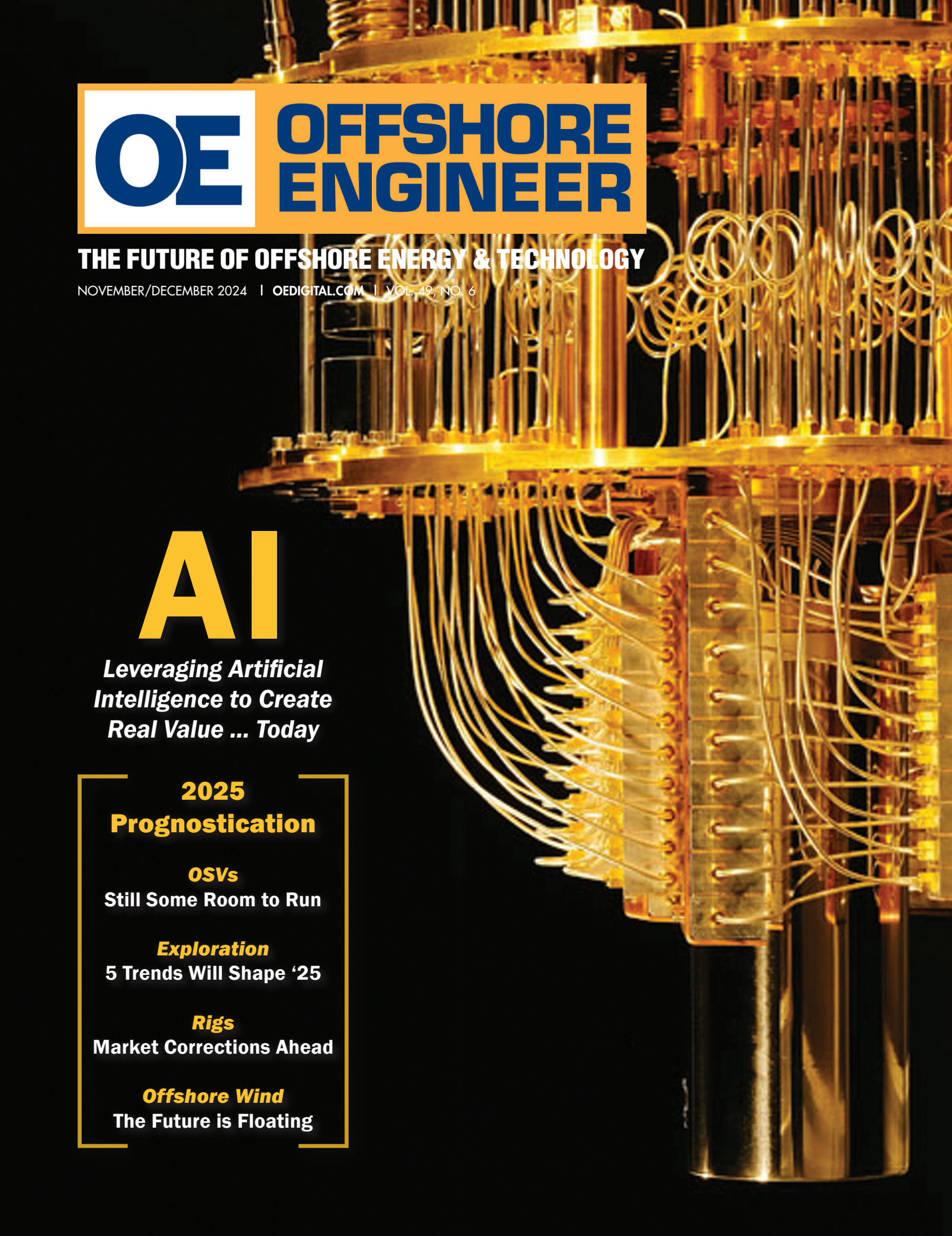

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AI

Leveraging Artificial Intelligence to Create Real Value ... Today

2025 Prognostication

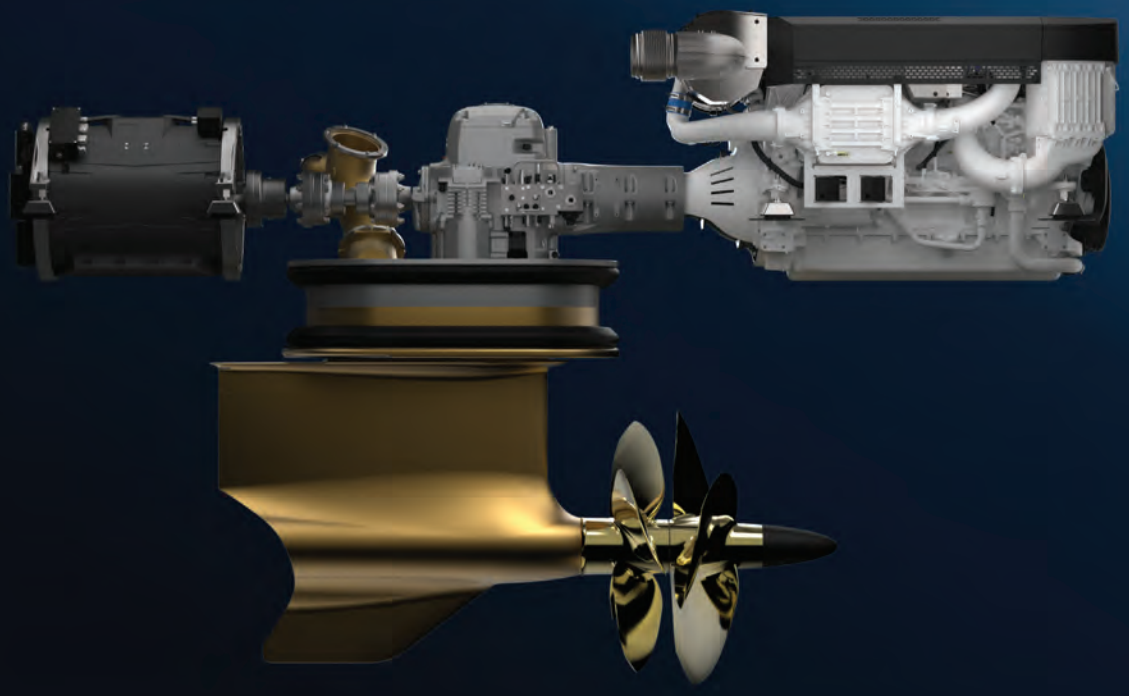
OSVs
Still Some Room to Run

Exploration
5 Trends Will Shape '25

Rigs
Market Corrections Ahead

Offshore Wind
The Future is Floating

VOLVO PENTA



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DEPARTMENTS

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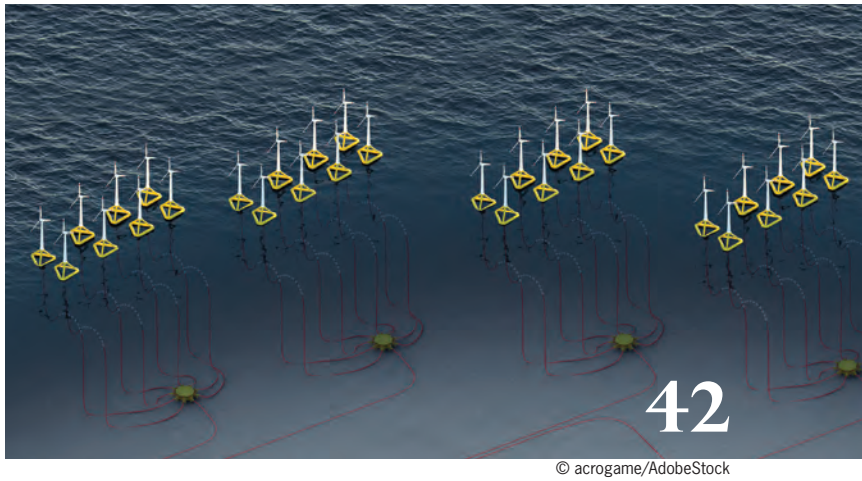

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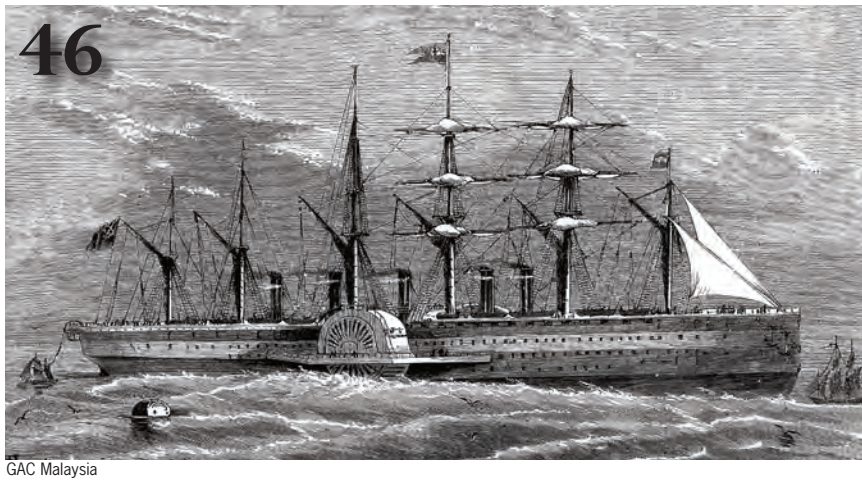
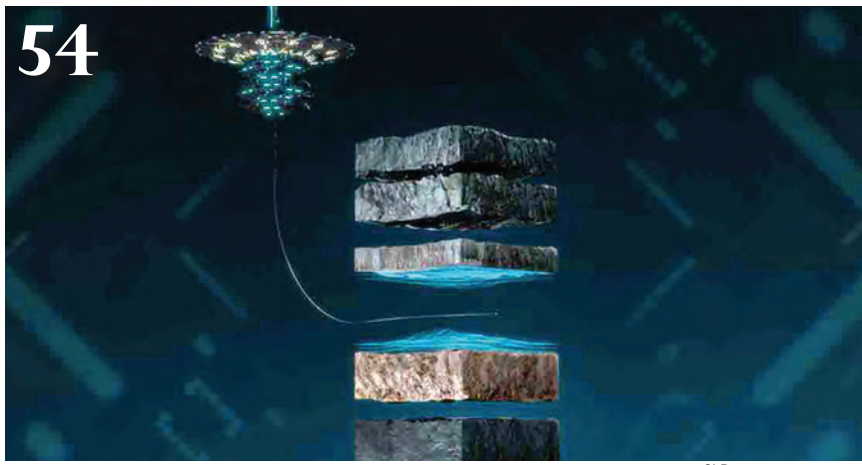


GAC Malaysia



SLB

There have always been 24 hours in a day, 7 days in a week and 365 days in a year, but somehow the days, weeks and months seemingly fly by ever faster, and here again we find ourselves on the doorstep of turning the clocks on another year.

Before sitting down to write this, I took the short exercise of exploring my year-end editorials since 2019, the first full year that ***Offshore Engineer*** was under the guise of New Wave Media, and much to my surprise the majority of the time I was correct in overview and projections. *[I must have been hitting the Christmas celebration a bit early in 2021, though, as I went in depth regarding my shopping experience for a shed … but I digress!].*

Now is the time to look forward, and while much has changed, much remains the same.

The biggest change, arguably, that will impact the offshore energy industry will be in January 2025 when **President Donald J. Trump** once again takes the helm, and it is zero surprise to this audience that fossil fuel exploration and production will be sharply in focus and on top of the President's agenda; while offshore renewable energy – heavily dependent upon government assistance – will be muted.

A decade ago the *'drill, baby drill'* mantra would have been met with unanimous excitement by the energy companies, and make no mistake, the opportunities in oil and gas production will be ever present and voluminous with the incoming administration.

But times change.

You walk into the Offshore Technology Conference today in Houston, and there is a large and growing 'renewable energy' pavilion, something that would have been unthinkable 10 years ago, let alone in 1993 when I first started making the annual trek to Houston for OTC. In this edition – in every edition of ***OE*** we explore the full range of emission reduction and environmental beneficial technologies, from the reduction/elimination of gas flaring to carbon capture and storage to the leveraging of Artificial Intelligence to make offshore operations more efficient and effective. Offshore wind, both the established fixed bottom and emerging floating wind, will have a role in the energy mix now and in the future. The holy grail is to evolve the business so that it can stand on its own, sans taxpayer funding.

I've again called upon our tight cadre of industry market experts from **Fearnley Offshore Supply AS, Intelatus, Welligence Energy Analytics** and **Westwood RigLogix** to deliver their own 2025 prognostications, and they collectively – as they do in each and every edition of ***Offshore Engineer*** – deliver their unique insight on what you can expect to see in the coming year.

I offer my sincere thanks to them … and also to you … our global community of ***Offshore Engineer*** contributors, readers and advertisers whose interest and support power us forward every day, week, month and year.

Check out the 2025 Media Kit via the QR Code Below

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OE WRITERS


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Geoff Bennett is Director, Solutions and Technology for Infinera, a leader in the submarine network market. His focus is on subsea technology and Artificial Intelligence.

Cinnamon Edralin is Americas Research Director for RigLogix and has been covering the offshore rig market since 2006. She began her career with ODS-Petrodata, which was acquired by IHS (later becoming IHS Markit), where she managed the Americas offshore rig team, along with the Americas marine team and the US/Canada land rig team. Cinnamon then moved to Esgian, where she helped raise brand awareness for offshore rig services, along with supporting offshore wind. She joined Westwood in 2023 and provides support for the subsea team in addition to her rig analyst duties. Cinnamon holds a BA in Liberal Arts from the University of St. Thomas in Houston, Texas.


Edralin

Jürn Edzards is Business Development Manager for Svendborg Brakes, a Regal Rexnord brand. He has 25 years of global experience in Wind Energy, responsible for growth in Renewable Energy for Regal Rexnord in EMEA.

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.


Edzards

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.


Garanović

Ruaraidh Montgomery is currently the Global Head of Research at Welligence Energy Analytics, based in Houston. He has over 20 years' experience in the oil & gas sector, beginning his career in an engineering capacity with Hess in in the North Sea, before moving to the energy market intelligence and analytics space.

Jesper Skjong is a market analyst at shipbrokerage Fearnley Offshore Supply covering the offshore support vessel market, including O&G and offshore renewables.


Laursen


Lewis


Montgomery


Skjong

AST Networks White Paper:

Decarbonisation Through Automation: Unlocking Emissions Reductions and Operational Efficiency in the Energy Transition

Introduction

The world is facing an urgent need to reduce carbon emissions, and industries are under increasing pressure to decarbonise their operations. Governments, investors, and consumers alike are demanding more sustainable practices, with the goal of mitigating climate change and reducing environmental impact. However, the path to decarbonisation isn't always straightforward – many companies fear that reducing their carbon footprint could come at the expense of profitability and efficiency.

In response to these challenges, a powerful solution emerging is the intersection of two transformative forces: automation and decarbonisation. Automation and autonomous technologies, once viewed solely as tools for improving operational efficiency and reducing costs, are now recognised as key enablers of sustainable practices. By integrating automation systems with sustainability goals, industries can optimise processes, minimise waste, and drastically reduce their energy consumption and emissions.

This white paper explores how AST Networks can lead the way in helping companies navigate the dual goals of decarbonisation and operational efficiency through automation and autonomy. We will examine the technologies driving this shift, the practical applications in various industries, and how AST Networks' solutions are uniquely positioned to support this transition.

Automation as a Key Enabler of Decarbonisation

Decarbonisation aims to reduce or eliminate the carbon emissions produced by industrial and energy-related activities. Traditionally, companies have approached this challenge by focusing on cleaner energy sources and energy efficiency improvements. However, the integration of automation offers a complementary and often more powerful pathway to emissions reduction.

Automation enhances operational efficiency by optimising processes, reducing energy consumption, and enabling better decision-making in real-time. These efficiencies naturally lead to fewer emissions, making automation a critical tool in the broader effort to decarbonise industrial operations.

For example, in manufacturing, automated systems can precisely control the amount of energy used in production processes, ensuring that only the required resources are consumed. Automated logistics systems can optimise transportation routes, reducing fuel consumption and the carbon footprint of supply chains. In energy production, autonomous monitoring and control systems can continuously adjust operations to ensure minimal waste and maximum efficiency, whether in a traditional oil field, or renewable energy plant.

Incorporating automation into decarbonisation strategies allows companies to balance environmental sustainability with profitability. This is particularly critical for industries such as energy, transportation, and manufacturing, where reducing emissions can be complex and expensive without the operational gains that automation provides.

Automating Emissions Control and Monitoring

A crucial aspect of decarbonisation is the ability to monitor and control emissions in real-time. Automation technologies, including IoT sensors, AI, and machine learning, are revolutionising the way companies manage their emissions. These technologies provide real-time data on energy use, resource consumption, and carbon output, enabling companies to make proactive adjustments to minimise their carbon footprint.

IoT sensors embedded in key equipment can track emissions at every stage of production. These sensors send continuous data streams to centralised systems, where AI-powered analytics can detect inefficiencies and potential emission spikes. In response, the system can automatically adjust operations to reduce energy use, or switch to cleaner energy sources, effectively mitigating carbon output without human intervention.

For example, in an energy facility, autonomous systems can monitor CO2 emissions and adjust to optimise energy efficiency whilst adhering to regulations. These automated systems act faster than manual adjustments ever could, providing a more agile approach to emissions control. Over time, this can lead to significant reductions in emissions, whilst maintaining operational performance.

For AST Networks, offering solutions that integrate real-time emissions monitoring and automated controls is a profound opportunity. This approach allows customers to not only track their carbon footprint, but also actively reduce it through automated decision-making in real-time.

Smart Energy Management Systems

Energy management is a key area where automation plays a direct role in decarbonisation. Smart energy management systems (EMS) integrate renewable energy sources, manage demand fluctuations, and optimise energy usage to minimise both costs and emissions.

Automated EMS can manage energy consumption across industrial facilities by using AI algorithms to predict and control usage. These systems can integrate multiple energy sources – such as solar, wind, and traditional power – whilst optimising for the lowest carbon footprint. For example, an EMS could prioritise solar energy during peak sun hours whilst minimising reliance on fossil fuels, thus reducing overall emissions.

These systems also allow companies to balance energy consumption with real-time energy demand, ensuring that no unnecessary energy is consumed. The result is a more efficient use of energy resources, leading to significant emissions reductions, without sacrificing operational needs.

AST Networks can offer tailored smart energy management solutions that help companies integrate renewable energy sources into their existing infrastructure. This will allow them to achieve their decarbonisation targets whilst maintaining the operational flexibility required to remain competitive.

Autonomous Operations Minimise Environmental Impact

Automation can also minimise the environmental impact of physical operations through autonomous technologies. Autonomous systems reduce the need for manual interventions, minimise human error, and operate with greater precision, all of which contribute to lower energy use and fewer emissions.

For instance, in oil and gas, autonomous drilling rigs can optimise operations by reducing downtime, minimising fuel consumption, and cutting energy waste. By using data analytics to predict equipment failures before they happen, these systems ensure that resources are used effectively and that unnecessary environmental disruptions are avoided.

Moreover, autonomous transportation and logistics systems can optimise routes and schedules, ensuring the least carbon-intensive paths are taken. This reduces both fuel consumption and emissions, making a significant impact on an organisations carbon footprint and costs.

The role of autonomous operations in decarbonisation extends beyond direct emissions reductions. By minimising human presence in hazardous environments (such as offshore oil rigs, or remote wind farms), these systems also contribute to safety, and reduce the need for energy-intensive support activities, such as transport of personnel.

Digital Twin Technology for Sustainability

A digital twin is a virtual model of a physical asset, system, or process that can simulate and optimise real-world operations. This technology is emerging as a powerful tool for both automation and decarbonisation, offering companies the ability to test and optimise their operations in a digital environment before implementing changes in the real world.

By using digital twins, companies can identify inefficiencies, test new processes, and predict how changes will impact both operational performance and emissions. For example, in a manufacturing facility, a digital twin can simulate energy usage across different production scenarios, helping businesses select the most energy-efficient processes.

Digital twins also enable predictive maintenance, reducing energy waste by ensuring that equipment operates at peak performance. Over time, this leads to lower energy consumption and fewer emissions.

For AST networks, offering digital twin solutions can give customers a powerful tool for reducing their carbon footprint. By simulating different scenarios, companies can make data-driven decisions that align with both their operational goals and their sustainability targets.

Automation and Decarbonisation in Action

Consider an energy company that integrated AST Networks automated emissions control and smart energy management systems into its operations. By installing IoT sensors across production facilities and using AI to analyse real-time data, the company would be able to identify significant inefficiencies in its energy use. Automated controls make continuous adjustments to optimise energy consumption, leading to the potential of a 15% reduction in energy use and 20% decrease in emissions, over a 12-month period.

Additionally, if the company adopted digital twin technology to simulate various energy usage scenarios, they could fine-tune their operations to be able to achieve optimal energy efficiency, resulting in them not only meeting their carbon reduction goals, but also saving millions in operational costs.

Conclusion

The combination of decarbonisation and automation represents a powerful opportunity for companies looking to reduce emissions, whilst maintaining operational excellence. By integrating smart technologies such as IoT, AI, and digital twins, companies can achieve real-time emissions control, optimise energy use, and reduce their carbon footprint – all whilst cutting costs and improving performance.

