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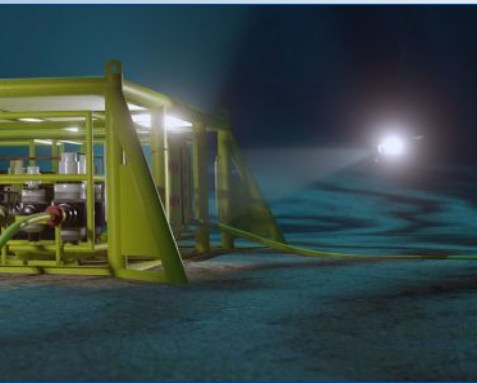
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)) Feasibility Study of Chile-Antarctica Submarine Fiber-Optic Cable. The Chilean Undersecretariat of Telecommunications (Subtel) and the Development Bank for Latin America and the Caribbean (CAF) have signed an agreement with the consortium of Pioneer Consulting and Salience Consulting to produce a feasibility study for a submarine fiber-optic cable to connect continental Chile to Antarctica. The study will examine the technical, legal, economic, financial, environmental, social, governance, and geopolitical issues surrounding the implementation of a submarine fiber-optic cable system between continental Chile and Antarctica to serve the dozens of international research missions scattered among the South Shetland Islands and the Antarctic Peninsula. This digital bridge to link nations with scientific bases in Antarctica will benefit the well-being of the resident scientists and support their research. The study is expected to conclude by April 2026.

)) World's First Fully Electric Ferry Turns 10. Since going into service in 2015, the MF *Ampere* has sailed a distance equivalent to 17 times around the equator on batteries alone, solidifying its place as a groundbreaking achievement in sustainable maritime transport, according to Corvus Energy. Despite initial skepticism, the vessel has successfully demonstrated a model that has now been adopted in hundreds of ferries around the world, earning Norway a reputation as the innovative leader in green shipping due to the electrification of its ferry fleet. It began with the Norwegian Public Roads Administration requiring sustainable technology on board the newbuild *Ampere*, destined to transport passengers and vehicles across the Sognefjord on Norway's west coast. Ferry operator Norled began exploring electric alternatives and initiated a collaboration with Fjellstrand Shipyard to find the best solution. Norled went on to win the ferry tender. Launched on the Lavik-Oppedal route, MF *Ampere*'s electric propulsion system has delivered exceptional results, drastically reducing the environmental impact of ferry travel. CO₂ emissions were reduced by 5,700 tons annually, marking a significant step toward decarbonizing Norway's transport sector. Compared to a traditional fossil-fueled ferry, the operational cost per crossing has been reduced by 85 to 90 percent, generating total savings of nearly \$15 million. The ferry's success has not only demonstrated the practicality of electric ferries in Norway, but has also accelerated the adoption of similar technology in coastal cities and island communities worldwide. With the recent installation of additional batteries to prolong the vessel's lifetime, the MF *Ampere* will continue to sail until four autonomous ferries are set to operate the route from 2026.

)) New Guidance on Ship Recycling. With the Hong Kong Convention (HKC) set to take effect this year, shipowners should ensure compliance with regulatory controls and inspections governing ship recycling for their vessels. DNV's latest guidance paper, "Safe and Green Recycling for Ship Owners," outlines how they can work in line with both existing EU Ship Recycling Regulations (EU SRR) and the HKC, coming into effect on June 26, 2025. The ship recycling process is a key contributor to a circular economy where materials and components may be reused or recycled. However it needs careful planning for safe execution. Ships often contain hazardous materials that can pose significant risks to workers' health, safety and the environment if not managed properly. To mitigate these risks, shipowners must adopt a carefully planned strategy for responsibly handling the end of life of their vessels. With thousands of ships expected to require recycling over the next decade, the International Maritime Organization's Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC) is an important step toward safer and more sustainable ship recycling. EU SRR was implemented in 2013, focusing mostly on safe waste management and sustainable ship recycling for EU-flagged ships. HKC requires compliance by 2030 and applies to HKC ships equal or above 500 gross tonnage. Twenty-four countries and the four largest recycling nations by tonnage (India, Bangladesh, Pakistan and Turkey) have ratified the HKC. DNV's new guidance details the regulatory landscape and recycling options to give shipowners a better basis for making decisions on the recycling of their vessels.

)) Women in Maritime Exhibit Seeks Contributors. Rewriting Women into Maritime History, an initiative led by Lloyd's Register and Lloyd's Register Foundation to showcase the critical role of women in the maritime sector past and present, has entered a new, international phase, expanding to nine more countries with stories that will be captured over the next three years, starting in 2025 with Greece, the Netherlands, and India. Launched in the U.K. and Ireland in 2023, the program uses archival material from maritime organizations and oral histories to piece together stories for the SHE_SEES exhibition. Using a mix of striking visuals, art and storytelling, SHE_SEES debuted at the home of the International Maritime Organization (IMO) during London International Shipping Week 2023 and is currently on tour, with a residency at Portsmouth Historic Dockyard until August 2025. By highlighting the expertise, experience and leadership of women, the program encourages more people to take up the opportunities offered by a career in the maritime sector today. Figures from the IMO show that women currently account for 29 percent of the overall industry workforce, and just 2 percent of seafarers in the crewing workforce. SHE_SEES is currently seeking eight female harbor pilots to share their stories. To learn more, visit the Lloyd's Register Foundation Heritage Centre website, https://hec.lrfoundation.org.uk/whats-on/she_sees, or contact: hello@samacreatives.com. **ST**

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AUV + AI Will Maintain Biodiversity Offshore

Sustainable monitoring is crucial for the environmentally responsible operation of offshore wind farms, including the protection of biodiversity. In the Sustainable Ecosystem Approach in Monitoring the Marine Environment (SeaMe) project, the German international electricity company RWE is collaborating with research partners to develop innovative technologies for comprehensive ecosystem monitoring. The goal is to replace costly, invasive and CO₂-intensive methods.

SeaMe, led and financed by RWE, was launched in summer 2024 and will run for three years. The German Research Center for Artificial Intelligence (DFKI), the Helmholtz Institute for Functional Marine Biodiversity at the University of Oldenburg, the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, BioConsult SH, and the Danish company DHI A/S are the research partners.

DFKI is contributing by equipping an AUV with oceanographic sensors and artificial intelligence (AI) technologies to enable safe navigation and precise data collection.

The collection of physical and biological data allows for a comprehensive assessment of the marine ecosystem. This includes often overlooked components, such as phytoplankton and zooplankton (e.g., krill), which play a vital role in the marine food chain.

To understand the interactions between offshore wind farms and the local ecosystem, aerial drones, an AUV, and environmental DNA analysis will be used in a way that reduces carbon emissions and minimizes the impact on marine life. The DFKI Robotics Innovation Center is optimizing the "Deep-Leng" AUV for offshore monitoring in SeaMe. The researchers in Bremen are equipping the AUV with a multimodal oceanographic sensor system capable of precisely measuring physical parameters, such as water temperature, salinity and oxygen content.

In addition, researchers are developing an AI-based video monitoring system that will enable the AUV to detect fish and marine mammals. This technology uses machine learning and image processing for the robot to continuously improve its ability to identify marine life. AI-based image analysis aims to replace invasive and CO₂-intensive methods, such as trawling, and to provide accurate, continuous in-situ monitoring of marine life without habitat disturbance.

DFKI is preparing the system specifically for offshore use. Existing functions will be optimized to withstand demanding operating conditions. This includes improving communication systems, implementing enhanced safety measures such as emergency surfacing capabilities, and increasing overall system robustness. Navigation in the open ocean is particularly challenging as conditions vary and the AUV has to react to unforeseen events. Intelligent algorithms will enable the robot to maneuver safely through the water, detect and avoid obstacles, and maintain mission objectives.

In addition to extensive lab tests in the 1,300-m² Maritime Exploration Hall at DFKI in Bremen, field tests are planned at the Test Center for Maritime Technologies in Helgoland to assess the AUV's seaworthiness and safety functions.

In SeaMe's second phase, testing in real-world conditions will take place at RWE's Kaskasi offshore wind farm, which has a capacity of 342 MW for 400,000 households.

The project results will pave the way for development of the offshore wind industry alongside biodiversity conservation. **ST**

SEA TECHNOLOGY® 2025

JANUARY

Annual Review & Forecast

FEBRUARY

Instrumentation: Measurement, Processing & Analysis

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

MARCH

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*

JUNE

Seafloor Mapping/Sonar Systems/Vessels

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BONUS INFORMATION

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Editorial Calendar

ADVERTISING CLOSES ON THE 15TH OF THE MONTH PRECEDING ISSUE DATE

JULY

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

Undersea Defense/Antisubmarine Warfare

****International WorkBoat Show**, December 3-5, New Orleans, Louisiana

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The Wind Neo-Revolution

Advancing Wind Propulsion Tech in the Energy Transition

By Dr. Alberto Llopis Pascual • David Ferrer Desclaux • Marc Martí Arasa



Verticalization maneuver of a 22-m-high bound4blue eSAIL during installation on board Ville de Bordeaux, owned by LDA and chartered by Airbus, February 2024 in Vigo, Spain.

Wind is where it's at. Awareness, appreciation, and adoption of wind-assisted propulsion systems (WAPS) are growing exponentially throughout the maritime industry as forward-thinking owners and operators look to unlock significant environmental, regulatory, and commercial advantages. However, there's one big issue

that's hiding beneath the sails: aerodynamic interference.

Spain's bound4blue has been tackling this challenge and is on a roll. The pioneering WAPS developer had a breakthrough year in 2024, landing the largest-ever wind propulsion contract (for 20 of its eSAIL suction units with Maersk Tankers) and securing orders with shipping com-

“We’ve developed our fully autonomous suction sail to deliver a mechanically simple, powerfully effective solution for a broad range of vessel types. Typical return on investment is less than five years.”

panies such as Klaveness Combination Carriers, Eastern Pacific Shipping, Amasus, and Marflet Marine, to name a few.

While the company is reveling in the wider appreciation of wind power as a key enabler in shipping’s energy transition, it is one of the few players to caution that real care is needed to optimize WAPS and unlock the true propulsive power of nature.

Aerodynamic Interference

The challenge of aerodynamic interference has not received the attention it deserves.

Let’s start at the beginning. If you have one WAPS unit that is capable of generating the power of X, it’s common sense to assume that installing four units on the vessel would generate 4X. But it’s not that simple.

When two aerodynamic bodies, in this case WAPS, are placed in the vicinity of one another, they affect the airflow (the speed and direction of the wind), which modifies the resulting aerodynamic forces. Therefore, any installation of two or more lifting devices on a vessel can create an interference, which will reduce overall, combined performance.

The problem is one of physics. For any shipowner that’s considering adopting wind, it is absolutely essential to work with your suppliers from the very beginning of the process and understand the degree of potential efficiency loss. To do that, you have to consider factors such as the number of units, the size of the WAPS and their positions, and, from that starting point, you can then work to optimize the configuration to reduce the impact of aerodynamic interference and maximize propulsive force.

As an example of the difference this can make, a recent modeling project for a *Kamsarmax* vessel with four eSAILS showed that an optimized configuration, compared to three slightly different setups, could increase savings by up to 28 percent.

Suction Sails

bound4blue’s eSAIL is a suction sail. In contrast, examples of competing WAPS technologies are kite sails, Flettner rotors (spinning cylindrical structures) and rigid wings. All WAPS offer advantages and disadvantages that may or may not be applicable to individual vessels, but the most critical issues are the fuel savings they can generate (which leads to emissions reductions and easier regulatory compliance) and the return on investment.

We’ve developed our fully autonomous suction sail to deliver a mechanically simple, powerfully effective solu-

tion for a broad range of vessel types. Typical return on investment is less than five years.

Lift force is the “holy grail” in WAPS. You want to generate as much propulsive power as possible, while minimizing size and weight. From a purely aerodynamics point of view, mathematics tells us a thick shape, or a circle, is best to maximize lift. However, these shapes have poor aerodynamic properties due to flow separation, where the airflow detaches from the surface and the power “stalls.” That’s where the genius of suction sails comes in.

By using a fan and creating suction along the surface of the WAPS, the flow can be reattached and used to generate very high lift forces. In fact, the thick surface of an eSAIL with suction power produces up to seven times more lift than a similar size, non-suction, slender-bodied WAPS, such as an airfoil, wing or wingsail.

This exceptional aerodynamic efficiency allows for smaller size and weight, with less impact on ship stability, visibility, lights, deck space, and air draft, and much easier integration. This helps owners maintain operational flexibility while accessing the many benefits of wind power.

