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Cogbill Construction

## DEPARTMENTS

On cue, the **Trump** administration roared back into the White House on January 20, 2025, and per campaign promise has immediately put the brakes on offshore wind energy and doubled down on commitments to oil and gas. It will be months to effectively gauge how this – plus a bevy of additional economic seismic shifts – will impact energy flows and markets globally, but for now the U.S. will be pumping more oil and gas into the world market. The U.S. Energy Information Administration's (EIA) latest Short-Term Energy Outlook has forecast that U.S. crude oil production will average 13.59 million barrels per day (bpd) in 2025, up from its previous estimate of 13.55 million bpd; and that U.S. natural gas output and demand will both rise to record highs in 2025, with dry gas production projected to rise from 103.1 billion cubic feet per day (bcfd) in 2024 to 104.6 bcfd in 2025 and 107.3 bcfd in 2026. With that, Brent crude prices are projected to average $74 per barrel in 2025, before declining to around $66 in 2026, reflecting anticipated increases in production and modest global demand growth.

While the impact on U.S. offshore wind has been widely expected for the past year, a development confirmed anecdotally with a relative paltry turnout for a mid-January floating wind event in Houston, **Phil Lewis**, Director of Research at Intelatus and a global authority on offshore wind and offshore energy matters at large, said in a recent interview that "It's not the death of U.S. offshore wind. While some projects may face delays and investment slowdowns, the market's reliance on established European supply chains and its growth potential support a resilient future." While the U.S. pumps the brakes on offshore wind, the market internationally grows at speed, particularly in Europe and Asia.

Cumulatively this impacts various vessel sectors serving offshore energy, and in this edition we have a trio of reports to offer guidance on vessel trends that impact offshore operations.

- FPSOs are mammoth, CapEx intensive units that take years to build, with only a handful of yards globally able to build them. ABS's **Matt Tremblay**, VP, Global Offshore said that while demand for FPSOs remains steady, the prices are soaring.
- In the OSV segement, Fearnley Offshore Supply's **Theodor Sørlie**, Senior Analyst, writes that all OSV segments are not created equal, with large AHTS', in particular, experiencing high volatility.
- Finally, Phil Lewis and Intelatus recently issued a report that takes a deep dive into the SOV/CSOV sector, a segment that is rapidly expanding through 2028, with some early signs already of over-expansion.

**Check out the 2025 Media Kit via the QR Code Below**

**Gregory R. Trauthwein**
Editor & Publisher
trauthwein@offshore-engineer.com
m: +1-516.810.7405



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118 East 25th Street,
New York, NY 10010
tel: (212) 477-6700; fax: (212) 254-6271
**www.OEDigital.com**

**EDITORIAL**
GREGORY R. TRAUTHWEIN
Editor & Publisher

AMIR GARANOVIC
Managing Editor
garanovic@offshore-engineer.com

BARRY PARKER, New York
WENDY LAURSEN, Australia

**PRODUCTION / GRAPHIC DESIGN**
NICOLE VENTIMIGLIA
nicole@marinelink.com

**SALES**
TERRY BREESE, VP Sales
+1 (561) 732-1185 | breese@marinelink.com

JOHN CAGNI
cagni@marinelink.com | +1 631-472-2715

FRANK COVELLA
covella@marinelink.com | +1 561-732-1659

MIKE KOZLOWSKI
kozlowski@marinelink.com | +1 561-733-2477

GARY LEWIS, Panama
(516) 441-7258 | lewis@offshore-engineer.com

**CORPORATE STAFF**
**CEO**
JOHN O'MALLEY
jomalley@marinelink.com

**President & COO**
GREGORY R. TRAUTHWEIN
trauthwein@offshore-engineer.com

**IT Director**
VLADIMIR BIBIK

**Public Relations**
MARK O'MALLEY
momalley@marinelink.com

**Accounting**
ESTHER ROTHENBERGER
rothenberger@marinelink.com

**Circulation**
KATHLEEN HICKEY
k.hickey@marinelink.com

**SUBSCRIPTION**
To subscribe please visit:
**www.OEDigital.com**

**Email:** oecirc@offshore-engineer.com
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t: (212) 477-6700

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# OE WRITERS


Almufti


Garanović


Laursen


Lewis

**Hani Almufti**, an engineer and senior manager at Cogbill Construction, focuses on piping supports and external pipe corrosion, with expertise in process improvement, and had published articles on related innovative solutions.

**Amir Garanović** is managing editor of Offshore Engineer. He has covered offshore energy and maritime industry since 2014, with a special focus on renewable energy sector and emerging clean energy technologies.

**Wendy Laursen** has 20 years of experience as a journalist. In that time, she has written news and features for a range of maritime, engineering and science publications. She has completed a Master of Science research degree in marine ecology as well as diplomas in journalism, communication and subediting.

**Philip Lewis** is Director Research at Intelatus Global Partners. He has extensive market analysis and strategic planning experience in the global energy, maritime and offshore oil and gas sectors. Intelatus Global Partners has been formed from the merger of International Maritime Associates and World Energy Reports.

**Anurag Raj** is PPG's Customer Sustainability Business Partner for Protective and Marine Coatings. He leads and supports PPG's and its customers' sustainability targets. To learn more about how PPG helps clients make choices that align with their sustainability goals, visit here. Learn more about Protective and Marine Coatings here.

**Theodor Sørlie** is a Senior Analyst covering O&G and renewables at Fearnley Offshore Supply AS since 2022. He is focused on projects across S&P, newbuilding and corporate advisory. He graduated from University College London with a M.Sc. Management Finance (Distinction).

After honing the media campaign of Norwegian green group Bellona (current fuels advisors to the European Commission), **William Stoichevski** began working for the Associated Press. William lives and works in Oslo.

**Fernando Tamayo** currently leads the Emissions team at Welligence Energy Analytics, based in Houston. He has extensive knowledge in the upstream oil and gas sector, with a focus on emissions and decarbonization.


Raj


Sørlie


Stoichevski


Tamayo

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# SOV/CSOV Through 2030: Oversupply and Market Volatility

**By Philip Lewis,** Research Director, Intelatus Global Partners

There has been much interest in the Service Operation Vessel (SOV) and Commissioning Service Operation Vessel (CSOV) segment in recent years. As a consequence of this interest, the combined SOV and CSOV fleet will almost double in size from the end of 2024 to 2028. The rapid expansion of the offshore wind fleet is creating both opportunities and risks. While the demand for offshore wind support vessels is growing, the near-term oversupply will put financial pressure on vessel owners and could trigger S&P (vessel sales & purchase) and M&A (company mergers and acquisitions) opportunities. However, looking beyond 2030, new vessel orders will be required to sustain the next phase of offshore wind development.

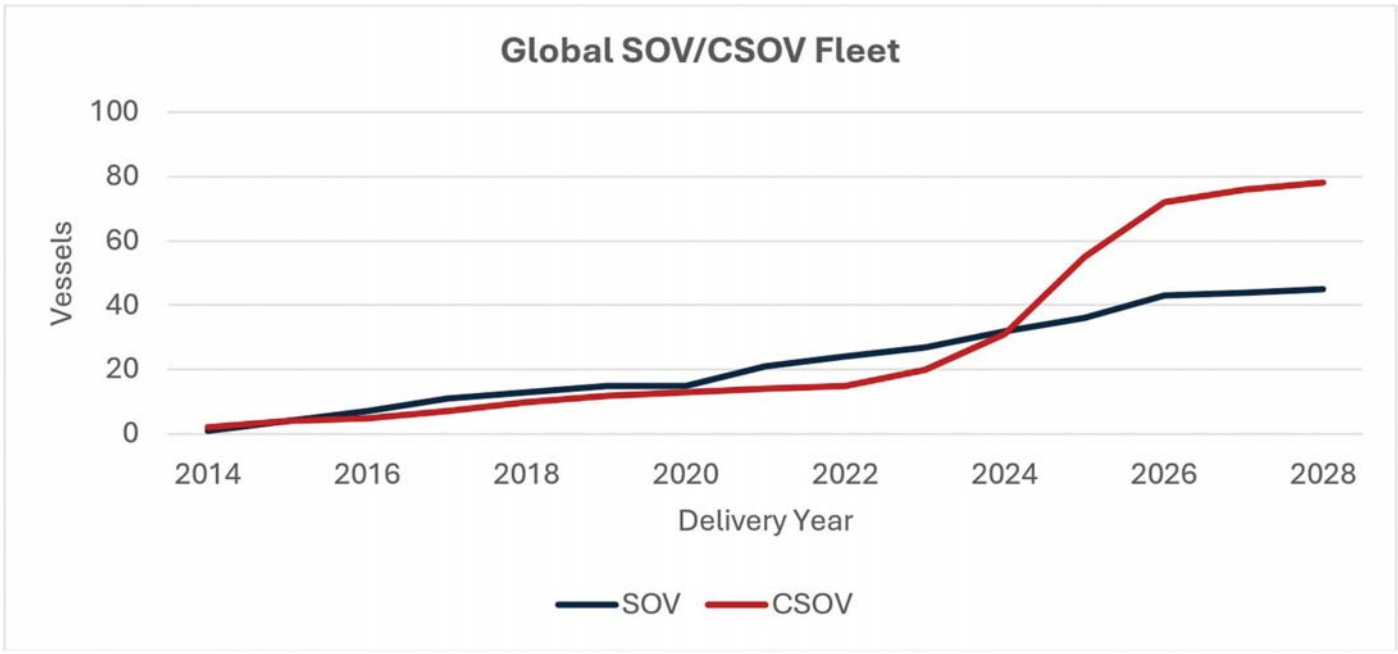
A new 110-page report from Intelatus Global Partners presents an in-depth review of the SOV and CSOV market analyzes the reasons for an imminent oversupply of vessels that could disrupt the offshore wind sector between 2025 and 2030.

## Defining the Segment

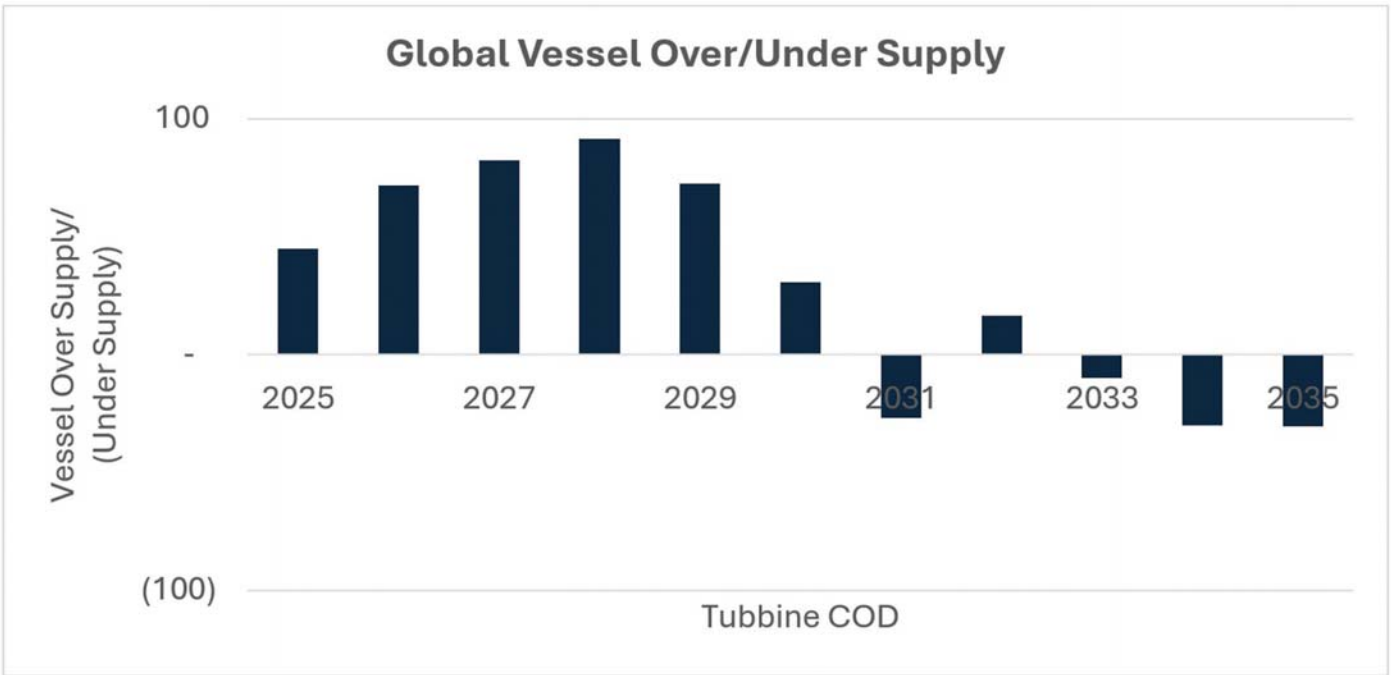
SOVs have traditionally been associated with long-term wind farm operations and maintenance support charters of 10 years or more, and increasingly mid-term (2-10 years) deployment. The guaranteed utilization results in vessels on charter for comparatively low day rates, often yielding single digit IRRs.

CSOVs have traditionally been chartered for offshore wind construction and commissioning campaigns, lasting two years or less. Day rates for these vessels respond quickly to vessel supply and demand balances. Although these rates have been trending up, the forecast vessel oversupply in 2025-2035 is expected to impact utilization and day rates. Some CSOVs have been chartered to satisfy long-term requirements, but at SOV rates. While some of the surplus vessels are likely to find employment in the oil & gas sector, this shift will not be sufficient to offset the excess supply.

Our forecast covers two tiers of vessels:




*Source: Intelatus Global Partners*




*Source: Intelatus Global Partners*

- *Tier 1 vessels are purpose built offshore wind DP2 vessels with motion compensated gangways a 3D cranes. All new building vessels are currently Tier 1 vessels*
- *Tier 2 vessels are generally converted oil & gas MPSVs and PSVs with a permanently installed walk-to-work system and crane. At present, there is only one Tier 2 conversion ongoing, and this is a specific case for U.S. market.*

## Crewing the Vessels

A concern for vessel owners is the ability to attract, develop and retain sufficient numbers of competent and qualified crew.

In the SOV and CSOV, there are two major challenges to address:

- *Recruiting an additional ~1,500 senior crew positions and an additional ~1,725 other positions to crew all the confirm new buildings arriving on the market in 2025-2028.*
- *Addressing increasing local content barriers and costs for crewing vessels in the core SOV/CSOV market of the UK, Europe, Taiwan, Korea and the USA.*

What does this all mean for the financial position of owners?

We have undertaken an analysis of the financial reports of large SOV/CSOV owners accounting for close to half of the delivered fleet.

Many owners already face cash flow constraints, balance sheet pressure, and bottom-line challenges. The forthcoming forecast vessel oversupply is only expected to make conditions more challenging. One consequence is that vessel S&P and company M&A activity will become a key theme in the coming years.

**Report Availability**

*The full report is now available at* ***https://intelatus.com/Business/sovforecast***

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# In OSVs, All Asset Segments are Not Created Equal

Island Victory was delivered in 2020: the most powerful multi-purpose offshore vessel ever built with a towing power of 477 tons recorded.

Photo: Island Offshore/Droneinfo

## *As the offshore market cycle continues to progress, we see large differences across asset segments.*

**By Theodor Sørlie,** Senior Analyst, Fearnley Offshore Supply AS

Beginning post-COVID and in the early phase of the European energy shortage in 2022, all segments experienced an immediate uplift due to attractive supply dynamics and strong projections of future demand. The high-end subsea fleet has by far progressed the furthest, where newbuilds in certain cases are economically justified based on recent fixing activity.

Similarly, modern and large PSV tonnage has seen both dayrates, valuations, and utilization rise to healthy levels in the term market, leading to speculative newbuilds scheduled to enter the market in the coming 18 months. However, large AHTS units have seen a mixed period with high volatility, limited S&P activity, and less market certainty.

Of the traditional OSV segments, large AHTS units can be classified as the highest risk assets given the dynamics of the market. High requirements from operators, lack of term contracts, significant CAPEX for both building and maintenance all lead to a highly specialized market. The total global AHTS fleet today is ~1,700 units, coming down from a peak in 2016 at ~1,900 units. The majority of assets are of low specifications and aging tonnage operating in regions such as the Middle East, West Africa, and Southeast Asia.