AST Networks is uniquely positioned to support this transition, offering advanced automation and energy management solutions that help companies meet their decarbonisation targets. By embracing the intersection of automation and sustainability, businesses can future-proof their operations and lead the way in the global energy transition.

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API RP 75, 4th ed

A Proactive Approa
Offshore Safety Exc

All images courtesy Getty Images

In the world of offshore operations, where conditions are both demanding and unpredictable, precision and reliability are essential, complemented by a steadfast commitment to safety and environmental stewardship. Achieving this balance isn't left to chance. It's the result of robust training and the kind of proactive safety culture advanced by the Center for Offshore Safety (COS) and supported by the 4th edition of API Recommended Practice 75 (API RP 75).

For over a decade, COS has been at the forefront of fostering this culture of safety, equipping offshore operators with the guidance needed to meet the evolving demands of Safety and Environmental Management Systems (SEMS). At the heart of this effort is API RP 75, Recommended Practice for a Safety and Environmental Management System for Offshore Operations and Assets.

First introduced in 1993 and updated over time, the third edition (2004) was eventually incorporated into U.S. regulations by the Bureau of Safety and Environmental Enforcement (BSEE), establishing itself as a critical benchmark for safety on the Outer Continental Shelf (OCS). However, the growing complexity of offshore operations, along with advancements in technology and the global expansion of energy projects, led to an update of the standard: API RP 75, 4th edition, published in 2019.

A Shift in Approach: From the 3rd to the 4th Edition

The 4th edition of API RP75 introduces significant changes from its previous edition. While the 3rd edition focused on prescriptive requirements, the 4th edition emphasizes a performance-based framework designed to achieve measurable safety and environmental outcomes. This change requires operators to adapt their approach to SEMS implementation, developing systems customized to their unique operations.

Leadership plays a central role in the 4th edition, which highlights the importance of coordinating safety and environmental programs across contractors, co-owners and partners. It also emphasizes the interaction and interdependence of SEMS elements, addressing the industry's growing need for advanced training. Finally, as third-party audits accelerate their focus to enable operator implementation of actions to prevent recurrence of problems, the 4th edition highlights the need to coordinate all the evaluation and improvement tools in their SEMS arsenal.

Collectively, these changes reflect a significant evolution in offshore safety. And aligning an organization's practices with its principles enhances safety outcomes and reinforces its commitment to advancing a proactive safety culture, making it an essential standard for industry professionals.

Training to Maximize Safety Practices

Indeed, adopting the 4th edition of API RP 75 aligns an organization's practices with the industry's latest performance-based approaches. All change requires some effort, and organizations need to assure a coordinated consistent message is delivered, particularly when mindsets may need adjusting for increased coordination of SEMS elements.

Recognizing this need, COS has developed a comprehensive training program that bridges the gap between

the prescriptive approach of the 3rd edition and the performance-based outcomes required by the 4th.

COS's training program consists of three modules:

Module 1 (online): Foundations of the 4th Edition

This online course provides an overview of the 4th edition, focusing on its performance-based framework and the interaction of SEMS elements. Participants will learn how SEMS elements interact and depend on one another.

Module 2 (online): Planning SEMS Audits

This online module introduces the principles of audit planning. Participants will learn the importance of understanding the variables within the organization and sites being audited that impact scheduling and assigning auditors.

Participants will also learn about site selection, work assignments, and scheduling tips for assuring audit objectives are achieved.

Module 3 (onsite): Conducting SEMS Audits

Delivered in-person, this module provides hands-on training on performing a SEMS audit based on RP 75 4th Edition. Participants will explore how compliance findings can uncover underlying system weaknesses and how issues in one SEMS element may impact others. The hands-on training equips participants to deliver actionable insights that promote continual improvement through effective corrective actions.

While preparing participants to align their SEMS program with API RP 75, 4th edition, the training also provides a strong foundation for understanding API RP 75W, Safety and Environmental Management System for Offshore Wind Operations and Assets, introduced in 2024. The two recommended practices are nearly identical, with only minor adjustments in terminology and examples, making this training invaluable for professionals operating across both traditional offshore energy and renewables.

Looking Ahead

By emphasizing leadership, coordination and the interdependence of SEMS elements, the 4th edition challenges organizations to move beyond compliance and toward proactive, outcome-driven safety management.

For industry professionals, embracing the principles in API RP 75, 4th edition, enhances safety outcomes and reinforces their organization's commitment to operational excellence and environmental stewardship in an increasingly complex offshore landscape.

For more information on API training courses, visit api.org/training (SEMS training information will be available in early 2025).

CENTER FOR OFFSHORE SAFETY

The Center for Offshore Safety (COS) supports companies in offshore natural gas and oil operations worldwide to develop, implement and improve their Safety and Environmental Management Systems.

Join the COS mission to improve offshore operations:

www.CenterForOffshoreSafety.org

info@centerforoffshoresafety.org

Offshore Drilling Upcycle Continues, but 2025 will be a Year of Market Corrections

2024 has been another strong year for the offshore drilling rig market with high utilization and dayrates. However, the winds of change have started to blow, and the market is already showing some signs of weakening demand and declining dayrates across the three main rig types – jackups, semisubs and drillships. Inflationary pressures across the sector are the driving force of the market correction we expect to see in 2025.

By Cinnamon Edralin, Americas Research Director, RigLogix

Westwood expects full-year 2024 marketed committed utilization, which considers actively marketed rigs with charters underway or already booked with future start dates, to come in around 92%. This is down from 94% in full year 2023 but is still a strong rate indicating tight rig availability. For 2025, Westwood is forecasting a lower marketed committed utilization rate of 89%, with the semisub market to be the hardest hit of the three rig types.

Westwood's top three predictions for 2025 are that there will be a slowdown in global rig demand, a pickup in rig attrition, and downward pressure on dayrates.

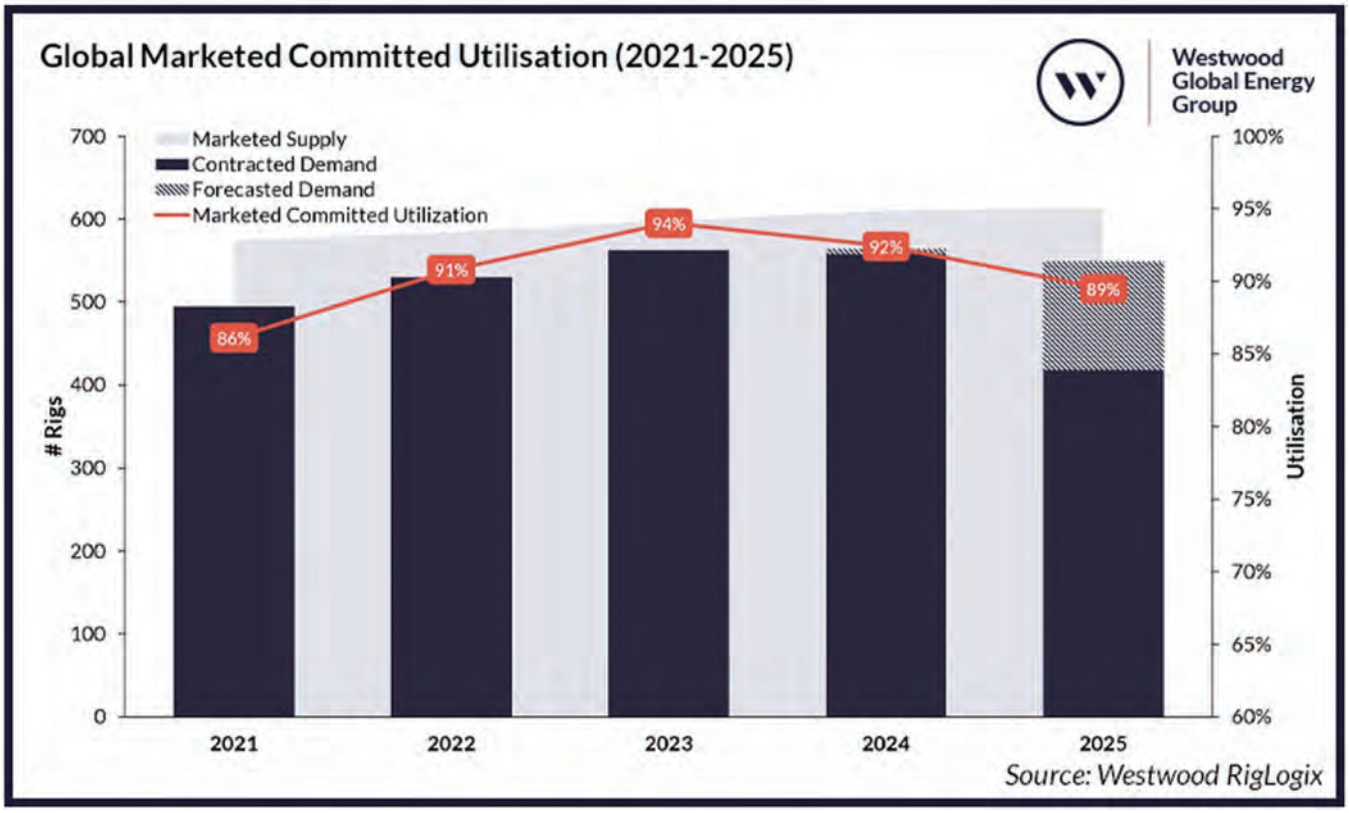
1. Slowdown in rig demand, but Global South to dominate going forward

By the second half of 2024, signs of slowing demand were already being felt, as several projects with pending final investment decisions were pushed out, and drilling campaigns with tentative start dates in late 2024 and early 2025 were delayed. Given that we are seeing demand delays rather than demand destruction through project cancellations, is an indicator that the market is entering a correction phase and the upcycle continues. Rising projects costs, of which rig dayrates are only one part, are one of the main contributing factors, along with delays caused by supply chain challenges resulting in long lead-times for parts and equipment. In some cases, field development components have been delayed to the point that the timing for the related development drilling also needs to be postponed until the components are ready to go.

While the slowdown in demand is being felt worldwide, the decline is not as steep in the Global South, which is a loose grouping of countries considered to be "developing", many of which are located in the Southern Hemisphere. Going forward, offshore rig demand is expected to grow in areas such as Latin America, Africa and India, offsetting some of the demand loss in locations like the North Sea more recently, and the US Gulf of Mexico shallow-water shelf, which has been on the decline for many years. This is in line with expected global energy demand expectations. South America will continue to lead global floating rig demand, and the Middle East will remain the dominant driver of jackup demand.

2. Rig attrition will pick up, particularly for semisubs

The drop in offshore rig demand will then lead to an increase in attrition decisions. Westwood expects the semisub segment to lose the most of the three rig types next year, as this rig segment continues to fall out of favor in most floating rig regions, with the exceptions being the North Sea and Australia, where semisubs are preferred over drillships. As the



end of 2024 nears, six semisubs have been retired already this year. None have been delivered, resulting in a net decrease for this rig type. Conversely, in 2024, no drillships or jackups have been retired. Instead, four drillships and four jackups have been delivered, yielding a net increase in both fleets.

Rig contractors will focus their cuts on units with the least likelihood of finding future work. Projected high reactivation or upgrade costs is also a factor that will be considered. Recent and likely forthcoming consolidation among rig contractors should also provide the opportunity to streamline the combined fleets and retire any units not part of the company's go-forward fleet.

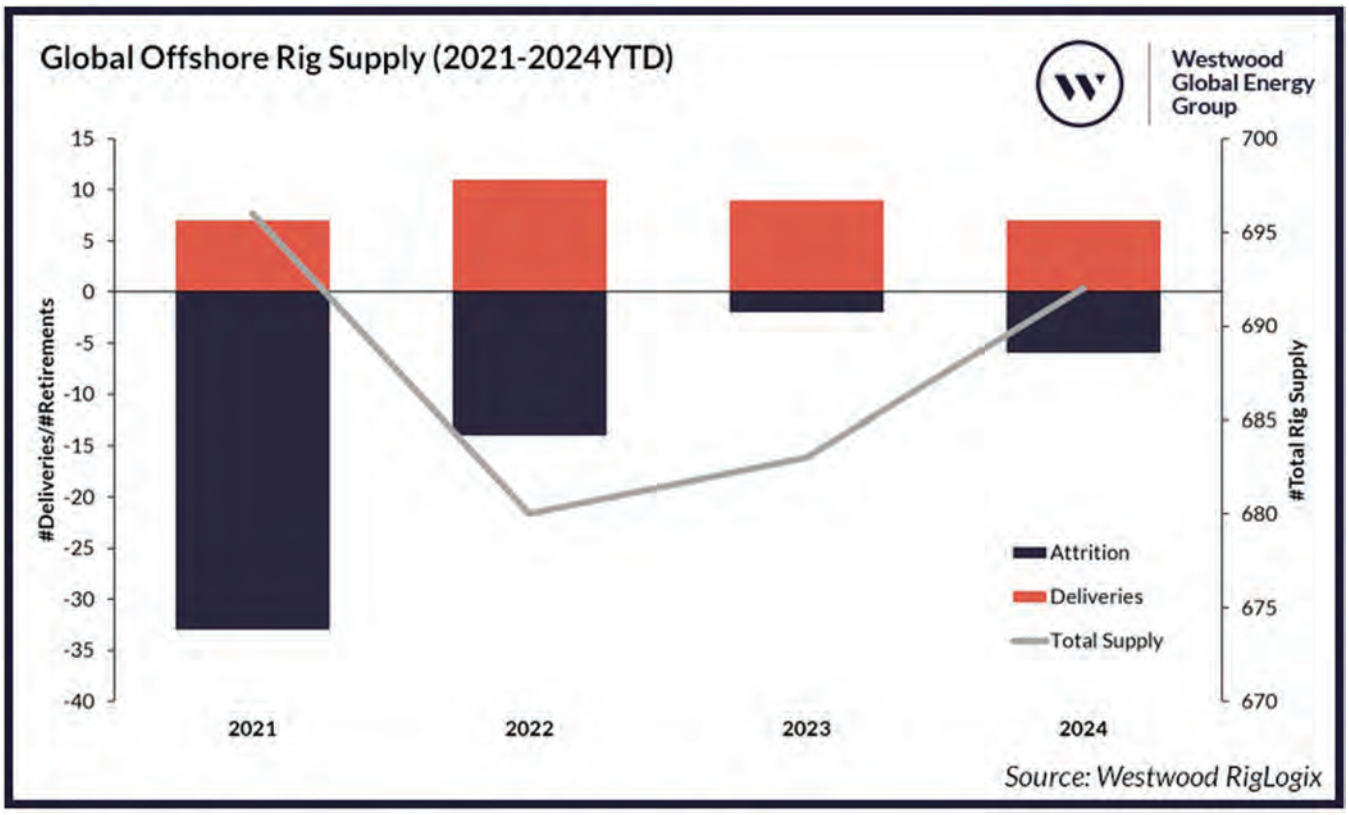
3. Leading-edge dayrates will decline

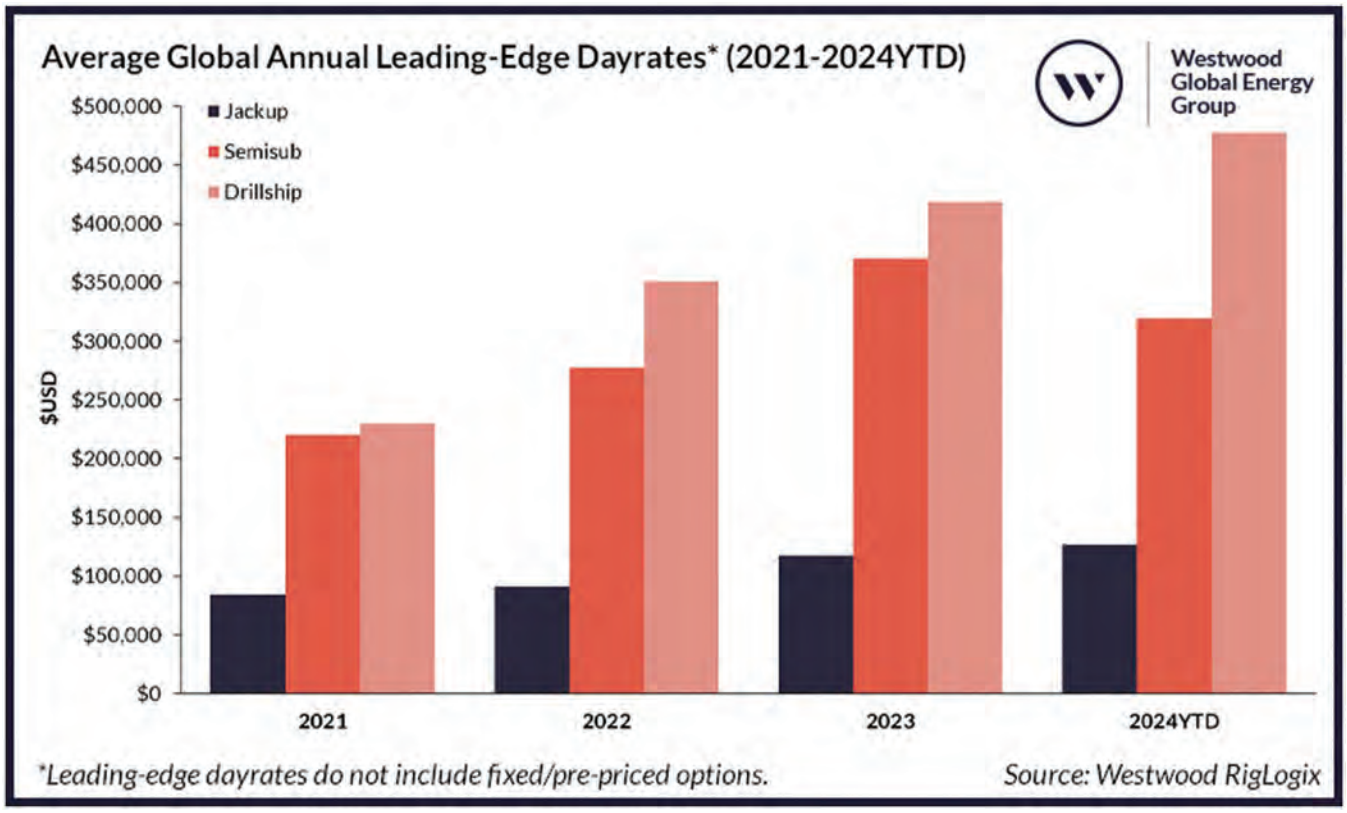
2024 brought some additional clean (that is, excluding additional items such as MPD or integrated services) floating rig rates above $500,000 per day, as well as the first rate recorded during this cycle over $600,000, which was for an 8th generation drillship to conduct high-specification 20K project work in the US Gulf of Mexico. However, Westwood is already seeing signs of leading-edge dayrates declining as whitespace has started appearing on late 2024 and 2025 schedules across rig types.

With semisubs being the first rig type to show demand softness this year, they have kicked off the declining dayrate trend, as the 2024 average is down about 14% from 2023. Meanwhile, the demand weakness we are seeing for jackups and drillships is showing up closer to the end of the year; therefore, both will record 2024 average leading-edge dayrates above their 2023 averages, with jackups up about 8% and drillships up around 15%.

As bidding becomes more competitive, dayrates are increasingly under pressure, as rig contractors push to keep their active fleets working. Expect to see more incentives offered, such as lower mobilization fees and discounted minor upgrades. However, do not expect dayrates to crash as low as they did during the previous prolonged downturn. This time, inflation plays a factor, with much higher labour, service and parts costs. This means rig contractors will not be able to discount their dayrates as much as before, and we may see some rigs forced into cold stack if they cannot find work quickly enough to warrant keeping the rig marketed and fully or partially crewed. Meanwhile, dayrates for the highest-capability units will continue to command the highest end of the dayrate ranges, as these units also face the least availability in the near-to-medium term.

The aforementioned attrition and Westwood's expectation for few deliveries next year will tighten the available rig supply even further. Once operators begin to jump on the lower dayrate offers, thereby reducing near-term availability, then dayrates will bottom out and start to rise once again. With drilling demand generally being pushed into 2026-27 instead of cancelled, this sets the stage for 2025 to be a year of declining demand and dayrates as part of a market correction in a continued upcycle rather than the beginning of another downturn.