Furthermore, unlike other solutions, suction sails excel in sailing upwind, ensuring low power consumption and mechanical simplicity. It’s a combination that, as shown by findings from Clarksons Research’s World Fleet Register, is pushing suction sails into pole position in the orderbook.

Designing with Aerodynamic Interference in Mind

Aerodynamic interference has to be taken into account from the very first stages of any project. Traditionally, computational fluid dynamics (CFD) studies have been the go-to method for this, but CFD requires high-power computing solutions, and CFD studies are incredibly complex, time consuming and expensive. That puts CFD out of reach for many owners and installations.

To solve that issue, we’ve developed something called POINT (POtential INTERference Tool). This is an advanced simulation tool that can be run on any standard laptop, working up to 25 times faster than CFD to assess as many eSAIL configurations as possible on board a selected vessel. It compares the impact of potential interference, enabling informed, optimal decision making and giving owners realistic insights into the savings that can be unlocked with eSAILS.

In short, it tackles the issue, democratizes the whole study process (opening up the benefits of CFD without the price tag), fast-tracks simplified adoption, and cre-



The Eems Traveller, a general cargo vessel owned by Amasus, on route with two 17-m-high eSAIL systems.

ates transparency around the scale of future savings and benefits.

The Right Time for a New Wind Revolution

The International Maritime Organization has set ambitious decarbonization goals, and we all have a part to play in the transition to a more sustainable maritime industry. Wind power is an abundant, renewable, proven and free energy source, making it the natural choice for voyaging toward sustainability. Given the lack of availability of other green fuels at present, it's also a key enabler, as it reduces the overall energy demand of ships for a more cost-effective move to alternatives, such as hydrogen, ammonia or batteries. It is fully complementary with these technologies.

While the commercial benefits of lower fuel consumption, reduced OPEX, and improved asset value and competitive advantage speak for themselves, it's worth diving a little deeper into the regulatory perspective. It's

here where wind really comes into its own, with added value realized through easier compliance, reduced penalties and more future-proof assets.

If you consider how the regulatory landscape has evolved in recent years, we've seen a flood of new environmental legislation, defined by steadily increasing targets, and ever more stringent penalty costs for non-compliance. Wind delivers benefits across the board.

For example, with the Energy Efficient Design Index (EEDI) and Energy Efficiency Existing Ship Index (EEXI), WAPS reduce the by-design CO₂ emissions for vessels, while Carbon Intensity Indicator (CII) ratings improve with less operational emissions. A reduction in the tonnage of CO₂ emitted reduces the economic cost of EU Emissions Trading System (ETS) compliance, while a "wind reward factor" in FuelEU Maritime works to reduce the greenhouse gas intensity of vessels.

Let's take one ship, for example: a 17,000-dwt LPG tanker sailing a route between Antwerp and Houston at



15 kt. Installing eSAILs could reduce fuel costs on that vessel, without deviating from the normal route and speed or buying alternative fuels, by 9.8 percent a year, translating to annual OPEX savings of \$283,000.

Now, let's consider EU ETS and FuelEU penalty costs. There's a heavy price to pay for non-compliance. eSAIL installation addresses regulatory compliance while enabling savings that could climb to 18.4 percent by 2027, equivalent to \$532,000 a year. By 2040, those savings rise to 22.66 percent, or \$655,000.

This is really just the tip of the iceberg. There are powerful regulatory advantages, and positive financial rewards, for owners opting for wind. And, when you consider that regulations are only going to grow in complexity and stringency, the incentives for adoption will multiply.

So, seeing the big picture, we believe the stars are really aligning for wind power. The quicker you take advantage of that fact, the more you save, the greater the

impact, and the easier compliance will be—today and far into the future.

The Role of Collaboration

Collaboration with shipowners and operators on the installation of WAPS is essential. There's no standard, one-size-fits-all approach. We'd advise any client to start with a feasibility study to understand the potential savings and suitability for individual vessels, working hand-in-hand with a trusted, specialist supplier to ensure a chosen system fits operational needs, commercial objectives, and any other stakeholder requirements.

From our perspective, selecting the optimal eSAIL configuration is a case-by-case exercise, and close collaboration with the customer allows for fine-tuning of the number, placement, and size of eSAILs for maximum efficiency. Transparency, communication, and mutual understanding are absolutely key to successful implementation and long-term success.

In terms of installations, coordination, timing and flexibility are key factors. As we can all appreciate, vessels are "moving targets," and it's not always possible to plan everything down to the second. So, again, communication is important, as is the ability to adapt to unforeseen circumstances. At bound4blue, we do everything we can to ensure smooth, efficient and high-quality installations. We're lucky our customers are as focused on those objectives as we are.

Looking Ahead

It's an exciting time for the segment. Wind power is achieving more and more recognition as a viable, market-proven, and cost-effective means to decarbonize shipping, enhance competitiveness, and work toward the most demanding regulatory requirements. With each new order and installation we undertake, we're edging ever closer to a tipping point of wide-scale adoption.

By 2030, we anticipate that WAPS will be well-established as a preferred decarbonization solution for the maritime industry, working standalone or integrated with hybrid systems/alternative fuels. This will propel us closer to our goal of a more sustainable maritime sector, with less dependency on fossil fuels. **ST**

Dr. Alberto Llopis Pascual is the head of aerodynamics at bound4blue. He holds a Ph.D. in aerospace engineering in the field of experimental aerodynamics from the University of Manchester. Previously, he worked on developing the first aircraft to fully integrate and demonstrate fluidic control effectors, and he designed medical delivery drones.

David Ferrer Desclaux is the CTO and co-founder of bound4blue. He holds a B.S. and M.S. in aeronautical engineering and an M.S. in project management. Previously, he worked at Zero 2 Infinity, a Spanish tech company that provides access to space with stratospheric balloons. He has been recognized as an Innovator Under 35 and Visionary of the Year by MIT.

Marc Martí Arasa is an aerodynamics engineer at bound4blue. He has an M.S. in aeronautical engineering, and he developed bound4blue's POINT solution, as well as numerical models for the simulation of supersonic rockets.

Deep Subsea Power

Design Considerations for Evolving Technology and Applications

By Patrick Le Fèvre

Subsea power applications range from offshore oil and gas fields to intercontinental communications to deep-sea earthquake detection, to name just a few. Equipment can be installed on the seabed at depths of 4,000 m (13,000 ft.) and at pressures of 400 bar (5,816 psi), requiring safe and reliable power sources. In such highly demanding applications, what factors must an electronics engineer consider when designing subsea power solutions?

Subsea Power Architecture

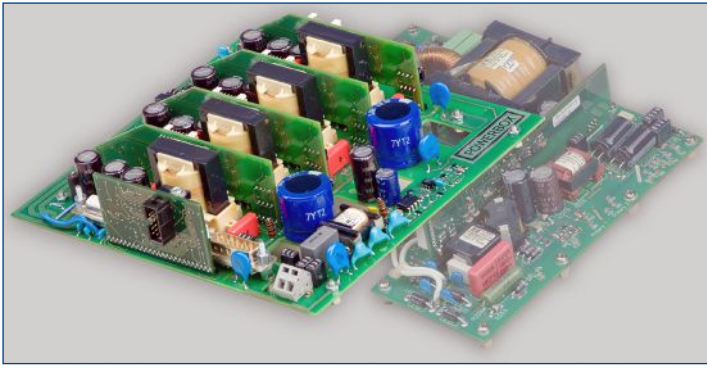
Typically, seafloor installations are powered from the shore or a platform at sea via long-distance, high-voltage transmission cables to floating or submerged transformation stations. There, the voltage is stepped down locally

to AC or DC within the range of 300 to 900 VAC or 400 to 1,500 VDC to power local equipment and, ultimately, lower DC voltages for the final application. This standard approach is like the one for power grids and electronics equipment in industrial applications on terra firma. However, when the equipment is located on the seabed and is sensitive, the level of quality and safety requirements are significantly higher.

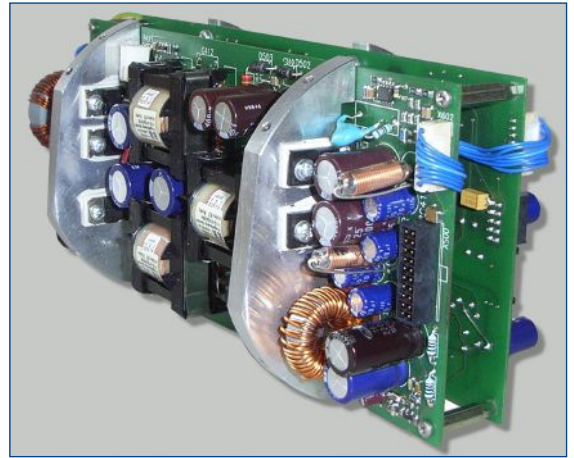
The subsea power grid contains components such as switchgear, step-down transformers, energy distribution, and monitoring and control equipment (for pumps, compressors, water-injection systems and safety controllers). For efficiency and safety, the power components can be installed on a common base frame on the seabed and interconnected through application-specific connectors



Common base frame for subsea applications with ROV interconnections. (Credit: PRBX/Shutterstock/Vismar UK)



(Right) Subsea power supply designed to fit into pressurized cylinder. (Credit: PRBX/VB120-5) (Left) Subsea power supply designed with high safety margin and reliability. (Credit: PRBX/VB140-384)



that can handle low voltage for signal use and high voltage for power supplies, and can sustain hydrostatic pressure and underwater operation. For safety reasons, and to guarantee uninterrupted operation, the local grid is secured by uninterruptible power supplies (UPS), which could also be located on the seabed.

All components within the grid are retrievable and are designed and constructed for normal and incidental operation. But because they are often deployed at depths below which humans can operate, they usually require ROV intervention, which is often rolled into the design.

Subsea Power Supply Categories

Subsea power supplies are classified into two major categories. One is the standalone container power supply unit (SC-PSU). SC-PSUs are designed to sustain very high pressures. They feature deepwater connectors and built-in removable chassis for ROV handling. SC-PSUs require very high levels of expertise in deepwater equip-

ment design and are often designed and manufactured by the same companies who provide subsea transformers and substations.

The other category is the embedded power supply unit (E-PSU). E-PSUs are integrated within the final pressurized equipment and not exposed to high pressure or in contact with seawater. E-PSUs are closer to industrial power supplies but with extremely high reliability and dedicated functionalities for subsea operators' requirements.

Design Guidelines

Designers of subsea power supplies often describe their job as designing a highly rugged power supply with extreme reliability and intelligence for one of the most hostile environments on Earth where failure is not an option. This is a good summary of the challenges faced by designers when developing power solutions that will be operated in the deep sea in locations that are mostly inaccessible to humans, which is where ROVs come in.

The range of subsea applications is large, and depending on which segment the power supply will address, different standards and best practices apply, but for all of them there is a common approach to perform risk analysis properly for operational safety.

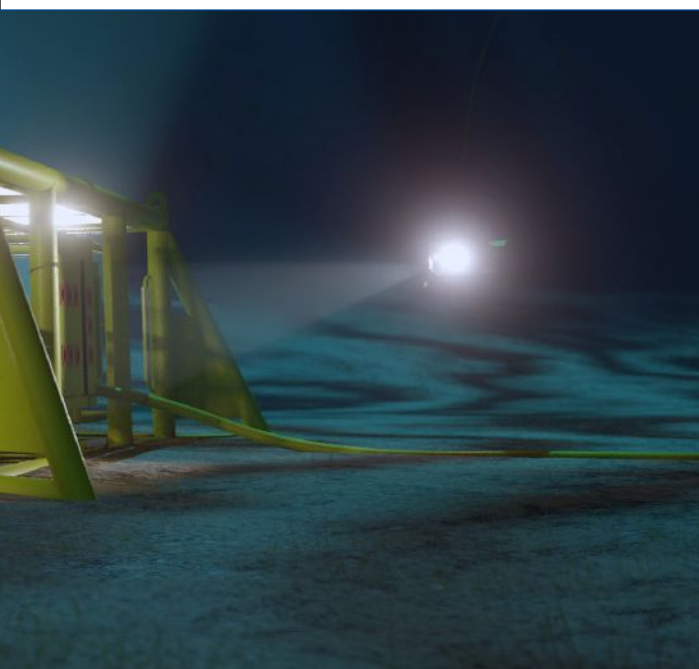
In cooperation with the equipment manufacturer, the electrical load calculation is one of the earliest tasks during the power system design. Engineers should estimate the required electrical load of all the subsea elements so that they can select an adequate power supply. Each local load may be classified into several different categories, for example: vital, essential and nonessential.

