

Oil Review

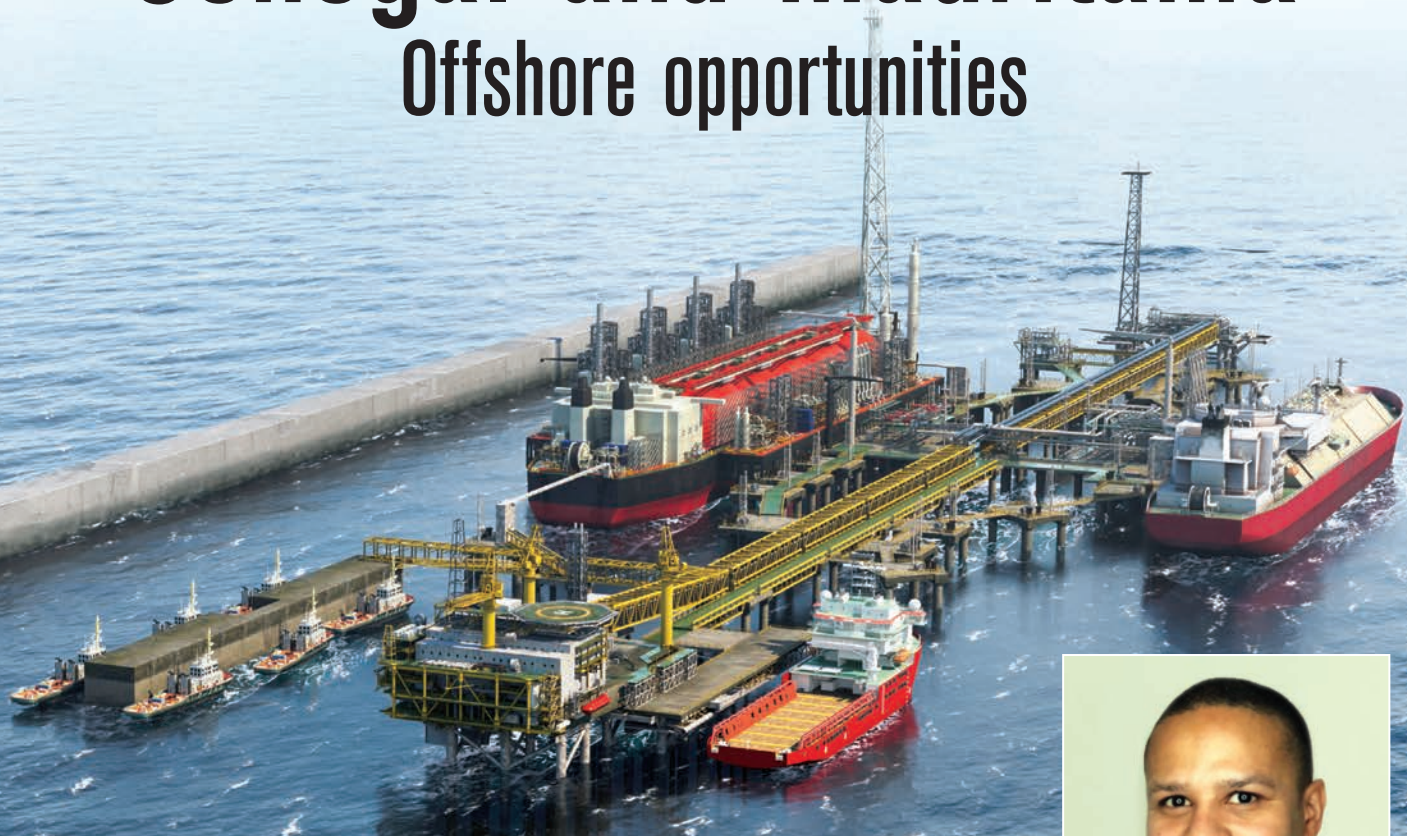
Oil · Gas · Petrochemicals

Africa

VOLUME 14 | ISSUE 3 2019

Senegal and Mauritania

Offshore opportunities



Country updates: Angola's re-emergence as a major player plus new projects for the Gulf of Guinea

News and views from across the continent at the Africa E&P Summit

Geoscience, training, shallow drilling, pipeline construction and process automation



Sergio Pugliese,
AEC president for Angola (p34)

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L-R: Engr. Umar Moriki (Asst. Director, DPR);
Engr. Ebi Ogionwo (DPR), Engr. Chidi Ike (DPR)
Isioma Nwabueze (Tolmann)

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Senegal and Mauritania are two exciting new markets for Africa. (Image credit: BP)

EDITOR'S NOTE

IT IS CERTAINLY an exciting time to report on the African oil and gas industry. While there is still plenty of news coming from the stalwart markets of Nigeria and Ghana, the emerging markets are keen for investment and to become competitive major players on the world stage. In this issue, we look at the latest developments from the Gulf of Guinea (p17), as well as talking frankly with Equatorial Guinea's petroleum minister, Gabriel Mbaga Obiang Lima (p16). Our cover story, meanwhile, features Senegal and Mauritania (p18), where developing the enormous offshore discovery has not been without its challenges, but operators in both countries remain optimistic.