The global AHTS fleet exceeding 250-ton bollard pull, which is the typical North Sea requirements to qualify for all relevant work scopes, consists of ~75 units, whereof ~10 can be excluded from the competitive charter market due to flag, ownership or long-term contracts with government entities. Additionally, these vessels are often attractive for advanced project scopes given their power, deck area, subsea features such as ROVs and accommodation capacity.

Of the remaining fleet, roughly 75% is owned by North Sea vessel operators such as DOF, Sea1 Offshore, Solstad Offshore and Aurora Offshore, with the majority of vessels built at yards such as Kleven, STX/VARD and Ulstein. As such, the market is concentrated towards Northwestern European owners who pushed vessel capabilities during the latter part of the last newbuilding cycle. The most recent supply addition is Island Victory, which was delivered in 2020,and the DOF M-class units, delivered from Kleven in 2018.

The North Sea, being the leading region of both ship-

building, design, ownership, and operation of these assets, has been lagging in terms of offshore activity in recent years. The summer of 2022 saw average spot rates exceeding GBP 100,000 for both June and July, which was driven by a perfect storm of low supply and project work across both conventional O&G and floating offshore wind.

Since then, the market has overall improved, yet the incredible peaks we experienced have not persisted primarily due to weak rig activity in the UK. Additionally, we observe improved efficiency from charterers such as Equinor and AkerBP in Norway during the last decade, as a result of improved internal planning and preference for modern rigs, leading to fewer required vessel days per campaign.

With annualized average spot dayrates for large tonnage increasing from roughly GBP 21,000 in 2021 to GBP 40,000 in 2024, we do see a material improvement, yet the spot utilization in the North Sea did not manage to exceed 70% during 2024. Term contracts are not frequent either, with less than a handful of North Sea assets operating on multi-year contracts as of today and typically just around one in five vessels employed on firm term contracts, somewhat driven by the ample spot availability.

On the other hand, the Brazilian market has continued to absorb large AHTS tonnage on long-term contracts in recent years. Multiple North Sea vessels have been awarded multi-year contracts at healthy rates, including tonnage from Solstad and DOF, contributing to the rising global term dayrates. A further three high-end North Sea units have been fixed for commencement this year, leading to a continued decline in North Sea supply.

Similarly, the Australian market has shown strength with owners such as GO Offshore and Sea1 Offshore securing long-term contracts at elevated levels. Furthermore, the Canadian East coast has absorbed tonnage from Maersk prior to the DOF merger.

As such, while the North Sea market is not where the high returns are made, it is indeed now benefiting from the uptick in activity in other regions. The highest demand contribution to the fleet going forwards will be term contracts in the previously mentioned regions as well as the demand related to specific campaigns requiring advanced tonnage in the commissioning or maintenance phase, often vessels supporting with a mix of pre-lay, heading control, accommodation support or ROV operations.

We have already seen multiple vessels working on strong dayrates for EPC clients such as Ocean Installer, TechnipFMC, Saipem and Subsea 7, which we believe will be a core driver of demand going forward. Moreover, project developments in high growth regions such as South America and West Africa are shifting towards deeper waters, which often specifically requires advanced tonnage with significant operational capacities.

Global CAPEX on offshore E&P saw roughly 30% of total volume in deepwater regions from 2016 to 2020, which is now expected to be 35% in 2025. Most of these projects, such as FPSO deployments in Brazil, Guyana, and West Africa, have solid per unit economics and break-even prices below USD 40 p/boe, suggesting healthy fundamentals for future demand even in today's turbulent energy markets.

However, with a persistently volatile local North Sea market with overall weak spot utilization, few owners are today prioritizing fleet renewal in the high-end AHTS segment compared to especially subsea newbuilds. As large AHTS units are considerably equipment-heavy, newbuild prices cannot be justified with current dayrates when adjusted for utilization. Additionally, owners of varied OSV tonnage will have to allocate a significant portion of their balance sheet to enter the large AHTS newbuilding market, compared to lower ticket size opportunities in other segments.

With limited term contracts, financing will require significant equity from the owners as lenders seek stable cashflows, further complicating the process. Subsequently, we predict the current fleet in the high-end segment to remain stable towards 2028, which would lead to a global mean average fleet age of 18 years. Owners seem to be acknowledging the supply limitations of the market and have increased confidence, as bids for both long-term work in Brazil and project work globally often exceed USD 100,000 in dayrates.

2025 might be the year when these rates not only materialize over a short period, but can be achieved with healthy utilization. This could be the trigger required for S&P volume to increase in a similar fashion as observed across PSV and subsea tonnage, yet owners are today quoting asking prices that cannot be justified based on current dayrates in most cases.

As a reminder, this article was written in early February and at the time of writing we can record ample supply of available North Sea tonnage in both Bergen and Montrose. The first month of 2025 saw North Sea AHTS rates vary from GBP 12,500 to GBP 100,000, with comparable vessels achieving approximately USD 70,000 on the most recent Petrobras tender or up to USD 100,000 in the project market, illustrating the required risk appetite to operate in the segment. Subsequently, the market is still not trending towards full utilization and requires further project activity or units absorbed over long-term contracts.

# Cancelling Jackdaw and Rosebank will Increase UK Emissions

**By Fernando Tamayo,** Emissions team lead, Welligence Energy Analytics

A Scottish court has ruled that the approvals for the Rosebank and Jackdaw oil and gas fields were unlawful due to inadequate environmental impact assessments, particularly concerning downstream emissions (Consumption - Scope 3). Despite this ruling, development work on these projects will continue while new environmental assessments are submitted. This decision follows a Supreme Court mandate that fossil fuel project approvals must account for all downstream emissions. Shell (Jackdaw) and Equinor (Rosebank) will resubmit their applications once revised environmental guidelines are released in the spring.

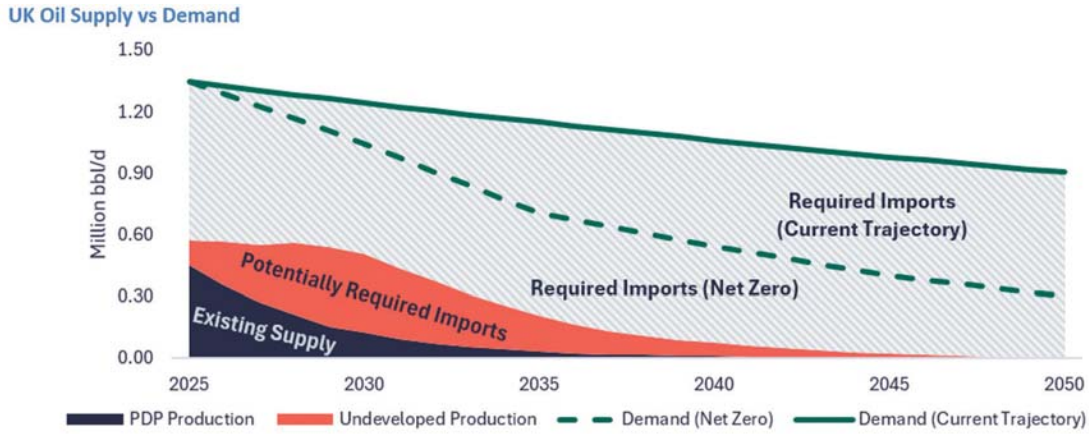
## Our take

If Rosebank, Jackdaw, and other future developments are cancelled, the UK will increase its reliance on imports and inadvertently contribute to higher global greenhouse gas emissions.

The court's ruling was based on Shell's and Equinor's failure to consider emissions associated with the combustion of produced hydrocarbons. However, it is important to note that this source of Scope 3 emissions is ultimately driven by hydrocarbon demand. Even under the Department for Energy Security and Net Zero's ambitious Net Zero Scenario (DESNZ NZC), there is a significant gap between national demand and supply. Jackdaw and Rosebank do not increase demand; instead, they serve as a means for domestic production to meet the UK's sustained demand (as well as supporting jobs and providing tax revenue).

By limiting oil production to levels below demand, the UK restricts its ability to regulate upstream operational practices and increases the distance oil must travel—both factors significantly impacting emissions. As domestic production in the UK diminishes, the country will increasingly rely on imports. Currently, the main countries that supply crude to the UK are Algeria, Libya, Nigeria, Norway, and the US. All but Norway must ship crude thousands of kilometres, and these voyages are emissions intensive.

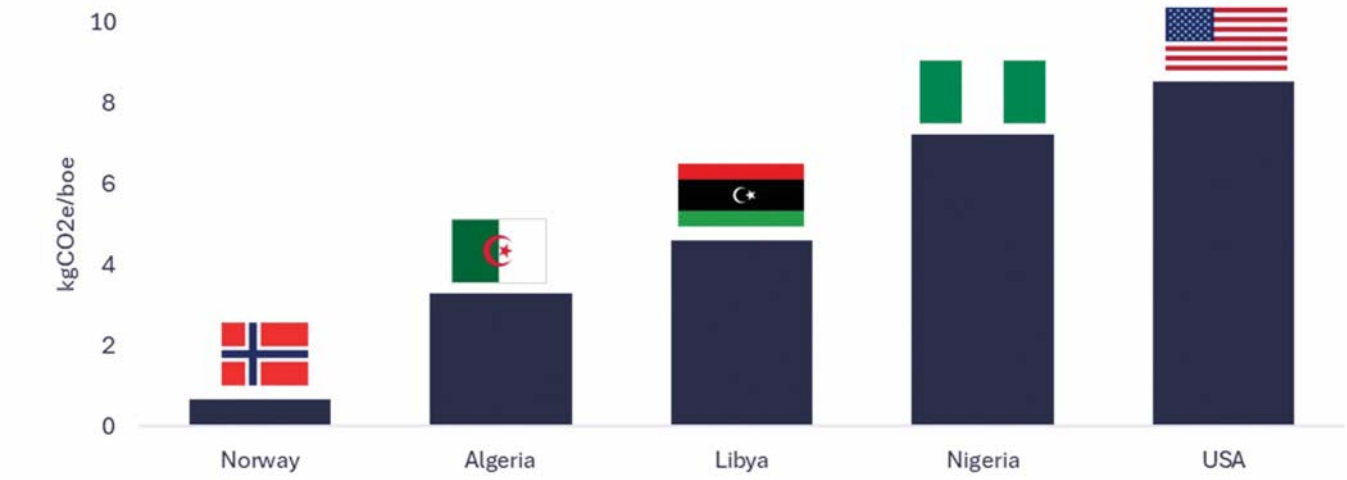
For reference, Rosebank's average emissions intensity for the first 13 years (8.40 kgCO2e/boe) of production would be lower than just the transport emissions associated with crude imports from the US (8.53 kgCO2e/boe). This means that even if the production of crude in the US was carbon neutral, the UK (and the world) would see




Source: Welligence Energy Analytics and DESNZ

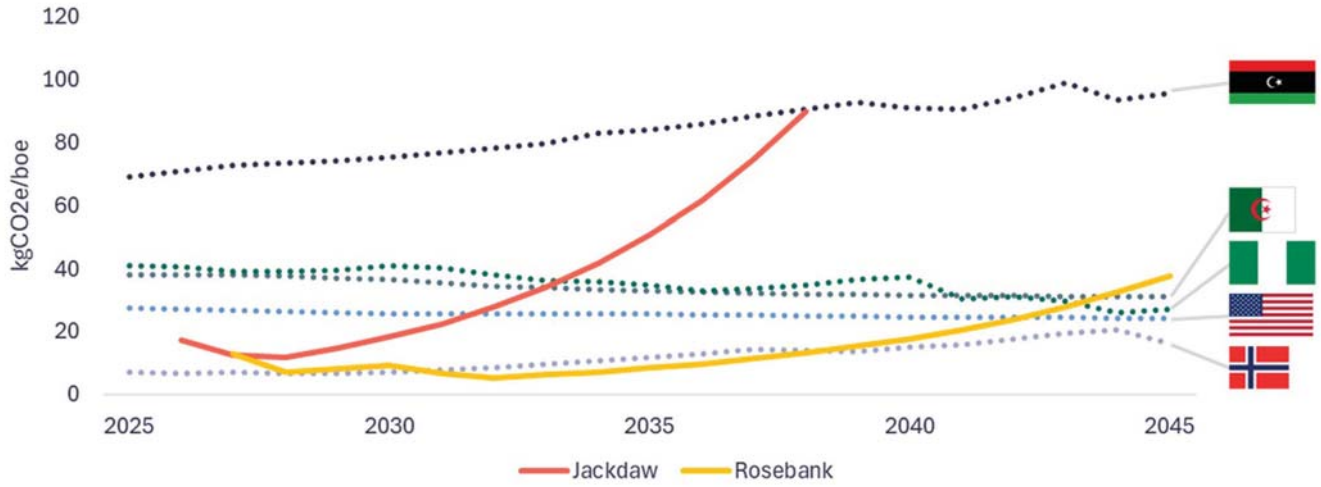
*Note: Demand (Current Trajectory) represents an oil demand forecast based on historical data from the past 25 years. Demand (Net Zero) represents the Department for Energy Security and Net Zero's (DESNZ) net zero scenario.*

**Crude Transport Emissions Associated with Key Crude Exports to the UK**




Source: Welligence Energy Analytics Scope 3 Platform

**Upstream (Scope 1 + 2) and Transport Emissions Intensity - Domestic Production vs Imports**




Source: Welligence Energy Analytics Emissions Platform

lower absolute emissions if crude was produced domestically, instead of imported from the US.

When these factors are considered, the court's decision appears to accomplish the opposite of what it set out to do. Compared to imports from key suppliers to the UK, Rosebank's upstream and transport emissions would make it the least emissions-intensive source of crude until the late-2030s. Jackdaw would be less emissions intensive than oil supplied by four out of five key countries exporting to the UK. Moreover, Jackdaw's positive environmental impact is not fully captured above. Given that the asset is being developed via the existing Shearwater infrastructure, it will be responsible for zero incremental emissions. Furthermore, the Jackdaw tieback will decrease in the emissions intensity of the Shearwater Hub by nearly 70%.




# FPSO MARKET 2025: DEMAND STEADY, PRICES SOAR

*As a leading classification society for Floating Production Storage and Offloading vessels (FPSOs), the American Bureau of Shipping knows a thing or two about the trends driving future generation of these mammoth, capital-intensive units.* ***Offshore Engineer*** *was in Houston last month and met with* ***Matt Tremblay, Vice President, Global Offshore at ABS****, for his insights on drivers for the market in 2025 and beyond, from new designs to digitalization's evolving role in maintenance.*

FPSOs are the backbone of offshore oil and gas production discovery and recovery, providing a bridge between deepwater reservoirs and global energy markets. Today the oil and gas industry as a whole faces consistent and sometimes rapid shifting landscape in terms of economics, technology and sustainability.

According to Tremblay, the FPSO market in 2025 is expected to remain stable, with 10 to 12 offshore production projects reaching final investment decisions (FIDs)—a continuation of 2024 trends. Brazil remains a focal point, with Petrobras leading significant developments, including the Petrobras 86 project and SEAP 1 and SEAP 2 FPSOs. Shell's Gato do Mato project is also anticipated to move forward early in the year.

"The year is front-loaded with Brazil's activity," says Tremblay. "We expect around four to six FIDs in both the first and second halves of 2025, with the majority leaning toward new construction. However, some conversions will still play a role."

## NEW CONSTRUCTION VS. CONVERSION: SHIFTING DYNAMICS

Traditionally, FPSO conversions—modifying existing tanker hulls for offshore production—offered a cost-effective and faster alternative to new builds. However, the industry has seen an increasing tilt toward new construction, with 80% of projects in 2024 being newly built.

This trend is fueled by major players such as Exxon and

Petrobras, who are commissioning high-capacity FPSOs, exceeding 200,000 barrels per day.

Tremblay notes, "Conversions can't accommodate FPSOs of this scale, as they're larger than even the biggest ultra-large crude carriers (ULCCs). And with limited shipyards capable of building them, costs are naturally higher."

SBM Offshore's Fast4Ward program is one example of maximizing efficiency, a program which builds FPSO hulls on spec, essentially helping to shorten delivery timelines, bringing new builds below the traditional 36–40 months to under 30 months.

