Haut to attract serious long-term residents and young people to stay and help the community thrive.

To remedy this situation, the Isle au Haut select board appointed committee members, all volunteers. A select-person who is a full-time resident provided the primary link to the town government for the committee throughout the project. Altogether, volunteers invested more than 4,000 hr. to achieve their mission of bringing broadband to the isle.

The committee determined that a 10-km subsea fiber-optic cable connecting to the mainland via Stonington on Deer Isle would be the ideal solution, as they

"Like municipal power and introduction of telecommunications before it, access to high-speed internet is a transformational project for Isle au Haut," said Mark Ouellette, president and CEO of Axiom.

"Broadband is a critical link for sustainable communities. It can support local businesses, attract year-round residents, encourage remote workers to settle on the island, and enhance the cultural and economic life of the whole community."

Ouellette commissioned Pioneer Consulting to provide key advice and connect the project to pivotal resources. Pioneer Consulting Director of Marine Services Bob Munoz took the lead, with assistance from Managing Partner Gavin Tully (the authors of this article).

Planning the Route

Generally, cable routes span hundreds, even thousands of miles. Sophisticated—and expensive—surveying equipment is deployed to map the seafloor and design a cable route.



The Isle au Haut town store displays its first-ever Wi-Fi sign, welcoming broadband internet to the island. (Credit: Axiom Technologies)

In this case, both the challenges and solutions were much more home brewed. While surveying the site, Munoz referenced the planning and engineering of a resident, Parker Waite, who, as an independent diver, personally swam and surveyed the seabed in 1983 before installing the island's first power cable. As a local scallop diver, Waite knew the seabed like the back of his hand. His knowledge of the seabed allowed for the power cable to be installed along the rugged seabed profile, where it has provided uninterrupted service for the last 42 years. Fortunately, Waite's maps and cable routing notes were preserved by the Isle Au Haut Electric Power Co. Waite was present at Stonington to witness the completion of the fiber-optic cable installation.

Cable Sourcing

The entire process of sourcing cable took about two years from start to finish. With no experience purchasing subsea cable or managing such a project, Isle au Haut Broadband Committee members initially picked up their phones and cold called suppliers. Since the project was small in terms of distance, many companies did not even respond to inquiries, as their normal orders often

spanned entire oceans. The one company initially willing to work with Isle au Haut was based in Europe, and the cost of shipping and importing the cable alone was prohibitive.

Once Pioneer Consulting was brought on board, acquiring the cable was much more within reach. Pioneer Consulting has extensive prior experience working with SubCom, which manufactures submarine cable not far from Isle au Haut, in Newington, New Hampshire. SubCom offered its state-of-the-art SL17 special purpose application (SPA) fiber-optic cable to ensure long-term survivability, and the cable was made more affordable in part because SubCom allowed the islanders to arrange transportation of the cable in a 40-ft., open-top shipping container.

"Connecting communities is what we're all about," said David Coughlan, CEO of SubCom. "And as a New England company, it's a special opportunity to take part in connecting a place we know and love so well."

Laying the Cable

Various permits were required for the project, both from the state of Maine and the U.S. Army Corps of En-

gineers (USACE). The timeline for approving submitted permits was approximately one year. Preparation of the submissions took approximately six months.

The USACE permit was received on November 21, 2023. The permit window for the marine installation was limited between November 8 and March 14, 2024, due to considerations for essential fish habitat.

There were two primary challenges when it came to the laying the cable: the cable laying equipment and the weather.

The use of a large ocean-going cable ship was not viable logistically or financially for the project, so Isle au Haut hired a local barge that was fitted with cable-laying equipment and an experienced installation team from GAEAquatics, a company based in Middleburg, Florida.

The weather proved more formidable. The cable needed to be laid during a very narrow weather window: between high season for tourism and fishing, and the onset of the frigid, forbidding Maine winter. Although November 8, 2024 was initially selected for installation, high winds of up to 30 kt. caused a two-day delay.

On November 10, 2024, the installation process began around 4:30 a.m. with a cable landing at Isle au Haut. The cable lay took 3 hr., and the Stonington cable end landed around 11:30 a.m. without a hitch, connecting the submarine cable between Isle au Haut and Stonington on Deer Isle.

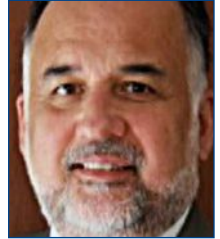
The two ends of the submarine fiber-optic cable were later spliced to terrestrial cables, providing fiber-optic

connectivity between Isle au Haut and the worldwide web.

The Little Island that Could

Now, for the first time, Isle au Haut's town store boasts a "WiFi" sign on its door. Life is changing for the town; more connectivity means more year-round residents, and longer summers for seasonal residents who can now work from their island homes. For Isle au Haut, the future is now, thanks to a big effort from a small group of people. **ST**

Bob Munoz is the director of marine services at Pioneer Consulting. He has more than 30 years of experience supporting marine installation projects for both cable system owners and cable system installers. Before his current role, he served as marine manager at Pioneer Consulting, working on major submarine telecommunications network systems, including projects in the oil and gas sector.



Gavin Tully is a managing partner at Pioneer Consulting. He served for three years as the company's director of submarine solutions before being named partner in 2018. Gavin began his career in mechanical engineering of under-sea cables before growing into system engineering and then evolving into global sales for the offshore oil and gas, scientific, and renewables markets.



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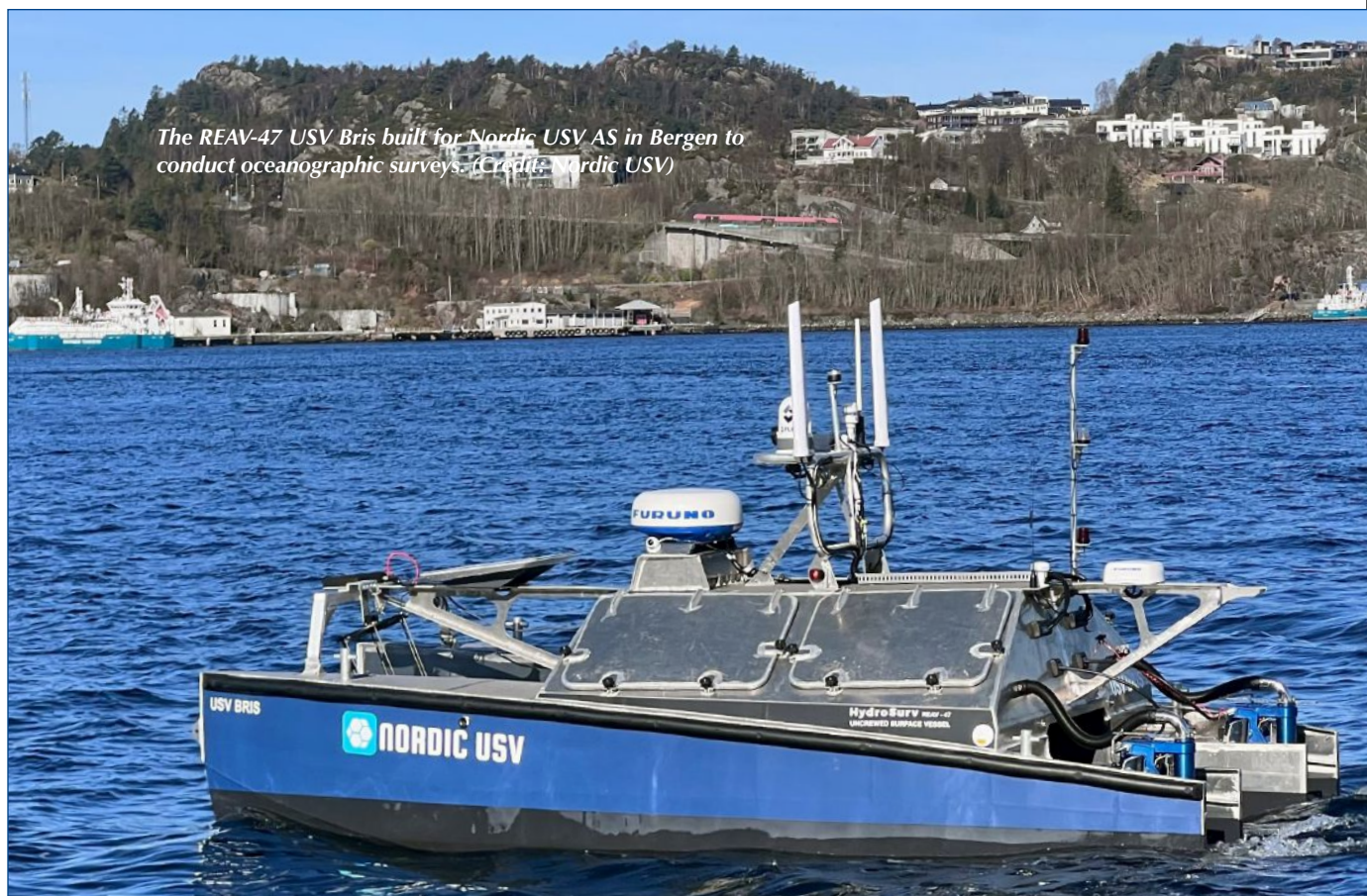
Partnership for USV Build Will Enable Surveys at Scale

By David Hull • Lennaert van den Berg

In recent years, the untapped potential of USVs as a transformational capability for marine data acquisition has been well-studied and documented as an alternative to traditionally crewed survey platforms. At the forefront of this evolution is HydroSurv, a U.K.-based pioneer in the design and deployment of industrialized, turnkey USV solutions for inland, nearshore, and coastal envi-

ronments. Since its founding in 2019, the company has delivered more than 90 successful projects, deploying 25 USVs globally across a wide spectrum of hydrographic, geophysical and oceanographic applications.

HydroSurv's portfolio is anchored by the rapid environmental assessment vessel (REAV) series, based on an agile platform concept engineered to deploy quickly in



environments with limited infrastructure, or in remote locations, often where data are otherwise inaccessible or unreliable. These values underpin HydroSurv's broader vision to democratize ocean data by making non-invasive, efficient and cost-effective autonomous systems accessible across the supply chain.

A Third-Generation Milestone: REAV-47

HydroSurv's mission to make autonomous systems accessible relies on technology that is industrialized, trusted, available and field-proven. The company's latest REAV-47 platform represents the newest step in optimizing performance, endurance and efficiency.