Vital: Will the loss of power jeopardize the safety of personnel or cause serious damage within the platform/vessel/seabed equipment?

Essential: Will the loss of power cause degradation or loss of the oil/gas production or, in the case of transcontinental cable, communication?

Nonessential: Does the loss have no effect on safety or production?

Depending on the final equipment and the level of risk, different technologies might be considered, such as a redundant power solution, automatic load balancing or an emergency power resource switching to UPS. In all



American Petroleum Institute (API)	
API RP 14F	Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Division 1 and Division 2 Locations
API RP 17A	Recommended Practice for Design and Operation of Subsea Production System
API RP 17H	Remotely Operated Tools and Interfaces on Subsea Production Systems
API RP 500	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
API SPEC 17D	Specification for Subsea Wellhead and Christmas Tree Equipment
API SPEC 17E	Specification for Subsea Production Control Umbilicals
API Standard 17F	Standard for Subsea Production and Processing Control Systems
International Standard Organization (ISO)	
ISO 13628-5	Petroleum and Natural Gas Industries – Design and Operation of Subsea Production Systems – Part 5: Subsea Control Umbilicals
ISO 13628-6	Petroleum and Natural Gas Industries – Design and Operation of Subsea Production Systems – Part 6: Subsea Production Control Systems

Examples of API and ISO standards applicable to subsea oil and gas applications. (Credit: PRBX)

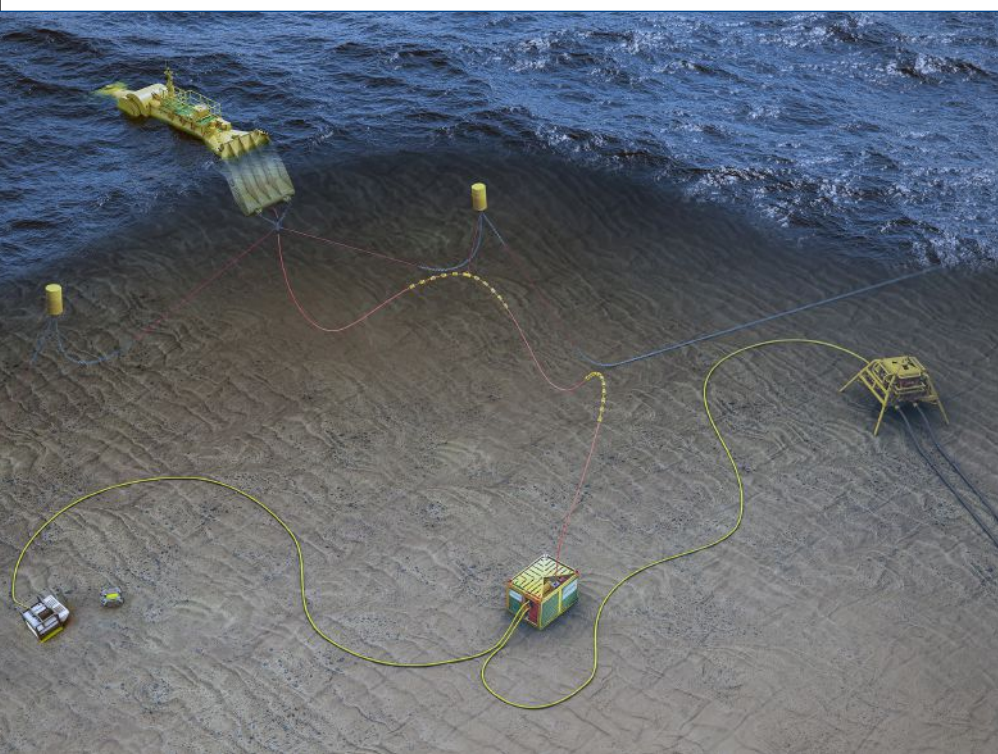
cases, the power supplies must be able to communicate with the central monitoring system, where, using the latest evolution of digital control and predictive algorithms, high levels of operational safety can be achieved.

As certain parts of subsea oil and gas equipment migrate from full hydraulic operation to hybrid—for example, motorized valves that electronically monitor and control—power supplies are required to be integrated

within the pressurized cylinder. Also, when designing power supplies for transmission cables, e.g., signal repeaters, because space is critical, power designers must consider the volume available for fit into the final application.

Due to the demands for compactness and high level of integration, another important point to consider when designing a subsea power supply is the electromagnetic compatibility within the embedded system. Extensive interoperability tests are performed during the design of the final equipment, and sometimes this could require

Mocean Energy Blue X wave energy converter. (Credit: PRBX/Mocean Energy/Colin Keldie/EMEC) (Below) Blue X provides renewable power for a range of subsea applications. (Credit: PRBX/Mocean Energy)



the adoption of a different topology, e.g., multiphase with active phase-shifting to reduce electromagnetic interference.

In subsea applications, reliability and longevity are very important. Power supplies must be designed with a high safety margin and with the lowest possible amount of stress—electrical and thermal—on every component. The selection of components is key to the design because the choices could influence the topology and building practices. (One example is the choice of the preferred switching transistors with a baseplate to facilitate conduction cooling.)

Designers for subsea oil and gas applications can look to the American Petroleum Institute's (API) Standard for Subsea Production and Processing Control

Systems (API 17F) for guidance. This standard includes specific tests and communication protocols.

Sustainable Power

Most subsea applications are powered from shore through long-distance power cables, or a platform at sea via high-voltage transmission cables often 10 to 100 km, but there are several applications that require remote power solutions. Conventionally, a vessel or floating platform with traditional power generators can be located above the field, but when considering the environment and sustainability, this is not optimal. Accordingly, the subsea engineering community has begun exploring alternatives.

The Renewables for Subsea Power (RSP) project is one of the most promising. It seeks to answer the question: How can green technologies be combined to provide reliable and continuous low-carbon power and communications to subsea equipment, offering a cost-effective alternative to umbilical cables?

Mocean Energy in Scotland, which developed Blue X, a 20-m-long, 38-t, 10-kW wave energy converter machine, and partners in subsea energy storage/management have made a business case combining wave power and solar with energy storage to power subsea equipment for oil and gas projects.

RSP's test and evaluation is now complete, and the Blue Star ocean energy floating device, which developed from Blue X, is ready for commercial deployment. This is

an excellent demonstration that wave energy combined with solar power and battery technologies can offer a reliable and cost-effective alternative to expensive umbilical cables for subsea applications.

Conclusion

Developing power solutions for the deep sea is a great opportunity to learn about a very interesting range of applications that require advanced technology, extreme reliability and innovation. With the new ideas in initiatives such as Renewables for Subsea Power, we can push the limits of underwater electrical design. **ST**

Patrick Le Fèvre is the chief marketing and communications officer at Powerbox (www.prbx.com). He is a degree-qualified engineer with a 40-year track record of success in power electronics. He has pioneered the marketing of new technologies, including digital power and technical initiatives to reduce energy consumption. Le Fèvre has written and presented numerous whitepapers and articles at the world's leading international power electronics conferences. He is also involved in several environmental forums, sharing his expertise in clean energy.



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Aerial Drones for Offshore Inspection

UAV Ultrasonic Thickness Measurements to Monitor Structures

By Alex Clark

The offshore energy sector requires safer, more efficient and sustainable inspection methods. Operators need to manage aging infrastructure, comply with stricter regulations, and aim to reduce carbon emissions while maintaining the integrity of offshore assets.

One of the most pressing concerns in offshore operations is the risk posed to personnel during structural inspections. According to the International Association of Oil & Gas Producers, over 60 percent of offshore safety incidents involve working at height or in confined spaces: environments that are inherently hazardous. Traditional inspection methods, such as rope access and scaffolding, further expose workers to risk, extend downtime, and increase operational costs.

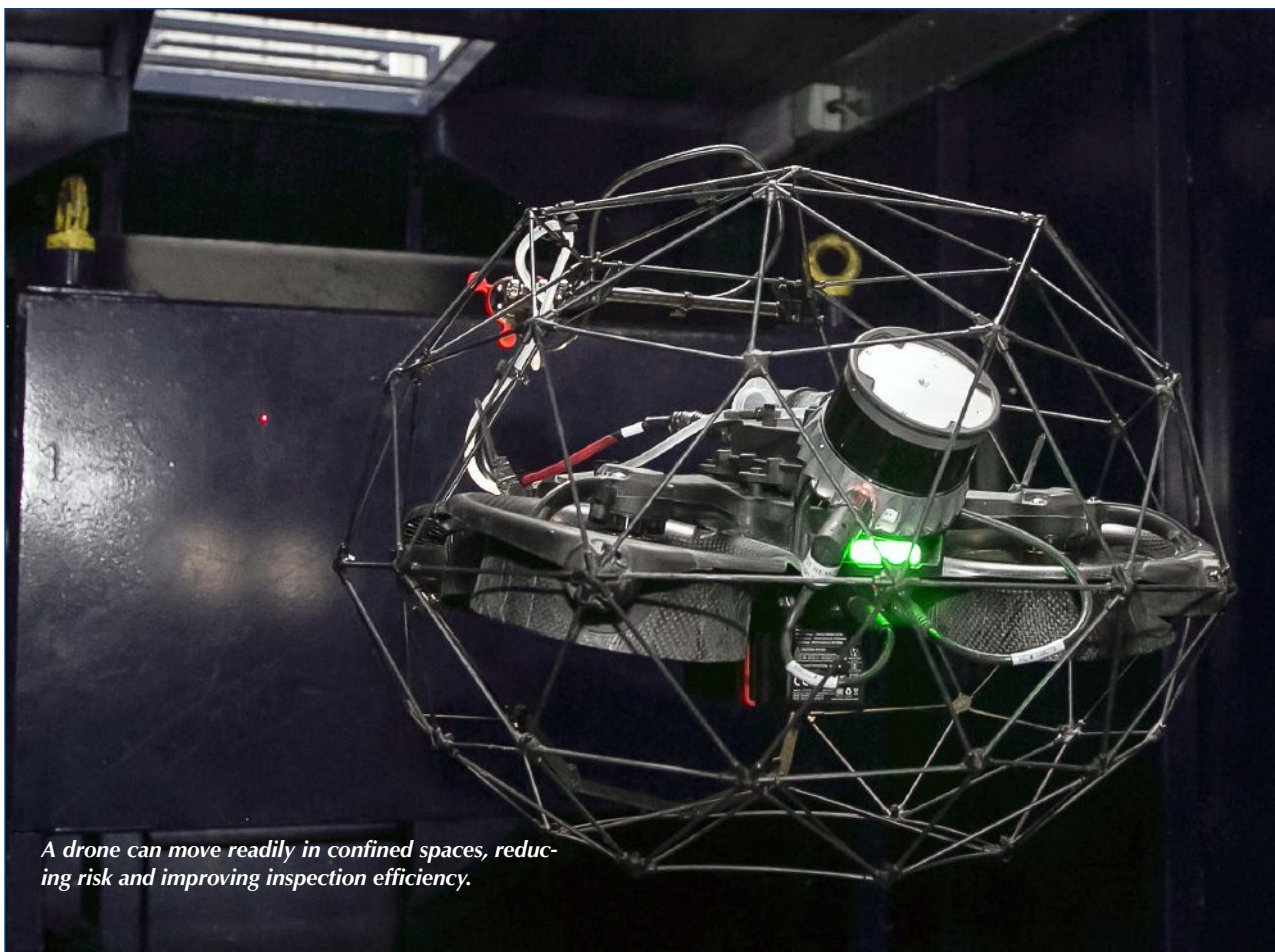
Simultaneously, industry regulations are becoming stricter. Classification societies require regular ultrasonic thickness measurements (UTM) to monitor the structural integrity of key offshore assets. Traditionally, these inspections necessitate significant preparation, specialist personnel and considerable logistical effort to achieve compliance.

For over 18 years, Interocean Marine Services has been delivering safe, professional and high-quality services to the offshore energy sector. Focused on marine assurance, inspection, and operational support, Interocean collaborates with drilling contractors, asset owners, and classification societies to improve safety, efficiency, and sustainability in offshore drilling operations.

Interocean is implementing class-approved UTM inspections using unmanned aerial vehicles (UAVs), aiming to reduce risk, improve efficiency and establish new safety standards.



Interocean offers UAV-based UTM inspections.



A drone can move readily in confined spaces, reducing risk and improving inspection efficiency.

