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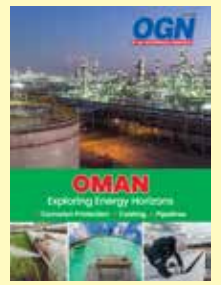
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Championing
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CLEAN ENERGY 'BEATS' FOSSIL FUELS ON GLOBAL COSTS

BY ABDULAZIZ KHATTAK

Clean energy surge cuts costs of new project and boosts global energy security

In a dramatic shift that underscores a global energy transformation, renewable power projects have decisively outpaced fossil fuels in cost competitiveness, according to a new report from the International Renewable Energy Agency (IRENA).

Data for 2024 reveals that 91 per cent of all new utility-scale renewable energy capacity delivered power at a lower cost than the cheapest new fossil fuel-fired alternative.

The global weighted average levelised cost of electricity (LCOE) for onshore wind fell to \$0.034 per kilowatt hour (kWh), making it the world's cheapest source of new power.

Solar photovoltaics followed closely at \$0.043/kWh, while hydropower settled at \$0.057/kWh.

From 2010 to 2024, installed costs for key renewables plummeted by 87 per cent for battery storage alone, while the outlook through 2030 suggests further declines, particularly for solar PV and onshore wind.

Much of this progress is driven by a combination of technological inno-



In 2024, renewables averted \$467 billion in fossil fuel expenditures

vation, streamlined manufacturing processes, and economies of scale in deployment.

Rapid growth in emerging markets, bolstered by supportive policies and falling hardware costs, is accelerating adoption and making clean energy more accessible.

However, cost trends remain vulnerable to supply chain pressures, and raw material pricing, all of which could shape short-term investment decisions and long-term policy strategies.

However, the report warns of potential short-term volatility due to geo-

political disruptions, such as trade barriers and shifting dynamics in China's manufacturing sector.

In 2024 alone, renewables helped avert an estimated \$467 billion in fossil fuel expenditures; a staggering figure that highlights not only their economic edge but also their role in bolstering energy security and climate resilience.

Although integrating variable renewables presents grid challenges, innovations combining solar, wind, storage and digital controls are already smoothing the path forward. ■

Adnoc Drilling revenue H1 hits \$2.37bn

ADNOC Drilling has reported record-breaking revenues of \$2.37 billion, reflecting a 30 per cent year-on-year (YoY) increase, and net profit of \$692 million (21 per cent YoY).

The Board of Directors approved \$217 million in Q2 2025 dividend.

The company showed strong segmental growth in 1H 2025, with onshore revenue hitting \$1 billion, offshore revenue increasing to \$671 million, and oilfield services revenue of \$689 million.

L&T bags \$1.7bn order

LARSEN & Toubro (L&T) has secured a big order worth \$1.7 billion from a major client in the Middle East.

The package encompasses multiple offshore packages, and the scope of work includes engineering, procurement, construction and installation of offshore structures, along with the upgradation of existing facilities. ■



Compact reactor could propel Mideast's nuclear ambitions

A TRANSFORMATIVE leap in nuclear energy is on the horizon as Terra Innovatum unveils its micro-modular reactor (MMR), offering the Gulf region a fast, safe, and scalable pathway to carbon-free power.

The US-based firm's 1-MWe SOLO unit can be deployed within six months of order, needing no refueling for 15 years, no water for cooling, and minimal land.

Speaking exclusively to **OGN** energy magazine, Alessandro Petrucci, Terra Innovatum CEO, said SOLO's passive safety, autonomous control, and factory-built design position it as a game-changer for emerging markets and arid regions.

The system is designed to use standard low-enriched uranium and, when available, can transition to high-assay variants, future-proofing long-term energy

investments.

SOLO's ability to scale from 1 MWe to 1 GWe can serve a wide range of applications—from data centres and mining to desalination and green hydrogen.

Interest is already growing across Saudi Arabia and the UAE, where pilot projects could break ground within 12–18 months.

By eliminating on-site fuel handling and enabling remote monitor-

ing, SOLO addresses nuclear safety and non-proliferation concerns while creating opportunities for regional job growth through local assembly facilities.