Purpose-built for nearshore, multi-day coastal surveys, REAV-47 combines Mastervolt energy systems with a new electric propulsion system developed by the innovative Dutch company Rim Drive Technology. This milestone marks the first integration of a rim-driven thruster onto a HydroSurv platform.

The first-of-class vessel, named "USV Bris," was delivered to Nordic USV AS of Bergen in early 2025. It is the first of three REAV-47s to be supplied to Nordic USV this year, supporting the company's mission to deploy low-emission uncrewed survey capabilities in Northern Europe.

In parallel, HydroSurv is delivering a REAV-47 order from a key customer in Nigeria, scheduled for handover June 2025.

A Choice of Electric and Hybrid Powertrains

The REAV-47 is available in two variants: a fully electric, 24-kWh battery configuration and a 12-kWh battery-hybrid configuration designed for extended operation in remote locations. In its hybrid form, the vessel is powered by two 6-kWh Mastervolt lithium-ion (MLI Ultra) batteries and a highly efficient 4-kW, 24-V DC generator from Fischer Panda, which consumes less than a liter of fuel per hour under normal operating conditions. HydroSurv has relied on Mastervolt battery technology since the introduction of the REAV-60 in 2022, and the REAV-47 is the first to implement the system in a higher 48-V configuration, offering improved energy density and reduced cable losses.

The powertrain delivers an operational endurance of 72 hr. while reducing CO₂ emissions by more than 97 percent compared with small diesel workboats used for similar missions. This underscores the environmental value of hybrid electric USV systems, even where they utilize conventional fuels.

However, where mission fre-



POD assembly.

quency is a more important consideration than endurance, the REAV-47 may be optimally installed with an automated mooring and charging system that will recover and recharge the vessel for a hand-off operation. An evaluation unit is installed on USV Bris, and a second unit will be extensively tested by HydroSurv this summer. Afterward, the technology will be available on all third-generation REAV platforms.

Virtual Watchkeeper for Remote Operations

At the heart of the REAV-47 lies HydroSurv's proprietary Virtual Watchkeeper vessel control system, a patent-applied PLC-based control and monitoring suite that manages propulsion and power systems and controls the vessel's onboard systems. Designed with fault tolerance and safety in mind, the system integrates redundant power supplies, backup uninterruptible power supply and multi-channel overcurrent protection, providing the resilience customers expect from industrialized USV platforms deployed to remote work sites.

The propulsion system of Rim Drive Technology is integrated with an updated firmware build of the Dynautics SPECTRE autopilot HydroSurv has been using since

2019, allowing for precise maneuvering and dynamic positioning.

Electric Propulsion

Rim Drive Technology develops, manufactures, and sells rim drive motors from 0.5 to 75 kW for private, commercial, industrial, and underwater applications. In order to guarantee and monitor the quality of their products, Rim Drive Technology's production, R&D and office are located in the Netherlands. The motors are 100 percent electric and can be used as either main propulsion or secondary drives. In addition to motors, Rim Drive Technology provides a wide range of customizable complementary products, including batteries, monitors, throttle controls, motor controllers and cables.

Rim Drive Technology's electric motors are designed to excel in the most demanding environments. Whether navigating through polluted waters or areas with heavy sediment and sand, these motors deliver outstanding reliability and efficiency. Thanks to the unique design, featuring no center shaft, there is minimal risk of entanglement from ropes, nets, or debris, making them an ideal solution for autonomous surface vessels and other critical applications.

Compact and lightweight, the motors easily fit into even the smallest installations, while also reducing drag to enhance efficiency and speed. At the same time, full system access through the motor controller gives users immediate insight into all essential motor and battery data, simplifying integration. Wireless, CAN-based control adds another layer of flexibility, eliminating the need for physical connections while ensuring smooth performance.

Maintenance is often a major cost driver in marine operations, but not with Rim Drive motors. With only one rotating part, the simplified mechanism drastically reduces wear and tear. The result is lower maintenance needs and reduced operational costs.

Rim Drive Technology also offers direct, high-quality service. By partnering with the company, HydroSurv gains from short communication lines, expert support, and quick access to updates and spare parts, ensuring reliable performance.

Propulsion Range

Rim Drive Technology offers a wide range of propulsion options, providing efficient and reliable solutions

for various vessel types and applications. For main propulsion, we provide fixed PODs, steerable PODs and outboard options.

The Rim Drive pod features a minimalist design with only one rotating part, requiring straightforward maintenance and delivering over 90 percent efficiency at medium speeds, ideal for cruise operations. The fixed pod is available from 0.5 to 75 kW and is fully waterproof (IP68).

The steerable pod configurations include an entry-level option as a cost-effective solution that integrates easily with existing systems, available from 2.5 to 15 kW. Another option is the steerable pod available from 2.5 to 75 kW, with 320° rotation for superior maneuverability. It can be controlled by joystick, steering wheel or CAN interface.

For outboards, the steerable outboard offers 320° rotation and 360° propulsion, with remote adjustment capabilities. It's mountable on the transom or a tilt-and-trim bracket and is available in 11 and 15 kW. The entry-level outboard, available from 2.5 to 15 kW, provides affordable propulsion with a manual tilt-and-trim bracket. This outboard is compatible with all standard steering cylinders, perfect for easy refitting.

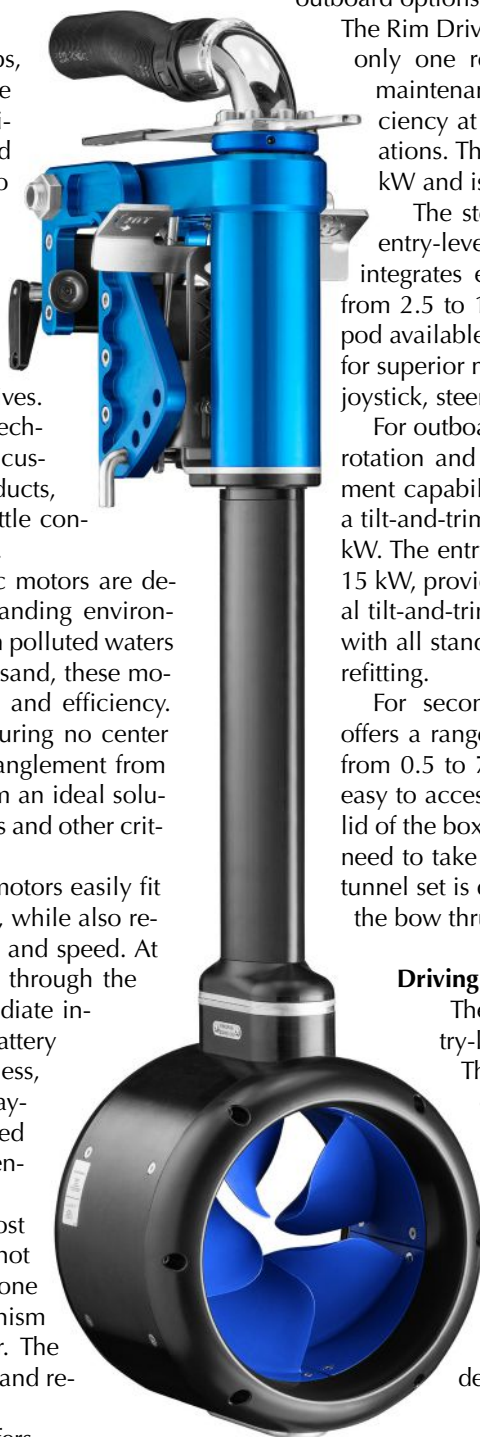
For secondary propulsion, the company also offers a range of bow and stern thrusters, available from 0.5 to 75 kW. The bow thruster box makes it easy to access the motor because installation of the lid of the box is above the waterline, eliminating the need to take the boat out of the water. The thruster tunnel set is designed for difficult conditions, where the bow thruster remains protected.

Driving Innovation, Together

The REAV-47 is equipped with two entry-level Outboard 5.0 propulsion systems. The motor controller is separate from the outboard and can be installed inside the hull, allowing for an IP68-rated system without the need for additional sealings or oils.

The entry-level Outboard 5.0 is a compact and efficient solution designed for straightforward integration. Operating at a nominal voltage of 48 V with a current draw of 104 A, it delivers a static thrust of 60 kg. The unit weighs just 23 kg and features a propeller diameter of 133 mm and a total length of 967 mm. With the two Outboard 5.0 units, REAV-47 achieves a cruising speed of 4.1 kt. and a maximum speed of 6.5 kt., operating at a combined power output of 10 kW.

Rim Drive Technology's electric motors are a natural fit for HydroSurv, not just technically but strategically. Both companies are ambitious and committed to continuous innovation in the field of autonomous marine technology. As HydroSurv expands its



Entry-level outboard.

fleet with versatile platforms such as the REAV-47, Rim Drive Technology's range of compact, scalable motors supports that growth with propulsion solutions tailored to vessels of all sizes.

The company's fully waterproof, shaftless rim drive systems reduce drag, require minimal maintenance, and provide real-time access to motor and battery data; a necessity for remote nearshore survey. Combined with Rim Drive Technology's global service partner network, this ensures that HydroSurv can support its USV customers efficiently and reliably around the world. It's a strategic alignment rooted in shared vision, technical compatibility, and a commitment to shaping the future of marine autonomy.

A Scalable USV Platform

Looking ahead, HydroSurv is extending the benefits of the Rim Drive propulsion system into its upcoming REAV-25. Based on the popular REAV-28 platform, the REAV-25 has been reiterated to comply with U.K. Maritime Guidance Note 702, offering a 24-V version of the Rim Drive Technology configuration for day-works-capable USVs, with a focus on evolving regulatory and safety standards for small maritime autonomous surface ships.

As demand grows for clean, compact, and versatile survey platforms that can be delivered quickly and generate a rapid return on investment for their users, HydroSurv sees strong market traction for its third-generation USVs from a diverse pool of customers seeking to low-

er operational carbon emissions while increasing data availability.