Global Offshore Rig Supply (2021-2024YTD)
Westwood Global Energy Group
#Deliveries/#Retirements
#Total Rig Supply
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
700
695
690
685
680
675
670
Attrition
Deliveries
Total Supply
2021
2022
2023
2024
Source: Westwood RigLogix


Average Global Annual Leading-Edge Dayrates* (2021-2024YTD)
Westwood Global Energy Group
$USD
$500,000
$450,000
$400,000
$350,000
$300,000
$250,000
$200,000
$150,000
$100,000
$50,000
$0
Jackup
Semisub
Drillship
2021
2022
2023
2024YTD
*Leading-edge dayrates do not include fixed/pre-priced options.
Source: Westwood RigLogix

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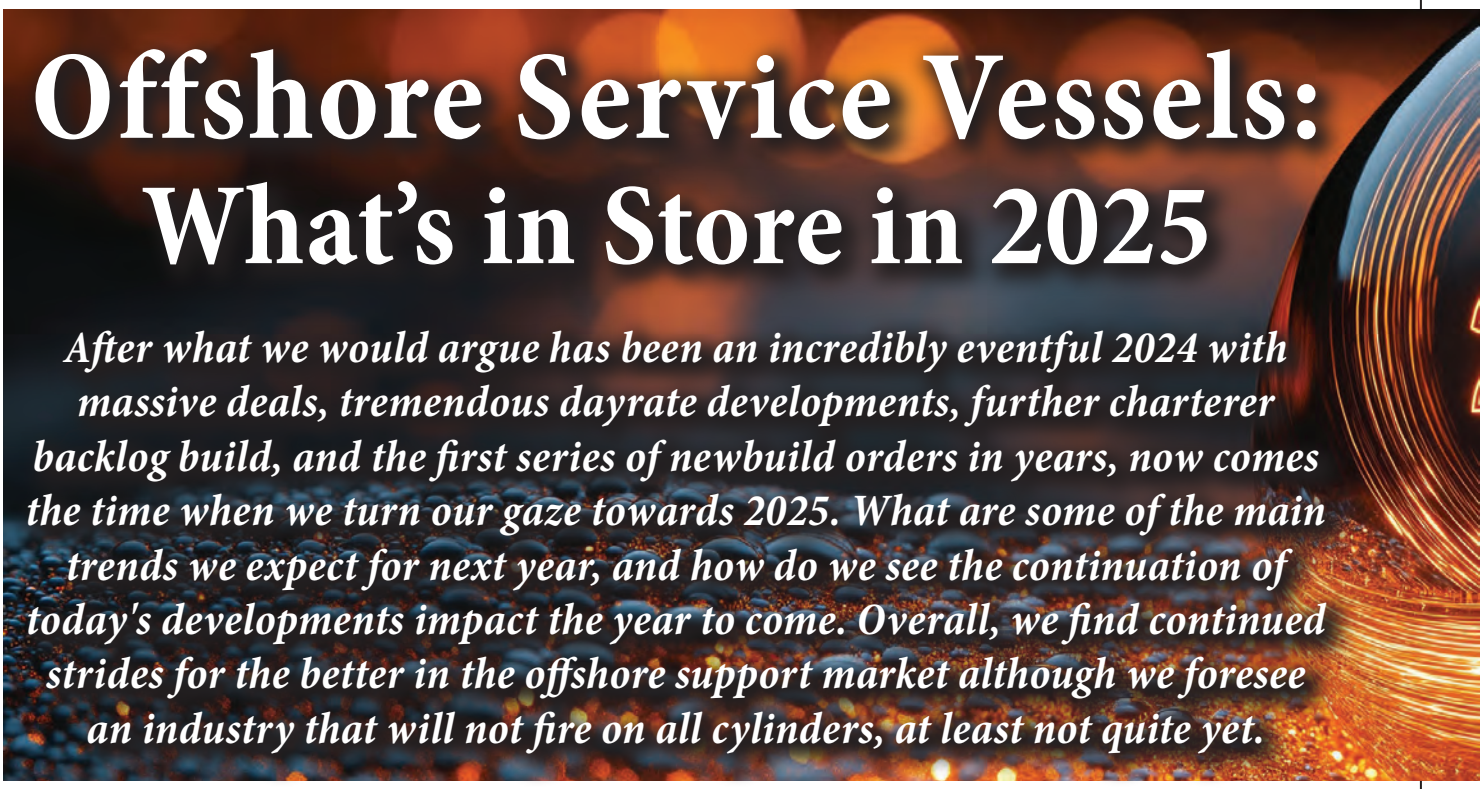
Offshore Service Vessels: What's in Store in 2025



After what we would argue has been an incredibly eventful 2024 with massive deals, tremendous dayrate developments, further charterer backlog build, and the first series of newbuild orders in years, now comes the time when we turn our gaze towards 2025. What are some of the main trends we expect for next year, and how do we see the continuation of today's developments impact the year to come. Overall, we find continued strides for the better in the offshore support market although we foresee an industry that will not fire on all cylinders, at least not quite yet.

By Jesper Skjong, Market Analyst, Fearnley Offshore Supply AS

The World

From a global perspective, we forecast the overall demand for OSVs will continue to increase in 2025, continuing the clear trend since the market trough in 2017 less the impact of COVID in 2020 and 2021. Yet again do we find vessel demand at its highest level since the previous peak 10 years earlier as demand derived from oil & gas activities are estimated to grow by almost 4% on top of a relatively strong 2024. Furthermore, when applying a broad definition of offshore support and including the vessel demand derived from the offshore wind industry, 2025 is set for the highest vessel activity level ever!

That having been said, this is not equally true for all regions. While the usual suspects of the golden triangle and the Middle East are forecasted to see their respective OSV segments continue to higher demand levels next year, we note weaker project development in key countries in both Northwest Europe and Southeast Asia, as well as rig activity in Australia is expected to develop flat in 2025. Thus, while positive in general, it is a bit of a mixed bag when looking at the different key regions.

By Region

Political sentiment in the UK ushered in by the new government in the UK hit the market like a hammer earlier this year, and the impact on the local market therein will beyond likely continue to shape the trajectory in 2025. Despite representing a relatively modest O&G production, the UK is by far one of the biggest OSV markets in Northwest Europe, and as such it will have a significantly negative effect on the entire region. As we are writing this, vessels have recently been fixed for less than GBP 5,000 per day, not even covering operational expenditure. Granted, the challenging weather patterns of the winter months certainly have a lot to do with that, but even so we find that the weakened market fundamentals playing a critical role here as well.

Similarly, postponements and failure to approve new projects has seen major developments offshore Malaysia come to a halt. As the definitive largest country for OSV demand in the Southeast Asian region, this too is likely to put a dent in the sentiment for local Shipowners. When the Sabah government will make up its mind is anyone's guess, and while we wait, we understand that several contenders are now tendering for the fourth(!) time on the same project.

Elsewhere, however, the market is charging on with continued growth in OSV demand in 2025. In Brazil, Petro-

© Anna/AdobeStock

bras recently update spending plan for 2025 to 2029 sees continued confidence in the country's key role as a driver for activity with E&P budgets revised further up from its previous plan. And while Petrobras is in the market for newbuilds, additional supply will not hit the market for several years even if they are ordered before this article hits print.

Likewise, offshore activity in the Middle East remains encouraging despite all of the rig suspension throughout 2024 – amounting to a total of roughly 30 jackups thus far. In fact, in contrast to our initial take on the impact on the OSVs in the region, which in fact saw a total of 50 vessels go offhire, all of these quickly found themselves back working. Moreover, due to a lot of them being on legacy contracts, the new dayrates they achieved were up to 50% higher, which saw overall dayrates in the region improve significantly. A blessing in disguise for some, a lesson for others. You have to be careful what you wish for these days.

With some of the largest field developments in the Middle East paused for the time being due to prolonged timelines and rising costs, admittedly putting a damper on what could have been. Furthermore, OPEC+ recently announced that it will extend the production cuts for another three months running into April of 2025 with the full unwinding scheduled for the end of 2026. Regardless, our forecast still sees the remainder of the planned activities in the region push OSV demand further up in 2025 on top of already historical high number recorded this year.

In West Africa, big things are materializing as well. Galp Energia recently spudded an appraisal well on its huge Mopane discovery offshore Namibia and has also identified the targets for its third exploration probe in its prolific Petroleum Exploration License 83 in the Orange basin. ENI acquired another four blocks for offshore drilling off Côte d'Ivoire following its announced discovery earlier this year. And going forward we expect offshore activity in Angola to increase, potentially even overtaking Nigeria in the long-term.

Across these high growth regions, the challenge for the charterers in 2025 will be that there are simply no new supply additions coming any time soon. While 2024 brought the first real newbuild orders since the previous boom, these vessels will not be delivered until 2026 and 2027. Furthermore, the current orderbook of PSVs and AHTS sits at a meager 2% with 30 and less than 40 units respectively.

As such, the overall OSV fleet will continue to age in the immediate future putting a further strain on the supply side. For 2025 therefore, we find that both increased demand in key regions, and continued pressure on the supply side overall, will benefit the Shipowners across the globe.

Source: Welligence

Looking Ahead: Five Trends Shaping 2025

By Ruaraidh Montgomery, Global Head of Research, Welligence Energy Analytics

[1] Flat Outlook for Global Spend … but … Advantaged Projects Attract Capital

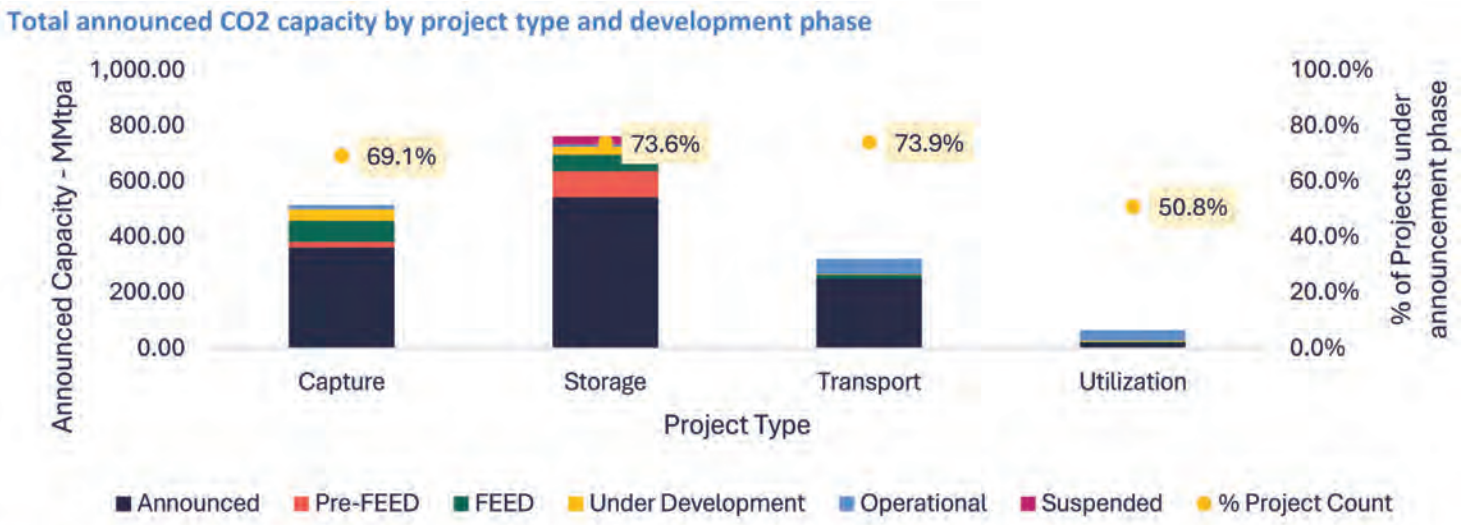
With concerns of a softening oil market, we expect global upstream investment to remain flat or even fall – indeed, the reported 2025 budgets to date show a 3-4% drop. This doesn't mean companies won't pursue new projects, but only the best will pass strict hurdle rates. We estimate spend north of $50 billion will be allocated to new greenfield projects, similar to this year, potentially unlocking over 8 bnboe of reserves.

The most high-profile development that could be sanctioned is TotalEnergies' Venus project in Namibia. We also anticipate a wave of multi-tcf gas developments will move forward – in the Eastern Mediterranean, Chevron could sanction Leviathan Phase 2 (Israel) and Aphrodite (Cyprus), while Eni may take FID at Cronos (Cyprus). New gas projects are also in Southeast Asia, like Eni's Geng North and INPEX's Abadi LNG (both Indonesia).

[2] Almost 50 bnboe of Reserves Up for Grabs

We expect year-on-year M&A activity to remain relatively steady. Most deal-making (as usual) will occur onshore North America, in the US and Canada, with consolidation remaining an underlying theme. But given the levels of large-scale activity that have taken place, especially in the Permian, a certain level of asset high-grading can also be expected as the buyers optimize their portfolios. Activity in other basins, like the Bakken, may start to pick up.

Consolidation will continue to be a theme as companies seek scale and it has just been confirmed that Kosmos is in talks regarding a possible takeover of Tullow. We expect the NOCs of the Middle East to continue their international acquisition drive, and we may also see bp and Shell, both of whom have pivoted their strategies back towards oil & gas, chasing opportunities. There are plenty of opportunities with the likes of Chevron and Occidental executing multi-billion dollar divestment programs.



Source: Welligence CCUS offering

[3] LNG – Market Tightness Persists

The 2025 LNG market will remain supply-constrained, keeping prices elevated, as Asian and European demand growth outpaces the gradual start-up of new, mostly North American, liquefaction trains. Growth will remain muted as the latest wave of liquefaction trains only begin ramping up and we forecast just ~30 MMtpa of new capacity will have started by end-2025.

The two largest new projects are the initial trains at Venture Global's Plaquemines LNG in the US and Shell's LNG Canada, the country's first export project. Additional supply will come online in Australia, Mexico and West Africa. Potential FIDs in 2025 include TotalEnergies' Papua LNG project in Papua New Guinea, Eni's Coral North FLNG in Mozambique and INPEX's Abadi LNG project in Indonesia. President-elect Trump's agenda includes ending the current pause on US LNG non-FTA export permits, which could propel Venture Global's CP2 LNG development and Sempra Energy's fourth train at Cameron LNG to FID. Woodside is also targeting FID at its Louisiana LNG project in Q1 2025.

[4] Race to the Top – Fiscal Incentives, Regulatory Improvements Deepen

The competition for upstream investment will grow, with countries pulling levers from fiscal terms to regulatory streamlining to attract E&Ps. In 2025, oil and gas producing countries will continue their intense competition to attract upstream dollars. Although IOC and NOC budgets have steadily grown post-COVID, the investment pool is still limited compared to previous years. Some producer countries have reacted by lowering entry requirements and making their fiscal and contractual regimes more attractive.

We have seen Argentina, Brazil, Trinidad & Tobago, Egypt, Angola, Nigeria, Indonesia and Malaysia, just to mention a few examples, introducing fiscal incentives and regulatory changes in 2024. It's important to note that in most cases, these changes are part of a wider policy rather than isolated actions. We envisage that this trend may be replicated by other countries that are lagging and need to take bold actions to reactivate their E&P sectors.

[5] Less Emphasis on Energy Transition

Some E&Ps are adjusting their energy transition targets to enable continued investment in oil & gas. The challenging economics of many new energies projects has ultimately manifested in shareholder pressure. And this had led to leadership changes at certain companies with bp's appointment of Murray Auchincloss, who has reprioritized oil & gas, and Shell's restructuring under Wael Sawan to focus more on hydrocarbons. E&Ps will retain decarbonization targets, but adjustments are expected – for example, some will set emission intensity-based targets, allowing more flexibility to invest in hydrocarbons.

Companies will only work on the best energy transition projects, selling or cancelling those at the tail end. With 69% of projects in our CCUS coverage still in the announcement phase, 2025 might be the year where we see an industry-wide opportunity high-grading. Under the second President Trump term, the United States is expected to prioritize oil and gas, focusing on reducing regulations. But we expect existing incentives, such as those from the Inflation Reduction Act, to remain, and the permitting processes for ongoing CCS projects may be expedited.

Image credit: Boskalis

FLOATING WIND VESSEL SUPPLY & DEMAND THROUGH 2035

By Philip Lewis, Research Director, Intelatus Global Partners

Floating wind is an emerging technology, currently being tested in small scale demonstration and pilot projects. Global commissioned floating wind capacity is forecast to amount to ~6 GW by 2030 and ~50 GW by 2035. A sharp increase in activity is expected in the period 2031-2035. Market growth will initially be led by the South Korean market, but the European market, led by the UK and France, is forecast to dominate in the next decade as North America and other East Asia Pacific markets join the fray. To reach ~50 GW of installed capacity by 2035, capital investment of around a quarter of a trillion dollars is required.

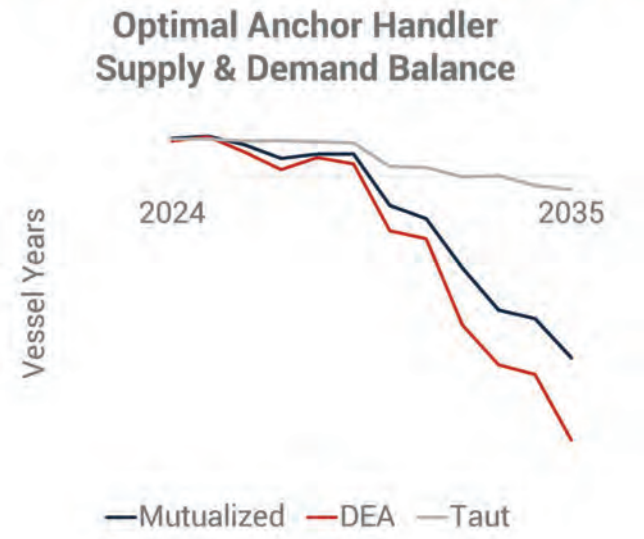
Although there are many different solutions to building a floating wind farm (different floater, anchor and mooring line types), the nature of floating wind projects, both in numbers of systems to install and their physical size, drives demand for the largest and most highly specified anchor handlers and subsea vessels.

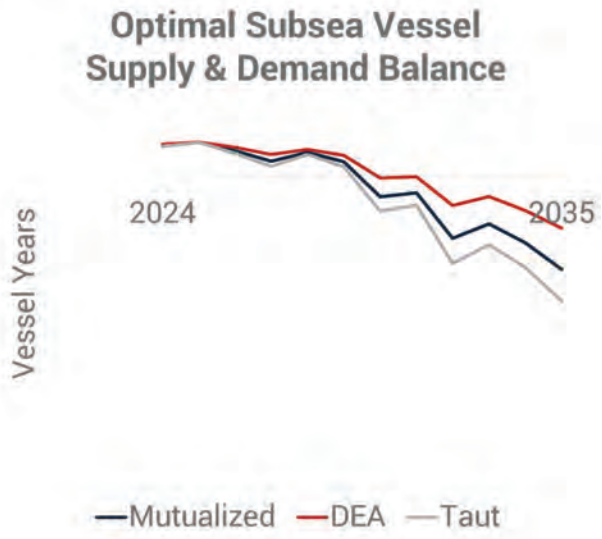
Significant vessel shortages are forecast through the middle of the next decade.

This vessel shortage will drive shortages of qualified and experienced seafarers, which appear from ~2030. Shortages will be in all senior bridge, deck and engine room positions. To demonstrate the trend, the chart presents a forecast of additional Senior DPOs and DPOs onboard (i.e. excluding back-to-back crew).