Angola is going through a period of change, particularly since João Lourenço took over as president in 2017. There is a determination to revive its fortunes as an oil-producing nation – turn to page 13 for a report from Angola Oil & Gas 2019 to find out the state of play, and see page 34 for an interview with Sergio Pugliese, the new African Energy Chamber president for Angola.

Georgia Lewis
Managing Editor

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The new Angola president for the African Energy Chamber

Managing Editor: Georgia Lewis

✉ ora@alaincharles.com

Editorial and Design team: Prashanth AP, Fyna Ashwath Miriam Birkova, Praveen CP, Manojkumar K, Deblina Roy Emmet McGonagle, Nonalynka Nongrum, Rahul Puthenveedu Rhonita Patnaik, Samantha Payne and Louise Waters

Publisher: Nick Fordham

Sales Director: Michael Ferridge

Magazine Sales Manager: Chidinma Anah
Tel: +44 (0) 20 7834 7676 Fax: +44 (0) 20 7973 0076
E-mail: chidinma.anah@alaincharles.com

International Representatives

India	Tanmay Mishra
Nigeria	Bola Olowo
UAE	Murshid Mustafa
USA	Michael Tomshafsky

Head Office:

Alain Charles Publishing Ltd
University House, 11-13 Lower Grosvenor Place,
London SW1W 0EX, United Kingdom
Tel: +44 (0) 20 7834 7676 Fax: +44 (0) 20 7973 0076

Middle East Regional Office:

Alain Charles Middle East FZ-LLC
Office L2-112, Loft Office 2, Entrance B
P.O. Box 502207, Dubai Media City, UAE
Tel: +971 4 448 9260 Fax: +971 4 448 9261

Production: Srinidhi Chikkars, Eugenia Nelly Mendes
Infant Prakash and Hariharan PM
E-mail: production@alaincharles.com

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Executives Calendar 2019

JULY

- 1-4 Nigeria Oil & Gas Conference & Exhibition**
Abuja
www.cwcnog.com
- 25-27 8th Africa Oil & Gas International Trade Exhibition**
Nairobi
www.expogr.com/kenyaoil

AUGUST

- 5-7 SPE Nigeria**
Lagos
www.spe.org

SEPTEMBER

- 25-26 Uganda International Oil & Gas Summit**
Kampala
www.uiogs.com

OCTOBER

- 1-3 Tanzania Oil & Gas Congress**
Dar es Salaam
www.cwctog.com
- 9-11 AOP 2019**
Cape Town
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NOVEMBER

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

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Industry leaders to gather in Abuja for NOG 2019

THE NIGERIA OIL & Gas Conference & Exhibition, now in its eighteenth year, will be returning to Abuja from 1-4 July 2019. The annual meeting of industry stakeholders will once again gather together more than 700 industry professionals to network and explore new business opportunities within the industry. Organisers are advising potential delegates not to miss this opportunity to meet the who's who of the Nigerian oil and gas industry.

With the support and participation of the Ministry of Petroleum Resources, NNPC, its subsidiaries and the Nigerian oil and gas industry, NOG has become a part of the institutional framework of the industry and has been at the forefront of policy announcements and strategic discussions for the past 17 years.

The Nigeria Oil & Gas International Exhibition is a vital platform for Nigerian SMEs and international partners.

It is an event where leading Nigerian content initiatives are planned and contracts are established and often signed.

Initially, international players dominated the exhibition with only a handful of



Industry and government leaders gathered at NOG 2018 for discussions and presentations, and this will again be the case this year.

indigenous exhibitors. However, indigenous players and SMEs now make up 85 per cent of the exhibiting companies at NOG.

The Nigerian Content Seminar provides a platform for legislators, the NCDMB, investors and oil and gas businesses to convene and celebrate the Nigerian content achievements

realised since the enactment of the Nigeria Oil & Gas Industry Content Development Act, discuss the challenges that remain in Nigerian content implementation, explore solutions and share case studies.

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Nigeria Head Office: 11, Niger Street, Park View Estate, Ikoyi, Lagos

PH Branch Office: 206H, Ordinance Road, Trans amadi layout, Port Harcourt, Rivers State.

Lagos OPT Office: 13 Point Road, Apapa, Lagos (OPT – Oil & Petrochemicals Testing)

Lagos M & O Office: 15, Lisabi Street, Apapa GRA, Lagos (M & O – Marine & Offshore)

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Africa Oil Corp focuses on “hunting elephants” in Nigeria, Kenya and South Africa

AFRICA OIL CORP is “expanding horizons [and] hunting elephants” in Nigeria, Kenya and South Africa, according to Keith Hill, the company’s CEO. The “elephants” are big hydrocarbons discoveries, where Africa Oil can enter fields at a low cost and find “good product”.

