

Oil Review

Oil · Gas · Petrochemicals

Africa

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North Africa: Progress in Egypt, Tunisia, Algeria and Morocco

Offshore opportunities in Sierra Leone

Uganda emerges from uncertainty

Event previews: Africa Oil Week and ADIPEC

Technology: Valves, pipelines, safety clothing, compressors, digital oilfields



South Sudan's petroleum minister is optimistic about exploration. (p23)



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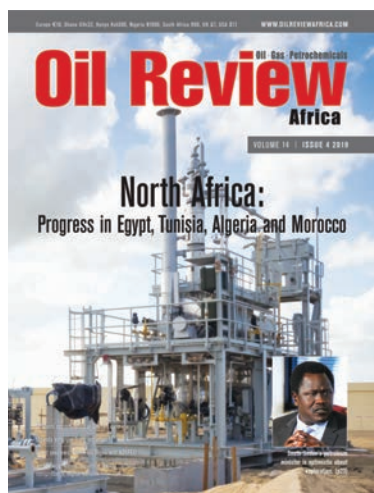
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ONE STEP AHEAD.



North African markets are on the rise.
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EDITOR'S NOTE

WE FOCUS ON North Africa for our cover story in this issue. Egypt, with the Zohr gas field in particular, has been the scene of a flurry of activity in the region. With its close proximity to the Middle East and Europe, North Africa is a strategically important part of the hydrocarbons world. Despite significant political challenges in Libya, there is plenty of good news coming out of Egypt, Algeria, Tunisia and Morocco, as these four countries seek to advance their economies with the benefits of developing natural resources.

Uganda is another part of Africa which is under the spotlight thanks to ambitious oil plans, 10 years after it was initially discovered. Finally, the time is right for development and investment, and this will be showcased at the Uganda International Oil & Gas Summit. *Oil Review Africa* is delighted to be a media partner and find out more about the opportunities on offer, including exciting new bidding rounds for promising oil blocks.

Georgia Lewis
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www.uiogs.com

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- 9-11 AOP 2019**
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www.spe.org/events

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- 4-8 Africa Oil Week**
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www.africa-oilweek.com
- 11-14 ADIPEC**
Abu Dhabi
www.adipec.com
- 21-22 Ghana Summit**
Accra
www.cwcghana.com

DECEMBER

- 2-5 SPE Workshop: Drilling & Completion Optimisation**
Cairo
www.spe.org/events

Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.

Energy minister to update delegates on 2022 LNG plant at leading Tanzanian oil and gas congress

THE HONOURABLE DR MEDARD Kalemani, Tanzania's Minister of Energy, has confirmed his attendance at the Tanzania Oil and Gas Congress this October where he will give updates on the recently announced plans for a syndicate of oil companies to commence construction of the \$30bn LNG project in 2022.

In March, the government stated that it planned to complete negotiations with a group of international oil companies in September to develop the project.

Led by Norwegian energy firm, and Platinum Sponsor of the Congress, Equinor, the group also consists of Royal Dutch Shell, ExxonMobil, Ophir Energy and Pavilion Energy. These international companies will work closely on the project, alongside the state-run Tanzania



The Tanzanian energy minister will play a leading role at the congress.

Petroleum Development Corporation (TPDC).

In a budget presentation to parliament, the minister stated that the project aims conclude in 2028 and will have capacity to produce 10 million tonnes per

annum of LNG.

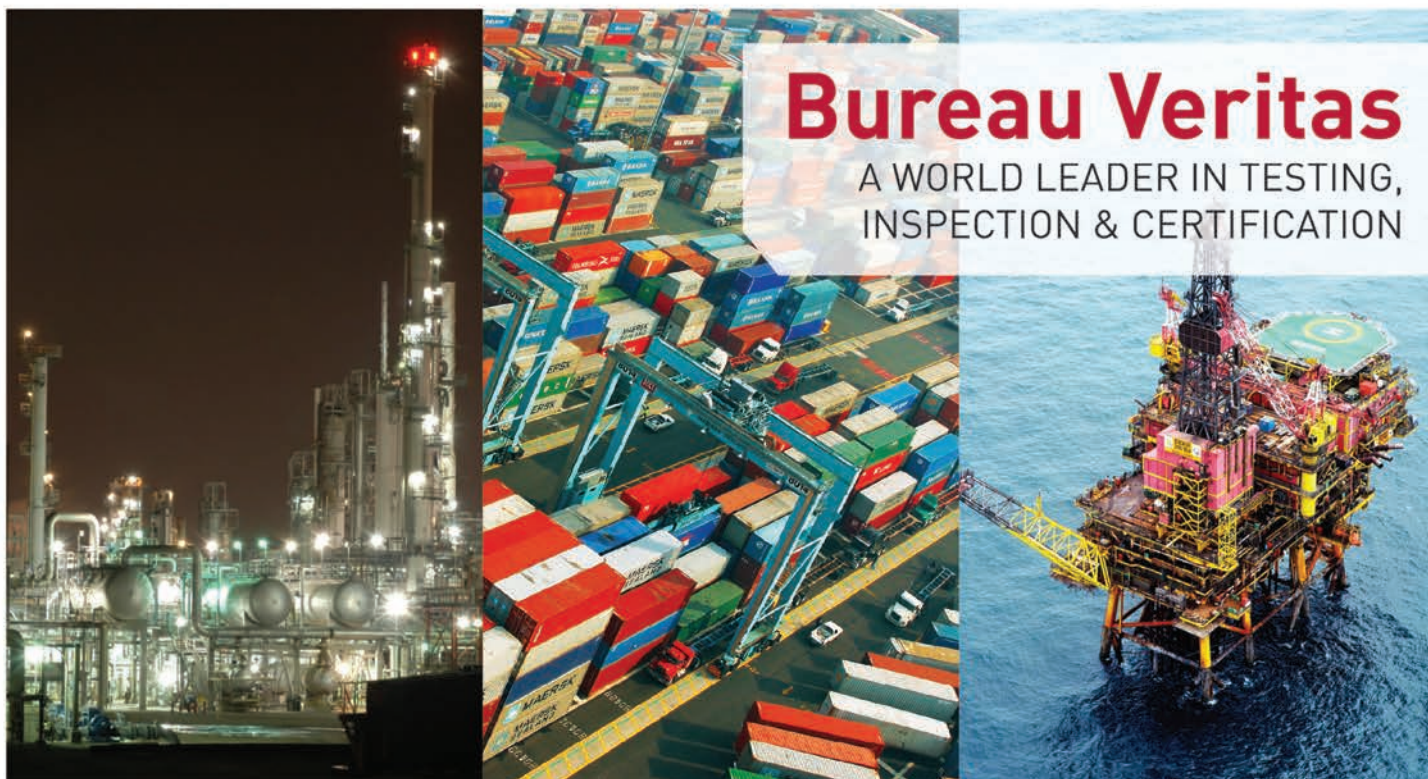
Currently, each individual investor of the project is holding separate talks with the government negotiation team. These talks are expected to be finalised within seven months.

According to the Bank of Tanzania, work on the project will increase annual economic growth, which stands at around 7 per cent, by another two percentage points.

Those keen to learn more about the movements in Tanzania's gas market would find it beneficial to attend the Tanzania Oil & Gas Congress, which brings together all the major players in Tanzania's oil and gas value chain.

Delegates at the high-profile event, which takes place in Dar es Salaam on 2-3 October 2019, will be the first to hear about Tanzania's exciting investment opportunities directly from the Minister of Energy, Government representatives, regulators and industry leaders.

Find out more at cwctog.com



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Report finds Senegal's oil and gas industry is setting a high standard, while Petro-Tim is under investigation

AFRICA ENERGY SERIES – Senegal 2019, a comprehensive report on the Senegalese oil and gas industry, highlights the country's ascent as a major player in the African exploration sector, with first offshore oil expected in 2022.

In 2014, Kosmos Energy unveiled the Grand Tortue Ahmeyim field, which is said to contain around 15 tcf of gas. Another sizeable oil and gas discovery was announced offshore Dakar in the SNE Field.

As well as a busy exploration sector, Senegal has an ambitious gas-to-power agenda with long-term plans to develop this aspect of the industry with gas from the Grand Tortue field. UK-based companies Penspen and MJM Energy are working closely with the Senegalese government in this regard.

"We are pleased to be contributing to the development of Senegal's domestic gas sector. This important project is a significant milestone for the country in providing access to competitive and clean supplies of energy to its people. We look forward to using our deep



President Macky Sall has launched an investigation into the Petro-Tim affair.

technical experience to help Senegal maximise the benefit from the natural gas it has discovered within its territorial waters," Penspen CEO, Peter O'Sullivan, said.

"Senegal ... has rapidly emerged as a legitimate player in the oil and gas arena while also quickly developing a robust petroleum and local content legislation," said Guillaume Doane, CEO of Africa Oil & Power.

The report will be launched at the Africa Oil & Power 2019 Conference in Cape Town, where Senegal's president, Macky Sall, will be awarded the Africa Oil Man of the Year prize.

Senegal was the subject of a TV investigation by the BBC programme Panorama earlier this year, which claimed that Petro-Tim was granted exploration licenses without due diligence. However, the license has since been sold to Kosmos Energy and Petro-Tim CEO Frank Timiş sold his shares to BP for a reported US\$250mn. The Senegalese government is undertaking an investigation into the granting of the license to Petro-Tim.

The African Energy Chamber issued a statement on the matter: "Now, Timiş initial acquisition of the licenses during the Wade administration might have happened under suspicious circumstances, as the BBC alleges, and might certainly be worth investigating, which president Macky Sall has already initiated. That, however, is no reason to demonize the whole of the country's oil sector and produce false claims that jeopardise the work being done to develop an industry with the potential to bring considerable wealth, jobs and economic development to this impoverished nation."

Exclusive closed-door roundtable sessions with C-level executives added to the ADIPEC agenda for 2019

FOR THE 2019 edition of ADIPEC, the Abu Dhabi International Petroleum Exhibition & Conference, Middle East Petroleum Club roundtables have been added to the programme for the first time.

There will be six exclusive, closed-door roundtable sessions solely attended by CEOs and C-level executives. As well as leading international oil and gas companies being represented, leading technology companies and global thought leaders will be present to share their knowledge on how to spearhead innovation and disrupt industries for the better around the world.

There will be six main themes for these exclusive sessions. The topics include: global energy trends and policy formation; digitalisation in energy; ethics, liability and governance in the digital era; the transformation of the world's energy mix; the circular plastics economy; and driving smart energy investments for the oil and gas business model of the future.



Mohammed Barkindo will be among the speakers at ADIPEC 2019.

For the main programme, the confirmed speakers for 2019 include Claudio Descalzi, CEO of Eni; Dr Omar Mitha, Mozambique's hydrocarbons minister; Tarek El Molla, Egypt's petroleum and mineral resources minister; Irene Muloni, Uganda's minister of mineral

development; and Mohammed Barkindo, OPEC Secretary General.

For more information about the roundtables, go to www.adipec.com/middle-east-petroleum-club/roundtables/

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Equatorial Guinea licensing road show attracts Chinese investors in Beijing with 27 blocks available

THE EQUATORIAL GUINEA mines and hydrocarbons ministry has been buoyed by the success of the Chinese leg of the EG Ronda Licensing Round Roadshow, which was held in Beijing.

More than 100 Chinese investors participated, with extensive discussions held on investment in oil, gas and minerals with the Ministry of Mines and Hydrocarbons' delegation.

The Ministry officials delivered presentations on the EG Ronda Licensing Rounds 2019 to an audience which included CMEC, CPP, CNOOC, PowerChina, Sinochem, Sinopec, Zhenhua Oil and China Minmetals.

There are 27 hydrocarbons blocks on offer for appraisal and development under the licensing round, including EG-27 (former Block R) and EG-23. As well as oil and gas blocks, the ministry showcased opportunities for exploration and mining companies worldwide to apply for exploration rights in the Rio Muni area, which is highly prospective



Gabriel Mbaga Obiang Lima at the Beijing roadshow.

in minerals such as gold, diamonds, base metals, iron ore and bauxite.