Advantages of Remote Inspections

Ensuring the structural integrity of offshore assets is crucial for safety and operations. Inspections are needed for preload tanks, ballast tanks, voids, chain lockers, and other enclosed areas to detect corrosion, material loss, and weaknesses.

Traditionally, these inspections require personnel to enter confined spaces, often using rope access or scaffolding. These processes increase safety risks, extend downtime and inflate costs.

Interocean has reduced human entry into high-risk areas by using UAV-based UTM inspections. It is among the first companies approved by ABS and DNV for class-certified drone inspections. This method has cut the need for scaffolding and rope access by up to 80 percent, while maintaining accuracy and compliance. This technology advances offshore safety and efficiency, making inspections more reliable and data-driven with minimal risk to personnel.

Integrating UAV-based UTM inspections into offshore operations offers several benefits. It reduces exposure to hazards by employing UAVs to handle measurements in confined spaces, reducing the need for personnel entry. There is up to 80 percent reduction in scaffolding and rope access, so UAVs lessen reliance on high-risk, labor-intensive methods. Faster and more efficient inspections are enabled by UAVs that gather data quickly and accurately, minimizing downtime. There is also a lower

carbon footprint: Fewer offshore personnel means less helicopter transport and accommodation costs, cutting emissions.

Proving the Technology

The practical application of UAV-based UTM technology has been demonstrated aboard the Valaris Viking jack-up rig, where the system conducted thickness measurements inside preload tanks. The trial, observed by both ABS and DNV, validated UAV-based inspections, confirming that: class-approved UTM inspections can be conducted using UAVs; high-accuracy thickness measurements can be obtained without direct human access; and personnel exposure to hazardous environments can be reduced.

Following this validation, Interocean received official approval from ABS and DNV to perform class-certified UAV-based UTM inspections, facilitating the broader adoption of this technology across the offshore sector.

Data-Driven Inspections

The quality and accuracy of inspection data are important in maintaining the safety and integrity of offshore and industrial assets. Traditional methods often depend on isolated snapshots of asset conditions, which may overlook emerging structural issues or fail to provide comprehensive data sets that include both quantitative and qualitative insights.



Interocean NDT (nondestructive testing) Inspector and UAV Pilot Alex Wilson demonstrates a UAV-based UTM drone at a training facility in Aberdeen.

UAV-based UTM inspections offer a more advanced, data-rich approach. UAVs capture detailed, repeatable thickness measurements that enhance long-term asset monitoring. Real-time 3D modeling provides operators with detailed defect maps and digital models, facilitating more effective planning. With predictive maintenance, asset owners can optimize for actual conditions instead of scheduled inspections, reducing downtime and costs. This data-driven methodology ensures that early warning signs of structural deterioration are detected before they become critical, helping to prevent accidents and unplanned operational failures.

With ABS and DNV approval, Interocean has effectively used UAV-based UTM inspections in various offshore settings. Applications include preload and ballast tank surveys (reducing confined-space entry and ensuring compliance with standards, which decreases offshore personnel days) and hull and structural assessments (obtaining precise thickness data in limited spaces without needing rope or scaffolding).

By using UAV technology, offshore operators are lowering risks, enhancing data accuracy and simplifying maintenance, striving for a safer, more sustainable industry.

Case Studies

Interocean has demonstrated its capability to help major operators meet safety and legislation requirements and improve personnel safety through UAV-based inspection technologies. The company's recent inspection

on board the Macro Offshore Crossway Eagle self-elevating accommodation jack-up unit illustrates how drone technology can enhance safety while ensuring compliance with DNV rules and regulations.

The primary objective was to conduct a visual inspection of two spud cans to evaluate their condition and adherence to DNV class guidelines. Additionally, Interocean inspected a ballast tank and a void space within one of the pedestal cranes for structural anomalies and defects.

The inspection team included a Civil Aviation Authority-approved UAV pilot and a certified inspection technician, whose expertise ensured the safe and efficient execution of the inspection process. The Elios 2 drone was deployed through a deck-access hatch, enabling remote inspection via its live video feed. The UAV conducted a comprehensive visual assessment of critical structural elements, including internal walls, chord-to-can connections, and supporting braces and stiffeners. The drone systematically navigated through the tanks and spud cans, capturing high-resolution visual data to ensure thorough coverage of all areas. Each flight was recorded, allowing inspectors to perform detailed post-flight analysis and closely examine any potential concerns. The collected data were compiled into detailed photographic and technical reports, providing a clear and accurate assessment of the structures' condition.

UAV technology yielded several advantages. By using drones, personnel did not need to enter confined and potentially hazardous environments, reducing exposure

“Interocean has reduced human entry into high-risk areas by using UAV-based UTM inspections. It is among the first companies approved by ABS and DNV for class-certified drone inspections.”

to safety risks. Inspection findings were available instantly, enabling real-time discussions and immediate client feedback. The inspection adhered strictly to class rules, ensuring regulatory compliance without compromising safety. The entire workscope, including travel, was completed swiftly, achieving an estimated 30 percent cost and time reduction compared to conventional methods. Coatings and steelwork conditions were thoroughly assessed and verified by a qualified coatings and inspection technician.

By integrating UAV-based inspections, Inter-ocean aims to enhance safety standards while maintaining high levels of precision and regulatory compliance. The successful execution of the Macro Offshore Crossway Eagle inspection underscores the impact of drone technology in high-risk environments, setting a new standard for safety and efficiency in the industry.

A Step Forward

By incorporating UAV-based UTM inspections, Inter-ocean is aiding the offshore industry in adopting more

data-driven maintenance strategies. As offshore energy infrastructure ages, reducing risk and maintaining asset integrity will be crucial for long-term sustainability.

Future advancements in digital twin technology, AI-driven defect analysis, and autonomous UAV systems could further enhance efficiency and decision making, diminishing the need for human entry.

With a focus on safety, efficiency, and innovation, Inter-ocean is contributing to changes in how offshore inspections are performed, ensuring that both personnel and assets are protected. **ST**

Interocean's Chief Commercial Officer Alex Clark has extensive expertise in high-risk operations and leadership within the maritime and energy sectors. He is recognized for delivering innovative, value-driven solutions that not only enhance profitability but also ensure long-term growth and resilience.

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Digital Management System

Holistic Vessel Monitoring Streamlines Operations

By Chris Huxley-Reynard

The maritime industry stands as the backbone of global trade, facilitating the transportation of more than 80 percent of the world's goods. The sector grapples with a host of challenges: volatile fuel prices, stringent environmental regulations, rising operational costs, and ensuring the safety and well-being of seafarers. Against this backdrop, innovative technologies have become indispensable—not just for maintaining operational efficiency but also for safeguarding the environment and supporting those who power the industry.

At the forefront of this process is AST Reygar, a pioneer in maritime monitoring and reporting solutions. Its flagship vessel monitoring system (VMS), BareFLEET, exemplifies the power of cutting-edge technology to address these challenges. Combining real-time data insights, predictive analytics, and user-centric design, BareFLEET empowers maritime operators by enhancing safety, efficiency, and sustainability in operations.

AST Reygar is more than just a technology provider; it is a trusted partner in the maritime industry's modernization journey. With years of experience designing solutions for a range of vessels—from workboats and offshore support ships to passenger ferries—AST Reygar has established itself as a leader in asset monitoring systems. Its commitment to innovation and collaboration ensures that products meet the practical needs of operators and crews alike with the core values of innovation, customer-centricity, and sustainability. Through BareFLEET, AST Reygar demonstrates these values, delivering a product that is as transformative for seafarers as it is for vessel owners and operators.

The Challenges Facing Modern Maritime Operations

Before delving deeper into BareFLEET's transformative impact, it is important to understand the pressing challenges faced by the maritime industry today. These challenges underscore the need for innovative solutions, such as BareFLEET.

Operational costs are rising. Fuel accounts for a significant portion of maritime expenses, and fluctuating oil prices add uncertainty to budgeting and operations. Effective fuel management and efficient vessel operation are critical for maintaining profitability and reducing environmental impact.

Environmental regulations are also pressuring operators. Global efforts to combat climate change have led to stricter regulations, such as the International Maritime Organization's (IMO) greenhouse gas reduction targets. Compliance requires sophisticated monitoring and reporting tools.

Crew safety and welfare continue to be important. Seafarers face harsh working conditions, from rough seas to long hours, and ensuring their safety and well-being is both morally and operationally imperative.

Maintenance and downtime also affect operations. Unplanned machinery breakdowns disrupt schedules and result in costly repairs. Predictive maintenance is essential to minimize downtime and ensure smooth operations.

Introducing BareFLEET

BareFLEET is an all-encompassing remote monitoring system, designed to provide real-time, accurate insights into vessel performance. By integrating advanced sensors with powerful analytics, the system consolidates critical data—from fuel usage and motion monitoring to machinery health and environmental metrics—into an intuitive dashboard. This empowers operators to make informed decisions, based on real data, enabling crews to focus on their core responsibilities.

The key features of BareFLEET are: real-time monitoring of fuel consumption, engine load, vessel motion, and environmental impact with precision; predictive maintenance via data analytics to identify machinery wear and tear early, reducing unexpected breakdowns; user-friendly dashboards that simplify complex data, presenting ac-



Crew transfer vessels for the offshore wind industry benefit from BareFLEET's ability to optimize operations, reduce environmental impact and enhance crew welfare.

tionable insights in an accessible format; and environmental reporting to support compliance with stringent global regulations by tracking emissions and operational efficiency.

While these features offer clear benefits for vessel operators, the transformative impact on seafarers is equally profound.

Enhancing Crew Safety

Safety is the cornerstone of maritime operations. For seafarers, who often work in some of the world's most challenging and dangerous environments, advanced safety systems such as BareFLEET are invaluable.

The system offers real-time impact force monitoring. Operating in rough seas or crowded ports exposes vessels to impacts that can jeopardize both crew safety and structural integrity. BareFLEET's sensors measure these impacts in real time, notifying vessel operators of

potential risks. By addressing issues promptly, operators can prevent minor incidents from escalating into major hazards.

BareFLEET provides whole-body vibration monitoring. Continuous exposure to high vibration levels poses a significant health risk to seafarers, potentially leading to fatigue, musculoskeletal problems, and long-term health issues. BareFLEET tracks these vibrations in detail, enabling operators to implement adjustments that reduce strain on the crew. Over time, this contributes to a safer and more comfortable working environment.

The system also enables incident reporting. Every voyage comes with lessons to be learned and BareFLEET generates detailed reports on vessel activity and safety incidents, providing actionable insights to improve future operations. This proactive approach fosters a culture of safety, benefiting both individual seafarers and entire fleets.



Streamlining Operations

Efficiency isn't just about reducing costs; it's about creating a seamless workflow for crew, minimizing stress and maximizing productivity. BareFLEET excels in optimizing operational processes.

Fuel is the lifeblood of maritime operations, but managing it efficiently is often a challenge. BareFLEET provides real-time insights into fuel consumption, enabling crews to adjust speeds, optimize routes and

fine-tune engine performance. These small adjustments can lead to significant savings, reduced emissions and a lighter workload for the crew.

Unplanned maintenance is one of the biggest disruptors to maritime schedules. BareFLEET's predictive maintenance tools monitor machinery health continuously, identifying wear and tear before it leads to failure. For crew members, this means fewer breakdowns, more predictable schedules and enhanced confidence in their equipment.

The maritime industry's reliance on complex data often leaves crews overwhelmed. BareFLEET simplifies this process by consolidating critical information into one intuitive dashboard. Operators and crew can make quick, informed decisions, without the need to parse through dense data sets.

Sustainability: A Shared Responsibility

With the maritime sector facing mounting pressure

to reduce its environmental footprint, sustainability is no longer optional. BareFLEET helps operators and crew meet their environmental goals without compromising operational efficiency.

By providing real-time emissions data, BareFLEET empowers crews to adjust operations to minimize greenhouse gas output. This ensures compliance with international standards, such as the IMO's decarbonization targets while contributing to a greener future.

Environmental regulations often require extensive documentation, and BareFLEET automates this process, generating accurate reports to satisfy various stakeholders. For crew, this reduces administrative burdens and frees up time for other tasks.

BareFLEET's focus on fuel efficiency and emissions reduction directly supports global decarbonization efforts. By integrating sustainability into everyday operations, the system ensures that crews and operators can work together toward a cleaner maritime industry.

BareFLEET in Action

Farra Marine, a Dublin-based specialist in crew transfer vessels (CTVs) for the offshore wind sector, has significantly enhanced its fleet's performance and client trust through the implementation of AST Reygar's BareFLEET VMS.