HydroSurv's latest collaboration with Rim Drive Technology demonstrates the power of engineering partnerships in realizing the promise of industrialized, forward-looking robotic solutions for the marine sector's toughest challenges. **ST**

David Hull is the founder and CEO of HydroSurv, a pioneering U.K. marine robotics venture developing battery electric and hybrid USVs. With more than 20 years in the marine industry, spanning shipbuilding, vessel construction management, and marine technology, he brings extensive expertise in revolutionizing hydrographic and environmental data acquisition across inland, nearshore, and offshore applications.



Lennaert van den Berg leads international sales at Rim Drive Technology, where he steers global partnerships and client relations. He helps grow the company's presence in the marine sector by working closely with customers and building strong, long-term collaborations.





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Find out more

Electric Drive Systems

Sustainable Propulsion with Smart Navigation

By Dan Hook

There's a seismic shift in the industry as pressure mounts to reduce emissions and embrace sustainability. This is causing vessel operators to increasingly turn toward electric propulsion as a practical and future-proof alternative to traditional combustion engines.

Innovators driving this revolution include the team here at U.K.-based RAD Propulsion, where our cutting-edge technology is reshaping how commercial operators and leisure users think about power on the water.

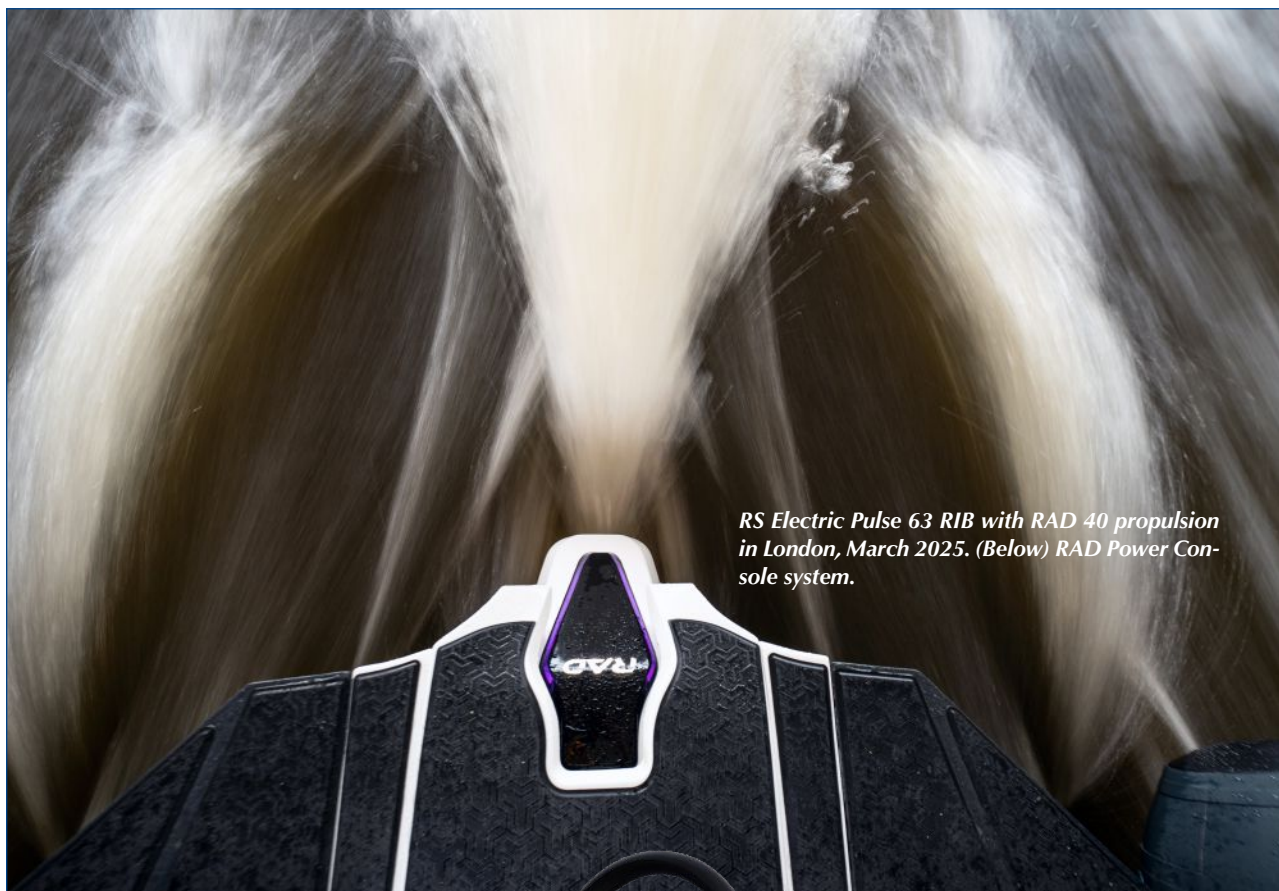
At the heart of our offering is the RAD 40 electric

drive, a lightweight, intelligent, 60-hp-equivalent propulsion system that combines top performance and innovative technology while being simple to install and maintain. The RAD 40 also enables boat builders to maximize space on board thanks to its compact and space-saving design. The integrated steering and flush transom provide more room for features such as bathing platforms or extra seating.

With a fully integrated drive-by-wire throttle and steering system, our drive offers precise, responsive con-



Zodiac Milpro featuring RAD 40 electric propulsion in Southampton, U.K., 2024.



RS Electric Pulse 63 RIB with RAD 40 propulsion in London, March 2025. (Below) RAD Power Console system.

trol. The $\pm 90^\circ$ steering enables 180° maneuverability, making complex handling effortless. Its ultralow maintenance requirements further enhance reliability, which is crucial for vessel owners and operators and ensures peak performance in demanding applications.

We've ensured users have no charging concerns with CCS DC fast charging in under an hour and AC charging solutions for use with 16- and 13-A shore power sockets. It was important to us to optimize turnaround times between uses to meet the real-world needs of our customers. Integrated battery management systems (BMS) also ensure safety and performance, while adapting to variable environmental conditions, from -10 to $+55^\circ\text{C}$.

Smart Navigation

Earlier this year, we were proud to announce a new partnership with Savvy Navvy, a marine navigation technology company, to integrate our electric propulsion systems with smart range technology.

This collaboration combines both power management and route planning, allowing boaters to receive real-time updates on their range based on dynamic environmental conditions such as wind, tides, and weather. With more than 2 million downloads globally, Savvy Navvy's intuitive mobile charts are already transforming how boaters approach trip planning. By feeding RAD's Propulsion data into this ecosystem, users gain unprecedented accuracy and confidence in every journey, ensuring they can make the most of their voyages. This partnership vali-



dates our broader approach that clean marine propulsion needs to be part of a connected and intelligent system.

Power Console System

Another breakthrough product from the RAD Propulsion team is our Power Console system, a fully inte-

RAD Propulsion's multifunction displays.



grated, all-in-one outboard console designed for rapid deployment. We wanted to design a product which appealed whether you are a commercial operator needing fast turnaround or a leisure user desiring a hassle-free setup. This system brings professional grade performance in a compact, user-friendly format, perfect for inflatable ribs such as the Zodiac MK 5.

Two versions are available currently. The Power Console features a 21-kWh battery and a range up to 21 nautical mi. (nm) at low speed, and the Power Console+ features a 42-kWh battery and a range up to 41 nm at low speed. Both systems are designed for ease of deployment. Mountable in forward or aft positions, they require no complex wiring and can be installed in under 15 min. The systems are also engineered for environmental robustness, operating in air temperatures from -10 to +55° C and water temperatures down to -5° C.

Their low noise and thermal output make them ideal for eco-sensitive missions, scientific research, and defense operations. The RAD 40's thermal imaging footprint is negligible, a key advantage where detection or disruption is a concern. Likewise, our product's underwater acoustic signature is significantly quieter than combus-

tion alternatives, enhancing its utility in marine biology, conservation, and tactical uses. A cruise line successfully used the product in Antarctica during the winter, just to name one customer.

The Future

At RAD Propulsion, we're working hard to demonstrate what electric marine systems can achieve, proving that clean boating doesn't require a compromise in performance or capability. Whether it's through reduced environmental impact, intelligent smart range navigation, or ease of deployment and maintenance, our solutions are set to help the marine industry in its move toward a more sustainable and reliable future. **ST**

Dan Hook is the CEO of RAD Propulsion. He is a chartered engineer and a fellow of the Royal Institution of Naval Architects in the U.K., with more than 20 years' experience in the marine industry. Hook was one of the founding members of ASV Global, now known as L3 ASV. This company continues to be at the forefront of unmanned surface vehicles. He founded RAD Propulsion in 2018. Hook is a trustee of the National Oceanography Centre and active on many industry/government initiatives to grow the U.K. marine industry.



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Subsea Power

Batteries, Energy Systems Provide Reliable Power at Depth

By Sören Johannsen

SubCtech, an award-winning leader in underwater technologies, founded in 2010 by applied physicist Stefan Marx (CEO), has grown into a maritime powerhouse based in Kiel, Germany. This medium-size enterprise, composed of a diverse team of skilled mechanical and electrical engineers and software specialists, is dedicated to next-generation R&D, custom project consulting, thorough prototype testing, and high-quality manufacturing according to international standards.

The great benefit for customers is a safe and reliable field-tested technology that not only significantly reduces CAPEX and OPEX costs but also greatly reduces the CO₂ footprint through less downtime and service calls and longer life cycles; a win-win for industry, the blue economy, and the environment.