"We have met with very serious investors who believe in the immense hydrocarbons and mining potential of Equatorial Guinea and are ready to invest, we will announce agreements

very soon," said Gabriel Mbaga Obiang Lima, Equatorial Guinea's minister for mines and hydrocarbons. "This will ensure additional investment into our oil and gas sector and, more importantly, help develop our mining and minerals industry and create jobs."

Deal-making in sharp focus with new features and leading decision-makers at Africa Oil Week

FOR MORE THAN 25 years, Africa Oil Week has acted as a central hub for decision-makers in the African oil and gas sector, bringing together delegates from Marrakech and Maputo to Lagos and Lusaka in Cape Town each November.

Following consultation with two expert advisory boards, and countless interviews with the industry, this year organisers have crafted a programme that puts deal-making front and centre of the agenda for the 1,500 delegates.

Among the features of the 2019 edition of the conference are a Ministerial and VIP Programme which is expected to play host to 25 ministers, more than 150 C-level industry leaders.

Kael O'Sullivan, head of investor and VIP relations, commented: "A key aim of ours for the 2019 Summit is to ensure that capital is connected to the right opportunities. The Ministerial & VIP Programme is key to these efforts and will bring together the top 180 decision-makers and influencers in the



Cape Town will again play host to delegates at Africa Oil Week.

African upstream space for investment and deal-making. This core group, we believe, will play a major role in the future development of the sector and, by extension, the economic development of Africa."

After launching last year, returning to the conference in 2019 is the Prospect Forum. The data revealed at the forum will help industry leaders make big investment decisions, based

on world class geophysical findings. Expect speakers from organisations including PGS, TGS, Petrosen and more.

Last year's event featured bidding round launches from Ghana, Congo and Sudan and this year, more African nations will use the event to launch their own bidding rounds.

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African ethylene capacity expected to rise to 4.63mtpa in the next four years, with Egypt leading the way

ETHYLENE CAPACITY IN Africa is expected to rise at an average annual growth rate (AAGR) of 18.6 per cent from 1.83 mtpa in 2018 to 4.63 mtpa in 2023, according to GlobalData. Most ethylene capacity additions will be from Egypt with capacity of around 1.70 mtpa by 2023.

Global ethylene capacity is set to register growth of 40 per cent from 189.13mn tonnes per annum in 2018 to 264.13 mtpa in 2023, led by Asia and North America. The report, 'Global Ethylene Industry Outlook to 2023 Capacity and Capital Expenditure Forecasts with Details of All Active and Planned Plants' reveals that around 126 planned and announced plants are scheduled to come online,

predominately in Asia and North America, over the next five years.

Ethylene capacity in Asia is expected to increase at an AAGR of 8.7 per cent from 66.82 mtpa in 2018 to 103.33 mtpa in 2023. Among the countries in the region, China will add a capacity of around 20.92 mtpa by 2023. Major capacity addition will be from Exxon Mobil Corporation Zhoushan Ethylene Plant, with a capacity of 1.80 mtpa by 2023.

Dayanand Kharade, oil and gas analyst at GlobalData, said, "Asia will dominate the global ethylene market, mainly due to China having both the biggest number of new projects and the largest absolute capacity expansion driven by the country's economic growth. The country is



Ethylene capacity is on the rise in multiple markets across the globe.

set to build around 34 ethylene projects in the next five years."

Ethylene capacity in Africa is expected to increase at an AAGR of 18.6 per cent from 1.83 mtpa in 2018 to 4.63 mtpa in 2023. Egypt is forecast to be the top country in the region with

capacity additions of 1.70 mtpa by 2023. Exxon Mobil Corp, Saudi Arabian Oil Co and The National Petrochemical Co will be the top three companies globally in terms of planned and announced capacity additions over the outlook period.

Timipre Silva appointed as new Nigerian petroleum minister

WHILE KEEPING THE petroleum portfolio for himself, Nigeria's President Muhammadu Buhari has appointed Timipre Silva as the minister of state for petroleum.

As a former governor of the Bayelsa State, in the Niger Delta region, Timipre Silva has been involved with issues affecting Nigeria's oil and gas sector such as revenue management and distribution and increased community involvement in Nigeria's oil regions.

Mr Silva previously served as a special assistant in the petroleum ministry.

"The appointment of a well-versed former Governor with a demonstrated ability to work with different parties and a good understanding of the oil sector is a clear sign that Nigeria is serious about continuing its pace of reforms," said Nj Ayuk, executive chairman at the chamber and CEO of the Centurion Law Group.

"Africa's biggest oil producer needs such an experienced figure to lead the industry and our continent into new heights," he added.

The African Energy Chamber has congratulated Timipre Silva on behalf of its partners and will continue to work closely with the Department of Petroleum Resources to pursue local content development, support regionalisation and assist foreign investors.





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Carbon capture tech boosted by ExxonMobil

US SUPERMAJOR EXXONMOBIL and engineering firm Mosaic Materials have entered into an agreement to explore technology that can remove carbon dioxide from emissions sources. Mosaic Materials has researched a process that uses porous solids, known as metal-organic frameworks, to separate carbon dioxide from the air or flue gas.

Vijay Swarup, vice-president of research and development for ExxonMobil Research and Engineering Company, said, "New technologies in carbon capture will be critical enablers for us to meet growing energy demands while reducing emissions."

"Our agreement with Mosaic expands our carbon capture technology research portfolio, which is evaluating multiple pathways, including evaluation of carbonate fuel cells and direct air capture, to reduce costs and enable large-scale deployment. Adding Mosaic's approach will allow us to build on their work to evaluate the potential for this technology to have a meaningful impact in reducing carbon dioxide emissions," he added.

Thomas McDonald, CEO of Mosaic Materials, commented, "Through this agreement with ExxonMobil, we look to accelerate the pace of our development and demonstrate the business and environmental benefits that our technology can offer. Our proprietary technology allows us to separate carbon dioxide from nearly any gas mixture using moderate temperature and pressure changes, substantially increasing energy efficiency and decreasing costs."

CNPC Upper Nile discovery a major boost for South Sudan's oil potential

A CNPC-LED CONSORTIUM has made a 300 million barrels of recoverable oil discovery in South Sudan's northeastern Upper Nile state. It is almost as much as the Oyo Discovery announced at the start of August in Congo.

The exploration well was drilled at a total depth of 1,320m near the Adar oilfield in Block 3, operated by the Dar Petroleum Operating Company (DOPC), which includes CNPC, Petronas, Nilepet, Sinopec and Tri-Ocean Energy. Earlier this year, South Sudan signed an exploration and production sharing agreement (EPSA) with South Africa's Strategic Fuel Fund for the highly prospective Block B2. The move was part of South Sudan's strategy to diversify its basket of investors and encourage further exploration.



Image Credit: African Energy Chamber

The major discovery was made in South Sudan's Upper Nile state.

While the country sits on over 3.5bn of proven oil reserves, the third largest in sub-Saharan Africa, 70 per cent of its territory remains under-explored.

To boost exploration, South Sudan will be launching a new

petroleum licensing round at the Africa Oil & Power conference in Cape Town on 9 October.

To find out more about the opportunities in South Sudan, turn to our special feature on page 23.

African LNG to attract billions in investment across new and emerging markets

AFRICA HOLDS 7.1 per cent of proven global gas reserves and is expected to contribute nearly 10 per cent of global production growth through to 2024. This should prove a boon to the LNG market with greenfield investments in Nigeria, Egypt, Mozambique and elsewhere

reaching nearly US\$103 bn this year. Liquefaction is viewed as an important strategy for realising Africa's gas potential.

Nigeria accounts for more than half current LNG production capacity on the continent, with October 2019 seeing FID on the US\$12 bn expansion of the

country's liquefaction plant at Bonny Island in Rivers State. The Train 7 expansion project would increase Nigerian LNG production capacity by 35 per cent, from 22 mtpa to 30 mtpa.

As well as Nigeria, Algeria, Egypt, Ghana, South Africa, Mozambique, Senegal and Mauritania are leading the investment charge. Earlier this year, Total announced reached a binding agreement with Occidental Petroleum to acquire Anadarko's assets in Algeria, Ghana, Mozambique and South Africa, which feature extensive gas reserves.

For more on the gas potential of Egypt and Algeria, turn to our cover story on page 19.



Image Credit: Total/Fliobr

Total has a long track record in LNG in Africa.

Otakikpo development to continue apace after Lekoil partners with Schlumberger and Green Energy International

LEKOIL SIGNED THE Otakikpo Joint Venture (JV) with Green Energy International, with LEKOIL as the technical partner. Additionally, a MOU has been signed with Schlumberger and a subsidiary of a major international oil company. The Otakikpo field is located in coastal swamp in the south-eastern part of the Niger Delta.

The MOU covers a comprehensive infrastructure sharing and drilling programme around a group of marginal field assets in OML 11. Standard Chartered Bank is to act as the lead financial advisor for the Project and perform financial advisory, security and banking services required for the project.

The phased development plan of the project consists of drilling up to five new wells in Otakikpo, expanding processing infrastructure to comprise an onshore terminal to be located outside the Otakikpo field operations area, construction of an export pipeline connecting the onshore terminal to an offshore buoy to handle Otakikpo and other fields in OML11. The



Image Credit: Adobe Stock/jucaya

The Niger Delta has long been a Nigerian oil hotspot.

Otakikpo JV will partake in the costs of its field development with funds provided for such participation by the development consortium. Project management and associated asset management costs provided by Schlumberger will be shared between the Otakikpo Joint Venture and the operators and owners of other marginal fields participating in the project.

Capital expenditure to be incurred by the Otakikpo Joint Venture is expected to be

approximately US\$170 million covering new wells and processing infrastructure, of which LEKOIL is expected to fund US\$68 million.

Under the terms of the MOU, the unnamed major will provide funding to the Otakikpo Joint Venture alongside the other funding partners, subject to due diligence, project economics, entry into definitive documentation and final investment decision. The Otakikpo JV will enter into an exclusive offtake agreement with the major for the sale of crude produced. Schlumberger will act as technical and project execution partner to provide oilfield services and project management services to assist in ramping up production and long-term field management.

Lekan Akinyanmi, CEO of LEKOIL said, "This MOU ... secures the necessary funding, subject to the various conditions being satisfied, to drill additional wells and unlock further value at Otakikpo ... We look forward to the transformation of operations infrastructure and an opportunity to earning revenue along the value chain".

ABS leverages legacy of innovation in the booming FPSO market with Angola and Nigeria leading the way

RECENT STABILISATION IN the oil price and a backdrop of government support for new projects could see a record number of FPSO projects come online in the next 12 months.

Consultancy Marketwatch predicts that 2019-2020 may be the strongest period of growth in the history of the FPSO market, with predictions that it will reach over USD 30 billion by 2025.

Figures from Global Data show that Africa is the second highest growth region, with 14 upcoming FPSO additions by 2025. Angola and Nigeria are the main countries in the region, followed by Senegal, Ghana, South Africa, Tunisia and Mauritania. Contributing factors include growth in offshore exploration and production seeking to replace diminishing onshore reserves and a trend toward fast-track floating solutions which take advantage of advances in subsea technologies.

These drivers are catalysts for innovation, forcing stakeholders to think differently about



Image Credit: Shutterstock

The FPSO sector has the power to be transformative across Africa.

how to maximise performance with efficient and sustainable offshore operations.

As the leading class society for offshore energy production units, ABS brings extensive experience and technical leadership in FPSO and FPU classification and statutory/regulatory certification. In 1975, ABS provided classification services for the offshore industry's inaugural floating production system and classed the first FPSO

unit in 1978. Today, as a result of ABS' advanced approach to safety considerations, its global footprint in the classification of FPSOs continues to expand. As more FPSO projects come online, ABS will continue leading classification by leveraging data to drive innovative solutions that optimise efficiencies and reduce environmental impact for the growing FPSO market.

Application of digital technologies continues to evolve in the offshore world, including floating production units. Technology advances such as remote inspection techniques, sensor technology and data analytics are driving new levels of reliability that enable better decision-making and improve asset performance.

By leveraging data science and digital technologies, ABS can provide deeper insights into asset condition to optimise inspection activities, reduce downtime and operational costs and transition to an informed, targeted, and predictive classification model.