These are the findings of a comprehensive new floating wind installation vessel market report published by Intelatus Global Partners. The report examines a range of

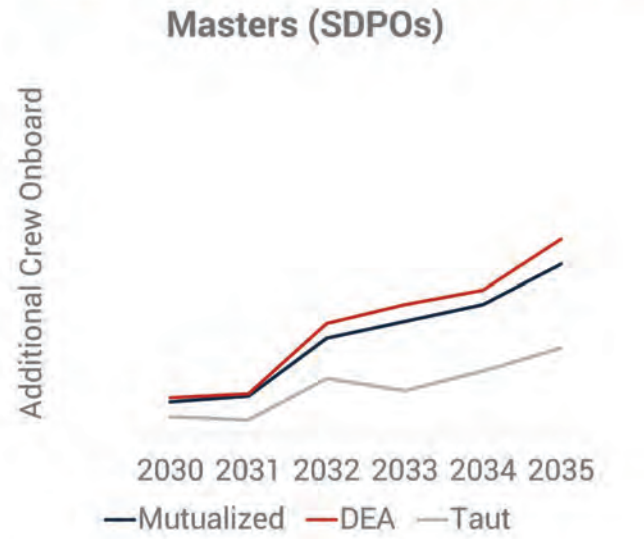
Vessel supply and demand balance forecasts

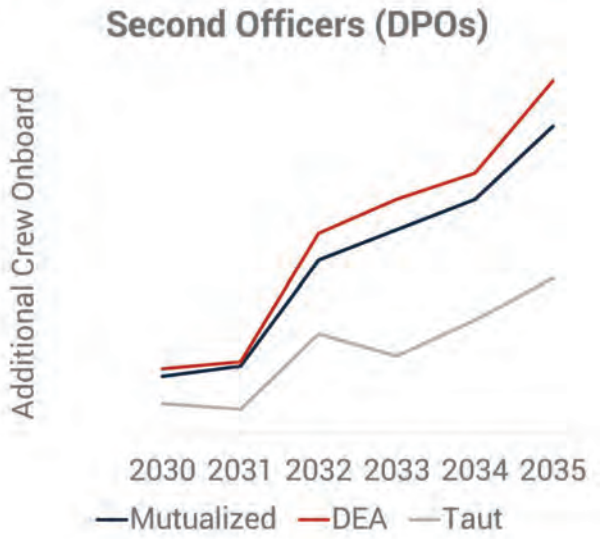




Source: Intelatus Global Partners

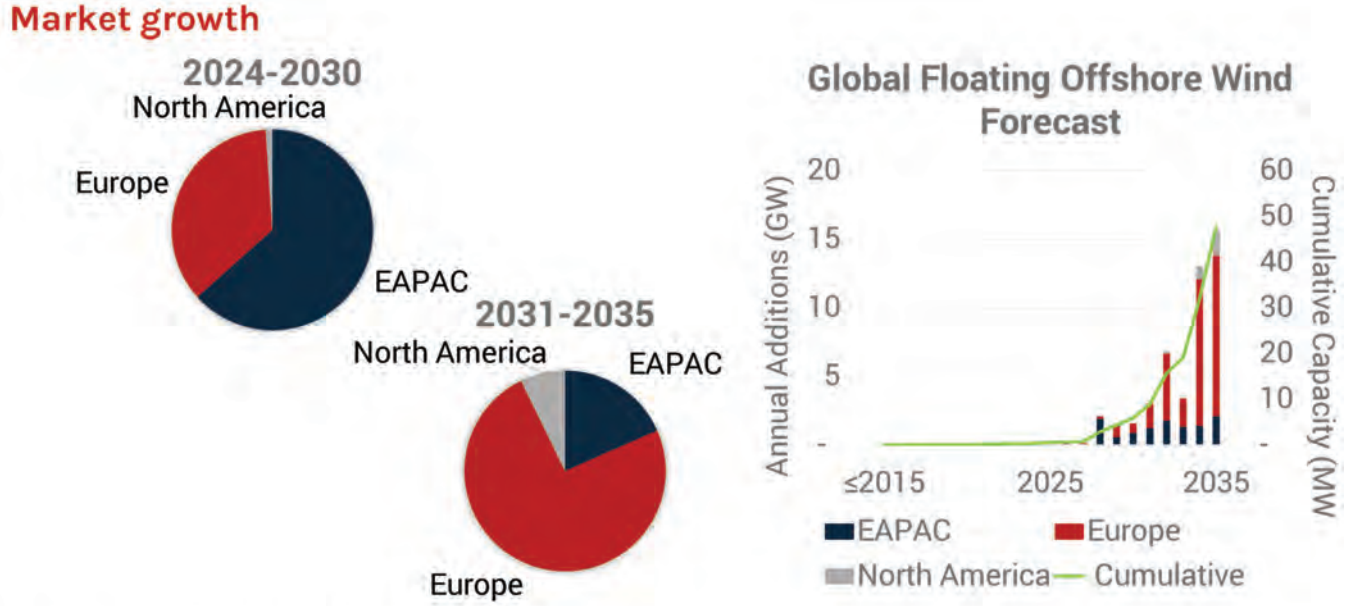
Vessel supply and demand balance forecasts





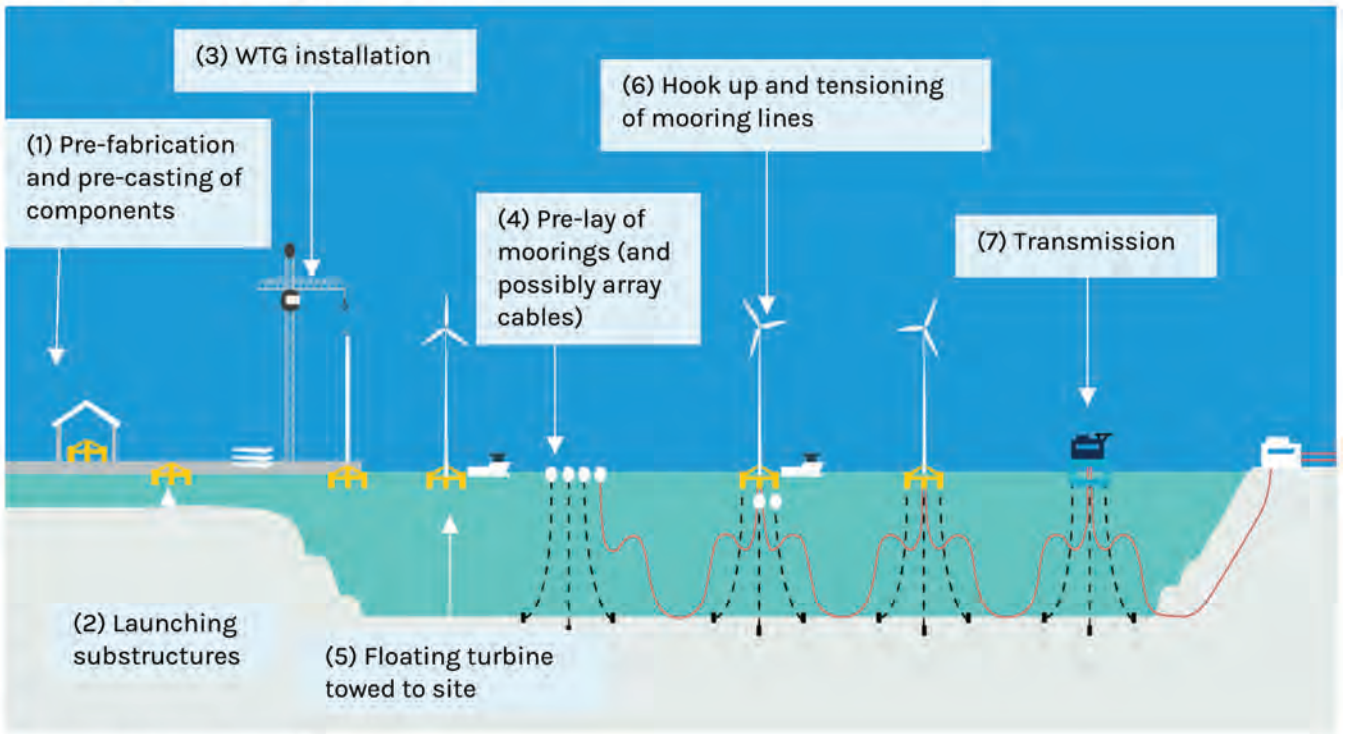
Source: Intelatus Global Partners

Market growth



Source: Intelatus Global Partners

Building a floating wind farm



Source: Intelatus Global Partners

technical drivers, summarizes the findings of the latest research, presents a deep dive into each of the major floating wind markets and translates the activity forecast into a vessel supply and demand balance forecast.

THE MARKET IS GROWING – BUT POSSIBLY NOT AS QUICKLY AS SOME BELIEVE

As we have mentioned previously, floating wind is an emerging technology. Concepts are still be demonstrated in single turbine and small pilot arrays. The first commercial scale arrays (±500 MW) with offshore construction activity within this decade are being planned for such markets as South Korea and the UK.

From around ~305 MW installed at the end of 2024 to ~6 GW (2030) and ~48 GW (2035). Market growth anchored by Europe in the first half of the next decade.

Through this decade, we anticipate that South Korea will be the largest floating market, but the first half of the next decade is likely to be dominated by activity in Europe, with the UK, France, Italy, Portugal forecast to be the most active (but not only) floating wind markets. The U.S. enters the floating wind stage during the forecast period with both pilot and commercial scale developments on the West Coast and pilot arrays on the East Coast.

HOW DO YOU BUILD A FLOATING WIND FARM?

At a high level, building a floating wind farm can seem to be a simple exercise, as shown in the graphic.

However, the uncertainty over what we will be installed, volumes of components to be handled and their sheer physical size present many challenges to floating wind developers. Let's look at the differences that sets the building of a floating wind project apart from the established bottom-fixed segment to understand these challenges of technical uncertainty, volumes and sizes of components.

- It starts with the floater, for which there are more than 100 concepts being developed globally that are broadly grouped in semi-submersibles, barges, spars and TLPs. These concepts can be built from steel (rolled stiffened plate, flat panel construction and heavy-walled tubular, etc.) or concrete (slip formed, pre-cast, with reinforcement, with post tensioning tendons, etc.). Some concepts feature steel plate construction familiar to shipbuilders while others rely on large diameter steel pipes produced at offshore wind monopile and tower manufacturing plants. Steel concepts can be manufactured in sub-assemblies and shipped to assembly yards or can be shipped as complete units from construction yards on heavy lift vessels. Concrete concepts are generally more suited to local manufacture and assembly. Depending on the concept selected, each floater for current generation turbines could weigh from below 5,000 tonnes to 20,0000 tonnes. A commercial scale project will require ~30-35 of these floaters per year to meet installation requirements of one full installation spread.
- Turbine installation is generally expected to take place at the assembly port. Next generation turbines with larger diameters drive the hub height where a crane needs to lift weights of 750-1,050 tonnes to over 180 meters assuming the currently available large turbines. A key variable to monitor is the development by Chinese developers of turbines as large as 25 MW with rotor diameters of ~300-310 meters. Suitable crane supply is limited today and with potential increases in rotor diameters will become even more limited. Once assembled, several turbines will likely be wet stored before being towed offshore for hook-up. Due to installation season weather windows, this period could last 4-6 months. The implication is that a sufficient supply of suitable large, sheltered harbor facilities is required.
- A station keeping system is required for the floating turbines. There are many different solutions available depending on the specific site conditions and floater design, but suction anchors, drag embedment anchors and driven piles are likely to feature in most projects in the short- to mid-term. Again, depending on a number of variables, anchors can be shared by mooring lines or each mooring line can feature an anchor. The base case is for each floater to generally require three mooring lines, either in a 3x1 (3 lines per floater) configuration, a 3x2 layout or even 3x3. The uncertainty over the technical solutions drives us to develop our three base scenarios (mutualized suction anchors, drag embedment anchors and taut mooring with suction anchors) to present an order of magnitude of the volumes of components, the demand for vessels and to highlight the impacts and major differences in the various technical choices. It is likely, at least in the short-to-mid-term, that mooring systems will feature sections of large chain (~130-1800mm) and sections of large fiber rope (±300mm).
- Complete assemblies will be towed offshore by a spread of tugs including lead, support, and security tugs and then hooked up to the pre-laid moorings. Tensioning of the mooring system will generally be required, more often than not from the vessel rather than the floater. It should be noted that the impact of larger turbines referenced earlier will likely be larger floaters and more robust (larger in num-

ber and/or size) moorings, which of course can increase the technical requirements for towing and hook-up vessels.

- Array cables can be pre-laid and wet-stored with the moorings or installed when the floaters are hooked-up. A key difference in floating wind array cable systems to those found on bottom-fixed projects is that the subsea cables are flexible or dynamic and are suited to deployment by vertical lay systems.
- Substations can be bottom-fixed, floating or even subsea, depending on the specific project site characteristics. Export cable laying is for the most part the same as seen in bottom fixed wind farms.

TURNING THE FORECAST INTO VESSEL DEMAND

We have prepared a bottom-up forecast for activity through 2035 and have developed demand models for three scenarios:

- Mutualized catenary mooring lines (very large diameter chain and fiber rope) connected to suction anchors.
- Drag embedment anchors, two per floater mooring connection, connected to individual catenary mooring lines (large diameter steel chain, smaller than that of the mutualized and taut mooring case, and a fiber rope mid-section).
- A taut mooring system with a smaller footprint, with predominantly fiber rope mooring lines and connected to induvial suction anchors.

The mooring scenarios deliver significantly different results of anchor demand (~10,000-30,0000 anchors) and mooring lines (~17,000-35,000). We expect to see all three systems used, although the catenary systems are likely to be preferred in the short-to-mid-term. More than 14 million meters of array cables are also forecast to be installed in the period.

The characteristics of the components drive the need for large anchor handlers and subsea vessels. In our report, the detailed technical analysis takes the reader through the drivers to understand the constraints in terms of capacity, capabilities and efficiencies of vessels and why the large vessels will be required.

The simple conclusion is that there is insufficient technically capable vessel supply to meet forecast demand in the next decade.

ARE BIG, EXPENSIVE FLOATING WIND SPECIFIC VESSELS THE ANSWER?

The quick answer is "no".

Unless charters agree long-term vessel utilization, there will be likely be several months every year where a floating wind specific vessel will be underutilized. Long-term charters commitments will be needed to justify investment in high-cost assets. These conditions do not currently exist.

There is a greater argument for large subsea vessel building, due to the flexibility of the assets to work in both oil & gas and offshore wind (bottom-fixed and floating) space. But the high-specification anchor handlers required by floating wind projects are a more difficult investment case. What most floating wind projects will require is generally technically very different from most oil & gas projects. As a result, a typical large oil & gas anchor handler will lack one or more of the key technical features to be an efficient tool for commercial floating wind projects.

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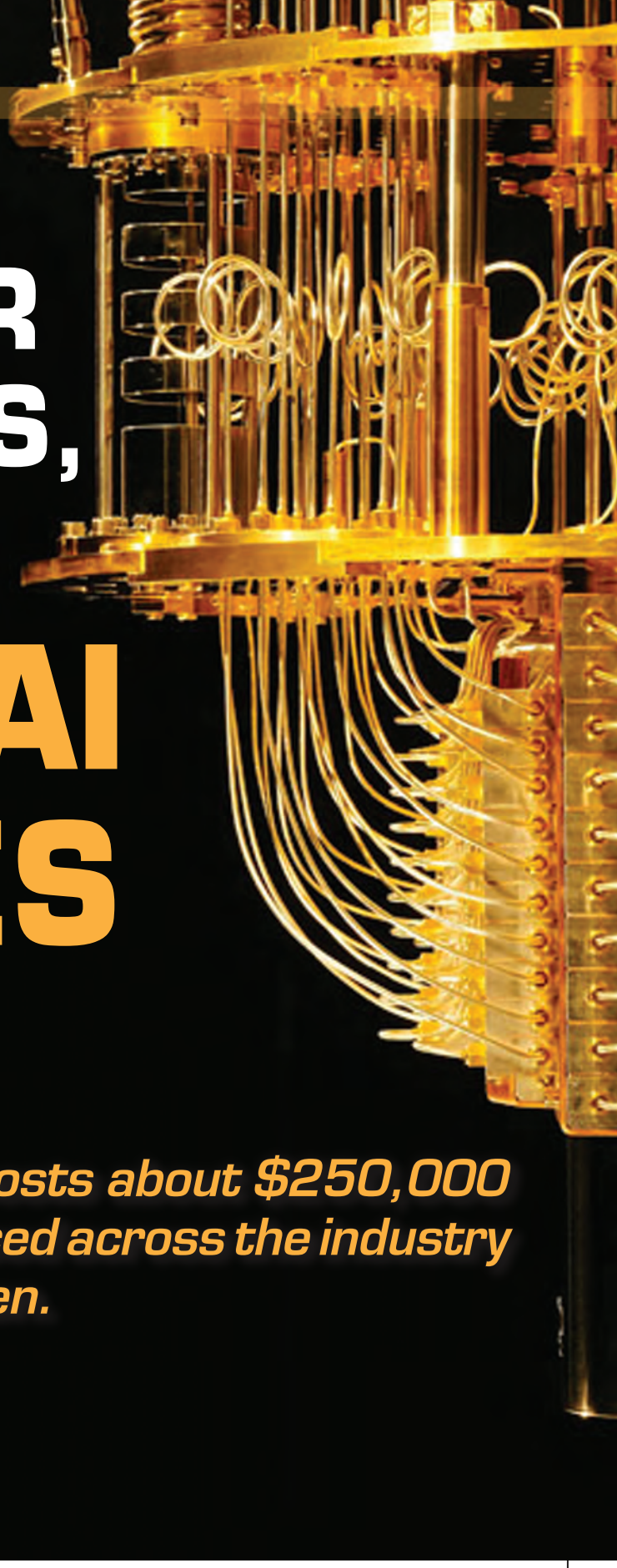
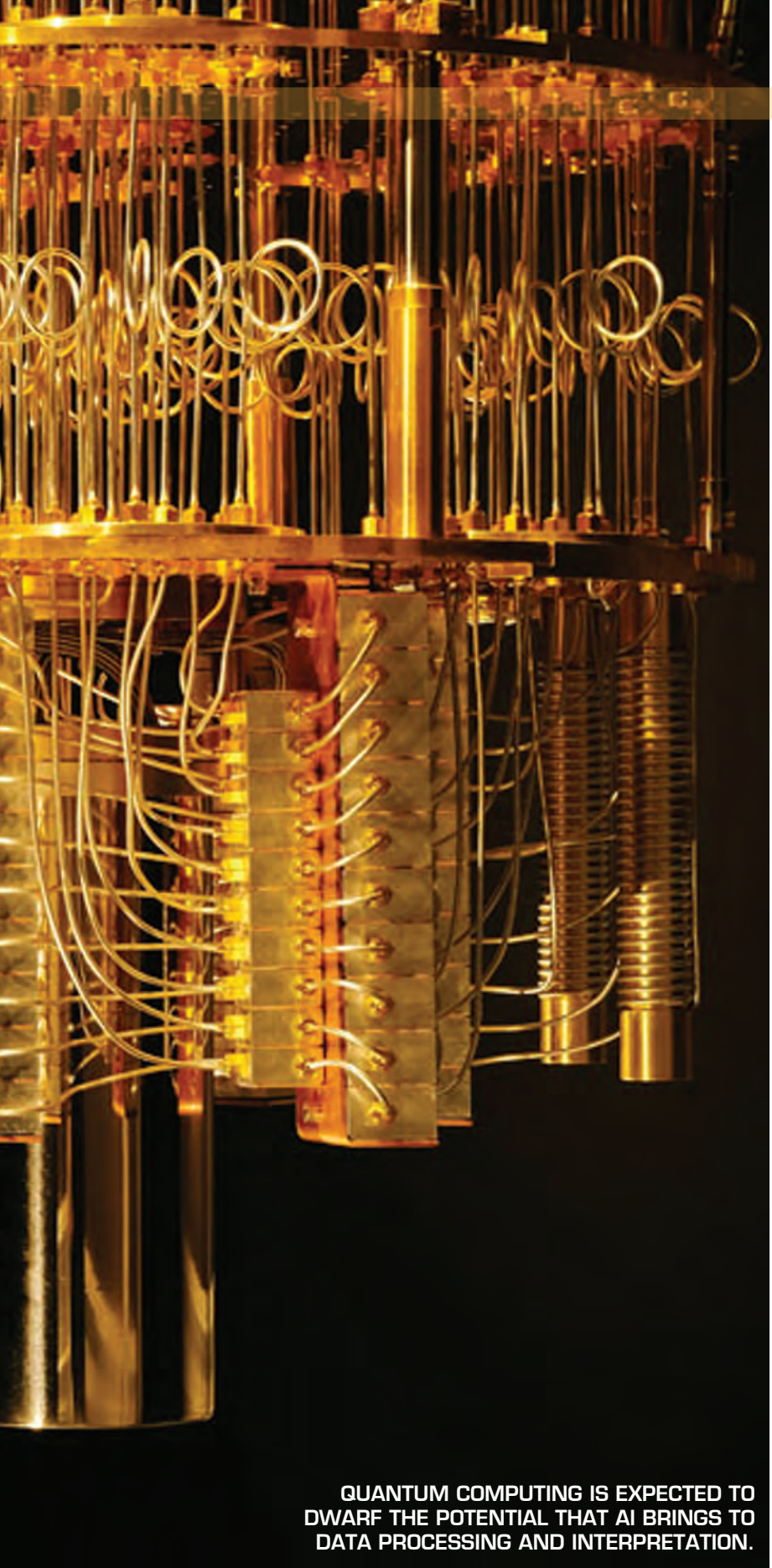
THE HIGHER THE STAKES, THE MORE VALUE AI CREATES



Idle time for a drilling rig costs about $250,000 an hour. AI is being embraced across the industry to ensure it doesn't happen.

By Wendy Laursen

Image courtesy of IBM



QUANTUM COMPUTING IS EXPECTED TO DWARF THE POTENTIAL THAT AI BRINGS TO DATA PROCESSING AND INTERPRETATION.

A while back, an energy major had an unfathomable, intermittent problem with its drilling operations. It was beginning to cost big money, and experts from IBM were called in. After an extensive AI and human examination of historical sensor data, the problem was determined to be caused by whale song during the mating season which was reverberating in the drill pipe. As a classic demonstration of the power of AI, the situation brought together the key components of data science: data, models, processing speed and the human mind.

The aim is never to take the human out of the loop, says Carol Lee Anderson, IBM's technology GM for the oil and gas industry, just to rid them of laborious and repetitive tasks and provide them with real-time decision support. "You still need somebody that can interpret the data and make the right decisions."

According to IBM, AI is technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy. For oil and gas companies, IBM often puts it to use for asset management, operational efficiency and safety. It's an industry with big money and big risk. If things go wrong, people could die. "When the stakes are high, so are the benefits," says Anderson.

Directly underneath AI is machine learning (ML) which involves creating models by training an algorithm to make predictions or decisions based on data. Here it's important to guard against hallucinations - when a model perceives patterns or objects that are nonexistent, creating nonsensical or inaccurate outputs. "IBM is about risk reduction, and we back our governance in legal terms," she says.

Woodside and IBM have worked together to implement solutions that can extract meaningful insights from 30 years of dense and complex engineering data. Woodside considers that AI enables the development of faster models that can explore larger solution spaces, identifying optimal operating conditions more efficiently. This approach can be

AI is technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy. For oil and gas companies, IBM often puts it to use for asset management, operational efficiency and safety. "When the stakes are high, so are the benefits."

– Carol Lee Anderson,
Technology GM for the oil and gas industry, IBM

Image courtesy IBM

validated with traditional chemical process simulation, leading to more efficient production processes, lower costs and reduced carbon emissions (e.g. advanced analytics to optimize mixed refrigerant out of the liquefaction process).

Woodside is also using generative AI - deep-learning models that can generate high-quality text, images, and other content based on the data they are trained on. With safety is a top priority, the company uses generative AI to review scopes of work on its assets to help identify lessons learned and relevant training. For example, it is developing an AI project to count birds at its operations in Trinidad and Tobago after a number of bird-related incidents involving helicopters. The solution uses CCTV and AI vision models to provide status updates on the number of birds near the offshore landing facility, maximizing worker safety and the integrity of infrastructure.

Halliburton is using natural language processing (NLP) in the design of oil and gas wells. NLP is AI that uses ML to enable computers to understand and communicate with human language. Milos Milosevic, Halliburton's Senior Director, Digital Well Construction, says: "We use NLP algorithms to help read many text entries captured by experts from previous wells to suggest optimal design features. Likewise, we use NLP to read industry standards and documentation to extract relevant sections for consideration in the current well."