Ocean Power Products

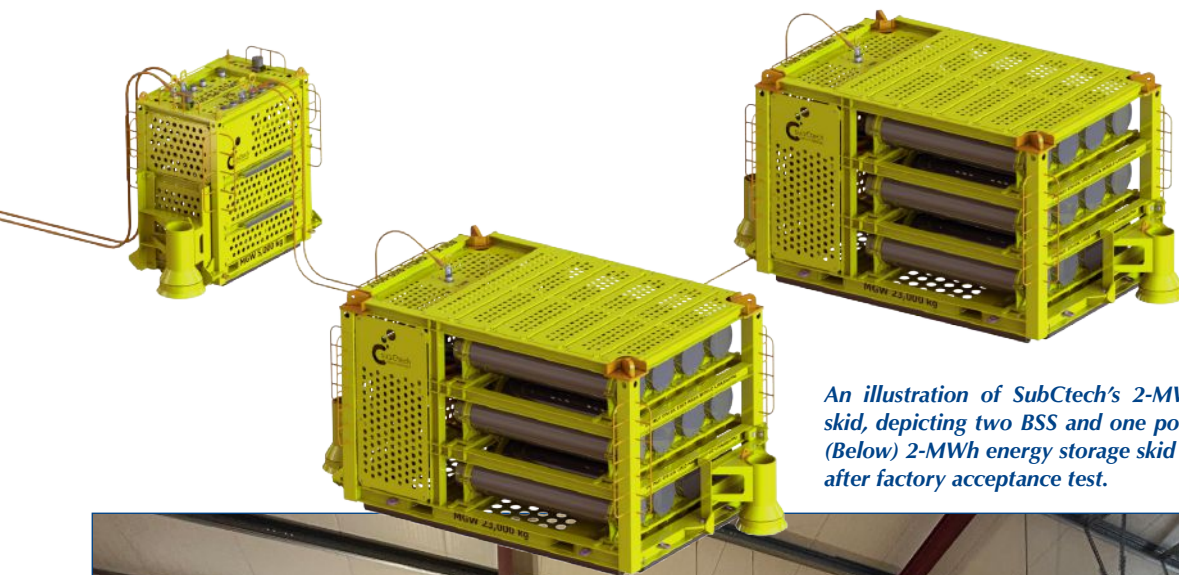
SubCtech's ocean power products are crucial for off-

shore oil and gas companies; environmental monitoring stations; manufacturers of AUVs, USVs, and ROVs; and other subsea applications. The company's flagship product line, PowerPacks, features advanced lithium-ion (Li-ion) battery systems with configurations for basic, subsea, vehicle, and custom battery needs, including advanced charging and battery management systems (BMS). These modular and flexible battery power blocks (SPBs), encased in a custom housing, are depth-rated to 6,000 m and designed for a life span of up to 20 years.

One of the key factors in SubCtech's success with its subsea batteries is the unmatched reliability and adherence to strict safety standards. The Li-ion cells as well as the entire PowerPacks undergo rigorous testing to meet UN T38.3, MIL-STD, DNV, and API 17F compliance standards, along with further customized requirements. These subsea batteries are specifically engineered for high-capacity, uninterruptible power supply for subsea



SubCtech battery storage skid (BSS) placed on seabed for operational use.



An illustration of SubCtech's 2-MWh energy storage skid, depicting two BSS and one power skid/converter. (Below) 2-MWh energy storage skid ready for shipment after factory acceptance test.



energy production facilities, capable of operating even in extreme conditions. Our batteries undergo intensive testing for heat resistance, shock and vibration tolerance, and electromagnetic compatibility to ensure they meet the stringent standards our clients expect and heavily rely on.

The batteries automatically protect themselves from potential issues, safeguarding the system from damage and ensuring operational safety. They are equipped with features to disconnect in case of over- or undervoltage, over temperature, overcharge, overcurrent or short circuits, with a high number of sensors and new KI-based algorithm to eliminate false alarms and detect critical states. Compared to traditional alkaline primary batteries, Li-ion PowerPacks provide robust high-current operation, functioning at sub-zero temperatures, able to handle peak currents efficiently, and suitable for long storage or operating times. These attributes precisely meet demanding subsea and offshore applications.

Subsea Energy Storage System

Recently, SubCtech developed a 2-MWh subsea energy storage system (ESS), setting a milestone in its commitment to sustainable energy storage solutions. This ESS stands out due to several key innovations. Its design is based on scalable and independently operable SPB modules, allowing for flexible configurations, from small kilowatt-hour setups to multimegawatt-hour installations. The ESS uses field-proven, DNV GL-certified lithium-ion batteries, ensuring reliability and safety.

The advanced BMS provides real-time diagnostics, redundancy, intelligent balancing, and autonomous subsea operation with minimal maintenance. It is applicable for both energy storage and powering AUVs, sensors, and subsea equipment. This combination of technical maturity, scalability and autonomy sets it apart in the global subsea energy market.

The ESS, with a Technology Readiness Level of 6 (TRL 6 according API 17Q), is currently in operational use in

the oil and gas sector. The system has proven its value in the field, where it effectively supports the demanding power requirements of offshore operations.

One of SubCtech's customers, a major international oil and gas company based in North America, impressed by the ESS's performance and reliability, recently placed an order for an additional complete system. This order underscores the ESS's success and the growing demand for sustainable, high-capacity power solutions within the subsea industry. It represents a milestone in the commercialization of large-scale subsea battery systems.

Global Growth

As the global demand for ocean power products increases, SubCtech has been experiencing rapid growth, supplying products to clients around the world. To accommodate this growth, SubCtech has doubled its workforce to 76 employees and plans a significant expansion of its production facilities in 2025.

Our UN T38.3-certified Li-ion batteries are safely transported worldwide via airline cargo, thanks to our

professional sales partner network that ensures seamless service availability even in diverse regions.

Future Vision

Looking to the future, SubCtech is committed to advancing as a global leader in ocean power solutions, as well as ocean monitoring systems, such as our Ocean-Pack RACE system, currently deployed on German research vessels, such as the RV *Polarstern*. It performs continuous CO₂ and pH monitoring; meteorological and hydrographic data logging (salinity, temperature, oxygen, etc.); and real-time satellite transmission to global networks, including the Integrated Carbon Observation System and SOCAT, which brings together, in a common format, all publicly available surface water data from the global oceans. SubCtech's systems contribute critical data to climate research and carbon cycle modeling, and they are recognized for their reliability in extreme polar and tropical environments.

The company actively seeks strategic partnerships to extend its network and deepen its impact in the international oceanology sector. With continued innovation in subsea energy storage and monitoring, along with a robust commitment to environmental responsibility, SubCtech is well-positioned to set new standards in sustainable marine technology.

SubCtech is a trusted partner in the marine and subsea technology sectors, known for its innovative solutions, such as Li-ion PowerPacks and the pioneering Subsea ESS. These products deliver reliable, field-proven technology that meets the demanding standards of the offshore industry.

The key benefit for customers lies in significantly reducing CAPEX and OPEX costs. Longer operational intervals, fewer service calls, and reduced downtime not only optimize efficiency but also lower the CO₂ footprint—offering a clear win for industry, the blue economy, and the environment.

The recent success of the ESS in operational deployment within the oil and gas sector and the subsequent re-order by a key customer further underscores the effectiveness and reliability of SubCtech's solutions in real-world applications. As SubCtech continues to innovate and grow, it solidifies its role as a pioneer in sustainable power and monitoring technologies for the marine environment.

For more information, visit www.subctech.com or contact: info@subctech.com. **ST**

For more information, visit www.subctech.com or contact: info@subctech.com. **ST**

Sören Johannsen is the COO and marketing manager of SubCtech.



An illustration of a subsea tech ecosystem with multi-use energy storage system and several charging options.

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Retrofitting Project for Sustainability

If the shipping industry were a country, it would be the sixth-largest polluter in the world. With its \$123.7 million retrofitting project, Atal Solutions—alongside Damen Shipyards Group, Blue Astra Maritime Shipping, and a consortium of partners—is taking direct action to change that with an initiative to transform the global shipping fleet by integrating technologies that cut CO₂, SOx, and NOx emissions; achieving fuel savings of more than 25 percent; and nearly eliminating vessel waste.

Four vessels have been modified so far in Istanbul, with initial results showing fuel savings of at least 25 percent. As retrofitting continues, more data from ongoing trials are anticipated to validate these results further.

The project brings together 10 advanced technologies, each focused on reducing emissions and improving performance. Atal's innovative financing model ensures that these sustainable upgrades are accessible with minimal upfront investment. Through a supplier credit covering \$105.2 million of the project's cost, shipowners are only required to contribute 15 percent equity. This model facilitates the rapid adoption of green technologies and offers a scalable solution for the maritime industry.

Innovation Ecosystem Partnership

The World Ocean Council (WOC) has a new multi-year strategic partnership with OCEANOVATION, an innovation ecosystem, dedicated to advancing sustainable ocean solutions.

Through a dynamic roadmap of co-created initiatives, WOC and OCEANOVATION will bring together startups, corporations, investors, and policymakers to tackle some of the most pressing challenges facing the ocean—from climate change to pollution, biodiversity loss, and sustainable resource use.

Sulmara Grows Office Presence

The independent subsea survey and inspection company Sulmara has reinforced its growing footprint by relocating to larger premises in Glasgow and Taipei, and opening a brand new office in Norwich, U.K., to support a global team that grew by 25 percent over the last year to 250 employees.

Sulmara's new offices are located closer to industry hubs, strengthening the firm's ability to support local clients and projects. This includes bringing the company, which also has offices in Aberdeen, Singapore, and Houston, closer to key suppliers.

Arctic Way Cable System

Space Norway and SubCom have announced that a contract is in force for the survey, design, supply and installation of the Arctic Way Cable System. Providing necessary route diversity to a region with rapidly increasing data traffic demands, the new system will become a critical asset for transmitting data between the Norwegian mainland, Jan Mayen and the Svalbard archipelago.

SubCom will produce the components for Arctic Way at its manufacturing campus in Newington, New Hampshire. The trunk-and-branch, repeatered system will be approximately 2,350 km in length, with direct shore end landings in Bodø, Jan Mayen, and Longyearbyen, Svalbard, Norway. Located entirely within the Arctic Circle (67 to 78° N), this will be the world's northernmost subsea cable system and will be installed by one of SubCom's polar-certified, *Reliance*-class cable ships.

Saildrone Secures Investment Funding

Saildrone has closed a \$60 million investment round led by EIFO, the Export and Investment Fund of Denmark. The investment will be used to bring Saildrone technology to Europe to address the urgent need for maritime security for critical infrastructure and wider defense applications. This latest investment brings Saildrone funding to \$325 million.

Accreditation for Abu Dhabi Maritime Academy

The Institute of Chartered Shipbrokers' long-standing partner, Abu Dhabi Maritime Academy (ADMA), has officially been accredited as an International Teaching Centre. This recognition follows a comprehensive audit and solidifies ADMA's role as a hub for professional maritime education in the Middle East region.

3D Boat Printing at Scale

CEAD, a specialist in end-to-end, large-scale 3D printing technology, has launched the Maritime Application Center (MAC), an industry-first initiative focused on accelerating the adoption of automated, sustainable production in the maritime sector. The MAC is positioned as a vital innovation hub where advanced manufacturing, material development, and application engineering converge to tackle the complexity of boat building and related maritime components.