Rystad tips subsea risks if oil price is sub-US\$50

THE SUBSEA MARKET in 2019 will experience year-on-year growth for the first time since 2014, but the positive outlook is vulnerable to any significant decline in oil prices over the next few years, according to Rystad Energy.

Henning Bjørvik, a Rystad analyst, said, "We expect the subsea market to thrive during the coming years, but market growth will be at risk if the oil price falls to US\$50 per barrel."

Rystad analysed the outlook for global subsea segments in the coming years and stated that this year's development is locked in with brownfield opportunities and already sanctioned projects – but the oil price will dictate growth. In a US\$60-\$70 scenario, the subsea market is set to grow around seven per cent annually up to 2025. But a portion of this activity is at risk if the price falls to US\$50 per barrel. The firm believes prices at that level would still be enough to support five per cent annual growth in subsea to 2022, but after that, the growth rate could fall to zero.

"Although we expect the subsea market to have one of the highest growth rates within oilfield services, the segment is also more vulnerable to an oil price drop than the oilfield services market in general. We see significant risks in terms of subsea spending as well as growth," Bjørvik remarked. "It is worth mentioning that operators have had a remarkable ability to cut costs during downturns, much helped by the oilfield service industry. Should a lower price environment again become reality, we can be assured that the industry has a proven track record of survival and ingenuity."

Oyo discovery enhances potential for onshore oil in the Republic of Congo

AN ONSHORE DISCOVERY made in the Delta de la Cuvette deposit in the Republic of Congo was announced on 10 August by SARPD Oil and PEPA, a Congolese consortium working as operators on the block.

Early projections indicate that the discovered deposits could produce up to 359 million barrels of oil, or 983,000 bopd, from Congo's central province. This could quadruple Congo's production, which stands at more than 330,000 bopd according to OPEC figures. Production has been steadily increasing in recent years, with a target set by the government of reaching 400,000 bopd by 2020. At present, Congo has a robust offshore oil sector so the latest discovery could herald the start of significant diversification into onshore.

The Delta de la Cuvette deposit covers 9,392 m and comprises four wells, the first has been drilled in March of this year. When fully exploited, the license could propel Congo as Africa's third largest oil producer, ahead of Algeria and Libya.

After the discovery was announced, President Denis Sassou Nguesso pledged to ensure the development would meet high environmental



Image Credit: African Energy Chamber

Denis Sassou Nguesso, president of the Republic of Congo, is promising an environmentally sound project.

standards. In a message on public television, he noted that the discovery is located on the periphery of wetlands that support peatlands.

"Congo remains fully aware of the need to preserve peatlands, given their impact on global climate balance and the protection of biodiversity," the Congolese president said. "Our country has never violated the obligation to protect peatlands in its lake areas. It has no intention of doing so in the future, notwithstanding the financial compensation announced and still to be received."

Tanzania gas turbine project completed ahead of schedule at Songas Ubungu plant

GE AND SONGAS have successfully completed upgrades to the entire GE fleet of three LM6000PA and one LM6000PC gas turbines at the Songas Ubungu Power Plant in Dar es Salaam, Tanzania. These

technology upgrades will increase the power plant's efficiency and reliability, enabling Songas to maintain the plant more economically.

GE's upgrade of the four LM6000PA gas turbines to

LM6000PC significantly improves the current fleet. GE's SPRayINtercooling (SPRINT) technology, installed on two of the four units, increases gas turbine performance, improves power flexibility, enhances the combustion system, improves fuel efficiency, extends maintenance intervals for the combustor, hot section and major overhaul and lowers maintenance costs. The Ubungu power plant provides more than 20 per cent of the grid-connected power in Tanzania. It includes four GE LM6000 gas turbines, which have been operational since 2004. In 2017, GE signed a multi-year agreement to upgrade gas turbines at the Songas Ubungu power plant in Tanzania.



The upgraded Songas Ubungu power plant.

Image Credit: GE

FAR farms out majority stake in two offshore Guinea-Bissau projects to CNOOC

AUSTRALIAN OIL AND gas explorer FAR Ltd, which holds a stake in oil drilling licenses off the West African coast of Guinea-Bissau, has announced that a unit of China National Offshore Oil Corp (CNOOC) will take a majority stake in the projects.

Under the terms of the farm-out agreement, a 55 per cent interest in Sinapa and Esperanca licenses will be assigned to CNOOC West African Petroleum E&P SA from Sweden's Svenska Petroleum Exploration GB.

FAR will continue to hold a 21.42 per cent stake in each license.

Svenska will retain a reduced participating interest of 23.03 per cent and will continue to act as an operator while CNOOC may choose to assume operatorship at the conclusion of the upcoming offshore drilling campaign.

Completion of the farm-out agreement is subject to approval by the government of the Republic of Guinea-Bissau and customary joint venture consents.

FAR's Managing Director Cath Norman said, "We look forward to progressing the Guinea-Bissau acreage now that CNOOC has farmed into the project. Attracting a National Oil Company such as CNOOC shows the confidence that another major company has in FAR's Guinea-Bissau acreage."



CNOOC's headquarters in Beijing.

"CNOOC brings a wealth of technical and operational expertise and experience, and we look forward to finalising the details of the future drilling plans that are expected to begin early 2020. We welcome CNOOC to the joint venture and look forward to a long and successful relationship."

Image Credit: Daniel Case/Wikimedia Commons



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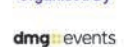
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Benin aims to come out of Nigeria's shadow with ambitious gas-to-power plans

TOTAL HAS SIGNED a gas supply agreement and host government agreement with Benin and its state utility the Société Béninoise d'Énergie Electrique (SBEE). The agreement will see the development of a 0.5 mtpa Floating, Storage and Regasification Unit (FSRU), the first in West Africa. The region has made multiple attempts to develop gas-to-power infrastructure but issues in regard to financing, infrastructure and regulation have been challenging.

Between Côte d'Ivoire, Ghana, Nigeria and Senegal, up to 7,750MW of gas-to-power facilities could be installed by 2030, according to Power Africa.

"We are very pleased to have been entrusted by the Benin authorities to develop LNG imports and support a broad adoption of natural gas in the



Image Credit: Centurion Law Firm

Benin could boom if a major gas-to-power project comes to fruition.

country," said Laurent Vivier, senior vice president, gas, at Total. "Access to LNG will help Benin to meet growing domestic energy demand and add more natural gas to the country's current energy mix, hence reducing its carbon intensity."

"The new legislative framework fosters the participation of private capital in the energy sector and is manifested in independent

thermal, solar and hydroelectric power generation projects," said Benin's energy minister, Dona Jean-Claude Houssou. "The gas import project will supply plants in Benin, such as the new 127 MW power station at Maria Gléta, with imported liquefied natural gas, on preferential terms and will position Benin, capital of the West African Power Pool, as the crossroads for gas and electricity in the sub-region."

Amplus Energy makes its mark in Angola with marginal fields development project

ABERDEEN-BASED FLOATING PRODUCTION solutions specialist Amplus Energy Services has won a multi-million-dollar six-month contract to re-evaluate the development of marginal fields in Angola. The contract aims to

develop economically viable field development solutions for a major operator in Angola. Amplus will manage the six-month project from its Aberdeen headquarters. The company will work in partnership with TechnipFMC and Halliburton to

support the work on the project, while the company's in-country partner Prodiaman Oil Services SA will provide local support.

Ian Herd, managing director of Amplus Energy Services, said, "We are developing an excellent reputation as a company who can turn previously uneconomic oil and gas reserves into financially viable resources."

"The lessons learned from this latest contract award will not only be strategically key for marginal field developments in Angola, but also in the North Sea, where there are more than 200 discoveries still to be developed with several billion barrels of oil available for recovery," he added.



Angola's offshore sector is making a comeback.

Image Credit: Adene Stock/Bernd

ADES wins Egypt and Algeria rig contracts

ADES INTERNATIONAL HOLDING has been awarded a two-year contract for its ADMARINE IV offshore jack-up rig in Egypt, and signed a one-year contract extension for its onshore rig RIG 828 in Algeria.

The ADMARINE IV contract was awarded by a major Egyptian energy company through tendering and has a term of an initial one-year engagement, with an option to extend for another year at the same rates.

In Algeria, the existing contract of RIG 828, which was acquired from Weatherford earlier this year, was extended for a one-year engagement under the same terms and will run through until June 2020.

"Award of a new contract with a leading Egyptian energy company reinforces the strength of ADES' business model that focuses on providing tailored solutions and superior services in a highly competitive market," said Dr Mohammed Farouk, CEO of ADES. "We are also particularly pleased with the extension for Rig 828 in Algeria which is a strong endorsement of our client's confidence and demonstrates our ability to build value from recent acquisitions. These new agreements further underpin our revenue visibility and are aligned with ADES' focus on delivering organic growth."

ADES is an oil and gas drilling and production services provider working in North Africa and the Middle East, working on on- and offshore contract drilling projects.

For more on the North African oil and gas industry, turn to our cover story on page 19.

Eni makes major gas discovery in Niger Delta

ENI, THROUGH ITS affiliate NAOC (Eni 20 per cent, operator, NNPC 60 per cent, Oando 20 per cent), has made a significant gas and condensate find in the deeper sequences of the Obiafu-Obrikom fields, in OML61, onshore Niger Delta. The Obiafu-41 deep well has reached a depth of 4,374 m encountering an important gas and condensate accumulation within the deltaic sequence of Oligocene age comprising more than 130m of high quality hydrocarbon-bearing sands.

The find amounts to around 1 trillion cubic feet of gas and 60 million barrels of associated condensate in the deep drilled sequences. The discovery has potential that will be assessed with the next appraisal campaign.

The well can deliver in excess of 100 million standard cubic feet/day of gas and 3,000 bpd of associated condensates, and will be immediately put on-stream to increase NAOC's gas production.

The discovery is part of a drilling campaign planned by NAOC JV and aimed at exploring near-field and deep pool opportunities as immediate time-to-market opportunities.

Eni has been present in Nigeria since 1962, with operated and non-operated production, development and exploration activities on a total of 30,049 square kilometres in the onshore and offshore areas of the Niger Delta. In 2018, Eni's equity hydrocarbon production amounted to 100,000 boe/day.

Oando, meanwhile, will be boosted by this find, having announced an after-tax profit of N7.2 bn for the six months ending on 30 June 2019.

Springfield Group becomes first African independent to drill in deep water

SPRINGFIELD EXPLORATION AND Production (SEP), a subsidiary of Springfield Group, is on course to make history by becoming the first independent African energy company to drill in deep water.

Springfield, which operates the West Cape Three Points Block 2 (WCTP Block 2), has signed a contract with Stena Unicon Offshore Services Ghana (Stena Unicon) for the Stena Forth Mobile Offshore Drilling Unit (MODU). Springfield will utilise the Stena Forth in late September for a drilling campaign on WCTP Block 2.

The campaign will first target the Oak-1x well on trend with the Beech discovery, made on the Deep Water Tano Cape Three Points block (DWT/CTP) to the south-west of WCTP Block 2. The next well, Afina-1x, will test



Springfield's Kevin Okyere and Stena's Erik Ronsberg sign the rig contract.

the Cenomanian oil potential on a similar play fairway to discovered resources to the east of WCTP Block 2. Springfield is working to firm up further drilling locations on the highly prospective WCTP Block 2.

"This is a huge moment for Springfield Group and, I believe, for Ghana. Deep water drilling has never been carried about by an

independent African Energy company and we are incredibly proud to be on the cusp of being the first to do so," said Springfield CEO Kevin Okyere. "Chalking this milestone brings us closer to our vision of making our communities the ultimate beneficiaries of the resources on the continent. We are committed to achieving this to make Ghana and Africa proud."

Kenya and Namibia partnerships enhanced between Total and Qatar Petroleum

QATAR PETROLEUM WILL farm into Total-held exploration acreages in Kenya and Namibia,

as well as two blocks in Guyana.

In Kenya, Total will, along with Eni, transfer a combined 25

per cent interest in Blocks L11A, L11B and L12 to Qatar Petroleum. Total's interest will be reduced from 45 per cent to 33.75 per cent. All three blocks are located in Kenya's deep offshore. An exploration well is planned for Block L11B in 2020.