Even with efficiency fixes, the global supply chain remains a critical concern for FPSO construction. Tremblay emphasizes that while equipment delivery delays have stabilized, prices continue to rise.

"The cost of FPSOs has soared," he said. "The P-78 FPSO was contracted at $2.5 billion, but just a few years later, P-84 and P-85 are each valued at $4.1 billion."

One factor behind this cost escalation is vendor strategy, as they take a more measured approach to growth. Tremblay compares FPSO equipment manufacturers to offshore drillers: "After years of financial losses, they're holding off on expanding capacity and instead capitalizing on high demand."

Another factor in the cost equation is, of course, the shipyard.

With only a handful of shipyards capable of building FPSOs, the market remains constrained and China dominates, with four to five active yards, while South Korea's Hanwha is aggressively competing for market share, leveraging geopolitical concerns, specifically U.S./China relations.

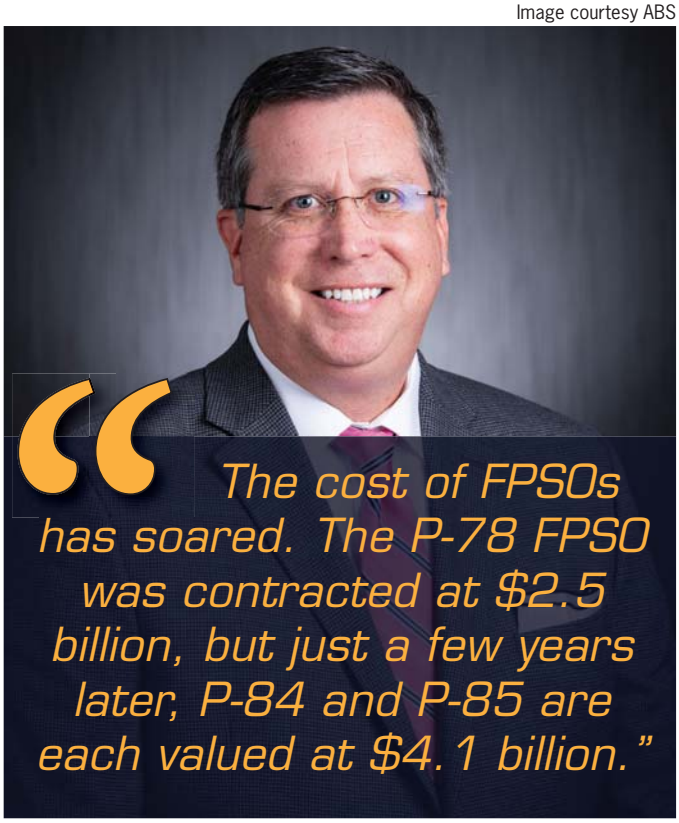
Meanwhile, even the shipyards that dominate the FPSO sector are actively weighing their options, as shipyards must weigh the size and particularly the length of FPSO contracts against more profitable alternatives like gas carriers. "FPSOs take a lot of steel; they're big; they take up a ton of space. I can probably build three, maybe four gas carriers per square meter of dry dock space versus one FPSO; so I'm making more money building gas carriers than I am building FPSOs," observed Tremblay.

## FPSO MAINTENANCE & THE DIGITAL SHIFT

While designing and building modern FPSOs present their own challenges, once built and operational a growing challenge for FPSO operators is maintaining these larger, more technically complex vessels. Traditional calendar-based maintenance cycles are giving way to vessel-specific, condition-based maintenance strategies, supported by digital tools and remote inspection technologies.

"Inspecting every tank in a five-year cycle is logistically tough, especially with FPSOs getting bigger," says Tremblay. "We need digital twins—fully integrated, real-time asset models that allow operators, regulators, and class societies to collaborate on maintenance plans."

Image courtesy ABS




**– MATT TREMBLAY,**
**VICE PRESIDENT, GLOBAL OFFSHORE AT ABS**

Remote inspection tools like drones, cameras, and LiDAR are advancing but remain limited by the need for physical cleaning. "You can't detect bottom pitting corrosion if the tank is covered in sludge," Tremblay explains. "That's why the new double-bottom FPSO designs will be a game-changer," as they simplify tank cleaning, reduce manpower and improving inspection efficiency.

At the same time, FPSO designs are also evolving to align with sustainability goals, with companies like Yinson and Petrobras pioneering technologies such as onboard carbon capture and FPSO electrification.

"Petrobras' new FPSOs will operate like electric cars—using large natural gas turbogenerators to power electric motors instead of diesel engines. This reduces CO2 emissions by approximately 20%," says Tremblay.


Image courtesy OKEA

# SCALING 'AI' OFFSHORE

*Production-well serial data ticking in from electronically tagged downhole tools are now sorted, algorithmically, and in near real-time. While some are still testing AI's backend (programming and hardware) and front-end (user controls and contextualized data) — without committing — operators in Norway are AI early adapters. Their engineer comms are already neural, just as young data scientists flush out the flaws, losses and some of the complexity in well tests.*

## By William Stoichevski

Nowhere offshore are the advantages of "AI" more impactful and the market-moving aspects clearer than during the "routine" well-test. Apart from engineers, geologists and company execs, even financial analysts are in on the scrutiny. We query the latter and find they have yet to consider whether AI production tools — whether "open API" or "closed" and cloud-based — make a difference in the bottom line. Perhaps they should.

Provided they have the right stuff, a producer, say, an indie, can "tweak" data models as they go on an "open" API system. Closed, cloud-based AI may be more regulatorily ready. Both can save millions of dollars during a year of well tests. Asked whether AI will become part of an oil company's SGA costs, be crunched as COGM or be chalked up as R&D, our analyst is stumped. Offshore operators, too — despite being early AI movers — aren't sure what to make of offshore AI.

"It's like (doing) magic," says Solution Seeker data scientist, Christine Foss-Sjulstad. "I think very many people think AI is a magical tool that fixes all your problems. So, getting customers in the mindset that they need some good data to start with is a tough discussion that we need to have. The more data you have, the better the product," she tells ***Offshore Engineer*** on Teams. AI and "expectation management", it seems, go hand-in-hand.

## SOLUTION SEEKER

Their Web page suggests offshore workflows and efficiency measures can be reined in, digitally. Norway operator, OKEA, is using Solution Seeker's Production Compass AI software and its data science tools at the Draugen field, where data-driven — and not just "physics-based" — flow-rate management is helping ensure better work flows and AI adaption elsewhere. Installed is a system of smart, "virtual-sensor" alarms that notify engineers when data models indicate noteworthy change, letting them other things. Draugen's topside-controlled well tests, once laborious, are simpler for using Solution Seeker's Well Test app. For its subsea wells, the app enables deduction testing that incurs minimal loss when shutting in one well at a time.

Stories about AI tend to be a mix of expectation and speculation about what AI should be able to do and where it is heading. Our analyst notices that offshore, service companies are pairing control systems with resident applications. "A lot of it refers to downhole data," he remarks.

At ONS 2024, Solution Seeker promoted their Neural Compass Virtual Flow Meter, or VFM, with its data-driven methodology enabling timely reservoir and pressure estimates to add to its streamlined production test app and workflow monitoring, including comms with offshore engineers. To use the tools, producers need their own data "solidly structured".

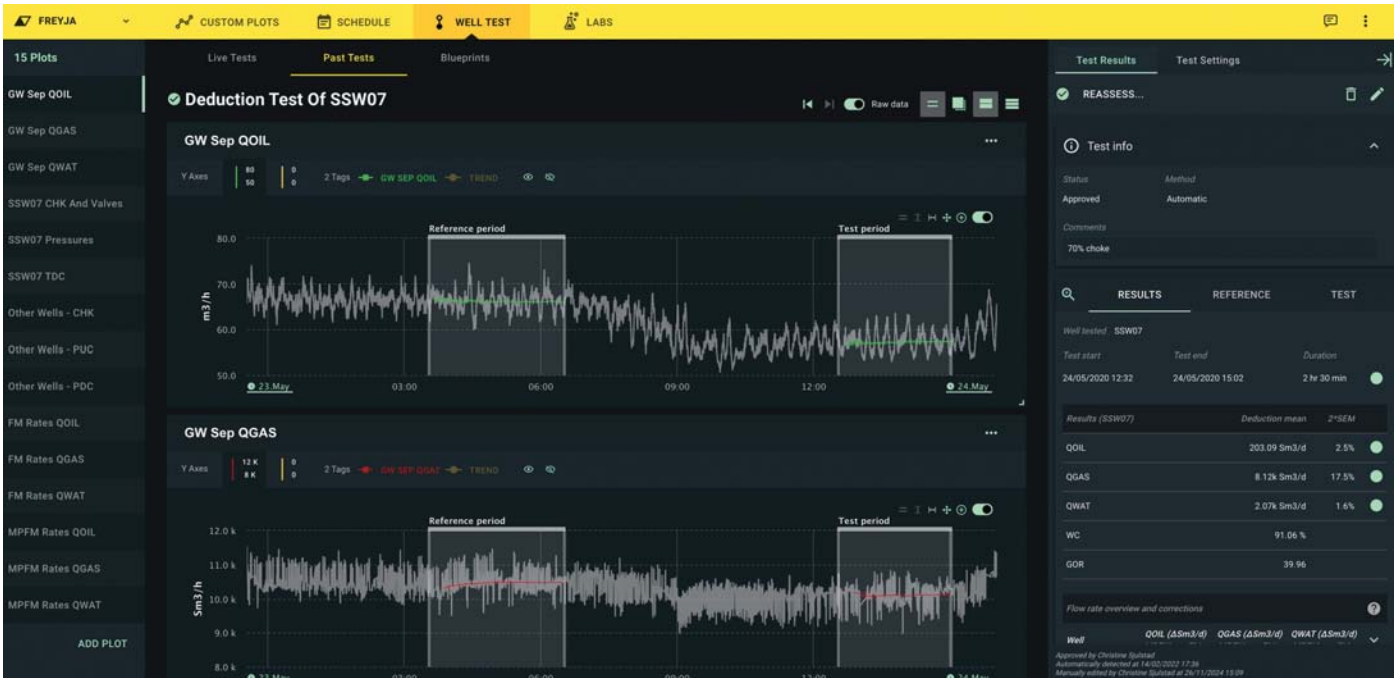



Image courtesy MAN ES

*"It's like (doing) magic. I think very many people think AI is a magical tool that fixes all your problems. So, getting customers in the mindset that they need some good data to start with is a tough discussion that we need to have. The more data you have, the better the product."*

**– Christine Foss-Sjulstad,**
**Data Scientist, Solution Seeker**

Image courtesy Solution Seeker

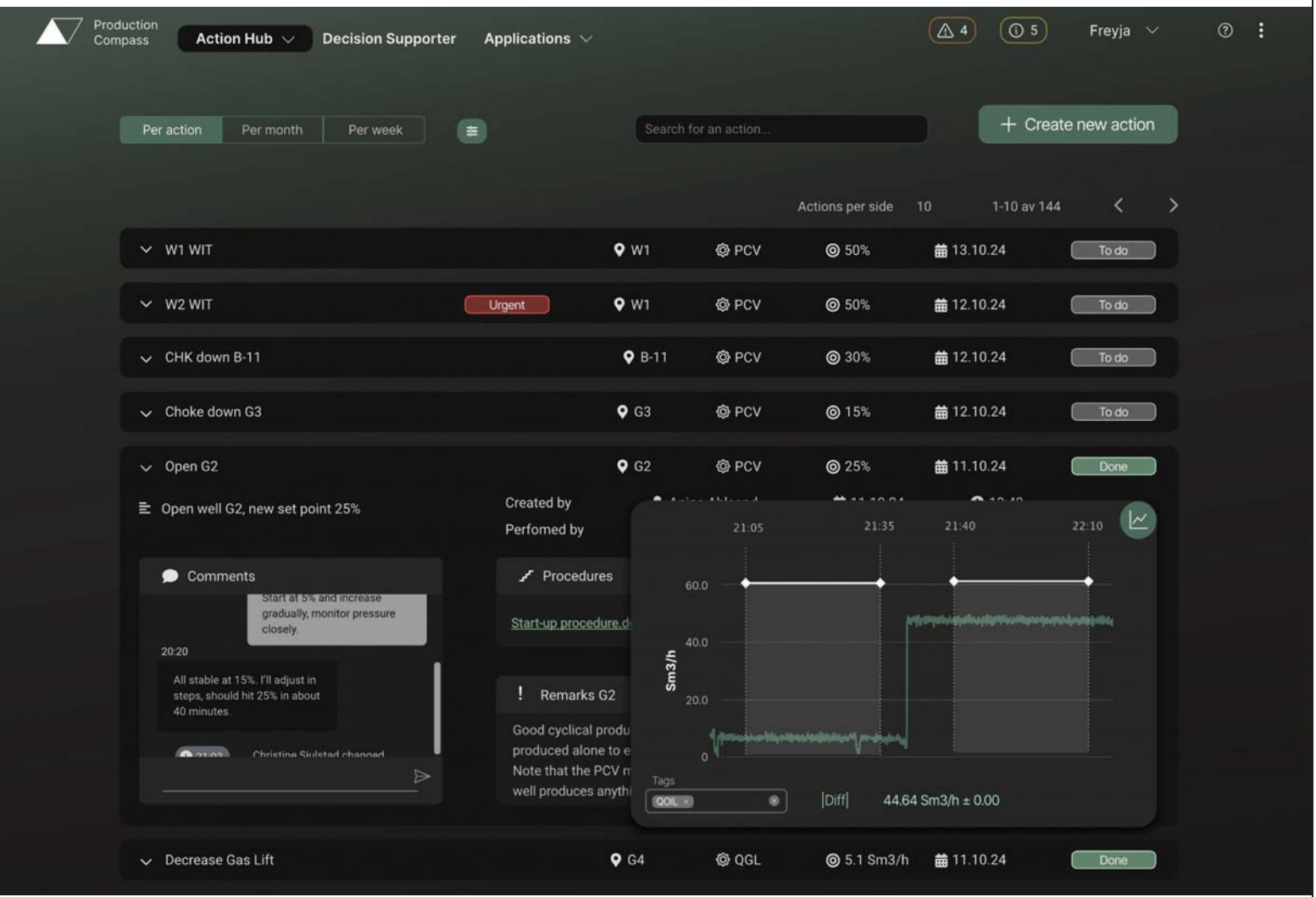



Image courtesy Solution Seeker

You can't just place an algorithm on top of a mass of data, Foss-Sjulstad says. "It's about contextualizing the data and triggering algorithms in a correct way," so having data infrastructure in place is key for both producer and AI supplier.

## SEEING HUMAN ERROR

Gathering and interpreting client data sets are how Foss-Sjulstad and her overwhelmingly under-35 team of data scientists find solutions to challenges that range from oil-water remedial work to models that don't reflect well tests.

Another challenge lies in showing the limits of physics-based production modelling. A data-driven offering appears to offer easy data control and model maintenance. Engineers' fears should be eased by knowing Solution Seeker products and tech have since 2013 been developed in close collaboration with production experts.

Virtual flow metering is a "tricky and complex" field of technology. The key info is the well test, which Solution Seeker defines a good when "you're actually approving tests and you have a very standardized workflow" while being able to easily import the well test data, other standard instrument data like pressure, temperature, choke sizes etc., when you're "good to go". Solution Seeker say they see human mistakes during well tests, as their tech autodetects well tests and provide info on "uncertainties" for different test results. "When we look at previous well tests, we see that there has been … a lot of human error. So, if it isn't very intuitive, then you might not enter a certain time that perhaps you should have looked at to recognize that perhaps this wasn't a really good well test," Foss-Sjustad says.

When talking to Solution Seeker, it is difficult not to flash back to a time — not long ago — when Increased Oil Recovery and Enhanced Oil Recovery were all the rage, before cost-cutting became the thing. Solution Seeker, despite its software start-up vibe (it is an NTNU university spinoff), did, in fact, emerge out of that era (in 2013) and was created to answer all those needs. Their young vibe is real, however, although anchored in solid, grey-haired reservoir-flow and well-integrity experience.