The MAC aims to demonstrate what the boat factory of the future looks like: a high-output, compact, automated facility where just two to three operators could produce more than 100 boats per year, depending on the specific factory configuration.

IMO-WISTA Women in Maritime Survey Report

The findings from the latest IMO-WISTA Women in Maritime Survey have been released, jointly published by the International Maritime Organization (IMO) and the Women's International Shipping & Trading Association (WISTA). The report presents data on the proportion and distribution of women working in maritime from IMO member states and the private sector.

Key findings from the report include a rise in women working in maritime: 176,820 women in 2024 compared to 151,979 in 2021. However, the latest data set shows that women account for just under 19 percent of the total workforce sampled, compared to a share of 26 percent reported in 2021. Of the sample group, women account for 19 percent of the workforce of national maritime authorities in IMO member states, and only 16 percent of the surveyed private sector workforce (excluding seafar-

ers). At sea, women account for just 1 percent of seafarers employed by the surveyed organizations. A total of 1,206 women sit on the boards of the surveyed maritime organizations, accounting for 34 percent of board members.

Maritime Aerial Drone Services Demo

Skyports Drone Services has conducted a series of proof-of-concept, ship-to-shore, beyond-visual-line-of-sight drone flights and deliveries in Michigan's Great Lakes region.

Conducted in partnership with the Michigan Department of Transportation, the Michigan Office of Future Mobility and Electrification, and Newlab, the trial operated from DeTour, Michigan, to validate the benefits of using drones to supplement regular ship deliveries from supply boats. Light cargo, such as oil samples, potable water samples, flat and small mail, and linens/laundry were delivered during the trial.

The pilot program aims to validate the technology needed for safe and efficient drone integration in maritime environments.

It will generate valuable insights to help inform the regulatory requirements and policy frameworks necessary to scale shore-to-ship drone operations, laying the groundwork for the widespread adoption of drone-based logistics in the region.

The initial proof-of-concept pilot is the first of a proposed three stages to demonstrate the feasibility of other high-value use cases for drone deliveries.

Smaller Satellites Continue to Develop

SFL Missions Inc. is continuing the development of pioneering small satellite missions for commercial, government and academic customers worldwide by building upon the legacy of Space Flight Laboratory (SFL).

With the foundation of the SFL heritage that produced 86 operationally successful missions and more than 370 cumulative years in orbit, SFL Missions Inc. is developing nano-, micro-, and small satellites and constellations using space-proven bus designs for Earth observation, communications, environmental monitoring, maritime situational awareness, space astronomy, scientific research, and more.

SFL Missions will continue the tradition of devising and implementing innovative technologies for low-mass spacecraft, including precision attitude control, accurate sensor pointing, autonomous formation flying, scalable power and propulsion, and deployable antennas.

SFL Missions also gives customers the option of having satellites developed in their own location, at a third-party site, or at the SFL Missions facility.

Geological Evaluation in GOM

TDI-Brooks has finalized a geological evaluation in the Gulf of Mexico (GOM) on behalf of Enbridge. TDI-Brooks utilized the RV *Brooks McCall*, executing 38 piston cores, seven gravity cone penetration tests and 82 box cores. TDI-Brooks has conducted previous geotechnical projects for Enbridge in the Gulf of Mexico. **ST**

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USCG Cutter Enters Fleet

The U.S. Coast Guard (USCG) has commissioned its newest cutter, *John Witherspoon* (WPC 1158), for official entry into its service fleet during a ceremony held in Kodiak, Alaska. The vessel is the 58th fast response cutter (FRC) in the service and the first of three FRCs scheduled to be homeported at Coast Guard Base Kodiak.

The crew of the Witherspoon will primarily serve in and around the Aleutian Islands, Bering Sea, Gulf of Alaska and North Pacific Ocean. The cutter is designed for missions such as search and rescue; fishery patrols; drug and migrant interdiction; national defense; and ports, waterways, and coastal security.

The namesake for the cutter, Capt. John G. Witherspoon, enlisted in the Coast Guard in 1963. During his career, Witherspoon rose to the rank of captain and served as the commanding officer on three Coast Guard cutters. Witherspoon became the first African-American to command a medium-endurance cutter and the first African-American officer to command both afloat and ashore units. He earned the Coast Guard Meritorious Service Medal and two Coast Guard Commendation Medals during his career. He is the namesake of the USCG Captain John G. Witherspoon Inspirational Leadership Award.

Maritime Action Plan

U.S. President Donald Trump has issued an executive order to restore America's maritime dominance. As part of the executive order, the Department of Transportation's Maritime Administration (MARAD) will coordinate with various stakeholders to create a Maritime Action Plan (MAP).

The MAP will include key initiatives, such as revitalizing the U.S. Merchant Marine Academy, incentivizing domestic shipbuilding, enhancing infrastructure and capacity, growing demand for U.S. shipping, investing in maritime technology, enhancing workforce development, and strengthening maritime security.

USTR Makes Decision on Tariffs For Chinese Vessels, Cargo Movement

The U.S. Trade Representative (USTR) has made a final action to a Section 301 Investigation that would impose fees on Chinese vessels and new tariffs on cargo-handling equipment (CHE).

The U.S. American Association of Port Authorities (AAPA) submitted industry comments opposing the original proposal and joined a coalition of 316 other trade groups in a letter outlining the far-reaching negative impacts of the proposed fees.

The new policy would severely impact specific cargo segments, such as automobiles, said AAPA. The policy includes a fee on foreign-built vehicle carriers of \$150 for every car it has capacity to carry. This poses new and unique burdens on many ports specializing in roll-on, roll-off trade business. The potential for an additional 100

percent tax on CHE could bring the tariff as high as 270 percent on ship-to-shore cranes.

There are currently no domestic manufacturers of ship-to-shore cranes. Without action from the administration to create an incentive for their production, there won't be for several years, AAPA said. High tariffs on ship-to-shore cranes, without affordable alternatives from either domestic or allied sources, function as a crippling tax on port development and threaten U.S. cargo movement.

Instead, AAPA suggests legislation to create a production tax credit for domestically produced CHE, which would be necessary to incentivize manufacturing.

Automated Satellite Fire Detection

Less than a year after being evaluated in NOAA's Fire Weather Testbed, the automated satellite fire detection capability of the experimental Next Generation Fire System (NGFS) has been embraced by the firefighting community and is being increasingly integrated into operations across the country, according to NOAA.

The first of two key features of the revolutionary system are the Advanced Baseline Imager, the primary instrument on NOAA's two GOES geostationary satellites orbiting 22,000 mi. above the equator. The second is a set of NGFS algorithms that continuously comb through enormous volumes of data generated by the imager and automatically identifies heat anomalies or hot spots, even through clouds and smoke.

Any new sources of heat are overlaid on surface imagery and geolocated. Then an alert is sent instantly to an online dashboard so users can easily visualize the location. Once a fire is detected, the system tracks and records the fire's spread and intensity. The information is simultaneously available to weather forecasters, fire dispatchers and first responders. Getting firefighters on a fire before it becomes big increases the chances for a successful initial attack.

Ninety percent of the National Weather Service's 122 Weather Forecast Offices around the country have subscribed to the NGFS feed since it became available in February. Forecast offices in California, Oregon, New Mexico, Texas, Oklahoma, Nebraska and North Carolina have used it so far this year.

Ocean Enterprise Accelerator First Stage

VentureWell, a global nonprofit dedicated to fostering innovation for lasting social impact, has convened 15 blue tech startups from across the country and other ocean innovation leaders in Rhode Island to kick off the first stage of the VentureWell Ocean Enterprise Accelerator, supported by NOAA.

VentureWell and NOAA are working to achieve the overarching goal of the Ocean Enterprise Accelerator program: to support the adoption of new ocean data technologies and services for economic and societal benefit to the U.S. and its growing blue economy.

The participants are now engaging in three months of virtual workshops, one-on-one mentorship, and personalized support to develop their product readiness roadmaps. **ST**

productdevelopment

For more information on any of these products, visit our website at www.sea-technology.com/products

Compact IP Camera



LUXUS provides IP capabilities that enable direct network connection for remote viewing and management. A 12- to 24-VDC supply powers the camera and consumes only 3.5 W, making it energy-efficient for prolonged use. The resolution is 1920 x 1080 at 25 fps (2 mp). LUXUS offers a 95° horizontal angle of view of in air and 72° in water, with a focus length of >0.5 m (F 2.0). It supports multiple control options, including ONVIF (S), and features fully automatic or manual gain and exposure settings. MacArtney Benelux BV.

Citizen Science Reporting

The latest SonaSoft software update builds on the existing Data Sharing Program by introducing the ability for users to report whale sightings and floating trash/debris. Through a simple pop-up box, users can log observations of whales or trash/de-

bris with a single input. Each sighting is automatically geotagged and time stamped, then it can be securely uploaded and anonymized. Data are shared with trusted partners, including Whale Alert and Ocean Wise for whale sightings, and Eyesea for trash/debris reports. FarSounder Inc.

[Cyberattack Prevention

External Attack Surface Management (EASM) offers real-time asset discovery, instantly mapping exposed digital assets across your environment. Vulnerability detection occurs with identification of unpatched systems and configuration issues. Threat intelligence is integrated by leveraging insights from global threat feeds curated by Marlink's cyber experts. EASM provides 24/7 monitoring. Marlink.

Tailshaft Bearing

RiverTough is primarily a retrofit solution but also increasingly specified for newbuilds. It is designed for coastal and inland waterways, where conditions are typically muddy and abrasive. The solution, applied in combination with hard-coated nickel-chrome-boron Thordon shaft sleeves, has been ver-

ified as outlasting rubber bearings by a factor of two or more in the harshest operating environments. Thordon Bearings Inc.

