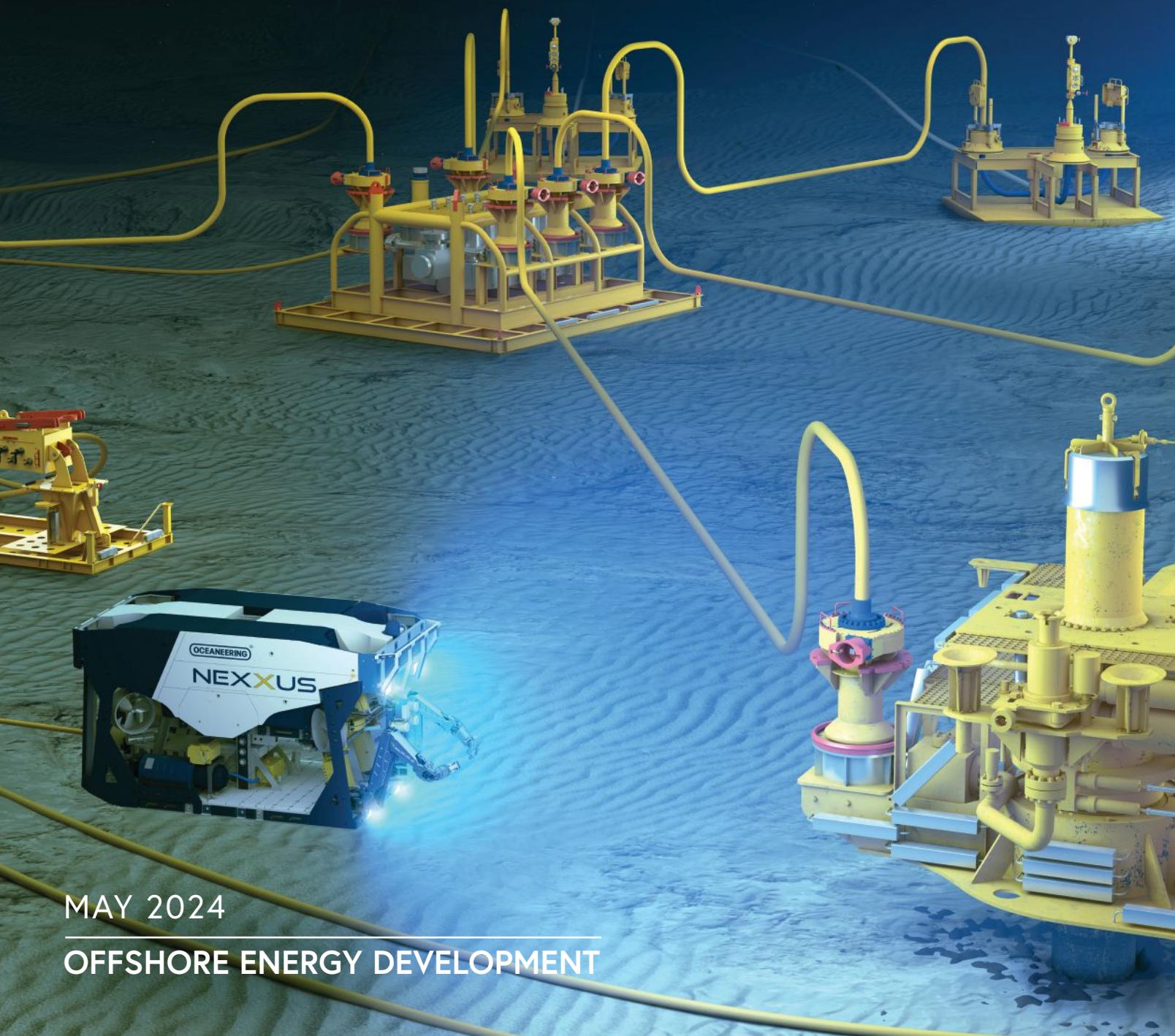


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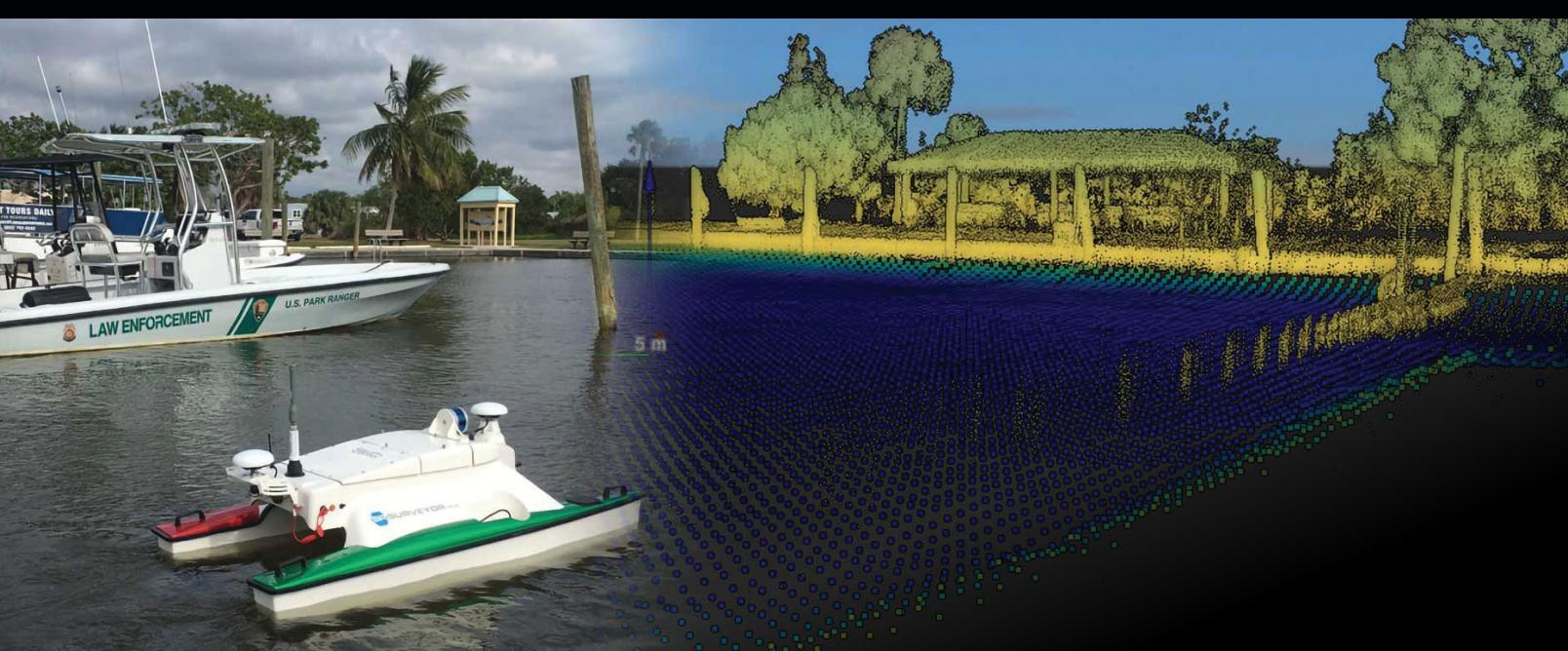
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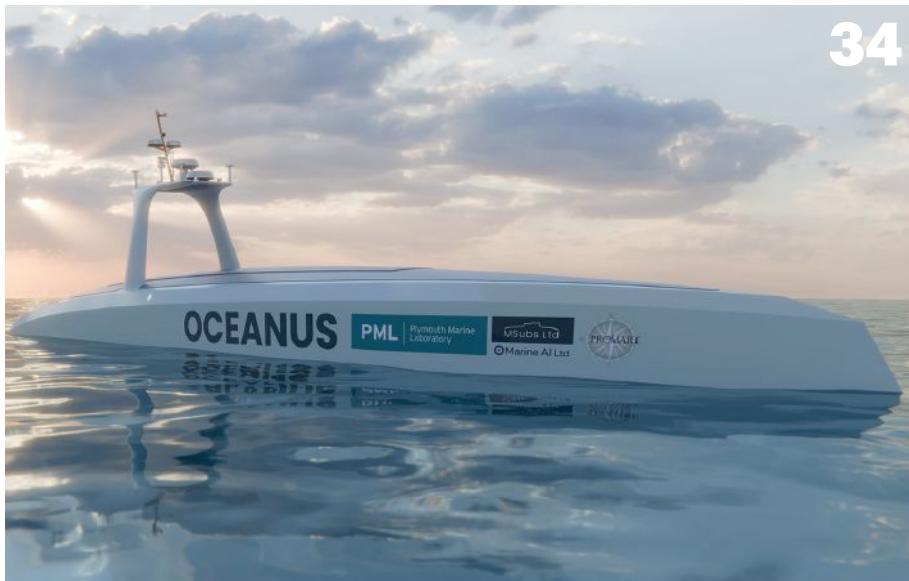


YEARS
1964 - 2024

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EDITOR UPFRONT

The demands placed on the global energy system continue to mount. Amid sector-wide environmental pressures and creeping geopolitical uncertainty, untapped offshore energy resources will prove instrumental to sustainable energy independence and security.

While challenging, the dawning opportunities to electrify long-established at-sea operations, expand the contribution of marine renewables, and integrate the role of carbon capture and sequestration are tantalizing.

The offshore energy mix of tomorrow will, among other things, rely heavily on an unwavering investment to advance ocean technology, as well as a professional community determined to action meaningful change.

In this edition of ON&T we profile both, as we meet some of the organizations at the forefront of the energy transition; our thanks this month go to BOEM, Oceaneering, Marine Renewables Canada, SubCtech, and DNV.

Ed Freeman

editor@oceannews.com

ON THE COVER



A remotely operated vehicle (ROV) inspects oil and gas subsea tieback infrastructure, including jumpers, while navigating an intricate layout.
(Credit: Oceaneering)

SMART SUBSEA SOLUTIONS

- Delivering data in most adverse conditions: underwater acoustic modems with advanced communication technology and networking
- Accurate USBL, LBL and hybrid positioning of underwater assets, navigation for divers
- Modem emulator and multiple cost-saving developer tools
- Sonobot 5 - the autonomous surface vehicle for bathymetry, monitoring, search & rescue, and AUV support
- Quadroin - the novel bionic AUV for surveys and monitoring



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BUILDING THE FUTURE, NOW



Dr. Jim Kendall

*Regional Director
Gulf of Mexico*



In recent years, we've witnessed an acceleration of climate change's damaging impacts on the planet, including massive wildfires, severe flooding, and intense storms.

Transitioning to a clean energy future is critical to address this issue—and a centerpiece of President Biden's agenda to combat the climate crisis. With its long and storied history of offshore energy development, the Gulf of Mexico has the unique expertise, infrastructure, and technology to play an integral role in this transition.

The Bureau of Ocean Energy Management (BOEM), with its mission to manage and develop the US Outer Continental Shelf (OCS) energy, mineral, and geological resources in an environmentally and economically responsible way, is launching the offshore renewable energy industry in the Gulf. Since 2021, BOEM has hosted a series of intergovernmental renewable energy task force meetings among Gulf federal, state, local, and tribal governments to establish a common understanding of the future potential and benefits of offshore renewable energy for this region.

THE STAGE IS SET

One of the realizations from these meetings is simply this: the conventional energy infrastructure, workforce, and business expertise that exist along the Gulf coast will play a key role in making the transition to offshore renewable energy.

For instance, Gulf Island Fabrication, Inc., a longtime builder of offshore platforms in south Louisiana, has recently fabricated the steel jacket foundations for Rhode Island's offshore Block Island Wind Farm. In a south Texas shipyard, Dominion Energy is applying the finishing touches to the first Jones Act-compliant wind turbine installation ves-

sel. At 472-feet in length, it's equipped with a set of legs that will raise it completely out of the water and create a stable platform for wind turbine installation.

These are just two examples of the numerous assets that several decades of offshore energy development have created along the Gulf coast. For offshore renewable energy development, these assets and others are in the right place at the right time.

THE TRANSITION IS HERE

The Gulf region comprises 32% of the shallow-water offshore wind potential in the US, and we are finally taking advantage of the opportunities that presents.

In August 2023, BOEM held the first Gulf of Mexico offshore renewable energy auction, resulting in the sale of a 102,480-acre area offshore Lake Charles, Louisiana, with the potential to support approximately 1.24 gigawatts of energy capacity and provide clean renewable energy to over 435,000 homes. In March 2024, BOEM began the preliminary steps to set a second offshore wind lease auction in motion.

BOEM is also exploring other opportunities to develop clean energy such as blue or green hydrogen, which reduce carbon dioxide emissions as compared to traditional gas production. We are also seeking to understand the impacts of carbon sequestration, which safely stores industrial carbon dioxide to keep it out of the atmosphere.

With its extensive history with offshore energy development, strategic location, and existing infrastructure, the Gulf of Mexico is on the cusp of a significant energy transformation, well-positioned to become a leading region in offshore renewable energy development.

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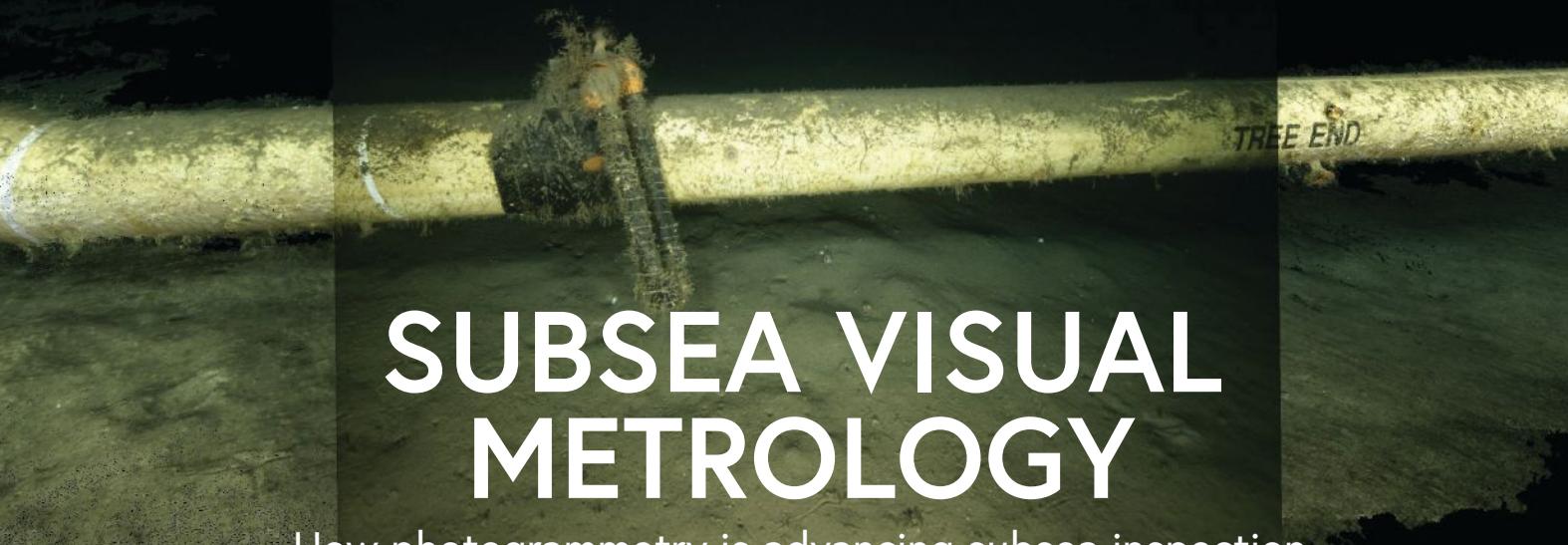
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SUBSEA VISUAL METROLOGY

How photogrammetry is advancing subsea inspection

▲ 4K image overlaid on a 3D reconstruction. (Credit: Oceaneering)



Alexander Steele
Michael Sheppard
Corey Halsell

Rapid, reliable subsea surveys are important for deepwater oil and gas operations because they produce data that is vital to assessing asset integrity for safe operations. Technologies currently in use provide basic information that is essential for decision-making, but emerging technologies are demonstrating that better data can dramatically improve the status quo.

OPPORTUNITIES FOR IMPROVEMENT

Laser imaging detection and ranging (LiDAR) technology has been used for decades in the offshore industry for subsea inspections. Deployed from a vessel, LiDAR units are positioned by an ROV on the seabed, where they capture 3D scans of the inspection area from static locations and store the data for post-processing.

Depending on the size of the asset, executing a single 360-degree scan takes between one and four hours, after which the ROV repositions the LiDAR units for the next scan. Because it is only possible to capture one side of a structure per scan, a typical survey requires a minimum of four

scans to examine all sides of an asset. Ideally, once all scans have been acquired, they can then be post-processed to combine the point data into a single point cloud that represents the seabed assets and can be used by the operator to assess the integrity of the equipment and determine when or if maintenance or replacement is needed.

Although LiDAR has proven useful, there are some drawbacks in using this technology for inspections. The process of deploying and retrieving the equipment is time-consuming and requires multiple technicians onboard a vessel that must remain on site for the duration of the program. Because the scans are not in color, it is difficult, if not impossible, to detect gradations in the seabed, structures, and marine growth, and since the data is not visible in real time, there is no way to know if a scan is compromised—obscured by turbidity or transiting marine life—until the unit is retrieved and the data is downloaded for processing.

The industry would benefit from technology that is more exact and a process that is more expedient and affordable.

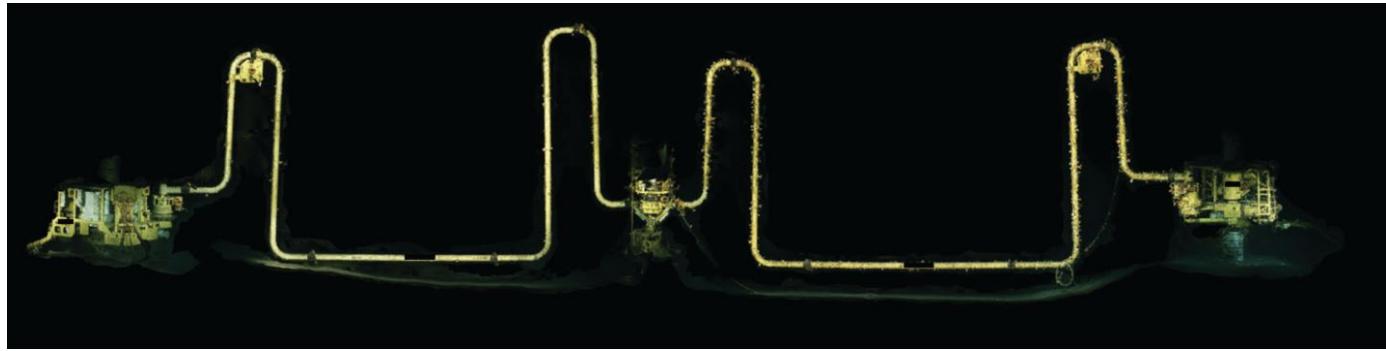
“ADVANCED SUBSEA VISUAL METROLOGY (ASVM) PRODUCES MORE PRECISE RESULTS IN LESS TIME THAN LiDAR SCANNING.”

THE NEXT STEP

Advanced subsea visual metrology (ASVM) produces more precise results in less time than LiDAR scanning. ASVM makes it possible to acquire high-quality images and 4K video during inspections and combines stereo optics and embedded compute capability with processing and analysis tools to deliver consistent results. The image data is used to generate a 3D dense point cloud on which accurate measurements can be taken in an operating environment where millimeters of wear can impact operational safety.

This solution relies on optimized hardware, a media vault for secure cloud-based data storage, communication with an onshore remote operations center (OROC)—where expert teams review data in real time and provide operational insights, quality control and processing tools—and tried and proven operating procedures that streamline operations.

In the course of the survey, ROV-mounted cameras capture images through optically engineered domed viewports that reduce distortion. High-power LED strobe light-



▲ 3D reconstruction of the double jumper and structures, with 65 m horizontal distance. (Credit: Oceaneering)

ing reduces the effects of turbidity and motion blur, calibration validates parameters, and survey sensor synchronization enables simultaneous data acquisition. The resulting 4K video stream undergoes real-time, onboard image enhancement for true image color and distortion correction.

Advanced communication that enables continuous contact with the OROC not only allows expert consultation while the survey is underway, but also enables remote piloting, which reduces the number of workers required offshore and improves operational safety. With fewer deployments and less vessel time, ASVM programs also have a smaller carbon footprint.

ASVM is suitable for a range of subsea tasks, including:

- Structural inspection
- Chain and mooring inspection
- Underwater inspection in lieu of drydocking (UWILD) for hulls
- Spool piece and jumper metrologies
- Free-span measurement
- Unexploded ordnance identification.

PUTTING ASVM TECHNOLOGY TO WORK

Oceaneering was contracted in Q3 2023 to carry out an ASVM survey in the Gulf of Mexico to collect data related to wells and pipeline end manifolds in 1,500 ft water depth. The survey was part of an annual inspection campaign to confirm asset condition. The goal of the survey was to collect images that would be used to generate a 3D model to enable precise year-to-year comparisons of subsea infrastructure wear and movement.

Designed for seabed conditions, subsea infrastructure is expected to experience movement because of the changes in temperature when hydrocarbon production is initiated. This movement prevents components such as jumpers and hub connectors from overstressing, but excessive movement can compromise performance and lead to leaks or in extreme instances, to complete equipment failure. The operator's

objective was to perform detailed movement analysis to ensure components were moving as expected and that no excessive stress was affecting the jumpers or hubs.

Historically, the operator had used LiDAR to gather condition data but was interested in exploring photogrammetry to determine if it would enable faster data acquisition with less equipment and produce the promised accurate results.

The Oceaneering team executed the sub-sea inspection with the 4,000-m-rated ASVM suite, gathering data from cameras fitted on its proprietary Millennium ROV, which was deployed from the *Brandon Borodelon* ultra-light intervention vessel.