Recent support from the World Bank for nuclear projects now provides a financing tailwind for SOLO deployments across Africa and Asia, opening markets once off-limits to conventional nuclear. ■

Full interview on Page 22

MEOS GEO 2025 SETS STAGE FOR ENERGY TRANSITION, DIGITAL TRANSFORMATION

This year's theme, 'Energy for a Prosperous Future: Leading a Sustainable Tomorrow', builds on the evolving priorities of the industry, from hydrocarbon optimisation and digitalisation to decarbonisation and talent development



Over 17,000 people attended the 2023 edition

BY ABDULAZIZ KHATTAK

In a region defined by its deep legacy in oil and gas production, the Middle East continues to position itself as a pivotal player in shaping the global energy future.

The Middle East Oil, Gas and Geosciences Show (MEOS GEO), returning to Bahrain from September 16-18, 2025, serves as a flagship platform uniting energy leaders, innovators and geoscientists under the shared vision of progress, sustainability and resilience in upstream operations.

Held under the patronage of His Royal Highness Prince Salman bin Hamad Al Khalifa, the Crown Prince and Prime Minister of the Kingdom of Bahrain, MEOS GEO 2025 will take place at Exhibition World Bahrain, one of the largest convention venues in the region.

The event is organised by Informa Markets in partnership with leading professional societies, such as the Society of Petroleum Engineers (SPE), the American Association of Petroleum Geologists (AAPG), the

European Association of Geoscientists and Engineers (EAGE), and the Society of Exploration Geophysicists (SEG), in collaboration with the Ministry of Oil and Environment. *OGN* energy magazine is a media partner.

This year's theme, 'Energy for a Prosperous Future: Leading a Sustainable Tomorrow', builds on the evolving priorities of the industry, from hydrocarbon optimisation and digitalisation to decarbonisation and talent development.

With the global push towards net-zero targets, climate resilience, and the rise of Industry 4.0 technologies, MEOS GEO presents an influential platform to foster partnerships, unveil technologies, and spark dialogue.

A LEGACY EVENT AMPLIFIED

Originally held as two separate events—the Middle East Oil & Gas Show (MEOS) and the GEO Conference and Exhibition—MEOS GEO merged these formats in 2023, creating a unified show that caters to the entire upstream value chain.

The 2023 edition hosted from Feb-

ruary 19-21 saw a robust return to in-person exhibitions post-pandemic, with over 17,000 participants attending from 78 countries, more than 180 exhibitors showcasing products and services and 890 expert speakers.

The success of the 2023 edition not only validated the new combined format but also set the stage for a larger and more diversified 2025 edition.

Chaired in 2023 by Faisal AlNughaimish, Vice-President and Chief Drilling Engineer at Saudi Aramco, the event saw participation from regional and global leaders such as Eni, ADNOC, Halliburton, SLB, Chevron, Exxon-Mobil, TAQA, CGG, and Baker Hughes.

In addition to hosting panel sessions, technical workshops, and strategic roundtables, MEOS GEO 2023 launched the inaugural MEOS GEO Energy Awards, recognising excellence in innovation, sustainability, and organisational transformation.

The 2025 edition builds on this foundation with a wider exhibitor base—more than 180 companies are expected—and an upgraded con-

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ference programme spanning over 396 hours of content.

The technical programme is once again led by top regional experts from Saudi Aramco, Tatweer Petroleum, and PDO Oman, alongside international technical leads from SLB, Halliburton, and academia.

DEEP-DIVE INTO THE 2023 BLUEPRINT

To understand the significance of MEOS GEO, it is useful to revisit highlights from 2023. The three-day programme spanned over 100 technical sessions and six high-level panel discussions, covering topics like carbon management, 4IR applications, frontier geophysics, reservoir engineering, and supply chain resilience.

The key sessions included:

- 'Vision to Reality: Revolutionising the Industry through 4IR Advancement', which explored the transformative potential of AI, cloud computing, and digital twins in subsurface analysis.
- 'Extreme Computational Capabilities and Beyond', focusing on how companies like Saudi Aramco, NVIDIA, and TotalEnergies are pushing the frontiers of real-time simulation and visualisation.
- 'Talent 4.0: Attracting and Preparing Talents for a Digital Future', a forward-looking dialogue on workforce transformation amid automation, remote operations, and Gen Z's entry into the industry.

The CEO Plenary Session was another highlight, featuring speakers such as Nasir Al-Naimi, Executive VP Upstream, Saudi Aramco; Lorenzo Simonelli, Chairman and CEO, Baker Hughes; and Saugata Saha, President, S&P Global Commodity Insights.