In Nigeria, Africa Oil is “close to closing” a deal on a deepwater project, Mr Hill told the Africa E&P Summit. He said this project will be the “cash engine that we need” to fund other projects.

The deepwater Nigeria project is primarily an exploration operation, with assets bought when they were divested by Petrobras. Mr Hill said the company has bought “a small percentage of a very good field ... a good bargain” with potential for 550,000bpd of oil.



Keith Hill addressed the summit after a keynote from Seplat’s Effiong Okon.

In Kenya, Mr Hill said the company has “a herd of elephants”, despite progress on the South Lokichar field taking longer than expected. He is “very confident” about the field going into production, but contractual terms in regard to legal and regulatory issues, tax and

transport are being negotiated with the Kenyan government.

In South Africa, Mr Hill said “there is still a lot to be known” about the Brulpadda field” which has gas condensate with oil in “a challenging environment” but four prospects have been de-risked.

A “mixed bag” of prospects for Tullow’s operations across Africa

ROBIN SUTHERLAND, GENERAL manager of new ventures for Tullow Oil, told the Africa E&P Summit that the company has a “commitment to shared prosperity” with exploration being “a very important part of our business

these days”. He echoed the sentiments of other speakers at the summit when he said there was “a perception that we come in and steal resources, but this is not fair”.

Mr Sutherland said that Tullow had seen “massive

success” with Ghana’s Jubilee and TEN fields. He praised the Ghana National Petroleum Corporation as a “very strong partner”.

However, elsewhere in Africa, it was a “mixed bag” with hopes for production in Côte d’Ivoire, Gabon and Equatorial Guinea, while early production in Kenya was less than 2,000 bpd.

In Uganda, he said the company “should be further ahead but we’re not”, but the discovery from 2006 is a “230,000bpd development”.

Like Africa Oil Corp, Mr Sutherland said Tullow was in contract negotiations with the Kenyan government.

“We need to nail that final agreement with the government,” he told delegates.



Robin Sutherland reported highs and lows across its African projects.

Galp to focus on LNG by 2022 in Mozambique

MOZAMBIQUE’S CORAL SOUTH LNG development is being fast-tracked with first gas expected in 2022, Thore Kristiansen, COO and head of E&P for Galp, told the Africa E&P Summit.

Meanwhile, the Rovuma LNG plan of development (POD), which was submitted by ExxonMobil and its partners, including Galp, has been approved by the Mozambican government. The POD includes two mega LNG trains and FID is expected this year.

Mr Kristiansen described Galp’s work in Mozambique as “very exciting” and told the summit about the prospects for LNG development, particularly as a serious competitor to Qatar.

“It is significantly cooler in Mozambique compared to Qatar so that’s a cost-saving on cooling,” Mr Kristiansen said.

Elsewhere in Africa, Galp is working on E&P projects in Angola and Namibia.

In the Kaombo ultra-deepwater project, Galp and its partners, including Total and Sonangol, have ramped up production on Blocks 14, 14K and 32. Production commenced in April this year.

In Namibia, Galp is working with Kosmos on exploring PEL 82 in the Walvis Basin and PEL 83 in the Orange Basin. In PEL 82, it acquired 5,000km of seismic data in 2018, as well as 3,000km of seismic data on PEL 83 in March this year.

“We are looking for a competitive, stable fiscal framework and transparency in all the processes,” said Mr Kristiansen in regard to how Galp chooses the markets in which it operates.

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Strong partnership focus for Oando in Nigeria as an “ambitious independent”

ALEX IRUNE, COO for Oando, addressed the Africa E&P Summit on the importance of partnerships to increase the participation of independents.

“We need to create innovative ways to build a portfolio of assets so we can extract much-needed value for the country,” Dr Irune told delegates.

Oando is working with ConocoPhillips on OMLs 60-63, 131 and 145, in a transaction worth US\$1.5bn.

Dr Irune pointed out ways in which governments and oil and gas companies in Nigeria, as well as across the continent, can meet challenges faced by the industry.

For governments, he suggested investment in infrastructure, access to sustainable financing, increased domestic resources mobilisation,



Alex Irune had strong messages for governments and industry.

investor-friendly tax, trade and privatisation policies, predictable regulatory, commercial and legal framework, and combating the security issues which threaten assets and reduce supply.

For companies, he urged investment in innovation and technology to drive efficiency,

creative financing solutions such as obtaining funds from international markets, investment in infrastructure including several companies working together so infrastructure can be jointly used, and engaging with governments to increase the domestic market.