The suitability of photogrammetry for subsea metrology was demonstrated by imaging passes of the seabed without the structure in view. Each pass was completed in less than 30 minutes, proving that this approach could quickly and efficiently capture the required data. Two surveyors on the vessel were supported by a shore-based team, who viewed the survey data as it was streamed via secure infrastructure and the media vault to provide operational support in real time.

This photogrammetry survey using ASVM provided rapid, high-quality results, and the compiled dataset enabled advanced analysis and quantitative measurements of the site. Using this dynamic acquisition method produced immediate feedback on visibility and coverage, making it possible to know as the survey progressed that nothing was impeding data acquisition and that the data being acquired was of the requisite quality.

The in-house team processed the data to produce full color models that allowed the operator not only to assess the position of the assets compared to historic data, but also to identify structural changes, including marine growth on the subsea components and areas of the structure that were experiencing degradation.

The team also was able to compare the conductor locations measured between the jumper inspection dataset and the dataset that only included the conductors and seabed. The result of fitting a best-fit circle to the conductors showed a difference between surveys of only 4.6 mm over 65 m.

FUTURE IMPLICATIONS

The successful execution of this project and the production of a thorough report—complete with images, video, 3D models, and measurements—demonstrates the suitability of this solution for deepwater, subsea inspection.

Applying this technology in subsequent annual surveys will enable complete year-by-year asset comparisons showing the integrity and position of the subsea components, and the comprehensive dataset will enable accurate decision-making for maintenance and intervention.

This successful program demonstrates the technology's capability, and as metrology becomes more pervasive, there will be opportunities to use ASVM in more environments to capture even greater value for the industry.

[i oceaneering.com](https://www.oceaneering.com)



▲ 3D reconstruction of well from a top-down perspective. (Credit: Oceaneering)

FOURTH GLOBAL CORAL BLEACHING EVENT CONFIRMED THROUGHOUT THE TROPICS

Scientists have confirmed the fourth global coral bleaching event on record, the second in the last 10 years.

Bleaching-level heat stress, as remotely monitored and predicted by NOAA's Coral Reef Watch (CRW), has been—and continues to be—extensive across the Atlantic, Pacific and Indian Ocean basins. CRW's heat-stress monitoring is based on sea surface temperature data, spanning 1985 to the present, from a blend of NOAA and partner satellites.

"From February 2023 to April 2024, significant coral bleaching has been documented in both the Northern and Southern Hemispheres of each major ocean basin," said Derek Manzello, Ph.D., NOAA CRW Coordinator.

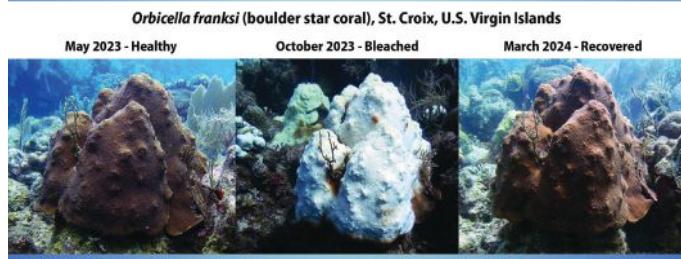
Since early 2023, mass bleaching of coral reefs has been confirmed throughout the tropics, including in Florida in the US; the Caribbean; Brazil; the eastern Tropical Pacific (including Mexico, El Salvador, Costa

Rica, Panama and Colombia); Australia's Great Barrier Reef; large areas of the South Pacific (including Fiji, Vanuatu, Tuvalu, Kiribati, the Samoas and French Polynesia); the Red Sea (including the Gulf of Aqaba); the Persian Gulf; and the Gulf of Aden.

NOAA has received confirmation of widespread bleaching across other parts of the Indian Ocean basin as well, including in Tanzania, Kenya, Mauritius, the Seychelles, Tromelin, Mayotte and off the western coast of Indonesia.

"As the world's oceans continue to warm, coral bleaching is becoming more frequent and severe," Manzello said. "When these events are sufficiently severe or prolonged, they can cause coral mortality, which hurts the people who depend on the coral reefs for their livelihoods."

Coral bleaching, especially on a widespread scale, impacts economies, livelihoods, food security and more, but it does not necessarily mean corals



▲ This three-panel image shows a boulder star coral in St. Croix, USVI, as it shifted from healthy (May 2023), to bleached (October 2023), to recovered (March 2024), following extreme marine heat stress throughout the Caribbean basin in 2023. (Credit: NOAA)

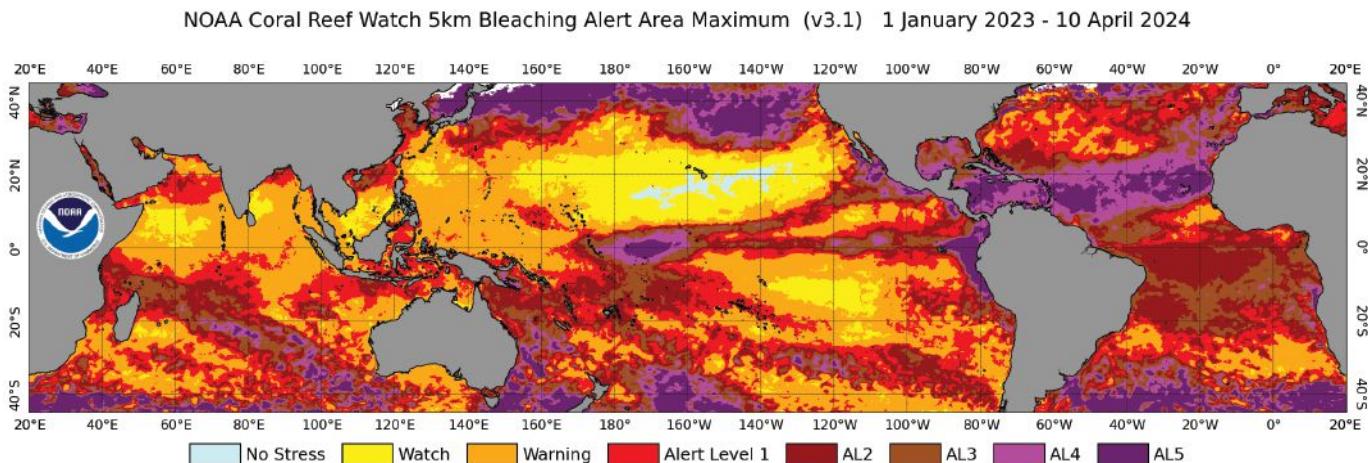
will die. If the stress driving the bleaching diminishes, corals can recover and reefs can continue to provide the ecosystem services we all rely on.

"Climate model predictions for coral reefs have been suggesting for years that bleaching impacts would increase in frequency and magnitude as the ocean warms," said Jennifer Koss, Director of NOAA's Coral Reef Conservation Program (CRCP).

The 2023 heatwave in Florida was unprecedented. It started

earlier, lasted longer and was more severe than any previous event in that region. During the bleaching event, NOAA learned a great deal while engaging in interventions to mitigate harm to corals.

Through its Mission: Iconic Reefs program, NOAA made significant strides to offset some of the negative impacts of global climate change and local stressors on Florida's corals, including moving coral nurseries to deeper, cooler waters and deploying sunshades to protect corals in other areas.



▲ NOAA Coral Reef Watch's global satellite Coral Bleaching Alert Area Maximum map, for January 1, 2023, to April 10, 2024. This figure shows the regions, around the globe, that experienced high levels of marine heat stress (Bleaching Alert Levels 2-5). (Credit: NOAA)

EELUME LAUNCHES ALL-TERRAIN AUV TO ACCELERATE UNDERWATER EXPLORATION

Eelume has announced the launch of Eelume-S, an innovative All-Terrain Autonomous Underwater Vehicle (All-Terrain AUV) set to revolutionize underwater exploration.

Traditionally, AUVs have been limited in their accessibility to underwater environments. However, Eelume-S breaks these barriers by offering unparalleled versatility and sustainability in exploring previously inaccessible environments. Unlike conventional AUVs, the Eelume-S All-Terrain AUVs have 360 degrees of agile maneuverability in roll and pitch, which hugely expands the operational envelope of utilizing AUVs for exploration, inspection, and monitoring of critical and complex underwater environments.

"Our commitment to advancing oceanic exploration while minimizing environmental impact has led us to develop the Eelume-S series," said Thomas Nygaard, CEO of Eelume. "With its ultra-high-quality data capture, superior maneuverability, and easy operation, Eelume-S empowers researchers, scientists, and marine enthusiasts to delve deeper into the mysteries of the ocean."

With sizes ranging from 45 to 75 kg, Eelume-S units are easily deployable, and include a 4K still image acquisition system from VOYIS with LED panels providing up to 480,000 lumens of light and a Wavefront Solstice Multi-Aperture Sonar enables Eelume-S to carry out class-leading bathymetric mapping with a 200 m swath and resolution down to 3 cm.

Eelume-S offers unparalleled capabilities in capturing 3D photogrammetry and photomosaic of underwater environments and structures through its ability to track along hilly and inclined seabed with fixed altitude down to 1 m. With 360 degrees of freedom in roll and pitch, Eelume-S enables safe and sustainable exploration even in challenging underwater terrains.

Whether fully or semi-autonomous, Eelume-S facilitates goal-based mission planning and in-mission data processing, offering a cost-effective solution that enhances understanding of oceanic spaces while mitigating risks and reducing carbon emissions associated with data collection endeavors.



Eelume

SEA MACHINES UNVEILS SELKIE 7 AUTONOMOUS VESSEL

Sea Machines Robotics, Inc. recently announced the launch of SELKIE, its latest innovation in unmanned surface vessels (USVs). The first model, SELKIE 7, is a 7-meter USV powered by the company's flagship SM300 Autonomous Command and Control system, and represents a leap forward in autonomous technology and a new era of marine exploration and operations.



SELKIE 7 USV. (Credit: Sea Machines)

As the first turnkey autonomous vessel released by Sea Machines, SELKIE is poised to revolutionize industries ranging from hydrographic surveying, offshore asset inspection, and persistent on-water operations such as security and environmental studies. SELKIE is the ideal full solution USV for any task-driven workboat fleet operator wanting to enhance and optimize their routine or persistent long duration on-water work.

SELKIE boasts cutting-edge autonomous capabilities for a range of survey operations and comes equipped with an under-keel sonar mount, CTD winch, and ample power and space to mount customer hardware. Thanks to its generous built-in cargo storage, equivalent to 2 x 1.3 meters (2 Euro Pallets), SELKIE is also perfect for long range logistics. The remotely controllable deck hatches for deploying payloads at sea like inspection or surveillance UAVs at sea. With its efficient design and diesel propulsion, SELKIE offers an extended operational range for a vessel of her size.

"With nine years of autonomous development and on-water use behind SELKIE, our overarching goal is to give customers, the world's fleet operators, products that enable them to capture new and substantial value from their work," said Michael G. Johnson, Founder and CEO of Sea Machines. "With SELKIE, commercial operators, researchers, and security agencies can go further, do more, do it better, with less costly or restrictive effort."

NEW DIVER NAVIGATION SYSTEM TO STREAMLINE UNDERWATER TASKS



EvoLogics

EvoLogics has introduced a new acoustic navigation system for divers. The innovative system facilitates map-based navigation for divers on a mission, offering the flexibility of seamless two-way communication between divers and the dive supervision team, as well as pre-mission and real-time waypoint setup.

Much like texting on a smartphone, the system allows a team of divers to exchange short messages with each other and the surface while also providing real-time tracking of each other's positions.

Map waypoints can be added before or

even during the mission to coordinate operations and mark discovered objects or infrastructure for further investigation.

With the new system, EvoLogics aims to streamline complex underwater tasks such as search and rescue, salvage operations, recovery efforts, and cleanup operations. The Diver Navigation system enhances coordination, improves task management, and promotes efficient information sharing, ultimately enhancing the effectiveness of diver operations.

The battery-powered diver tracker unit is compatible with all EvoLogics 18/34

modems and systems. It comes with mounts to attach it either on the diver's scuba tank or to most of the common underwater scooters. The molded unibody design of the tracker ensures broad compatibility with various diving equipment and facilitates straightforward installation.

The diver console is a compact wrist tablet that connects to the tracker modem by cable. It provides the diver access to the SiNAPS user interface—EvoLogics positioning software visualizing the map of the current operations area, the positions of all divers and the support vessel, and running the text chat tool.

At the surface, the USBL buoy acts as the acoustic node for operations. This device, a mono-unit with a USBL antenna, an integrated PC running SiNAPS positioning software, a dual-antenna GNSS receiver, and a WiFi access point, is designed for mobile scenarios. The Buoy ensures rapid setup and fully supports bidirectional diver tracking and message exchange.

The USBL buoy calculates diver positions using acoustic signals and displays them in the SiNAPS interface for the support team. This capability allows the surface team to monitor diver positions, communicate messages, and adjust mission waypoints as needed. Bidirectional acoustic links ensure that all mission divers have access to tracker positions.

BOEM RELEASES NEW SERIES OF VIDEOS EXPLORING SHIPWRECKS IN THE GULF OF MEXICO

The Bureau of Ocean Energy Management (BOEM) has announced a series of short videos showcasing 19th century underwater shipwreck sites in the Gulf of Mexico that have been nominated for placement on the National Register of Historic Places (NRHP).

These videos are the culmination of a comprehensive study to identify and protect a vast array of 19th century underwater shipwrecks. Protection of significant historical and cultural sites from authorized activities is not only a key responsibility of the BOEM mission but also an opportunity to celebrate and learn from the rich maritime history of the Gulf of Mexico.

The videos explore the captivating realm of shipwrecks and archaeology. They also give a deeper understanding of the historical and

cultural significance of these sites, as well as the importance of protecting them for future generations.



BOEM

NBOSI CTD SENSORS SELECTED BY OCEAN TECH INNOVATORS

Neil Brown Ocean Sensors, Inc. (NBOSI) has secured contracts with Apeiron Labs (Cambridge, MA) and Acbotics Research (Falmouth, MA) that will demonstrate novel applications of NBOSI's new 500 Series Conductivity-Temperature-Depth (CTD) sensors.

These contracts not only represent new business for NBOSI but also underscore the growing demand for CTD solutions from commercial survey, oceanographic research, and defense industries.

Acbotics Research is a pioneering ocean tech start-up, building semi-Lagrangian autonomous floats for a collaborative NSF-funded effort titled, Passive Localized Underwater Transiting Observing Systems (PLUTOS). The PLUTOS project seeks to develop a system of low-cost, modular, open-source logging drifters with acoustic and eDNA sensing/sampling capabilities to

capture multi-modal data, with initial pilot studies for seal food web ecology in Massachusetts and California.

Acbotics will utilize NBOSI's Model 501 CTD to collect temperature and salinity data for acoustic modelling, for density calculations used in real-time buoyancy control, and to provide water column temperature and salinity as a part of the science dataset. The Model 501 offers precision electronics combined with a compact and rugged sensor body to deliver real-time, research-quality ocean data in an affordable, easy-to-integrate package.

Venture-backed Apeiron Labs' mission is to lower the cost of acquiring data from the upper ocean by orders of magnitude. Requiring accuracy, reliability, and a compact size, they selected the versatile NBOSI Model 503 CTD for their new Tensor 1 platform. The Model 503 is geometrically

and hydrodynamically optimized for smaller platforms while maintaining all the performance benefits of the Model 501.

"We offer a uniquely personal approach to CTD sensor technology based on our years of experience both building and using our products in challenging ocean environments," said Dave Fratantoni, CEO at NBOSI.



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Canada's ocean sector boasts investment, innovation, and ambition. The shared goal among public and private sectors is to grow the national ocean economy to \$220 billion by 2035. Collaboration will be key to realizing such a target but so will the steady development and integration of marine renewable energy to the mix. This month ON&T sat down with **Elisa Obermann, Executive Director of Marine Renewables Canada (MRC)**, the national association for offshore wind, tidal, wave and river current energy, to better understand the scale of opportunity and MRC's role in advancing technology.



with Elisa Obermann
Executive Director



1 **ON&T:** What does Canada's renewable energy landscape currently look like?

EO: Canada is home to some of the world's most abundant marine renewable energy resources. Atlantic offshore wind speeds match those found in the North Sea, while seabed conditions favor both fixed and floating installations. Although Canada is one of the newer entrants to the global offshore wind market, federal and provincial governments have been busy laying the foundation for future offshore wind development on both coasts. The establishment of a legislative framework is underway, and the expectation is that the first call for offshore wind leasing will occur in 2025.

Beyond wind, Canada is also investing in developing tidal, wave, and river current energy. Tidal alone represents an estimated capacity of 40,000 megawatts; add wave and river to the equation, and the potential climbs to 340 gigawatts—enough energy to power every home in Canada five times over.

There are several tidal projects underway on both the east and west coasts, but much of the current focus is concentrated in the Bay of Fundy, Nova Scotia, which is also home to the Fundy Ocean Research Centre for Energy (FORCE). The team at FORCE have already overseen the deployment of several devices, with more in the pipeline over the coming years.

On the east coast, British Columbia has been the frontrunner for wave energy development, with much of the work being spearheaded by the University of Victoria and its West Coast Wave Initiative (WCWI)—a team of academics and cross-sector engineers seeking ways to harvest wave energy resources found off Vancouver Island.

Canada is also leading the way in exploring river current energy potential, with several projects already in various stages of planning, development, and operation across the country, in Alberta, British Columbia, Manitoba, the Northwest Territories, and Quebec.

In short, leveraging marine energy resources to bring about an economically sustainable energy transition is a national undertaking.

2 **ON&T:** What is Marine Renewables Canada's role in the energy transition?

EO: Marine renewable energy technologies can generate electricity and fuels to power marine transportation, aquaculture, and offshore oil and gas. The sector is uniquely positioned to help build the blue economy and combat climate change.

Ultimately, Marine Renewables Canada's role is to ensure that all stakeholders, from government officials to the broader public, are aware of the vast potential that marine renewable energy sources present in terms of achieving clean energy and net-zero goals.

3 **ON&T:** What regional benefits does Canada bring to the renewables industry?

EO: Clearly the natural untapped resources available represent a healthy and sustainable market for electricity production, but Canada is also an ideal testbed for the demonstration and refinement of clean, scalable technologies for the global market. Given the international shift towards a carbon neutral future, Canada has several unique characteristics that are particularly advantageous.

First, Canada has 270 remote communities.

Over 60 percent of these are Indigenous and over 200 of the communities have their own fossil fuel plants, using diesel or fuel oil. While many of these communities have access to different renewable energy resources, marine renewable energy may present the more optimal technology in some cases where wind and solar are not as plentiful or reliable. Over 100+ remote communities in Canada have access to marine renewable energy or waterpower resources, so there is enormous potential to expand a network of remote community marine renewable energy projects capable of establishing scalable and innovative systems and technologies. Innovation thrives in these communities and their individual needs spur creativity.

Second, Canada is increasingly focused on the large-scale production of green hydrogen and ammonia. The east coast, with its established ports and relative proximity to Europe, could play an instrumental role in this market as it develops.

The regional success of Canadian suppliers working in the offshore oil and gas, defense, and other ocean industries means that the supply chain is primed to service both the domestic and international marine renewable energy sector. Indeed, Canada has already proven instrumental to the burgeoning US offshore wind plans. To date, several ports in Atlantic Canada have been responsible for receiving turbine components and monopiles for projects in US waters because of the US Jones Act limitations, which require that any transport of goods between US ports be done on US built, crewed, and flagged ships.

4 **ON&T:** More specifically, how are you supporting the advancement of ocean-based technologies?

EO: Marine Renewables Canada has many

ocean technology companies in its membership. Our focus with these companies is to connect them with business opportunities in Canada and overseas by providing market intelligence, brokering new relationships, and keeping them up to date on marine renewable energy projects that they could engage in.

We also work closely with our members to identify knowledge gaps where technology and innovation could prove pivotal. Questions surrounding the potential marine environmental impacts of marine renewable energy infrastructure development persist, and ocean technologies help provide data and information to validate or abate any such concerns.

5 ON&T: How do you see your organization evolving in the foreseeable future?

EO: Marine Renewables Canada has grown significantly in recent years, and much of that demand is associated with the surging interest in offshore wind in Canada. The emphasis on offshore wind in Canada can only benefit the marine renewable energy sector as a whole—suppliers, ocean tech companies, and researchers will gain invaluable experience, expertise that can be applied to accelerate the commercialization of tidal, wave, and river current projects. Under this spirit of collaboration, we have seen our membership grow and strengthen.

Also, as we start to see members explore new energy sources, such as green hydrogen and ammonia production, I see our role as partially educational, helping stakeholders and others understand how marine renewable energy interfaces with these emerging opportunities. As technologies advance and help industry explore a broader range of marine environments, we will likely see the training and development of ocean professionals evolve. Ensuring that the human inputs (workforce) and technical resources (ocean technologies) progress in sync hinges on clear lines of communication and collaboration, and this will remain a major part of Marine Renewables Canada's remit.

marinerenewables.ca

FOR MORE TAKE 5 INTERVIEWS, VISIT:
oceannews.com/featured-stories/take-5



▲ US offshore wind monopiles delivered at Port of Argentia, Newfoundland & Labrador. (Credit: MRC)



▲ RivGen (river current) device at the Canadian Hydrokinetic Turbine Test Centre. (Credit: MRC)



▲ Fundy Ocean Research Centre for Energy (FORCE) substation at Bay of Fundy Site. (Credit: MRC)

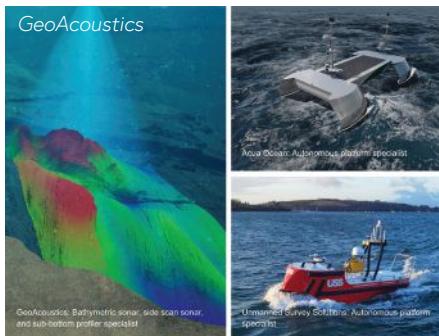
USV CONSORTIUM SECURES FUNDING TO ENHANCE SEAGRASS MAPPING

A consortium of uncrewed surface vessel (USV) and hydroacoustic technology companies consisting of ACUA Ocean, Geo-Acoustics, and Unmanned Survey Solutions (USS) has secured funding under the DEFRA—Department for Environment Food and Rural Affairs—Improving Observation Capabilities of Biodiversity in UK Waters: Phase 2 program.