Halliburton has also introduced the next generation of its LOGIX automation and remote operations platform that leverages downhole data to assist with autonomous drilling. LOGIX responds to changes in geological formations with the analysis of data from adjacent wells and updates the drilling plan with live data. The platform's latest developments use ML to boost drilling efficiency, fine tune shoe-to-shoe performance and predict bit wear with more accuracy, and it can be coupled with Halliburton's iCruise Force intelligent, high-performance motorized rotary steerable system.

The company has also developed the first-ever automation service that enables customers to execute their fracture design without human intervention. Octiv Auto Frac pairs automated frac control with the insights from AI-driven sensing of fracture propagation. This automates thousands of decisions while pumping, based on job designs and pre-job control inputs, with constant response to dynamic stimulation conditions.

Milosevic sees cloud computing as seminal for the industry. "Many problems could either not be solved before due to the lack of processing power and attached storage or could be solved partially by very few with large resources.

Image courtesy Halliburton

HALLIBURTON'S OCTIV AUTO FRAC PAIRS AUTOMATED FRAC CONTROL WITH THE INSIGHTS FROM AI-DRIVEN SENSING OF FRACTURE PROPAGATION.

Image courtesy Halliburton

HALLIBURTON HAS INTRODUCED THE NEXT GENERATION OF ITS LOGIX AUTOMATION AND REMOTE OPERATIONS PLATFORM THAT RESPONDS TO CHANGES IN GEOLOGICAL FORMATIONS WITH THE ANALYSIS OF DATA FROM ADJACENT WELLS AND UPDATES THE DRILLING PLAN WITH LIVE DATA.

In parallel with the increase in cloud processing capabilities, the industry has realized that we need to liberate data from various compartmentalized databases.

"We are also able to deploy economically more processing at the rig site and in downhole tools to automate corrective actions based on sensor inputs. This is fueling a revolution in upstream oil and gas automation and AI-based decisions."

This year, SLB launched its Lumi data and AI platform which will be available on all major cloud service providers as well as on-premises. It includes large language models which are models trained on large amounts of data and capable of understanding and generating natural language and other types of content to perform a wide range of tasks. These models help contextualize data across domains so customers can scale advanced AI workflows using generative AI. "As we navigate the delicate balance between energy production and decarbonization, generative AI is emerging as a crucial catalyst for change," says Olivier Le Peuch, chief executive officer, SLB.

To come is agentic AI - a system or program that is capable of autonomously performing tasks on behalf of a user or another system by designing its workflow and using available tools. The system has "agency" to make decisions, take actions, solve complex problems and interact with external environments. Software developer eDrilling is developing a drilling agent it says would behave like an experienced engineer to free up human engineers for more strategic activities.

Beyond that, quantum computing is expected to dwarf the potential that AI brings to data processing and interpretation. Where a supercomputer might take a year to crunch a load of data, it could take just a few hours with a quantum computer. IBM, ExxonMobil, Woodside and others are already involved.

SLB'S LUMI DATA AND AI PLATFORM WILL BE AVAILABLE ON ALL MAJOR CLOUD SERVICE PROVIDERS AS WELL AS ON-PREMISES.

Image courtesy SLB

Image courtesy Yinson

FLARE GAS RECOVERY MEETS THE FUTURE

Flare gas recovery lies at the heart of a range of integrated, new emissions abatement technologies.

By Wendy Laursen

The World Bank's 2015 launch of the Zero Flaring by 2030 initiative saw flare gas recovery become a standard part of many topside production processing systems. Regulations in places like Brazil, the Gulf of Mexico and the North Sea fortified this voluntary commitment. Now with the industry heading towards zero-emission FPSOs, flare gas recovery is being integrated with more ambitious technology developments.

While field layout and the ability to re-inject or export recovered gas are still major determinants for how much gas is flared, the move towards greater topside energy efficiency, through developments such as electrification, is potentially reducing the other main factor: the use recovered gas for power.

Advances are such that BW Offshore, for example, predicts that the FPSO BW Opal will consume up to 66% less energy than industry standard designs. The FPSO will enter operation next year on Australia's Barossa gas field, and will include combined cycle gas turbines with waste heat recovery, a closed flame flare system and a hydrocarbon cargo tank blanket system with vapor recovery.

The need for remote operation of equipment is driving developments. MAN Energy Solutions is providing remote process supervision for four HOFIM motor-compressor systems being deployed at the Yggdrasil gas field in Norway. Two of these compressor systems will be installed at the unmanned gas production platform Munin.

Image courtesy MAN ES

MAN ENERGY SOLUTIONS IS SEEING INCREASED DEMAND FOR ITS HOFIM COMPRESSORS.

Head of Sales Upstream Industries, Holger Wörner sees an increasing demand for this small-footprint compressor technology. It is hermetically sealed, oil-free and employs seven-axes active magnetic bearings, so it dispenses with many components typically requiring maintenance in conventional topside compressor systems including gearbox, lubrication-oil system, instrumentation and valving.

Virtual sensors allow operators to validate measured data in real time, increasing operational efficiency and accuracy while, leveraging machine learning capabilities, the system also continuously improves performance over time.

Digitalization is also helping optimize the flaring process. With Baker Hughes' emissions abatement technology, flare.IQ, bp is using critical information from its flare systems, including temperature, pressure, vent gas velocities and gas composition, to help maximize combustion efficiency and minimize emissions. Acting on real-time data from flare.IQ at 65 flares across seven regions, bp can carry out early interventions to reduce emissions.

flare.IQ enables emissions reporting based on real-time measurement in compliance with the UN Environment Program's Oil & Gas Methane Partnership (OGMP) 2.0 level 4. Growing interest in measurement-based reporting is evident in the growth in OGMP membership which has doubled to over 120 companies since its launch in 2020.

TotalEnergies has used AVEVA's PI System to create a digital platform that can perform emissions and energy efficiency calculations in real time based on inputs such as fluid composition, process design data and operating parameters. It can now provide real-time calculations of 85% of scope 1 GHG emissions across all of TotalEnergies' operated E&P assets. It is being used for purge gas optimization, to categorize flaring sources, to detect passing valves and to detect process control anomalies.

Laurent Le Touze, SBM's Product Development Director, points to the importance of flaring equipment operation. "Amongst the key challenges to be overcome, there are preventing over-pressurization of the flare system and flare gas recovering compressor, preventing oxygen ingress in the gas treatment system and ensuring flaring functions as required, including flare tip ignition."

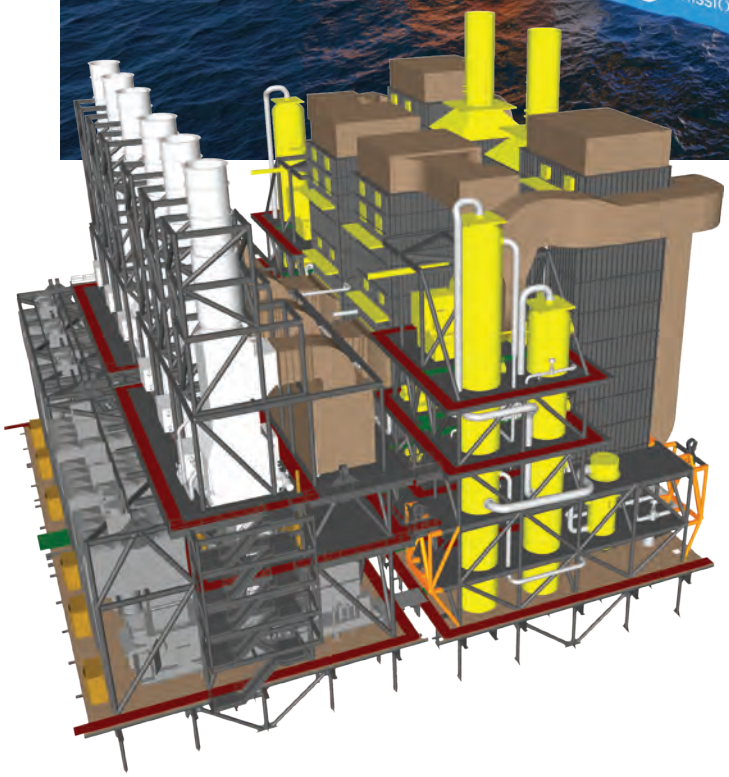
Closed flares offer reducing emissions and without visible flame or heat radiation, and the first unit with a closed flare that SBM will operate is the Almirante Tamandaré FPSO in Brazil from 2025. The closed flare gas capacity is calculated based on all continuous very low-pressure gas streams from the produced water treatment and the triethylene glycol (TEG) gas regeneration system. This totals just over 6 million standard cubic feet per day when the compressor dry gas seal system, flare network purge, and some provision for fugitive emissions are also accounted for. The result will be a reduction of about 50kT of CO2 per year or 1,250kT CO2 over the full operating life of the FPSO.

"We observe a dual trend," says Le Touze. "A push towards reducing emissions driven by international organizations, national regulators, client policies, financial institutions and SBM's own initiatives, alongside a need for new technologies to emerge. Many technical solutions already exist that could significantly reduce emissions, with the primary one being amine-based carbon capture for which SBM has developed a standard module based on our Fast4ward program. However, these solutions are not always selected by the oil companies due to a lack of CO2 disposal options in the field or because of insufficient incentives to justify the additional investments."

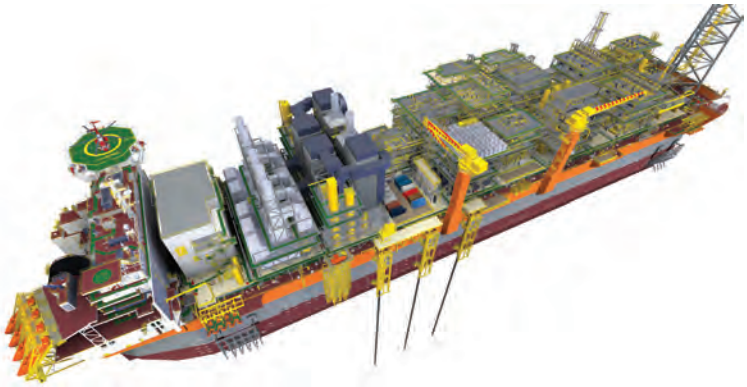
The Agogo FPSO, designed with a full suite of carbon emission reduction technologies, will be the first FPSO featuring carbon capture technology. Its construction was contracted to Yinson Production by Azule Energy, a 50/50 joint venture between bp and Eni. With an estimated reduction in carbon emissions of 27% compared to a conventional design, the FPSO also includes a closed flare system, hydrocarbon blanketing, combined cycle technology, automated process controls and all electric drive systems.

Images this page courtesy SBM

DEMAND FOR DECARBONIZATION OF FPSO OPERATIONS IS EXPECTED TO INCREASE RAPIDLY.



LAURENT LE TOUZE, SBM'S PRODUCT DEVELOPMENT DIRECTOR: *"MANY TECHNICAL SOLUTIONS ALREADY EXIST THAT COULD SIGNIFICANTLY REDUCE EMISSIONS, WITH THE PRIMARY ONE BEING AMINE-BASED CARBON CAPTURE."*



DNV offers its Abate Notation to help assess the viability of the various options available. In July, MODEC's FPSO Bacalhau, built by Dalian Shipbuilding, was the first FPSO to receive Approval in Principle for the notation. This involves stringent management of emission systems (similar to ISO 50001 Energy Management requirements) and the implementation of substantial abatement measures onboard to prevent non-emergency flaring.

The notation is designed to both nudge the industry forward and to recognize progress already made, says Conn Fagan, Vice President - Business Development at DNV. It provides a structured approach to evaluating the practicality and financial viability of the various options available.

Lars Tore Haug, Head of Section, Offshore Safety and Systems at DNV, says the GHG emissions coming from power generation have become a greater focus than flaring now. "This is one of the reasons why there's a lot of focus on electrification. If you can reduce the use of gas turbines on board, you can reduce the amount of overall greenhouse gas emissions. These might account for around 30% of CO2 emissions when, on the more advanced FPSOs, emissions from flaring might be less than 20%."

Motivation to adopt new technology continues, most recently in October 2024 with Petronas teaming up with key Asian and international players to launch the ASEAN Energy Sector Methane Leadership Programme 2.0. MLP 2.0 is expected to expedite regional collaboration, facilitating technology demonstrations from partners within and beyond the region.

Image courtesy DNV

IF YOU CAN REDUCE THE USE OF GAS TURBINES ON BOARD, YOU CAN REDUCE THE AMOUNT OF OVERALL GREENHOUSE GAS EMISSIONS, ***SAID LARS TORE HAUG, HEAD OF SECTION, OFFSHORE SAFETY AND SYSTEMS, DNV.*** *THESE MIGHT ACCOUNT FOR AROUND 30% OF CO2 EMISSIONS WHEN, ON THE MORE ADVANCED FPSOS, EMISSIONS FROM FLARING MIGHT BE LESS THAN 20%.*

Image courtesy DNV

DNV'S ABATE NOTATION IS DESIGNED TO BOTH NUDGE THE INDUSTRY FORWARD AND TO RECOGNIZE PROGRESS ALREADY MADE, ***SAYS CONN FAGAN, VP - BUSINESS DEVELOPMENT, DNV.***

MODEC'S FPSO BACALHAU WAS THE FIRST FPSO TO RECEIVE APPROVAL IN PRINCIPLE FOR DNV'S ABATE NOTATION.

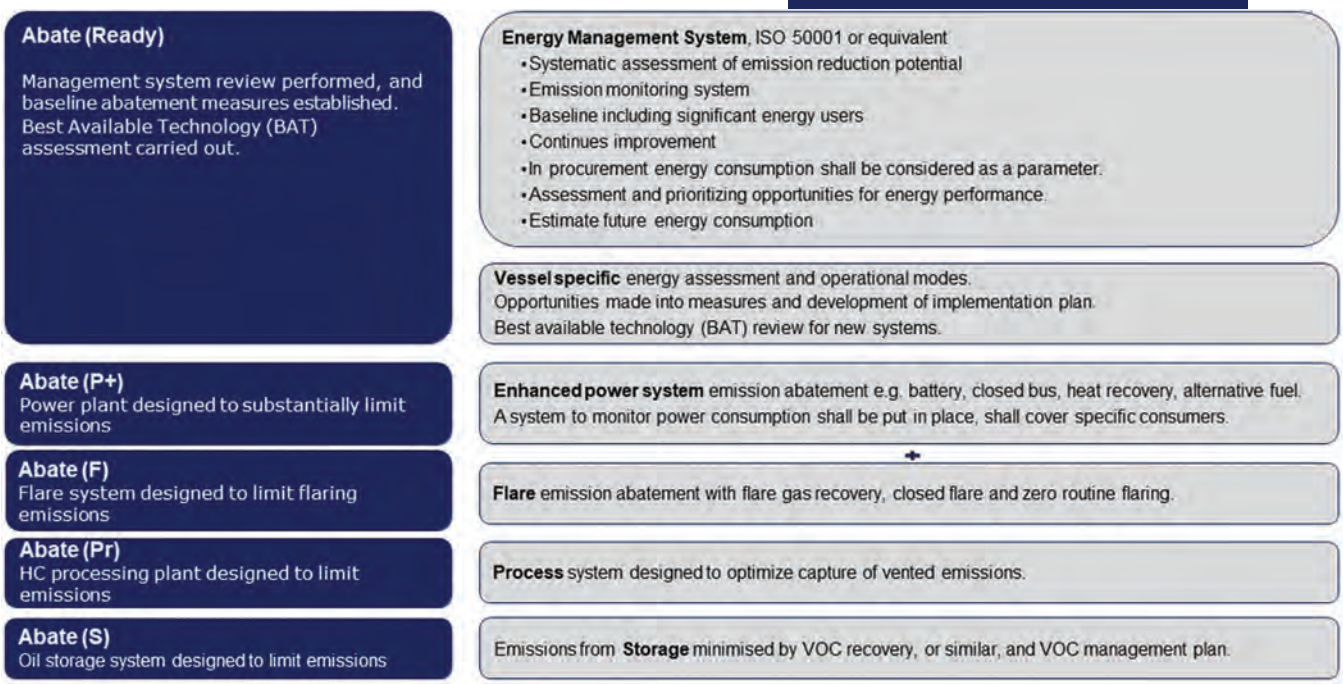


Image courtesy MODEC

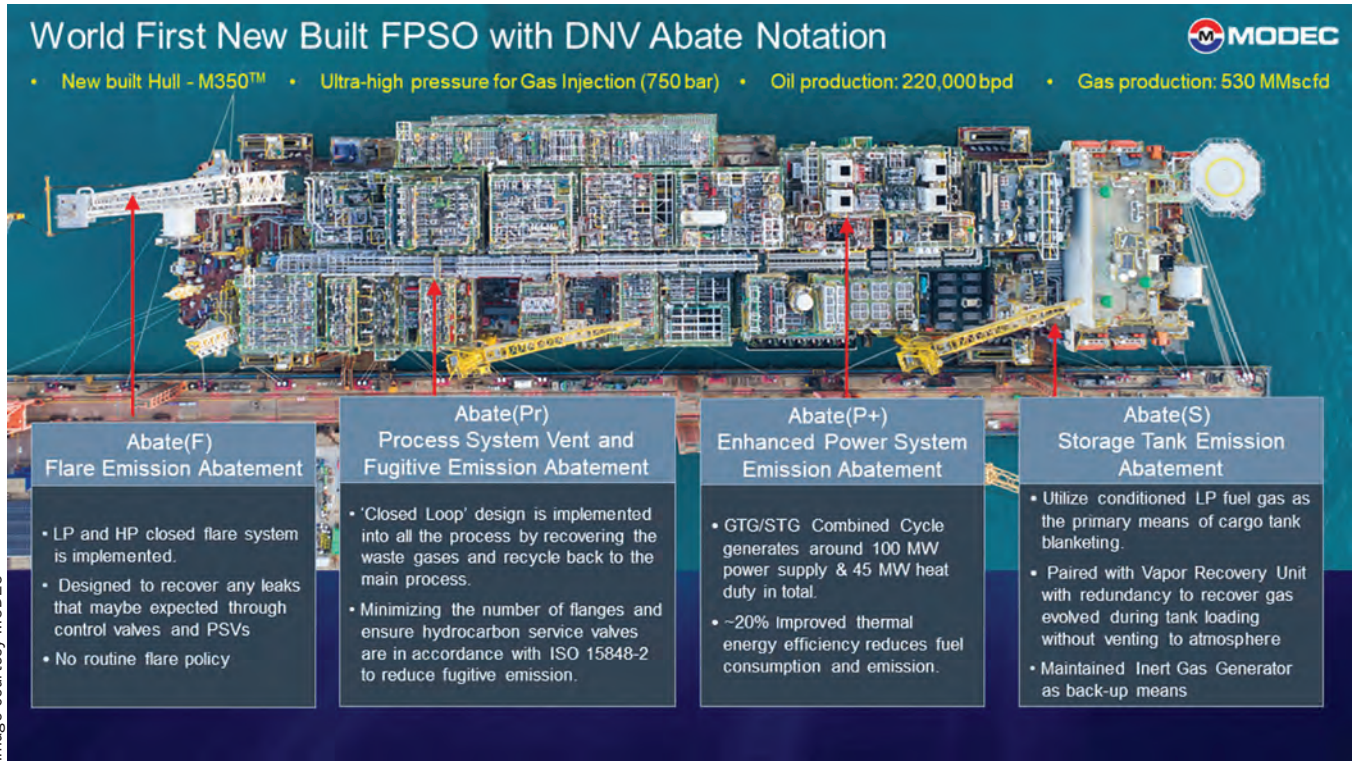


Image courtesy MODEC

IN OCTOBER 2024, PETRONAS TEAMED UP WITH KEY ASIAN AND INTERNATIONAL PLAYERS TO LAUNCH THE ASEAN ENERGY SECTOR METHANE LEADERSHIP PROGRAMME 2.0.