By analyzing fuel consumption patterns via BareFLEET, Farra Marine has optimized engine performance and operational procedures, leading to reduced fuel usage and lower emissions. Monitoring vessel motion data allows for adjustments that minimize vibrations and movements, ensuring a smoother ride for both passengers and crew. The transparency offered by BareFLEET has been pivotal in building trust with Farra Marine's customers. Farra Marine can showcase the capabilities



of the WindFlex CTV design through real-time data, reinforcing confidence among clients worldwide. Detailed performance data ensure that Farra Marine meets customer expectations and contractual obligations, fostering stronger partnerships.

Continuous monitoring of vessel motions and machinery health ensures operations are conducted within safe parameters, reducing the risk of accidents. Crew members take pride in operating vessels that are optimized for fuel efficiency and reduced emissions, aligning with global sustainability goals.

The successful integration of BareFLEET across Farra Marine's fleet has not only optimized operations and reduced environmental impact, it has also strengthened customer relations and enhanced crew welfare, positioning Farra Marine as a trusted and efficient operator in the offshore wind sector.

In another customer example, continuous monitoring of engine health indicators facilitated early detection of potential issues. AST Networks' IRAMS telemetry software, integrated with AST Reygar's BareFLEET, helped Gardline detect turbocharger fault early, avoiding a £50,000 engine rebuild and preventing extended downtime.

The Broader Impact

BareFLEET's benefits extend beyond individual vessels or fleets. By enhancing safety, efficiency, and sustainability, the system is shaping the future of maritime oper-

ations. This transformation is especially significant for seafarers, whose work is often unnoticed and goes underappreciated—despite being vital to global commerce.

With BareFLEET, crews are no longer burdened by inefficient processes, unexpected machinery failures, or unclear environmental regulations. Instead, they are empowered by a system that prioritizes their safety, simplifies their workflows, and aligns their daily tasks with the industry's sustainability goals.

The maritime industry is on the brink of a digital revolution, with technologies such as AST Reygar's BareFLEET leading the charge. By addressing critical challenges, such as operational efficiency, environmental sustainability, and crew welfare, BareFLEET is transforming the way vessels are managed and operated. It offers a vision of a greener, safer future for maritime operations with practical tools that make that vision achievable today. The future of maritime operations lies in embracing innovative solutions that balance performance with responsibility. **ST**

Chris Huxley-Reynard is the commercial director of AST Reygar, www.ast-reygar.com, with extensive expertise in maritime technology and business development. Focusing on innovation, he has been instrumental in driving the adoption of advanced vessel monitoring solutions across the maritime industry, fostering partnerships, and ensuring the delivery of efficient, data-driven systems to clients worldwide.

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Ultraviolet Light for Aquaculture

UV-C LED Lamps Minimize Biofouling in Fish Farms

By Christian Haag

Biofouling is a natural process of accumulation of micro-organisms, plants, and algae on artificial surfaces submerged or in contact with seawater or freshwater. This can affect a variety of structures, including ship hulls, water inlets, pipes and aquatic sensors. Such buildup not only compromises the integrity of these objects but also interferes with their intended functions.

To combat biofouling, several technologies have been developed, including paints, resins and chemical sprays that release biocidal substances to prevent microbial adhesion. While antifouling coatings can be effective, they often pose environmental risks due to their toxic components.

In contrast, a nontoxic and highly efficient alternative for biofouling control is the application of UV-C spectrum ultraviolet radiation. UV-C light damages the genetic material of micro-organisms, inhibiting their reproduction and colonization.

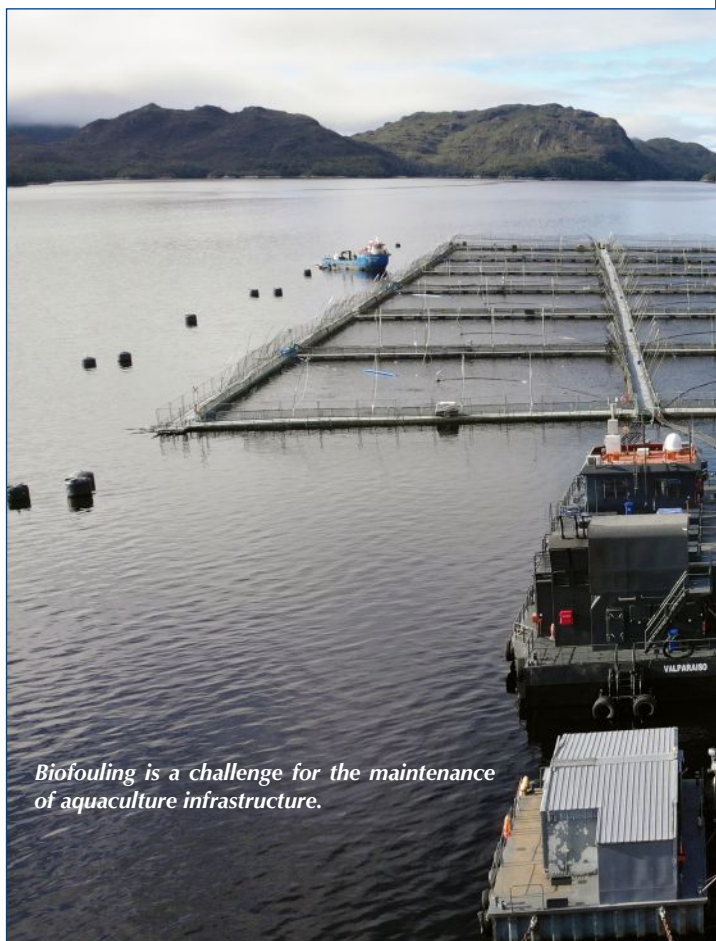
Mariscope Meerestechnik has developed submersible lamps equipped with UV-C LEDs specifically designed to mitigate the adverse effects of biofouling on submerged surfaces. We tested two lamps with different light emission cycles underwater in Puerto Montt, Chile, from January to August 2024 to evaluate their efficiency and effectiveness in preventing biofouling growth over several months. Visual comparisons were made to discern variations across different light configurations.

Understanding Biofouling

The biofouling process commences when a substrate is immersed in an environment rich in living organisms that require stable surfaces to complete their reproductive cycles. Within hours of immersion, a submerged surface can develop initial bacterial colonization. These bacteria release substances that promote the adhesion of single-celled organisms and microscopic flora. This proliferation fosters an environment conducive to the attachment of larger species, including algae, sponges

and various shellfish. Factors such as the hardness and chemical composition of the submerged material, temperature, and light conditions play critical roles in determining which species adhere.

Biofouling presents operational challenges, including excessive weight on floating objects, damage to vessel



Biofouling is a challenge for the maintenance of aquaculture infrastructure.



Mariscope's UV-C LED lamps work effectively to keep illuminated areas free of fouling.

surfaces, and obstruction of measuring equipment and underwater sensors used in monitoring and research.

Antifouling Solutions

To address biofouling, various methodologies have been employed, primarily focusing on antifouling paints and ultraviolet light radiation. While antifouling coatings are effective, their use has raised regulatory concerns

due to the harmful biocidal agents that leach into the water, endangering the marine environment.

In contrast, UV lights do not pose such environmental risks. They offer a targeted approach with low energy consumption, demonstrating exceptional efficacy in keeping illuminated surfaces free from biofilm.

The Science of UV-C Light

UV-C light operates at short wavelengths (240 to 280 nm) and is highly energetic, making it dangerous to human tissues while remaining nontoxic to the environment. Although UV-C light is

naturally emitted by the sun, it is fully absorbed by the atmosphere.

When UV-C light is employed in anti-biofouling technology, organisms' DNA and RNA absorb this short-wavelength energy, altering their genetic structure and rendering them unable to reproduce. Consequently, bacteria and other micro-organisms are deactivated, leading to disinfection of the surface.

UV-C LED Lamp

The concept and initial prototypes of Mariscope's innovative antifouling UV light were developed by engineers at the Leibniz Institute for Baltic Sea Research in Warnemünde, Germany (IOW). Successful tests were conducted on sensors operated by IOW in the Baltic Sea, providing continuous environmental monitoring. This antifouling system received production certification in 2021 and is now manufactured by Mariscope under IOW's license.

Designed for user-friendly operation, the lamp employs a UV-C LED and features a robust pressure housing capable of withstanding up to 15 bar (equivalent to a water depth of 150 m). An acrylic glass cap protects against accidental exposure to UV-C light during handling and programming, which is removed during underwater use. The lamp measures 127 mm in length and 30 mm in diameter.

Fish Farm Experiment

Two Mariscope UV-C lamps were mounted on a stainless steel structure measuring 1 m², positioned 25 cm away from a fish net with a mesh size of 0.5 mm. The lamps were programmed to alternate between on and off cycles: Lamp one was off for 1 sec., while lamp two was off for 4 sec., representing 25 percent of the maximum irradiating energy. Both lamps consumed 40 mW/s while operational.

The system was deployed on a pontoon near the shore of Puerto Montt in northern Chilean Patagonia. The re-





The contrast between the macrofouling that has developed and the clear areas illuminated by UV-C technology is visibly evident.

gion's fjord waters are highly productive in spring and summer, with strong blooms of microalgae and bacteria that accelerate biofouling, posing significant challenges to aquaculture, a vital economic sector in the area.

To ensure stability, ropes were secured to the pontoon and weighted to maintain approximately 3 m of water over the structure, even at low tide. The system underwent visual inspections every two weeks over a 32-week period. At week seven, lamp two was adjusted to evaluate its effectiveness in addressing existing macrofouling on the mesh.

Results

After one week, the structure exhibited a thin layer of algae on the fish net, indicating rapid biofouling. By three weeks, distinct areas of the net illuminated by the lamps were evident, as they contrasted with significant algae growth on the unlit portions. Despite the short exposure time, both lamps effectively prevented biofouling.

After five weeks, the contrast was stark; only areas exposed to UV-C light remained free of fouling, while the rest of the structure, including the lamps themselves, was heavily covered in brown algae. Lamp one showed a larger disinfected area, suggesting greater effectiveness due to its shorter off-cycle. However, lamp two, operating at 25 percent energy, also maintained fouling-free areas, albeit smaller ones. Observations revealed that

small crustaceans were present only in unilluminated areas.

After seven weeks, no significant changes in efficiency were noted, and the disinfected areas remained clearly visible. Some unidentified micro-organisms began to appear at the structure's edges, indicating the initial stages of macrofouling. The angle of lamp two was modified to assess its ability to disinfect previously affected areas.

The experiment concluded after eight months of permanent installation. Lamp two was able to "burn" the fouled area and inhibit further growth of marine life. Lamp one kept the area it was illuminating free of fouling.

Conclusion

The field experiment confirmed the high efficiency of Mariscope UV-C LED lamps in the highly productive waters of Patagonia, where strong algae blooms are prevalent. While the lamps' effectiveness is influenced by radiation duration, they successfully maintained surfaces free of macrofouling, even when operating at just 25 percent of their maximum irradiating capacity. Increasing UV-C intensity or reducing the distance between the lamp and affected surfaces could further enhance biofouling control. **ST**

Christian Haag is the founder of Mariscope Meerestechnik.

international

Samson Offers Testing in France

Samson Rope Technologies has expanded its global service offering and enhanced testing capabilities following its 2024 acquisition of Corderie Lancelin. The company has leveraged Lancelin's modern testing facilities in Ernée, France, to offer destructive testing up to 600 tons.

USV Supports Salvage off Taiwan

The rapid deployment of a USV played a critical role in helping to salvage cargo from a heavy transport vessel that ran aground with almost 300 t of fuel oil on board during one of the worst typhoons to hit Taiwan in decades. At the request of the Taiwanese government and within 24 hr., Sulmara mobilized a WAM-V 16 USV and a team of survey specialists to assist in the emergency fuel recovery operation for *Yu Zhou Qi Hang* to prevent further environmental impact.

Taiwanese marine contractor Dong Fang Offshore was called upon to deploy the *Orient Constructor*, a vessel capable of lifting salvage equipment and pumps onto the wreck. To mitigate the risk of damage to the *Orient Constructor* and ensure safe navigation in the shallow waters, Dong Fang Offshore worked alongside Sulmara to conduct a complex seabed survey. Sulmara equipped a WAM-V 16 USV with a multibeam echosounder to gather seabed data. Sulmara also reviewed and advised on the data to enable the team to navigate safely and efficiently, ensuring a successful fuel removal operation.

Permission for USS to Survey in UK

The USV manufacturer and marine data acquisition specialist Uncrewed Survey Solutions (USS) has received U.K. Maritime and Coastguard Agency (MCA) general exemption for remotely operated unmanned vessels (ROUV) safe operations, allowing the business to conduct hydrographic surveying within U.K. waters.