The consortium's demonstration seeks to combine three cutting-edge technologies into a single approach capable of providing holistic mapping and water quality data of seagrass meadows more efficiently and with lower carbon footprints compared to current sonar-based techniques.

USS has previously incorporated a Geo-Swath 4 sonar system and collaborated with GeoAcoustics on a project aimed at providing fully automated end-to-end bathymetric solutions. This groundwork sets the foundation for the current project. While single-beam echosounders have

historically been employed for seagrass mapping, their effectiveness is constrained by their narrow beams, which only survey a limited strip of the seabed per ping. In contrast, this project adopts a strategy leveraging the wide swath capabilities of the GeoSwath system, promising substantial gains in efficiency.



The project will use an advanced interferometric sonar system capable of transmitting sonar beams over 40 times wider

than a typical single-beam sonar system, allowing for greater spacing between survey lines and significantly reduced survey times. The GeoSwath 4 bathymetric sonar features an onboard Artificial Intelligence system to automate data processing and extract sea grass height estimates in real time. Survey and water quality systems will be deployed from a carbon neutral USV to further reduce environmental impact and operating costs.

Project Lead, James Williams, Chief Executive Officer of Unmanned Survey Solutions, said: "This new project will be a game-changer for seagrass mapping efficiency due to the wide seabed coverage from every survey line. Combined with Geo-Acoustics new AI processing and ACUA Ocean's Natural Capital Assessment tool, our ability to transmit raw data to anywhere in the world will give scientists access to real-time data, allowing them to make critical decisions during survey operations."

THE SENTINEL MISSION UNVEILED BY OCEAN EXPLORATION PARTNERS

Rutgers University and Teledyne Webb Research have unveiled The Sentinel Mission, a collaborative initiative that marks the beginning of an ambitious journey as Teledyne's Slocum Sentinel Glider, *Redwing*, (Research & Education Doug Webb Inter-National Glider) prepares for a historic round-the-world flight. The mission is further strengthened by the involvement of NOAA, the Marine Technology Society, and the UN Ocean Decade.

The event, which took place at Rutgers University on April 23, 2024, showcased the intricate planning and resilient partnership behind The Sentinel Mission. The Redwing glider, embodying the intersection of Research and Education, pays homage to Doug Webb, a pioneer of autonomous underwater technology. The glider stands not only as an innovative piece of machin-

ery but also as a symbol of global research unity and exploration.

A highlight of the event was the christening of the glider, "Redwing," with seawater from Cape Cod, signifying its readiness for its summer 2024 launch.

A cohort of Rutgers' brightest undergraduate students presented the mission's flight path. Their extensive planning encompassed considerations for ocean currents, water conditions, and other environmental variables. These presentations highlighted the exceptional educational experiences at Rutgers, exemplifying the university's dedication to hands-on, impactful learning.

Insights from partners integral to the mission's global scope further enriched the event. With each presentation, the essence of collaborative spirit and international

cooperation became clearer, setting the stage for a truly global expedition.

The Sentinel Mission's anticipated launch in the summer of 2024 will contribute to our understanding of the oceans and serve as an inspiring testament to the power of academic-industry partnerships and the indomitable human spirit of discovery.



↑ Rutgers University Faculty and Teledyne Marine Team. (Credit: Teledyne Marine)

SUBC IMAGING LAUNCHES NEW CAMERA FOR OBSERVATION CLASS ROVS

SubC Imaging has launched a solution designed to redefine compact subsea imaging. Combining cutting-edge technology with a compact form factor, the Rayfin Micro delivers exceptional image quality and versatility for observation class ROVs.

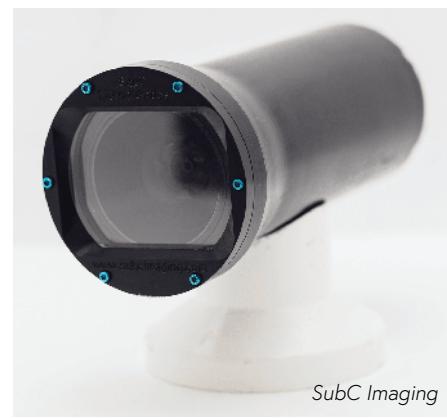
The Rayfin Micro 500 m ROV Camera is the latest addition to SubC Imaging's lineup of high-performance underwater cameras. Despite its compact size and lightweight design, weighing less than 500 g in water, the Rayfin Micro maintains the exceptional image quality. Its small form factor allows for easy integration into any system, making it the perfect choice for observation class ROVs.

The Rayfin Micro offers comprehensive imaging capabilities for subsea inspections and surveys, featuring real-time digital stills, HD video over Ethernet, annotation, and image enhancement features. Users can access images and video instantly

without the need for downloading, ensuring efficient data retrieval. Crucial survey data is logged with precise date and time stamps, while GPS data embedded in EXIF facilitates geo-referenced images. With the ability to transfer digital stills in real-time topside and stream live HD video topside, users can capture essential data effortlessly. The camera's low-latency performance and live image enhancement technology ensure clear visuals, even in challenging underwater environments, guaranteeing reliable and precise imaging for a variety of applications.

Rapid Digital Imaging (RDI) embedded technology is a key feature of the compact camera. Traditional video imagery can miss crucial details, but Rayfin RDI captures a series of high-resolution digital stills that can be zoomed in on to inspect the smallest detail or combined for a complete picture of the object being inspected.

The Rayfin Micro is fully customizable with optional upgrades, including SubC LEDs for strobe and additional lighting, lasers for precise measurements, and a DVR for multi-channel capability. Compatible with SubC's Blackbox for added peace-of-mind, the Rayfin Micro seamlessly integrates with SubC's Real-Time Streaming for live monitoring and remote inspections.



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NOAA AND OCEAN DISCOVERY LEAGUE TO ADVANCE LOW-COST OCEAN EXPLORATION

NOAA and the nonprofit Ocean Discovery League (ODL) recently signed a formal agreement to work together to accelerate deep-ocean exploration through the development of low-cost tools and technologies, such as deep-sea cameras, that give greater, more equitable access to broader public and scientific communities to explore the deep ocean.

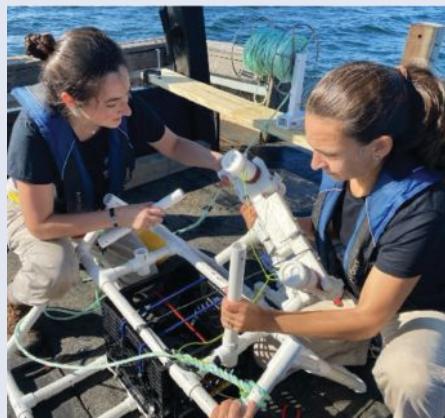
Founded by deep-sea explorer Katy Croff Bell, Ph.D., Ocean Discovery League's mission is to accelerate deep-ocean exploration by developing accessible systems to broaden the community of those who explore and understand the deep sea. ODL is developing a strategic approach to expand the area of the seafloor explored, mapped and characterized while reducing expenses by creating lower-cost, easier-to-use tools and technology.

These actions, along with a more targeted approach to selecting exploration loca-

tions, will expand deep ocean exploration to a broader community of explorers, focusing on those historically excluded from deep-sea research and exploration.

"This partnership with Ocean Discovery League will help us accelerate ocean exploration at a time when only a fraction of the ocean has been explored and allow us to expand access to careers available in this field for underserved communities," said Jeremy Weirich, Director of NOAA Ocean Exploration.

More specifically, NOAA and ODL will develop targeted and strategic deep-sea locations of mutual importance for future expeditions; develop and implement low-cost, deep-sea technologies required to increase access to ocean exploration; and develop joint outreach and education opportunities to broaden and diversify the community of deep-ocean explorers.



↑ Ocean Discovery Director of Engineering Jessica Sandoval, Ph.D., (left) and Ocean Discovery League President and founder Katy Croff Bell, Ph.D., (right) work on attaching a low-cost camera system and light modules to a prototype weighted lander configuration made of PVC pipe during deployment and recovery trials in the waters off Rhode Island. (Credit: Susan Poulton/Ocean Discovery League)

OSIL SUPPLIES VAN OORD WITH DREDGE MONITORING BUOY NETWORK

Leading international marine systems manufacturers Ocean Scientific International Limited has supplied a network of 1.2 m data buoys to offshore construction company Van Oord to monitor turbidity and dissolved oxygen levels in the location of dredging operations.

A total of nine data acquisition systems have been produced for the global contracting company, and the fully integrated multi-discipline data buoy networks will support dredging operations by providing continuous real-time information about the dredge plume and surrounding environmental conditions.

The buoys are equipped with water quality sondes provided from Van Oord's existing equipment pool, and relay collected data via GSM with an Iridium satellite Short Burst Data (SBD) back up.

OSIL data buoys can be equipped with a multitude of instruments and sensors, from measuring basic parameters such as water temperature, current and wave measurements, atmospheric pressure and salinity, to hydrophones, subsea cameras, or sensors for nutrients, pollutants, oxygen and CO₂ levels, or Chl-a and PAR.

The systems are self-contained, being furnished with sufficient solar power (which can be combined with alternative power sources) and back-up batteries to sustain the power demands of

the systems. Data can be relayed from the buoys immediately and securely via GSM, radio or satellite, to a secure webpage or internet enabled device.

OSIL has more than 800 data buoy systems worldwide and is a leading manufacturer of marine environmental monitoring and sampling systems.



OSIL

MARITIME ROBOTICS AND AKVA GROUP PARTNER TO MANUFACTURE CLIMATE-NEUTRAL USV HULLS

Maritime Robotics and AKVA group Helgeland Plast have announced that their next step towards a more sustainable future is manufacturing the hulls of the Maritime Robotics' Mariner USV using climate-neutral materials.

"With our newly achieved ISCC PLUS certification and the transition to bio-based and recycled materials, Helgeland Plast and Maritime Robotics are taking significant steps towards a more sustainable future for maritime technology," said Freddy Bakken from AKVA group Helgeland Plast.

AKVA group has obtained ISSC PLUS certification for the use of bio-based and recycled raw materials in the production of their plastic products and has decided that all boat hulls will be produced using these new materials.

"This development, among other things, supports AKVA group's vision of pioneering a better future," continued Mr. Bakken. "This partnership is a shining example of how two leading companies can work together to create groundbreaking products that not only meet current needs but also ensure a greener future."

The transition from fossil to plant-based materials makes the boat hulls climate-neutral without compromising quality and safety. This

maintains the trademarks of both Maritime Robotics' Mariner USV and AKVA group's Polarcirkel boats as reliable and robust work-boats, while also offering a greener alternative for those operating in rough sea conditions.

"As a rapidly growing company, we rely on strong partnership to scale in an efficient and sustainable manner. Together with AKVA group Helgeland Plast, we can ensure that we deliver our products, which contribute to increased safety and reduced CO2 emissions for our customers, in a more climate-neutral way," adds Børge Sørli from Maritime Robotics.



Maritime Robotics



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DOI ANNOUNCES OFFSHORE WIND LEASING PLAN WITH UP TO 12 POTENTIAL SALES BY 2028

In remarks at the International Partnering Forum conference in New Orleans, Louisiana, on April 24, Secretary of the Interior Deb Haaland announced a new five-year offshore wind leasing schedule, which includes up to 12 potential offshore wind energy lease sales through 2028.

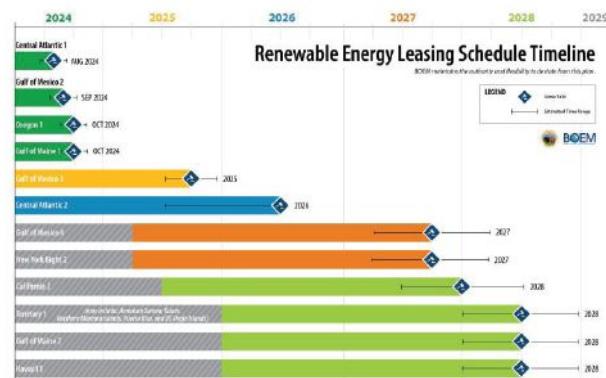
Future offshore wind energy lease sales from the Bureau of Ocean Energy Management (BOEM) are anticipated in the Atlantic, Gulf of Mexico, Pacific, and the waters offshore of the US territories in the next five years. The leasing schedule includes four potential offshore lease sales in 2024, one each in 2025 and 2026, two in 2027, and four in 2028.

Since the start of the Biden-Harris administration, the Department has approved the nation's first eight commercial scale offshore wind projects, held four offshore wind lease auctions—including a record-breaking sale offshore New York and the first-ever sales offshore the Pacific and Gulf Coasts, and advanced the process to establish additional Wind Energy Areas in Oregon, the Gulf of Maine and the Central Atlantic.

Thus far, the Department has approved more than 10 gigawatts of clean energy from offshore wind projects—enough to power nearly four million homes. The Department has also taken steps to grow a sustainable offshore wind industry by encouraging the use of project labor agreements, strengthening workforce training, bolstering

a domestic supply chain, and through enhanced engagement with Tribes, fisheries, underserved communities, and ocean users.

"As we look toward the future, this new leasing schedule will support the types of renewable energy projects needed to lower consumer costs, combat climate change, create jobs to support families, and ensure economic opportunities are accessible to all communities," said Secretary Deb Haaland. "Our offshore wind leasing schedule will provide predictability to help developers and communities plan ahead and will provide the confidence needed to continue building on the tremendous offshore wind supply chain and manufacturing investments that we've already seen."



RWE AND MASDAR AWARD FUGRO CONTRACT FOR UK GEOTECHNICAL SURVEYS

Masdar, the UAE's clean energy powerhouse, and RWE, a leading renewable energy company in Germany, have awarded global leading geodata specialist, Fugro, a contract to undertake geotechnical surveys on the site of the Dogger Bank South (DBS) West offshore wind farm.

The Dogger Bank South wind farm, which is split across two separate sites, DBS East and DBS West, each with a capacity of 1.5 GW and spanning 500 square kilometers, is expected to generate enough electricity to power three million typical UK homes.



Masdar

One of the largest offshore wind farms in the world, it will lead to the creation of 2,000 jobs during construction and more than 1,000 direct and indirect jobs during the operational phase.

Three vessels, *Fugro Quest*, *Fugro Voyager*, and *Normand Mermaid*, will survey the ground conditions below seabed from May to October 2024 at the location of each proposed turbine and platform foundation, and associated seabed infrastructure.

Using a combination of surveying techniques, the ground investigation will be an extensive geotechnical campaign and is an essential step in determining the final design and engineering of the project.

The next development milestone for the projects will be the submission of applications for Development Consent Orders, expected to be during the second quarter of 2024. If successful, the next steps would be to secure Contracts for Difference (CfD), followed by financing, construction and finally commissioning by 2031.

Masdar is aiming for a renewable energy portfolio capacity of 100 GW by 2030, supporting the target set in the historic UAE Consensus to triple global renewables capacity by the end of this decade, and aims to be a leading producer of green hydrogen by the same year.

COLLABORATION TARGETS SUPPORT FOR FLOATING WIND TECHNOLOGY

On April 18, 2024, applications opened up for a unique project that could expand the US market for innovative UK companies developing technology that can help support the growing floating offshore wind market in the United States.

The UK-US Floating Offshore Wind Supply Chain Innovation Bilateral (FLOWB) supply chain program brings together the Offshore Renewable Energy (ORE) Catapult and Innovate UK, with US partners including University of Maine and NREL (National Renewable Energy Laboratory). Together they will support UK companies developing exportable technologies to team up with floating wind platform developers in the US and benefit from up to a £1.5 million funding pot.

ORE Catapult, NREL and University of Maine have identified four emerging technical innovation challenges that UK companies are ideally placed to solve. Up to five companies will be chosen through a competitive process to each receive grant funding ranging between £300,000 and £500,000 as well as bespoke technical support from ORE Catapult for 18 months. Chosen companies will engage with the

US partners to develop new and innovative technologies or adapt pre-existing technologies that can be used in testing and demonstration projects.

Dr. Stephen Wyatt, Director of Strategy and Emerging Technologies at ORE Catapult, said: "This is a hugely exciting opportunity for companies in the UK to engage with floating offshore wind platform developers in the US—identifying technical and commercial gaps where they can work together and leverage the UK's early floating supply chain experience."

Roger Townsend, Innovation Lead—Energy at Innovate UK, added: "The US offshore wind market potential is high, with some ambitious targets being set at state and federal level. To achieve these targets, innovation and international collaboration will be key. With their knowledge and experience, UK innovators and supply chain partners are well placed to play a key part in the development of the US offshore wind sector."

ORE Catapult will announce the successful companies chosen in June 2024, and the FLOWB program will run until December 2026.



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CEO



THE ULTIMATE GOAL IS TO MAKE GLOBAL ENERGY SUPPLY MORE RELIABLE WHILST MINIMIZING THE DOWN TIME OF PRODUCTION AT THE SAME TIME BY PROVIDING SUFFICIENT UNINTERRUPTIBLE POWER SUPPLIES AND, THEREFORE, ENABLING THE USE OF ALL-ELECTRIC SYSTEMS FOR BLUE AND BROWN FIELDS.



SubCtech was established in 2010 with a clear mission—to champion an innovative approach to ocean monitoring and subsea power solutions. Based in Kiel, Northern Germany, the company has carved out a significant niche in this highly specialized industry and today boasts a diverse team of highly qualified mechanical and electrical engineers, as well as software specialists, all committed to developing next-gen products, bespoke project consultation, and rigorous testing of prototypes—all in strict accordance with international standards and first-class manufacturing.

The company is divided into two specialized sections: Ocean Power—subsea Li-ion batteries and power equipment—and Ocean Monitoring—vessel underway equipment and ocean climate change analysis.

OCEAN MONITORING

The Ocean Monitoring business unit, which equates to 10% of the company's operations, supplies mainly to scientific institutes, research vessel-based scientists, as well as ocean race sailors. The monitoring equipment covers surface and underwater greenhouse gas monitoring and micro-plastic samplers. The Autonomous Underway Measurement System (AUMS) is designed for pCO₂ monitoring on ships ('FerryBox') and can be further upgraded via various available sensors: e.g., Meteo Top-Box for meteorological and sea-air exchange flux measurements and any third party instrument.

The latest Microplastic Sampler, for example, enables monitoring on any type of sea vessel and can detect even the smallest presence of microplastics in the water, down to particles single parts per m³, without the need of large nets or complex filter systems. The next-level robust and waterproof design provides accurate sampling even on high-speed boats travelling at more than 30 kn or underwater up to 3,000 m water depth.

OCEAN POWER

SubCtech's Ocean Power portfolio, the company's mainstay, services customers within the offshore energy and subsea intervention sector, as well as autonomous underwater vehicle (AUV) and remotely operated vehicle (ROV) manufacturers.

The Li-ion battery systems range from standard common off the shelf (COTS) subsea to customized vehicle batteries with battery-management systems (BMS) and chargers. The advanced-precision titanium housing is fully custom and can be designed for full ocean depth.

Subsea batteries for liquid natural gas (LNG) production, for example, allow high-performance for a service life of 10 to 15 years for the batteries and a design life of 25 years with the electronics and Li-ion cells meeting specific and meticulous safety standards. In these cases, the rechargeable Li-ion batteries provide robust subsea uninterruptible power supplies (UPS). They are perfect for marine and offshore technology applications, offering

next-level safety, reliability and availability.

The PowerPacks™ automatically protect themselves via built in safety features against low voltage whilst discharging as well as the capability to disconnect in the event of overcurrent or external short circuiting thus preventing any resulting damages and giving the operators the assurance of the best possible safety at all times. Some of the advantages of Li-ion batteries are the high current and standby operationality features, the ability to function at low to high temperatures and to cope with high currents/peaks. Furthermore, the corrosion-free titanium housings reduce OPEX costs close to zero and offer designs capable of operations in more than 6,000 m depth. The batteries comply with ISO 13628-6/AP117F for industrial applications and are tested according to: API117F, MIL-STD, DIN-EN/IEC, DNV, and other international standards. Of course, SubCtech is capable of meeting the UN T38.3 test requirements.

SubCtech is able to offer solutions that fit our customers' specific requirements, and our ability to provide offshore operators with truly fit-for-purpose packages has proven key to our growth. Beyond the successful application of advanced subsea technology, trust is key to developing long-term, collaborative relationships in this industry.

SAFETY ABOVE ALL ELSE

Battery cells with SubCtech's Li-ion technology offer enormous advantages in terms

of energy and power density in combination with highest safety, but all at moderate costs. However, all Li-ion or Li-pol cells are sensitive to overcharging, deep discharge and can also be damaged by excessively high currents or temperatures. For safe operations and a long service life they need appropriate protection.

Their special industrial cells already have several built-in internal safety features: an overpressure valve, a short-circuit protection, a steel housing and, in the case of the high-energy cells, a special temperature protection jacket around the electrodes. Even if some of these properties can also be found in "no-name cells," only high-quality industrial cells offer the required failure rates of typically 1 in 10 million during their entire lifetime, i.e., the risk of failure according to FMEAs is extremely low.

SubCtech's many years of experience add further levels of safety. The battery is primarily divided into safe battery modules. These can be scaled up and are monitored and controlled by a high-level controller (BMS).