Image courtesy Petronas

24-7 OPERATIONS

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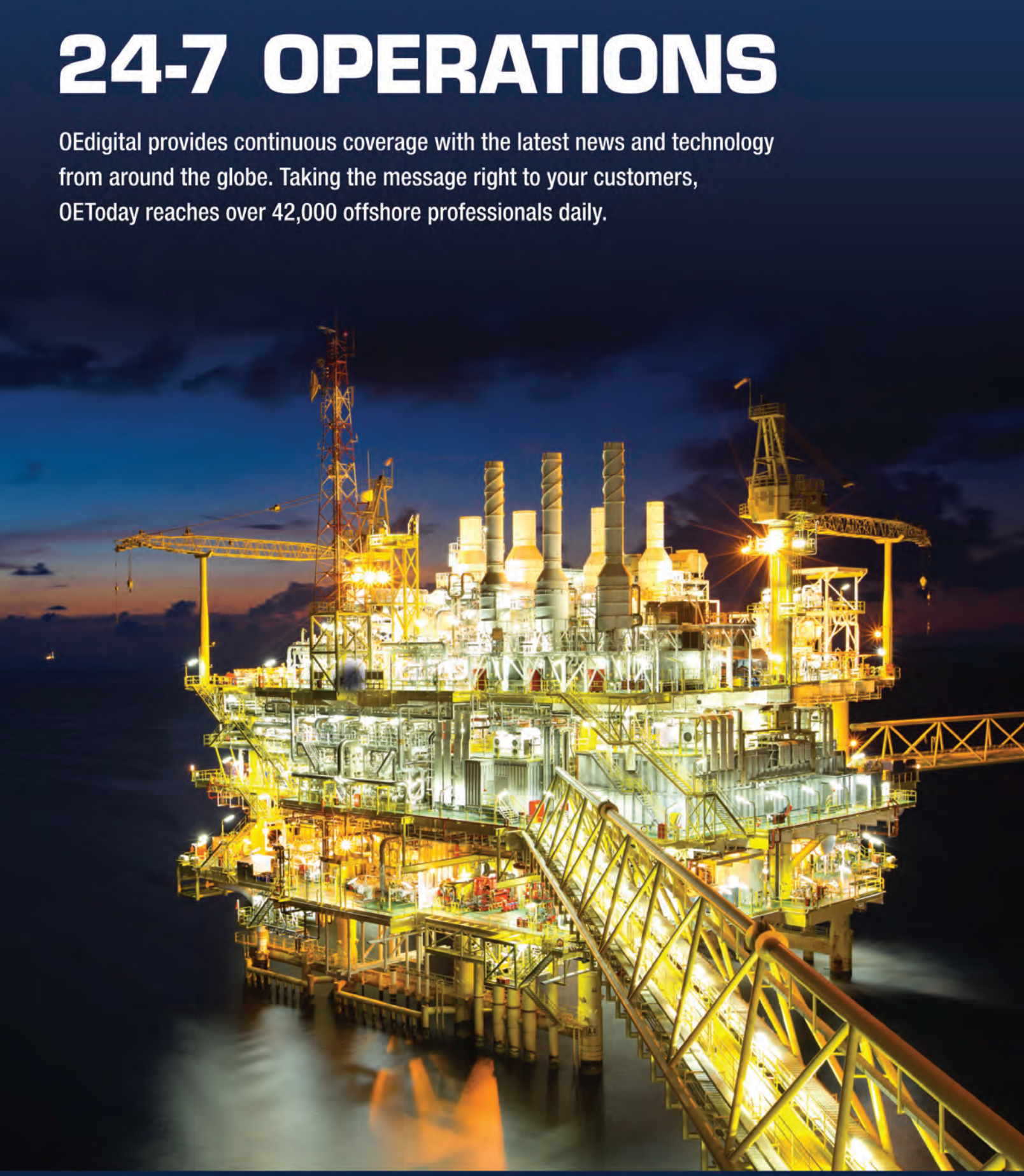

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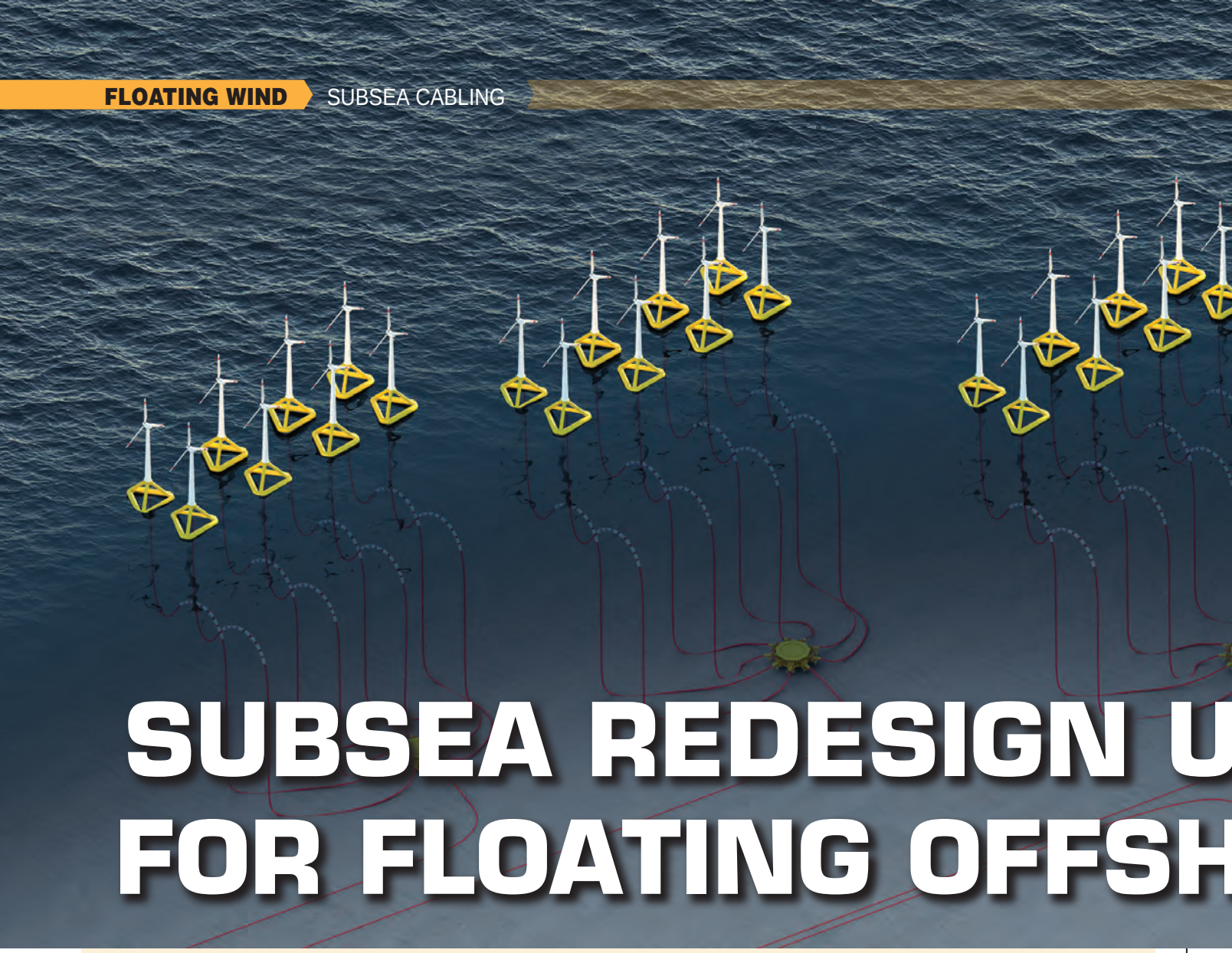
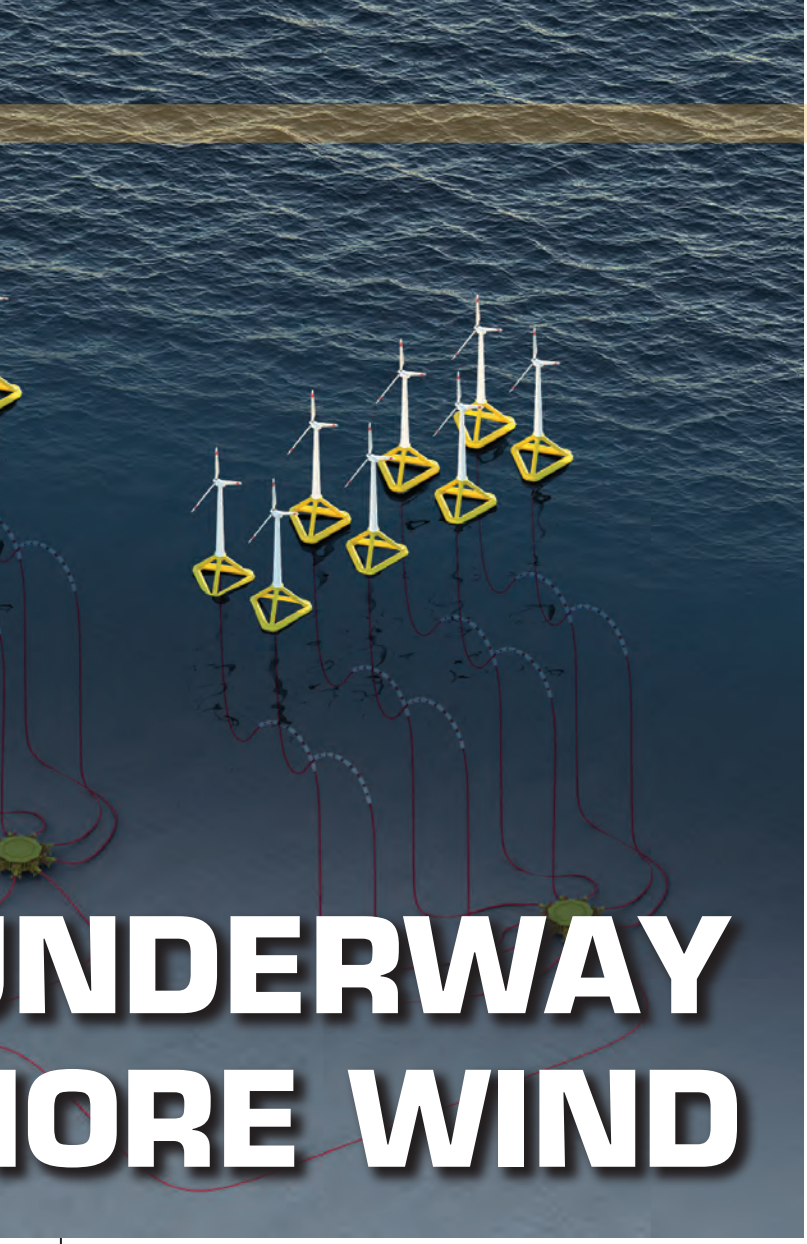


SUBSEA REDESIGN U
FOR FLOATING OFFSH

The dynamic high voltage cabling required for floating offshore wind farms is causing a rethink of subsea array design, and Baker Hughes is qualifying a solution that aims to increase standardization and reduce costs.

By Wendy Laursen

All images courtesy Baker Hughes



UNDERWAY HORE WIND

The 66kV high voltage wet mate connector currently undergoing technical qualification by Baker Hughes weighs in at around one ton and has over 40 liters of dielectric oil protecting copper cable up to 1,200 square millimeters in diameter.

The connector is designed to sit on the seabed at the end of a dynamic cable coming from floating wind turbines and connect it to a collector hub that ultimately delivers the megawatts of energy it produces to a subsea substation and then to shore.

There's a lot that could go wrong. Cable failure is a high-cost problem for fixed offshore wind even though, like oil and gas applications, it involves static cabling. Dynamic cable failures are expected to be even more common when the floating wind industry takes off.

Baker Hughes has therefore leveraged its oil and gas experience to redesign and increase the power range of its Marine Electrical Connectors (MECON) high voltage AC wet mate connector to reduce the impact of cable failure. The company's three-phase wet mate connectors consolidate three connections into a single housing, optimizing insulation fluid cleanliness while minimizing potential leak paths compared to the single-phase connectors used by others in the industry. These require three connections for every cable and therefore create three potential leak paths.

"If you look at other technologies, there are three individual connections inside a connection frame that just looks like a single connector. The benefit of our system is that all three individual phase connections are really in a single mechanical connector," says Mike Birch, Product Manager for Offshore Power Systems at Baker Hughes.

The connectors are ROV flushable, meaning that they can be installed by a ROV that first flushes the connector-collector interface with seawater to clear away any debris. This is followed by fresh water flushing then ethanol before the dielectric oil is injected. The oil initiates and isolates the electrical connection.

Baker Hughes has been scaling up their wet mate connectors from the original 12kV version, first used in oil and gas in 1999, up to 36kV and now 66kV for floating wind applications. The company is being assisted by energy majors potentially interested in the yet-to-be-deployed connectors. Their input has been invaluable, says Birch, as existing IEC standards only cover connectors up to 36kV and the industry needs a qualification matrix that will be broadly accepted.

The connectors interface to a subsea collector hub. Here Baker Hughes has aimed at simplicity, at least for the first generation of equipment, so the collector hub is essentially an oil-filled enclosure with wet connectors around the outside. "There are no moving parts within our MECON Collector, there's nothing smart inside the box, it simply collects power through multiple inputs and exports it through one output."

As there is no defined switch gear at the collector, the Baker Hughes wet connect provides this functionality via an internal disconnector which is operated via ROV and is designed to isolate a cable using the switch in the connector after the array is powered down. The transition to having switches in the collector hub so the task could be performed remotely and under electrical load may come in time, but for now Birch believes simplicity and lower costs are what the industry needs.

> ***For our star configuration, we never have more than one in a single line, so the entire field can be standardized down to one size, typically 95 or 150 square millimeters.***
>
> **– Mike Birch,** Product Manager for Offshore Power Systems at Baker Hughes

The simplicity of the design belies its importance, because with multiple turbines connected directly to a collector hub the problems associated with daisy-chaining cables are removed. Currently used for fixed offshore wind, if a cable fails at any point in the daisy-chain, the power from an entire train may be lost, but the collector hub enables a star configuration where each turbine is connected to the collector hub independently from other turbines.

"If you look at the star configuration, it's obviously got benefits with availability because you can isolate an individual turbine or group of turbines, depending on the configuration. The second part of that is because you don't have multiple turbines in series, you can reduce the size of the cables and standardize on one size."

In a daisy chain, cable diameters could start at 95 square millimeters of copper, then increase to 300 and then, say, 1,000, as the power from each turbine is aggregated along the array.

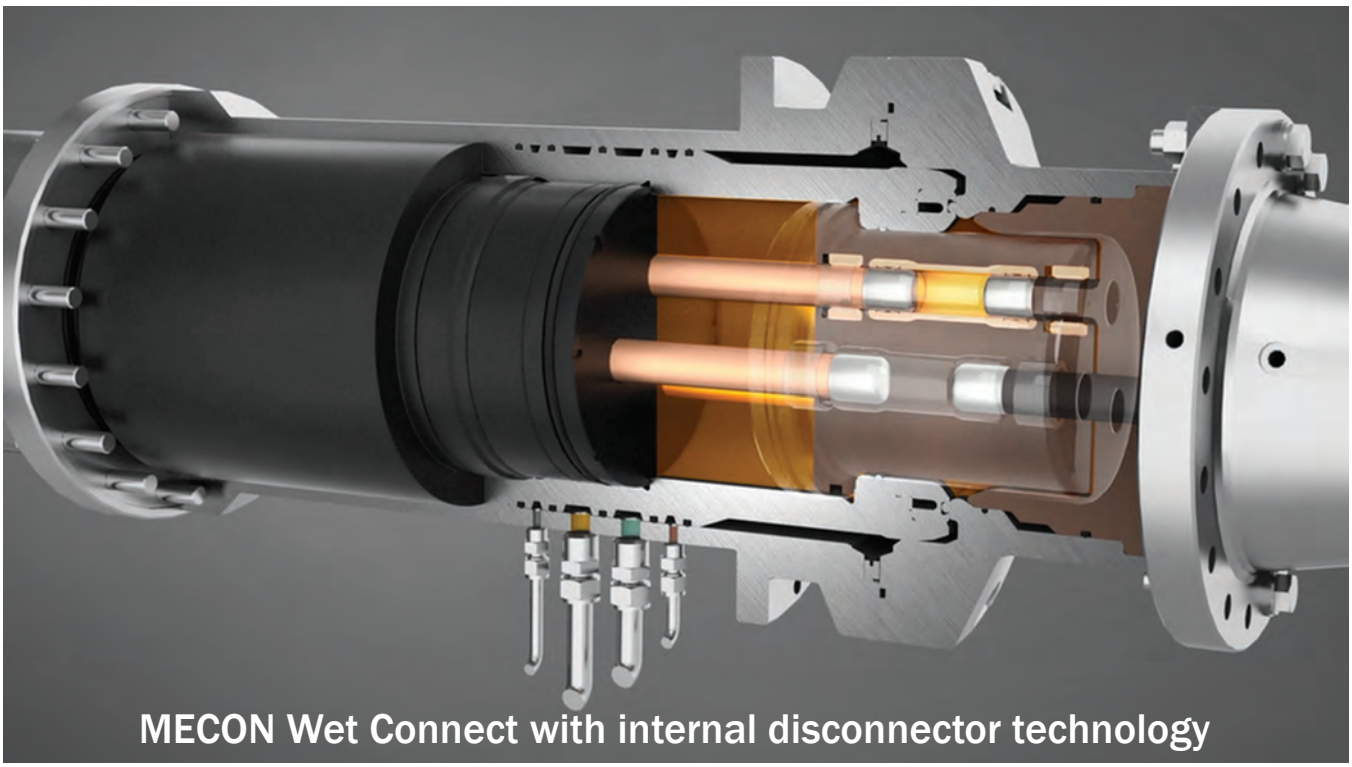
"For our star configuration, we never have more than one in a single line, so the entire field can be standardized down to one size, typically 95 or 150 square millimeters. There's an enormous difference in cost between 1,000 square millimeters and 95 square millimeters. That's the CAPEX benefit, but there's also an OPEX perspective. It means you only need to keep one cable size in stock."

This sort of standardization is crucial for the burgeoning floating wind market's viability, says Birch. "Unlike the oil and gas industry, we cannot have bespoke systems in floating wind – the margins are too low for renewables. We need to have structured building blocks – connectors, collector hubs, turbines – that's the only way to get economies of scale that can bring down the levelized cost of energy."

Product qualification for the new connectors is expected to be completed next year, in time for the dramatic floating wind market growth that Birch anticipates from 2027. "The future is promising, with projections estimating around 270GW of installed floating wind capacity by 2050. At an average of 15MW per turbine, achieving this will require more than 700 floating wind turbines deployed annually for the next 25 years."

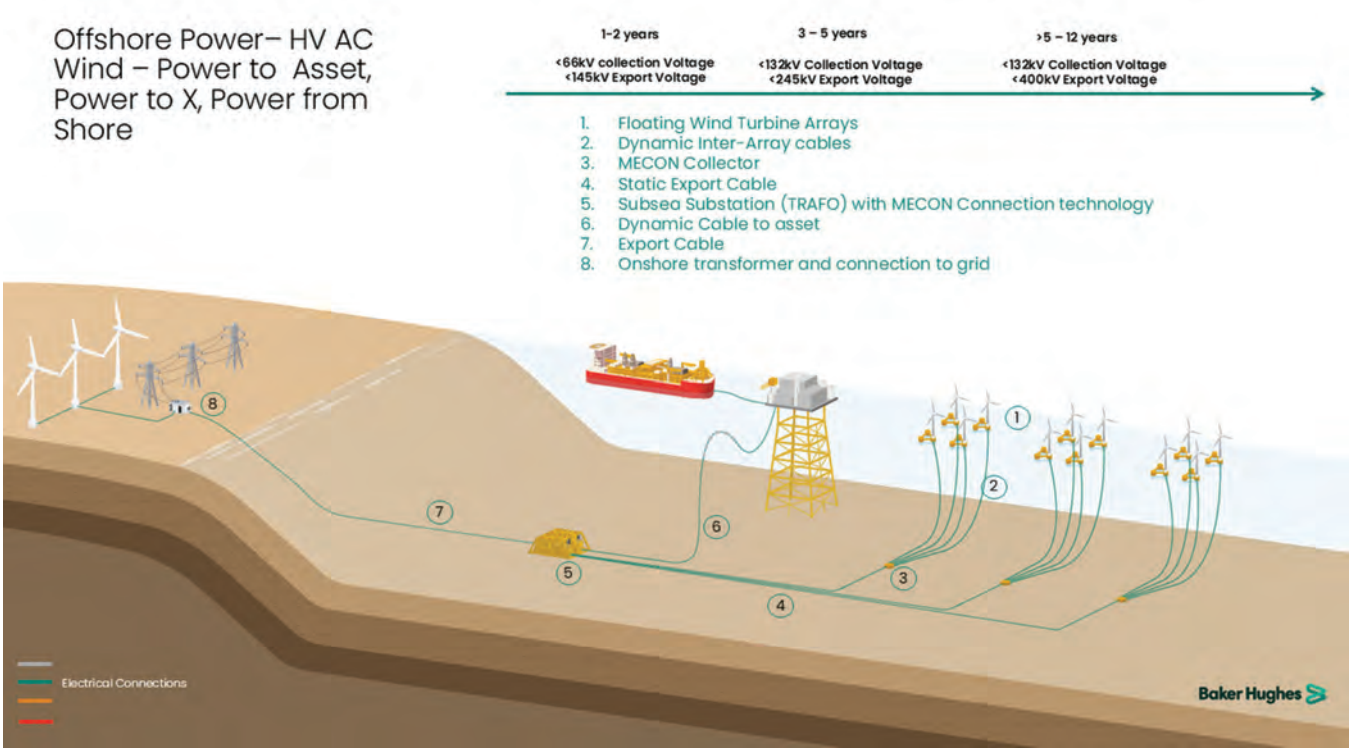
Birch foresees a range of possible configurations being used. The Baker Hughes subsea design can take turbine energy to an onshore grid or additionally to offshore installations or power-to-x platforms. It can also be used for tidal arrays, an opportunity that Birch considers will be suitable for some applications, such as providing power to islands. For long-distance energy transport to shore, the system can also include midpoint reactors that re-establish the integrity of the transmission through the export cable so that the current limit of around 100-150 kilometers from substation to shore can be extended.