ROUVs between 2.5 and 4.5 m in length may comply with the general exemption permitting eligible vessels to operate without certification issued by the MCA or its delegates. Vessels subject to this general exemption are expected to be under the constant supervision of a human operator that can take control at any time.

Operating under the general exemption allows USS to further assist its customers in their transition from traditional crewed surveying operations to the utilization of smaller, uncrewed craft delivering turnkey 24/7 hydrographic surveying and marine data acquisition solutions for both line-of-sight and over-the-horizon projects.

FuelEU Maritime Pool Management

Ahti Climate and Carbonex have partnered to advance the promotion and commercialization of FuelEU Maritime (FEM) pool management. By leveraging Ahti Climate's unique expertise, Carbonex will offer FEM pool management solutions to its extensive customer base in Europe and the Americas, including shipowners, charterers, and ship managers.

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Through this collaboration, Ahti and Carbonex will provide a comprehensive and seamless approach to managing maritime emissions, aligning with the EU's sustainability goals and helping operators achieve their compliance objectives more efficiently.

Ahti has developed the FEM pool management system, with more than 250 vessels already under management. It significantly mitigates FEM costs for shipowners and operators and enables seamless regulatory compliance. Carbonex assists clients with EU ETS compliance, voluntary CO₂ emissions offsetting, and monetizing on-board CO₂ emissions reductions.

New Saab Manufacturing Site in UK

Saab UK has opened its new state-of-the-art manufacturing facility in Fareham, Hampshire, U.K., marking a milestone in the company's continued growth.

The site is developing, manufacturing, and supporting Saab's radar systems and the Seaeye underwater robotics portfolio. This includes the 3D multi-mission radar, Giraffe 1X, and the all-electric subsea ROV Seaeye SR20.

The facility supports up to 400 jobs and provides local opportunities for apprenticeships.

Saab's new campus is expected to benefit the U.K. Ministry of Defence. The site is a center of excellence ready to meet future customer radar requirements and servicing, in addition to supporting in-service radars operated by the U.K. armed forces: the Giraffe 1X, Giraffe AMB air defense radars, and TAIPAN (Arthur) artillery locating radars.

G2 Ocean Chooses AI Fleet Management

G2 Ocean will implement Seaber.io's chartering and schedule optimization solution for fleet planning.

Seaber's cutting-edge AI platform provides data-driven decision support for scheduling and chartering, empowering commercial ship operators, industrial charterers, and commodity traders to maximize fleet utilization and earnings. The platform's insights also help reduce the environmental impact of shipping—a key priority for many industry leaders.

Seabed 2030 Adds Partner

The Nippon Foundation-GEBCO Seabed 2030 Project has a new partnership with Orpheus Ocean, a company dedicated to advancing exploration of the ocean's most remote and challenging environments. This collaboration will support the comprehensive mapping of the world's ocean floor by the end of the decade.

Orpheus Ocean specializes in the development of innovative AUVs and technologies designed for deep-sea exploration and environmental data collection. These solutions are set to improve data acquisition from previously inaccessible areas, contributing valuable insights to ocean science, conservation and resource management.

Fugro Acquires EOMAP

Fugro has acquired EOMAP GmbH & Co. KG, which specializes in mapping and monitoring of marine and

freshwater environments through satellite Earth observation (EO). Adding EO technology to Fugro's existing mapping solutions is a key step to further expand into the water market.

EOMAP has been pioneering EO technology since 2006, holding several patented algorithms. The market for EO solutions is growing due to increasing environmental regulations, the need to address climate change impacts, and the recognition of marine ecosystems' vital role in our planet's health.

Over the years, EOMAP has been a key partner in many of Fugro's climate adaptation and nature conservation projects, including the ISPRA Seagrass Coastal Restoration project, in which Fugro is mapping the entire coastline of Italy. EOMAP and Fugro also collaborated in the recent COASTS project, which advances integration of data and modeling of coastal processes and blue carbon ecosystems with pilots in Europe and the Maldives.

Swedish Icebreaker Piping Upgrade

To ensure that its icebreaker *Oden* continues to operate at the highest level, the Swedish Maritime Administration has decided to replace the steel pipes of the ship's jet thrusters with a complete solution by GF Piping Systems. Extensive engineering services enabled a cost-efficient retrofit with 200 m of DN1000 thermoplastic piping components.

Originally, the jet thrusters relied on a steel piping system to handle the high flow rates and pressures, but corrosion made it necessary to replace the system.

Duncan-Parnell Makes Acquisition

Duncan-Parnell, a provider of positioning solutions for the geospatial and construction industries, has acquired Measutronics, the Trimble Marine dealer that provides best-in-class guidance and positioning solutions to the marine construction, specialty construction, and dredging industries.

Measutronics will continue operating with the same team of experts from its headquarters in Lakeland, Florida, as well as its office in Vancouver, Washington.

JW Fishers MC-2HD Supports Dive Teams

The Washtenaw County Sheriff's Office has purchased a JW Fishers Manufacturing MC-2HD mini-camera.

Washtenaw County's Underwater Search and Recovery Team (USRT) comprises highly trained certified scuba divers from multiple divisions within the Sheriff's Office. It is responsible for all water recovery operations in the county, including, but not limited to, the recovery of drowned persons. The USRT is also crucial in recovering criminal evidence and/or property within county waterways and is active in community water safety events.

The Washtenaw County Sheriff's Office has used the MC-2HD in training operations and evidence searches. It benefits topside support to monitor what the diver sees in real time and aid in searching for evidence, and the diver can utilize the integrated dive light. The light is dimmable, so in areas of high silt or debris, it can be adjusted to prevent light oversaturation during search. **ST**

Holes in Carbon Pump Theory

A new U.K. National Oceanography Centre (NOC)-led study has put a major question mark over the role that diatoms, tiny microscopic plants, play in driving ocean carbon storage.

Diatoms, a type of plankton or marine algae, are part of the process of drawing carbon down into the deep, especially in the Southern Ocean, which takes up about a third of organic carbon stored in the ocean.

Diatoms have dense, silica-based exoskeletons, like miniature glass houses, which were thought to provide ballast, making them prone to sinking upon death and, therefore, a key way carbon is transported to the deep ocean.

But the new study, based on data from two major expeditions to the Southern Ocean's underexplored twilight zone (the region between 100- to 1,000-m deep) found that the diatom skeletons lingered near the sea surface while carbon made its way to the deep ocean by other methods. This means there are unknown or poorly measured processes happening in the deep ocean.

A concern has been that ocean warming could impact diatom productivity and therefore reduce the strength of the biological carbon pump in the Southern Ocean. But this new research suggests such changes may not impact the strength of Southern Ocean carbon storage as much as previously thought.

Carbon is still making its way to the deep, and understanding these processes and how they govern carbon uptake in this critical part of the ocean is important for accurately predicting how the ocean may store carbon in the future.

VA Undergraduate Degree in Coastal, Marine Sciences

The State Council of Higher Education for Virginia has formally approved William & Mary's (W&M) new bachelor's program, set to launch this fall. The program will leverage opportunities and exper-

tise available through W&M's Batten School and the Virginia Institute of Marine Science (VIMS) while providing students the flexibility to explore a multitude of evolving career paths.

W&M's Batten School, colocated with the Virginia Institute of Marine Science, ranks among the top coastal and marine science institutions in the U.S. and currently offers two research degrees (Ph.D. and M.S.), a professional master's degree (M.A.), and an undergraduate minor administered in collaboration with W&M's Arts & Sciences. The undergraduate major will provide a foundational education in coastal and marine sciences with an emphasis on experiential learning and research.

KIOST Receives Sonar

The Korea Institute of Ocean Science & Technology (KIOST) has accepted delivery of Klein Marine Systems' 5900 ultrahigh-resolution sonar. The acceptance trials were conducted off the coast of Busan, South Korea. KIOST plans to use the sonar for seafloor topography surveys.

Grant for Shark Expeditions

ANGARI Foundation has been awarded \$25,000 for a second consecutive year by the Palm Beach International Boat Show Gives Back grant program to support and expand its educational Coastal Ocean Explorers: Sharks (COE: Sharks) program. The grant will fund three COE: Sharks expeditions for Title 1 students in the fall and a summer expedition for marine science educators during the Lake Worth Lagoon Educator Workshop.

The goal is to boost educator engagement, expand knowledge of the local marine environment, and extend the program to more schools across South Florida.

COE: Sharks, the ANGARI Foundation's flagship education program, immerses students in shark science through both classroom learning and expeditions aboard RV *ANGARI*, a 65-ft. research vessel.

These experiences equip participants with STEM knowledge and hands-on involvement related to at-sea operations, marine industry careers, the practice of science, research tools and techniques, data collection, and more.

RV *Falkor (too)*'s First Antarctic Science Expedition

After a year of preparing the ship and crew, Schmidt Ocean Institute's RV *Falkor (too)* has completed its first science expedition to Antarctica, which included eight dives down to 3,918 m (nearly 2.5 mi.) using the ROV SuBastian to assess biodiversity and explore vents and seafloor mapping.

Ice pilots and crew transported scientists via small boats to places such as Joinville Island, off the northeastern tip of the Antarctic Peninsula, for marine mammal and sea bird research.

The ship's satellite system livestreamed ROV dives to the Antarctic seafloor.

The rare sights included icefish guarding their eggs, cold Antarctic seep environments with bacteria feeding on chemical energy, and dense sponge and kelp outcrops in -1° C water.

The understudied Southern Ocean occupies a quarter of the global ocean surface. It absorbs an estimated 40 percent of anthropogenic carbon emissions and nearly 75 percent of excess heat in the atmosphere yearly, according to Schmidt Ocean Institute.

The inaugural expedition to Antarctica was done in collaboration with National Geographic Society (NGS) as part of NGS's Perpetual Planet Ocean Expeditions.

A multidisciplinary cohort of National Geographic Explorers conducted a comprehensive scientific examination, from sea ice to seafloor, of this critical yet understudied marine ecosystem to advance conservation research in the Southern Ocean.

After one more Antarctic expedition in early 2025, RV *Falkor (too)* will spend the next four years primarily supporting research in the South Atlantic Ocean. **ST**

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Sonar for Work-Class ROVs



The Gemini 1200id builds on the Gemini 720is sonar. It features a wide 120° horizontal field of view when operating at both 720 kHz and 1,200 kHz and offers improved attenuation of waterborne electrical noise for optional imaging performance. An integrated speed-of-sound sensor ensures the targets are displayed to a high degree of positional accuracy. CHIRP processing improves target separation over longer ranges. Tritech International Ltd.

Downhole Scale Remediation

DSR is a sustainable wellbore cleaning solution for the global energy sector. The DSR directly addresses long-standing industry challenges posed by scale, wax, and other naturally occurring deposits that obstruct fluid flow, compromise production efficiency, and create unsuitable surfaces for bridge plugs. Its advanced water-jetting nozzle tracks and adapts to a wellbore's varying inner diameter for precise and effective cleaning of safety valves, side pocket mandrels, and other critical areas, restoring surfaces to bare metal. Pipetech.

Multipurpose Marine Pliers

VT-001-8 PRO screw extraction and multipurpose lineman's pliers are suitable for ROV maintenance, subsea equipment installation and shipyard maintenance tasks. VT-001-7LN long nose screw extraction pliers can apply to ROV circuit board repair, sensor installation and marine electronics maintenance. VT-001-7SJ slip-joint screw extraction pliers can be used

for pipe fitting and assembly, valve maintenance, and general shipyard use. Vampire Tools Inc.

Ship Management

D-VESSELKEEPER is a ClassNK-endorsed platform that conducts automatic data collection and analysis for energy efficiency monitoring ship management; carbon intensity monitoring; and equipment monitoring, including health intelligent prediction and fault diagnosis by vibration detection. The digital technology also provides maintenance suggestions. WinKong Marine Engineering Co. Ltd.

Autonomous Camera



The Autonomous Timelapse System offers marine researchers, environmental monitors and offshore operators a more reliable way to conduct long-term underwater monitoring. The system features an exclusive hibernation mode that conserves battery power, enabling months or even years of continuous operation. The camera can integrate with various setups, including drop frames, landers, BRUV systems and AUVs. It captures SD, HD and 4K video, or 12.3-MP digital stills. SubC Imaging.