Undersea Threat Detection



PointShield's new version for the detection of manned and unmanned submersibles is designed for installation on a variety of platforms, ranging from maritime vessels to ports. Rapidly deployable, the portable sonar system is ready to respond quickly to potential threats. With fully automatic detection, classification and alert capabilities, the system does not require a real-time operator. It effectively detects underwater intruders, including divers, diver propulsion vehicles and AUVs. DSIT Solutions Ltd.

pH Sensors

Production and service has restarted for the Shallow SeaFET and Shallow SeapHOx, featuring advanced ion-sensitive field effect transistor (ISFET) technology. They are ideal for all coastal applications up to 50-m deep. Shallow SeaFET V2 uses ISFET for stable, long-term pH

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measurements in saltwater for applications such as ocean acidification research, coral reef research, coastal marine biology, and environmental monitoring. The Shallow SeapHOx V2 combines the Shallow SeaFET V2 with the SBE 37-SMP-ODO MicroCAT CTD+DO sensor for comprehensive data collection of pH alongside critical oceanographic and biological measurements of temperature, salinity, and oxygen. Sea-Bird Scientific.

Compact Navigator



A fully integrated navigation solution, the Compact Navigator is ideal for small vehicles, enabling inspection and survey applications. Small ROVs and AUVs can perform high-accuracy structure inspections, hydrographic surveys, and mine countermeasure missions in deeper waters. The DVL bottom track range is up to 420 m, enabling operation in the littoral zone independent of USBL. Safe navigation is ensured in areas where GNSS is challenged, actively denied or spoofed. Teledyne Marine.

Pipeline Visual Monitoring

LineVu Discovery is a real-time visual system that empowers gas pipeline operators to detect liquids, mist, and other contaminants as they occur, providing immediate, actionable intelligence to improve measurement accuracy, optimize maintenance, and enhance safety performance. Process Vision Ltd.

Carbon Capture

This solution is proven to reduce vessel CO₂ emissions from ship exhaust systems by up to 70 percent, providing shipowners with an im-

mediate solution to meet increasingly stringent environmental regulations. Different scalable sizes and configurations are on offer to suit various vessel types and operator needs, both on newbuilds and retrofits. The system can be applied to the exhaust from any carbon-based fuel (HFO, methanol, LNG and MGO) and can work alongside other emission reduction technologies, including SOx scrubbers, NOx reduction systems, and particulate matter filters. Wärtsilä Marine.

Real-Time Drilling Data

This joint solution drives automation and provides a single source of truth for survey, BHA, and well-planning data, empowering operators and service companies to make faster, higher-confidence decisions without sacrificing production targets or HSE standards. Users can analyze real-time drilling data in a dedicated, always-connected app. Corrected inclination and azimuth measurements feed directly from the rig as drilling progresses.

Peloton Computer Enterprises Ltd. and Innova Drilling & Intervention Ltd.

Giga-Scale Hydrogen Production

P2(H2)Node's standardized architecture will streamline the green hydrogen industry by replacing bespoke projects with a uniform approach that co-locates giga-scale hydrogen production with wind and solar farms, ensuring power is used where it's generated. This system lowers production costs by 10 to 20%, which will enable faster, large-scale hydrogen adoption for industry. Built-in energy storage allows for more consistent flow delivery to customers via line packing of hydrogen pipelines. InterContinental Energy.

Electric Workboat

VITA Seal has a range of applications, including debris removal and emergency response. The vessel features zero emissions, near-silent operation and easy plug-in charging. VITA Power. **ST**

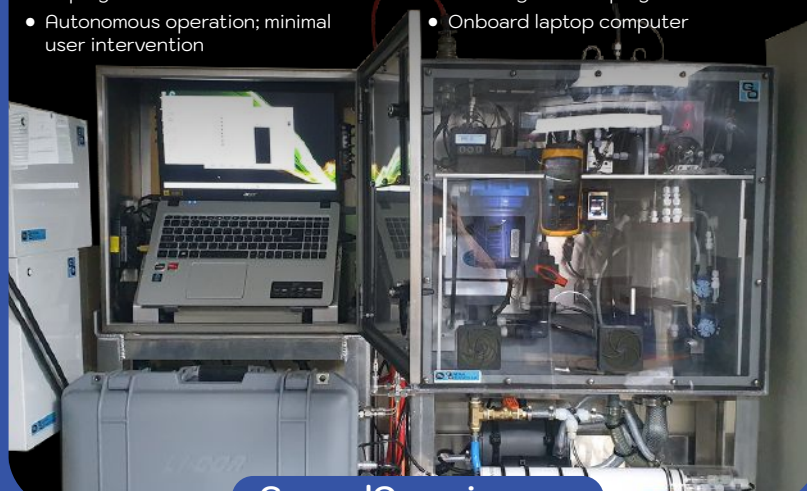


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Tidal Current Study in Canada

ASL Environmental Sciences Inc. has successfully completed an initial multi-week study to measure tidal currents in collaboration with the Nunatsiavut government and Oceans North. This initiative aligns with the Nunatsiavut Energy Security Plan to explore clean, renewable energy solutions for coastal communities and reduce dependence on diesel-generated electricity.

Current transect surveys were initially carried out with ADCPs over the broader study area. ADCPs were then deployed on moorings at three strategic locations within the Rigolet Narrows waterway and recovered in September 2024. The data from this initial phase informed the suitable site selection for a longer phase two measurement period, which involves the observational study of tidal currents to capture the

full annual tidal cycle. The second phase deployment was completed in the fall and is scheduled for recovery in summer 2025.

The processed tidal current data sets from phases one and two will provide valuable insights for assessing tidal energy potential, addressing operational challenges, and determining optimal placements for potential future in-water tidal turbines. A community consultation will take place during phase two recovery to review the results.

PAM-on-USV Demo

A landmark project supported by Innovative Solutions Canada's Real-Time Marine Mammal Monitoring Service via Uncrewed Surface Vehicle program has successfully demonstrated a novel effective method for real-time marine mammal monitoring.

JASCO Applied Sciences and SeaTrac Systems collaborated on deploying an advanced passive acoustic monitoring (PAM) system aboard SeaTrac's SP-48 USV. Equipped with JASCO's acoustic technology, a collapsible directional array, and heave-compensating winch, the system successfully detected several endangered North Atlantic right whales during trials conducted off the coasts of Massachusetts and Rhode Island.

Traditional PAM systems rely on towed arrays, which require continuous vehicle movement and limit deployment duration. The new approach replaces the towed array with a dipping, collapsible array that supports "sprint and drift" operations, enabling the USV to collect data while stationary. This method significantly reduces energy consumption, allowing for extended deployments and broader coverage.

Between December 14, 2024 and April 7, 2025, four field trials were conducted in various sea

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states and locations, including Marblehead, Massachusetts; Point Judith, Rhode Island; and Cape Cod Bay, Massachusetts. These tests confirmed the system's ability to operate reliably and autonomously in challenging conditions while consistently delivering high-quality acoustic data.

SeaTrac custom-designed its solar-powered SP-48 USV with a deep keel to enhance stability and provide precise support for JASCO's specialized equipment. Its 48-V-battery-powered JASCO heave-compensating winch was controlled by an onboard single-board computer (SBC) to deploy and retrieve the collapsible acoustic array.

JASCO's array features a unique collapsible design with four adjustable arms and a fabric damper to minimize motion interference. When lowered, the array unfolds into a compact spatial configuration that captures high-quality acoustic data, streamed in real time to the SBC.

The project trials have shown the solution's adaptability to varying weather conditions and operational demands for effective real-time marine mammal monitoring.

Barbados Sea Monitoring

Barbados Meteorological Services has launched its AutoNaut USV, "Seawolf," alongside a new spotter buoy. Seawolf will operate east of the island in Barbados' Exclusive Economic Zone, enhancing the country's ability to monitor sea state conditions and tropical cyclone activity.

These advanced tools are a key part of expanding Barbados' National Multi-Hazard Early Warning System, improving real-time data collection and strengthening the accuracy of weather forecasts and storm tracking across the region.

Subsea Port Monitoring

The Port of Gulfport in Mississippi has begun implementing continuous autonomous subsea surveillance. Using Ocean Aero's state-of-the-art technology, the Triton AUSV, the port is running ongoing scans using a variety of subsea

payloads, including bathymetry, side scan sonar and magnetometers, to produce high-resolution comparative data sets for real-time change detection. The initiative is designed to detect irregularities in both port traffic and infrastructure, which has the potential to save the port millions of dollars.

Triton's advanced monitoring will also play a crucial role in post-hurricane recovery, identifying debris and potential threats to

port infrastructure in the aftermath of severe weather events. Ensuring the channel and harbor are clear for ship traffic is critical to the rapid reopening of a port following a hurricane.

Small changes can accumulate over time with a significant impact on port operations. By identifying these subtle shifts early on via patterns in the data, Gulfport can enhance situational awareness and inform proactive port maintenance. **ST**

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Radar Tracking for Platforms

Cambridge Pixel has supplied its advanced radar tracking, recording, and display technology to Elcome (India) to enhance the security of offshore oil and gas platforms operated by Reliance Industries.

The integrated solution provides a multi-sensor security capability, leveraging Cambridge Pixel's SPx Server to process radar returns and generate high-quality track information. SPx Fusion enhances situational awareness by combining track detections from two independent radars with AIS reports, forming a consolidated threat feed.

The unified data are displayed in Cambridge Pixel's RadarWatch application, where operators can monitor vessel movements over an electronic chart underlay. RadarWatch enables automatic alarms based on flexible, user-defined rules. Cameras can be automatically steered to track targets, allowing security personnel to react swiftly. To support multi-operator environments, multicast data are used over a standard network infrastructure, enabling each user to independently select their preferred view of tracks and sensor data.

Cambridge Pixel's RDR data recorder application is included to ensure comprehensive capturing of radar video, track data and camera video into multichannel time-stamped recordings. With built-in archiving, automatic deletion, and full replay capabilities, it provides a robust analysis tool for post-event review and investigation.

To provide the required level of availability, SPx Server and SPx Fusion support failover operation. Secondary instances run on a separate processor in hot standby, ready to take over automatically if an application failure is detected.

Subsea Production off Brazil

TechnipFMC has been awarded an integrated engineering, procurement, construction and installation contract by Shell for its Gato do Mato greenfield development off-

shore Brazil. In addition to integrated execution, the project will utilize Subsea 2.0 configure-to-order subsea production systems. Combining the offerings will enable streamlined project management through a single interface and accelerate time to first oil.

USBL for Geophysical Surveys

TGS, a provider of energy data and intelligence, has selected the Exail Gaps M7 USBL system to enhance its underwater tracking capabilities for efficiency and accuracy in offshore geophysical surveys.