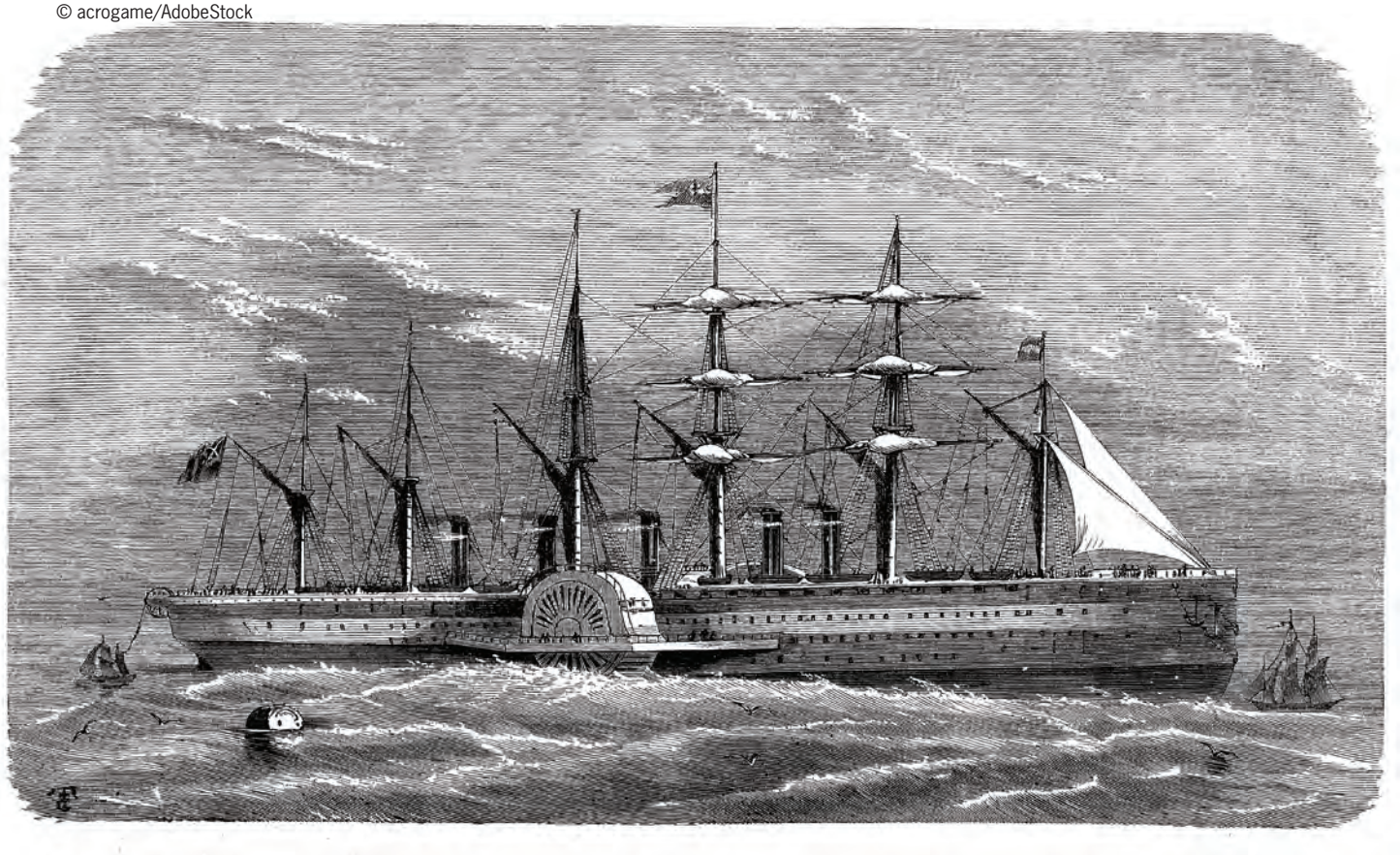
There's more connector development expected in the future. "We're looking at 66kV today, but 20MW turbines are on the way that will require 132kV. Some of these fields just won't be economically viable without these very large turbines."



MECON Wet Connect with internal disconnector technology

High voltage AC wind power to assets





THE IMPACT OF ARTIFICIAL INTELLIGENCE ON SUBMARINE NETWORKS

Submarine communication cables – almost 560 of them deployed to date – crisscross our oceans, interconnecting continents and carrying over 99% of intercontinental data traffic. This article looks at how the emergence of artificial intelligence (AI) will affect these cables in terms of traffic demand as well as in terms of how we design and operate the key equipment that feeds data into these cables.

By Geoff Bennett, Director, Solutions and Technology, Infinera

AI AND NETWORK TRAFFIC VOLUMES

There are several reports that predict a huge increase in the processing power required for AI applications as well as the electrical power consumed by future AI workloads. Indeed, power consumption is already reaching critical levels in countries such as Singapore and Ireland, where data center projects have been put on pause by government intervention because of concerns over insufficient capacity on their power grids. But there is very little published data at the moment on the likely workload that AI will place on transport networks – be they metro, long-haul terrestrial, or even submarine links.

Is there a lesson to be learned from cloud computing?

As shown in Figure 1, two distinct types of traffic emerged in cloud computing 10 years ago.

NORTH-SOUTH: USER TO NETWORK TRAFFIC

First was "user-to-network" traffic. Because of the way PowerPoint diagrams tend to be drawn, this is usually portrayed as running up and down, or north-south.

North-south traffic was originally thought to be the main contributor in a cloud architecture because users would need to move information back and forth to the cloud applications in the data center instead of running the applications locally.

EAST-WEST: INTRA- AND INTER-DATA CENTER TRAFFIC

The other type of traffic – east-west – is the local (intra-data center) and long-distance (inter-data center) traffic between servers. Initially, this was assumed to be just occasional updates, with most of the real traffic staying inside the data center, travelling between servers in the same rack or racks in the same building.

TRAFFIC EVOLUTION

As time evolved, however, an odd thing happened, as highlighted in Figure 2.

The volume of north-south traffic grew steadily as companies migrated to cloud applications, but the volume of east-west traffic grew at an even faster rate – and soon dwarfed north-south traffic levels. The east-west growth arose from virtualization, cloud computing, and the intensive use of databases and internal applications that require constant server-to-server communication. For example, your Facebook page may look like a single pane of information, but it's actually a collage of multiple information streams that come from different

Figure 1: Traffic flows

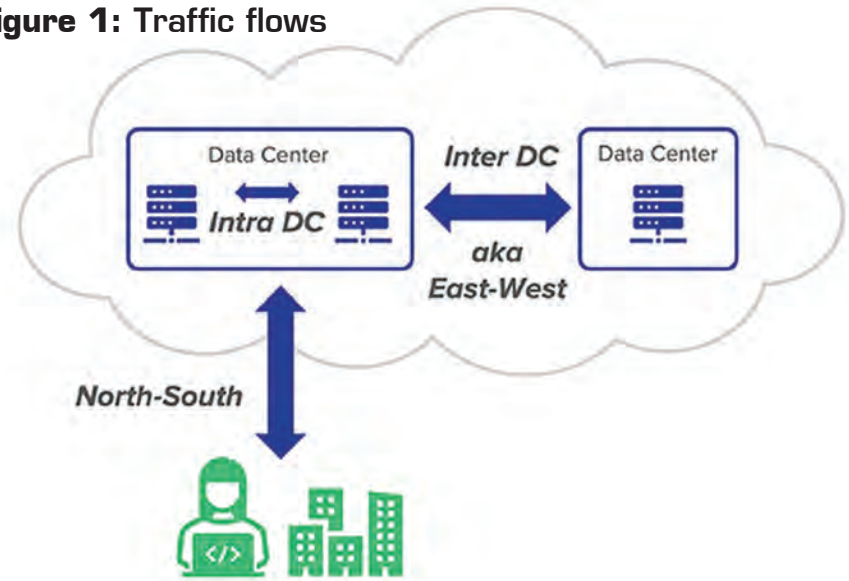
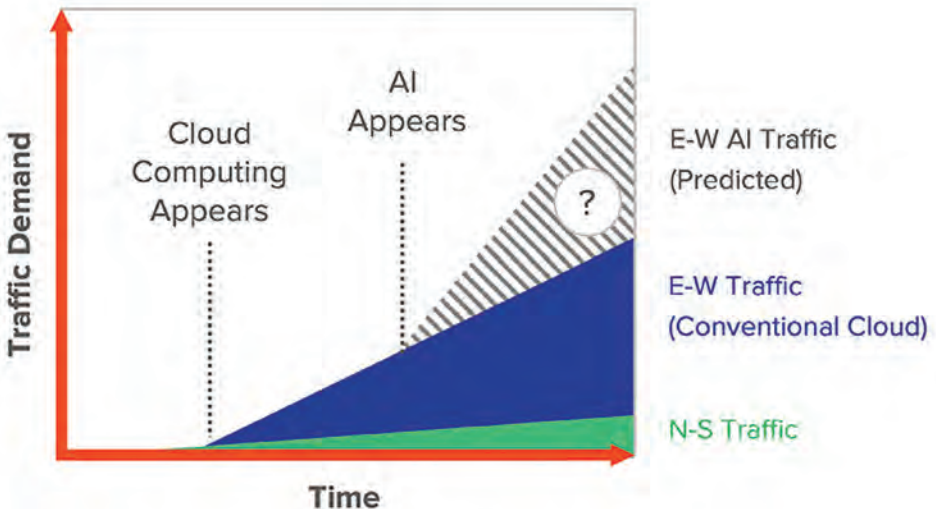


Figure 2: Traffic volumes



parts of the virtualized cloud of storage. And this east-west growth can happen over long distances.

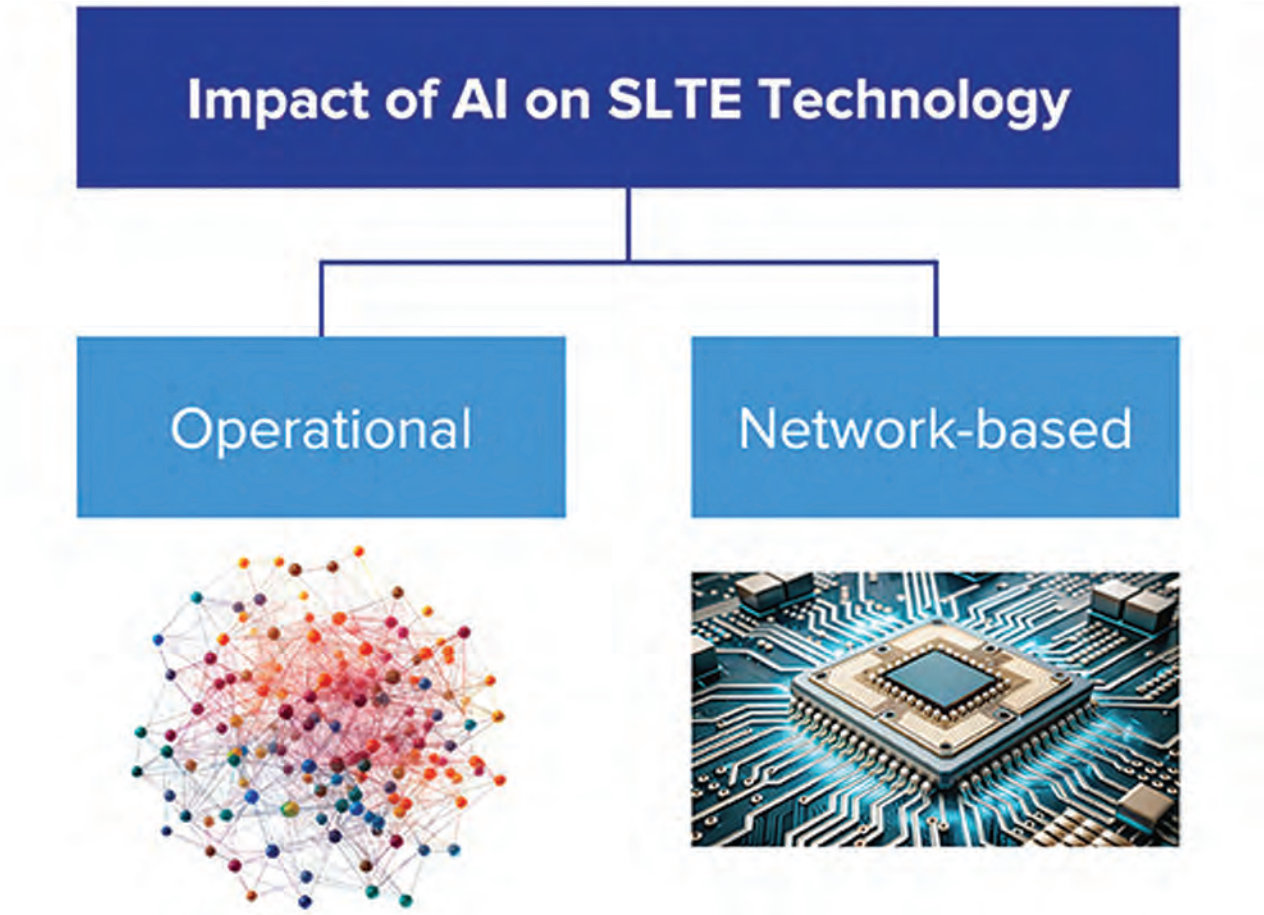
To explain why, let's look at the Facebook model, which is driven by advertising revenue. As a U.K. resident, I spend most of my money here, so if I travel to the U.S. or around Asia, there's no point in serving me U.S. or Asia ads – the Facebook data center in Singapore, for example, has to synchronize with one of their three data centers in Europe to retrieve the appropriate advertising and deliver it with low latency so I don't scroll past it before it's delivered, because then Facebook would not get paid for my "eyeballs." East-west traffic also means that data centers can load-balance and act as resilient backup.

FROM CONVENTIONAL CLOUD TO AI DATA CENTERS

The biggest question mark over AI data centers is what effect AI processes such as training vs. inference will have on traffic patterns. The initial observations are that the move to AI data centers for training large neural network models is boosting east-west growth because, for one thing, these models are exceeding the scale that can easily be trained inside using the capacity that can be rented at any one time in a single data center. I've shown this speculative growth prediction with the shaded section in Figure 2.

Inference requires low latency, whereas training is regarded as being less latency-sensitive for the simple reason

Figure 3: The operational and network-based impact of AI in SLTE technology



that it usually happens within a single data center. In the inference phase, in terms of network traffic, a pre-trained model is queried using relatively short text prompts, and the responses sent back are also short text documents or still images. North-south traffic per user will obviously increase as AI moves from text responses to still images and then to ever-increasing quality of video.

AI'S IMPACT ON SUBMARINE NETWORK TECHNOLOGY

Once a submarine cable is deployed, it has an engineering life of 25 years, but the only thing we can upgrade during that lifetime is the submarine line-terminating equipment (SLTE), and there may be multiple opportunities to enhance cable performance by taking advantage of the latest transponder and SLTE terminal technology. AI can play a part in this enhancement in two different ways: operational and network-based functionality.

OPERATIONAL USE OF AI

There are three main operational areas where AI can be used to enhance SLTE capability, and all of these functions tend to be housed within the management and automation software of the network.

AUTOMATING NETWORK PLANNING AND CAPACITY OPTIMIZATION

In a modern open cable system, it's essential to characterize each fiber pair to ensure that the cable operator got what they paid for in terms of wet plant performance. Characterization using a range of parameters has been well defined by the SubOptic Open Cable Working Group. But the process of taking these measurements can be labor intensive, and AI can certainly play its part in reducing the manual work required.

The next step for operators is spectrum planning and allocation. That can include the need to support spectrum sharing on a given fiber pair. This stage is performed knowing the exact type of transponders that will be deployed, and these performance parameters can be plugged into an AI model that can help optimize the available spectrum.

Finally, optical power planning is an ongoing aspect of fiber pair operation, and it's essential that this is carefully designed in order to ensure stable service levels.

ENHANCED NETWORK MONITORING

Coherent transponders and, to a lesser extent, the transport platforms they are housed in offer a veritable fire hydrant flow of telemetry, with the latest transponders having hundreds of information points in their published data models. Dealing with this flood of information over the data communication network has always been a challenge, but this is exactly the kind of problem that AI can help with by extracting correlations and patterns that the human eye alone cannot recognize.

PREDICTIVE MAINTENANCE

Hand in hand with enhanced monitoring is the ability to use the processed telemetry from the transponder, transport platform, SLTE terminal, and repeater chain to detect potential operational issues and to deal with them before they become a problem.

NETWORK-BASED USE OF AI

Network-based features generally run in AI-enhanced transponders, and at least two different features have seen active development.

THREAT MONITORING AND PROACTIVE PROTECTION

For several years, Infinera has been involved in the development of techniques for seismic anomaly detection – basically using existing submarine cables to enhance tsunami warning systems. Cable operators have shown interest in this capability, but they have also thrown down the challenge of enhancing sensitivity in order to detect threats such as seabed trawling or dragging anchors in the vicinity of the cable.

ADVANCED NONLINEAR COMPENSATION

The limiting impairments for modern coherent transponders are nonlinear effects caused by high optical power levels in the fiber. Using fully effective, algorithmic nonlinear compensation (NLC) techniques is extremely computationally intensive – well beyond the immediate roadmap for ASIC processing power. Limited NLC does deliver useful additional performance, but one direction of research is looking at the use of a neural network approach for NLC that uses far less processing power yet delivers a significant performance improvement.S

GettyImages courtesy Regal Rexnord

SVENDBORG BRAKES' YAW BRAKE SOLUTION TRANSFORMS WIND TURBINE MAINTENANCE

By Jürn Edzards, Business Development Manager for Svendborg Brakes, a Regal Rexnord brand

When damaged yaw brake discs were preventing numerous wind turbines from operating in optimum conditions, their operator was looking for an economical maintenance service that would ensure the turbines' availability. Svendborg Brakes, a Regal Rexnord Brand, developed a new solution to quickly restore operations - cutting disc resurfacing activities and exchange pads to only 3 days, while requiring only a day and a half of true downtime.

As the Wind Industry navigates short-term challenges and sustained growth potential, Regal Rexnord's decades of industry experience, deep application knowledge and robust testing capabilities offer low-risk, high-value solutions that prioritize profitability for OEMs and reliability for wind farm owners both on and offshore.

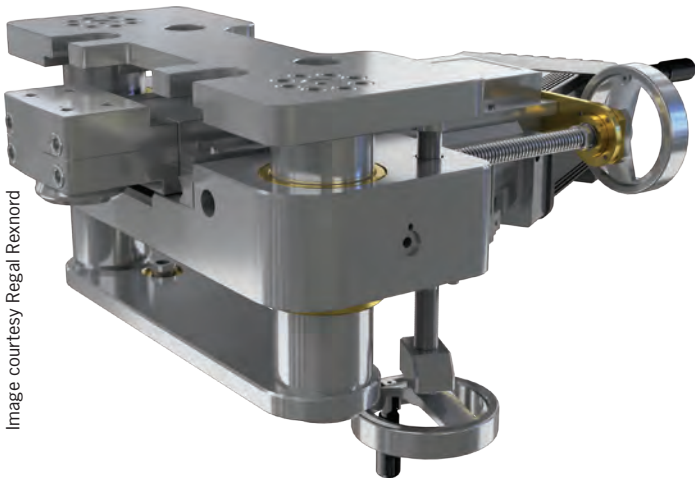


Image courtesy Regal Rexnord

GettyImages courtesy Regal Rexnord

The High Stakes of Yaw Brake Repair

Wind turbines have become bigger, with taller hub heights and larger rotors. This increase in size creates additional challenges for maintenance and repair efforts, especially for offshore installations where the turbines can be located 1-2 hours away from land.

The yaw system of the wind turbine generators (WTGs) has the essential role of orientating the nacelle towards the wind and holding it in position. Performing both yaw stopping and holding functions, the brakes are under constant use and are required to operate reliably. The condition of the brake disc surface is key to the brake system's performance, it must be smooth and remain free from damage. Over time, the surface of the yaw brake will begin to suffer wear and small imperfections will appear. These imperfections will affect yaw brake performance and ultimately reduce the productivity of the WTG – eventually leading to a failure, which could cause compound damage to other components.

If the WTG were to fail, the repair would require removing the nacelle of the turbine to access the yaw system. This would be very expensive, requiring the use of a crane, additional labor, and increased downtime. Instead of replacing the brake disc, operators utilize a resurfacing process to eliminate the imperfections which is traditionally a time-consuming task. Many operators accept the downtime caused by disc resurfacing as an unwelcome but essential chore. However, when one custodian of several WTGs off the coasts of Denmark and the UK identified that several of their yaw brakes were damaged, they were eager to find a solution that could expedite the process.

Revolutionizing Brake Disc Resurfacing

The turbine operator was looking to minimize any downtime associated with disc resurfacing operations. To do so, it contacted Svendborg Brakes, a part of Regal Rexnord, and asked to develop a solution that would address the requirement of removing the brake systems from the tower. The company was selected due to their comprehensive brake repair services in wind turbines, which has proven to streamline overall maintenance and repair operations by providing all the services that typically require multiple contractors. Svendborg Brakes has solutions installed in over 200,000 wind turbines globally, both on and offshore.

Thanks to their extensive expertise in braking systems and its suite of components that are manufactured in-house, Svendborg Brakes was able to develop an innovative, portable disc resurfacing tool. This tool consists of a milling machine that quickly repairs the disc onsite while minimizing the quantity of fine dust produced during the process.

James Woods, Senior Project Manager, Engineering & Test at Svendborg Brakes, said, "With only 1 mm thickness of material removed from the disc, the solution we developed was able to exceed our expectations, delivering an end result of extremely high quality. Even more, the process is extremely fast, with less than a day required to repair the disc."