IoT Data Collection

Cybersecurity-verified by Bureau Veritas Marine & Offshore, this Internet of Things data collection solution enables remote users to collect the data required to understand vessel efficiency, monitor fuel consumption and lower emissions in line with ESG goals and regu-

latory compliance. The solution is vendor agnostic, so shipowners and managers can collect data from any equipment made by any manufacturer. Marlink.

Coastal Mapping Solution



Fathom is a fast, intuitive technology that provides comprehensive data integration of topo LiDAR, bathy LiDAR, and a multispectral camera to capture the complete coastal scene, from dry land to below water. It is optimized for smaller aircraft, requiring only a two-person team for installation and operation. It is natively gyrostabilized and features real-time quality control and a modern interface to facilitate data collection and accelerate data acceptance. Automated routines convert raw data to point clouds, images, grids and navigation charts. Teledyne Geospatial.

Offshore Wind Service Vessel

ULSTEIN SX250 bridges the gap between crew transfer vessels (CTVs) and service operation vessels (SOVs), introducing new service logistics. One or more SX250 vessels can support a full-size SOV, the latter handling larger tasks while the SX250s manage the smaller jobs. This setup meets service requirements and maintains the necessary up-time, allowing for more detailed operational planning and distribution of workload. SX250 is ideal for small and medium-size wind farms and wind farms located in benign and moderate sea states or shallow waters. Ulstein Design & Solutions AS.

Ocean Vector Chart Service

OVCS provides seamless access to high-resolution nautical charts directly in the MakaiPlan cable route planning software. Users can display the web-hosted electronic

navigation charts with enhanced detail and precision compared to traditional Admiralty raster charts, as well as interrogate individual objects in the charts to view their attributes. Triton Software Ltd. and Makai Ocean Engineering Inc.

NOx Abatement for Engines

Designed for marine two-stroke engines, this on-engine NOx reduction solution integrates selective catalytic reduction and secures IMO Tier III compliance while giving operators greater flexibility in engine room configuration and ship design. This new iteration further reduces the cost impact of NOx abatement and improves the efficiency of treatment with both existing and emerging fuels. WinGD Ltd.

Shallow Dynamic Positioning

SPRINT-Nav DP is a shallow-water DP reference system that integrates high-grade inertial navigation with DVL technology in a single, pre-calibrated unit. It was developed in

response to demand from the offshore wind farm sector. The DVL bottom-lock technology, which is effective to 230-m depth, means there is no need to deploy sensors or other equipment because the seabed is used as the positioning reference. Sonardyne International Ltd.

AI Fish Biomass Estimation

BiomassPro delivers over 95% accuracy in real time. It features a fully automated, lightweight camera, weighing 7.5 kg, that is easy to deploy and move between pens. Using an advanced algorithm, BiomassPro analyzes fish stocks and autonomously reports precise biomass estimates to an intuitive dashboard, which eliminates the need for manual sampling. BiomassPro provides support for six species: Atlantic salmon, cobia, gilthead seabream, king salmon, red snapper and yellowtail. A European sea bass algorithm is scheduled for release later this year. Innovasea Systems Inc. **ST**

SEA TECH e-NEWS

Featuring the government and industry news you need to know, *Sea Tech e-News* delivers timely information straight to your inbox, with details on recent product releases, updates on new hires and promotion, and workshops. We send out the newsletter every other week, so you'll get a steady stream of news edited down to what matters most.

Oyster Aquaculture Could Improve Potomac River Estuary
Oyster aquaculture in the Potomac River estuary could result in significant improvements to water quality, according to a new NOAA and U.S. Geological Survey study published in *Aquatic Geochemistry*. All of the nitrogen currently entering the estuary from the Potomac River would be removed if 40 percent of its riverbed were used for shellfish cultivation, according to the joint study. [Read more](#)

Navy's Laser Weapon Ready for Summer Deployment
Navy engineers are making final adjustments to a laser weapon prototype that will be the first of its kind to deploy aboard a ship late this summer. The prototype, an improved version of the laser weapon system, will be deployed on the USS *Ponce* for at-sea testing in the Persian Gulf. Navy leaders have made direct energy weapons a top priority to counter what they call asymmetric threats, including unmanned and light aircraft and small attack boats that could be used to deny U.S. forces access to certain areas. [Read more](#)

Ferry Sinks Off Coast of South Korea
With 462 passengers aboard, a ferry sailing from Incheon, South Korea, to the island Jindo sank near the southern tip of South Korea Wednesday, reported Associated Press. Most of the more than 400 people on the ship were high school students headed for a school trip to the tourist island. In the rescue effort, more than 80 vessels and at least 18 aircraft swept in to pull passengers from the water to safety. [Read more](#)

Pay Increase for Sailors Soon to Come
Sailors working for the U.S. Navy could see a pay raise in the coming weeks, reported the Virginia Pilot. On May 1, sailors serving on boarders ships will receive a pay raise. The increase in pay comes as an effort by the Navy to incentivize thousands of unfilled seafaring jobs. The bonus is a part of sea pay, a perk to those who work in jobs involving long deployments. Currently, this stipend is between \$50 and \$700 dollars. [Read more](#)

US Senate Reviews DOE Budget Request
For fiscal year 2015, the Department of Energy (DOE) requested \$77.3 billion. The U.S. Senate Appropriations Committee, Subcommittee on Energy and Water Development, held a hearing last week to review the funding request and discuss financial priorities. According to Lamar Alexander (R-Tenn.), research should be a focus of spending. [Read more](#)

US Technology Helps in Search for Flight 370
More than a month after Malaysia Airlines Flight 370 went missing, crews are hard at work trying to uncover what happened to the Boeing 777. Acoustic signals emitted from the plane's black box houses records from the flight, provide clues as to what happened, and where the plane was. [Read more](#)

Evaluating Scanning LiDAR Potential for Offshore Wind

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The project, the first of its kind in the world, will examine the measurement capability of four manufacturers' long-range scanning LiDAR systems and provide highly valuable insights into the measurement capability and sensitivity of the measurements to various environmental conditions. The project will run until June 2025.

Wave Energy for Porto

Eco Wave Power Global AB has engaged MOQ Engineering to perform the final design and load calculations for its pioneering wave energy project in Porto, Portugal, expected to launch in 2026.

This will be the first megawatt-scale wave energy project in Porto. The project is a part of a 20-MW concession agreement with

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The solutions address two specific challenge areas: understanding metocean conditions at and en route to the West of Orkney Windfarm site; and design for short weather window installations.

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wind operational expenditure models, narrowing the gap between the oceanography world and the OPEX world. The software will help de-risk and improve bankable financial performance of projects prior to a final investment decision.

Seaview Sensing aims to improve wave measurement accuracy in high seas and provide wind mapping to ensure 24/7 surface current, wave, and wind data using a high-frequency radar system. The data can provide real-time metocean information and, with models, improve forecasting and identify weather windows to reduce risk.

Next Ocean has developed a Wave Predictor tool to predict waves and ship motions in real time for the upcoming few minutes. This decision support tool provides detailed predictions at the level of individual waves and motion crests, enabling the crew to pick calmer moments to execute the most critical phase of offshore operations.

Projects are now underway and expected to be completed this year.

Offshore Wind Holds Steady

Intelatus, a provider of market analysis and strategic planning in the energy sector, has declared that the offshore wind market is steady amid political shifts.

The global fleet of service operation vessels (SOVs) and construction service operation vessels (CSOVs) is expected to double from the current 60 vessels to approximately 120 by 2028, driven by the expansion of offshore wind farms, particularly in Europe.

Despite the Trump Administration's policy shifts favoring hydrocarbons over renewables and causing some project delays, the U.S. offshore wind industry remains resilient, supported by European supply chains and long-term growth potential.

There is increasing overlap between offshore wind and oil and gas markets, with some purpose-built offshore wind CSOVs being considered for oil and gas projects, while the sector overall appears headed for potential consolidation through mergers and acquisitions. **ST**

people

The U.K. National Oceanography Centre's (NOC) **Dr. Elizabeth Kent** has been awarded an MBE (member of the most excellent order of the British Empire) in honor of her decades of research to improve historical sea surface temperature records. For over three decades, Kent, who is associate head of the Marine Physics and Ocean Climate group at NOC, has done research that underpins climate assessments, such as the Intergovernmental Panel on Climate Change assessment reports.



TDI Brooks has appointed **Frank Feurtado** as manager of marine systems. His career spans over 25 years in the international maritime industry, beginning as a marine electronics technician and progressing to become a captain. He has led marine operations across Europe, Asia, and the Americas, significantly contributing to the development and success of offshore oil and gas divisions for ship management companies.

Panagiotis Kasionis has joined BMT as a marine consultant. With more than 15 years of experience in shipping, classification, and marine consultancy, he brings deep technical expertise and a global perspective to BMT's growing portfolio.

Seasoned crewing expert **Dimitris Liolios** has taken office as Danica's representative in Athens to provide direct contact for Greek shipowners. He is the director and partner of Danica's manning office in the Philippines. Liolios has more than 30 years' shipping experience and has built his expertise in ship and crew management companies.

Subsea Micropiles has appointed Professor **Jacques Yves Guigné** as chief scientific officer. His previous roles include: founder of Acoustic Zoom, co-founder of Pangeo Subsea and senior adviser for Kraken Robotics, significantly contributing to seabed imaging technological advances.

Smart Ocean has appointed **Jon Erik Reinhardsen** as chairman. He is also chairman of Equinor and brings extensive industrial expertise. He is well-acquainted with Smart Ocean's technology as a part-time senior adviser at BearingPoint Capital, which provides Smart Ocean with strategic and financial advice.

DNV has appointed **Cristina Saenz de Santa Maria** as chief operating officer. Based in Singapore, she will streamline communication and coordination between regional teams and central functions, work closely with

key customers globally, and strengthen operational capabilities in key growth markets.

Brian Klinzing has joined the Coast Guard Foundation as regional director of philanthropy. He will work closely with U.S. Coast Guard units throughout the Mid-Atlantic area to identify and fulfill education, morale and wellness, and emergency disaster and tragedy assistance needs for Coast Guard members and their families.

Cavotec has appointed **Jonathan Eriksson** as senior vice president and head of the industry division and **Nicklas Vedin** as senior vice president and head of the ports and maritime division. **Patrick Mares**, in group management since 2019, has been appointed senior vice president of product management and chief technology officer.

Advanced Navigation has appointed **Maximilian Doemling** as head of product management. He will focus on class IIA and IIB ROV acoustic heading and orientation, subsea asset tracking, marine construction, benthic survey and point inspections, and reliable navigation on large survey vessels.

Nautel has appointed **Virginia Jimenez** as EMEA sales consultant. She will represent Nautel's NDB, DGPS, GMDSS, NAVDAT, NAVTEX and eLORAN products. Jimenez has nearly 20 years of experience in the maritime industry. **ST**



pCO₂

General Oceanics, Inc. introduces its **new model 8050 autonomous pCO₂ monitoring system**. Continuous measurement, recording and transmission of sea surface CO₂ levels.

- **Efficient equilibration of sea water and confined air head space.**
- **Infrared analysis of CO₂ concentrations.**
- **Automatic calibration.**
- **Integrated computer and control software.**
- **Integrated GPS location and atmospheric conditions.**
- **Satellite data transmission.**

<http://generaloceanics.com/home.php?cat=69>

General Oceanics Inc.

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E-mail: Sales@GeneralOceanics.com

<http://www.GeneralOceanics.com>

Standards for Electric Vessels

DNV has signed a memorandum of understanding with HD Hyundai Mipo (HMD) and HD Korea Shipbuilding & Offshore Engineering (KSOE). The collaboration focuses on developing standards for testing electric-powered vessels through the use of digital twin-based criteria and procedures, as well as enhancing ship safety and efficiency.

This collaborative project aims to resolve issues related to the integration of highly complex vessel systems for electric propulsion. Utilizing hardware in the loop (HiL) testing via digital twins of the different systems enables integration tests to be performed both earlier in the process on a much broader and deeper level.

To ensure the accuracy of the tests, there must be confidence in the digital assets. Together DNV, HMD and KSOE are working on the verification of these digital assets. Utilizing DNV-verified digital assets will facilitate the integration process. In addition, when systems from multiple suppliers are tested together, having the same requirements and HiL test procedures ensures the reliability of the testing.

The project will also focus on maintaining the digital assets throughout the life cycle of the vessel to maximize their value over the long term. With verified assets, component models could also be used in a plug-and-play manner as different systems are introduced into the simulation space or updated over time.

This initiative sets out to build a foundation for leveraging class-verified digital assets to support more comprehensive and earlier HiL testing. It aligns with DNV's Data-driven Verification notation, which has been developed to ensure reliable performance of complex systems.