RECORD-BREAKING ESS

Many years ago, SubCtech recognized the growing demand for increasing subsea power and capacity to support offshore



▲ 2 MWh Energy Storage System (ESS). (Credit: SubCtech)

energy expansion. Our latest response is a new series of Li-ion batteries engineered specifically for large subsea energy storage facilities, vehicle propulsion, and, last but not least, for the electrification of energy production locations—playing a crucial role within the transition from electrohydraulic to "All-Electric" systems.

The ultimate goal is to make global energy supply more reliable whilst minimizing the down time of production at the same time by providing sufficient uninterruptible power supplies and, therefore, enabling the use of all-electric systems for blue and brown fields. This helps facilitate very deep and remote production facilities, making long-distance tiebacks redundant. In short, it's a safe way to cut cost for sustainable industries.

The resulting system is already making

waves across the industry: the Subsea 2 MWh Energy Storage System (ESS), which is fully qualified according to API17F already reaching TRL 5. It has been a labor of love over the past two years and is now being deployed underwater for operational use! The ESS is the first of its kind anywhere in the world and we are delighted by its design functionality and high manufacturing standards.

This is an exciting milestone for the entire SubCtech team. The full system serves as testament to our company's unwavering commitment to bringing true innovation to the global offshore sector. Interested parties should check out our construction log on SubCtech's website, chronicling key milestones from concept through to final testing and deployment.

subctech.com

▲ Offshore deployment use cases. (Credit: SubCtech)



SEATOOLS PRE-PILEING TEMPLATE EQUIPMENT DEPLOYED AT HAI LONG OFFSHORE WIND FARM



Seatoools is pleased to announce the successful delivery and operation of its pre-piling template equipment to CSBC-DEMÉ Wind Engineering (CDWE) for the Hai Long Offshore Wind Farm project. This milestone reinforces Seatoools' standing as the market leader in advanced subsea metrology and control solutions, drawing on its vast experience from over twelve similar pre-piling template projects.

Seatoools, in close collaboration with CDWE, was responsible for the comprehensive design of the pile template's metrology and

control system, encompassing all mechanical, electrical, hydraulic, and software components. This scope also included hydraulic and mechanical systems dedicated to template leveling and precise pile positioning. The advanced metrology system ensures that pile installation is achieved with exceptional accuracy, meeting stringent tolerance requirements.

The commissioning of the equipment supplied by Seatoools was notably smooth, a result largely credited to Seatoools' utilization of advanced simulation capabilities and to the constructive collaboration with CDWE through the different phases of the template design. These sophisticated simulations subjected the equipment to extensive virtual testing under various operational conditions prior to its actual deployment.

This proactive approach significantly reduced the need for on-site modifications and calibration, streamlined the commissioning process, and improved the certainty of adhering to the offshore wind farm's construction schedule. The accuracy and reliability demonstrated through these simulations reflect Seatoools' dedication to employing technology for superior project performance.

The project uses both a vibratory hammer and an impact hammer for pile installation. This mixed-method approach led Seatoools to undertake a detailed evaluation, ensuring the equipment's structural integrity and operational reliability under the varied loads imposed by both the vibratory and impact methods.

SEATRIUM AND SHELL TO COLLABORATE ON FLOATING PRODUCTION SYSTEMS

Seatrium has inked a non-binding Memorandum of Understanding with energy company Shell Global Solutions International B.V. to explore and strengthen collaboration opportunities in Floating Production Systems through leveraging both parties' deep engineering capabilities and technologies.

The agreement, which focuses on driving project standardization and replication, seeks to promote best practices in the design and construction of Floating Production Systems. Both parties intend to leverage their experience and know-how from previous projects to mature and realize further benefits of replication, tapping on each other's competencies and technologies and incorporating lessons learned from past projects.

Seatrium and Shell have worked together on various projects over the years, includ-



▲ Shell Vito RPF, our first of two newbuild FPUs.
(Credit: Seatrium)

ing the recently announced Sparta floating production unit (FPU), which is conceived as a replicable project to leverage the Group's topsides single lift integration methodology, following the fabrication of Vito and Whale FPU newbuilds in 2021 and 2023 respectively.

Mr. William Gu, Executive Vice President of Seatrium Oil & Gas (International), said: "We are pleased to deepen our collaboration with Shell, leveraging both parties' competencies and technologies in past Floating Production Systems projects. We look forward to continuing working with Shell to mutually learn and develop best-in-class project management practices to achieve operational efficiency in future floater projects, benefitting both parties."

CYBER THREAT TO OFFSHORE ENERGY

Robust security measures are key to leveraging digitalization opportunities



Auke Huijstra
Industrial & OT Cyber
Security Director



As the energy industry's digital transformation continues, securing operational technology (OT), the control systems that manage, monitor, and automate industrial operations, from cyber security threats is key. The growing inter-connectivity of offshore assets exposes OT systems to the outside world—unless they're well protected.

In a DNV survey of 601 energy professionals for its latest Cyber Priority report, 89% deemed cyber security essential for digital transformation. Without robust measures, the sector risks missing out on the benefits of digitalization and embracing opportunities in the evolving energy landscape.

VULNERABILITIES AT EACH STEP

With new energy forms largely still in the early stages of maturity, relatively, there has not been a similar exposure to cyber risks, which perhaps the oil and gas industry has experienced. While 63% of oil and gas professionals say their organization has good oversight of the cyber security vulnerabilities in their supply chain, that number drops to 54% for those working in electric power, renewables, and grid infrastructure. However, many of the challenges they face aren't new, and history often repeats itself, especially when companies move quickly in emerging or competitive markets.

According to DNV research, energy professionals consider the supply chain one of the top five challenges for cyber security. In other words, having your own house in order only goes so far, and companies must

AS THREAT ACTORS EVOLVE AND BECOME MORE CREATIVE IN THEIR METHODS OF ATTACK, STAYING AT THE FOREFRONT OF DEFENSIVE PRACTICES IS ESSENTIAL MITIGATION FOR OFFSHORE COMPANIES.

also take steps to ensure that their suppliers adhere to strict protocols.

There is growing awareness around this threat but tackling it is not high on the priority list for many organizations. A further study of OT and IT practitioners across industries by Applied Risk, a DNV company, found that just 27% of companies do due diligence on new suppliers, despite this being a major potential area of vulnerability—possibly providing an easy 'back door' to cyber threats.

Generally, investment is also lagging. Fewer than half (42%) of those surveyed think their organization's current level of investment is sufficient to ensure the resilience of their assets. Just one in three expressed confidence in their company's investment in OT cyber security. Clearly, despite the optimism beginning to be felt across the industry, there is still progress to be made in building robust defenses.

Despite these challenges, there is recognition that cyber security is an ever-growing threat that must be taken seriously. Indeed, 71% of respondents said that their organization takes cyber security as seriously as it takes physical health and safety.

WHAT'S NEXT?

Cyber security breaches are a case of when, not if. As threat actors evolve and become more creative in their methods of attack, staying at the forefront of defensive practices is essential mitigation for offshore companies.

One positive outcome from the research is that 73% of power and renewables professionals say that cyber security is incorporated in the early phases of new energy infrastructure projects. Together with the corresponding result of 55% in the oil and gas industry, it suggests that a new culture is taking shape where resilience is built in from the start.

New regulations, including the imminent EU NIS2 guidelines that require member states and those working within them to adopt a stricter cyber stance, also pose significant challenges for organizations, particularly those in critical-infrastructure sectors such as energy. Similar regulations are also released in other countries. Other cyber security regulations, such as the Cyber Resilience Act and the Machinery Regulation, are anticipated in the EU, and they will have a direct or indirect effect on offshore companies as well as their suppliers.

Offshore operators should consider investing in cyber security now to manage risks, meet compliance standards and expectations from all stakeholders, and potentially even gain a competitive advantage. Given the accelerating energy transition and the growing risks of cyber-attacks in every sector, ever-stronger cyber security resilience is crucial for safety, environmental and financial performance.

SBM OFFSHORE AWARDED CONTRACTS FOR EXXONMOBIL GUYANA'S FPSO JAGUAR

SBM Offshore recently announced that ExxonMobil Guyana Limited (EMGL) has confirmed the award of contracts for the Whiptail development project located in the Stabroek Block in Guyana. Under these contracts, SBM Offshore will construct and install FPSO *Jaguar*.

Ownership will transfer to EMGL prior to the FPSO's installation in Guyana, and SBM Offshore expects to operate the FPSO for 10 years under the Operations and Maintenance Enabling Agreement signed in 2023. The award follows completion of front-end engineering and design studies, receipt of requisite government approvals and the final investment decision on the project by ExxonMobil and block co-venturers.

The Whiptail development is the sixth development within the Stabroek block, circa 200 kilometers offshore Guyana. EMGL is the operator and holds a 45 percent interest in the Stabroek block, Hess Guyana Exploration Ltd. holds a 30 percent interest and CNOOC Petroleum Guyana Limited, holds a 25 percent interest.

The FPSO *Jaguar*'s design is based on SBM Offshore's industry leading Fast4Ward® program that incorporates the Company's 7th new build, multi-purpose floater hull combined with several



standardized topsides modules. The FPSO will be designed to produce 250,000 barrels of oil per day, will have associated gas treatment capacity of 540 million cubic feet per day and water injection capacity of 300,000 barrels per day. The FPSO will be spread moored in water depth of about 1,630 meters and will be able to store around two million barrels of crude oil.

DEME VESSEL COMPLETES INSTALLATION PROJECT FOR OFFSHORE WIND FARM IN SCOTLAND

DEME's flagship *Orion* completed monopile installation works on Ocean Winds' Moray West offshore wind farm project in Scotland. Despite harsh winter conditions, DEME swiftly installed 29 monopiles in approximately two months. Meanwhile, DEME's DP2 jack-up vessel *Apollo* is installing the transition pieces.

The Moray West offshore wind farm, developed by Ocean Winds in Scotland's Moray Firth, will generate 882 MW, powering over 1.3 million homes. A key industry milestone has been delivered by DEME installing the first complete foundations for near 15 MW turbines. Dedicated novel tools were deployed such as a Quad Vibro Hammer and pioneering bolting equipment for M90 bolts.

Orion transported the 29 monopiles, which weigh up to 2,000 tons each, from the port of Invergordon and installed them in full DP mode, without the use of anchors. *Orion*'s specially designed and high-tech motion compensated pile gripper, in combination

with its 5,000-ton crane and vessel ballasting techniques, enabled efficient operations despite the notorious Scottish winter weather conditions.

The Vibro Hammer was used to overcome the risks of pile-runs, due to the combination of soft and hard soil layers. Afterwards the

piles were hammered to the target depth with a hydraulic Impact Hammer. DEME's jack-up vessel *Apollo* is performing the transition piece installation which is expected to be finalized in the coming months. This efficient way of working accelerated and de-risked the schedule of the project which has a very limited installation period.



SECOND LNG BUNKERING VESSEL LAUNCHED BY SEASPACE ENERGY

Seaspan Energy launched the second of its three 7,600 cubic meters LNG bunkering vessels, the *Seaspan Lions*, named after the twin peaks of the North Shore, or known as *Ch'ich'iyú Elxwíkn* (Twin Sisters or Two Sisters) to the Squamish Nation.

This series of vessels is named after iconic West Coast mountains and the first two vessels, the *Seaspan Garibaldi* and the *Seaspan Lions*, will be delivered in 2024 with the third vessel arriving in 2025.

The *Seaspan Lions* will provide liquified natural gas (LNG) fueling services for vessels on the West Coast of North America, becoming the first company to provide LNG bunkering in the Pacific Northwest. The *Seaspan Garibaldi* is set to deliver low-carbon solutions to the global market and will be based in the Panama region.

"Solving the LNG infrastructure gap on the West Coast will play a vital role in creating new markets for lower-emission fuels and a more sustainable maritime industry," said Ian McIver, President of Seaspan Energy. "We understand the importance of providing low-carbon bunkering solutions for ship owners who want to decarbonize their operations and we are committed to supporting the transition to cleaner, lower-emission marine fuels in British Columbia, Canada and the world."

This series of vessels are each 112.8 meters in length, 18.6 meters in width, five meters in draft, with a design speed of 13 knots. The LNG bunkering vessels are being built by CIMC Sinopacific Offshore & Engineering (CIMC SOE), one of the most experienced small-scale gas carrier shipyards in the world, having delivered more than 30 LNG gas carriers.

For the design of the LNG Bunker Vessels, Seaspan worked closely with the Canadian-based team at VARD Marine Inc. to incorporate emerging technologies resulting in a decrease in emissions and underwater noise. The design is focused on safe, efficient, and economical refueling of multiple ship types with an ability to transfer to and from a wide range of terminals. The design will allow the vessel to engage in ship-to-ship LNG transfer and coastal and short-sea shipping operations.



A large industrial camera system with the 'bp blueprint subsea' logo. The camera is mounted on a metal frame and is positioned in front of a dark, textured background. The text 'TRANSFORM YOUR CAPABILITY' is overlaid on the left side of the image, and 'REAL-TIME IMAGING IN ALL CONDITIONS' is overlaid at the bottom left.

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CRUDE OIL

When violence erupts in the Middle East, commodity traders begin loading up on oil futures in anticipation of a global supply disruption. Therefore, prices move higher. It is a Pavlovian response. Traders are so conditioned that they seldom assess whether the outbreak is similar to past events and whether outcomes will be the same. Additionally, they seldom consider oil market conditions. Instead, they buy first and assess the situation later.

When Iran sent 200 drones and 100 missiles against Israel, it and its allies were prepared and successfully destroyed almost every weapon sent. Yes, the Iranians had told Türkiye about its plans to attack and its hopes for a de-escalated response from Israel. Israel's response proved tactical, targeted, and tempered.

The record of oil prices from late March to mid-April showed just how much prices were influenced by geopolitical developments. WTI futures were trading in the mid-\$81 a barrel range until the end of March when Israel launched an attack on the Iranian consulate in Damascus, Syria. Seven people died, including a top Iranian commander and his deputy. Oil prices jumped and climbed to \$87 as traders awaited Iran's response. Following Iran's attack, oil prices fell as it became apparent World War III was not starting.

Are oil prices poised to collapse? If the Middle East powder keg is not about to blow up, the geopolitical risk factor in oil prices dis-

appears. We are back to focusing on economic activity and trends in oil consumption and global oil supply. Downward price pressure could come at the end of May when we start the US driving season—a seasonal peak in consumption.

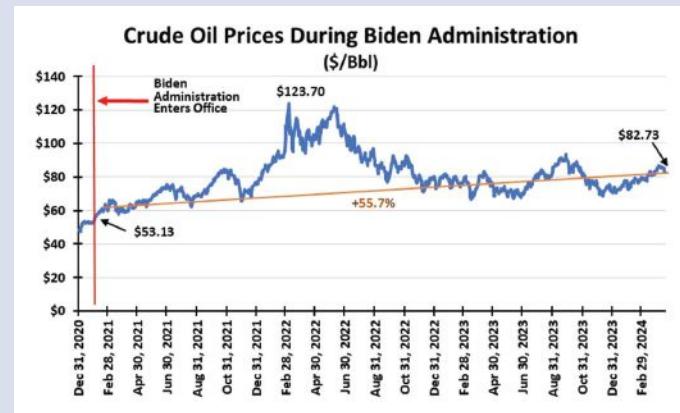
Globally, China's latest economic data came in stronger than projected, but investors are unconvinced it will continue and lead to higher energy use. Recently, the International Monetary Fund revised its global economic growth projection higher, which should be positive for oil demand.

The OPEC+ oil output capacity held off the market is an overhang traders see as a cushion against any consumption increase. Without it, higher consumption would push up oil prices in lockstep. The weight of current sentiment is for oil prices to work lower. Or at least until it becomes evident that OPEC+ must reverse its withheld capacity to keep prices from soaring, i.e., consumption rising.

The long-term case for oil remains in place. Oil prices are in backwardation because near-term prices are higher than long-term ones. The May 2024 oil futures contract traded slightly over \$83 a barrel. For a year later, the price is about \$75, and two years out it is \$70. Such price levels ensure healthy profits for oil producers.

If oil prices rise higher, expect the Biden administration to release oil from the Strategic Petroleum Reserve to dampen gasoline prices like it did in 2021. Both oil prices and regular gasoline pump

GEOPOLITICAL RISK PREMIUM DISAPPEARS BUT LONG-TERM ECONOMIC CASE STRENGTHENS





▲ West Texas oil fields in the Permian Basin: The US gas market remains swamped due to last year's record production.

prices are 55 percent higher than when President Joe Biden was inaugurated. He needs those prices lower to improve his re-election chances.

NATURAL GAS

Although winter weather returned, the duration was brief. Gas for home heating barely benefited. Before and after the cold spell, temperatures were not high enough to necessitate increased air conditioning forcing utilities to fire up natural gas generators. The combined weather trends contributed to natural gas storage levels soaring to record levels.

As the accompanying chart shows, gas volumes in storage are well above the 5-year highs. Unsurprisingly, natural gas prices languish at low levels—about the low of the past decade.

The Energy Information Administration (EIA) forecast that continued mild weather conditions will lead to high natural gas storage volumes through 2025, meaning little hope for a recovery of gas prices. Producers need no encouragement to store gas in anticipation of substantially higher prices next winter. The US is swimming in natural gas supply.

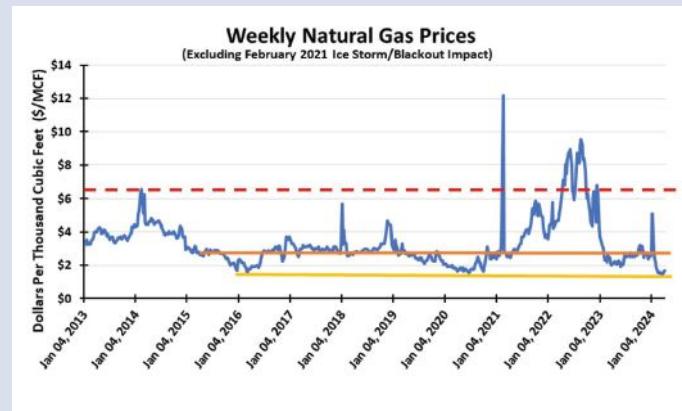
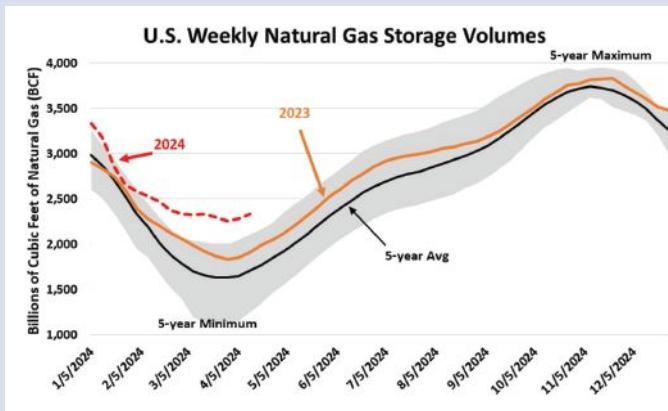
What will change the gas price outlook? Only a reduction in gas production. A consumption surge can be handled by current out-

put and gas volumes already in storage. The most recent estimate of daily US dry gas production is 99.4 billion cubic feet (bcf), down from 101.4 bcf a year ago. The EIA estimates production to average 103 bcf/d in its 2024 Short-Term Energy Outlook. Any estimate reduction could spark a rise in gas prices, but we doubt a revision will happen before mid-year.

In the meantime, the most telling information about how swamped the nation is with natural gas comes from the Permian basin in West Texas. The nation's three largest sources of natural gas are the Marcellus (WV, OH, PA, NY), the Permian (TX, NM), and the Eagle Ford (TX) in that order. Last year, the Permian experienced the largest production increase of 2.6 bcf/d, over twice the output growth of the Marcellus and three times that of the Eagle Ford.

The major problem gas-producing regions are experiencing is adequate pipeline capacity to take away the output that constrained Marcellus' growth last year to only three percent. The Permian basin faces a similar problem compounded by it being the nation's largest oil-producing region. Significant associated gas flows accompany the growing oil output. In recent weeks, producers paid pipelines \$3/mcf to take the gas output. Thus, oil producers lost over \$1/mcf on the sale of the gas that would limit their oil output. Thankfully, oil prices are high, offsetting the gas losses. A petroleum industry irony.

RECORD GAS STORAGE VOLUMES HAVE SENT PRICES TO DECADE LOWS



BP ANNOUNCES START-UP OF OIL PRODUCTION FROM NEW PLATFORM IN THE CASPIAN SEA



▲ ACE platform. (Credit: bp)

bp, as operator of the Azeri-Chirag-Gunashli (ACG) project, has announced the start-up of oil production from the new Azeri Central East (ACE) platform as part of the ACG field development in the Azerbaijan sector of the Caspian Sea.

The ACE platform is the seventh oil producing platform installed on the giant ACG field in the Caspian Sea. ACG first began production in 1997 and has since produced over 4.3 billion barrels of oil. The bp-operated Shah Deniz gas field has two further platforms in the Caspian.

The ACE platform and related facilities are designed to process up to 100,000 barrels of oil per day (bpd) and the project is expected to produce up to 300 million barrels over its lifetime. Oil will pass through the processing facilities on the platform and then be exported around 130 kilometers to the onshore Sangachal terminal via a new in-field pipeline linked to an existing 30-inch subsea export line.

Initial production from ACE comes from the first well that was initiated from the platform at the end of last year. ACE production is expected to increase through 2024 to around 24,000 bpd as two more planned wells are drilled, completed and brought online.

The ACE platform is technologically and digitally the most advanced bp-operated platform in the world. Its innovative engineering allows automation of labor-intensive processes, enabling safer and more efficient operations. The platform has a state-of-the-art fully automated drilling rig. The use of modern technology and new processes also helps lower operational emissions.