Their discussion tackled the paradoxes of energy security versus environmental goals, and how digitalisation is shaping the agility of global operators in an unpredictable landscape.

Moreover, the SPE Seminar on Energy Transition, led by Kamel Ben-Naceur, 2022 SPE President and a former director at the IEA, offered insights into CCUS strategies, hydrogen projects, and sustainability pathways being adopted globally.

2025 IS BIGGER & BETTER

MEOS GEO is more than an exhibition; it's a convergence of influence. A relevant list of topics will come under discussion in the Strategic and Technical sessions, with the aim of giving the energy industry a strong sense of direction.

Global energy leaders from Bahrain, Saudi Arabia, and elsewhere will tackle key topics head-on. Panel sessions, such as the plenary, 'Navigating the Future of Energy: Investment, Innovation, and



Global energy leaders will discuss issues in the Strategic Sessions

Sustainability', and 'Balancing Energy Security and Transition'; 'Toward a Net-Zero Future' draw ministerial and C-suite representation to address macroeconomic energy policy.

Meanwhile, the MEOS GEO 2025 technical conference is structured around three main pillars:

- Resilience in volatile markets, which explore ways to maintain production, ensure supply chain continuity, and manage cost inflation amid geopolitical and economic volatility.
- Accelerating digital transformation, which emphasise the integration of AI, machine learning, cloud computing, remote operations, and blockchain into geoscience and engineering workflows.
- Achieving net-zero objectives that highlight CCUS (carbon capture, utilisation, and storage), hydrogen exploration, energy efficiency, and environmental stewardship as key enablers of the low-carbon transition.

Some of the specific technical sessions include presentations on seismic acquisition and imaging; reservoir characterisation and modelling; geomechanics and borehole integrity; well stimulation and enhanced oil recovery (EOR); AI and big data in exploration and production; hydrogen technologies and geothermal exploration; and CCUS project case studies and circular carbon economy insights.

YOUNG TALENT & EDUCATIONAL OUTREACH

One of MEOS GEO's long-term strengths lies in its

commitment to young professionals and students.

The Young Professionals and Students Committee, co-chaired by members from Saudi Aramco, coordinates student competitions, mentorship meetups, and site tours for aspiring geoscientists and engineers.

This outreach is more than symbolic; Bahrain, like many countries in the GCC, faces a challenge in bridging the gap between academia and applied industry knowledge. Events like MEOS GEO serve as a real-world classroom for students, giving them exposure to cutting-edge tools and ideas, and potentially influencing their career paths.

STRONG INDUSTRY SUPPORT

At MEOS GEO 2025, a distinguished list of sponsors reinforces the event's strategic relevance.

Saudi Aramco, which also led the previous technical and executive committees, is expected to reprise its leading role.

SLB (Co-host), Saudi Arabian Chevron (Titanium Sponsor), and Alkhorayef Petroleum Company and Baker Hughes (Gold Sponsors), and Sawafi Al-Jazeera Oilfield Products and Services, and Shell Overseas Services (Supporting Sponsors) are joined by several other major participants reflecting the region's diversification into digital and clean technologies.

The Sustainability Sponsor this year is SANAD (Saudi Aramco Nabors Drilling), reflecting its investment in emissions-reducing technologies and ESG practices.

The Kuwait Oil Company and NESR are Registration Sponsors; while Pasqal Arabia for Information Technology is sponsoring the breakout stages like the Live Labs and Genius Talks.

As energy systems evolve, MEOS GEO has evolved with them. From a trade fair focused on upstream oil to a full-fledged innovation and thought leadership platform.

For Bahrain, the show reinforces its commitment to the region's knowledge economy and positions it as a hub for energy transition dialogue.

Whether through high-stakes strategy sessions, hands-on technology showcases, or knowledge exchanges between generations, MEOS GEO 2025 reflects an industry that is no longer defined by hydrocarbons alone, but by the balance between innovation, responsibility, and adaptability.