The groundbreaking tool is extremely compact and lightweight, allowing it to be easily transported to the top of the wind turbine. The disc resurfacing tool is mounted using one of the yaw brake mounting positions. This is an easy to install and minimally invasive process. The disc resurfacing tool can also be operated manually or automatically, via sin-

gle-axis computer numerical control (CNC) – the latter being accomplished using the company's proprietary software. It is possible to map the surface of the disc to create a CNC machining profile that the disc resurfacing tool uses to accurately follow the disc. Since this process does not require the turbine nacelle to be removed to resurface the yaw brake disc, the operator saw three major areas of cost savings: no lifting equipment required to remove the nacelle, no supply vessels needed to complete a replacement project, and no purchasing and installing of a new yaw brake disc.

Continued Innovation for the Future of Wind

As a full-service provider of braking solutions, Svendborg Brakes was able to combine additional elements to streamline the entire maintenance process. First, the repair team could utilize an LBS yaw brake lifting tool developed in-house to quickly and easily remove the brake from the disc as well as reinstall them afterwards. The entire project could then be completed in three days, which is incredibly brief compared to "typical" brake pad removal/replacement projects. In addition, the specialized teams were able to perform a complete pad exchange within this timeframe.

Svendborg Brakes' experience in wind turbine operations and yaw brake systems was crucial to bypass dismantled components and allow the WTG to run during the night. As a result, it was possible for the operators to generate power for at least 12 hours every day, yielding 50% more uptime than most typical projects of this scope. After the successful development of a new disc resurfacing tool and its adoption for the repair of wind turbines off the coasts of Denmark and the UK, Svendborg Brakes has discussed future projects with the WTG operator as well as other wind turbine owners and operators.

As the industry continues to see significant growth, manufacturers must navigate increasing logistical complexities and the need to adapt their operating models to keep up with market demands and challenges. As turbines continue to grow in both size and output, the durability of components is out to the test, with quality issues leading to significant operational and financial consequences. Regal Rexnord™ provides complete solutions for the Wind industry, from design and manufacturing to installation and continuous support.

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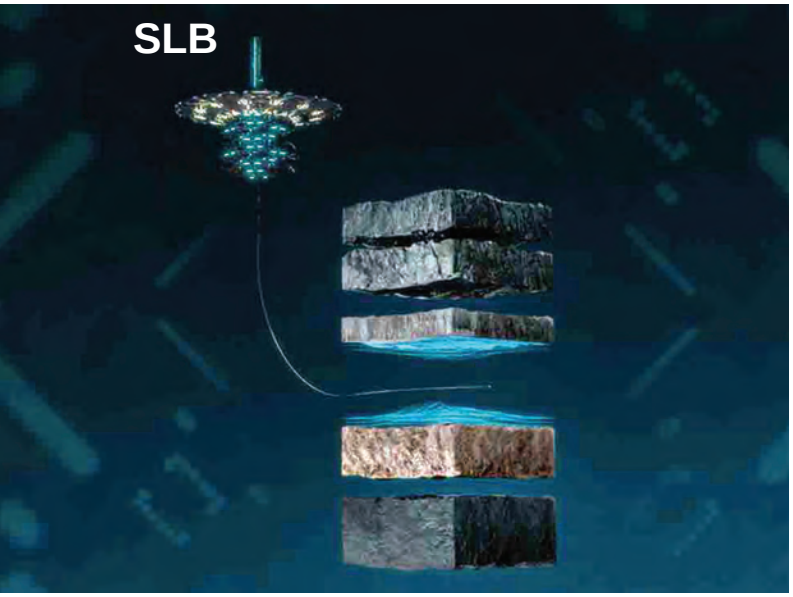


AI-Driven Geosteering Now Part of SLB's Autonomous Drilling Solutions

SLB has introduced Neuro autonomous geosteering, which dynamically responds to subsurface complexities to drill more efficient, higher-performing wells, while reducing the carbon footprint of the drilling operations.

Using artificial intelligence (AI), Neuro geosteering integrates and interprets complex real-time subsurface information to autonomously guide the drill bit through the most productive layer or 'sweet spot' of the reservoir.

Intelligent closed-loop drilling system dynamically responds to subsurface geological information.

It identifies a well target, updates the well plan and trajectory, and communicates all the information to the directional driller, without any human intervention.

Neuro autonomous geosteering builds on the technology foundation of SLB's Neuro autonomous directional drilling, which drills wells to a defined well target in accordance with the well plan, taking it a step further by incorporating high-fidelity downhole measurements that ensure certainty of well placement in the best part of the reservoir.

"Using advanced cloud and edge AI capabilities, the system automatically selects the best route for drilling the well based on high-fidelity downhole measurements, bringing the well trajectory in line with the real-world conditions of the reservoir.

"By drilling more consistent and higher-producing wells, our customers can optimize their field development plan while reducing operational emissions from drilling over the lifetime of the asset," said Jesus Lamas, President, Well Construction, SLB.

NOV's GustoMSC Unveils Quick Connector for Heavy Lift Cranes

NOV has introduced the Quick Connector, developed by its subsidiary GustoMSC, with the aim to optimize heavy lift operations across the offshore energy industry.

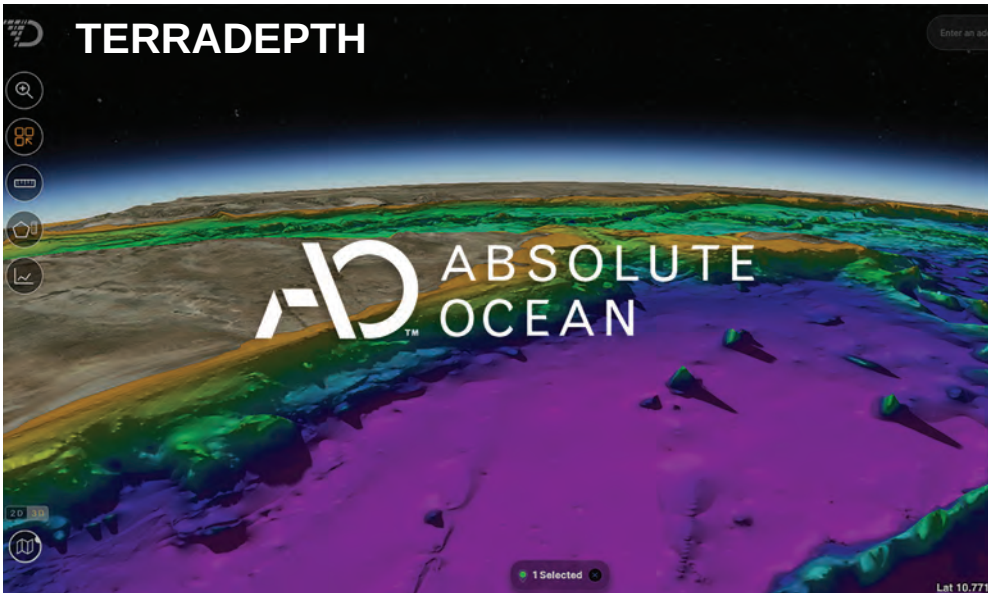
The Quick Connector, developed by GustoMSC, provides a secure and reliable connection between the crane's lower block and the tools underneath, enhancing enhances the safety and efficiency of offshore lifting operations.

This is especially important for offshore wind sector as installing and maintaining offshore wind farms involves complex operations that require precise and secure lifting of various increasingly larger components, such as turbine blades, towers, and foundations.

The Quick Connector's ability to swiftly connect and disconnect components minimizes downtime, reduces labor costs, and enhances overall project efficiency.

Most importantly, the remotely operated Quick Connector improves operational safety by eliminating the need for on-deck personnel to make the sling connection between the hook and tool during each tool change-out. Its integrated lower block design removes the need for rigging and enables a higher lifting height.

By integrating the pin with latches into the lower block, the tool connects seamlessly with the corresponding sockets, creating a secure and fail-safe lift.



Terradepth Maps Out Cost-Efficient Ops for Offshore Energy Firms

Offshore energy developers can now access ocean mapping data in real-time from any location, cutting project development costs and increasing efficiency, by using Terradepth's recently launched cloud-based tool Absolute Ocean.

Ocean data technology specialist Terradepth has launched a cloud-native geospatial platform for its offshore energy clients, dubbed Absolute Ocean.

Purpose-built to host complex maritime data, Absolute Ocean provides web-browser based access to ocean maps.

Subsea data collected for stakeholders can be shared, visualized and collaborated on in near real-time, empowering smarter decisions and ensuring sustainable growth in challenging marine environments.

The software operates in the cloud and can ingest diverse types of data, including bathymetric surveys, sonar scans, and video footage. By centralizing and simplifying subsea data access for teams, the secure platform offers visibility into the critical information needed for successful execution of projects.

"Current systems can take weeks to realize actionable data. Our offshore partners in petroleum and wind are enabled to access their data in near real-time from any location on our new platform. This leads to safer, more cost-effective, and more environmentally conscious operations," said Joe Wolfel, CEO of Terradepth.

Tritek's TRICON Dynamic Positioning System Gets New Interface

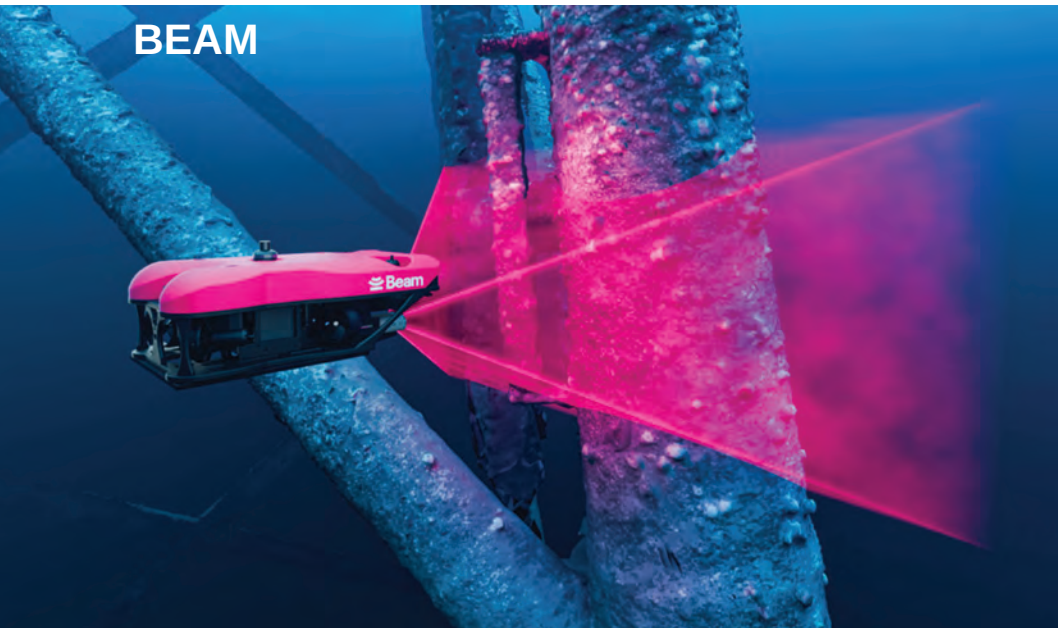
Tritek Power & Automation has unveiled a new graphical user interface for its TRICON DP during ADIPEC 2024 at ADNEC in Abu Dhabi.

The new interface is based on Tritek's experience in building automation systems for more than a decade and valuable input from shipowners and DP operators.

Tritek has been advancing the DP systems for vessel operations since 2022, after acquiring the rights to produce it from NAVIS. With plans in place for further improvement, the first and most important step was the upgrade of the obsolete DP user interface.

Working collaboratively with shipowners and highly experienced DP operators, Tritek has developed and enhanced the operator's control logic and interaction with human-machine interface. The new clear and intuitive interface is based on the OpenBridge 5.0 and provides the operators a positive experience for sustainable DP operations.

"Existing DP control systems were developed long ago, and their graphical user interfaces are not in line with current trends. Our aim is to gift the operators the best operating feelings. The Open Bridge solution best suits this due to its scalability, flexibility and holistic approach to the building of an intuitive user interface," added Ralph Cabral, Managing Director at Tritek Power & Automation.



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Beam's AI-Driven AUV Set for 2025 Offshore Wind Debut

Beam, a company created by the recent merger of Rovco and Vaarst, has unveiled Scout, an autonomous underwater vehicle (AUV) driven by artificial intelligence (AI).

Scout, a concept expected to enter the market in 2025, will put the power of subsea inspection directly in the hands of wind farm operators.

This is an important step in Beam's journey to develop cutting-edge underwater technologies that transform the viability and scalability of offshore wind.

The AUV will combine advanced AI, real-time 3D reconstructions, and precise navigation to deliver inspections that are quicker and more cost-effective.

As demonstrated in a world-first deployment at SSE's Seagreen Wind Farm in September 2024, the system's fully autonomous self-driving capabilities also require minimal human intervention.

Unlike traditional inspection methods that demand specialized vessels and expert crews, Scout is designed to be self-driving and will perform inspections by itself, reporting back at the end of the mission.

Beam intends for Scout to be deployed directly by people from existing Crew Transfer Vessels (CTVs) during routine visits.

This will enable a wider pool of people to confidently manage subsea maintenance of wind farms, helping to alleviate the pressing offshore wind skills gap that threatens the sector's ability to scale.

Scout will enable 4K 3D reconstructions, such as year-on-year site comparisons, equipping teams with unprecedented insights into asset integrity and structural health. This will minimize the need for reactive repairs and reduce long-term operational costs, according to Beam.

Repsol, Baker Hughes to Advance Leucipa Automated Field Production Solution

Energy technology company Baker Hughes and oil and gas major Repsol have signed an agreement to collaboratively develop and deploy next-generation artificial intelligence (AI) Leucipa tool to optimize processes and workflows for oil and gas production.

Through this strategic collaboration, AI-powered automation workflows will be developed and implemented

throughout Repsol's assets around the globe to unlock new operational capabilities through the Leucipa automated field production solution.

The Leucipa automated field production solution helps oil and gas operators proactively manage production and reduce carbon emissions. Leucipa focuses first on the specific outcome an operator wants to achieve, harnessing and leveraging data to drive intelligent operations.

By automating production processes, Leucipa will reduce inefficiency, ensure more environmentally sound operations, and enable customers to help recover the millions of barrels that would have otherwise remained in the ground.

"Artificial intelligence is revolutionizing energy production, and Leucipa enables companies to operate more efficiently to recover more from their assets," said Amerino Gatti, executive vice president of Oilfield Services and Equipment at Baker Hughes.

TAQA's Inflow Control System for Optimized Reservoir Performance

Saudi Arabia-based oilfield services company TAQA has launched the M4 Inflow Control System, designed to help operators optimize reservoir performance while sustainably managing fluid production.

The M4 Inflow Control System dictates the flow of the undesired fluid (water and gas) and avoids any binary (open/close) effect that can result in instability, or worse, stop production.

According to TAQA, the system excels in controlling water in ultra-light and light applications and enhances gas production control, providing stability and flexibility in diverse reservoir conditions.

The M4 Inflow Control System technology incorporates an advanced pilot control system that is super sensitive to density, making it suitable for a wide range of oil types, including ultra-light, light, medium, and heavy oils.

It also features advanced multi-phase control, allowing the device to perform independently of its orientation in the wellbore.

"Its main benefit is precision control based on reservoir production. The device allows operators to maximize output without risking shutting wells in, so they can manage production continuously and efficiently, which translates into obvious financial benefits," said Mojtaba Moradi, Subsurface Engineering Manager at TAQA.

BY THE NUMBERS

RIGS

Worldwide

Rig Type	Available	Contracted	Total	Utilization
Drillship	10	66	76	87%
Jackup	187	295	482	61%
Semisub	24	46	70	66%

Africa

Rig Type	Available	Contracted	Total	Utilization
Drillship		12	12	100%
Jackup	13	19	32	59%
Semisub		2	2	100%

Asia

Rig Type	Available	Contracted	Total	Utilization
Drillship	4	3	7	43%
Jackup	80	80	160	50%
Semisub	14	7	21	33%

Europe

Rig Type	Available	Contracted	Total	Utilization
Drillship	3	1	4	25%
Jackup	10	31	41	76%
Semisub	4	19	23	83%

Latin America & the Caribbean

Rig Type	Available	Contracted	Total	Utilization
Drillship		29	29	100%
Jackup	3	5	8	63%
Semisub	2	8	10	80%

Middle East

Rig Type	Available	Contracted	Total	Utilization
Jackup	45	128	173	74%
Drillship				

North America

Rig Type	Available	Contracted	Total	Utilization
Drillship	2	20	22	91%
Jackup	26	25	51	49%
Semisub	2	3	4	50%

Oceania

Rig Type	Available	Contracted	Total	Utilization
Drillship				
Jackup		2	2	100%
Semisub		6	6	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	474.0	High-spec	163.5
Deepwater	254.1	Premium	131.0
Midwater	400.4	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 December 2024
Source: Wood Mackenzie Offshore Rig Tracker

DISCOVERIES & RESERVES

Offshore New Discoveries

Water Depth	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
Deepwater	20	13	14	22	15	17
Shallow water	88	49	60	42	61	27
Ultra-deepwater	18	12	7	22	12	4
Grand Total	**126**	**74**	**81**	**86**	**88**	**48**

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	600	47,984	22,600
Shallow water	3,283	461,328	155,554
Ultra-deepwater	346	43,732	26,123
Grand Total	**4,229**	**553,004**	**204,277**

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

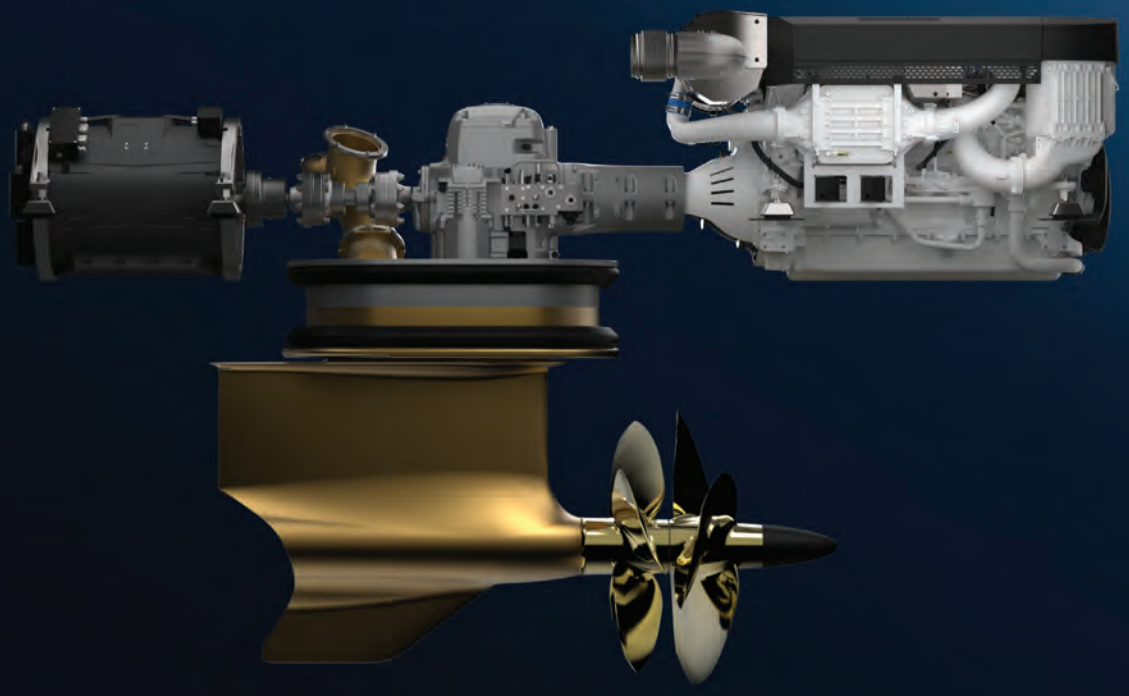
Region	*Number of fields*	*Remaining reserves gas mboe*	*Remaining reserves liquids mbl*
Africa	593	18,395	11,260
Asia	854	15,935	7,164
Europe	730	11,433	10,726
Latin America and the Caribbean	200	7,623	39,729
Middle East	140	84,098	145,297
North America	476	2,500	13,042
Oceania	85	10,230	1,023
Russia and the Caspian	60	16,974	12,145
Grand Total	**3,138**	**167,188**	**240,386**

Onstream and under development.

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

Source: Wood Mackenzie Lens Direct

VOLVO PENTA



Boost Your Offshore Capabilities with Volvo Penta's IPS Professional Platform

After 10,000 hours of virtual and on-water testing at Volvo Penta's Krossholmen Test Center in Sweden, the new Volvo Penta Inboard Performance System (IPS) Professional Platform will enter series production in 2025.

Features:

30% Expanded Range: Go farther on less fuel, maximizing your operational capabilities.
40% Enhanced Acceleration: Experience faster response times, ensuring you can tackle any challenge efficiently.
Up to 50% Reduction in Noise and Vibration: Enjoy a quieter and smoother ride, improving comfort for crew and passengers alike.

Benefits:

Reliable Power: Depend on consistent performance, whether you're operating tugboats or offshore vessels.
Precision Handling: Navigate with ease and confidence in various marine conditions.
Reduced Operational Costs: Lower fuel consumption and maintenance needs translate to savings for your fleet.

Visit volvopenta.com and discover why the Volvo Penta IPS Professional Platform sets a new standard in marine performance.

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