The Gaps M7 is a pre-calibrated USBL positioning system with an integrated INS, delivering precise subsea positioning from ultrashallow waters to depths of 7,000 m. With a 200° acoustic aperture, it enables true horizontal tracking for high-accuracy positioning, making it ideal for TGS's demanding offshore surveys. Lightweight and pre-calibrated, the Gaps M7 ensures fast deployment, minimizing downtime and streamlining survey workflows. Its rugged design guarantees stable performance in harsh offshore conditions, supporting TGS in acquiring high-quality geophysical data while reducing project costs.

North Sea Forecast to 2050

Collaboration between countries and sectors must strengthen as the North Sea undergoes a period of diversification, according to a new report from DNV. "North Sea Forecast: Ocean's Future to 2050" estimates that offshore wind will claim 9 percent of the North Sea space by 2050, and policies to promote cross-industry collaboration are required to ease spatial planning pressure. The North Sea hosts Europe's busiest ports, produces most of Europe's offshore energy, and is the area with the biggest fisheries catch.

Offshore wind capacity in the North Sea is projected to grow six-fold by 2050, reaching 214 GW, which will be on par with energy production from offshore oil and gas. DNV estimates that the area

claimed from offshore wind alone will exceed 60,000 km² in 2050. In total, ocean infrastructure will occupy 23 percent of the North Sea area in up to 50-m water depth, 2 to 50 km from shore.

While offshore wind is projected to grow, this is still not sufficient to meet the green energy ambitions of the Ostend Declaration for the North Sea. Maritime supply chain bottlenecks must be addressed. North Sea ports need to quadruple the capacity of facilities dedicated to offshore wind construction. There is also the need for more vessels to install and service the turbines.

The North Sea's oil production will decrease to 800,000 barrels per day in 2050, less than a fifth of today. Gas has more staying power due to its strategic importance to Europe, with production forecast to reduce to 60 billion m³ per day, almost two-thirds less than in 2024.

The North Sea will remain an important source of food. Due to an increased demand for seafood and good management practices, North Sea fisheries will retain the same catch volumes as today. Norway and the U.K. will increase aquaculture output, but the majority of that growth will be in cooler waters further north.

The report highlights how five of the world's 10 leading maritime cities lie on the North Sea, giving the region the infrastructure, financial power and expertise to deal with the challenges. However, lack of policy standardization makes sustainable growth difficult. The EU's policies relating to marine spatial planning differ from Norway and the U.K. Only a few countries have integrated ecosystem-based management into their spatial planning.

Hybrid Connectivity

Tampnet, an offshore connectivity provider, has chosen Nowhere Networks' business-critical technology to strengthen its offshore communications infrastructure. Tampnet's extensive offshore footprint and fiber-based backbone will be combined with Nowhere Networks' radio technology for hybrid connectivity. **ST**

Persistent Undersea Surveillance

Saildrone and Thales Australia have successfully integrated the BlueSentry thin-line towed array with the Saildrone Surveyor, creating a groundbreaking system for autonomous long-endurance undersea maritime domain awareness. The project, funded by the U.S. Office of Naval Research (ONR), marks a significant leap forward in persistent, real-time, undersea surveillance.

During the trials, the Saildrone Surveyor and BlueSentry system operated continuously for 26 days and maintained uptime greater than 96 percent, while successfully detecting and classifying underwater and surface threats. The extreme endurance of the system enables access to places that were previously out of reach, at a cost point orders of magnitude below traditional manned surveillance platforms.

Progress on Lionfish SUUV Program

HII has delivered the first two Lionfish small uncrewed undersea vehicles (SUUVs) to the U.S. Navy under a program that could scale to 200 vehicles.

Lionfish is based on HII's REMUS 300 platform, a modular, open-architecture SUUV engineered for multi-mission adaptability. The program was developed in collaboration with the U.S. Navy and Defense Innovation Unit to accelerate the adoption of dual-use commercial technologies into U.S. Department of Defense programs.

The program has been recognized as the Navy's first transition from another transaction prototype to full-scale production.

The Lionfish SUUV is the first, and only, cyber-compliant uncrewed underwater vehicle.

HII was awarded the U.S. Navy's Lionfish system program contract in 2023, and production of the Lionfish is underway at HII's uncrewed systems facility in Pocasset, Massachusetts.

ASW M-Hull Platform with Sonar

Ghostworks Marine, a Michigan-based company specializing in innovative hull designs and materials, has developed the Medusa (M90T), a modular platform capable of delivering a rapidly deployable, layered and networked antisubmarine warfare (ASW) capability in an affordable construct to allied navies, equipped with Ultra Maritime's next-generation sonar technology.

The 90-ft. platform with its M-hull design will carry Ultra Maritime's Mission Pod and towed array. The 20-ft. containerized Mission Pod is specifically designed for smaller, minimally crewed and uncrewed vessels to deliver scalable undersea domain awareness at pace. The Mission Pod contains a complete ASW system and is fully automated for remote operations. The hull design of the vessel enables sufficient payload capacity while maintaining high speed for the rapid deployment of ASW missions. The platform offers navies an innovative and flexible way to respond quickly to potential underwater threats.

In addition, the Medusa is designed to carry Ghostworks' USVs to extend ASW operational reach. They will deploy Ultra Maritime's sonobuoys. These sonobuoys have extended operational life and improved acoustic output to help navies assure safe passage for commercial and military vessels. The USVs will also carry Ultra Maritime's receivers and processing equipment.

UK NOC Renews Partnership with Royal Navy

The U.K.'s National Oceanography Centre (NOC) has renewed a memorandum of understanding (MOU) with the Royal Navy, reinforcing a long-standing partnership in marine science and technology. The MOU, which includes collaboration with the Defence Science and Technology Laboratory, the Ministry of Defence's science and technology organization, underscores a shared commitment to fostering innovation and advances in autonomous and robotic underwater systems. With expertise from NOC Innovations, NOC's applied research and commercialization arm, the agreement will enhance the U.K.'s leadership in marine science and technology.

Intruder Detection Sonar Testing

The U.S. Naval Surface Warfare Center Panama City Division and NORBIT have successfully operated the GuardPoint 70 and GuardPoint 100 intruder detection sonars in weeks-long testing. The sonars detected and tracked multiple AUV form factors at range and depth scenarios in a challenging shallow-water environment. **ST**

Ocean Power & Monitoring
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The advertisement features a central image of a large offshore vessel at sea, with the subCtech logo prominently displayed. Below the main image, several key components and systems are illustrated with labels:

- Wave Energy & Wind Battery Storage
- Vehicle Batteries
- 1-6 Mwh Energy Storage Systems
- Intervention Batteries
- AUV / Drone Docking Station
- Subsea UPS & Converter

At the bottom of the advertisement, there are two QR codes on the left, and a series of certification logos on the right, including UN 38.3, ISO 9001, API 17F, and a green energy symbol.

Second E-Tug for Khalifa Port

Damen Shipyards Group and Noatum Maritime, part of AD Ports Group's Maritime & Shipping Cluster, have agreed on the delivery of a second, fully electric Damen RSD-E Tug 2513. It will enable Noatum Maritime to perform berthing and unberthing operations at Khalifa Port with two electric tugs. This is aligned with Noatum Maritime's vision to provide their clients with fully sustainable berthing operations.

The RSD-E Tug 2513, compact at 25 m, is well suited to the modern terminal operation handling the world's largest ships. The Damen Twin Fin skeg and double bow concept provides maneuverability in both sailing directions. It offers ample strength with 70+ tonnes bollard pull. The tug is able to complete two or more assignments on a single charge and can be rapidly recharged in just 2 hr.

Stillstrom Joins MBF

The Maritime Battery Forum (MBF) has welcomed Stillstrom, a company owned by the A.P. Moller-Maersk Group that is dedicated to delivering offshore power and charging solutions, as its newest member.

Stillstrom is focused on transforming offshore power supply by enabling vessels to connect to clean electricity while stationary at sea or in port. The company's mission is to eliminate offshore vessel emissions and support the maritime industry's decarbonization through cutting-edge offshore charging technology.

By providing offshore charging solutions for hybrid and electric service operation vessels, Stillstrom plays a critical role in enabling emissions-free operation at sea. The company's innovative infrastructure also establishes zero-emission anchorage zones—transformative spaces where vessels traditionally reliant on fossil fuels can now switch to clean electrical power, drastically reducing emissions such as CO₂, NO_x and SO_x.

Biggest Battery-Electric Ship

Incat Hull 096, the world's largest battery-electric ship at 130-m long, has been launched.

Constructed for the South American ferry operator Buquebus, Hull 096, when it enters service between Buenos Aires and Uruguay, will operate entirely on battery-electric power, carrying up to 2,100 passengers and 225 vehicles across the River Plate.

The ship is the ninth Incat-built vessel for Buquebus. It is equipped with over 250 tonnes of batteries and an energy storage system (ESS) providing more than 40 MWh of installed capacity. The ESS, which is four times larger than any previous maritime installation in the world, is connected to eight electric-driven waterjets and supplied by technology partner Wärtsilä. This combination of technology sets a new global benchmark for the shipping industry.

Work will now continue completing the vessel's interior. Final fit-out, battery installation and energy system integration will take place ahead of sea trials later this year on the River Derwent.

Digital FPSO Management

ABS and Akselos S.A. have jointly completed technical assessment for structural digital twin technology applied to floating production storage and offloading (FPSO) units, enabling more accurate and reliable assessments of structural integrity.

FPSOs are some of the most complex and capital-intensive assets in operation, often required to perform far beyond their original design life. With increasing pressure to improve safety, extend asset life, and reduce costs, operators need better tools to understand and manage structural health in real time.

This data-driven approach can significantly improve operational cashflow by reducing inspection and maintenance costs by up to 33 percent, minimizing both planned and unplanned downtime, and enhancing safety by limiting human

exposure to hazardous operational areas. This unlocks hundreds of millions of dollars in value through extended FPSO life and avoided production losses.

FPSO vessels are substantial capital assets operating in harsh offshore environments and handling highly volatile substances. Proactive protection of their structural integrity is crucial for maximizing production and ensuring a strong return on investment.