In a post-pandemic, post-carbon, and digitally charged world, the value of coming together to exchange ideas, showcase progress, and chart a course forward has never been more crucial. ■



The Young Professionals and Students corner serves as a real-world classroom for students



E Plug's new facility in Doha, Qatar

CHAMPIONING RIG-LESS SOLUTIONS FOR WELLS IN THE MIDDLE EAST

E Plug's modular, data-driven technologies offer operators scalable, rig-less solutions to help them reduce cost, rig time and emissions while enhancing well integrity in challenging environments

BY ABDULAZIZ KHATTAK

E PLUG is advancing well intervention and abandonment in the Middle East with rig-less, data-driven technologies tailored for high pressure, high temperature (HPHT), high CO₂ and corrosive well environments. Its solutions are supporting safer, low-emission operations by reducing the need for heavy rigs.

"Our tools like the Electric Manipulation Tool (EMT), TorcPuncher and TorcDesperado are gaining interest from NOCs in Qatar, the UAE, Saudi Arabia and Oman. Our E-Line deployable, modular design enables high-precision real-time control, ensuring minimal surface footprint and improved operational efficiency," Navin Balakrishnan, E Plug Vice-President – Middle East, exclusively tells **OGN** energy magazine.

Below are excerpts from the interview:

Can you briefly tell us what E Plug does?

At E Plug, we are redefining well intervention and abandonment solutions through agile, data-driven technologies backed by a relentless spirit of grit and perseverance.

As a forward-thinking technology company – not a conventional oilfield services provider – we pride ourselves on our rapid response times, modular rig-less solutions, and an unwavering drive to close



Navin Balakrishnan

technology gaps in the region.

Our core values centre on innovation, operational integrity, and resilience, enabling us to deliver scal-

able solutions that meet the evolving needs of national oil companies.

E Plug is purpose-built to adapt quickly, act decisively, and overcome challenges head-on.

From humble beginnings, we've navigated complex technical, operational, and market hurdles to become a trusted partner in well intervention and abandonment.

Explain how E Plug is adapting its rig-less technologies for operational and well integrity challenges faced by Middle Eastern operators?

E Plug's rig-less technologies are purpose-built to address the complex and evolving well integrity challenges faced by operators in the Middle East.

Our solutions, such as the Electric Manipulation Tool (EMT), TorcPlug and TorcDesperado, are engineered for HPHT conditions, and rigorously tested for sour gas environments and high CO₂ exposure, where material integrity and sealing reliability are critical.

We've enhanced our tool metallurgy and elastomer selection to ensure long-term performance in corrosive and high-pressure environments.

Meanwhile, electro-mechanical design allows for precise control, real-time diagnostics, and minimal surface footprint, making them ideal for offshore assets where rig time is costly and logistics are complex.



We're not just adapting tools- we're co-engineering solutions with operators to meet the region's toughest well integrity scenarios. This collaborative approach ensures our technologies are aligned with both operational realities and strategic goals of Middle Eastern energy producers.

How does E Plug's rig-less, data driven P&A approach contribute to emission reductions and safer well abandonment?

E Plug's rig-less intervention systems operate with real-time control and diagnostics, enabling precise, efficient execution of plug and abandonment (P&A) operations without the need for heavy rigs.

This significantly reduces emissions by minimizing fuel consumption, logistics, and personnel exposure.

Our tools are controlled on-site by trained personnel and our systems also support remote monitoring and control, allowing operators to make informed decisions in real time.

This dual capability enhances both safety and operational flexibility, especially in offshore or logistically constrained environments.

In the Middle East, we've built considerable experience with one of the region's major operators, and we are now working to replicate this successful set-up with other key players in Qatar and across the GCC.

These efforts are supported by strong interest in our rig-less approach to well abandonment.

To support knowledge sharing, E Plug authored three SPE papers in 2024 detailing our technology and field learnings. These will be available at our stand at MEOS GEO 2025.

How receptive have NOCs in the Gulf been to E Plug's rig-less and data driven intervention solutions?

NOCs across the Gulf have shown a strong inter-



At E Plug, we are redefining well intervention and abandonment solutions through agile, data-driven technologies backed by a relentless spirit of grit and perseverance

est in E Plug's rig-less intervention technologies, particularly as they seek to reduce operational costs, improve safety, and align with broader sustainability goals.

Our engagements in Saudi Arabia, Oman, and the UAE have revealed a clear appetite for low-footprint, wireline-deployed solutions that can be integrated into existing well abandonment workflows.