Invictus seeks farm-out partner for Zimbabwe’s Cabora Bassa Basin

SCOTT MACMILLAN, MANAGING director of Invictus Energy, told the Africa E&P Summit about its work in Zimbabwe and called for a farm-out partner.

The company has been working in the Cabora Bassa Basin, an onshore play. Its SG 4571 license – the company has an 80 per cent stake – contains “potentially the largest, seismically defined, undrilled structure” onshore in Africa, he said, adding that new geological and geophysical work has de-risked the acreage.

The license area covers 250,000 acres and the renewable SG 4571 license was granted in August

2017 for an initial three-year period. The first 18 months of the work programme has been completed and an updated PSC is being drafted for presentation to the Zimbabwean government.

A US\$30mn 2D seismic, gravity, aeromagnetic and geochemical dataset, acquired by Mobil in the 1990s has since been acquired and reprocessed by Invictus with promising results.

Mr MacMillan told delegates that Zimbabwe had been overlooked as an investment destination for 20 years because of political and economic instability, but said the new government is “pro-business, promoting foreign investment and implementing investor-friendly reforms.”

The amended Indigenization and Empower Act allows 100 per cent foreign ownership of assets, guaranteed investor rights, 100 per cent remittance of earnings, a five-year tax holiday, 15 per cent corporation tax thereafter, zero capital gains tax, and a customs duty exemption on raw materials and capital equipment. Furthermore, offshore banking and transacting outside Zimbabwe has been legalised to protect investors against local currency effects.



Scott MacMillan, Invictus managing director.

Niger “highly prospective” for Savannah Petroleum

STEVE JENKINS, CHAIRMAN of Savannah Petroleum, addressed the Africa E&P Summit on the company’s work in the Agadem Rift Basin Niger.

The basin has a long history with five discoveries from 25 exploration wells made mostly by oil majors between 1975 and 2004. From 2004 until 2014, CNPC made 95 discoveries from 129 exploration wells, acquired more than 18,000km² of 2D and 13,000km² of 3D seismic, as well as building infrastructure, such as a 463km pipeline and the Zinder refinery. First oil was delivered in 2011 from the Sokor and Goumeri fields and from Agadi in 2014. In 2013, 20 per cent of the Agadem license was sold to CPC and 50 per cent of the license mandatorily relinquished.

Savannah has been present in Niger since July 2014, when it was awarded the R1/R2 license and then the R3/R4 license in July 2015. A 36,948km² FTG survey was acquired, as well as 806km² of 3D seismic data over a portion of R3 in 2016. The company has a 100 per cent success rate with five discoveries from five wells.

In particular, Mr Jenkins said there was great exploration potential in the cretaceous R3 East Yogau play in the Upper Sokor field, thanks to legacy 3D seismic as well as the acquisition of new 3D seismic data.

The R3 East feasibility study has been submitted to Niger’s Ministry of Energy and Petroleum, outlining Savannah’s plan to develop the site.

“Hopefully next year, we’ll be commencing drilling again to deliver more hydrocarbons,” he told delegates.

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Dana Gas commences drilling in Egypt

DANA GAS, A Sharjah-based natural gas company, has commenced drilling operations at its Merak-1 well, offshore Egypt.

The exploration well is located in 755 m of water in the North El Arish concession, also known as block six.

The Merak-1 well will be drilled with the sixth generation dynamically positioned drillship 'Tungsten Explorer' on hire from ADVantage Drilling Services SAE – a joint venture between ADES International and Vantage Driller II Co (a subsidiary of Vantage Drilling).

The well is expected to take around 70 days to drill, Dana Gas revealed. The prospective resources to be added from this well could reach four tcf of natural gas.

"We have commenced an exciting exploration programme in our Egypt block six concession area. Until now, all of our Egyptian operations have been onshore the Nile Delta," said Patrick Allman-Ward, CEO of Dana Gas.

Mazarine Energy and ETAP discover oil in SMG-1 in central Tunisia

MAZARINE ENERGY TUNISIA BV and partner Entreprise Tunisienne d'Activités Pétrolières (ETAP) have discovered an oil-bearing reservoir in exploration well Sidi Marzoug-1 (SMG-1) in the 4012 sq km Zaafrane permit in central Tunisia.

During a production test, SMG-1 well flowed, constrained by surface facilities, at a rate of more than 2,000 barrels of oil per day and five million cf of natural gas per day.

Mazarine Energy is the operator of the Zaafrane permit,



Image Credit: Mazarine Energy

The latest discovery is a boon to Tunisia's oil sector.

with ETAP as partner. The well was drilled by Compagnie

Tunisienne de Forage (CTF) to a total depth of 3,880 metres.

Eni and Sonatrach extend Algerian gas supply contract until 2027

ITALIAN SUPERMAJOR ENI has signed a renewal contract with state-owned Sonatrach for the import of Algerian gas into Italy until 2027.