In Namibia, Total will transfer to Qatar Petroleum a 30 per cent interest in Block 2913B and retain a 40 per cent interest.

Additionally, Total will transfer to Qatar Petroleum 28.33 per cent in Block 2912 and retain 37.78 per cent. The deepwater blocks are located in the Orange Basin, offshore Namibia. A first exploration well for this market is scheduled to be drilled next year on Block 2913B.



The Qatar Petroleum headquarters in Doha.

Image Credit: Alberto Albuquerque/Stephen/Flickr



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BUSY TIMES AHEAD FOR NORTH AFRICAN GAS DEVELOPMENT

The focus is on further developing gas markets in North Africa with a flurry of activity across Egypt, Algeria, Morocco and Tunisia.
Martin Clark, Deblina Roy, Nonalynka Nongrum and Georgia Lewis report.

NORTH AFRICAN GAS industry development is buoyant with exciting activity aplenty particularly in Egypt, Algeria and Morocco, as well as cross-border cooperation between Algeria and Tunisia. While Libya continues to struggle with ongoing political and economic instability, other North African markets are going from strength to strength, with their close proximity to Mediterranean markets, such as Lebanon, Cyprus, Turkey and Israel playing an important role, even during a period when tensions between Lebanon and Israel remain high.

Egypt

Egypt remains active in its congested corner of the Mediterranean; the mighty Zohr field sits close to the border with Cyprus and to the west of Israeli territory.

The rapid development of Eni's giant 30 trillion cubic feet Zohr gas field soon after discovery has almost, on its own, transformed Egypt in the space of three years from a major gas importer to a net exporter. Eni's recent Nour discovery, about 50 km North of the Sinai peninsula, reinforces the trend. The Nour-1 wildcat well was drilled in 295 metres of water to a total depth of 5,914 metres. It found 33 metres of gross sandstone pay with good petrophysical properties and an



Offshore work in Egypt's West Nile Delta, where BP has been very active in transforming the country's gas sector.

Image Credit: BP/Flickr

estimated gas column of 90 metres in the Tineh formation of Oligocene age.

The Italian group is now the country's leading producer with

“The rapid development of the Zohr gas field has transformed Egypt, along with projects in the east and west of the Nile Delta, with major operators involved”

equity above 340,000 barrels of oil equivalent per day (boepd) that will further grow in 2019 with the ramp up of the Zohr field to production plateau.

A host of other major projects are together transforming the gas sector. BP is especially active with its West Nile Delta project and last year launched its Atoll Phase One project in the North Damietta concession in the East Nile Delta. This is now producing 350 million cubic feet of gas a day (mmscfd) and 10,000 bpd of condensate. Gas production is directed to Egypt's national grid. Other major operators include Shell, SDX and Dana Gas.

Significantly, Egypt already

has the infrastructure in place to take advantage of this opportunity, both for production, such as flow lines and treatment plants, and for export, such as LNG terminals and pipelines.

Eni chief executive Claudio Descalzi said at a Chatham House event in London this year that the idea of creating an export hub was a realistic possibility.

“If these countries are able to define common strategies and share these existing infrastructures, they will manage to lower the necessary investment levels, reduce costs and speed up the exploitation of available resources, helping them to grow faster,” he noted. “This will lead

to the creation of a new gas hub, which could boost development and contribute to the stability of the entire region.”

Then there's the politics. With tensions between Israel and Lebanon surfacing even before any drilling has taken place, that remains a potential hurdle. Yet the development of the now defunct Arab Gas Pipeline, carrying Egyptian gas to Israel, shows what is possible.

What's more, the area's swollen gas resources have prompted operators and governments to push for solutions.

In a landmark deal last year, Delek Drilling and partner Noble Energy agreed to export US\$15bn worth of gas from Israeli offshore fields to a customer in Egypt. The gas is expected to feed into a new pipeline, the EastMed pipeline, between Ashkelon in Israel and El-Arish in Egypt, to transport the gas supplies. Gas exports to Egypt are expected to commence by the end of the year. Cyprus too is pondering its options and could, potentially, see an outlet in Egypt with its existing infrastructure.

Algeria and Tunisia

As well as its work in Egypt, Eni is very active in Algeria and this is having a positive knock-on effect for Tunisia. Claudio Descalzi, CEO of Eni, and Slim Feriani, the Tunisian Minister of Industry, have signed a new agreement to transport Algerian natural gas through Tunisia.

The agreement follows those reached with Sonatrach last May in connection with the purchase of gas and transport in the Strait of Sicily (the TPMC system) and completes the contractual framework which allows Eni to import Algerian gas into Italy.

With this agreement, Eni undertakes to operate the pipeline for the next 10 years through its subsidiary Trans Tunisian Pipeline Company (TTPC), ensuring the necessary reinvestment to modernise

infrastructure and taking advantage of the exclusive rights to the entire transport capacity.

Built in the early 1980s and subsequently reinforced over several phases, the trans-Tunisian pipeline consists of two lines, 48 inches wide and about 370 km long, from the Algerian-Tunisian border near Oued Saf to the Cap Bon headland, as well as five compression stations. With a transport capacity of approximately 34bn cubic meters per year, it plays a vital role in

open workshops with equipment. The curriculum covers five specialist trade areas – instrumentation, electrical, mechanical, pipework and welding – all with a strong emphasis on health and safety.

An applied training methodology will provide students with the theoretical knowledge and practical skills they need to work in their chosen professional discipline upon graduation.

Graham Mac Millan, senior



Image Credit: Eni/Flickr

Oued Zar Camp, Tunisia, in 2010. Since then, further investment and development has taken place.

“ Training enables Petrofac to transfer knowledge and experience to the local supply chain, improving the safety and quality of our projects”

Italian and Tunisian energy supply and will continue to do so.

Petrofac is another company which has reinforced its commitment to Algeria. The oilfield services giant has opened a construction skills training centre in Hassi Messaoud, Southern Algeria, following the completion of a programme to upgrade the centre's facilities. The centre will provide training for the next generation of Algeria's oil and gas industry workforce with an annual capacity to train up to 400 people at a time.

The training centre's facilities include classrooms and large

vice-president – North Africa, said, “Training enables Petrofac to transfer the company's deep knowledge and experience in key trades to the local supply chain, which consequently improves the safety and quality of our projects and those throughout Algeria.”

Morocco

While Morocco has a growing presence in the renewables sector, gas presents opportunities, especially as it is seen across the energy industry as a bridging fuel between reliance on fossil fuels and the move towards greater use of renewables in the energy mix.

Chariot Oil & Gas Limited announced that the development of the offshore Morocco Anchois Field is technically feasible, with the potential for either a single phase or a staged development to commercially optimise access to different parts of the gas market.

The firm stated that the development options included a subsea-to-shore concept. According to the company's statement, this concept consists of subsea production wells tied to a subsea manifold, from which a subsea flowline and umbilical connect the field to an onshore Central Processing Facility (CPF), where gas is processed and then delivered into the Maghreb-Europe Gas pipeline (GME) via an onshore gas flowline.

Chariot updated that there was potential to re-enter the suspended Anchois-1 gas discovery well, which may be completed as a producer well.

The company added that Morocco has a growing energy market with attractive gas prices that underpin a commercially attractive project. It has initiated an Environmental Impact Assessment to facilitate appraisal operations in 2020.

Larry Bottomley, CEO commented, “The results of these studies demonstrate the technical feasibility and commercial attractiveness of developing the Anchois gas discovery with the potential to offer a strategically important indigenous source of gas into Morocco's developing energy market.”

“We believe the combination of a de-risked resource base in a fast-growing energy market, with high gas prices and a need for increased supply, remains highly attractive to a wide range of potential strategic partners throughout the energy value chain. As part of the partnering process and to facilitate appraisal operations in 2020, the company has initiated a drilling environmental impact assessment,” he concluded. 🔥

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SOUTH SUDAN: ON THE RISE

South Sudan has had a turbulent history in recent years but the government is optimistic about improved stability as a driver for investment, particularly with other partners in Africa. Georgia Lewis reports.

THE COUNTRY OF South Sudan is only eight years old but, despite political and economic hurdles along the way, significant progress is being made in developing the petroleum industry. While its neighbour to the north, Sudan, has experienced political and social turmoil this year, particularly in the wake of a military coup in April, South Sudan is emerging as a promising investment destination. With the new country benefiting from existing oil infrastructure, as well as encouraging exploration sites, will South Sudan be able to maintain peace, stability and the rule of law and establish itself as an important player in the continent's oil and gas industry?

Partnerships with other African countries are becoming important – in May this year, South Sudan signed an exploration and production sharing agreement (EPSA) with South Africa for Block B2.

The deal, which is strategic for South Africa as an energy consumer, will see Block B2 operated by the state-owned Strategic Fuel Fund (SFF), the Ministry of Petroleum and Nilepet – the national oil company of the Republic of South Sudan. This is the second EPSA signed since South Sudan gained independence and shows progress for the country's oil



Longstanding oil installations are being revived across South Sudan.

industry as production resumes at existing oilfields and new exploration begins. Under this new EPSA, which includes a six-year exploration period, the SFF will launch with great prospectivity a comprehensive aero gravity survey exploration campaign, seismic acquisition and drilling wells. The SFF will invest in capacity building initiatives, training South Sudanese citizens, investing in social and community development projects, and ensuring empowerment of local content and women.

Ezekiel Lol Gatkuoth, minister of petroleum, said, "The petroleum resources of

Block B2 are vast. For South Sudan to reach its target of bringing back production levels of around 350,000 barrels of oil per day (bopd) and beyond, we need committed new entrants like the SFF."

At the time of the announcement, Jeff Radebe, South African energy minister, stated, "South Africa has supported peace and economic development in South Sudan since the country's independence and this is the continuation of long-term cooperation between both our countries and people. Investment is vital to guaranteeing the economic progress of South Sudan"

The B2 area includes productive parts of the Muglad Basin and is part of the 120,000 sq km Block B divided into three in 2012. There has been a lot of interest in the Block B acreages of South Sudan since Oranto Petroleum entered Block B3 in 2017. Much of the oil and gas blocks in South Sudan are yet to be fully explored and resources assessed.

Outside of Africa, South Sudan is interested in investment from other countries. In June, the Vice-President Taban Deng Gai led a South Sudanese delegation to the Saint Petersburg International Economic Forum, where he talked about investment opportunities and the need for stronger cooperation between Russia and South Sudan.

"With the resumption of peace and security, the government of the Republic of South Sudan has been especially active in attracting investment to the country. These efforts are proving successful: we have recently signed a second Exploration & Production Sharing Agreement for our biggest oil block last month, and are proud to have welcomed sizeable new entrants into our oil licenses over the past few years. We are proud to count Rosneft and other Russian energy companies as the partners of the rebuilding of South Sudan's economy and oil industry," he said. ♦

Image Credit: United To End Genocide/Flickr

PLANS IN THE PIPELINE FOR UGANDAN OIL DEVELOPMENT

Uganda is emerging from a decade of slow progress and uncertainty in regard to its crude oil discoveries, but with progress being made in regard to infrastructure, could a new period of optimism and activity be just around the corner? Georgia Lewis reports.

IT HAS BEEN more than 10 years since crude oil was discovered in Uganda and the road to commerciality has not been smooth. However, with progress being made, particularly in regard to essential infrastructure, the government is optimistic about the future of the petroleum industry in this landlocked east African country. The Ugandan oilfields, located near the border with the Democratic Republic of Congo, are jointly owned by Total, CNOOC and Tullow Oil, with licenses awarded between 2012 and 2016. Additionally, Armour Energy holds an exploration license over the Kanywataba block, issued in 2017, and Oranto Petroleum has two stratigraphic licenses over Ngassa shallow and deep plays.

In May, Uganda's energy minister Irene Muloni announced that it had agreed to pay a tariff of US\$12.77 per barrel to use a proposed pipeline which is slated to run via Tanzania, Uganda's neighbour to the south. The route for the 1,445km, US\$3.5bn electrically heated pipeline, outlined in 2016, would send oil to the Indian Ocean port of Tanga for export.