We are actively working with several NOCs to address specific requirements, such as tool qualification for sour gas and high CO₂ environments, compatibility with existing well architectures, and local content development.

While we've made strong progress, we are still navigating technical and procedural challenges that come with introducing new technologies into established operational frameworks.

That said, the potential for broader adoption is strong, and we remain committed to building long-term partnerships.

Are you currently engaged in any commercial deployments or field trials in the Middle East?

Yes, we have successfully deployed our TorcPlug solution commercially for a major operator in the Middle East.

This deployment delivered significant efficiency gains and has since reshaped the client's operational strategy.

One of the SPE papers we referenced earlier is based on this deployment and the insights gained from the field.

We are currently in active discussions with several operators across the GCC, with a focus on onshore mature gas wells that require efficient, low-impact plug and abandonment (P&A) solutions.

Initial feedback from these engagements has been very positive, particularly regarding the wireline deployability, multi-set capability, and real-time control features of our tools, which are seen as key differentiators in the region.

In terms of tangible outcomes, what measurable



The TorcPlug offers operations with high reliability and minimal surface footprint

improvements have been achieved by clients using your technology compared to conventional methods?

Our clients have reported 30–50 per cent reduction in rig time; up to 15 per cent cost savings in plug and abandonment (P&A) operations; and significant emissions reductions by eliminating the need for heavy rigs and associated logistics.

For example, in a recent offshore campaign in Southeast Asia, the TorcPlug enabled operators to save 2–3 days per well, translating into both financial and environmental benefits.

These results are now being used as benchmarks for upcoming projects in the Middle East, where similar well conditions and cost-efficiency goals apply.

How do you see data shaping the future of well abandonment globally, and where do you believe Middle Eastern operators stand in this transition?

Data-driven decision-making is a key enabler for the future of both well abandonment and well intervention.

Globally, there is a clear shift toward evidence-based workflows, not only in P&A but also in intervention.

In the Middle East, we see growing momentum among operators to adopt data-backed, low-impact solutions that can scale across both intervention and decommissioning programs.

What insights have you drawn from your other markets that could directly benefit your Middle Eastern clients?

Each region contributes unique insights. From the North Sea, we've adopted a strong focus on real-time verification, tool reliability, and regulatory compliance, all of which are increasingly relevant to operators in the Middle East as they scale up well decommissioning programs.

In the Asia-Pacific, we've learned to streamline logistics and deployment models, which has helped us improve efficiency in remote or infrastructure-limited environments.

Our R&D team plays a central role in translating these insights into practical tool enhancements and our Doha office plays a central role in adapting these global insights to regional realities, ensuring that our solutions are both technically robust and operationally relevant.

During Tech Day 2025 in Qatar, which solutions resonated most with regional clients, and have any pilot projects or trials been initiated as a result?

Tech Day 2025 in Qatar was a key milestone for E Plug. Our multi-set TorcPlug and Electric Manipulation Tool (EMT) stood out for their ability to deliver rig-less, E-Line-deployed P&A operations with high reliability and minimal surface footprint.

Following the event, we have seen growing interest across the region, not just offshore, but also in onshore assets. We are currently in advanced discussions for pilot deployments in Qatar and Oman.

These engagements reflect a clear appetite for cost-effective, low-carbon intervention technologies that align with national sustainability goals. ■

E Plug will be exhibiting at Stand 8,G80 at MEOS GEO 2025.

Upstream oil data integration struggles amid AI promise and connectivity

Upstream oil firms face fragmented legacy systems, growing data complexity and cybersecurity risks; and despite soaring investment in AI, digital twins and IoT, operators struggle with interoperability, skills shortages and real time connectivity in remote oilfields



Real-time data integration platforms are transforming upstream oil operations

THE upstream oil and gas sector is experiencing a pivotal moment: The promise of digital transformation has never been greater, yet integration and implementation challenges risk undermining ambitions.

Operators worldwide are increasingly investing in artificial intelligence (AI), data analytics and Internet of Things (IoT) systems, but without solving core issues like data silos, legacy infrastructure and workforce readiness, the technology potential remains out of reach.

The result is a sector poised for rebirth, yet hamstrung by systemic digital hurdles that echo across continents and rigs.

Upstream organisations frequently operate with siloed legacy platforms across geoscience, drilling, production and maintenance.