Eni, which has a series of exploration and production assets in Algeria, stated that this deal will strengthen its ties with Sonatrach. The supermajor added that the agreement also included an option to extend the

contract deadline by another two years. The agreement covers almost 15 per cent of the gas imported into Italy, and also defines the transportation arrangements through the pipeline crossing the Mediterranean Sea.

Claudio Descalzi, Eni's CEO, commented, "I am particularly pleased with the renewal of the gas supply contract and the level

of the strategic partnership with Sonatrach which spans from the exploration and production sector to gas marketing and transportation, to renewables."

Additionally, Eni has partnered with Total and Sonatrach for offshore exploration off the coast of Algeria, with a view to fast-tracking hydrocarbons development.





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REFORMS ACROSS ANGOLA AIM TO ATTRACT INVESTMENT

The focus was on attracting investment, boosting local content and developing the re-emerging hydrocarbons sector along the entire value chain at the Angola Oil & Gas conference, which was held in Luanda. Dialito Cahumbele reports from the event.

A new dawn for the Angolan oil industry? The conference was held in Luanda, the Angolan capital.



Image Credit: André Paegle/Flickr

UNDER THE THEME “Petroleum as a Catalyst for a Dynamic, Renewing and Self-Sustaining Economy”, Luanda held the Angola Oil & Gas conference and exhibition. In his opening speech, President Lourenço, pointed out the major steps needed to guide Angola from import dependency of oil derivatives to a more sustainable and efficient oil producing country.

“Unfortunately, several technical, operational and strategic constraints in recent years have led to a decline of oil production, which forced the government to take several measures to enforce the objectives and targets of the

2018-2022 National Development Plan for the oil sector,” the president told delegates.

According to President Lourenço, the development and consolidation programme for oil and gas, designed for the 2018-2022 National Development Plan, comprises three main objectives: to boost and intensify the replacement of reserves with a view to alleviating the sharp decline in production; ensure the self-sufficiency of refined products through the construction of new refineries; and the expansion of the existing refinery, as well as improving the networking distribution of fuels and lubricants throughout the national territory by increasing

storage capacity.

With a view to reform, in February this year, the government created the Angola National Agency of Petroleum, Gas and Biofuels (ANPG), to take on the role of concessionaire for hydrocarbons licence and the regeneration of Sonangol, the state oil company, by focusing on its core business around the crude oil and natural gas value chain, reinforce the role of the Ministry of Mineral Resources and Petroleum and liberalise the fuel derivative commercialisation and distribution sector, creating the Regulating Institute for Petroleum Derivatives (IRPD). One of the measures taken to attract more foreign

investments is tax reduction on the import of production materials from new investors and operators in the market.

Local content was a major theme of the conference, with the president emphasising the Angolan government’s ambition to carry on the Angolanisation process, by encouraging oil and gas companies operating in Angola to invest more in education and training. Moreover, in a bid to boost technical know-how and expertise, the government will restructure the National Institute of Petroleum and create the Higher Institute of Petroleum, which will be located in the province of Kwanza-Sul.

Sonangol, in partnership with ENI, announced the award of the contract for the execution of the new platforming unit of the Luanda Refinery to the company, Kinetics Technology. The international tender was held by ENI. This announcement states that the inclusion of the new unit at the Luanda Refinery will increase four times the high-octane gasoline production capacity of that unit and, consequently, reduce the need for imports.

It is estimated that the project of the platforming unit will be completed in two-and-a-half years and the execution of this contract will employ around 600 local workers. During the construction phase more than 1,000 jobs will be created, in mechanical, electrical, civil and



Angola is keen to revive its fortunes along the entire value chain.

instrumental fields. The activities will be supervised by a joint team, specifically designated by Sonangol and ENI, to ensure the highest standards of safety, quality, cost efficiency and compliance with the project schedule. This project results

from the Cooperation Agreement signed by Sonangol and ENI in 2018 for the re-launch of Angola's refining sector. In compliance with that agreement, ENI successfully completed the refinery maintenance campaign which resulted in an increase in

its reliability and started a programme currently underway in Italy for the training of 40 Sonangol technicians focused on the management of refineries.

Additionally, Sonangol announced the signing of an agreement with United Shine for the construction of a crude oil refinery of high-conversion in Cabinda, northern part of Angola. The project is financed by the Russian Bank VTB with \$1.5bn, as confirmed by the Russian ambassador to Angola, Vladimir Tararov.