Fully Electric Offshore Vessel

Corvus Energy will deliver a mega-size battery system for the first fully electric offshore vessel ever to be built, according to Corvus.

The vessel is an electric commissioning service operation vessel (eCSOV) that will be constructed by Armon shipyard in Spain for the U.K.-based shipowner Bibby Marine Ltd. Corvus Energy will supply its Blue Whale battery energy storage system (BESS), delivering close to 25 MWh of power for the vessel. It will be the largest LFP (lithium iron phosphate) battery system ever delivered to a maritime project.

Corvus Energy has been cooperating closely with the shipowner, designer and integrator on design. Unlike conventional hybrid systems, the vessel will utilize its large battery pack as the primary power source, with engines running solely for charging at a constant, optimized load that maximizes efficiency, extends battery lifespan and significantly reduces emissions. The innovative DC grid architecture further enhances overall system performance by minimizing energy losses and ensuring seamless power distribution. Offshore charging capabilities will enable simultaneous battery charging and dynamic positioning for station-keeping, representing an industry first in the SOV market.

Equipment from Corvus Energy will be delivered to the shipyard in 2026, and the vessel is scheduled for operation in 2027 to support the commissioning and operation of wind farms.

GasLog Chooses Customized Fleet Engine Management

GasLog, an international owner, operator, and manager of 35 LNG carriers and one floating storage regasification unit (FSRU), has selected Propulsion Analytics to develop a version of the Engine Hyper Cube platform tailored specifically for GasLog's fleet. The platform will be enabled by Kongsberg Digital's Vessel Insight cloud infrastructure.

The bespoke platform builds on Propulsion Analytics' core Engine Hyper Cube application, which performs continuous engine performance analysis using high-frequency

data from onboard engine sensors. The data are seamlessly integrated via Kongsberg Digital's Vessel Insight vessel-to-cloud infrastructure, building on the success of the existing infrastructure on board the vessels since the agreement in 2022, when GasLog connected its entire fleet to Vessel Insight. By synthesizing continuous engine performance analysis with insights from various other data sources, the platform enables improved engine condition assessment, optimizing performance and supporting data-driven engine maintenance decisions.

The primary objectives of this advanced platform are: enhancing engine availability by developing advanced diagnostics and predictive maintenance strategies to improve vessel reliability and reduce engine downtime; optimizing fuel efficiency and minimizing environmental impact by reducing greenhouse gas emissions through improved engine performance; and data-driven predictive maintenance via the coupling of continuous engine performance monitoring, prognostics, and optimized operation with long-term statistics and reliability-based engineering principles for more flexible overhaul planning, in line with LNG carrier trading profiles and drydock schedules.

EM Sensors for ROVs

Exail has selected Elwave's advanced electromagnetic (EM) sensing technology to equip its R7 ROVs for an undisclosed client.

Exail will integrate Elwave's Tetrapulse sensors—powered by the innovative CEDAR (Controlled Electric Detection And Ranging) technology—into multiple R7 ROVs.

The R7s equipped with Tetrapulse sensors will improve the detection, localization, and characterization of metallic and non-metallic underwater and buried targets, including steel, aluminum, and fiberglass composites.

R7s are well-suited for underwater security missions, including hazardous terrain navigation, unexploded ordnance detection and disposal operations. **ST**

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wind operational expenditure models, narrowing the gap between the oceanography world and the OPEX world. The software will help de-risk and improve bankable financial performance of projects prior to a final investment decision.

Seaview Sensing aims to improve wave measurement accuracy in high seas and provide wind mapping to ensure 24/7 surface current, wave, and wind data using a high-frequency radar system. The data can provide real-time metocean information and, with models, improve forecasting and identify weather windows to reduce risk.

Next Ocean has developed a Wave Predictor tool to predict waves and ship motions in real time for the upcoming few minutes. This decision support tool provides detailed predictions at the level of individual waves and motion crests, enabling the crew to pick calmer moments to execute the most critical phase of offshore operations.

Projects are now underway and expected to be completed this year.

Offshore Wind Holds Steady

Intelatus, a provider of market analysis and strategic planning in the energy sector, has declared that the offshore wind market is steady amid political shifts.

The global fleet of service operation vessels (SOVs) and construction service operation vessels (CSOVs) is expected to double from the current 60 vessels to approximately 120 by 2028, driven by the expansion of offshore wind farms, particularly in Europe.

Despite the Trump Administration's policy shifts favoring hydrocarbons over renewables and causing some project delays, the U.S. offshore wind industry remains resilient, supported by European supply chains and long-term growth potential.

There is increasing overlap between offshore wind and oil and gas markets, with some purpose-built offshore wind CSOVs being considered for oil and gas projects, while the sector overall appears headed for potential consolidation through mergers and acquisitions. **ST**

contracts

Fugro, Leidschendam, Netherlands, has been awarded a new five-year contract for hydrographic survey services. Fugro will support the creation and maintenance of highly accurate nautical charts, which ensure safe and efficient maritime navigation within U.S. waters. NOAA.

Interocean Marine Services, Aberdeen, U.K., has a three-year contract to provide marine vetting and assurance to the Morgan, Mona, and Morven offshore wind projects being developed under a joint venture. The projects are in the Irish Sea, 22 to 37 km from the coast, with a combined area of 580 km². bp and Energie Württemberg AG.

Well-Safe Solutions, Aberdeen, U.K., has received a further contract extension from an Italian energy major to decommission selected subsea and platform wells across Eni's portfolio in the Dutch sector of the North Sea. Eni Energy Netherlands BV.

Greensea IQ, Richmond, Vermont, has been awarded a contract for delivery of the customized Bayonet 250 Amphibious Underwater Ground Vehicle for the U.S. Marine Corps' Littoral Explosive Ordnance Neutralization project. Defense Logistics Agency and Darley.

Inmarsat Maritime, a Viasat company, London, U.K., will upgrade its satellite communications services across Maersk's global fleet of approximately 340 container ships. Bandwidth enhancements will roll out in 2025 and 2026. A.P. Moller - Maersk.

Yara Clean Ammonia, Oslo, Norway, has signed a time-charter contract for an ammonia-fueled medium gas carrier to be delivered in November 2026. This will help reduce greenhouse gas emissions from marine transportation and develop an ammonia supply chain as demand grows for ammonia in the power sector, as a marine fuel, and

other applications. Nippon Yusen Kabushiki Kaisha. **ST**

meetings

MAY

May 5-9—UAE Maritime Week, Dubai, United Arab Emirates. www.uaemaritimeweek.com/en/home.html.

May 12-14—Intelligent Ships Symposium, Philadelphia, Pennsylvania. www.navalengineers.org/symposia/ISS-2025.

May 20-21—TugTechnology, Antwerp, Belgium. www.ast-reygar.com.

JUNE

June 1-6—Aerospace Medical Association & Undersea and Hyperbaric Medical Society Annual Scientific Meeting, Atlanta, Georgia. <https://asma-uhms-asm.org>.

June 2-5—Capitol Hill Ocean Week, Washington, D.C., and virtual. <https://marine-sanctuary.org/chow-2025>.

June 3—Offshore CCS & Emerging Technologies Symposium, Houston, Texas. www.noia.org.

June 10-12—Seawork, Southampton, U.K. www.seawork.com.

June 11-12—European Wind Blade Recycling Summit, Berlin, Germany. www.wplgroup.com/aci/event/european-wind-blade-recycling-summit.

June 16-19—OCEANS 2025 Brest, Brest, France. <https://brest25.oceansconference.org>.

June 19-20—East Med Maritime Conference, Athens, Greece. <https://emmc.me>.

June 24-26—Electric & Hybrid Marine Expo, Amsterdam, Netherlands. www.electricandhybrid-marine-world-expo.com/en.

June 25-26—MAST Focus Forum USA, Waikiki, Hawaii. <https://mastconfex.com/usaFocus2025>.

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://tmstaccc.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 Conference, Tampa, Florida. www.ibexshow.com.

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

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

China Needs Better Carbon Regulation—Dr. Wang Tao and Ma Yuying

Dr. Wang Tao (pictured) received a doctoral degree from the School of Law, Xi'an Jiaotong University in 2018. He currently teaches as an associate professor at Northwestern Polytechnical University, China. His research focuses on environmental, natural resources, and energy management law and policy. Ma Yuying is a postgraduate student at Northwestern Polytechnical University, China.



With China's goal of "dual carbon"—reducing CO₂ emissions and achieving carbon neutrality—there is momentum to regulate greenhouse gases. Upstream offshore oil and gas contributes about 80 percent of carbon emissions in China.

Compared with the management system in the United States, China's higher-level legal support for greenhouse gas emissions is insufficient. The revised Law on the Prevention and Control of Atmospheric Pollution in 2015 only mentions the principal provisions for the coordinated control of air pollutants and greenhouse gases in Article Two. Under this framework, there are still differences in the legal status of greenhouse gas emissions and air pollutant emissions control. Specifically, there is no legal binding force for greenhouse gas regulation in the country.

Unlike the U.S., China does not incorporate greenhouse gas control into its environmental impact assessments. China's carbon emission assessment work is in the very early stages, mainly following "Pilot Technical Guidelines for Key Industries." China does not consider offshore oil and gas a key industry.

There is no current management of air pollutant emissions in China's offshore oil and gas industry, and the relevant technical standards are not operable because they lack quan-

titative indicators. Driven by future management needs, it is urgent to improve China's technical support system for pollutant discharge permits, which should be based on data, and to achieve coordinated control of air pollutants, including greenhouse gases, through comprehensive factor regulation.

China's onshore and offshore oil and gas industries mainly use outdated emission estimation factors pegged to an earlier version of Canada's oil and gas industry. The relevant experience of the U.S. offshore oil and gas industry shows that by adopting on-site greenhouse gas emissions measurement and monitoring methods for verification and comparison and updating and improving emission coefficients, the accuracy of greenhouse gas emissions data can be improved.

In addition, the monitoring of greenhouse gases in the U.S. offshore oil and gas industry is used to analyze the occurrence and development of greenhouse gases and to provide support for future greenhouse gas emissions reduction and management based on the data.

Meanwhile, China's current emissions monitoring is mostly used for early-warning safety purposes and less for environmental monitoring applications.

There are three main factors that limit the application of emissions reduction technologies on offshore platforms in China. First, the relevant equipment lacks the robustness to withstand harsh conditions at sea, as well as lacking the smaller sizes needed to save limited operating space.

Second, the offshore transportation costs of personnel and equipment, as well as the installation of equipment, increase the application cost of emissions reduction technologies.

Third, in the adverse operating environment, more frequent use, maintenance, and repair of equip-

ment and facilities are required, which adds to the price tag.

Strengthening legal environmental protections and providing a technical basis for emissions regulation, particularly in the Law on the Prevention and Control of Atmospheric Pollution, would create a framework for management.

Technical standards, starting with upstream applications, should be developed to bring China's offshore oil and gas industry into the national pollutant discharge permit system.

Linking greenhouse gas emission environmental impact assessment with the pollutant discharge permit system is also key, as well as a greenhouse gas reporting system.

Other recommendations are to gradually include the offshore oil and gas industry in the carbon assessment pilot program and encourage offshore oil and gas development and construction projects to carry out environmental impact assessments on emissions.

Currently, major oil and gas companies around the world are adopting advanced technologies and taking other action to reduce greenhouse gas emissions. For example, U.S. oil and gas companies use carbon capture, utilization, and storage technologies while also focusing on improving energy efficiency and reducing flaring.

Some international oil and gas majors reduce the carbon footprint of production by using shore power or low-carbon power supply on a large scale, upgrading their DC systems, and adopting microgrid technologies.

China should learn from these examples to formulate effective emissions reduction measures applicable to its offshore industry as soon as possible to benefit the economy and the climate. Emissions regulation has no solid foothold in the country. Advances in technology and policy are necessary. **ST**

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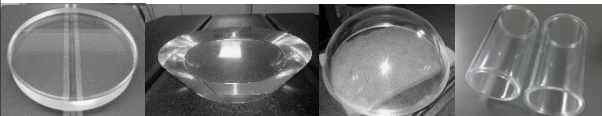
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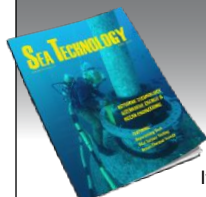
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A person in a blue and white patterned kayak is on a river. Several people are on the banks, some looking at the kayaker. The water is dark and there are some white flowers or petals floating around. The scene is framed by a wooden railing on the left and a blue wall on the right.