Disparate IT systems impede seamless data flow, making analytics and digital twins difficult to deploy effectively.

Industry reports have highlighted major pain points in upstream data management, including inconsistencies in quality, lack of standardisation, governance frameworks, security and accessibility challenges.

Efforts to harmonise data are ongoing, especially through adoption of open standards such as those promoted by Energistics and the OSDU Forum. However, adoption remains uneven across operators.

Meanwhile, ISO 15926 continues to

be adopted in certain regions (notably Norway) as a core data integration ontology across the asset lifecycle.

The upshot is that companies collect vast volumes of data—from seismic surveys to sensor logs—but insufficient governance and platform integration mean much of it goes unused or underutilised. The result is large-scale ambition trapped in small-scale silos.

GULF FIRMS GO ALL-IN ON UPSTREAM DIGITALISATION

Producers in the Arabian Gulf are at the forefront of overcoming these digital and integration hurdles.

For instances, ADNOC's panorama digital command centre unifies more than 120 dashboards and 200,000 data points into a real-time visual interface.

Through AIQ (a joint venture with G42 and Microsoft), ADNOC deployed over 30 AI tools in 2023 alone, generating \$500 million in value and avoiding 1 million tonnes of CO₂ emissions.

Similarly, the company's Neuron 5 predictive maintenance platform, introduced in 2024, has significantly reduced unplanned downtime and extended asset lifecycles.

Additionally, ADNOC's AR360 reservoir modelling tool, developed with SLB and AIQ, integrates subsurface data for smarter infill drilling, extending well life and improving emission outcomes.

In its neighbouring Saudi Arabia, Saudi Aramco has implemented an enterprise-wide digital transformation programme using drones, IoT, blockchain, VR, and automation.

Its global Digital Innovation Centres train staff and incubate tools focused on upstream automation and data analytics.

Qatar Energy, while more discreet, is investing in enabling telecom infrastructure. The nationwide 5G and edge-computing rollout, led by Ooredoo, will allow sensor-driven, real-time data collection for future offshore upstream applications.

These national champions also rely on partnerships with global tech firms to accelerate AI development and improve data platform interoperability.

Key interventions include AI-led drilling optimisation, predictive analytics, and digital twins to improve recovery and manage emissions.

SKILLS SHORTAGES

The digital transformation market in oil and gas is projected to grow by \$56.4 billion from 2025–2029, with a robust compound annual growth rate of around 14.5 per cent.

The rise of digital twins, AI-led predictive maintenance and IoT applications is powering this surge.

Yet, operators report a pervasive lack of skilled labour, particularly individuals with cross-disciplinary knowledge spanning upstream engineering, data science and cybersecurity.

This talent gap compounds security vulnerabilities. Increasingly digitised rigs and remote operations are exposed to cyber attacks targeting IIoT and SCADA systems.

Offshore assets controlled via integrated cyber physical systems could suffer serious operational and environmental consequences in the event of breach.

Connectivity remains a further bottleneck. Many upstream installations, such as remote offshore platforms or Arctic fields, have limited bandwidth and unreliable data transmission.

This undermines real time monitoring, analytics, and the deployment of digital twins.

Initiatives such as Norway's Integrated Operations in the High North project aim to remedy these by deploying interoperable open standards platforms across drilling, reservoir and operations domains.

As one research paper on upstream data identified "challenges, including data silos, quality and consistency, standardisation, volume and complexity, accessibility and security".

This summary encapsulates the core barriers delaying digital potential in exploration and production.

Despite these hurdles, firms such as BP, Equinor and others are piloting AI-driven reservoir models, digital twins built on seismic data and real time IoT integration that reportedly improve recovery rates while reducing cost per barrel. ■

AWARD WINNING TECHNOLOGY

The World's First multi-set retrievable wireline plug in the industry. Multiple set, latch and release in one run with full surface and downhole control.



TorcPlug

The World's First VO-Qualified Multi-Set Retrievable Barrier Plug.

VO Qualified. Industry Certified.

The first and only plug of its kind to meet VO barrier standards. Proven integrity in the most demanding well environments. Confidence backed by compliance.

Multi-Set. Single Run. Total Control.

Set, unset—multiple times in one run. Full surface and downhole control for operational flexibility. Independent equalization and adjustable setting force for precision.