The choice of United Shine is a result of a tender launched by Sonangol in 2017 for the construction of a refinery in Cabinda province which should have a processing capacity of 60,000 bpd to produce derivatives such as diesel,



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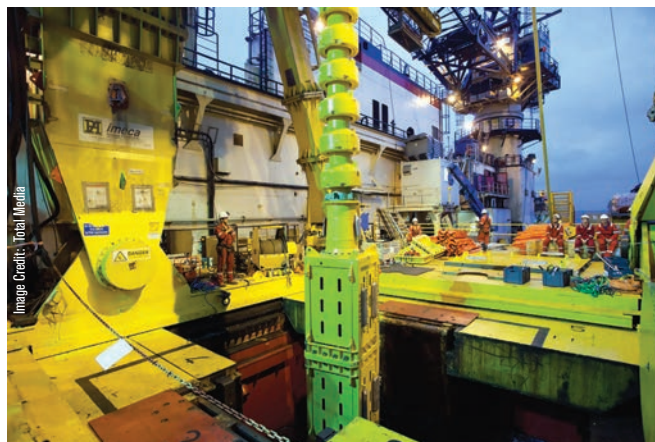
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gasoline, fuel oil and Jet A1. It was also announced that in October, the National Agency for Oil, Gas and Biofuels will carry out a bidding process of 10 blocks, nine in Namibe province and one in Lobito, Benguela province. TOTAL, through its Chairman and CEO Patrick Pouyanné, meanwhile, announced the construction of 50 filling stations across Angola. Last year, TOTAL launched three new projects with a budget of US\$2.5bn.

“We currently produce 600,000 bpd, which is 40 per cent of the Angolan production per day” said Mr. Pouyanné.

ExxonMobil and its partners announced further investment in Block 15, offshore Angola, to increase production as part of an agreement with Angola’s newly



TOTAL has a strong, long-term Angolan presence and is expanding.

established National Agency for Petroleum, Gas and Biofuels. Sonangol will receive a 10 per cent equity interest.

“This renewed collaboration will enable Angola to optimise recovery and add production from mature fields,” said

Hunter Farris, senior vice president of ExxonMobil Upstream Oil & Gas Company.

ExxonMobil will complete a multi-year drilling programme in the block and install infrastructure technology to increase capacity of existing

subsea flow lines. The project will generate about 1,000 local jobs during the execution phase, and will produce approximately 40,000 extra bpd once online.

Changes to the production sharing agreement will extend operations through 2032 and bring Sonangol into the Block 15 partnership with a 10 per cent interest. Under the agreement, Esso Angola’s interest is 36 per cent, BP Exploration’s share is 24 per cent, ENI Angola Exploration’s interest is 18 per cent and Equinor Angola’s share is 12 per cent.

Norway’s Equinor established a cooperation agreement with Sonangol for exploration and experience exchange. Equinor (formerly Statoil) operated in blocks 38 and 39, in the pre-salt from the Kwanza basin, between 2011 and 2016. ♦

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GABRIEL MBAGA OBIANG LIMA'S AMBITIONS FOR EQUATORIAL GUINEA AND AFRICA

Oil Review Africa's managing editor Georgia Lewis interviewed Gabriel Mbaga Obiang Lima, Equatorial Guinea's petroleum minister at the APPO Cape VII conference about development plans that involve trade and investment rather than aid.

THE APPO CAPE VII conference, held in Malabo earlier this year, was an important showcase for Equatorial Guinea's emerging oil and gas industry. From the opening ceremony onwards, Gabriel Mbaga Obiang Lima was clearly determined to use the platform to promote his country as an increasingly important player on a global level.

"With the Year of Energy 2019, we want to promote optimal policies that strengthen leadership and strengthen other members and elevate our world position," he told delegates. Equatorial Guinea joining OPEC in May 2017 was a strategic move in this regard.

In his address to the conference, he was quick to highlight the opportunities oil and gas offers not only to Equatorial Guinea but to the wider African continent.

"No one doubts the opportunities our sector represents to the economy. Oil and gas has to be to the benefit of our citizens. We need complete policies that benefit the lives of our citizens," he said. "We need to maximise ethically across the entire supply chain."

"We must have African people at the centre of all these policies – this will improve our lives as owners of our own destinies."

In line with an ever-closer African Union, as well as increased moves towards more regional integration and cooperation across the continent, Obiang Lima discussed regulatory alignment and delivering on national content requirements.

"It is important to harmonise legislation and national content policies in all our jurisdictions," he told the conference. "To



Gabriel Mbaga Obiang Lima had a strong message at APPO Cape VII.

Image Credit: Africa Oil & Power

highlight national content, governments need to provide all the help for these milestones to be delivered. We need to defend our resources, we need to commit and make decisions."

A trade-rather-than-aid approach is favoured by the minister: "Oil and gas has been very good for leapfrogging development. We are not interested in aid."

When Obiang Lima was interviewed by *Oil Review Africa*, he was asked for some more specifics on legislative harmonisation. His first response was to standardise taxes, as different tax regimes across borders "can make it very difficult for companies".

The African hydrocarbons industry needs to meet international regulatory standards, he added citing safety regulations as

a good example of appropriate cross-border harmonisation.