## DEFERRED PRODUCTION

The staggeringly wealth-generative and tech-heavy Norwegian oil industry is well onboard with Solution Seeker's approach. Only Equinor and Svall are understood to not be using Solution Seeker tech among Norway's operators.

While their current AI offering streamlines workflows and backs up physics-based production modelling, Solution Seeker are nevertheless upping their AI game and also adding use cases for machine-learning, at least with OKEA. Yet, it's their well-test app that has convincingly won over a client list that's the Who's Who of hydrocarbons.

"The well-test app … is fairly off-the-shelf, standardized and works from the get-go," Foss-Sjustad says, adding that deduction testing has also won over clients because "its crucial to know when you're not getting enough information during the additional time when you're shutting in a well. Being able to see the uncertainties and how they converge and be able to say, "Okay, now I can actually start up my well"." Beyond the algorithm, visualization, can now end a test earlier than once thought correct, and at least one client is on the record saying they avoided deferred production worth about 6 million kroner (USD 600,000) per well test (they average 12 tests a year)! "It's fairly simple. It creates value from the get-go."

Solution Seeker's recently released Neural Compass VFM app is used as both backup or as sole evaluator of flow. Some oil companies might also use a mechanistic MPFM which would have to be "fused" to it to add "information value", making setting up "out-of-the-box" difficult and highlighting an industry with no "off-the-shelf" app to relay on for production. It doesn't help that "Data infrastructure isn't standardized across producing fields, (digital) platforms and different companies". Custom set-ups, the fine-tuning of existing apps and the adding of new features "in-stride" appears to be the rule.

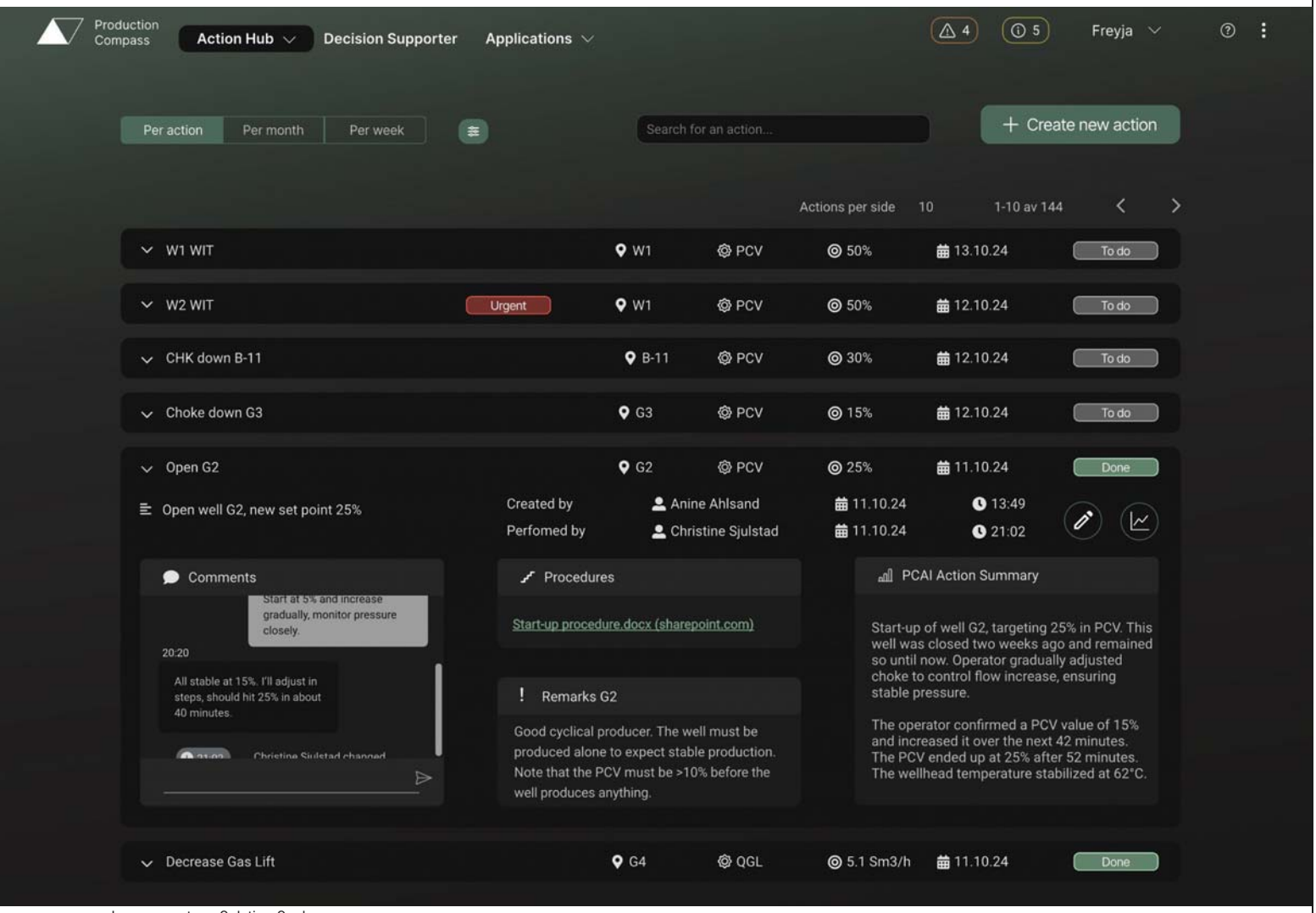
## TRAINING AI AND STAFF

Asked whether operator employees or the AI itself had to be trained, Foss-Sjulstad says, "It depends."

"VFM (Virtual Field Manager) is a service we deliver mostly from our side, training and updating the model as well as deployment. What the client sees is an updated signal, like any other tag. Training enters the picture on products that are workflow based. For the well test app, you need to have a tutorial with the client…The same applies to a product we have (Neural Compass), where you create actions, and you can cooperate with the offshore engineer or the offshore operator first to discuss an action and then to communicate back when done. That's when you need to train engineers."

As everywhere, selling AI isn't all smooth sailing. Gone are the fundraising rounds, the Norwegian Research Council funding and the help from known innovators. It's hard, too, to convince proud engineers using trusted physics-based models to open up to data-driven production management, however sound.

That, too, "depends on the use case".

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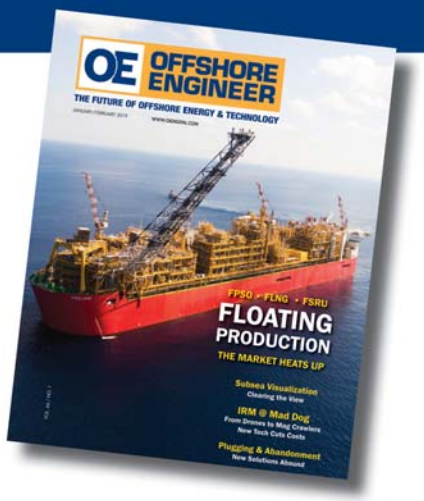

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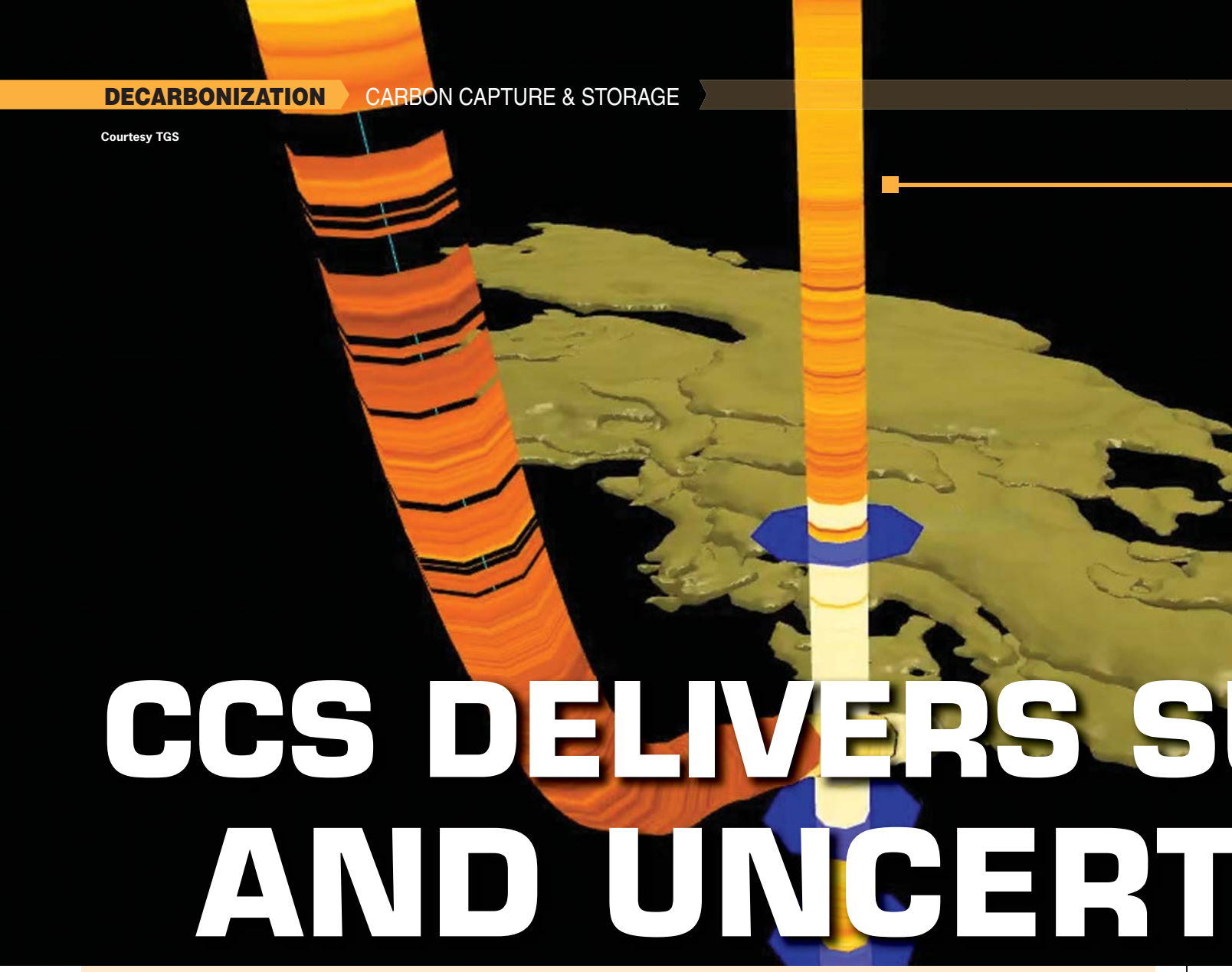


Courtesy TGS

# CCS DELIVERS S
# AND UNCERT

*There's two problems that demonstrate the immaturity of CCS: the physics for predicting CO2 behavior isn't perfect, neither are the 4D seismic strategies required to make up for it.*

**By Wendy Laursen**

3D VIEW OF SLEIPNIR DATA

# URPRISE
# TAINTY

*Using an oil and gas seismic survey system for CCS monitoring is like using a military tank for daily commuting.*

**– Frank Chen,**
**Senior Solutions Architect, Ovation Data**

Physicists at Los Alamos National Laboratory recently pointed out that current physical models of sequestered CO2 don't properly account for the elasticity of a rock when it is saturated by a fluid. They have developed a new model they hope will make monitoring of CCS sites more reliable.

Physics models such as the Biot-Gassmann equation, and the newer model from Los Alamos, along with others such as Darcy's Law, are used to simulate CO2 behavior. The aim is to avoid "subsurface surprises" – finding sequestered CO2 in unexpected places.

The CCS industry relies on geological and flow simulation models to predict CO2 plume development over decades. The surprise usually turns out to be significant permeability features, such as invisible faults or barriers, that are not detected in seismic surveys and therefore cannot be accurately included in simulations.

"This isn't to say that geologists and reservoir engineers haven't done their part well," says Frank Chen, Senior Solutions Architect at Ovation Data. "The challenge lies in the fact that the input models, heavily controlled by only a few wells, often need more details of geological heterogeneity in areas without well control."

4D seismic, which compares time-lapse differences in seismic surveys to capture snapshots of the CO2 plume front over time, is perhaps the only physical measurement that can 'directly measure' the CO2 plume front laterally, especially far from the injection well location, says Chen.

"4D seismic offers detailed mapping of the CO2 plume front. Moreover, it is an invaluable communication tool that bridges understanding among operators, regulators

> *Understanding of the overburden and the geology beyond the storage unit plays a critical role in the site validation. This requires large, yet detailed, subsurface models.*
>
> **– Bård Stenberg,**
> **VP IR & Business Intelligence, TGS**

Courtesy TGS

and the general public, especially when a vast amount of taxpayer money is at stake in a CCS project."

There's a lot of interest in optimizing costs, and a lot of scope to do so. "Most offshore CCS project injection formations are shallow, typically less than 1,000 meters deep. In contrast, oil and gas targets are much deeper, often requiring good imaging at depths of up to 5,000 meters. Using an oil and gas seismic survey system for CCS monitoring is like using a military tank for daily commuting," says Chen.

Equipment mobilization and deployment costs constitute a significant portion of seismic acquisition. Gregor Meikle, Technical Director – Seismic at Tetra Tech RPS Energy Limited, helps design acquisition strategies. These strategies consider the usefulness of existing datasets and practical considerations such as streamer positioning, weather conditions and SIMOPS, says Meikle. New data will be compared back to baseline data, so if extra lines were required then, the company's acquisition planning involves optimizing line planning and quality control next time.

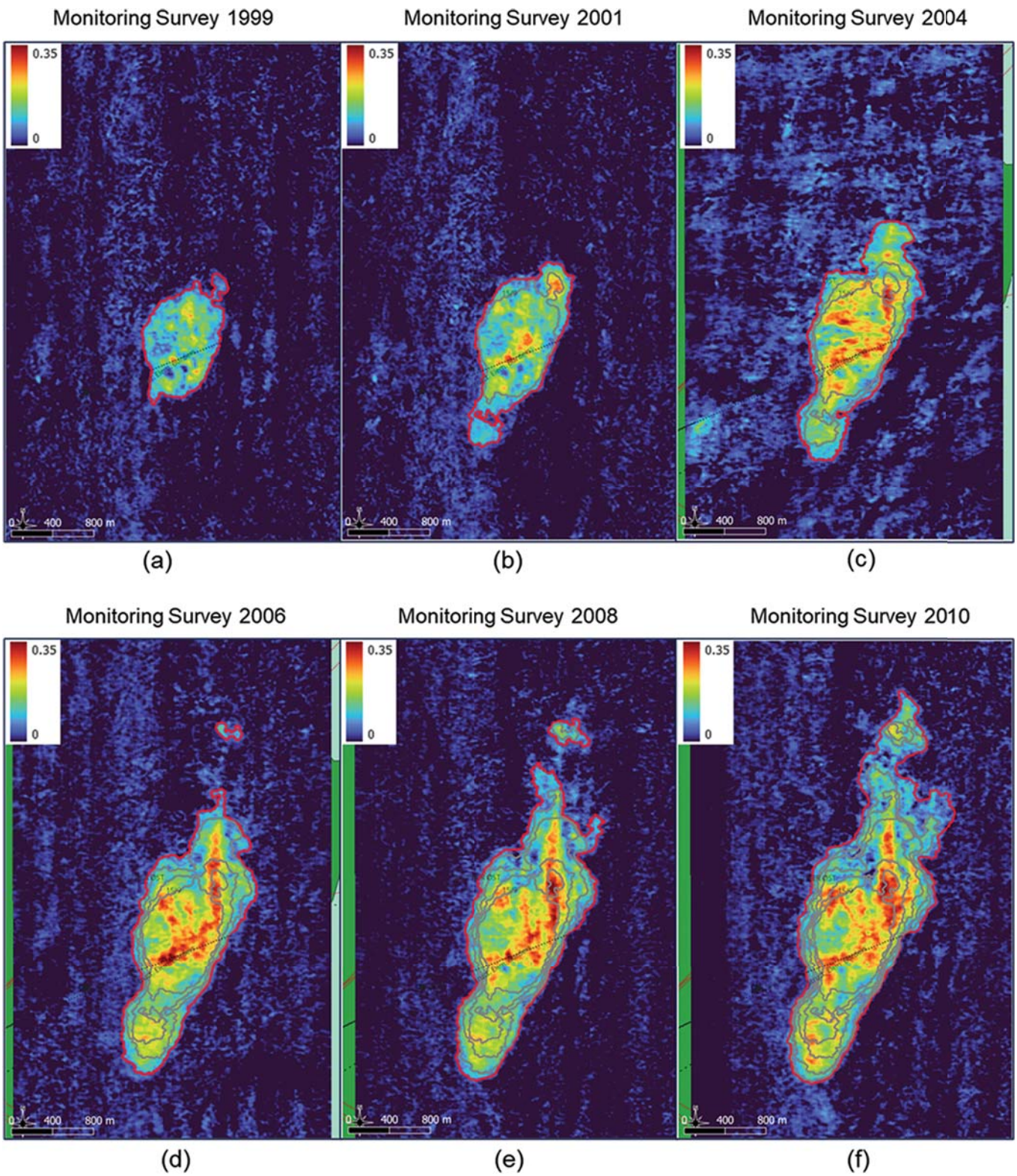
Legacy data can be useful even though a major part of the energy recorded by sensors has historically been treated as noise. Better physics, newer algorithms and scalable compute resources allow geophysicists to extract more accurate and complete information of the subsurface, for example using multiple reflections and waveforms other than reflections, says Bård Stenberg, VP IR & Business Intelligence at TGS.