Engineered by Human Torque

Developed by E Plug's elite engineering team. Backed by mechanical, electrical, and software excellence. Built on the values of grit, passion, and innovation.

FPSO operators are leveraging technology to maintain a competitive edge



2025 offshore boom driven by innovation, safety standards

Digital twins, sustainable FPSOs, and advanced technologies enhance safety and competitiveness, driving efficiency and environmental performance in the global offshore energy sector, Miguel Hernandez, ABS Senior Vice President, Global Offshore, tells *OGN*

BY ABDULAZIZ KHATTAK

OFFSHORE exploration and production is rebounding in 2025, driven by a dynamic mix of regulatory developments and technological advancements.

The industry is accelerating innovations that support the energy transition, with digital and energy-efficiency solutions underpinning future success.

To confirm that technical standards are upheld amid rapid transformation, classification is an independent, objective process used to verify industry best practices, and for more than 70 years.

Class societies like the American Bureau of Shipping (ABS) continue to have a vital role in helping offshore asset owners and operators overcome the challenges of ocean depth and harsh environments, keeping

safety at the forefront.

They are reinforcing the importance of technical safety standards while promoting novel concepts that push the boundaries of what's possible offshore.

SURGING AHEAD IN SOUTH AMERICA

South America has emerged as a powerhouse in offshore oil and gas activity, with Brazil and Guyana leading the charge.

Brazil's offshore industry is at a pivotal moment, where operational efficiency, digital innovation, and regulatory compliance must integrate seamlessly to support sustainable growth.

Its FPSO market remains a stabilizing force, with orders for two new units for the Sergipe Deep Waters Project (SEAP), SEAP 1 and SEAP 2, reflecting the strategic importance of these capital-intensive assets.

In a landmark development for Brazil's



Miguel Hernandez

offshore digital transformation, a digital twin and condition monitoring project for a mature FPSO in the Cessao Onerosa oil field is underway.

The creation of a digital twin of an asset using advanced structural perfor-

mance management software can help to enable the industry to transition from traditional time-based maintenance approaches to more efficient condition-based methodologies, resulting in substantial operational cost savings while enhancing safety performance.

The digital transformation of Petrobras's FPSO fleet exemplifies how leading operators are leveraging cutting-edge technology to maintain a competitive edge in an evolving market.

By fostering problem-solving and knowledge-sharing, class societies are driving industry-wide conversations about the future of offshore.

A delegation of maritime and offshore energy leaders not only from Brazil but also Argentina, Chile and throughout South America led by ABS came together in March 2025 to discuss forward progress in a region heating up with international interest.



Looking to the future of offshore energy, the outlook remains positive, with significant opportunities to evolve the world's energy mix and advance new efficiency technologies

Canada, Mexico and the US

In 2024, two floating LNG (FLNG) units were completed for the Fast Altamira LNG project offshore Mexico's east coast.

Up north, additional funding from the Government of Canada was secured in March 2025 for the Cedar LNG Project, which is a joint development between the Haisla Nation and Pembina Pipeline Corporation in Kitimat, British Columbia.

The project will be the first Indigenous-owned FLNG facility in Canada.

In the US, 2025 plans are moving forward to install an FLNG complex offshore Louisiana and export domestically produced LNG from a proposed deepwater port export terminal project.

Meanwhile, in the Middle East and North Africa (Mena) region, operators are focusing on optimising production and expanding subsea engineering, procurement, construction and Installation (EPCI) projects, such as in Qatar's North Field, which is bringing on additional LNG capacity.

According to QatarEnergy, recent studies show its legacy field contains additional gas reserves estimated at 240 tcf, bringing Qatar's gas reserves to more than 2,000 tcf.

In West Africa, ExxonMobil and TotalEnergies are spearheading major offshore projects that further strengthen the region's importance in the global offshore ecosystem.

FPSOs operating off the coast of Nigeria include units in the Egina and Akpo fields which continue to set new standards for operational efficiency and environmental performance in challenging deepwater environments.

Hanwha Ocean recently received Approval in Principle (AIP) for its Pre-FEED Standard FPSO Design, which it intends to use to create an asset optimised for deployment in the deep waters of West Africa.

To address the recent tightening of environmental regulations, the FPSO is set to incorporate technologies such as zero-flaring, GHG monitoring and an energy management system.