Akselos's SPM software provides a high-fidelity, near-real-time digital twin of the entire FPSO. By combining inspection records, metocean conditions, and cargo operations into one dynamic model, operators gain a live, continuous view of structural performance. This allows for real-time monitoring, identification of stress concentrations, and on-demand fatigue analysis to support data-driven maintenance and risk-based inspections.

When supported by ABS's Condition Manager and Eagle Twin inspection data management and condition tracking software tools, the combined suite is capable of monitoring real time load and condition information within a digital twin framework that enables full life cycle support of an offshore asset.

Ferry Battery Upgrade

The naval architecture and engineering consultancy Foreship is supporting Wasaline in delivering a breakthrough battery upgrade on MV *Aurora Botnia* that will see the ferry's energy storage capacity increase nearly sixfold. The world-first retrofit will combine two battery chemistries in a hybrid solution expected to cut annual CO₂ emissions by up to 23 percent.

Building on a longstanding relationship with Wasaline that began during the vessel's initial design phase, Foreship provided comprehensive technical and strategic support for the retrofit. The work included a feasibility study covering technical impact evaluation, emissions modeling, and cost analysis, then supplier evaluation, classification design, engineering support, and implementation assistance. **ST**

contracts

Helm Operations, Victoria, Canada, will replace a legacy crew dispatching system with Helm CONNECT, a modern, web-based solution for maritime operations. Washington State Ferries.

Kale Logistics Solutions, Mumbai, India, along with its local partner Novel Muscat, has been awarded a contract to develop a national port community system. This multimodal cargo community platform will digitalize and streamline operations across Oman's ports, airports, land ports, and free zones. Ministry of Transport, Communications and Information Technology of Oman.

Fugro, Leidschendam, Netherlands, will support the 2025 MAREANO seabed mapping program. For the first time in its history, MAREANO will use USV technology to acquire the data, with Fugro deploying its new 18-m Blue Eclipse USV for the initiative. Norwegian Hydrographic Service.

Cavotec, Lugano, Switzerland, will deliver complete shore power systems for newly built container vessels, including cable management reels and weatherproof enclosures. Deliveries should begin in the second half of 2026. Undisclosed.

BMT, Teddington, U.K., will deliver marine professional consultancy services as part of a multi-lot framework agreement, with awards in three key areas: naval architecture and technical support, marine and safety support, and investigation support. Caledonian MacBrayne.

Climeon, Stockholm, Sweden, has delivered its HeatPower 300 system on board a container vessel operated by a global shipping and logistics leader committed to decarbonizing ocean transportation. The system is now generating electricity from on-board waste heat. Undisclosed.

Harren Group, Bremen, Germany, will implement an agentic AI solu-

tion across its fleet of more than 70 vessels and 26 offices worldwide to reduce the workload of its employees and support them in operational decision making. Sealenic. **ST**

meetings

AUGUST

August 26-28—Oceans in Action, Biloxi, Mississippi. www.mtsociety.org/oceans-in-action.

SEPTEMBER

September 10-11—Digitalisation in Shipping: Europe Summit, Rotterdam, Netherlands. www.wplgroup.com/aci/event/digitalisation-in-shipping-europe.

September 10-11—International Antifouling Conference, Gothenburg, Sweden. <https://international-antifouling-conference.confetti.events>.

September 10-12—INMEX SMM India, Mumbai, India. www.inmex-smm-india.com.

September 15-19—London International Shipping Week, London, U.K. www.LISW.com.

September 24-25—European Carbon Dioxide Utilisation Summit, Antwerp, Belgium. www.wplgroup.com/aci/event/co2.

September 26—The Maritime Standard Transportation and Climate Change Conference, Abu Dhabi, United Arab Emirates. <https://tmstacc.com>.

September 29-October 2—OCEANS 2025 Great Lakes, Chicago, Illinois. <https://greatlakes25.oceansconference.org>.

OCTOBER

October 6-8—AAPA Annual Convention, Québec City, Canada. <https://aapa.getregistered.net/2025-annual-convention>.

October 7-9—International Boat-Builders' Exhibition and Confer-

ence, Tampa, Florida. www.ibexshow.com.

October 15-16—Decarbonisation in Shipping: Europe, Hamburg, Germany. www.wplgroup.com/aci/event/decarbonisation-ship-ping-europe.

October 22-24—WISTA International AGM & Conference, Barcelona, Spain. <https://wistainternational.com>.

NOVEMBER

November 4-6—Deepwater Operations and Topsides, Platforms & Hulls Conference and Exhibition, Galveston, Texas. www.offshore-event.com.

November 4-6—Sustainable Ocean Summit and Global Blue Finance Summit, Barcelona, Spain. www.oceancouncil.org.

November 5-6—European E-Fuels Conference, Hamburg, Germany. www.wplgroup.com/aci/event/european-e-fuels-conference.

November 12-14—Marine Renewables Canada Conference, Halifax, Canada. <https://marinerenewablesconference.ca>.

November 19-21—Vietnam International Marine & Offshore Expo, Ho Chi Minh, Vietnam. marine-vietnam.com and offshorewindviet.com.

November 25-26—Offshore Energy, Amsterdam, Netherlands. <https://oec.biz>.

DECEMBER

December 3-5—International WorkBoat Show, New Orleans, Louisiana. www.workboatshow.com.

2026

FEBRUARY

February 16-18—Geo Week, Denver, Colorado. www.geo-week.com.

For more industry meetings, visit sea-technology.com/meetings. **ST**

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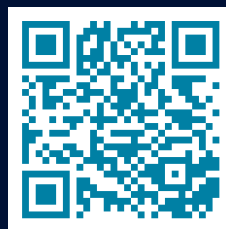
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Dismantling NOAA Harms the US Economy—David Helvarg

David Helvarg is the executive director of Blue Frontier, an ocean conservation and policy group, and the author of six books. In 2019, he launched the Ocean Climate Action Plan coalition that contributed to the first climate action law in U.S. history, including \$6 billion for coastal restoration and greening ports. Helvarg co-hosts "Rising Tide: The Ocean Podcast," available at: <https://bluefront.org/category/podcast>.



Earlier this year, almost 1,000 NOAA workers, including weather forecasters, were fired in accordance with a directive from the Trump Administration's Department of Government Efficiency (DOGE), a newly established agency led by tech billionaire Elon Musk that seeks to reduce federal spending by severely cutting the national government's workforce.

Although legal action paused the first firing block of NOAA workers, the administration was given permission to go ahead with the staff cuts.

DOGE has since told NOAA to fire another 1,000 people, with the target of a 20 percent reduction in workforce. (These cuts are not restricted to NOAA. DOGE's workforce reduction targets are in the process of being enacted throughout the federal government.)

DOGE's cuts extend beyond government employees to leases and grants. For instance, the White House and Elon Musk's agency have also informed NOAA that its lease on the Center for Weather and Climate Prediction in College Park, Maryland, will soon be canceled.

The center is essential in creating accurate computer models for everything from the next severe weather front to hit farmers in the Midwest to the long-term costs of extreme weather events linked to climate change.

NOAA was also ordered to cut off \$4.5 million in funding to Maine Sea Grant, one of 34 state-based university Sea Grant programs that support research on marine and Great Lakes issues to help local economies. The University of Maine was told its efforts (unlike the other 33 programs so far) were "no longer relevant to the focus of the administration's priorities."

Among the first to object was the Maine Lobstermen's Association, saying the loss would "have a negative effect on both our economy and our environment."

The funding for Maine Sea Grant was reinstated this spring by NOAA, but the federal Sea Grant program on the whole is vulnerable as the Trump Administration proposes cutting its funding.

This administration's playbook, Project 2025, created by The Heritage Foundation, aims to dismantle NOAA, including the National Weather Service. This would lead to privatization of weather forecasting, an idea that was floated during the first Trump Administration.

NOAA was established in 1970, bringing together older federal agencies: the Survey of the Coast, the Weather Bureau and the U.S. Commission of Fish and Fisheries.

When I began reporting on NOAA 25 years ago, there was an inside joke that NOAA stood for "no organization at all," but many of the bureaucratic problems that formerly stymied the agency have long since been resolved.

One example is the federal Magnuson-Stevens Fishery Conservation and Management Act of 2007 that NOAA's National Marine Fisheries Service oversees and enforces, along with the U.S. Coast Guard. The implementation of this legislation has made the U.S. commercial fishing fleet the most sustainable in the world.

At the same time, NOAA Fisheries has been working to support

the growth of U.S. aquaculture, as more than half the world's seafood, including fish and edible seaweeds, now comes from ocean farming, mostly in China and other parts of Asia. The administration's efforts to dismantle NOAA are equivalent to a handout to China and a blow to U.S. food security.

Over the years, I've witnessed NOAA's organization maturing with more integration of purpose between its fisheries and marine sanctuary functions, its science and operational side (its ship-based NOAA Corps is one of the eight uniformed government services), even its wet side and weather side with vessels, radars, satellites, and hurricane hunter aircraft.

NOAA's technologies not only support American businesses and national security: They save thousands of lives a year by predicting disasters and sharing that information with the public for safety.

Craig McLean, former NOAA acting chief scientist and founding director of the NOAA Ocean Exploration program, has told fellow scientists at America's leading ocean agency: "You are ocean and meteorology people. You know storms. We'll get through this and let's hope the ship looks the same when we do."

Unfortunately, without a loud and immediate outcry from the public, this ship increasingly looks like it's in the process of being torpedoed.

We at Blue Frontier invite you to call on your U.S. senators and House members to restore and protect NOAA's work and its services.

To find your representative, visit: www.house.gov/representatives. To find your senator, visit: www.senate.gov/senators/senators-contact.htm.

This article is based on David Helvarg's Los Angeles Times opinion piece: "In Trump's war on NOAA, the losers will be Americans and the economy." ST

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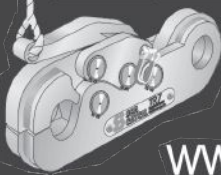
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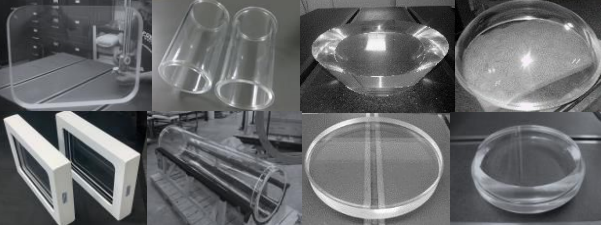
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