As well as the pipeline, Uganda signed a deal in April 2018 with a consortium to build and operate a refinery with a 60,000 bpd capacity. This is expected to be operational by 2023.

“Before any activity is considered in ecologically sensitive areas, an Environmental Social Impact Assessment will be undertaken”

Irene Muloni, Uganda's energy minister, is optimistic about Uganda's oil prospects.



Image Credit: UNIDO/Flickr

The expected date for the start of production is now 2022. It is expected that the first fields to go into commercial production will be Kingfisher, where CNOOC is the operator, and Tilenga, where CNOOC, Total and Tullow Oil are all stakeholders.

As well as the reserves near the DRC border, Ms Muloni said that traces of oil have been shown on preliminary surveys in a basin in the country's Karamoja region, located on the Kenyan border.

At the end of May, the second licensing round was announced, with a five-month bidding process. The round covers five blocks in the Albertine Graben. At the end of the bidding process, negotiations will commence with a view towards signing production sharing agreements between the government and the successful bidders. This round is expected to conclude with the award of petroleum exploration licenses by December 2020.

In her announcement, Ms Muloni raised

the issue of environmental concerns with the planned exploration projects. In a statement, she said: "It should be noted that some parts of the areas earmarked for licensing are in ecologically sensitive areas, such as Ngaji being in a National Park. However, before any activity is considered in any of these areas, an Environmental Social Impact Assessment (ESIA) will have to be undertaken to mitigate any likely impacts. It should further be noted that the exploration activities undertaken in other sensitive ecological areas such as Murchison Falls National Park have demonstrated a positive co-existence with wildlife activities."

At the Uganda International Oil & Gas Summit (UIOGS), which will be held in Kampala in September, a licensing bid round update will be held on the first day of the event. ♦

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SIERRA LEONE AIMS TO REVIVE OFFSHORE PROSPECTS

The Sierra Leonean exploration sector has been clouded in uncertainty for the past seven years, but a renewed licensing round could turn that around.
Georgia Lewis reports.

AFTER A FLURRY of exploration activity in 2012, followed by a licensing round which was suspended last year, the Sierra Leonean government is keen to revive offshore exploration in a bid to become a competitive, productive hydrocarbons nation. As such the fourth licensing round was reopened in May this year. The deadline for open tenders is 22 November 2019 and direct tender negotiations will close on 20 September 2019.

A new director general of Sierra Leone's petroleum directorate, Timothy Kabba was appointed in September last year and one of his first moves was to announce a six-month industry consultation in order to garner feedback from those involved in the fourth licensing round.

When the consultation ended in March, the government announced a raft of conclusions from what was described in a statement as "wide-ranging dialogue ... with a broad spectrum of high-quality international oil and gas companies".

The consultation found that companies recognise the proven nature of Sierra Leone's working hydrocarbons system, with a broad range of prospectivity across geographic locations, play types and water depths. It was acknowledged that prospectivity extends beyond the boundaries



The Sierra Leonean government is hoping for commercially viable offshore discoveries.

Image Credit: Adobe Stock/Fabian

of the area delineated in the fourth licensing round and the original tender process was no longer broad enough to explore as widely as the investors might like.

While there is significant interest in areas with water depths of more than 2,500 metres, the directorate has taken the view that the number of companies with the financial and technical capacity to operate safely in these areas is limited.

Access to high quality data has been put forward by the government as a drawcard for potential bidders, with the promise of a "world-class inventory of seismic, gravity, magnetic and well data and studies that is owned by the government." The Getech Group worked in conjunction with the Sierra Leonean government to provide extensive data, some of

which goes back as far as 1982, as well as more recent surveys.

CEO of the Getech Group, Jonathan Copus commented: "Having completed its consultation, the Petroleum Directorate has put in place a robust but flexible licensing framework that will assist investors in their evaluation of the significant potential of the Sierra Leone margin. We look forward to the successful outcome that facilitates the optimal exploration and development of Sierra Leone's petroleum resources for the long-term benefit of its people."

The re-opened licensing round has been restructured with the government fully opening the country's offshore waters for petroleum licensing with a more flexible block framework. The direct tender process is for bids where 50 per cent or more of the

application area is in water depths of more than 2,500 metres, while the open process is for all other applications.

"The reopening of the Fourth Licensing Round brings us to the cusp of a new era in Sierra Leone's oil and gas programme," said Mr Kabba when the licensing round was reopened. "We are confident that the flexibility delivered by this innovative flexible Block framework will foster a new dynamism in oil and gas exploration in the region – thereby increasing participation and demand from both major and independent oil companies. In this way we are setting a new pace in regional exploration activity, which also sets the stage for us to become the 'Gold Standard' for innovation and proficiency in oil and gas exploration and production." ♦

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AFRICA FINANCE CORPORATION BACKS MAJOR GHANA PROJECT

A deepwater project off the coast of Ghana will benefit from financing to the tune of US\$100 mn. This joint venture with the Africa Finance Corporation shows serious commitment to the growing Ghanaian oil and gas industry.

AFRICA FINANCE CORPORATION (AFC), a continent-wide infrastructure solutions provider, has financed Aker Energy by investing in US\$100 million of convertible bond notes with a commitment to participate in follow-on fundraising activities. The funds will be used by Aker Energy to finance the development of the Deepwater Tano Cape Three Points block (DWTCTP), a block off the coast of Ghana which contains multiple oil fields.

DWTCTP is owned and operated by joint venture partners with Aker Energy as the 50 per cent shareholder. Other partners in the joint venture include Lukoil (38 per cent), Fueltrade (2 per cent) and a 10 per cent carry for GNPC, Ghana's national oil company. The Pecan field, which is the most appraised in the block and the field to be developed in the first phase, is an oil field estimated to contain reserves of about 334 million barrels of oil.

This investment is aligned with AFC's overall natural resources strategy, which entails building a portfolio of value added assets across the Energy value chain. By taking an early equity financier role in operational or near-operational upstream assets, AFC can enhance the revenue potential of African states to generate revenue



A major Ghanaian project has received a boost of US\$100 mn.

required for investment in infrastructure and social services for its growing populations.

This investment also marks the beginning of AFC and Aker's mutually beneficial relationship in the exploration and production sector across the African continent; AFC will offer support to Aker, open new opportunities, and mitigate potential geopolitical risks. Aker, has a proven track record of delivering complex deep water projects on time and budget, along with its affiliates, such as Aker Solutions. It is seeking to broaden its partnerships with developers within the natural resources sector.

Ghana, which became an AFC

sovereign shareholder in 2018, having acceded to membership in 2011, will benefit from this project through increased revenue and government royalty and taxation income. The Deepwater Tano Cape Three Points field is one of the Ghana's principal hydrocarbon assets and is expected to contribute to Ghana's near term target of an annual production volume of 500,000 barrels of oil equivalent per day.

Samaila Zubairu, President & CEO of AFC, commented on the announcement: "This is an exciting milestone for Africa Finance Corporation – we have partnered with the subsidiary of one of the most highly respected international oil, gas and

industrials companies to support its first project in the African market as an operator. This is an opportunity for AFC to invest alongside a technically and financially strong sponsor that requires project development expertise and public sector advice in Africa, both of which AFC is ideally placed to offer."

Jan Arve Haugan, CEO of Aker Energy, added: "We value AFC's vote of confidence by collaborating with Aker Energy and the commitment to further strengthening this partnership going forward. We believe AFC will be a valuable partner to help Aker Energy navigate the opportunities and challenges that lies ahead of us." ♦

OPENING UP THE VALVES

Leading valves players are responding to rising demand along Africa's oil and gas value chains. Martin Clark finds out how some of the major players are succeeding in a competitive market.

VALVES PLAY AN integral role in many parts of the oil and gas value chain, from upstream production through to downstream operations. As such, it is a market that performs well when the industry is thriving.

Major players serving this industry niche include the likes of Flowserve, Cameron, Pentair, AVK Group and Emerson, which is almost synonymous with the valves market, across many parts of Africa. It is currently playing a role in the modernisation of a gas processing plant in Alrar on behalf of Algerian state oil company Sonatrach.

As part of the contract, Emerson – as main automation contractor – will combine its technologies, including speciality valves knowledge, to optimise production and improve the reliability and security of the plant's processes. That includes updating isolation valves, among

other specialist equipment.

The project also includes the engineering procurement, commissioning and testing of the new integrated control and safety systems, fire and gas systems, boosters and compressor controls, field instrumentation, liquid and gas metering skids, control and isolation valves, and other items for improved output, as well as reliability and safety.

"Sonatrach has long been a valued customer to Emerson," Mounir Taleb, vice president for measurement and analytical, Emerson Automation Solutions, Middle East and Africa, noted when announcing the US\$32m contract.

Emerson is working in partnership with Fores Engineering on the Alrar update.

There is certainly reason for all industry players to be positive about the near future. Flowserve Corporation, reporting its second quarter 2019 results on July 31,

said its bookings hit the highest quarterly level in over three years, with new awards across a range of end markets such as midstream pipeline, liquefied natural gas (LNG) and refinery regulation-driven upgrades.

One research report suggests that the oil and gas valves market will grow at a rate of more than three per cent per year over the next decade, rising from around US\$11bn in 2019 to nearly US\$16bn by the end of 2029. It states that 0.25 to 8 inch-sized oil and gas valves segment will swallow more than half of this market share.

It is certainly an acceleration on the past few years: the report (Oil & Gas Valves Market: Global Industry Analysis 2014–2018 and Opportunity Assessment 2019–2029 by Future Market Insights) says the market stood at US\$10bn in 2014, recording just incremental growth over the past five years. And Africa can expect

to take its share of this business, a growing market where competitors are keen to make an impression. That means investors are putting time and money in expanding local capabilities.

Genesis SG – a partnership between Genesis Oil & Gas Services and Severn Valve Solutions, a Severn Glocon Group company – is a valve engineering firm serving Ghana's rapidly-evolving energy market, which includes a buoyant offshore sector.

The company, which provides specialist valve management and repair services, is now expanding its workshop facility in Takoradi, reflecting an upbeat mood.

"Since Genesis SG was established in January 2018 it's made impressive progress," said its business development director Douglas Fulton. "Our valve services enable local operators to unlock better performance and reliability." ♦

A busy time across multiple oil and gas markets in Africa is a boon to the valves sector.

REDUCING BUNKERING UNCERTAINTY WITH ACCURATE MEASUREMENT

Tariq Boussouara, project engineer at TÜV SÜD National Engineering Laboratory, discusses the importance of good measurement accuracy when storing liquids in bunkers.

GOOD MEASUREMENT ACCURACY in the fuel bunkering industry is vital due to the sheer volume and value of fluid in bulk storage tanks worldwide. For example, 49.8 million tonnes of fuel was stored in the port of Singapore alone for 2018.

Determining the volume or mass of liquid in a storage tank is achieved through tank gauging, which is required for assessing tank contents, inventory control and tank farm management.

The available tank-gauging techniques includes: manual gauging; float and tape gauges; servo gauges; radar gauges; and hydrostatic tank gauges.

Hybrid methods combine modern level gauging techniques with hydrostatic tank gauging, using a radar or servo level gauge for accurate level measurement. Depending on the gauging technique used, each will have a different measurement uncertainty.

Uncertainty is the degree of doubt about a measurement, and accounting for all the uncertainties in tank volume or mass measurement is very important, especially when custody transfer of fluids is taking place. In addition to level measurement, there are several other sources of uncertainty in the measurement of mass or volume of product in a tank. These can include:



Getting smart about storage means accurate measurement.

Image Credit: Adobe Stock/VanderWolf Images

1. Tank capacity tables

Tank deformation over time requires recalibration every five to 10 years, creating tank capacity tables for which uncertainties must be accounted for.

2. Temperature stratification

Temperature differences in a tank could lead to stratified layers of liquid with different densities.

3. Shell thermal expansion

Tank capacity may change due to thermal expansion and could deform.

4. Environmental effects

The wind blowing on the surface of the tank can cause temporary changes to measurement levels.

5. Roof weight

When the roof weight or position of floating tanks changes, product level will too.

6. Mass flow meters (MFMs)

These have been brought into service to measure fluid in storage tanks, which introduces a different set of uncertainties.