The safe start-up of ACE delivers on the first major investment decision made by the ACG partnership since the signing of the extended ACG production sharing agreement in 2017.

CONSULMAR ACHIEVES WORLD'S FIRST ZERO-EMISSIONS MOORING SERVICE OF A TANKER

Consulmar has achieved a significant milestone by successfully executing the world's first zero-emissions mooring service for a tanker. The operation took place at an offshore multiple-buoy mooring site near the

BP refinery, situated two miles from the Port of Castellón in Spain. Utilizing its electric line handling tug, CASTALIA, Consulmar towed the steel mooring lines from the vessel to each of the five mooring buoys,

marking a significant advancement in the maritime industry towards more sustainable practices.

The tanker vessel ARCHANGEL, with 274 meters in length and 85,474 gross tonnage, was moored using the three-ton pulling capacity of the mooring boat CASTALIA, which operates on full electric propulsion. Equipped with two 150 kW engines and a lithium battery capacity of 485 kWh, CASTALIA ensures operational autonomy of up to eight hours, providing an efficient and non-polluting solution for mooring operations.

This achievement marks a significant step in Consulmar's commitment to the decarbonization of its activities. As part of this comprehensive project in the Port of Castellón, the company is also using electricity generated from its photovoltaic installation to power both its boats and electric vehicles in its fleet, contributing to a sustainable transition towards cleaner energy sources and reducing its carbon footprint.



Consulmar

VENTERRA COMPANY WINS CONTRACT FOR BALTICA 1 OFFSHORE WIND FARM

Venterra Group company Gavin & Doherty Geosolutions (GDG), a leading global offshore wind services provider have been awarded a contract to provide early supervisory and investigatory geophysical and geotechnical services including the development of a ground model and the conceptual design of foundations for subsequent design stages for the Baltica 1 offshore wind farm. This decision by PGE Baltica, from Poland's PGE Group, underscores the confidence in the Venterra company's capabilities to undertake and deliver critical aspects of this nationally important project.

Having worked in Poland for more than a decade and establishing a local presence in 2022, Venterra has been at the forefront of delivering specialist technical services for several Polish offshore wind farm projects, including Baltica 2 and Baltica 3. The insights and in-depth technical understanding gained from these projects have provided the Venterra Geoscience and Venterra Design teams with invaluable knowledge of the ground conditions in the Baltic Sea. This experience is anticipated to be a significant advantage for the Baltica 1 project.

The award of the Baltica 1 project contract marks a continuation of a highly successful period for the Venterra Group, which has recently secured substantial contracts across the Asia-Pacific region, North America, and various European countries. A signifi-

cant part of Venterra's recent market traction can be attributed to its unique single-point-of-contact service offering across the entire offshore wind farm lifecycle.

Baltica 1, set to be a 900 MW wind farm located approximately 80 km off the Polish coast, is one of several projects currently being developed by PGE in the Baltic Sea. Situated in the Central Shoal area, north of the Baltica 2 and Baltica 3 projects, Baltica 1 has already secured a location permit and a connection agreement, positioning it as a crucial project in Poland's offshore wind sector.



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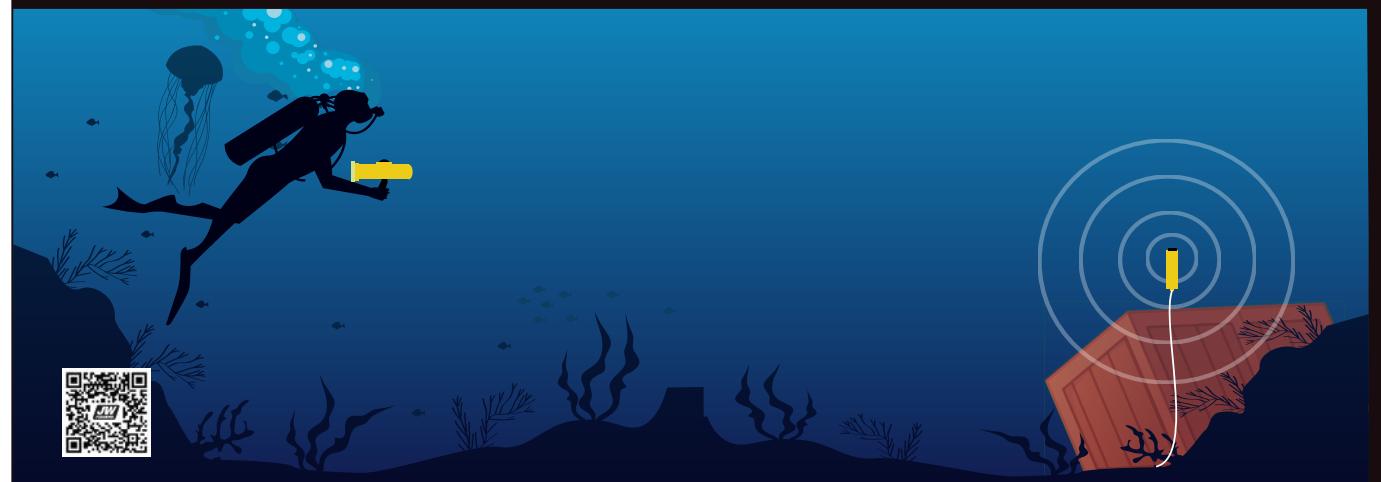
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THE WORLD'S FIRST LONG-RANGE AUTONOMOUS RESEARCH VESSEL

In mid-April, Plymouth Marine Laboratory (PML) released a new video featuring a computer-generated imagery (CGI) impression of *Oceanus*, a cutting-edge 24-m monohull uncrewed surface vessel (USV) designed to run remote, autonomous ocean survey campaigns. *Oceanus* represents the combined expertise and partnership of PML, MSubs, and Promare, three organizations all with extensive experience in working with maritime autonomy.

"The concept of a long-range USV is something Plymouth Marine Laboratory (PML) has been working on for several years now," said PML Chief Executive Professor Icarus Allen, talking exclusively to ON&T.

"PML has extensive experience of working with autonomous data collection platforms, such as our moored data buoys and smaller devices like our Autonaut USV and fleet of EcoSub autonomous underwater vehicles (AUVs), and this collective insight has built a strong foundation and vision for what the team are aiming to achieve next: a rugged USV capable of performing long-endurance oceanographic survey missions in remote environments."

The growing acceptance of USVs for marine survey—as well as other at-sea operations—is well documented. Traditional research vessels are expensive to build and operate. Research trips need to be crewed and can often be logistically challenging.

And, of course, they leave an environmental footprint. USVs present a viable solution, and in recent years, there has been a clear step forward in the development and application of autonomy and artificial intelligence (AI) systems capable of allowing a vessel to operate and navigate independently in open waters. However, many of the commercially available USVs are restricted in their range.

"Balancing the payload capacity with required endurance, both in terms of power consumption and survivability, was the key to ensuring that *Oceanus* would be capable of supporting the types of research that PML and our partners are targeting with long-range USVs," added Professor Allen.

ADVANCING OCEAN RESEARCH

As a fully uncrewed asset, the USV must be resilient enough to survive the often harsh and unpredictable conditions found in the Atlantic, and so the engineering team felt that a self-righting monohull design was the best form. *Oceanus* will be outfitted with a comprehensive range of advanced sensors and marine instrumentation to enable the USV to gather and process unprecedented levels of data and information needed to meaningfully advance studies into critical marine scientific areas.

Oceanus collaborators see the role of USVs as instrumental to the future scaling of

such research. In short, the more data we can harvest and process, the more we can further our understanding of marine environments. Ultimately, *Oceanus*—and future long-endurance USVs of this category—will rapidly accelerate our working knowledge of ocean stressors, climate change impacts, biodiversity, gasses, biogeochemical cycles, and a range of other key marine research areas.

"For the breadth and scope of the work we need to undertake to sustainably and cost-effectively better understand the evolving role of the planet's ocean, we need USVs capable of carrying out transatlantic research expeditions," Brett Phaneuf, President of MSubs, told ON&T.

TRIED & TESTED BLUEPRINT

Some of the *Oceanus'* design considerations were informed by the Mayflower Autonomous Ship, or MAS400, which was also built by MSubs and supported by IBM and Promare, and in 2022, completed an uncrewed crossing of the Atlantic Ocean from Plymouth, England, to Plymouth Massachusetts. Many of the learnings of this landmark project—which was seven years in the making—provided invaluable insights into the right approach to *Oceanus*.

"We garnered so much from MAS400, with some hard, unexpected lessons learned along the way about what was going to break and what was robust beyond

expectation," Brett Phaneuf recalled. "Also, MAS400 represented years of dedication to designing autonomy software—it was a grueling test about safety, resilience, and performance of the code, as well as its integration with sophisticated robotic systems working in the most hostile environment imaginable."

The legacy of the *Mayflower* lives on in this latest USV, the name inspired by the only child born on the ship during its grueling 10-week transatlantic journey to the New World back in 1620.

REMOTE OPERATIONS

The Command Center for *Oceanus* will be hosted at PML and will display oceanographic conditions in near-real time across the ship's transect, providing scientists and other users with open access to the latest and most robust oceanographic data.

How is the USV able to effectively navigate itself? After embarking on a journey, the ship's onboard computer system takes over as an "AI" captain. Fully equipped with sensors, radars, and cameras, AI is used to independently monitor and navigate the USV's immediate environment. That data, combined with

additional inputs such as weather forecasting, nautical charts, and GPS will allow the USV to make smart decisions, such as bypassing other vessels and hazards and rerouting to avoid dangerous weather.

In-situ sampling will still be needed at times to validate the collected data and to perform more complex experiments that require proximity to the sample sources. However, autonomy on this scale will allow for radically more responsive and more frequent data collections at a wider range than is currently possible, helping to plug any gaps in datasets and greatly improve marine modeling. The ambition is not to replace the role of the scientist on a research mission but to greatly increase the data they have access to and the work they can carry out.

LOOKING FORWARD

Oceanus should enter the build phase later in 2024. PML and partners are hoping to have the USV ready for deployment in 2025, and, in the meantime, the consortium is seeking additional partners for collaboration and funding support.

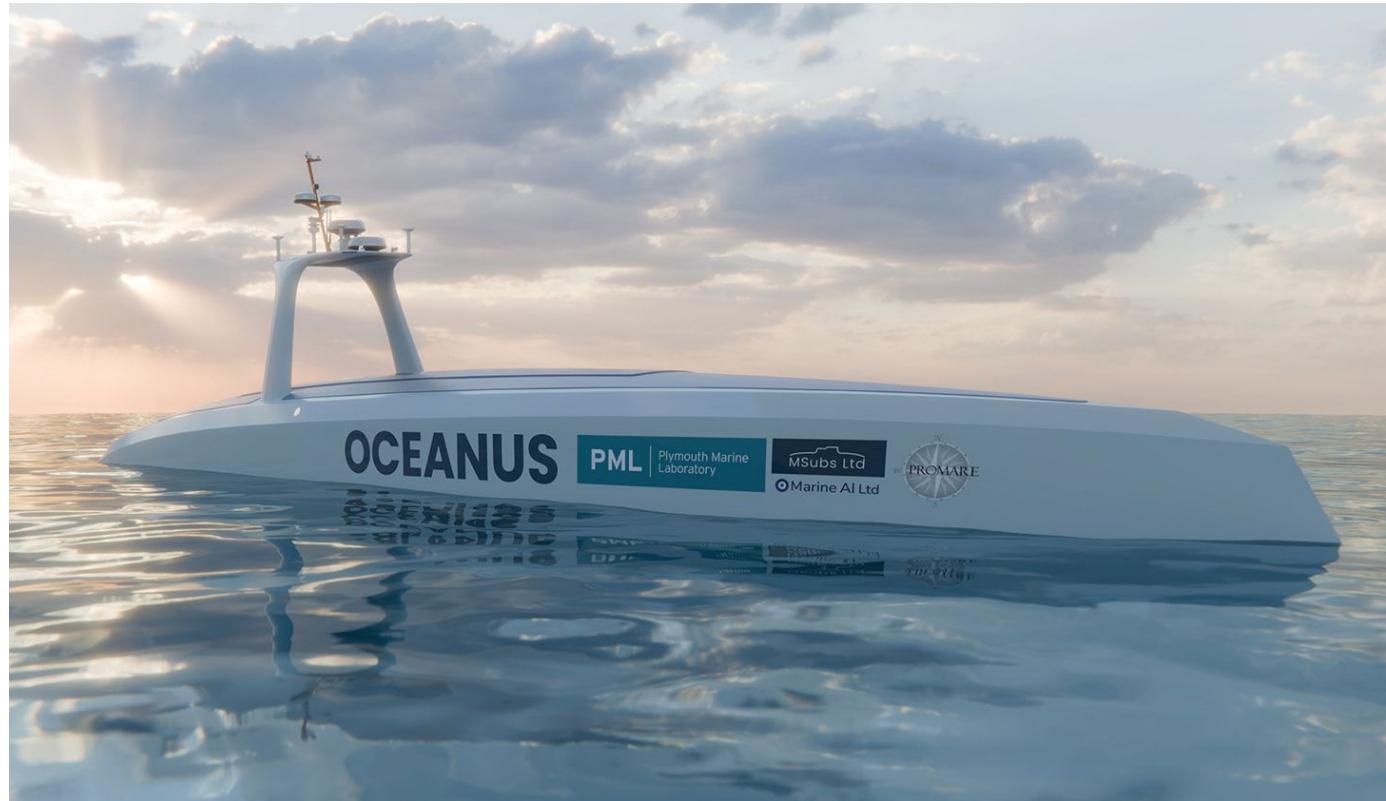
As USV technology continues to advance, so do our expectations for uncrewed mis-

FOR THE BREADTH AND SCOPE
OF THE WORK WE NEED TO
UNDERTAKE TO SUSTAINABLY
AND COST-EFFECTIVELY BETTER
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OF THE PLANET'S OCEAN, WE
NEED USVS CAPABLE OF CARRYING
OUT TRANSATLANTIC RESEARCH
EXPEDITIONS.

-Brett Phaneuf, President of MSubs

sions. The last word goes to PML Chief Executive Professor Icarus Allen:

"*Oceanus* is really science fiction becoming science fact. For over two decades we have operated the Atlantic Meridional Transect (AMT) on which scientists undertake biological, chemical, and physical oceanographic research during an annual voyage between the UK and destinations in the South Atlantic. The exam question we set ourselves was whether we could replicate that mission using autonomous technologies. *Oceanus* will make that a reality."



CHARTWELL MARINE EXPANDS CTV BUILD PIPELINE TO SUPPORT GLOBAL OFFSHORE WIND GROWTH

Chartwell Marine, a trusted pioneer of next-generation vessel design, has announced that a new Chartwell Brevity Class Crew Transfer Vessel (CTV) entered build in March at the Diverse Marine shipyard in Cowes, UK—becoming the latest in Chartwell's growing pipeline of new vessel builds to supply the global offshore wind market.

This latest Brevity Class CTV is one of three Chartwell-designed 'stock' boats to be constructed by Diverse Marine as part of a unique finance and lease program, which aims to give vessel operators the certainty to invest in their fleets ahead of the next phase of European offshore wind expansion. It is scheduled for completion in Q4 2024, to be joined by its sister vessels in Q2 2025 and Q3 2025, respectively.

The Brevity Class is designed to be a versatile 'vessel of choice' for the global market, capitalizing on lessons learnt supporting

offshore wind projects throughout construction and operation in Europe, while also responding to the specific operational requirements of projects in the US and Asian markets. It is a high-powered CTV, capable of cost-effective, low-emissions operation—with a signature hull form that enables enhanced maneuverability and stability.

To meet a wide range of operational demands across these markets, the Brevity Class can accommodate up to 32 personnel, with a range of crew configurations to allow for flexible space planning, and enhanced comfort for longer periods spent offshore.

A further Brevity Class vessel is currently in build at the Manor Marine shipyard in Portland, Dorset and is due to enter operations as part of Manor Renewable Energy's OPUS offshore wind fleet this Summer.



Chartwell Marine

ASSO.SUBSEA COMPLETES CABLE INSTALLATION FOR FLOATING OFFSHORE WIND PILOT



1 Cable Laying installation Provence Grand Large offshore wind pilot project. (Credit: Asso.subsea)

Asso.subsea, a leading force in submarine cable installation, has partnered again with Prysmian Powerlink and successfully completed the cable installation, burial, and protection operations for the Provence Grand Large Floating Offshore Wind Project.

This innovative project, situated in the Mediterranean Sea and developed by EDF Renewables and its partners, 17 km off the coast,

on a 100 m deep site, is a floating wind pilot project, designed to showcase the economic viability of offshore floating wind farms. Asso.subsea was entrusted with all marine works, including engineering, cable loading of export and inter-array dynamic cables, route preparation, cable installation and configuration of lazy wave, burial, and protection, along with Horizontal Directional Drilling (HDD) operations for the landing point.

The Provence Grand Large Offshore Wind Project served as a showcase for Asso.subsea's cutting-edge assets, featuring CLV Atalanti, TSV Argo and the AssoJet III Mk2 underscoring the company's unwavering commitment to innovation in the offshore wind sector. By covering a cable distance of approximately 21,000 m, Asso.subsea successfully connected France's inaugural floating offshore turbines to the Port-Saint-Louis-du-Rhône station, generating electricity equivalent to the consumption of 45,000 people.

Asso.subsea's deployment of the CLV Atalanti, a specially designed vessel for shallow waters was pivotal to tackle the challenges of the 780 m landing point at the shallow waters of Port-Saint-Louis-du-Rhône. The vessel was specially converted in 2023 for this project to create the required cableway for the dynamic cable installation.

VIKING AND HELISERVICE USA SIGN PPE AGREEMENT TO SERVE US OFFSHORE WIND SAFETY NEEDS



VIKING Life-Saving Equipment has signed a strategic agreement with HeliService USA, ensuring that the helicopter service provider has a single and continuous source of fully certified personal protective equipment (PPE) to uphold offshore wind industry safety standards along the US East Coast.

Building on enduring relations between the companies, the agreement includes personal protective equipment for the aircrews and service technicians who support turbine installation and maintenance.

Rhode Island-based HeliService USA will hold a complete inventory of ETSO-approved VIKING PPE at Quonset Point, where it has invested in additional facilities to service regional offshore wind needs. Including everything from pilot and crew immersion suits and aviation lifejackets, to hoisting gear, the agreement also authorizes HeliService USA to take care of VIKING PPE service and maintenance, as certified under ETSO Part 145.

First evidence of the new agreement in action sees VIKING PPE being deployed to serve the needs of Vestas Wind Systems in

the region. VIKING has a frame agreement to support air-borne personnel safety covering Vestas installations worldwide, with arrangements varying in different territories. HeliService USA will be the preferred supplier for Vestas in the US with VIKING and Vestas taking full responsibility for fulfilling the PPE needs of those on board.

"This is a key strategic partnership for VIKING, a significant win in a growing market, and a strong validation of the leading position our aviation and service technician PPE has established in the offshore wind industry worldwide," said Bettina Kjærgaard, Global Sales Manager Offshore Wind, VIKING Life-Saving Equipment. "It provides a highly efficient and practical solution for Vestas as the end-client by ensuring best quality PPE is always available, while partnership with HeliService USA also provides a platform for growth with other clients and in other markets."

PETROFAC AND BP EXTEND CONTRACT IN NORTH SEA

Petrofac, a leading provider of services to the global energy industry, has been awarded a contract extension by bp, continuing support across its North Sea portfolio.

Maintenance and engineering services will be provided under the terms of the three-year, multi-million-dollar contract.

Chief Operating Officer of Petrofac's Asset Solutions business, Nick Shorten, said: "Petrofac has supported bp in the North Sea for 15 years. This award is testament to delivering shared goals of increased efficiency and asset life extension. We look forward to continuing this relationship, delivering safe and reliable operations."



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ARCTIA MERITAITO TO PERFORM SEABED SURVEY IN NORWAY FOR NORWEGIAN MAPPING AUTHORITY

Arctia Meritaito, a subsidiary of Arctia, has been awarded by the Norwegian Mapping Authority a contract in the Mareano program of 2024 for hydrographic seabed surveying of ca. 1,900 km².

"The Norwegian Mapping Authority, Hydrographic Service (NHS) is pleased to award one of this year's contracts to Arctia Meritaito. The MAREANO program maps depth and topography, sediment composition, biotopes and habitats in Norwegian Waters. Arctia Meritaito is going to survey with [a] multibeam echosounder and sub bottom profiler in potential offshore wind area Sørvest F in the North Sea. The Norwegian Government has an ambition to develop Offshore Wind to increase access to renewable energy. NHS are looking forward to work together again after good collaboration in earlier years," stated the NHS.



Arctia

Arctia is participating in the Mareano program for the third time. "The Norwegian Mapping Authority quality requirements are one the highest in the world and being awarded another contract is a demonstration of trust in Finnish expertise in this field. Each year of collaboration also presents a great opportunity to develop this expertise in an international environment,"

said Lauri Pöyhönen, SVP of Arctia's Marine Survey Services.

The surveys will be conducted by the multi-purpose research vessel *Pohjanmeri*. Departure to the Norwegian waters is expected as soon as ice has cleared, and the ship will return to Finland near the end of the summer.

STROHM TO DELIVER MORE TCP FOR EXXONMOBIL'S WHIPTAIL PROJECT IN GUYANA

ExxonMobil Guyana has awarded Strohm a TCP (thermoplastic composite pipe) "Jumper On Demand" contract for the supply of TCP for the Whiptail project. This brings the project count for the Netherlands-based manufacturer to three for ExxonMobil Guyana, following previous awards

for the Yellowtail and Uaru projects. This latest award marks the largest commercial award for pipe supply in the company's 16-year history.