A suitable CO2 reservoir has a solid cap rock with an impermeable low porosity layer to prevent the CO2 from migrating vertically. Additionally, a good spread of the CO2 plume inside the reservoir is needed to ensure efficient storage. "Understanding of the overburden and the geology beyond the storage unit plays a critical role in site validation. This requires large, yet detailed, subsurface models," says Stenberg.

It also requires processing power. Seisnetics has adapted concepts from genetics for its AI-driven tools for detecting valuable information from big and complex seismic datasets. Its algorithms split seismic traces into small waveforms and then try to find similarities elsewhere and group them into families. The solutions are data driven: no models, simplifying assumptions, data training or human guidance is required. This optimizes processing time and produces unbiased information from 3D seismic volumes.

Shearwater Geoservices offers its proprietary processing software Reveal and is currently building new technology key to CCS within the platform, including spectral-element-modelling-based full-waveform inversion (SEM-FWI). SEM-FWI models the near-surface more accurately, as SEM moves away from forcing its modelling to fit into a regular grid of cuboids and instead allows the modeling to honor the geology, adapting when the geology changes rapidly.

Shearwater is partnering this with the use of NVIDIA's GH200 Grace Hopper superchip which is specifically designed to handle giant-scale AI applications by providing faster memory and massive bandwidth. Shearwater is investing significantly in AI research, and Senior Vice President of Strategy and New Markets, Tanya Herwanger, sees the company's new AI-based uncertainty qualification as game changing for CCS. "Driven by pressure to reduce costs, we expect companies to design 4D monitors that are sparser than the baseline. Having uncertainty estimates associated with models coming from sparser, more resource-constrained data will be paramount."




Courtesy Frank Chen

**FRANK CHEN AND KAMI KEIM OF OVATION DATA HAVE PROPOSED A NEW TIME-LAPSE SEISMIC METADATA EXTRACTION AND PROCESSING WORKFLOW DESIGNED TO CONTINUOUSLY MONITOR AND PREDICT THE CO2 PLUME FRONT IN CCS PROJECTS USING THE SLEIPNER DATASET AS A CASE STUDY.**

> *Today procurement processes for seismic are inflexible and inefficient and are a contributing factor to the end cost of seismic.*
>
> **– Tanya Herwanger, SVP of Strategy and New Markets, Shearwater**

Courtesy Shearwater

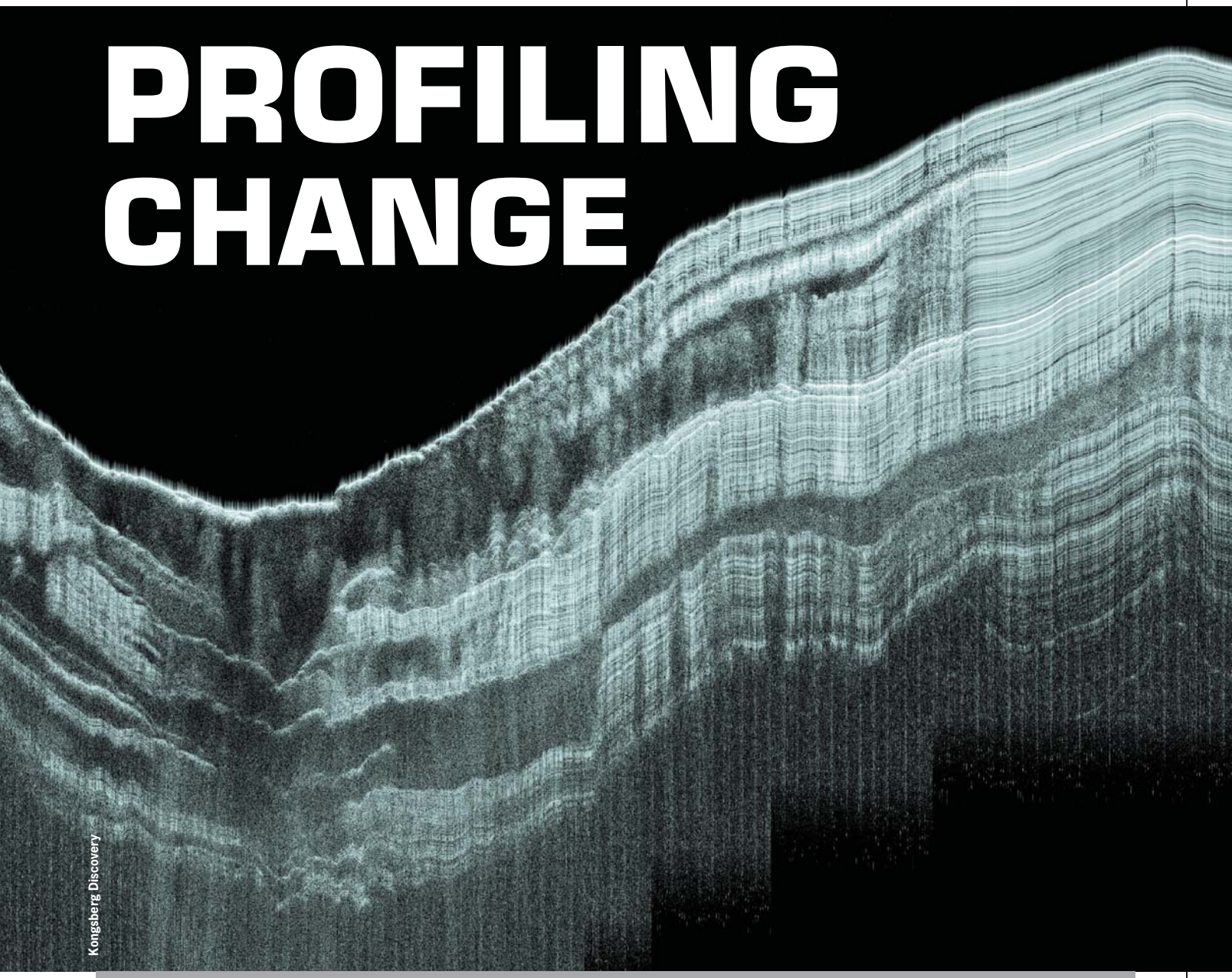
Monitoring strategies will vary from site to site and potentially also from country to country, depending on the regulations. 4D seismic will no doubt play a role, says Herwanger, but this may well be part of a broader plan that includes some kind of detection or trigger system that alerts the site operator to take a closer look. "Potential hybrid solutions feature in many of the discussions. These involve configuring ocean bottom nodes, fiber optic cables and streamers. Aspects such as long battery life which extends the time between deployment and recovery will open new possibilities. Shearwater's Pearl node has industry leading battery life of 150 days and extending that is certainly something we are looking at."

Herwanger expects business models to evolve to address subsurface data needs in hub environments with multiple storage sites and operators close together. This could involve operators working together. "Today procurement processes for seismic are inflexible and inefficient and are a contributing factor to the end cost of seismic. In traditional oil and gas, operators seem unable or unwilling to update their procurement practices to access seismic services in a smarter, more efficient manner. Will they manage to do so for CCS?"

**DRIVEN BY PRESSURE TO REDUCE COSTS, SHEARWATER EXPECTS COMPANIES TO DESIGN 4D MONITORS THAT ARE SPARSER THAN THE BASELINE.**

Courtesy Shearwater

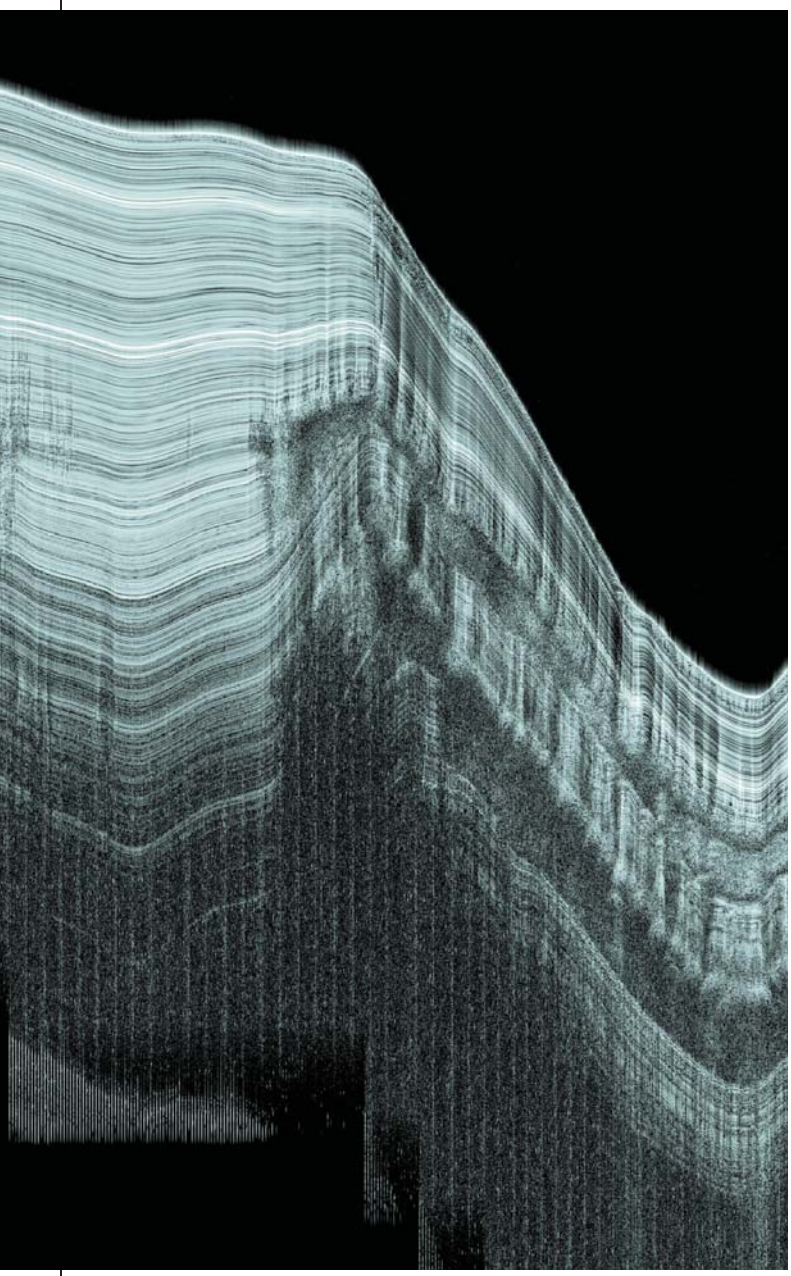
# PROFILING CHANGE



Kongsberg Discovery

*SUB-BOTTOM PROFILERS ARE TRACKING OFFSHORE WIND INTO DEEPER WATER, BUT THERE'S OTHER OPPORTUNITIES TOO THAT ARE DRIVING THE LATEST DEVELOPMENTS.*

**By Wendy Laursen**



Kongsberg Discovery

***"The need for automated solutions to ensure data quality is becoming more important."***

**– Therese Mathisen,**
**Product Manager for Sub-bottom Profilers, Kongsberg Discovery**

Bahrain's coastline has expanded significantly in the past 30 years, while Abu Dhabi actively pursues new land development through the creation of massive artificial islands.

Sub-bottom profilers have and will be crucial in projects like these, says Richard Dowdeswell, CCO at GeoAcoustics. "Offshore construction, particularly for land reclamation projects like ports and harbors, is a growing market. Before any construction begins, it's essential to understand the area's geology, which feeds into the civil and marine engineering plans. Most of this activity happens in shallow coastal waters."

The growing demand for geophysical surveys, particularly for wind farm development, is another key driver, says Dowdeswell, and this is increasingly encompassing deeper waters. "Wind farms require knowledge of subsurface conditions, especially for laying interconnecting and export cables. When operating cable trenching machines, it's critical to identify potential obstacles like large boulders that could damage the expensive equipment. This is where more powerful sub-bottom profilers, along with traditional seismic boomers and sparkers, come into play. These tools, which operate at lower frequencies with more power, help detect deeper subsurface features and harder


GeoAcoustics

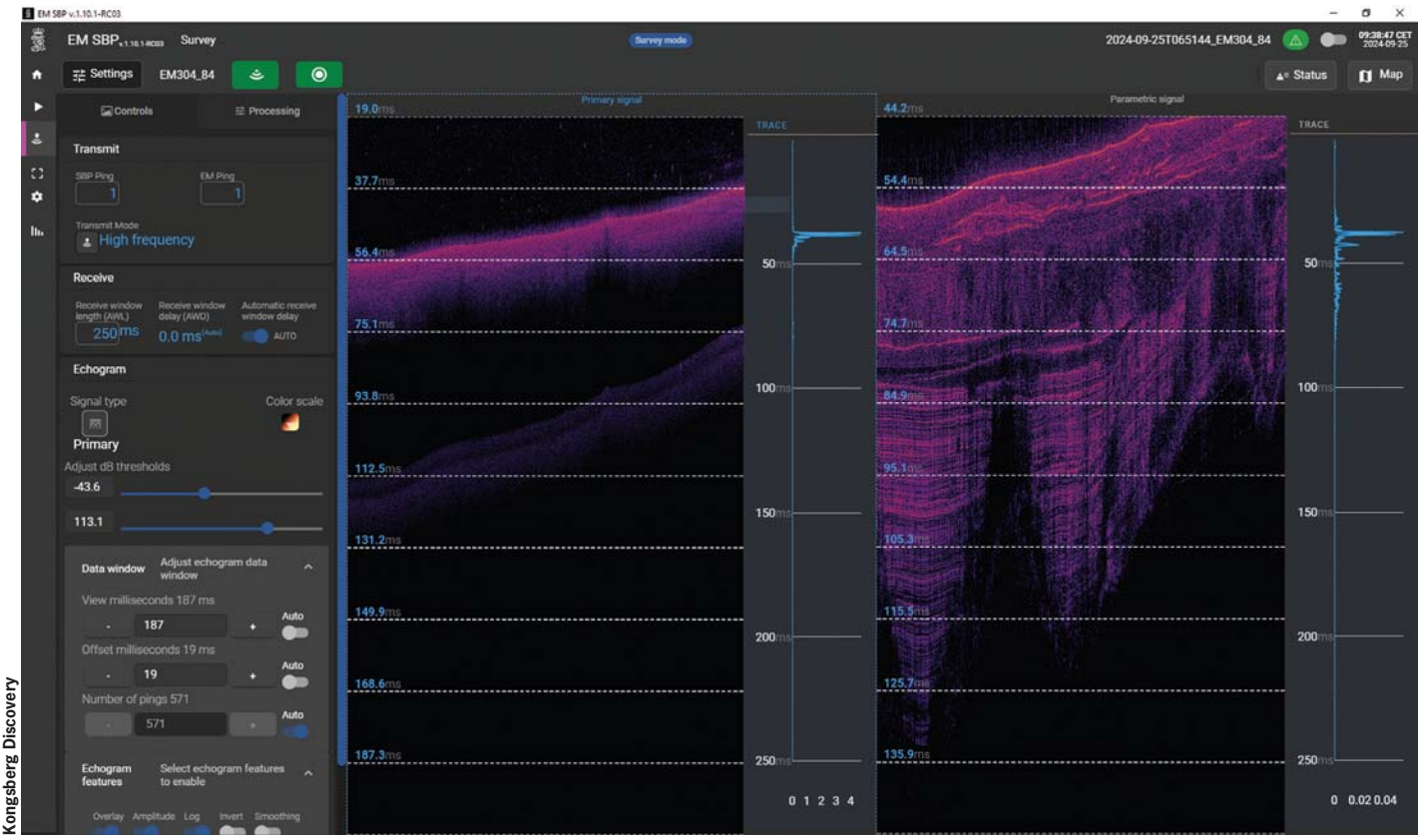
GeoPulse 2 from GeoAcoustics replaces the older analogue systems and operates at depths of up to 5,000 meters.

surfaces, such as compacted sand, revealing objects and the geology of the strata."