The sources of uncertainty in the measurement of mass or volume described above, are

normally combined to give an uncertainty value (quoted to a 95 per cent confidence level). Clearly identifying each source of uncertainty is the first step in reducing the overall uncertainty for the bunkering process. Also, tank farm operators normally check the mass or volume that is stored in their tanks against a bill of lading from the tanker delivery, as these two figures should normally be within 0.5 percent of each other. Using live uncertainty tables would make this type of comparison more realistic, and ultimately help operators track down the largest sources of error. ♦

AFRICA'S OIL AND GAS INDUSTRY'S GENERATION RENT

Equipment rental firms are thriving on the back of West Africa's oil industry. Martin Clark looks at how this often more cost-effective option is working for operators.

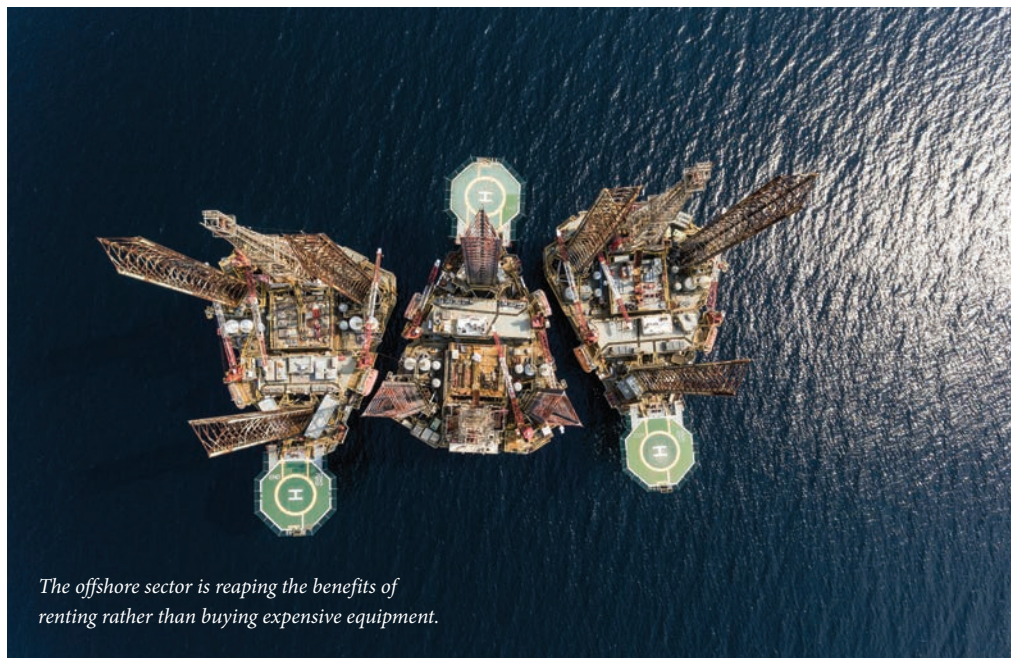
EQUIPMENT RENTAL IS part and parcel of the energy business: why buy high-cost kit when you only need it for a short time or you need it available immediately?

When time and budget are always of primary concern for big projects and the option to rent products off-the-shelf provides an instant solution with minimum capital exposure, it makes perfect sense.

It is an area in which many of the oilfield service industry's most familiar names, the likes of Atlas Copco, are highly active. Its fleet of industrial rental compressors, generators and complementary equipment covers every application, from upstream through to downstream.

But in challenging markets like Africa, it is often logistics specialists that are in most demand, providing the link in getting rental equipment to where it is needed fast. In strategic oil and gas territories like Nigeria and Angola, numerous oilfield service companies have exploited this niche to a tee.

Swire Oilfield Services, has been operating across sub-Saharan Africa for almost 20 years. It supplies various logistics solutions across West Africa. It has a base in Nigeria, but is also active in Angola, Ghana, Côte



The offshore sector is reaping the benefits of renting rather than buying expensive equipment.

Image Credit: Adobe Stock/Jam

d'Ivoire, Cameroon, Congo and Gabon.

In the past few decades, there's no doubt the rentals market has prospered on the back of West Africa's oil boom.

Nigeria's flagship Onne oil and gas free zone, near Port Harcourt is now a bustling centre for all kinds of equipment rentals, logistics and other related services. The complex helps international firms implement their projects and reduce costs for cargo handling, equipment, shipping and paperwork processing.

It has allowed operators to fast-track upstream work in a

country plagued by bureaucracy. Major operators like Shell and Total rent vast tracts of storage space and other facilities, while there is a multitude of equipment for hire, from tug boats to rigs. The trend is likewise mirrored in other parts of Africa.

Tiger Offshore Rentals expanded its position as a leading provider of offshore rentals in the North African and Mediterranean region after acquiring Comea Impianti Industriali's fleet of DNV certified offshore cargo carrying units. The company is a leading global provider of transportation and storage equipment to the

offshore industry.

And the emergence of other oil territories in southern and eastern Africa, such as Mozambique, Tanzania and Uganda, bodes well for rentals growth, from the provision of specialist parts and equipment through to transportation services and logistics.

Given the high cost of some of the projects on the drawing board in these countries including ground-breaking floating liquefied natural gas schemes and at a time when operators are seeking to stick to tight budgets, there is growing support for the rental model. ♦

GETTING HAND PROTECTION RIGHT FOR SAFE WORKPLACES

Investing in the right hand protection helps prevent serious injuries and saves money in the long term. Oil and gas operators should view hand protection as being as critical as head protection with hard hats and foot protection with appropriate footwear.

AROUND THE WORLD, it is common to see the wrong gloves in the wrong working environment, such as basic nylon gloves when cut-protection gloves should be worn. Often this results from a company cutting cost at the expense of workers, or workers not being properly educated by the safety managers, and because gloves are frequently not seen as the most important protective wear compared to, say, hard hats and shoes.

This is clearly a misguided approach since according to the U.S. Bureau of Labor Statistics nearly 20 per cent of workplace injuries involve cuts and lacerations to the hand and fingers. Hand injuries occur frequently and can be most severe – in terms of lost working days they are considered only less important than back strains and sprains. A National Safety Council study in the U.S. reports that the cost of just one disabling hand or finger injury ranges from \$540 to \$26,000 per patient, while cost of serious upward extremity trauma can average at \$730,000 per patient.

In spite of this, people are still frequently wearing the wrong gloves, often because gloves are considered the lowest in the spectrum of safety gear they are always under the radar. The US Bureau of Labor Statistics reports that more than 70 per



The right safety gloves can prevent traumatic hand injuries.

cent of workers experiencing hand injuries were not wearing gloves at the time, and the remaining 30 per cent of injured workers were not wearing the right type of glove.

A good example is the impact protection glove market where thermalplastic elastomer (TPE), otherwise known as thermalplastic rubber (TPR) is an excellent choice for impact pads for its comfort and wearability, ensuring that users keep their gloves on and keep working longer, better and safer.

TPE/TPR is excellent for impact protection but is expensive compared to cheaper,

lower performing PVC as used in extreme low-cost items where the result is some 20-30 per cent cheaper to make, but the trade-offs are that the PVC material is hard, hence increases hand fatigue and when PVC ages, it tends to become brittle and breaks easily.

Additionally, it is less flexible and sometimes results in injury after long hours of wearing.

The impact protection pads adhered to the gloves can determine the quality and longevity of impact gloves. For example, sewn-on pads may appear secure but they will come off easily if the material of the

pad is brittle, allowing the pad to break off very easily – a situation aggravated if the gloves are laundered with the PVC being degraded in the process.

Aquila has developed a new approach to cut glove manufacturing with its pioneering spiral wrap (or yarn wrapping) technology, which is more effective and cheaper over their lifetime than other methods, particularly as the gloves are washable. Ultimately a better cut yarn means a better glove, better cut resistance, better working and lower costs. ♦

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COMBINING GLOBAL EXPERTISE WITH LOCAL RESOURCES

As the world leader in premium tubular solutions, Vallourec serves energy markets across Africa thanks to an extensive presence. This year marks the 10th anniversary of its industrial establishment in Nigeria.

WITH 19,000 EMPLOYEES working across 20 countries, Vallourec boasts a truly global reach. The group has endeavored to develop business and local operations throughout Africa, supporting oil and gas and energy projects with its industry-leading experience and know-how. Vallourec believes in building long-lasting partnerships and in sharing expertise locally. Its sales offices, threading facilities, support and services hubs, yard management and field service facilities are present in nearly every major market on the continent.

All over Africa, Vallourec delivers its full scope of OCTG products, offshore and onshore line-pipe and hydrocarbon processing, with a broad range of services leveraged by the latest digital technologies. Drawing on production hubs in Europe, Brazil and China, it offers a comprehensive range of seamless products for drilling and well equipment. It has actively developed competitive supply routes via its mills in China, Brazil and Europe. As a result, Vallourec can provide all products, from contingency to premium VAM connections at competitive prices.

Producing more than two million barrels of oil per day in 2018, Nigeria is the largest oil producer in Africa. Vallourec



Vallourec is leading the way across multiple African markets.

Image Credit: Vallourec

“Our rig running supervision means that pipe handling operations on the rig comply with best practices in terms of HSE requirements”
- Justin Body, VAM Field Service manager

Nigeria, operating in the Onne Free Zone, is celebrating the 10-year anniversary of its threading mill at Port Harcourt, Nigeria this year. The mill employs a workforce of around 70 Nigerian trained staff and provides local OCTG threading as well as line pipe finishing operations. The industrial operations and sales activities are certified by the Nigerian Content Development and Monitoring Board and recognised by the major oil and

gas operators. In Nigeria, local experts also provide tubular yard management and field services both on and offshore, enhanced by state-of-the-art digital technologies and tools.

“Ever since setting up our offices here, we’ve created close relations with our Nigerian customers and been committed to the development of the local expertise and workforce,” says Augustin Irabor, OCTG Commercial Director, Nigeria.

Vallourec in Nigeria recently signed its first Tubular Management Services (TMS) contract to support offshore operations by a Nigerian oil company in addition to OCTG casing, tubing and accessories.

“Our TMS offer provides real value,” says Justin Body, VAM Field Service manager. “Our customers can be confident that they will have the right products in the right place at the right time. Our rig running supervision means that pipe handling operations on the rig will comply with best practices in terms of HSE requirements, reducing risk and saving time and money.”

In an ever-changing and increasingly competitive market environment, Vallourec aims to address new challenges to consolidate its technological leadership. Its Vallourec.smart range of solutions combines both physical and digital services to support customers along every step of the supply chain process.

“It’s a collaborative, client-focused framework that ensures full traceability, integrity and asset management,” explains Eugène Fogli, Vallourec’s Country Manager for Nigeria. “Thanks to Vallourec.smart, we’re seeing growing demand. We’re strengthening our footprint throughout Africa to meet our customers’ expectations and provide the best solutions for their most complex projects.” ♦

GROWING ACTIVITY OFFSHORE BOOSTS DEMAND FOR COMPRESSORS



BP's Greater Tortue Ahmeyim FLNG plant, located off the coast of Senegal and Mauritania, is using new technology.

The overall oil and gas industry uptick bodes well for the compressors market and Africa is no exception. Ghana, Mozambique, Egypt, Senegal and Mauritania in particular are providing myriad opportunities. Martin Clark reports.

MAJOR PLAYERS IN the global compressors market are set to reap the benefits in the renaissance of Africa's offshore industry, with Ghana and Mozambique proving to be particularly fertile ground. The market for compressors in Africa spans a host of industry sectors, though oil and gas is integral, along with the power industry.

According to one recent market research report, the Africa and Middle East compressor market combined is forecast to reach US\$3.9 billion by 2023, a figure that also includes demand from other areas such as mining and construction, as well as energy.

Leading players such as Atlas Copco, Ingersoll Rand, Sulzer and Wuxi Compressor, as well as industry heavyweights Siemens

and BHGE, are monitoring developments closely. Last year, Atlas Copco reported orders, revenues and profits at all-time highs, a sure sign that prospects are on the up; it prompted a wave of acquisitions, another feelgood barometer.