The TCP for Whiptail will be produced at Strohm's manufacturing facility at its head-

quarters in the Netherlands and used for water and gas (WAG) injection. The technology will be supplied to ExxonMobil Guyana in a single, continuous length along with associated pipe handling equipment. This concept and delivery method allows the individual 24 jumpers to be cut to the desired length, terminated, and tested onsite in Guyana, providing flexibility to the end-user. The jumpers, made of carbon fiber and PA12 polymer, will be installed at water depths over 1,600 m and will operate in the region of 10,000 psi.

Gavin Leiper, Strohm's vice president Americas & Global Field Services Group, said: "This latest award brings us to a total of over 70 jumpers across three developments in Guyana's Stabroek block. Not only is this our largest award to date, but it also means we will be terminating TCP and supporting ExxonMobil Guyana and its co-venturers for at least the next 5 years under our field service group contract. We look forward to deepening our relationship with ExxonMobil Guyana and our Guyanese partners through the delivery and execution of the scope for Whiptail."



Strohm's third ExxonMobil Guyana contract deploying its TCP Jumper on Demand service will see the pipes terminated and mated to the subsea connectors in-country. (Credit: Strohm)

ABL TO PROVIDE MWS SERVICES FOR NEPTUN DEEP PROJECT

OMV Petrom has appointed global energy and marine consultancy ABL to provide Marine Warranty Survey (MWS) services for the construction of Romania's Neptun Deep Gas Field Project in the Black Sea.

Shai Tzucker, ABL's Managing Director of Energy Services in Europe and West Africa, said: "We are delighted to be awarded by OMV Petrom the opportunity to support this important energy development for Romania and the wider Black Sea. ABL brings significant experience in marine warranty, engineering, consulting and surveying across the Black Sea region. We are also continuously cementing our commitment to the region with the development of our offices in Bulgaria, Turkey and our more recent office opening in Romania."

The Neptun Deep project is the largest natural gas project in the Romanian Black Sea. Production is expected to start in 2027 contributing to the region's energy security.

ABL's London operation has won the contract to provide MWS services to review, survey and approve all operations relating to the Transportation & Installation (T&I) of critical project assets for development of both Domino and Pelican South fields. ABL's scope of work includes the T&I of the shal-



▲ Shai Tzucker, ABL's Managing Director of Energy Services in Europe and West Africa (Credit: ABL)

low water platform, subsea installation at both fields including a 160 km subsea pipeline from the said platform to the shore.

The shallow water platform will be fabricated at yards in Italy and Indonesia. ABL's project management will be centralized in London, while much of the operational and on-site attendances will be delivered by ABL's local Black Sea operations. ABL's wider global team will also support the project's global supply chain, including its Indonesian operations based in Jakarta and Batam.

PXGEO AQUIRES MODUS SUBSEA SERVICES

PXGEO has expanded its subsea offering through the acquisition of Modus Subsea Services.

Modus Subsea Services is a leading provider of offshore life-of-field support services specializing in autonomous subsea operations using Underwater Intervention Drones (UID) based on the Saab Sabertooth platform.

The company has also developed and

commercialized the industry's first-ever UID subsea residency solution.

Through this strategic acquisition, PXGEO and Modus Subsea Services will leverage their respective technological expertise and enhance their subsea autonomous offerings to provide their customers with a range of benefits, including increased efficiency, reduced exposure, and a lower environmental footprint.

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Ocean information and communication technology (ICT) innovations are progressing ocean-based vessel automation and advancement with precision and efficiency. Autonomous Crafts, an emerged spin-off from a rich heritage of Croatian shipbuilding and automotive expertise, is spotlighted in partnership with Oceanology International's OceanICT.

Autonomous Crafts bases its solutions on a completely tailored, modular design approach. The four main building blocks include: the uncrewed surface vehicle (USV) as a carrier vessel for mission instrumentation; data acquisition, edge computing, and data transmission; data-driven operational awareness and analytics; and connected remote operations.

With the belief that ICT advancements are pivotal in transforming the ocean industry and that integration of cutting-edge remote operations, uncrewed systems, and networked assets unlock unprecedented levels of autonomy and precision in maritime operations, Autonomous Crafts developed ADAAMS (Active Data Analytics and Monitoring System), which provides deep insights on the fleet, vessel performance, and mission data; consequently, ensuring real-time operational intelligence, long-term data insights, and empowering data-driven decision-making.

"The future of ocean-based ICT hinges on transforming data collection, analytics, vessel, and mission management into seamless, integrated, connected operations," said Nikola Matulic, System Architecture, Autonomous Crafts.

Read ON&T's exclusive interview with **Autonomous Crafts** at oceannews.com/take5



SHEARWATER AND MONDAIC PARTNER ON FULL WAVEFORM INVERSION SOLUTIONS

Shearwater Geoservices Holding, the world's leading marine seismic acquisition company, and Mondaic AG, a provider of proprietary software and services for high-resolution 3D imaging, have entered a strategic collaboration for development and use of full waveform inversion solutions to enhance high-resolution subsurface imaging and optimize seismic acquisition surveys.

As part of the agreement, Shearwater has acquired exclusive and perpetual rights for the use and further development for subsurface applications of Mondaic's wavefield simulation and inversion codes. Furthermore, Shearwater has acquired an equity stake in Mondaic. Full waveform inversion is a key seismic data processing technology that improves visualization of subsurface structures, enhances reservoir understanding and helps planning and execution of more efficient surveys.

Simon Telfer, SVP Software, Processing and Imaging of Shearwater, said: "This is an important partnership, embodying Shearwater's dedication to creating and implementing cutting-edge technology and software to the benefit of our clients. Holding a leading position as a processing and imag-

ing service provider and further expand the capabilities of our proprietary processing and imaging software Reveal are central components of Shearwater's strategy."

Michael Afanasiev, Christian Boehm and Lion Krischer—Co-Founders and Directors of Mondaic, added: "We are thrilled to welcome Shearwater as a strategic investor. This partnership will advance Mondaic's technology across all scales and industries, and it is a significant driver to accelerate our growth."

"Shearwater is unique in its vision and application of emerging technologies to the energy transition, and we are extremely excited to work with them and our other partners in this regard."

Full waveform inversion is an integral part of the seismic processing value chain for subsurface exploration, characterization and monitoring due to its ability to estimate high-resolution subsurface property models in areas of complex geology with limited human user intervention. The technology is also expected to play a strategic role for characterization and monitoring of subsurface carbon storage sites and in site surveys for wind farms.

SUBSEA7 AWARDED CONTRACT BY TALOS ENERGY

Subsea7 announced the award of a sizable contract by Talos Energy for the Sunspur development in Green Canyon Block 78, in the Gulf of Mexico.

The project involves the subsea tie back of one production well at Sunspur to the Prince platform, 12 kilometers to the north. Subsea7 will install the flowline and related subsea equipment at 500-meter water depths.

Subsea7's Houston office will oversee project management and installation engineering, with offshore work scheduled to begin later this year.

Craig Broussard, Vice President for Subsea7 Gulf of Mexico, said: "This award further strengthens our strategic partnership with Talos Energy, enabling early-stage collaboration for faster, more predictable project delivery."

C-KORE CELEBRATES SIGNIFICANT MILESTONE WITH MOBILIZATION OF SUBSEA TESTING TOOL #800

C-Kore Systems, a UK company specializing in automated subsea testing tools is celebrating the mobilization of their 800th unit. The job is with a major operator off the coast of West Africa for a fault-finding operation on a complex subsea electrical network.

C-Kore's subsea testing units have gained worldwide acceptance with both operators and contractors for the cost-savings the tools provide, the reduction in offshore personnel required for testing, and the simplification they bring to subsea operations.

To date, C-Kore's testing tools have been used on over 100 different fields by more than 80 different customers around the world in 23 different countries. With over 35,000 tests being run, it can safely be said that C-Kore Systems has a good understanding of subsea fault-finding.

Cynthia Pikaar, Sales & Marketing Director



C-Kore

of C-Kore, said: "Our success is in part the simplicity our tools bring to once complex offshore operations along with the great service we provide. Once our customers experience the time savings and simplicity

our tools bring, they continue to come back to us for all sorts of offshore campaigns including commissioning of new installations and even decommissioning at the end of the lifecycle."

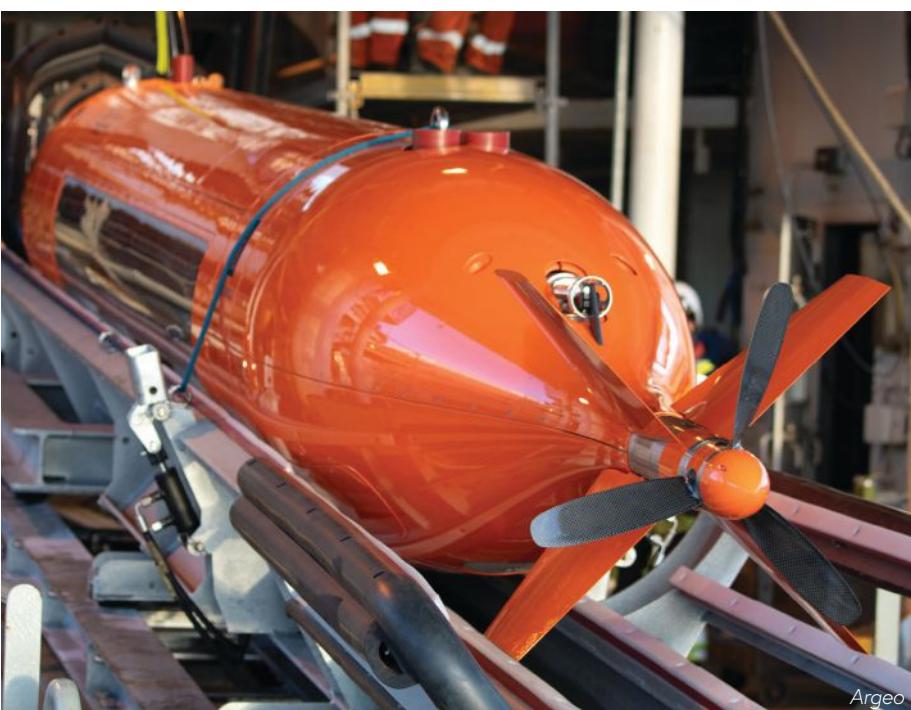
AR GEO SIGNS CONTRACT WITH WOODSIDE ENERGY FOR CALYPSO AUV SURVEY

Argeo has signed a contract with Woodside Energy to execute the 2024 AUV geo-physical survey for the deepwater Calypso field in Trinidad and Tobago.

The work will be carried out by the Argeo Searcher with commencement in Q3 2024. The project will occupy the vessel for approximately 60 days, not including any additional work. The Calypso field is located approximately 225 km off the East coast of Trinidad in -2,100 m water depth.

"This contract ignites our Caribbean and South American campaign to provide top-tier deep-water services within the North and South Americas (NSA) geomarket," stated Argeo CEO, Trond Figenschou Crantz.

"This is an important and significant award for Argeo, and we very much look forward to demonstrating our capabilities and expertise to Woodside on this project," added Argeo VP NSA, Dave Gentle.



Argeo

GREENSEA IQ AND VIDEORAY EXTEND PARTNERSHIP TO ADVANCE ROV USER EXPERIENCE

Greensea IQ and VideoRay have announced the extension of their strategic partnership. The renewed five-year, multi-million dollar agreement underscores both companies' dedication to improving the performance and dependability of their products, as well as fostering innovation within the inspection class ROV sector.

Under this collaboration, Greensea IQ and VideoRay will leverage their combined expertise and apply dedicated resources to develop industry-leading systems that promise to deliver unparalleled value and reliability to customers worldwide. The companies have already begun work on the development of Professional Workspace software for VideoRay's Ally, the newest member of their Mission Specialist family.

"The Master Agreement between Greensea IQ and VideoRay illustrates the significant commitment both companies are making to our US Navy and defense customers. This Agreement ensures our customers will have constant and stable access to the most advanced remote undersea robotics platform available. This Agreement removes the blockages of day-to-day operations and allows us to focus on technology advancement and customer satisfaction while maintaining our collaborative position as a world leader in ROV solutions," said Ben Kinnaman, CEO, of Greensea IQ.

This strategic alliance represents a shared vision for the future. By combining Greensea IQ's leading technology platform with VideoRay's leading Mission Specialist series ROVs, the partnership is set



VideoRay

to introduce breakthrough solutions that address the current and future needs of subsea defense and commercial customers.

"With our long-standing partnership, this new deal ensures our capability to address the long-term software demands of our defense customers while harnessing emerging technological advancements to bolster our Mission Specialist capabilities. Ultimately, all our customers stand to gain from this arrangement," added Chris Gibson, CEO of VideoRay.

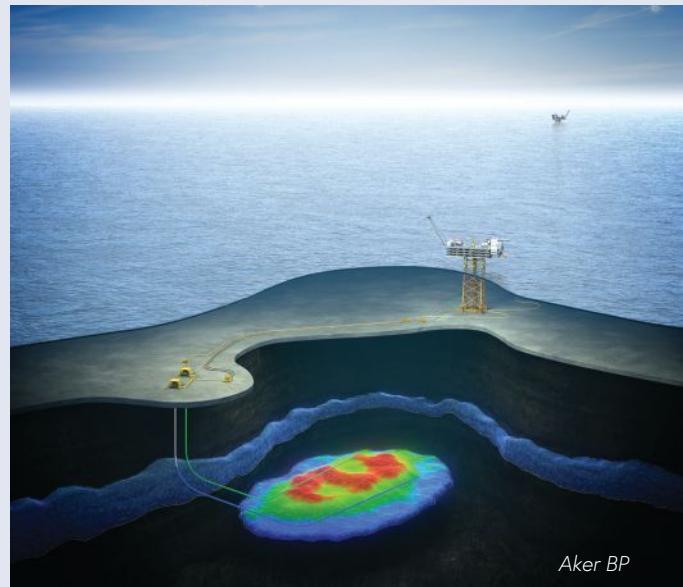
AKER BP BEGINS PRODUCTION FROM SUBSEA FIELD DEVELOPMENT HANZ

Aker BP is pleased to announce that production has started from Hanz in the North Sea, a subsea field development operated by Aker BP, with Equinor, and Sval Energy and tied into the Ivar Aasen platform about fifteen kilometers further south.

Hanz was discovered in 1997. After the delivery of the plan for development and operation (PDO) for the Ivar Aasen area, which included the Hanz development, the project matured an optimized development solution by re-using subsea production systems (SPS) from the Jette field. It is the first time that production equipment has been re-used in a new field development on the NCS.

In addition, the strategy for how the oil and gas is to be recovered was changed to include use of a cross-flow well for water injection. This results in a substantial reduction of power consumption, less use of chemicals and less equipment on the seabed.

The change in the development solution for Hanz since the original PDO was submitted led the partnership to send a formal statement regarding the investment decision and the selected concept to the authorities in December 2021.



Aker BP

EXAIL ENHANCES OFFSHORE OPERATIONS WITH OCTANS AHRS ADVANCED TECHNOLOGY

Exail has secured a contract with Bourbon, a leading French maritime services provider, to supply several units of Exail's Octans Attitude and Heading Reference Systems (AHRS) for integration into Bourbon Subsea Services subsidiary's fleet. These units will be installed on multiple Bourbon Evolution 800 Series multi-purpose support vessels (MPSVs) dedicated to subsea operations at depths down to 3,000 meters.

IMO-HSC certified, the Octans AHRS will enhance Bourbon vessels' efficiency in installation, maintenance, and repair tasks for the oil and gas and offshore wind industries. Providing highly accurate measurements for roll, pitch, and heave, Octans will serve as a survey-grade surface gyrocompass and motion sensor, seamlessly integrated into the vessels' Class 3 dynamic positioning (DP3) system. This integration will ensure precise positioning and stabilization over underwater structures, ensuring the safe deployment of cranes, remotely operated vehicles (ROVs), and supporting efficient survey and saturation diving operations.

"With the deployment of ROVs and the execution of complex subsea operations, DP3-type dynamic positioning is essential on our vessels. Additionally, to support survey services such as positioning, inspection, and metrology, a high level of specification demands the best-in-class motion sensors for safe operations.

That's why we've selected Exail's Octans, renowned for its globally recognized levels of performance, precision, and reliability," said Stephan Midenet, CEO of Bourbon Subsea Services.

"We are confident that the Octans AHRS, built on Exail's trusted Fiber-Optic Gyroscope (FOG) technology and already installed on thousands of surface platforms worldwide, will meet expectations and rise to the challenge of ambitious projects in the oil and gas and offshore wind industries," added Calixte Genin, Regional Sales Manager at Exail.

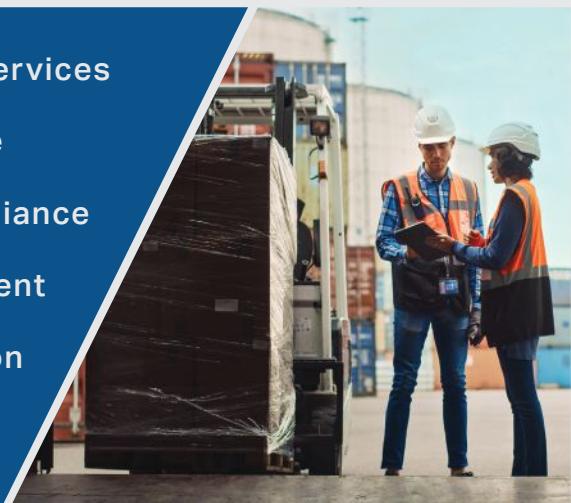


↗ Bourbon Evolution 800 Series will be equipped with Exail Octans AHRS. (Credit: Exail)

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SAILDRONE AND THALES PARTNER ON UNDERSEA SURVEILLANCE



Saildrone recently announced a strategic partnership with Thales Australia to integrate the Thales BlueSentry thin-line towed array with Saildrone Surveyor-class uncrewed surface vehicles (USVs) for autonomous anti-submarine warfare (ASW) missions. The announcement was made at the opening of Sea-Air-Space 2024, the premiere maritime exposition in the US, presented by the Navy League of the United States.

The Saildrone Surveyor is the largest in the Saildrone range of USVs and is capable of extreme, long-endurance missions in the open ocean. Equipped with the newest evolution of Thales's BlueSentry towed array, the Surveyor will conduct autonomous underwater ISR (Intelligence, Surveillance, Reconnaissance) for ASW applications. This enhanced USV capability supports broader naval operations by freeing up traditional low-density/high-demand manned assets to conduct other missions.

"Thales Australia has a proud history of exporting specialized sonar and acoustic products in support of one of our closest allies, the United States. Over two decades, these products have spanned the fields of Seismic survey to mine warfare and, more recently, surface ship anti-submarine warfare," said Troy Stephen, Vice President Underwater Systems, Thales Australia and New Zealand.

At 20 meters long (65 feet) and weighing 15 tons, the Surveyor classifies as a medium USV, built to American Bureau of Shipping (ABS) Light Warship code. Saildrone's Surveyor-class USVs are designed for persistent, wide-area maritime domain awareness (MDA) missions, using radar, cameras, acoustics, and advanced machine learning to deliver comprehensive situational awareness remotely from anywhere in the world.

"The Saildrone Surveyor was developed to conduct long-duration MDA missions in remote locations. Combining the BlueSentry thin-line towed array with our most capable USV provides a game-changing solution for wide-area ASW operations," added Richard Jenkins, Saildrone Founder and CEO. "Saildrone is committed to continuously delivering new advanced solutions to our defense customers, and it is wonderful to be able to add this new capability to the list of Saildrone services."

The first production Saildrone Surveyor USV was launched last month from Austal USA in Mobile, AL. The initial group of USVs is contracted to the US Navy for the testing and evaluation of Surveyor-class vehicles in multiple environments. Upcoming Navy missions will focus on the ability of the Surveyor to deliver both surface and undersea intelligence for a range of high-priority applications, including anti-submarine warfare (ASW).

US DARPA CONCLUDES IN-WATER TESTING OF MANTA RAY UUV PROTOTYPE

The Manta Ray UUV built by Northrop Grumman completed full-scale, in-water testing off the coast of Southern California in February and March 2024. Testing demonstrated at-sea hydrodynamic performance, including submerged operations using all the vehicle's modes of propulsion and steering: buoyancy, propellers, and control surfaces.

Northrop Grumman shipped the Manta Ray prototype in subsections from the build location in Maryland to its test location in California. The demonstrated ease of shipping and assembly supports the possibility of rapid deployment throughout the world without crowding valuable pier space at naval facilities.

Manta Ray aims to develop and demonstrate a new class of long-duration, long-range, payload-capable UUVs ready for persistent operations in dynamic maritime environments. DARPA is engaging with the US Navy on the next steps for testing and transition of this technology.

A second Manta Ray performer, PacMar Technologies, is continuing testing of its full-scale energy harvesting system in 2024.



▲ Manta Ray vehicle being towed in preparation for testing.
(Credit: Northrop Grumman)

KONGSBERG TO SUPPLY PROPELLER SYSTEMS FOR DAMEN NAVAL'S ASW FRIGATES

Kongsberg Maritime has been selected to supply controllable pitch propellers and shaft lines to ship builder Damen Naval for a series of four Anti-Submarine Warfare (ASW) frigates.

The new ASW frigates are being built for the Netherlands and Belgium and will replace the current Karel Doorman-class multi-purpose frigates. They will be deployed for a wide variety of tasks, with anti-submarine warfare as their main purpose. The ships will have hybrid diesel-electric propulsion and will be designed to operate as quietly as possible. The first ship is expected to be delivered by Damen Naval in 2028.

As part of this contract, Kongsberg Maritime will supply four shipsets of its controllable pitch propeller systems and associated equipment including blades, hubcaps, hubs, and shaft lines.

This is the second collaboration between Damen Naval and Kongsberg Maritime in the past 18 months, and follows a similar contract signed by the companies in September 2022 for the German navy's F126 frigates.