Obiang Lima did not mince his words when he addressed the conference on the Middle East and Russian oil industries. He pointed out that Middle East oil producers, such as Saudi Arabia, the UAE and Kuwait, store oil until the price increases because "that is how oil works".

"We know what we want to do do • we have a vision and it needs to materialise legally. Russia and the UAE oil and gas can get out of my country," he said.

However, Obiang Lima is quick to admit that more needs to be done to ensure that Equatorial Guinea and other African oil and gas producers succeed and the natural resources prove to be a benefit rather than a curse.

He told *Oil Review Africa* a cautionary tale, saying that

Equatorial Guinea has to make sure it does not end up "like the story of the little girl with the milk – her mother sends her to the market to sell the market and use the money to buy a chicken so they can have eggs but she trips over on the way to the market and all the milk spills on the ground."

He said downstream development is an important part of Equatorial Guinea's oil and gas journey, in particular phase two of the gas megahub with Marathon and Noble. On a pan-African level, Obiang Lima made a plea to all attendees, particularly those from NOCs.

"Wake up!" he implored delegates. "There are discoveries month after month ... NOCs are in a coma. Where are the NOCs of Africa going? Nowhere! We need to wake up." ♦

EQUATORIAL GUINEA AND GUINEA-BISSAU: SEEKING INVESTMENT

The governments of Equatorial Guinea and Guinea-Bissau are keen to show the world they are open for business, particularly when it comes to investing in oil and gas projects – and major companies are taking up the opportunities. Georgia Lewis reports.

THE GULF OF Guinea is shaping up to be one of the most promising markets in Africa for oil and gas opportunities, particularly Equatorial Guinea and Guinea-Bissau.

At the Africa E&P Summit, held in London in May, Tracey Henderson, head of exploration for Kosmos, said that “basin-opening exploration” in Equatorial Guinea was a great source of optimism for the company. Additionally, she cited the development of projects attached to the oil and gas industry as a positive for investors, describing Kosmos’ work in the country as “infrastructure-led exploration”.

“Equatorial Guinea has surprised a lot of people,” Ms Henderson told the conference. She praised the “long legacy” in Equatorial Guinea left by Trident Energy after exploring the area in the 1990s. Kosmos has acquired interests in the “legacy discoveries’ of Ceida and Okume, with drilling expected to start in the second half of this year, as well as further drilling in the blocks slated for 2020.

“The prospectivity is quite compelling,” she said in regard to Equatorial Guinea and the company’s work in nearby Sao Tome and Principe.

At the APPO Cape VII conference, held in April in Equatorial Guinea, Mohammed



FAR's Cath Norman addresses the Africa E&P Summit. Selma Usiku, exploration geologist for Azinam, moderated.

Sanusi Barkindo, secretary-general of OPEC, praised the country for its leadership in oil and gas development.

“ Equatorial Guinea recognises the value of being in an organisation such as OPEC and has empowered African countries on a global scale”

“The country’s leadership recognises the value of being in an organisation such as OPEC ... It empowers African countries on a global scale,” Mr Barkindo said, adding that Equatorial Guinea’s “one-stop shop” system which enables businesses to be set up in a week was an example for the continent.

Describing Equatorial Guinea as “a vital cog” for OPEC and “a driving force for operations in this region”, Mr Barkindo echoed the sentiments of Ms Mbengono when he said that the development of oil and gas in the country should help other

industries, such as agriculture and financial services.

In Guinea-Bissau, offshore exploration continues apace.

FAR’s managing director, Cath Norman told the Africa E&P Summit that the company has upgraded its Guinea-Bissau license terms and has “shifted exploration focus to deepwater”.

The plan is to drill in 2020. FAR’s long-term planning in Guinea-Bissau reflects the same patient approach the company has taken with Senegal, whereby making an extended commitment has paid off with access to a huge discovery. ♦

BP's work off the coast of Senegal and Mauritania continues apace.

Image Credit: BP

SENEGAL AND MAURITANIA: REVIVING AFRICA'S NORTH-WEST?

The neighbouring north-west African countries could be on the brink of a hydrocarbons revolution with ambitious operators in both markets overcoming hurdles and looking to go into production in the near future. Georgia Lewis reports.

THE OFFSHORE HYDROCARBON discoveries of Senegal and Mauritania have attracted investment, although governments of both countries are calling for more. However, overall, operators are optimistic about going into production in the 2020s.

At the Africa E&P Summit, Senegal and Mauritania were highlighted by multiple speakers as two of the brightest prospects for African oil and gas development. Peter Elliott, director of PVE Consulting, said that great progress has been made in phase 1 of the SNE development, where 32 API light oil and dry gas has been discovered 100km south of Dakar, the Senegalese capital. MODEC has been awarded the FEED contract for the FPSO and Diamond Offshore has the well-based contract for drill rigs Ocean Blackhawk and Ocean Rhino. Drilling is scheduled for 2020 and early 2022, and the FID target is for H2 this year.