All equipment has been electrified to reduce operational costs throughout the vessel's lifecycle. Additionally, advanced digital solutions, including cybersecurity, digital twin and predictive maintenance are integrated in this modern design.

In the world of classification, AIP is an important bridge between innovation and implementation, validating that novel concepts, designs, and technologies are fundamentally sound and demonstrate the highest safety standards.

ADVANCING AMMONIA FPSO CARBON CAPTURE DESIGN IN ASIA

Lower carbon and environmental impact fuels such as blue ammonia have significant potential to lower the emissions of offshore operations through the integration of carbon capture technologies in new FPSO designs.

An AIP was recently issued for an innovative ammonia FPSO unit with carbon capture capabilities developed by floating production engineering, procurement and construction companies MODEC and Toyo Engineering Corporation.

This groundbreaking design incorporating environment-friendly technologies for next-generation FPSOs represents another advancement in the industry's emissions-reduction journey.

The carbon capture enabled FPSO concept features an onboard plant capable of producing low-carbon ammonia while simultaneously capturing carbon, which is then safely stored in depleted subsea reservoirs or repurposed for enhanced oil recovery operations.

APPLYING GLOBAL OFFSHORE EXPERTISE FOR FLOATING WIND AND RENEWABLES

The offshore wind industry remains an important addition to the world's energy mix as all energy sources will be needed to meet the world's growing demand.

Major energy companies are increasingly applying decades of deepwater experience to overcome the unique challenges of floating offshore wind installations, primarily in Europe and Asia.

The offshore industry's evolution toward floating wind represents a natural technology transfer, with similarities in mooring systems, dynamic positioning and installation methodologies creating opportunities for cross-sector collaboration.

Several major operators are now pursuing hybrid energy systems that combine traditional production platforms with adjacent floating wind installations to reduce operational emissions and extend field economics.

ABS has already classed several pioneering floating wind projects and is actively developing standards using advanced simulation tools to mitigate structural risk for next-generation floating wind technologies suited for varying water depths and environmental conditions.

INTO THE NEXT PHASE OF OFFSHORE TRANSFORMATION

An essential part of maintaining safety leadership in the changing world of offshore energy is keeping far-future goals in focus and using that awareness to guide near-future technology development.

Objective inspection support applying engineering and risk-based offshore safety guidelines is essential for safely integrating new technologies that support assets over the long term.

While regulatory shifts may disrupt short-term plans, many operators are still actively planning for the next phases of both digital transformation and the future evolution of the energy mix.

The latest digital and smart technologies, including advanced dynamic positioning systems, remote monitoring capabilities, predictive maintenance implementation, and sustainability certifications like new environmental notations, are revolutionising efficiency and safety in the offshore industry.

Digital technologies are no longer optional but essential for maintaining competitiveness in today's offshore environment.

Looking to the future of offshore energy, the outlook remains positive, with significant opportunities to evolve the world's energy mix and advance new efficiency technologies. ■

Among the region's key exploration areas, Guyana has emerged as one of the most exciting offshore oil and gas bright spots in recent years with some of the largest oil finds of the past decade.

The ABS-classed Liza Unity FPSO operating in the Stabroek Block offshore Guyana, where ExxonMobil has made 12 oil discoveries since 2015, recently made history as the world's first FPSO to receive the SUSTAIN-2 Notation.

This designation marks a significant milestone for demonstrating environmental performance in offshore operations.

GAINING MOMENTUM IN NORTH AMERICA & MENA REGIONS

The Gulf of America is experiencing a revival in exploration activities, with 12 new fields and facilities scheduled to commence production through 2025.

The deployment of innovative floating production units (FPUs) underscores the region's continued significance in the global offshore landscape.

Notable units such as the all-electric ABS classed Anchor FPU for Chevron's deepwater development highlight the industry's commitment to reducing emissions and innovating with cutting-edge subsea technologies.

The industry-first unit is rated to safely operate at up to 20,000 psi, with reservoir depths reaching 34,000 ft below sea level while maintaining the highest safety and sustainability standards.

Investment in LNG infrastructure remains robust on the US Continental Shelf as North America seeks to diversify its energy portfolio with natural gas solutions.

According to the EIA, North America's LNG export capacity is on track to more than double between 2024 and 2028 to an estimated 24.4 billion cu ft (Bcf) per day, with 10 projects under construction in