"It is great news to have Kongsberg Maritime involved in the ASWF project as well," said Damen Naval Director Corporate Strategy and Innovation Richard Keulen. "We have a long-standing relationship with the company, and it is a good example of the excellent

cooperation that exists between the Dutch and Swedish naval shipbuilding industries."

Björn ten Eicken, Vice President—Naval, Kongsberg Maritime, added: "Kongsberg Maritime is proud to have been selected as a partner for this significant Damen Naval frigate program. The propulsion system for the new frigates has been optimized to match the customers' strict mission requirements, particularly for noise signature, which is a crucial factor in anti-submarine warfare operations."



SEA TO EQUIP ROYAL NAVY'S SONAR SYSTEMS WITH ADVANCED SOFTWARE

SEA is set to demonstrate a software application to enhance the UK Royal Navy's sonar systems as part of the Ministry of Defence (MoD) Spearhead defense innovation program.

The system, which is likely to be trialed later in 2024, automatically determines the optimum deployment depth of an active sonar projector and receiving array, depending on its underwater environment. It intends to significantly enhance the Royal Navy's detection and tracking capability.

Building its proven expertise in underwater environmental modeling, sonar and acoustics, SEA will not only demonstrate this software application but will also actively contribute additional concepts to the ASW Spearhead program, working with prime contractor Thales Underwater Systems. Such capabilities are designed to provide the Royal Navy with innovative ways to exploit both existing and enhanced systems in underwater warfare scenarios.

Ian Cox, Head of Research & Simulation at SEA, said: "SEA is proud to be demonstrating its leading capability for this important project with Thales, which is a continuation of our work with the Royal Navy based around trusted advice and consultancy, and the provision of leading technology. It shows SEA's dedication to support-

ing the enhancement of the Royal Navy's ASW capability. It also underscores our commitment to advancing research and development studies within underwater detection and tracking into operational capabilities for naval forces. We are proud to be pushing the boundaries of technological innovation within naval defense."





SECURE SEAS NEED SECURE SUPPLY CHAINS

Insights from Sea-Air-Space and Undersea Defence Technology

By Ed Freeman, Managing Editor, ON&T

The second week of April was a busy one for the professional international defense community, with two premier conferences taking place on either side of the Atlantic, first Sea-Air-Space (SAS) powered by the Navy League of the United States in National Harbor, Maryland, and then the Undersea Defence Technology (UDT) conference in London, UK. Both events are well-established meeting points for key naval personnel and defense supply chains, and so, undeterred by any transatlantic scheduling challenges, ON&T—a preferred media partner to both—spent two days at each to listen, learn, and reflect.

At a time of mounting geopolitical tension, the tone for the week was set first at SAS—now the largest maritime exposition in the US, attracting military decision makers, public office officials, and private sector leaders from around the globe. At the Opening Ceremony and Chiefs Leadership Session,

keynote speaker the Honorable Erik Raven, Under Secretary of the Navy, stressed that although the 0.7% budgetary increase for FY 2025 budget involves "tough choices," the available funding boldly advances undersea capabilities, the development of 31 amphibious ships, and the fielding of advanced uncrewed technologies within relevant and much needed timeframes.

READINESS TO RESPOND

This cautious optimism was not only shared among the distinguished panel but in many of the sessions that followed. The need for readiness, resiliency, and flexibility was a sentiment echoed throughout the week's busy and insightful agenda. While there is little debate that the US Navy must expand its fleet, a readiness to respond to today's threats with the right platforms, managed by the right people, at the right time and location is imperative.

However, that does not equate to doing more with less. Rather, it means making measured and increasing targeted investments in a time of fiscal constraint. While the operational intricacies associated with the development, planning, and steady integration of unmanned technologies above, on, and below the waterline were central to many discussions, so was a focus on investing in people. That is, the recruitment and retention of engaged personnel remains a priority, with clear professional development plans and career prospects paramount at a time of rapid technical advancement in the field.

INVESTING IN PEOPLE

The future requirements of the next generation of ocean professionals were also high on the agenda at UDT 2024. The event's theme, *Mastering undersea challenges: innovation and resilience in a complex domain*, offered a more subsea-focused



forum to explore all aspects of underwater defense and security, but professional development was a dominant thread.

How to recruit, train, and retain talent at a time of accelerated technological capacity is something of a moving target, as is the question of reskilling existing professionals in the age of artificial intelligence (AI) and machine learning (ML). Conversations about people management naturally dovetailed with the potential operational gains presented by advances in autonomy, and, again, of unmanned systems.

HARNESSING AUTONOMY

The promise of AI and data-fueled autonomy—a battlespace increasingly assessed and governed by remotely operable assets and digital twin technology—is a shared mission among the public and private sectors. This was evidenced by day two's keynote panel discussion surrounding the Royal Navy's (RN) transition to an autonomous force.

The RN needs to increase its underwater mass for anti-submarine warfare, and initiatives like Project CETUS—a 12-m XLUUV now in manufacturing—and Project CHARYBDIS—an initiative to develop a USV for wide-area tasks that is large and resilient enough to operate long-endurance missions in the Atlantic—exemplify how collaboration between naval forces and the commercial entities are leveraging shared learning to drive progress towards a truly integrated maritime system of systems.

Central to this underwater ecosystem—which includes a range of ASW sensors, gliders, seabed arrays, and MCM devices—is the SSN-AUKUS.

AUKUS

AUKUS was, unsurprisingly, a major talking point at both SAS and UDT. Addressing delegates at SAS, The Honorable Pat Conroy MP, Australia's Minister for Defence and Minister for International Development and the Pacific, stated that AUKUS was fundamentally about "maintaining peace and stability in the Indo-Pacific," but this is also a generational trilateral commitment to developing best-in-class ocean technology.

Landmark endeavors that depend on unwavering international cross-sector cooperation can often pose more questions than answers, and a year on from when

AUKUS partners announced, on March 13, 2023, their "Optimal Pathway" to produce a nuclear-powered submarine capability in Australia, stakeholders to the speaker lectern at both SAS and UDT to share progress to date.

Pillar 1 under AUKUS is a commitment to support Australia in acquiring three Virginia-class nuclear submarines to replace its current fleet in the 2030s, as well as the collaborative development of the "SSN-AUKUS," a future state-of-the-art platform for introduction to the UK fleet in the 2030s and in Australia in the 2040s. For Australia alone, it has been estimated that the Royal Australian Navy (RAN) will need to recruit and train up to 20,000 professionals to build and operate a new submarine fleet—again, strategic plans underwritten by long-term investments in people and human resources. This cultural exchange has begun with a growing number of RAN servicemen and women now stationed in the US and UK.

Pillar 2, intends to enhance joint capabilities and interoperability, integrate supply chains, and identify technological opportunities—especially in the fields of AI and quantum technologies—to advance undersea defense capabilities.

SECURING SUPPLY CHAINS

The unified ambition of AUKUS is clear, and while there is much detail yet to transpire, this agreement is a commitment to innovation, one that will rely not only on technology breakthroughs and diplomacy, but also on people. AUKUS is as much about securing people and supply chains as it is about securing the underwater battlefield.

Perhaps that is the key takeaway from SAS and UDT: Future defense priorities—both generational and immediate in timeframe—can only be met with a firm commitment to industry initiative and integration.

And, as is so often common at premier industry events, it is in the exhibition hall where the depth of opportunity hits you hardest, with both SAS and UDT floorplans boasting the latest marine technologies primed and ready to deploy, some with dockside demonstrations and on-stand test tanks. Clearly, these industry meets are instrumental to supply chain networking and identifying new synergies; the progress is tangible.



DUCOMMUN SECURES MAJOR DEFENSE ORDERS FOR RAYTHEON RADAR SYSTEMS

Ducommun, a global supplier of innovative electronic and structural solutions for the aerospace and defense industry, is proud to announce two major awards totaling over \$50 million in revenue for the Raytheon SPY-6 family of radar systems.

These two awards represent a \$25 million follow on order for one circuit card assembly already in production, along with another \$25 million order for one circuit card assembly that will be brand-



Amphibious transport dock USS Richard M. McCool Jr. (LPD 29), equipped with the SPY-6(V)2 radar, at sea. (Credit: Raytheon)

new production for the company. All cards will be produced at Ducommun's world-class engineering and manufacturing performance center for circuit cards assemblies in Tulsa, Oklahoma.

"We are thrilled to have earned the trust of Raytheon on this most critical Navy radar system as we continue to build out this part of our defense business by supporting off-loading from our strategic defense customers. This is a very important initiative for us and one I have been talking about with shareholders on our quarterly earning calls. We are also now moving more and more into radar systems for defense, which complements our already significant circuit card assemblies' franchise for missiles, such as MIR and the family of Standard Missiles," said Stephen G. Oswald, Chairman, President and CEO at Ducommun Incorporated. "Raytheon has treated us as a true partner, given us many opportunities and we are committed to continue delivering value for them and their customers."

With the addition of these two new major awards, the Company's backlog continues to break all-time high records at over \$1 billion, which benefits shareholders for years to come.

Ducommun currently provides Raytheon with electronics, circuit card assemblies, harness cable assemblies, and structural products on both legacy and emerging programs.

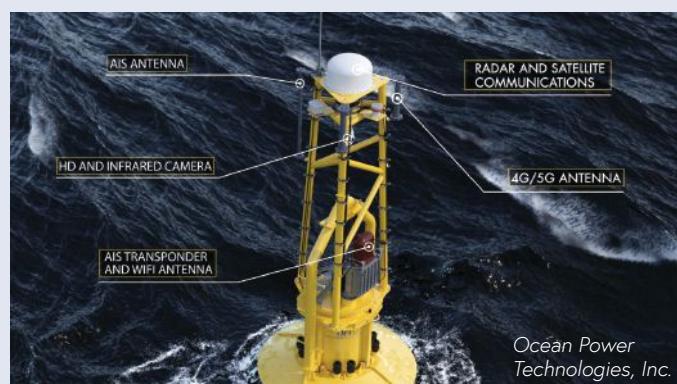
OPT PARTNERS WITH DEFENSE CONTRACTOR TO ADVANCE MARITIME DOMAIN AWARENESS

Ocean Power Technologies, Inc. (OPT), a leader in innovative and cost-effective low-carbon marine power, data, and service solutions, has signed a teaming agreement with a major international defense contractor to provide its Merrows suite of solutions with a focus on certain geographic regions. This alliance is set to advance maritime domain awareness through OPT's innovative Maritime Domain Awareness Solution (MDAS).

Under the terms of the agreement, the defense contractor will have exclusive rights to provide OPT's Maritime Domain Awareness Solution within certain international geographic regions. Leveraging OPT's cutting-edge technology alongside the international contractor's extensive expertise in defense, homeland security, and commercial programs, the collaboration aims to strengthen the contractor's capabilities in maritime security and surveillance.

Mr. Philipp Stratmann, CEO and President of Ocean Power Technologies, expressed enthusiasm about the alliance, stating: "We are thrilled to join forces with a major international defense contractor to provide our Merrows suite of solutions to certain international regions. This collaboration underscores our commitment to enhancing maritime security globally, and we are confident that together, we are positioned to achieve remarkable advancements in this field."

MDAS, developed by OPT, integrates state-of-the-art data collection and analysis capabilities to offer comprehensive maritime surveillance, tracking, and monitoring solutions. By combining autonomous marine platforms, including vehicles and buoys, with advanced sensors and data analytics, MDAS enables real-time situational awareness, supporting a wide range of applications including maritime security, environmental monitoring, and search and rescue operations.



Ocean Power
Technologies, Inc.

FIRST MCM US NAVY MISSION PACKAGE EMBARKED ON USS CANBERRA

The US Navy embarked the first Mine Countermeasures Mission Package (MCM MP) aboard USS *Canberra* (LCS 30), April 18, 2024, service officials announced. With the MCM mission package now onboard LCS 30, the Navy is looking forward to the first MCM Mission Package deployment in Fiscal Year 2025.

As part of the embark process, the Navy installed sensors, unmanned vehicles, support containers and the software that enables Sailors to execute MCM operations from an Independence-variant Littoral Combat Ship. The embarkation marks the formal turnover of the MCM mission package to the ship, signifying the crew is ready to commence onboard training and maintenance of the mission package in preparation for its first deployment.

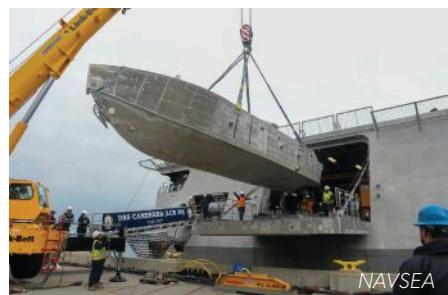
An integrated suite of unmanned maritime

systems and sensors, the MCM mission package locates, identifies, and destroys mines in the littorals while increasing the ship's standoff distance from the threat area. Embarked with the MCM mission package, an LCS or a vessel of opportunity can conduct the full spectrum of detect-to-engage operations (hunt, neutralize and sweep) against mine threats using sensors and weapons deployed from the MCM unmanned surface vehicle (USV), an MH-60S multi-mission helicopter and associated support equipment.

The MCM mission package achieved Initial Operational Capability (IOC) on March 31, 2023, following rigorous initial operational testing and evaluation (IOT&E) of the full mission package, including the AN/AQS-20 system, during the fall of 2022 aboard USS *Cincinnati* (LCS 20). With the deployment of the first MCM mission packages in

Fiscal Year 2025, the Navy will commence the process of divesting from aging MH-53 helicopters and Avenger Class MCM ships.

PEO Unmanned and Small Combatants leads the Navy's efforts to provide littoral combat ships with mission-tailored capability to Combatant Commanders to provide assured access against littoral threats, leveraging unmanned naval capabilities for enhanced operational effectiveness.



Whatever the mission...

Okeanus designs and manufactures mission-critical ocean equipment for commercial and government agencies throughout the world. We harness breakthrough Science and Technology to equip clients with the tools and trusted support they need for the rigors of ocean exploration.

Our comprehensive product portfolio—from customized deck equipment, including winches, LARS and A-Frames, to our extensive range of underwater survey and sampling equipment—is available for purchase or rent, and rapid deployment.

Whatever your mission, Okeanus has turn-key solutions to make it a success.

okeanus.com



US NAVY TO TEST DRONE-DISABLING TECHNOLOGY AGAINST SEABORNE ATTACK VESSELS

Epirus, a high-growth technology company, announced that the 2024 Advanced Naval Technology Exercise Coastal Trident Program (ANTX-CT24) will include field experiments to investigate the ability of the company's long-pulse High-Power Microwave (HPM) technology to temporarily disable small vessels powered by outboard motors.

The activities, planned and conducted by Naval Surface Warfare Center Port Hueneme's Office of Technology, will examine the capability of a low-cost, effective and non-lethal option to address the growing threat from seaborne drones. Seaborne drones have recently been used by both state and non-state actors as an offensive military capability.

The Navy's decision to test Epirus' HPM technology follows the US Army's awarding Epirus a \$66.1 million contract in support of the Indirect Fire Protection Capability-High-Power Microwave Program (IFPC-HPM).

The company delivered the first of four systems to the Army's Rapid Capabilities and Critical Technologies Office in November and finalized delivery of all systems in March 2024. The systems will be going

through additional Soldier training and engineering developmental testing in April.

"We welcome this opportunity to demonstrate the effectiveness of long-pulse HPM technology in another threat environment. Epirus can defend against a wide range of threats across domains," said Epirus CEO Andy Lowery. "Our expanded collaboration with the Department of Defense also underscores the growing recognition of the benefits of working with innovative tech companies outside of the traditional defense ecosystem."

In addition to testing the technology's ability to temporarily disable outboard motors and small vessels, the exercise will engage stakeholders in port security and critical infrastructure protection to increase awareness and access to counter-vessel capabilities and test its effectiveness when deployed on uncrewed autonomous vessels.

An ANTX-24 program spokesperson said the research exercise is intended to support Naval Innovative Science and Engineering research and accelerate identification, assessment, and implementation of leading-edge technology proposed to address gaps for the US Navy and its interagency



Epirus

partners in port and maritime security.

"ANTX-CT24 will feature technical demonstrations and experiments across a wide variety of technology areas, including unmanned systems countermeasures. We have conducted several HPM experiments in the past, as a method to counter electronic systems and unmanned aircraft swarms, and expect that an assessment of Epirus' HPM system in a counter-surface vessel role will support the program's goals effectively," added Brendan Applegate, NSW Port Hueneme Lead for Fleet Experimentation and Exercises.

PHOENIX CONTRACTED BY SPANISH NAVY FOR SUBMARINE EMERGENCY SYSTEM

Phoenix is pleased to announce that they have been contracted by the Spanish Navy to provide a Submarine Emergency Ventilation and Decompression System (SEVDS).

SEVDS is a rapidly transportable (via air, land, and sea) system that provides breathing air to disabled submarines to extend life on board while awaiting rescue and, if necessary, can be used to reduce internal

submarine pressure to reduce hyperbaric risks to surviving personnel. SEVDS is capable to a depth of 600 meters (2,000 feet) and can be connected to the submarine by divers or remotely operated vehicles (ROVs).

Phoenix has been supplying complete rescue and intervention solutions specifically tailored to each nation's submarine force

requirements for over 17 years, including rescue vehicles and chambers, Transfer Under Pressure (TUP) systems, Emergency Life Support System (ELSS) pods, ROVs, and SEVDS. Phoenix has completed more submarine rescue and intervention air mobilizations than any company in the world and, with the US Navy, was the only company to provide rescue systems in response to the missing ARA SAN JUAN submarine.

Commenting on this award, Phoenix President Patrick Keenan, stated: "We are honored that the Spanish Navy has entrusted Phoenix to provide them with our SEVDS to enhance their submarine rescue capabilities. We will deliver SEVDS as a fully functional system on time and within budget."



Phoenix

ANDURIL'S XLAUV GHOST SHARK MAKES ITS DEBUT IN AUSTRALIA

Anduril, the Royal Australian Navy (RAN), the Advanced Strategic Capabilities Accelerator (ASCA) and Defense Science and Technology Group (DSTG) recently unveiled the first Ghost Shark manufactured prototype, confirming that the Ghost Shark program is ahead of schedule and on budget.

As Anduril moves to deliver an operationally relevant capability within a fraction of traditional defense timelines, early creation and testing of the first Ghost Shark has been critical for rapid learning and iteration.

This represents a momentous advancement in the \$140 million co-development contract between RAN, DSTG and Anduril to design and develop the three 'Ghost Shark' extra-large autonomous undersea vehicles (XL-AUV) in three years in Australia.

Ghost Shark is a modular, multi-purpose capability that can flexibly respond to the Australian Defense Force's mission requirements, creating an agile force multiplier for defense.

David Goodrich OAM, Executive Chairman and CEO Anduril Australia, said: "The timeline we set to design and produce three Ghost Sharks in three years in Australia, by Australians for the ADF, was extremely ambitious. I am excited to report that we are ahead of schedule and, importantly for a defense program, we are on budget."

"We're moving incredibly quickly on this program in lockstep with our ASCA, DSTG and the RAN partners. The strategic leadership and innovation insights provided by Prof Tanya Monro, Prof Emily Hilder and Vice Admiral Mark Hammond are key to our success."

Dr. Shane Arnott, Senior Vice President Engineering, Anduril Indus-

tries, added: "Moving at the speed of relevance is Anduril's signature. For Ghost Shark, we have assembled a unique high-powered engineering team of 121 people from the best-of-Australia, across tech, resources and defense, to fuel this progress."

"We have 42 Australian companies currently working on Ghost Shark, which is being designed, engineered and manufactured in Australia. We plan to manufacture at scale in Australia for the Royal Australian Navy, and then for export to our allies and partners around the world."

"Using novel scaled agile development techniques, we are combining both tech and defense sector development practices - and it's paying big dividends. Ghost Shark is a program that we as Australians can be very proud of," said Dr. Arnott.



Ghost Shark XL-AUV at the ceremony. (Credit: Anduril)

SEABER LAUNCHES MARVEL MICRO-AUV FOR NAVIGATING CONFINED UNDERWATER SPACES

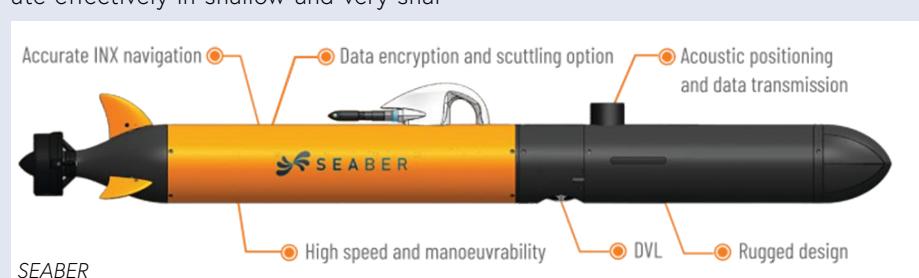
SEABER recently unveiled the newest addition to its cutting-edge range with the MARVEL micro-AUV. The MARVEL is setting a new standard in precision underwater exploration. The new range redefines the capabilities of micro-AUVs, through unparalleled speed and maneuverability. MARVEL can serve a variety of defense-oriented missions, including security, coast guard operations, and mine countermeasures.

Equipped with state-of-the-art technology, the MARVEL micro-AUVs include standard payloads for defense applications. Payloads include Side-Scan Sonar, Multibeam Echo Sounder, a fluxgate Magnetometer, USBL (Ultra-Short Baseline) underwater acoustic positioning and communication

systems, along with optional encryption and scuttling features. These advanced functionalities empower operators with enhanced situational awareness and operational effectiveness in challenging maritime environments.

The MARVEL Micro-AUVs ability to operate effectively in shallow and very shal-

low waters, revolutionizes mine countermeasure operations. SEABER's innovative design ensures that these micro-AUVs can navigate and execute missions with precision, even in the most confined underwater spaces, significantly improving the efficiency and safety of mine clearance operations.