The company's latest development extends depth range. "The GeoPulse Compact is an excellent tool for shallow water and small boat exploration. In contrast, the GeoPulse 2 replaces the older analogue systems and operates at depths of up to 5,000 meters. It has significantly more power, making it better suited for penetrating harder sediments and reaching greater depths."

GeoPulse 2 offers digital Chirp and Ricker waveforms, in addition to pinger functionality. These new waveforms offer enhanced resolution and advantages depending on the geological conditions and water depth. Despite these upgrades, GeoPulse 2 is designed to be a simple drop-in replacement – users don't need to replace their existing GeoPulse cabling or transducer, and it's compatible with systems like Chesapeake Technology's SonarWiz, Xylem Water Solutions' Hypack, and GeoMarine's Geo All Suite.

Therese Mathisen, product manager for sub-bottom profilers at Kongsberg Discovery, points to the trend towards smaller vessels and automated survey platforms. Saving space and power consumption are important factors. Contradicting these needs, operation at deep water requires providing greater penetration and resolution through a low and



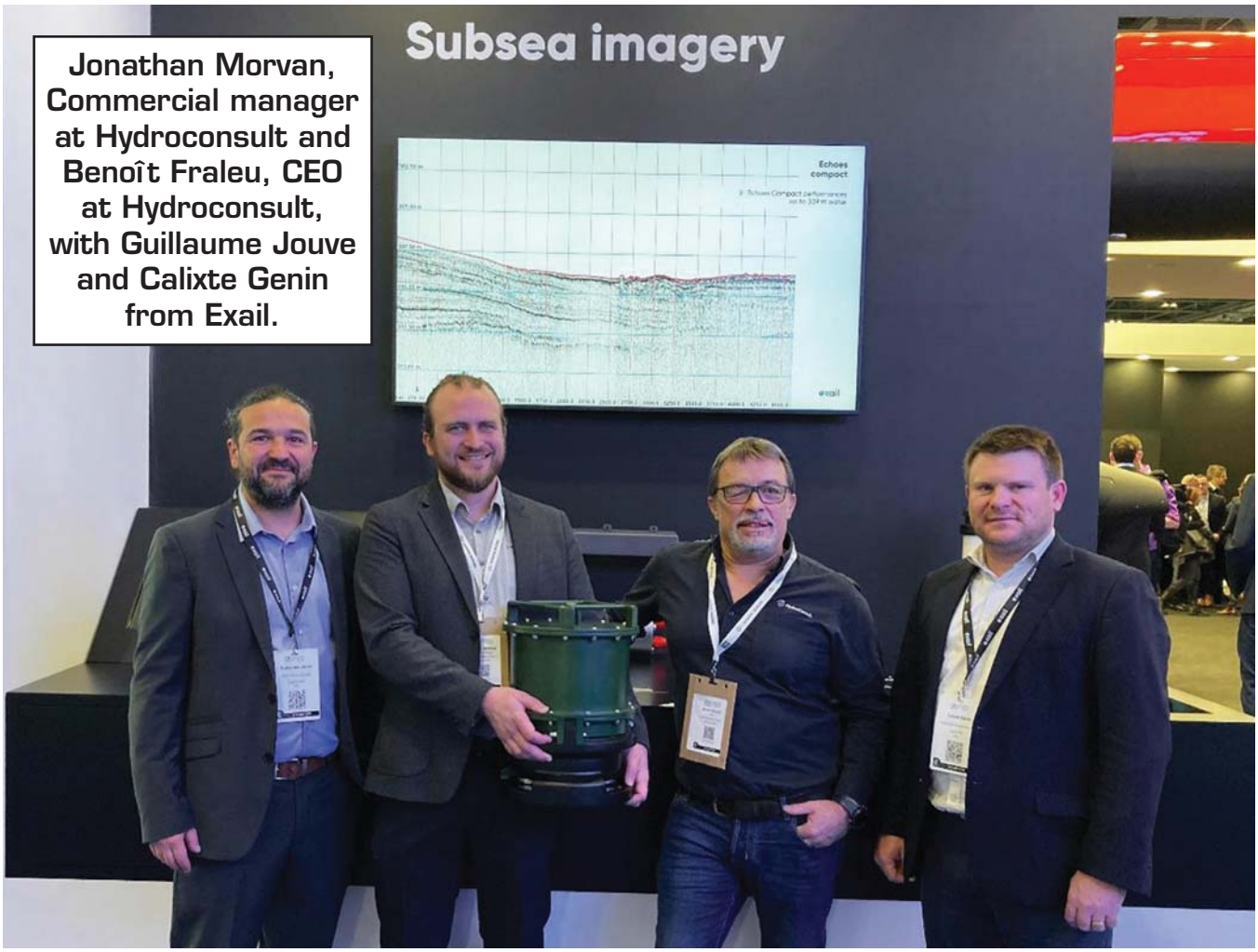

Kongsberg Discovery

Kongsberg Discovery's EM SBP sub-bottom by primary EM304 frequencies (left) and EM304 parametric low frequencies (right).


**EdgeTech's 3400-OTS transmits wide band frequency modulated pulses utilizing the company's proprietary full spectrum CHIRP technology.**

**EdgeTech's 3400 systems now have PVDF receivers and "pipeline mode."**


EdgeTech




Jonathan Morvan, Commercial manager at Hydroconsult and Benoît Fraleu, CEO at Hydroconsult, with Guillaume Jouve and Calixte Genin from Exail.

Exail

wide frequency range, high source level and narrow beams - which typically involve physically larger installations.

"The need for automated solutions to ensure data quality is becoming more important. Aided and automated survey settings are important to avoid making costly mistakes that requires re-runs, or even revisiting a survey area. The user may want data in near real time for their decisions makings. Cloud based solutions giving the user necessary information is certainly an important means to allow for sharing the data in an efficient manner," says Mathisen.

"The need for meeting practical solutions such as installation space, power requirements, remote operations, as well as robustness against user mistakes at the same time as providing expert users with high flexibility, is technologically challenging, but yet interesting and very understandable."

Kongsberg Discovery's sub-bottom profiling systems include the SBP29, a high power, narrow beam sub-bottom system that operates together with the deepwater Kongsberg multibeam systems. It operates at 2-9 kHz and can acquire several simultaneous narrow beam sub-bottom observations in a fan across the vessel. In real-time it will pick the strongest reflection and generate a multibeam sub-bottom image from several high resolution, narrow beams.

The TOPAS is a family of parametric sub-bottom profiling systems available in configurations from shallow waters to full ocean depths. The benefit of the parametric principle is that it can acquire high quality sub-bottom data with smaller transducer arrays.

EM SBP is Kongsberg Discovery's newest sub-bottom profiling solution. EM SBP uses the EM 124 or the EM 304 multibeam echo sounder hardware which for many larger survey vessels already are available on board for bathymetry purposes. "EM®SBP allows you to use your multibeam system for sub-bottom data acquisition and by that adding information and value to your seabed survey at low cost, low space and low power consumption," says Mathisen.

EdgeTech's 3400 systems now have PVDF receivers and "pipeline mode." The 3400-OTS transmits wide band fre-

quency modulated pulses utilizing the company's proprietary full spectrum CHIRP technology. The system uses flat multi-channel hydrophone array to generate high resolution images of the sub-bottom stratigraphy in oceans, lakes and rivers and provides excellent penetration in various bottom types, says Doug McGowen, Director, Sales and Marketing at EdgeTech.

The 3400-OTS receiver array is segmented for standard sub-bottom profiling operations or "pipeline" mode for optimal location and imaging of buried pipelines or cables. The system offers real-time reflection coefficient measurements. "This unique ability of the EdgeTech sub-bottom profiler system allows users the ability to collect complex analytic data using linear system architecture to measure sediment reflection and analyze sediment type determination," says McGowen. Additionally, the system has discrete transmit and receive channels allowing for continuous data collection resulting in a high ping rate, particularly important for construction and pipeline surveys.

At the high end of the market, EdgeTech has just started to deploy the buried object sonar system (eBOSS) which is capable of penetrating the seabed to accurately detect, locate, classify and identify buried and partially proud objects. This low-frequency acoustic imaging system can be operated in real-time for general survey purposes such as cable and pipe tracking and route surveys or have the data post processed utilizing synthetic aperture sonar processing to render 3-dimensional images of buried objects.

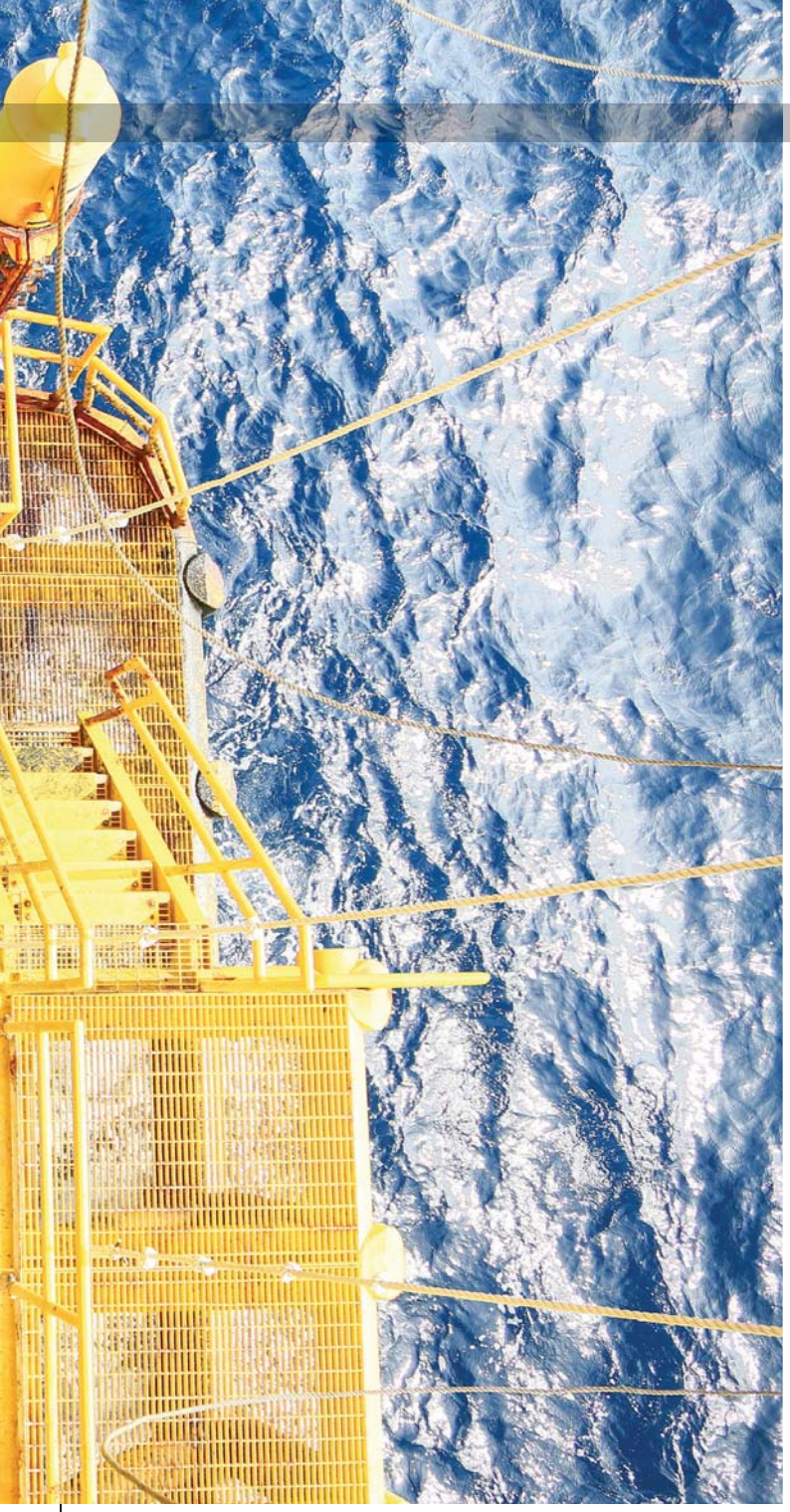
Exail's new Echoes Compact provides high-resolution images of sedimentary deposits and buried objects across a depth range from very shallow waters to 400m. The system is specifically designed for USVs and small vessels as it features low power consumption and compact dimensions. It is a portable solution suited to river, lake and ocean surveys, whatever the seabed topography. Exail says it offers good penetration of clays and sands due to its powerful low-frequency signal, together with 7.5cm vertical resolution thanks to a wide bandwidth from 5 to 15kHz.

Exail sold its first Echoes Compact to Hydroconsult. The company is serving as a consultant and personnel provider to a major multi-energy firm in Africa which is analyzing the sub-bottom before the installation of telecommunication cables and pipelines in West Africa.

# MAXIMIZE OFFSHORE ENERGY ASSETS LIFESPAN

*Learn how specialized coatings can extend assets and maintain operations.*

**By Anurag Raj,** PPG Customer Sustainability Business Partner, Protective and Marine Coatings



Advanced protective coatings remain essential for longevity and sustainability in the offshore energy sector, where assets endure harsh environments. This comes as the International Energy Agency (IEA) projects global wind energy capacity to triple by 2026, reaching 120 gigawatts—with offshore installations representing 20% of this growth.

Offshore oil and gas operators understand the stakes of operating in a harsh environment, with industry reports indicating a spend of more than $1.3 billion annually on corrosion and maintenance. This includes $589 million for surface facilities and $463 million for downhole equipment. As offshore wind expands into these same challenging marine environments, operators face similar durability challenges from saltwater exposure, temperature fluctuations, and high winds.

Advanced protective coatings emerge as a critical solution. These specialized solutions can help extend asset lifespans up to 50 years while reducing maintenance requirements—creating more sustainable infrastructure that aligns with circular economy goals. Beyond mere protection, these innovations help maximize resource efficiency and minimize environmental impact across the offshore energy sector.

## FACING HARSH ENVIRONMENTAL CHALLENGES

Offshore wind farms and oil and gas platforms face some of the most demanding environmental conditions. Constant exposure to saltwater, fluctuating temperatures, high winds, and, in the case of oil and gas, the added stress of hydrocarbon exposure can lead to corrosion and material degradation. This can ultimately result in costly repairs or replacements. Asset owners increasingly focus on maximizing the lifespan of these installations to protect their investments and help ensure they meet operational and sustainability goals. Protective coatings can help safeguard these assets from environmental elements and operational demands.

## IMPLEMENT INNOVATIVE PROTECTION STRATEGIES

Asset owners and operators turn to innovative coatings specifically designed to address the challenges of offshore energy infrastructure. These specialized coatings offer superior resistance to corrosion, UV radiation, chemical exposure and mechanical wear, providing a robust defense against the harsh conditions in severe marine environments. The needs of offshore oil and gas platforms extend beyond corrosion resistance. Coatings must also withstand exposure to aggressive chemicals and hydrocarbons, maintain their protective qualities in extreme temperatures, and endure the physical stresses associated with deep-sea operations.