Another industry player, Burckhardt Compression said its total order intake rose sharply in 2018 too, a hike of over 25 per cent on the previous year. It noted in May that it expected the general environment in its key markets "to remain positive" as customers maintain "high levels" of capital expenditure.

The research report, published by P&S Intelligence, notes that rotary compressors are one of the emerging trends across the combined Africa and Middle East regional market, especially in industries such as oil and gas,

mining and construction. As well as new business, the market for replacement compressors has also been evident on existing projects.

But it is a number of big new investments that underscore the general rise in optimism.

BHGE landed the project to provide the technology for four offshore gas liquefaction compressor trains at BP's Greater Tortue Ahmeyim FLNG plant offshore Mauritania and Senegal.

Each of the four trains will consist of a PGT25+G4 aeroderivative gas turbine driving a centrifugal compressor, to be manufactured in Italy.

BHGE is also expanding its local Angola footprint, investing in additional capabilities in turbo-machinery, process solutions and compression technology, among other areas.

Any increase in oil prices is also likely to make an impact on investment, including onshore projects. In Egypt, SDX Energy said it was gearing up for first production at its South Disouq field this year with the anticipated arrival of a compressor from its US manufacturing site this August.

As the industry emerges from the recent downturn, exploration and production companies are chasing the rewards of higher oil prices by accelerating the sanctioning of new projects, noted Rystad Energy analyst Taiyab Zain Shariff.

"Africa appears to be emerging from a long hibernation in terms of oil and gas exploration activities."

It opens up potential for service companies across the board, including the compressors market. ♦

THE CHALLENGES OF ACCURATE INTERFACE MEASUREMENT

While level measurement technologies have come a long way, multiphase level measurement continues to be a big challenge for technological development, but experience has shown that process optimisation and increased uptime can be achieved in many separator applications.

THE NEED FOR reliable interface measurement arises whenever immiscible liquids, those incapable of mixing, reside within the same vessel. The lighter medium rises to the top and the heavier settles at the bottom. In oil production, for example, water or steam is used to extract oil from a well. Well fluids then route to production separators where they settle into their primary constituents as a hydrocarbon over water interface.

Interfaces can form between liquids and solids, liquid and foam, and liquid and gas; but the emphasis here will be concentrated on liquid/liquid interface. Immiscible liquids meet along an interface layer where they undergo some amount of emulsification. This emulsion or “rag” layer may form a narrow, distinct boundary, but more frequently it is a broader gradient of the mixed liquids. Generally, the thicker the emulsion layer, the greater the measurement challenge.

If there is water in oil that is not separated effectively (water carryover), then this can induce processing problems, equipment failures and unplanned shutdowns. If there is oil in water, then there can be production loss, environmental fines, penalties and forced shutdowns.

Of all the level switches and transmitters available, only a



Image Credit: Adobe Stock/pictstocker

There is room for further technical development in oil and gas measurement technology.

handful are suitable for reliable interface measurement. The leading interface measurement technologies include guided wave radar (GWR), buoyancy-based displacers and magnetostrictive, RF capacitance, nuclear/ gamma radiation and thermal dispersion. Ideally, the technology utilised for interface applications does not have to differ from other level instruments installed at the facility in order to maintain familiarity with users. Standardising on a technology helps reduce training, installation & commissioning, maintenance and downtime.

Differential pressure (DP) is still the most widely used level measurement technology. However, DP is not a preferred technology for interface measurement. Extensive calibration is required along with assumptions that density and total level are constant.

Utilising this technology

typically results in one inferred interface measurement near the middle of the emulsion layer as opposed to total level and interface measurement. Variation in the thickness of the emulsion layer affects density, and can therefore induce significant inaccuracy.

The second most preferred technology as a percent of all instruments and applications is GWR. The ability to use GWR for total level and interface applications greatly increases user familiarity, allowing the tech to be applied correctly while decreasing training and commissioning time.

Magnetostrictive technology is based upon buoyancy principles, therefore specific gravity-related drawbacks exist, but it has advantages particularly in applications with large or swelling emulsion layers.

Consideration must be taken for solids buildup, such as

paraffin or asphaltene adhesion, due to moving parts.

Other interface technologies, such as displacers (mechanical) and RF capacitance, are preferred by only 12.6 per cent and 8.2 per cent of respondents respectively in one-third of their applications. Heavy oils may present major inaccuracies when coating probes or building up on floats, which can increase maintenance intervals. However, there is a comfort level with these technologies. There are numerous interface applications that potentially produce an emulsion layer. Having a reliable level measurement will help optimise processes while increasing uptime. The following are applications and case studies highlighting the challenges faced for level technologies and the importance of this measurement.

It should be noted that no matter the technology, optimal installation conditions will assist in maximising device performance. For instance, when inlet crude oil from a well enters a separator, retention time may be the most important factor to allow for the desired instrumentation performance, and therefore, process optimisation. ♦

This is an extract from a Magnetrol whitepaper. To download the full paper, go to www.interface.magnetrol.com

A GUIDE TO FIELD-PROVEN SUBSEA CT SCANNERS

Maintaining subsea pipelines is an essential task for oil and gas operators. Ensuring safe offshore operations to compliance with legal regulations, the importance of subsea pipeline upkeep cannot be understated.

IT IS IMPORTANT that the equipment used in flow assurance processes is accurate and reliable, able to find pipeline integrity issues quickly as well as calculate wall thickness to a high degree of accuracy. All of this must be obtained with minimal disruption to the pipelines in operation.

There are many issues which present challenges for pipeline inspectors, and if the challenges are not met, there can be costly consequences for operators.

It isn't always possible to carry out regular in-line inspections of subsea pipelines, and this is one of the biggest

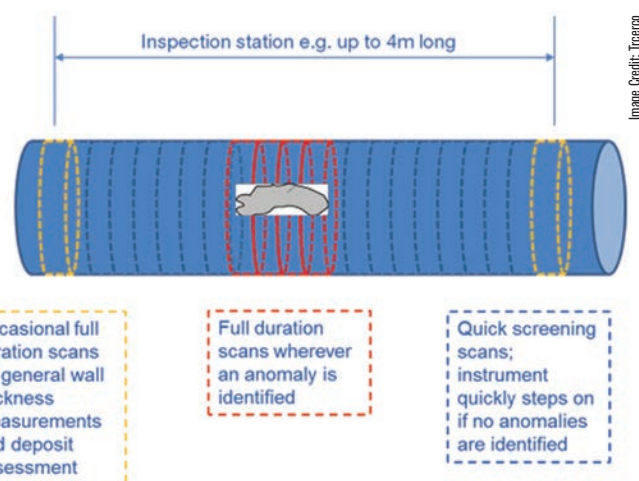
culprits of poor maintenance.

In this instance, operators may fall back on 'hotspot' inspections in localised areas. From this, more inspections can be carried out but it isn't efficient nor cost-effective to do this.

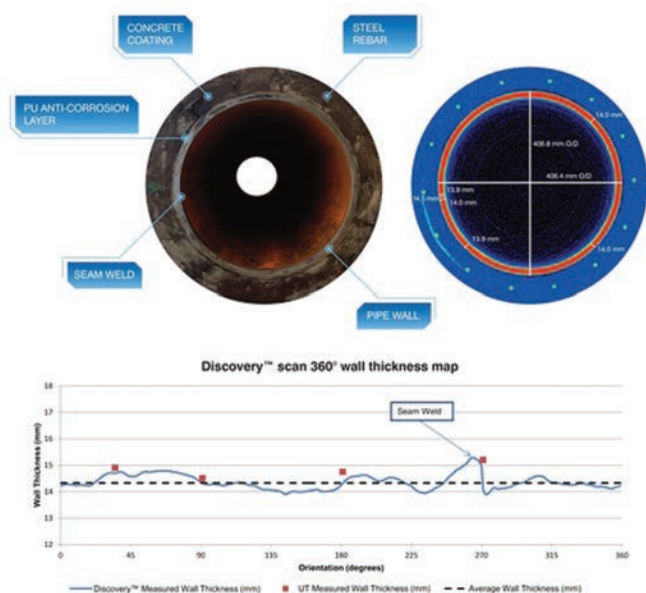
By using a field-proven subsea CT scanner, operators can eliminate the need for these hotspot inspections.

Instead, the software can find defects and inform the operator whether or not these issues are impacting the pipeline enough to push it out of its specified tolerance.

With these issues accounted



A diagram illustrating the multiple benefits of CT scanners.



CT scanners give greater visibility with less intrusion.

for, operators can then undertake a more detailed scan of that area, rather than extending the scanning scope blindly after hotspot inspections.

Powerful scanning technologies, however, can be transformative for operators.

One of the biggest advantages of field-proven subsea CT scanners is its ability to use non-intrusive scanning methods which can penetrate any pipeline coating or covering.

For example, one such subsea pipeline inspection scanner, Discovery, can scan for wall thickness in a number of different pipeline systems, from risers, piggyback lines, and pipe-in-pipe.

A further benefit of using

field-proven subsea CT scanners such as Discovery is that the system's technology is already proven and reputable, through recognition accredited by maritime classification society Lloyd's. For example, with over 2,000 scans and numerous accurate readings and findings in its repertoire, this scanner can surely help operators in the industry the world over.

Not only does implementing such a scanner help save time, it also helps financially operators could see savings of up to one-third on inspection campaigns by using a more accurate method than traditional scanning or hotspot inspections. ♦

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THE INVISIBLE WALL PROTECTING ESSENTIAL INFRASTRUCTURE

Access to oil is crucial. Protecting the pipelines that hold and distribute this essential resource should be at the forefront of any national agenda, yet security teams do not always have access to the right tools to do so efficiently. Neil Hendry, vice president EMEA, Digital Barriers, writes.

P HYSICAL THREATS TOWARDS oil pipelines are a constant concern for the security operators in charge of safeguarding them. Outside of environmental hazards, threats towards these forms of critical national infrastructure (CNI) include disruptive actions from activists, terrorists, and general trespassers alike, all of which risk causing severe damage and disruption.

Whilst the pipelines themselves rest deep under our feet, their control stations containing features essential to the functioning of the station such as compressors, valves and turbines are all situated above ground for all to see and access. The control centres work hard to keep oil moving efficiently and safely to its various destinations – any disruption to this flow will have severe consequences for both national and global oil distribution and consequently the political economy surrounding it.

To protect essential CNI, such as oil pipelines, sophisticated intrusion-detection systems able to provide security operators with quick and accurate information directly from the scene is required. An effective intrusion-detection system should be able to scrutinise events thoroughly for an enhanced interpretation of suspicious activity, whilst ignoring false alarms such as moving foliage and shadows,



Image Credit: Adobe Stock/silents88

Pipeline security has moved into the virtual world with more sophisticated systems.

which can be costly and consumes valuable working hours. To be effective, such a system needs to be able to fulfil three essential tasks: detection, defence, and deterrence. Many systems on the market today have the ability to do one or two of these tasks, but rarely all of them. An effective security solution for protecting CNI requires the earliest possible detection of intrusion, allowing personnel sufficient time to respond before severe disruption has a chance to take place.

An invisible 'digital wall' around the critical perimeter offers security operators the kind

of advanced situational awareness needed, enabling them to be much more proactive in detecting and acting on intrusion alerts. These digital walls were developed specifically with remote security assurance in mind – their autonomous and wireless ground sensors networks can work independently for long periods of time using their own power source, and can even fix issues themselves to some degree when need be.

These protective digital walls use sensors with a low-profile design, making them easy and quick to deploy and set up – even

in the most remote areas where other helpful deterrents such as acoustic alarms can also be deployed to keep intruders away until response teams arrive. Supported with a real-time video stream from the scene directly to security operators, the solution provides advanced situational awareness significantly raising levels of security. Being originally deployed for war zone deployment, this live-streaming works regardless of what communications infrastructure is put in place at the location, rounding-up the total perimeter security solution designed to protect what matters. ♦

NEW PARTNERSHIP FOR GAS PIPELINE STUDY FOR SENEGAL

A partnership between Penspen and MJMEnergy is set to undertake an important study for a gas-to-power project which could transform Senegal. The results of the technical investigations will be instrumental in shaping this major project.