DOMINION ENERGY LAUNCHES CHARYBDIS MARKING MAJOR MILESTONE IN ENERGY TRANSITION



Dominion Energy announces that *Charybdis*, the United States' first Jones Act-compliant offshore wind turbine installation vessel, was successfully launched from land to water, marking a major milestone in the vessel's construction. To achieve this milestone, welding of the ship's hull and commissioning of the vessel's four legs and related jacking system were successfully completed.

The 472-foot vessel is being constructed at the Brownsville, Texas shipyard of global marine and offshore engineering group Seatrium, using domestically sourced steel. At peak construction, over 1,200

workers were employed on this project. Once complete, the home port for the vessel will be in Hampton Roads, one of the nation's premier offshore wind installation harbors, and utilize an American crew.

"Seatrium's AmFELS shipyard has partnered with Dominion Energy in this ground-breaking project to supply the first US Jones Act-compliant WTIV, *Charybdis*, playing a critical role in the country's energy transition. The US-built vessel will not only contribute towards reliable, affordable and clean energy, but also benefit local communities in creating a significant local know-how and job opportunities, paving the way for future growth in the US offshore wind industry," said Mr. Chris Ong, Seatrium's CEO.

The vessel's hull and infrastructure was fabricated with more than 14,000 tons of domestic steel, with nearly 10,000 tons sourced from Alabama, West Virginia and North Carolina suppliers. The vessel is designed to handle turbine sizes of 12 megawatts or larger. The vessel launch marked a historical achievement as the world's largest completed lift totaling 23,000 tons.

Also announced today, the CVOW project received a final construction air permit from the Environmental Protection Agency. This is the 11th and final federal permit required to begin offshore construction. Offshore monopile installation begins in May.

SURVITEC ACHIEVES INDUSTRY MILESTONE WITH ISO 23678 CERTIFICATION

Survitec, the global Survival Technology solutions provider, has become one of the first maritime safety companies to achieve ISO 23678:2022 1-4 certification. This important standard was introduced in 2022 to establish the uniform and consistent training of personnel involved in lifeboat inspection, taking into account the mandatory requirements of resolution MSC.402(96).

Achieving ISO 23678 certification was also a key factor in Survitec receiving renewed approval for the maintenance, inspection, and testing of lifeboats on vessels operating under Lloyd's Register (LR) classification.

Matt Macfarlane, Head of Service Operations at Survitec, said: "By adhering to the stringent principles incorporated into the ISO 23678 standard, we have significantly broadened our scope of certification, enabling qualified and certified technicians to inspect, maintain and test an increasingly extensive range of equipment supplied by an array of different manufacturers."

"Survitec's achievement ensures customers receive a top-tier service backed by rigorous standards and a commitment to multi-brand service excellence with unmatched authorizations and accreditations from over 70 flag States."

Survitec's Marine Training Academy (MTA) successfully received certification to the new ISO training standard. Simultaneously, the company also developed a new internal, dynamic database tool

to facilitate technician competence tracking, ensure compliance with certification requirements, and aligning with audit standards.

ISO 23678 has streamlined the requirements and standardized certification training to ensure all technicians are competent, certified, and qualified by an authorized body.

Macfarlane added: "The ISO standard has the potential to significantly improve maritime safety globally through the standardized certification of service technicians to ensure all technicians are competent, certified, and qualified by an authorized body. As the largest company to achieve this standard, we see great benefit to the industry, and we call on regulators to adopt it to significantly enhance safety standards."



Survitec

KONGSBERG MARITIME CELEBRATES 50 YEARS OF SHIP DESIGN

From setting the benchmark that set the standard for offshore supply vessels in the 1970s, to advanced anchor handlers that transformed the oil and gas industry, and a growing reference list in fishery and merchant ships, Kongsberg Maritime's range of ship designs has continued to evolve over the past five decades.

Lisa Edvardsen Haugan, President of Kongsberg Maritime, said: "Over the past 50 years, our design teams have created an extensive portfolio of innovative ships for all market segments. As we reach our fiftieth year, we're delighted to report that we will also soon be delivering our 1,000th ship design."

"In the same way as the very first UT 704 platform supply vessel ventured out into the North Sea back in 1974 as a pioneer of its time, our latest state-of-the art windfarm service operation vessels (CSOV)—a fleet of six 'Skywalker Class' UT5519 DE for Integrated Wind Solution—will again be pioneering operations in the energy markets offshore".

Kongsberg Maritime's ship design philosophy is centered around three key pillars: safety; operational efficiency and sustainability. Many of the ships designed by the company operate in some of the harshest conditions on the planet, so there is always a laser-sharp focus on safety in all designs. Operational efficiency is

another crucial element, with a growing demand for vessels that can operate efficiently for decades.

The Kongsberg Maritime ship design team is based in Hjørungavåg and Aalesund on the west coast of Norway and is supported by a Kongsberg-owned Croatian company, Navis Consult, which provides a range of engineering services in support of the company's products and ship design projects.



MBARI APPOINTS NEW OPERATIONS DIRECTOR TO OVERSEE SEAGOING ASSETS

From the crew who manage MBARI's research vessels to the pilots and engineers who launch and operate their cutting-edge underwater robots, the Division of Marine Operations is the backbone of MBARI's work.

Recently, MBARI welcomed Kaya Johnson as their new Director of Marine Operations. Johnson will oversee MBARI's seagoing assets, including their three research vessels, deep-sea cabled observatory, and fleet of advanced underwater robots.

"MBARI's innovative technology is transforming ocean exploration. I'm honored to join the team and work alongside MBARI scientists and engineers to deploy our fleet of research vessels and advanced robots to answer important questions about the health of our ocean," said Director of Marine Operations Kaya Johnson.

"With a new research vessel joining our fleet soon and a new robotic technology

lab on the horizon, we're thrilled to have Kaya Johnson at the helm of our marine operations. His strong leadership, wealth of knowledge, strategic vision, and ability to foster collaborative relationships will be invaluable to MBARI's work," added MBARI President and CEO Chris Scholin.



▲ Director of Marine Operations Kaya Johnson

Johnson comes to MBARI from Oregon State University (OSU), where he worked for the past six years. Johnson was port captain at OSU, then served as marine superintendent of ship operations. He managed operations for OSU's fleet of three research vessels—the R/V *Elakha*, the R/V *Oceanus* (retired in November 2021), and the R/V *Pacific Storm*.

Prior to his tenure at OSU, Johnson served as the vessel operations coordinator with Ocean Associates, Inc. at the Point Adams Research Station, where he was responsible for the safe and efficient operation of a fleet of twenty research vessels, maintaining records and metrics, ensuring compliance with relevant regulations, and conducting risk assessment evaluations for scientific projects. Earlier in his career, Johnson served as a vessel master and marine operations manager at American Waterways, Inc. where he captained a fleet of five vessels.

AMERICAS

- Offshore Wind USA**
Boston, MA | June 17–18
<https://events.reutersevents.com/renewable-energy/offshore-wind-usa>
- Dredging Summit & Expo**
Tampa, FL | June 24–27
<https://dredging-expo.com>
- OCEANS Halifax**
Halifax, Canada | September 23–26
<https://halifax24.oceansconference.org>
- Industrial Decarbonization North America 2024**
Pittsburgh, PA | October 1–2
<https://events.reutersevents.com/energy-transition/industry-usa>
- ACP Offshore WINDPOWER**
Atlantic City, NJ | October 28–30
<https://cleanpower.org/offshore-windpower>
- International Workboat Show**
New Orleans, LA | November 12–14
www.workboatshow.com
- Underwater Intervention**
New Orleans, LA | November 12–14
www.workboatshow.com/underwater-intervention

EUROPE

- Underwater Technology Conference (UTC)**
Bergen, Norway | June 11–13
www.utc.no
- Seanergy**
Nantes, France | June 26–28
www.seanergy-forum.com/en/seanergy2024
- Offshore Northern Seas**
Stavanger, Norway | August 26–29
www.ons.no
- Offshore Wind Foundations & Substations**
Bremen, Germany | August 28–31
www.iqpc.com/events-offshore-foundations-substations
- WindEnergy Hamburg**
Hamburg, Germany | September 24–27
www.windenergyhamburg.com
- Sea Tech Week**
Brest, France | October 15–17
www.seatechweek.eu
- Euronaval**
Villepinte, France | November 4–7
www.euronaval.fr
- Ocean Energy Europe**
Aviemore, Scotland | November 5–6
www.oceanenergy-europe.eu/annual-event/ocean-energy-europe-2024

OTHER REGIONS

- Australia Wind Energy**
Melbourne, Australia | July 9–11
www.windenergyaustralia.com
- Underwater Minerals Conference**
Rarotonga, Cook Islands | September 15–21
www.underwaterminerals.org
- International Conference on Ocean Energy (ICOE)**
Melbourne, Australia | September 17–19
www.ocean-energy-systems.org/icoe/conferences/icoe-2024-melbourne/
- WIND EXPO**
Chiba, Japan | October 2–4
www.wsew.jp/hub/en-gb/about/wd.html
- All-Energy Australia**
Melbourne, Australia | October 23–24
www.all-energy.com.au
- ADIPEC**
Abu Dhabi, UAE | November 4–7
www.adipic.com
- MAST Australia**
Adelaide, Australia | November 19–21
[https://mastconfex.com/australia2024](http://www.mastconfex.com/australia2024)
- OSEA Energy Week**
Singapore | November 19–21
www.osea-asia.com

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2024 EDITORIAL CALENDAR

MONTH	DEADLINES	EDITORIAL FOCUS AND SHOW DISTRIBUTION	THEME FOCUS
JANUARY/ FEBRUARY	Editorial: January 17 Ad: February 2	OCEAN SENSORS & DATA MANAGEMENT • Oceanology International March 12–14 • Canadian Underwater Conference & Exhibition (CUCE) March 24–26	Ocean observation, multidisciplinary survey, telemetry, communications
MARCH	Editorial: February 12 Ad: March 1	NAVAL DEFENSE & SECURITY • Underwater Defence Technology April 9–11 • Sea-Air-Space April 8–10	Uncrewed systems, cyber security, marine surveillance systems
APRIL	Editorial: March 11 Ad: March 29	REMOTELY OPERATED VEHICLES (ROVs) IN FOCUS • International Partnering Forum April 22–25 • H2O Conference June 3–5 • Underwater Technology Conference (UTC) June 11–13	ROV development, subsea residency, deployment technologies
MAY	Editorial: April 8 Ad: April 26	OFFSHORE ENERGY DEVELOPMENT • Canadian Hydrographic Conference May 27–30 • Seanergy June 26–28	Infrastructure development for oil and gas, renewables, subsea power
JUNE	Editorial: May 13 Ad: May 31	UNDERWATER IMAGING	Advances in marine survey and subsea imaging capabilities
JULY (DIGITAL ISSUE)	Editorial: June 18 Ad: June 28	UNCREWED VEHICLE BUYERS' GUIDE	<i>Special Edition</i>
AUGUST	Editorial: July 15 Ad: August 2	SUBMERSIBLES & THE DEEP SEA • OCEANS Halifax September 23–26	Subsea vehicles, naval archaeology, bathymetric studies, geotechnics
SEPTEMBER	Editorial: August 12 Ad: August 30	REMOTE MARINE OPERATIONS • ACP Offshore WINDPOWER October 28–30 • Ocean Energy Europe November 5–6 • Offshore Energy Exhibition & Conference November 26–27	Marine autonomy, digital twins, remote monitoring and intervention
OCTOBER/ NOVEMBER	Editorial: September 9 Ad: September 27	UNCREWED VEHICLES & MARINE ROBOTICS • International Workboat Show November 12–14	USV R&D, emerging applications, breakthroughs in remote ops
DECEMBER	Editorial: October 17 Ad: October 28	THE FUTURE OF OCEAN TECHNOLOGY	<i>Special Edition</i>

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ALINTA ENERGY AND JERA NEX JOIN FORCES TO DEVELOP OFFSHORE WIND FARM IN AUSTRALIA

Alinta Energy and JERA Nex, through its wholly owned subsidiary Parkwind, have agreed to join forces to develop the 1 GW+ Spinifex Offshore Wind Farm in the Southern Ocean Region Declared Area in South West Victoria.

Under the agreement Alinta Energy and JERA Nex, the newly launched renewable energy company created by JERA combining the resilience of Japan's largest utility company with the focus and agility of a dedicated renewables business, will apply their respective expertise and capabilities to jointly develop the Spinifex Project.

The parties have identified a site for the project and will continue engaging with local stakeholders to refine their proposal and progress the project.

"JERA and Parkwind both have a great track-record in offshore wind and has pio-



neered some impressive engineering and construction techniques. We love that spirit and the launch of JERA Nex, bringing the two companies' renewable expertise together, is exactly what we'll need in Australia to build a new industry from the ground up," said Alinta Energy MD & CEO Jeff Dimery.

"There is huge potential for offshore wind in Australia and we're confident that the com-

bination of Alinta Energy's local expertise and experience and our offshore credentials provide a strong foundation for this project," added Francois Van Leeuw VP of Development & Construction Offshore, JERA Nex and Co-CEO of Parkwind.

The team at JERA Nex, of which Parkwind plays a central part, has experience in offshore wind and in developing supply chains for new offshore wind regions.

JERA Nex owns and operates seven wind farms across the world including in Belgium, Germany, the UK, Japan and Taiwan, and has a significant global pipeline.

A local supply chain and industry development study completed by the project in 2023 estimated the project could contribute up to AU\$1.6 billion during the construction period and AU\$40 million per year in operation to the regional economy.

NORDIC HYDROGRAPHIC COMMISSION PARTNERS WITH SEABED 2030

The Nippon Foundation-GEBCO Seabed 2030 Project announces its newest partnership with the Nordic Hydrographic Commission (NHC). This significant memorandum of understanding (MOU), entered into at the NHC's annual meeting in Sweden, marks the first time a Regional Hydrographic Commission has formally aligned with Seabed 2030, heralding a significant boost in the project's mission of delivering a definitive map of the ocean floor by the end of the decade.

Established in 1929 in Stockholm, Sweden, the NHC comprises the Kingdom of Denmark, Finland, Iceland, Norway and Sweden, with its overarching aim being the harmonization of Nordic practices with regard to hydrographic issues. One of 15 Regional Hydrographic Commissions—all of which contribute to the International Hydrographic Organization's (IHO) work—the NHC has become the first ever to sign up to the Seabed 2030 project.

Seabed 2030 is a collaborative project between The Nippon Foundation and the General Bathymetric Chart of the Oceans (GEBCO), which seeks to inspire the complete mapping of the world's ocean by 2030, and to compile all the data into the freely available GEBCO Ocean Map.

The MOU represents a strengthened collaboration between the NHC and Seabed 2030. It builds on the foundations of support already established through data contributions from respective Commission Member States via EMODNet, which itself is an official Seabed 2030 partner.

The signing ceremony was attended by Seabed 2030 Project Director Jamie McMichael-Phillips, who travelled from Barcelona—where he was attending the UN Ocean Decade conference—to participate in the occasion. McMichael-Phillips said: "This collaboration with the Nordic Hydrographic Commission is a monumental step forward in our collective journey towards understanding and ensuring the sustainable use of the ocean. We are delighted to welcome NHC as an official partner, and hope this partnership paves the way for more Regional Hydrographic Commissions to join."



From L-R: Pia Dahl Højgaard, Danish Geodata Agency; Rainer Mustanen, Finnish Transport and Communications Agency; Georg Kr. Lárusson, Icelandic Coast Guard; Gudmund Jónsson, Norwegian Mapping Authority; Magnus Wallhagen, Swedish Maritime Administration; and Jamie McMichael-Phillips, Seabed 2030. (Credit: Seabed 2030)

LOUISIANA OFFSHORE WIND SUPPLY CHAIN PRIMED FOR SUCCESS SAYS REPORT

A new report released shows Louisiana businesses and workers stand to benefit from expansion of offshore wind nationally and in the Gulf of Mexico. The "Louisiana Offshore Wind Supply Chain Assessment," released by the Southeastern Wind Coalition, GNO Inc., Center for Planning Excellence, and The Pew Charitable Trusts, with research partner and global energy consultancy Xodus Group, identifies recommendations to tap into more Louisiana know-how to help build offshore wind in US waters.

"This state is already a national leader for offshore construction. Harnessing that expertise and infrastructure for offshore wind is a logical next step," said Hillary Bright, VP of Renewables for Xodus Group. "The opportunity for Louisiana is real, and it's here right now for Louisiana's suppliers."

Louisiana businesses have been instrumen-

tal in using their offshore expertise to help build this emerging energy sector since the first US offshore wind farm was constructed near Rhode Island.

The findings come on the heels of the recent federal government announcement of new offshore lease opportunities in the Gulf of Mexico, which have the potential to power up to 1.2 million homes and create jobs and economic development across Louisiana.

The report also inventories the state's current assets that are ready for offshore wind. The impressive numbers help to reinforce the case for Louisiana benefits and how the state can serve as a strong link to fill supply chain gaps.

"Louisiana is an energy leader and this report shows how the state can add wind to an already thriving offshore economy,"



Xodus

said Southeastern Wind Coalition's Senior Program Manager, Jenny Netherton. "With over 450 businesses that are offshore-ready, Louisiana's workforce is poised to serve as the foundation of the offshore wind industry in the United States."

Also, there are over 100 fabrication and manufacturing assets with strong potential to support offshore wind development when coupled with investments to reskill, retool, or expand their current operations.

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Advanced Ocean Systems offers a unique spectrum of engineering, fabrication, testing, and installation capabilities designed to support defense, offshore energy, seabed infrastructure, and scientific operators with the integration of uncrewed technologies and remote systems into at-sea operations.

The collage includes several images: a large ship's hull with the word "UNCREWED" written on it; a circular radar display; a boat moving through the water; a blue industrial machine, possibly a winch; a small boat being lowered or hoisted; a large white ship on the water; a yellow boat; and a close-up view of some equipment or machinery.



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KRAKEN ROBOTICS APPOINTS PETER HUNTER AS CHAIRMAN OF BOARD OF DIRECTORS

Kraken Robotics has appointed Peter A. Hunter Chairman of the Company's Board of Directors. Mr. Hunter joined Kraken's Board in November of 2023 and is the founder, Chairman, and Managing Partner of Artemis Capital Partners, L.P., a Boston-based specialized private equity firm focused on differentiated industrial technology manufacturers.

An attorney and a CPA, Mr. Hunter has over 30 years of experience as both an investor and operator. His areas of expertise include strategic growth, structuring of multi-stakeholder strategies, corporate governance, and organizational planning. Mr. Hunter also has subsea technology

expertise, having served three years as the Chairman of Hydroid, LLC, an industry leader in unmanned underwater vehicles (UUVs) with its REMUS UUV brand. Mr. Hunter was Chairman of Hydroid from its

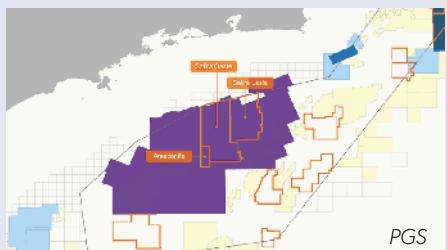


Kraken Robotics

early days to its eventual acquisition by Kongsberg Maritime, AS in 2008. Hydroid was subsequently acquired from Kongsberg in 2020 by Huntington Ingalls (HII), the US Navy's largest shipbuilder and UUV provider.

Greg Reid, Kraken's President and CEO and Director, said: "We are pleased to see Peter take on the Chairmanship of the Kraken Board of Directors. In his short time on the Kraken Board, Peter has added very valuable experience and perspective. The senior management team looks forward to working closely with Peter and the Board to take the company to the next level."

PGS REVEALS DATA COVERAGE OF NOMINATED BLOCKS IN SANTOS BASIN



PGS, a leading provider of seismic and reservoir data for oil and gas and new energy exploration and development, has revealed comprehensive data coverage of several blocks newly approved for licensing in the Santos Basin.

The Amazonita, Safira Oeste, and Safira Leste blocks, which lie in one of Brazil's most prolific offshore basins, have been approved by both ANP and CNPE for the upcoming Permanent Offer Sharing Round.

"PGS's data coverage provides unparalleled insights into the hydrocarbon potential of Amazonita, Safira Oeste, and Safira Leste, empowering decision-makers to make informed choices on these promising blocks," said Chadwick Hintz, Sales Manager Brazil at PGS.

The Santos Basin blocks were nominated

by PGS following a meticulous assessment of the comprehensive Santos Vision dataset, to evaluate prospectivity and the viability of identified prospects. These blocks exhibit clear carbonate build-up on structural highs, four-way dip closures, with well-imaged leads beneath a salt seal, and a proximal source kitchen. Evidence from the Parati and Dolomita Sul wells also indicates the presence of hydrocarbons within the Safira Leste and Oeste areas.

With high-end imaging technology and optimized parameterization, this data can also be suitable for prospect maturation.

CIP ANNOUNCES SOUTHERLY TEN TO DEVELOP OFFSHORE WIND IN AUSTRALIA

Copenhagen Infrastructure Partners (CIP) has been successful in Australia's first offshore wind feasibility license process and has secured site exclusivity to develop two offshore wind projects.

CIP also announced the launch of a new platform company called Southerly Ten, which is dedicated to the development and delivery of offshore wind projects in Australia and New Zealand.

CIP's first two projects in Australia—Star of the South and Kut-Wut Brataualung—combined have the potential to deliver up to 4.4 GW of capacity, enough to power 2.4 million homes with clean energy.

Jorn Hammer, Partner and Head of CIP Australia, said: "CIP was a first mover in developing offshore wind in Australia and has been proudly working with local communities, government and industry to kick

start an offshore wind industry. We are excited about the prospects of Southerly Ten to expand on CIP's extensive global experience and expertise in offshore wind development."



CIP



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