Companies can unlock significant sustainability and economic benefits by extending the useful life of critical

infrastructure like wind turbines, oil platforms and subsea pipelines. For instance, in recent internal abrasion resistance tests, PPG's reinforced novolac epoxy coatings outperformed styrene-free unsaturated polyester coatings by 30%–40% in reducing wear and damage caused by the harsh offshore environment, thereby enhancing the durability of critical infrastructure.

## GUIDE BETTER CHOICES

The longevity and sustainability of offshore energy infrastructure—whether in wind, solar, or oil and gas—is evaluated through life cycle assessment (LCA) and digital modeling. These tools guide maintenance and reliability experts to make sustainable and efficient coating choices. In the LCA process, specialists evaluate the environmental impact of coating solutions throughout their entire life cycle. This provides critical insights that help asset owners select solutions that protect their infrastructure and minimize their environmental footprints. This holistic approach includes assessing the impact from raw material extraction through application and use to eventual disposal.

Complementing this, digital modeling employs advanced computational tools to simulate the performance of coatings in various environments. This predictive capability allows for optimized coating systems specifically tailored for different applications—whether protecting a wind turbine from salt spray or ensuring that an oil rig's understructure remains impervious to chemicals and seawater. By forecasting the long-term behavior of coatings, digital modeling supports proactive maintenance strategies, reducing the likelihood of unexpected failures and ensuring steady, reliable operations.

## LOOKING AHEAD

A specialized protective coatings partner helps operators maximize asset lifespan while meeting sustainability goals. The right coating system protects and extends equipment life, reducing the need for replacements and supporting circular economy principles. By keeping critical components in service longer, operators achieve both economic and environmental objectives.

### CASE STUDY:
## EXTENDING THE LIFE OF OFFSHORE WIND ASSETS

A recent evaluation assessed the performance of styrene-free unsaturated polyester (UPE) glass flake coatings against reinforced novolac epoxy coatings for protecting offshore wind tower foundations. These coatings underwent comprehensive internal and third-party testing, including abrasion resistance, cathodic disbonding and impact damage, adhering to industry standards such as ASTM and NORSOK. Results showed that reinforced novolac epoxy coatings offer superior resistance to abrasion, stress cracking and corrosion compared to UPE coatings. Choosing coatings that meet rigorous performance criteria enables stakeholders to extend the service life of wind towers, reduce maintenance costs and support the long-term success of offshore wind projects.

# OFFSHORE PIPE CORROSION PROTECTION: THE REDLINEIPS SMARTPAD SYSTEM

*The RedLineIPS SmartPad System includes SmartPads with Hydroseal Gasket, SmartBands with buckles, and the SmartTool, creating a comprehensive solution for external corrosion protection at pipe support points in offshore and coastal regions.*

***All images courtesy Cogbill Construction***

*The maritime and offshore sectors face unique challenges with Corrosion Under Pipe Supports (CUPS), which jeopardize the safety and longevity of critical infrastructure. The RedLineIPS SmartPad System, developed by Cogbill Construction is a patent-pending solution designed specifically for offshore and coastal facilities.*

**By Hani Almufti,** Engineer and Senior Manager at Cogbill Construction

## CUPS: A Critical Challenge for Offshore Facilities

CUPS is particularly problematic in offshore and coastal environments, where exposure to salt-laden air, high humidity, and harsh weather accelerates corrosion. Pipes in these facilities are constantly exposed to a combination of mechanical stress, moisture retention, and galvanic corrosion. These factors can lead to catastrophic failures.

**1. Mechanical Stress**

In offshore platforms, movement from wave action, fluid flow, thermal expansion, and equipment vibration causes friction between pipes and their supports. Over time, this erodes protective coatings and exposes bare metal to corrosive elements.

**2. Crevice Corrosion**

Limited airflow in the tight crevices between pipes and supports traps moisture, particularly in humid and saline-rich offshore conditions. This promotes crevice corrosion, as the trapped water accelerates the degradation of coatings and pipe integrity.

**3. Galvanic Corrosion**

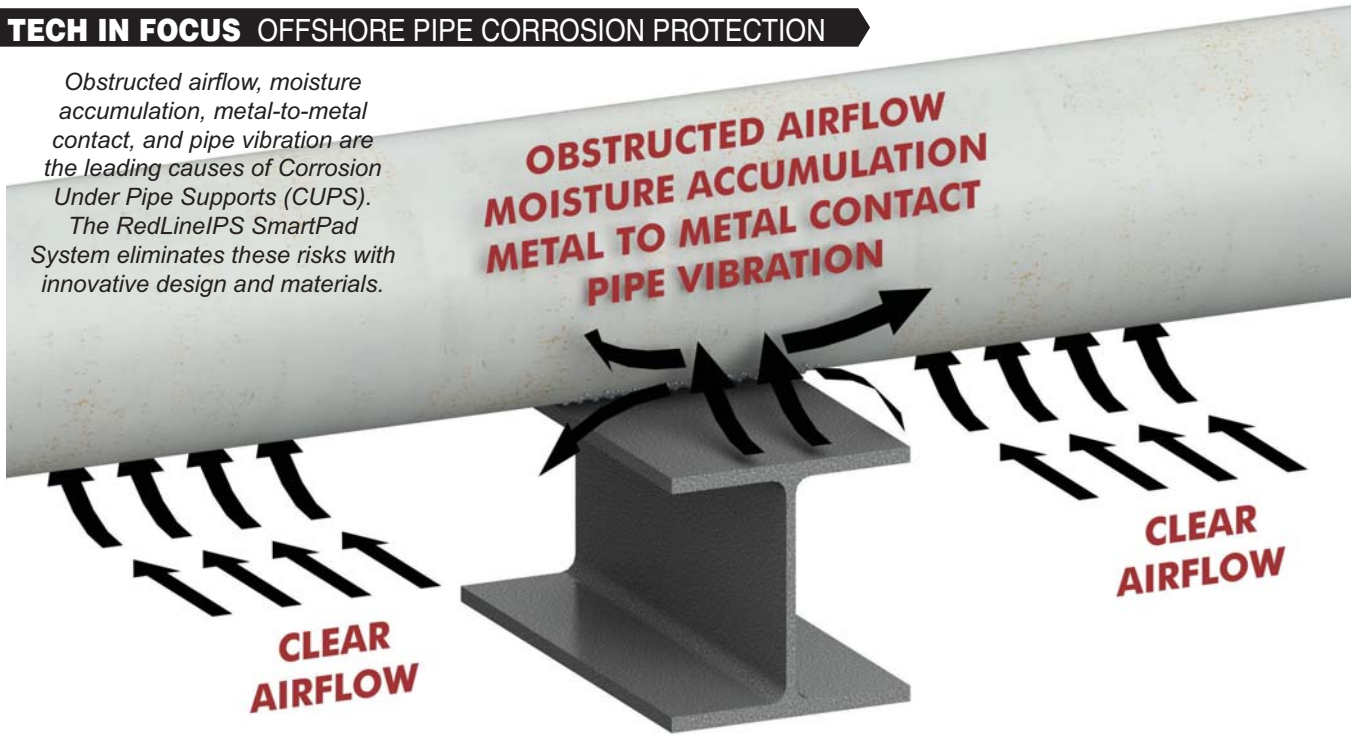
Metal-to-metal contact between pipes and supports creates an electrochemical reaction in the presence of moisture and salt, accelerating the corrosion of one metal while the other remains protected. This is a prevalent issue in offshore facilities where metal support systems are common.

The combination of these factors leads to chemical leaks, environmental hazards, costly repairs, and downtime—making effective CUPS prevention a critical requirement for offshore industries.

## Built for Offshore Environments

The RedLineIPS SmartPad System was designed specifically to combat these challenges in maritime and offshore facilities. Unlike traditional solutions, the SmartPad System requires no welding or epoxy and offers rapid installation, removal, and reinstallation. Its components are built to withstand the harsh conditions of coastal and offshore environments, ensuring reliable performance for decades.

*Obstructed airflow, moisture accumulation, metal-to-metal contact, and pipe vibration are the leading causes of Corrosion Under Pipe Supports (CUPS). The RedLineIPS SmartPad System eliminates these risks with innovative design and materials.*




## KEY FEATURES AND COMPONENTS

1. FRP SMARTPAD WITH SADDLE DESIGN

**o Material:** Made from continuous-strand mat laminated with vinyl ester resin, providing exceptional durability and resistance to salt spray, UV radiation, and extreme temperatures (-60°F to 400°F).

**o Load Capacity:** Independently tested to withstand over 111,300 lbs., making it suitable for heavy-duty offshore piping.

**o Saddle Shape:** Evenly distributes weight, alleviating point-loading stress and protecting pipe coatings from friction and wear.

**o Recessed Grooves:** Hold the SmartBands securely in place, preventing slippage during high-motion scenarios common in offshore applications.

2. HYDROSEAL GASKET

**o Material Options:** Available in Silicone, PTFE, and EPDM to handle a wide range of chemicals and temperatures (-60°F to 570°F).

**o Functionality:** Creates a NEMA-4-rated watertight seal, preventing moisture ingress and eliminating the conditions needed for crevice corrosion.

**o Performance:** Conforms to uneven pipe surfaces, ensuring a reliable seal even on pipes with pre-existing damage from corrosion treatment.

3. SMARTBANDS & BUCKLES

**o Material:** Made from corrosion-resistant, continuous strand fiber-reinforced polymer with smooth inner surfaces to protect pipe coatings.

**o Retention:** Capable of holding over 1,000 lbs. of axial force with a break strength exceeding 5,600 lbs., ensuring stability under the dynamic loads of offshore facilities.

**o Square Teeth Design:** Maintains a tight fit for 20–23 years, preventing loosening due to vibration or thermal cycling.

4. SMARTTOOL

**o Efficiency:** Installs SmartBands in under two minutes, reducing labor costs and downtime during maintenance.

**o Ergonomic Design:** Minimizes operator fatigue, making it ideal for repetitive tasks on offshore platforms.

o Integrated Cutter: Ensures precise trimming of excess banding material for a clean, professional finish.

5. OPTIONAL PTFE STRIPS

**o Enhancement:** Adds extra chemical resistance in extreme environments, such as exposure to hydrochloric or sulfuric acids.

**o Protection:** Shields the Hydroseal gasket and SmartPad edges from aggressive corrosive agents.

## HOW THE SMARTPAD SYSTEM MITIGATES OFFSHORE CORROSION

1. **PREVENTS GALVANIC CORROSION**
   o The non-metallic FRP construction eliminates metal-to-metal contact, breaking the electrochemical circuit that causes galvanic corrosion in saltwater environments.
2. **ELIMINATES CREVICE CORROSION**
   o The Hydroseal gasket blocks moisture from entering the pipe/pad interface, preventing the water pooling that fosters crevice corrosion.
3. **IMPROVES AIRFLOW**
   o The saddle design elevates the pipe above the support, enhancing airflow and promoting evaporation, further reducing the risk of moisture retention.
4. **FACILITATES PROACTIVE MAINTENANCE**
   o The system's quick removal and reinstallation enable rapid visual inspections, reducing reliance on costly methods like radiography or ultrasound. This improves the ability to detect early signs of corrosion and address them promptly.
5. **REDUCES MECHANICAL STRESS**
   o The saddle shape evenly distributes pipe loads, eliminating point-loading stress that could otherwise lead to coating failure and localized corrosion.

### Advantages for Offshore Applications

Compared to conventional solutions like welded metallic supports or epoxied FRP pads, the SmartPad System offers unique advantages tailored to offshore and coastal environments:

- **Corrosion Resistance:** Built to withstand harsh marine environments with high salt exposure and humidity.
- **Installation Speed:** Installs in under two minutes without welding, epoxy, or line shutdowns, drastically reducing downtime.
- **Versatility:** Suitable for pipes from ½" to 72" in diameter, making it adaptable for diverse piping needs on offshore platforms.
- **Durability:** UV-stable and long-lasting materials ensure reliable performance for 20–30 years, even in extreme conditions.
- **Cost Efficiency:** Eliminates the need for expensive welding permits, skilled labor, and prolonged maintenance schedules.
- **Sustainability:** Reusable components promote sustainability and reduce waste, aligning with green initiatives in maritime industries.

### Applications in Offshore and Coastal Facilities

The RedLineIPS SmartPad System is purpose-built for the challenges of offshore and coastal facilities. Its robust design and advanced materials make it ideal for:

*RedLineIPS SmartPads installed in a chemical plant's piping network at the Gulf Coast, providing long-term corrosion protection and improved airflow at critical support points.*

1. Offshore Platforms
   - o Protects piping against the constant motion, high humidity, and salt spray found in offshore environments.
2. Coastal Refineries
   - o Prevents corrosion in harsh chemical processing environments near the coast.
3. Maritime Pipelines
   - o Ensures the integrity of above-ground pipelines exposed to fluctuating tidal conditions.
4. LNG Terminals
   - o Handles extreme temperature ranges required for liquefied natural gas operations while preventing pipe damage and corrosion.

## Early Adoption, Real-World Implementation

The RedLineIPS SmartPad System has already been adopted by industry leaders to enhance corrosion protection in challenging environments. Chevron has implemented the system on a newly built offshore platform, where its ability to withstand high humidity, salt spray, and dynamic loads ensures long-term reliability. Additionally, Formosa Plastics and Nutrien are deploying the SmartPad System at their coastal facilities in Texas and Louisiana. These plants face harsh environmental conditions typical of the Gulf Coast, and the SmartPad System's corrosion resistance, ease of installation, and cost-effectiveness have proven invaluable in mitigating maintenance challenges.

The RedLineIPS SmartPad System, developed by Cogbill Construction, represents a major innovation in corrosion prevention technology for offshore and coastal facilities. Designed specifically for these environments, the system addresses the unique challenges posed by CUPS with unmatched durability, efficiency, and cost-effectiveness. By eliminating metal-to-metal contact, preventing moisture retention, and simplifying maintenance, the SmartPad System ensures the long-term safety and reliability of critical infrastructure.

With its proven success in offshore applications and adoption by major industry players, the SmartPad System is setting a new standard in pipe support technology for maritime and coastal industries. It is not just a product—it is a solution purpose-built to protect infrastructure in the most demanding environments.