SIGNIFICANT OFFSHORE OIL and gas discoveries have transformed the energy outlook in Senegal and the country is now undertaking a major domestic project to bring the benefit of this natural resource to its citizens.

To this end, Penspen has partnered with MJMEnergy, a gas and energy consultancy, for the gas-to-power study early development phase in Senegal. Penspen will be providing the main technical services for the sizing and routing of the pipeline network options, as well as cost estimating.

The integrated MJMEnergy and Penspen team will work closely with the Senegalese government to support the overall development of its gas-to-power strategy. The contract has been awarded by the International Finance Corporation, part of the World Bank, in association with the Senegalese Ministry of Petroleum and Energy.

Penspen will undertake technical investigations of the natural gas network scenarios for connecting potential gas consumers with new gas supplies. It will also provide a conceptual design for the gas network infrastructure, a cost estimate and schedule for developing the network, and risk assessments for the design, land access,



Image Credit: Adobe Stock/Erwin Barthe

A gas-to-power project, using the latest technology, could be transformative across Senegal.

construction, operation, environmental, social and

“This important project is a significant milestone for providing competitive, clean energy to the people of Senegal”

technical aspects.

MJMEnergy will define the gas markets, economic and financial aspects of the project, and develop the institutional framework and business requirements for the new, public-private gas network company required to build, own and operate the network. This scope of work is to focus on defining the objectives and business plan of the new enterprise, as well as its strategy, including the gas market and regulatory requirements, a SWOT analysis and pro forma

financial statements.

Peter O'Sullivan, Penspen's CEO said: “We are pleased to be contributing to the development of Senegal's domestic gas sector. This important project is a significant milestone for the country in providing access to competitive and clean supplies of energy to its people. We look forward to using our deep technical experience to help Senegal maximise the benefit from the natural gas it has discovered within its territorial waters.” 🔥

FIVE BENEFITS OF DIGITAL SEISMIC DATA ACQUISITION

It has been 20 years since digital seismic sensors based on microelectromechanical systems (MEMS) accelerometers were launched, replacing analogue. Here are five drivers behind the migration from analogue to digital technology. By Nicolas Tellier, chief geophysicist, Sercel.

1. Digital fidelity

While the response of geophones is damped below their natural frequency and distorted above their spurious frequency, MEMS sensors offer linear and flat amplitude and phase responses from DC to 800 Hz in the acceleration domain. Their specifications are not affected by temperature, ageing or manufacturing tolerances, making the signal recorded accurate in phase and amplitude on the entire seismic bandwidth of interest. The preservation of amplitudes has been recognised for amplitude versus offset applications. The coil-free design makes the sensor insensitive to electromagnetic noise, and the sensor distortion is much lower than that of geophones.

2. Low noise floor and low-frequency performance

Much progress has been made in lowering the noise floor of MEMS sensors, improving the detection of low frequencies and weak signals such as those that come from faraway targets or from micro-seismic events. The latest devices have been developed to reach a target specification of $15\text{ng}/\sqrt{\text{Hz}}$ through a variety of techniques linked to mitigation of all internal electronic and mechanical noise sources without any increase in power consumption.



African operators can reduce costs with MEMS technology.

3. 3C recording and vector fidelity

3C acquisition has a proven track record of success in complex geologies. From an operational perspective, the 3C MEMS channel is omni-tilt and compact, and removes potential errors when connecting geophones to three digitisers. The same sensor can be used for the three components, while geophones must be compensated for gravity when operated horizontally. The MEMS tiny size allows for a small housing form-factor, thus enabling an efficient rejection of parasitic signals, such as ground-roll induced rotations. The compactness of the 3C sensor also favours optimal coupling to the ground – a paramount factor for the proper recording of horizontal components.

Another benefit of 3C MEMS is the excellent vector fidelity it provides to seismic

measurements. Good MEMS accelerometers are fitted with a feedback loop that enables the measurement of static signals, such as the Earth's gravity. 3C MEMS sensors can be factory-calibrated by using an accurate gravitational acceleration reference, and consequently, the manufacturing orthogonality tolerances of the three axes can be compensated for.

4. Cost savings

Historically, it has always been considered that a configuration of MEMS-based digital sensor units is more expensive than a field digitising unit connected to a string of geophones, mainly due to the higher density required. However, over time, the seismic industry has started to take a more holistic approach to the cost of seismic sensors, with greater recognition of the difference between capital

expenditure for equipment and operational expenditure.

The smaller physical size of MEMS-based sensors provides many operational benefits. For geophone strings, a lot of effort is required to transport, deploy, retrieve, maintain and repair large quantities of equipment – in addition to the staff needed for these tasks and the subsequent logistics such as accommodation and transportation. The use of MEMS-based digital sensor units, on the other hand, provides savings in each of these areas.

5. Lower power

The steady growth in popularity of MEMS-based devices has also delivered manufacturing economies of scale, which has in turn driven down the price. Also, a single sensor's power consumption has been reduced to 85mW, which is providing costs benefits for large-scale, high-density deployments.

These benefits have seen MEMS-based sensors start to break down barriers and achieve greater market acceptance. After almost 20 years on the market, digital sensors have proven their technical and geophysical effectiveness for seismic applications, leading to the introduction of recorders that have been fully optimised for seismic land operations. ♦

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ANGOLA	4	4	5	5
CÔTE D'IVOIRE	0	1	1	0
EQUATORIAL GUINEA	0	0	0	0
GABON	4	3	6	6
GHANA	0	1	3	3
KENYA	9	9	7	7
MAURITANIA	0	0	2	2
MOZAMBIQUE	1	1	0	0
NIGERIA	14	13	14	14
SENEGAL	0	0	0	0

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Modular solution for ready-to-go power plants

THE WÄRTSILÄ MODULAR Block power plant solution is a pre-fabricated, modularly configured, and expandable enclosure for Wärtsilä medium-speed 34SG gas engine generators. Aside from the gas engine generator, the Wärtsilä Modular Block concept's enclosure incorporates engine-specific auxiliary units. The solution enables to reduce the on-site installation time from several months to a few weeks, depending on the full scope of supply. Medium-speed engine technology has higher efficiency and lower lifecycle costs than containerised high-speed engines or gas turbine solutions.

The block can be offered as a full engineering, EPC project. The solution is easily expandable to accommodate increased energy demand, and to respond to fast-growing customer business needs. The concept enables dismantling and relocation, meaning it also offers new business models, such as power as a service or rentals.

It is easy to integrate with renewable energy and storage systems. It provides grid stability and balancing when integrating renewable energy sources with intermittent production. The flexibility enables timely expansion with minimal front-end investments, or relocation to accommodate changing requirements. This, combined with the high efficiency, the minimised on-site installation time, and its configurability with external systems makes it an excellent solution for many power generation enterprises.

www.wartsila.com

Mobile app for configuring radar level transmitters aid accurate tank measurement

EMERSON HAS INTRODUCED the Radar Master app for the AMS Trex Device Communicator, to help field technicians to better configure Rosemount radar level transmitters. Radar level devices help deliver accurate, reliable measurements on liquid and solid materials. This app allows users to easily bring the radar configuration tools of Radar Master software to the field.

The compact design of the AMS Trex communicator has been designed for working in the small, and often hazardous, environment of a tank. One-handed operation, NFC-enabled user security, and intrinsic safety ratings enable technicians to work safely and effectively in these difficult areas.

Users can track, view, and



Image Credit: Emerson

Apps are the way forward for many industry tasks, such as measurement.

trend tank level and alert information to identify issues and troubleshoot by using the new built-in historian. Technicians can view and compare snapshots of past configuration data in a timeline, giving better insight to operational impact of changes.

Every configuration change made in the field is automatically

recorded and time-stamped, providing an automated audit trail. Changes are updated to the AMS Device Manager database whenever the AMS Trex device detects a WiFi signal or USB connection to ensure accuracy and measurement data integrity.

www.emerson.com/Trex

Human-Machine Interface (HMI) to provide a complete gas and hazard visibility solution

CROWCON HAS DEVELOPED an HMI solution that creates complete system visibility. The solution can run alongside existing systems or mimic panels which are used to monitor wider

system views, often incorporating other sensors including security, flow, smoke and fire.

Crowcon's product manager William Allum explains, "This solution enables our customers to

view data from multiple panels from one central screen. Due to the system having the ability to store alarm and event logs, users can quickly understand the symptoms of a problem as they view the information and identify the exact location.

Vortex & Gasmaster HMI employs license activated software operated from a dedicated touchscreen panel. As the system is modular, users specify the required number of input converters to link the number of controllers in their system. It monitors up to six Vortex panels or racks, or up to 10 Gasmaster controllers operating on one system, so either Vortex or Gasmaster."



Image Credit: Crowcon

Detecting hazards can be simplified with a simple, visible system.

www.crowcon.com

INTEGRITY AND SECURITY THREATS: PROTECTING PIPELINES

Pipeline security is an ongoing concern for many African operators. Stuart Large, product director and business solutions, at Fotech Solutions, discusses how to protect pipelines from integrity and security threats.

To what extent are security threats a concern?

By their nature, pipelines might be considered as soft targets. By planting a device close to the pipeline, or drilling into the side of it, it would be possible to cause substantial damage and disruption through an explosion, spillage or prevention of flow.

It's difficult to provide full protection for a pipeline using traditional techniques such as patrols or cameras, because the pipelines are so long and often travel through challenging and remote terrain. Those wishing to do harm to a pipeline can pick a section that is out of sight and can wait for line-walkers to pass before going about their work.

If the intent is to steal product from the pipeline, thought needs to be given to how the product will be transported and taken to market. But if the intention is simply to cause destruction, then that opens more opportunities to criminals and greater chances of success.

What are the main threats to pipeline security and integrity?

Pipelines are potentially exposed to the threats of terrorism, theft by hot-tapping, accidental damage from things like excavators, or geotechnical activity such as landslides. There has been news recently of drone attacks on critical Saudi pipeline infrastructure, with pipelines actually being shut down. Such attacks create wider issues for the global oil industry and cause a spike in global oil prices. This incident shows that other pipeline assets within the region are at risk from similar attacks.

What measures can pipeline operators take to protect their pipelines against such threats?

Operators need to apply technology such as



Pipeline security, especially in remote locations with increased vulnerability, is essential.

Image Credit: Adobe Stock/element88

DAS which can monitor pipelines covertly. Disturbances from criminals walking, digging or operating vehicles near the pipeline will be detected and located by an unseen fibre optic sensor. The activity will be categorised and raised as an alarm with a precise time and set of coordinates, so the security team can rapidly decide on the best course of action and seek to prevent damage to the pipeline.

Using a fibre optic cable laid alongside the pipeline, DAS technology will detect threats to the pipeline and raise alarms. It can be integrated with other aspects of the security system, which might include cameras, personnel response, or drones. They can be directed immediately to a very precise location, accurate to within 10m, to give the best chance of identifying the perpetrators.

Are there any case studies you would like to highlight?

Fotech Helios DAS sensors are protecting many assets in the region and elsewhere around the world. For example, with recent installations included, more than 5,000km of

pipelines are protected using our technology in India. In one example on a 72km pipeline, 26 hot tap attempts were detected and prevented in only six months. The success lies in the ability to detect disturbances at the earliest possible stage, raising an alarm and being able to provide actionable information for operators immediately before incidents become full-blown disasters.

One particular case involved a tunnel being dug into from a nearby building with an attempt to rupture a buried pipeline. A combination of two monitoring technologies, Fotech's LivePIPE and a mass balance system were able to detect this activity. This is because they worked in conjunction to identify both a loss of product within the pipes whilst identifying the tunnelers digging. Through cross referencing the data, operators were able to identify the rupture attempt to a region of 10m, and the security team could act accordingly. ♦

www.fotech.com

Tolmann Allied Services Company Limited



Chevron & Napims team paid an inspection visit at Tolmann Facility to ascertain standards for the delivery of BOSIET training.

Tolmann Allied Services introduced the OPITO DIGITAL DELIVERY BOSIET at the Offshore Technology Conference (OTC) 2019 in Houston, Texas where various industry executives meet to explore how companies are preparing for the brave new world of digitalization, automation and machine learning. Our vision is to make Basic Offshore training accessible to all through time management, digital accessibility and cost effectiveness.

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