*Field installation of the RedLineIPS SmartPad System, showcasing quick and efficient setup without the need for welding or epoxy.*

# 24-7 OPERATIONS

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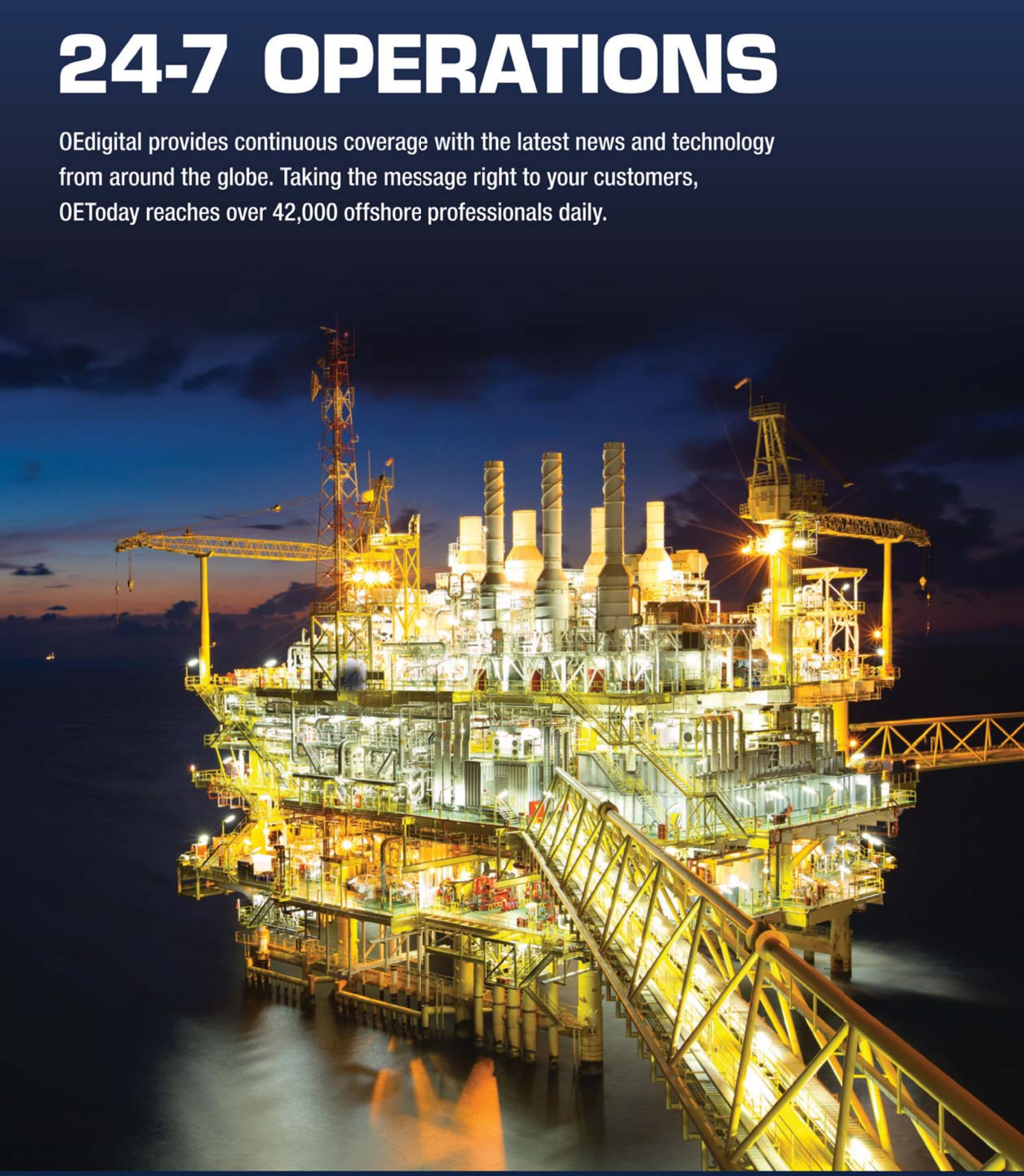

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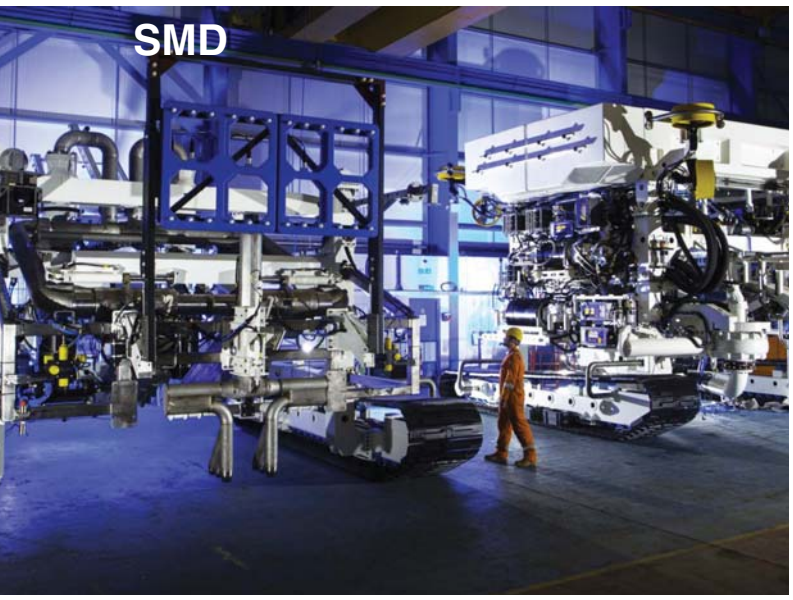




## SMD's ROV Trencher to Work in Japan's Offshore Wind Farms

Toyo Construction has invested in Japan's emerging offshore wind sector by purchasing a trenching remotely operated vehicle (ROV) from underwater technology and services company SMD.

The ROV will form part of Toyo's expanding fleet of assets, with the business having also invested in a custom-built cable-lay vessel late in 2024.

The new SMD trencher will be used alongside the vessel to facilitate the safe and efficient burial of subsea cables.

SMD's tailor-made trenching product range caters for a variety of different markets and end uses.

The self-propelled systems include the QTrencher (QT) and heavy tracked trencher ranges. QTrenchers are SMD's fourth generation trenching ROV.

Subsea power available ranges from 400hp through to 2800hp all able to free fly with track upgrades. Heavy tracked trenchers are available in a range of chassis sizes and power ratings to suit trenching in hard ground up to 50MPa.

Trenchers can be configured to carry multiple tools, simultaneously or in interchangeable cartridges, including rock and clay chains, jetters, dredges, eductors and backfill tools to suit every soil combination.

"We chose to invest in this technology because of SMD's prolific track recording in offshore wind, and of engineering excellence underwater globally. The team understood our unique requirements and adapted this vehicle into a bespoke product, suitable for our challenging operations," said Tatsuyoshi Nakamura, COO at Toyo Construction.

## Beam's New 3D Mapping System

Beam, a company created by the merger of Rovco and Vaarst, has unveiled SubSLAM X3, a new subsea 3D mapping system which can be integrated to both work class and observation class remotely operated vehicles (ROVs).

SubSLAM X3 offers real-time, high-resolution 3D mapping, designed to enhance the monitoring and maintenance of offshore wind farms.

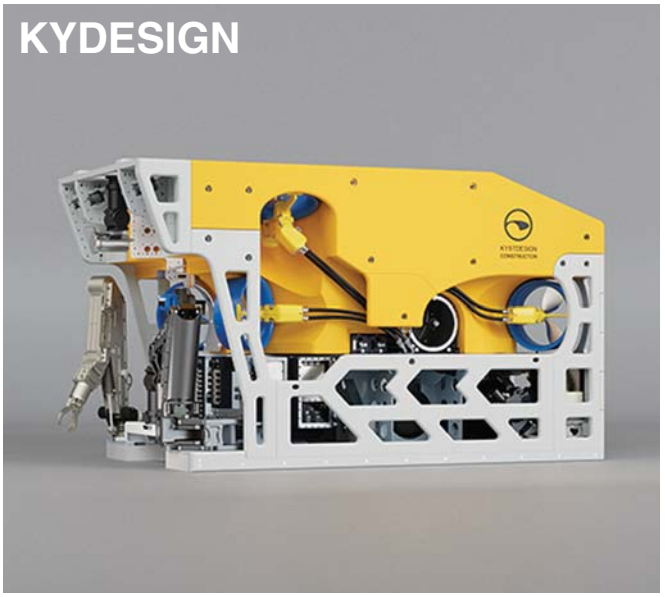
The system integrates artificial intelligence (AI), robotics, and advanced simultaneous localization and mapping (SLAM) technologies.

This integration is said to be critical for streamlining the development, construction, and maintenance phases of offshore wind projects.

The system provides 4K resolution video and precise 3D reconstructions, allowing for detailed inspection of underwater assets and intelligent autonomous control of underwater vehicles.

The newly designed SubSLAM X3 is more compact and lightweight than its previous version, making it suitable for integration into smaller observation-class ROVs as well as larger work-class ROVs.

Despite its reduced size, the system is capable of operating at depths up to 3000 meters and features enhanced sensor technology for improved image quality, especially in low-light conditions.





## Kystdesign's ROV Orderbook

Norwegian engineering firm Kystdesign has marked the successful start of 2025, having booked the largest order to date in the company's history for its remotely operated vehicles (ROVs) and associated equipment.

In February 2025, Steading signed an agreement with an undisclosed client for the supply of four work class ROVs, including Constructor and Constructor Compact models, along with Launch and Recovery systems (LARS), Remote Operating Centres (ROC), additional spares and extra equipment.

The order is the largest to date in the company's history, and is scheduled for delivery in the fourth quarter of 2025.

A month earlier, Kystdesign signed a contract with the Royal Netherlands Institute for Sea Research (NIOZ) for the construction of the advanced ROV, the Supporter 6000.

The Supporter 6000, designed for ultra-deepwater operations, will be delivered in June 2026 and will serve the entire Dutch marine research community.

The Constructor ROV is a powerful construction ROV uniquely. designed to carry and operate large tools and modules.

Kystdesingn's Constructor ROV accommodates up to 41 electrical connectors for interface of external equipment, such as tooling, survey sensors and cameras, and all electrical power supplies are ground-fault monitored.

The ROV also features 24 hydraulic functions, all proportionally controlled. The ROV control system is prepared for a variety of auto functions like AutoPOS and AutoTRACK capabilities, in addition to over-the-horizon control from a Remote Operation Center (ROC) onshore.

## MATCOR's Iron Gopher

Cathodic protection and AC mitigation solutions supplier MATCOR, a BrandSafway company, has relaunched its patented Iron Gopher linear anode for horizontal directional drilling (HDD) projects, with a significantly reduced price.

The price reduction is the result of MATCOR's move to in-house production, reducing reliance on third-party suppliers and shipping delays while ensuring superior quality control.

The result is said to be a stronger, more reliable linear anode that minimizes the risk of breakage during installation, helping you avoid idle crews and project delays.

"By bringing production in-house, we've cut costs dramatically, allowing us to offer this premium solution at just a small premium over standard linear anode products.

"When we introduced the Iron Gopher, its cost limited adoption despite its superior performance. By bringing production in-house, we've cut costs dramatically, allowing us to offer this premium solution at just a small premium over standard linear anode products," said Ted Huck, Director of Sales at MATCOR.

## FORUM ENERGY TECHNOLOGY


### Spanish Subsea Services Firm Orders FET's Latest Work Class ROV

Forum Energy Technology (FET) has secured a contract to provide a work class remotely operated vehicle (ROV) system and a Dynacon Launch and Recovery System (LARS) to Spanish-based subsea services provider ACSM.

FET's XLX EVO II ROV system represents the latest evolution in the highly successful Perry XLX series and is equipped with the latest ICE Unity Control System, incorporating remote operations and machine learning.

It features significantly enhanced performance across the full range of demanding intervention and survey tasks without compromise to the outstanding reliability for which FET vehicles are renowned throughout the world.

Building on a long-term relationship, the FET Perry XLX EVO II will be delivered in the third quarter 2025 to support construction, drilling, pipeline and platform inspection, survey, salvage, cleaning and dredging.

"We are proud of the longstanding relationship we have with ACSM and look forward to continuing work with our peers in delivering cutting edge ROV operations in the energy sector.

"Our Perry XLX EVO II, coupled with the robust Dynacon LARS system, is built to provide innovative solutions to challenging subsea operations and is equipped to perform reliably in hostile environments around the world," said Kevin Taylor, FET's Vice President Operations – Subsea.

## TRITECH INTERNATIONAL


### Tritech's New Gemini Sonar

Subsea imaging technology provider Tritech International has launched a new dual frequency Gemini 1200id sonar, said to offer higher resolution imaging for work class remotely operated vehicles (ROVs).

The Gemini 1200id is built on the same robust platform as the industry standard Gemini 720is sonar. It features a wide 120° horizontal field of view when operating at both 720 kHz and 1200 kHz acoustic frequencies and offers improved attenuation of waterborne electrical noise for optimal imaging performance.

An integrated speed-of-sound sensor ensures that targets are displayed to a high degree of positional accuracy. CHIRP processing provides improved target separation over longer ranges, according to Tritech.

The 1200id is fully compatible with Tritech's software package, Genesis. This ensures improved user interaction and allows for control of multiple Tritech products from within one software package. Software development kits (SDKs) are also available for Windows and Linux operating systems.

The Gemini 1200id employs a completely in-house developed analogue front-end solution that incorporates fully differential receiver channels for enhanced acoustic reception. Internal electronic circuits have been optimized and where necessary additional filtering exclusively employed to minimize self-generated noise.

These enhancements enable the Gemini 1200id to produce sonar images displaying sharp and bright acoustic returns on a noise reduced background resulting in crisp sonar images of impressive clarity.

"With its ultra-low-noise differential analogue front-end supporting a wide dynamic range optimized for sonar imaging applications, and with its ability to actively attenuate waterborne electrical noise from other subsea equipment, the Gemini 1200id provides work class ROV operators the clarity and confidence necessary for mission critical operations," said Asim Azad, Hardware Engineering Manager.

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# BY THE NUMBERS

## RIGS

### Worldwide

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Drillship | 11 | 76 | 87 | 87% |
| Jackup | 192 | 287 | 479 | 60% |
| Semisub | 23 | 44 | 67 | 66% |

### Africa

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Drillship | 1 | 12 | 13 | 92% |
| Jackup | 12 | 20 | 32 | 63% |
| Semisub | | 3 | 3 | 100% |

### Asia

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Drillship | 5 | 4 | 9 | 44% |
| Jackup | 77 | 82 | 159 | 52% |
| Semisub | 16 | 5 | 21 | 24% |

### Europe

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Drillship | 3 | 5 | 8 | 63% |
| Jackup | 9 | 32 | 41 | 78% |
| Semisub | 3 | 18 | 21 | 86% |

### Latin America & the Caribbean

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Drillship | | 32 | 32 | 100% |
| Jackup | 3 | 5 | 8 | 63% |
| Semisub | 1 | 9 | 10 | 90% |

### Middle East

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Jackup | 53 | 119 | 172 | 69% |
| Drillship | | | | |

### North America

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Drillship | | 22 | 22 | 100% |
| Jackup | 29 | 22 | 51 | 43% |
| Semisub | 1 | 2 | 3 | 67% |

### Oceania

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Drillship | | | | |
| Jackup | | 2 | 2 | 100% |
| Semisub | | 5 | 5 | 100% |

### Russia & Caspian

| Rig Type | Available | Contracted | Total | Utilization |
|---|---|---|---|---|
| Jackup | 8 | 2 | 10 | 20% |
| Semisub | 1 | 2 | 3 | 67% |

### Global Average Dayrates

| Floaters | | Jackups | |
|---|---|---|---|
| Ultradeep water | 350.0 | High-spec | 163.5 |
| Deepwater | 254.1 | Premium | 133.5 |
| Midwater | 360.7 | Standard | 93.3 |

This data focuses on the marketed rig fleet and excludes assets that are under construction, retired, destroyed, deemed noncompetitive or cold stacked.

Data as of February 2025
Source: Wood Mackenzie Offshore Rig Tracker

## DISCOVERIES & RESERVES

### Offshore New Discoveries

| Water Depth | 2020 | 2021 | 2022 | 2024 | 2024 | 2025 |
|---|---|---|---|---|---|---|
| Deepwater | 13 | 14 | 22 | 15 | 17 | 1 |
| Shallow water | 49 | 60 | 43 | 61 | 31 | |
| Ultra-deepwater | 12 | 7 | 22 | 13 | 5 | 1 |
| **Grand Total** | **74** | **81** | **87** | **89** | **53** | **2** |

Shallow water (1-399m) Deepwater (400-1,499m) Ultra-deepwater (1,500m+)

### Offshore Undeveloped Recoverable Reserves

| Water Depth | Number of fields | Recoverable reserves gas mboe | Recoverable reserves liquids mbl |
|---|---|---|---|
| Deepwater | 599 | 48,042 | 22,612 |
| Shallow water | 3,286 | 439,765 | 152,966 |
| Ultra-deepwater | 351 | 42,846 | 26,369 |
| **Grand Total** | **4,236** | **530,653** | **201,948** |

Contingent, good technical, probable development.

The total proven and probably (2P) reserves which are deemed recoverable from the reservoir.

### Offshore Onstream & Under Development Remaining Reserves

| Region | Number of fields | Remaining reserves gas mboe | Remaining reserves liquids mbl |
|---|---|---|---|
| Africa | 572 | 17,566 | 11,407 |
| Asia | 846 | 16,029 | 7,272 |
| Europe | 722 | 11,471 | 10,709 |
| Latin America and the Caribbean | 198 | 7,677 | 40,682 |
| Middle East | 141 | 105,818 | 147,900 |
| North America | 475 | 2,693 | 13,236 |
| Oceania | 81 | 10,201 | 1,025 |
| Russia and the Caspian | 60 | 16,974 | 12,145 |
| **Grand Total** | **3,095** | **188,428** | **244,376** |

Onstream and under development.

The portion of commercially recoverable 2P reserves yet to be recovered from the reservoir.

*Source: Wood Mackenzie Lens Direct*