Cath Norman, managing

director of FAR, said that "flexible and adaptive strategies" got the company through the 2016 oil price slump and their Senegal project is "headed for FID later this year". FAR's persistence has paid off after entering Senegal in 2006 at a time when it was difficult to find partners willing to farm in.

"Senegal had no offshore wells for nearly 40 years and no deepwater drilling... FAR [has had the] acreage since 2006 and there were numerous attempts to bring a farm-in partner that failed – Shell came in and went away," Ms Norman told the conference. However, the company had a large permit area and high-quality 3D seismic data, and Ms Norman [is] very nimble, able to make quick decisions [and] articulate to our shareholders where the opportunity lies."

Tracey Henderson, head of exploration for Kosmos, talked about the company's "growing portfolio" in Senegal, Mauritania and Equatorial Guinea. She described the Tortue discovery

off the coast of Senegal and Mauritania as world-scale, with FID coming last year. There are plans for further drilling in the Tortue, as well as Yakaar and BirAllah discovery, which could become a south Mauritanian hub.

At a Mauritanian British Business Council (MBBC) event with BP, Gerry McGurk, BP's vice president, projects, for Senegal and Mauritania, said BP is on track for first gas by 2022.

The plan is to send gas back to a hub which Mr McGurk said will be a "major LNG facility" with an FLNG plant to chill and liquefy gas so it can be transported by tanker for export and used in Senegal and Mauritania's domestic markets. An existing vessel is being upgraded at Singapore's Keppel shipyard to serve as the FLNG tanker.

Mr McGurk said the cross-border development between the two countries has presented "challenges and opportunities" but has been "uniquely successful, an amazing achievement."

Contracts have been awarded by BP to companies to assist with

six delivery teams – wells, subsea, gas processing, liquefaction, hub/terminal, and offtake, staffing and skills. As well as oil and gas operators and service providers, the project is using other sectors. For example, 2.8mt of rock will be required for the breakwater construction of the hub, which necessitates the repair of existing roads and the building of new roads for the quarry. This includes a bypass road around Nouakchott so trucks transporting rocks to the hub's construction site will not travel through the middle of the capital. Quarrying services will be required to obtain rocks for the project. BP is working with Mauritania's mining ministry, particularly in regard to a processing facility for the rocks.

In regard to phases two and three, Mr McGurk said that "a few key decisions need to be made", such as marketing LNG and financing the next phases. He said that the next tranche of contracts to go out to the market will take place in October at the earliest. KBR is the FEED engineer for the next phase. ♦

THE VIEW FROM BP: POTENTIAL FOR PROSPERITY

Geraud Moussarie, BP's head of country for Senegal, talks to *Oil Review Africa* about the company's plans for Senegal and Mauritania – and what the company is looking for when it chooses partners for major projects.

What are the challenges working in the new markets of Senegal and Mauritania?

This region is a great example of the massive oil and gas exploration potential we see across Africa – it's an exciting frontier basin with lots of potential – but being a frontier basin with an emerging industry means there are technical and logistical challenges.

From a technical perspective the GTA field will involve wells in around 2,850m water depth – making them some of the deepest drilled to date in Africa – certainly for a gas development. And the location of the project has meant we've had to work up an innovative concept which reflects the shared nature of these resources as well as being respectful to any environmental and social sensitivities. But the BP technical team working on this development is drawing on truly global expertise from other projects and regions to apply those learnings and work through any technical challenges – in fact it's just those sorts of challenges that get our engineers and scientists out of bed in the morning!

What role is new technology playing in BP's work?

Technology is playing a key role – from the engineering solutions we're applying to the GTA project, to how we're analysing the seismic data from our surveys and how we're remotely monitoring the wells we will be drilling for our upcoming drilling campaign. The way we've set up our business in the region is designed to connect our in-country teams and facilities with our international technology centre in the UK – so the teams on site are always connected to a global pool of expertise and the latest technology we are utilising to monitor and eventually run our operations. We're bringing this approach to some of the investments we are making to



BP's head of country for Senegal, Geraud Moussarie.

Image Credit: BP

enhance national skills and capability – for example, the Interactive Training Centre in Nouakchott, which we are building, is being designed with cutting-edge technology to allow long distance learning.

How important is local content in this project?

Local content is a key aspect of our plans in country. Our vision for the region is one that spans across the next 30 years – and includes developing Mauritania and Senegal's people as well as the nation's hydrocarbon resources. Developing national capability is vital for every country we operate in – but of course in an emerging market it is not something that can be put in place overnight. It takes time, commitment and care to put in place an approach that is meaningful and sustainable for the long term. That's why at BP we have worked closely with governments, academic and industry representatives to identify an appropriate, needs-based approach that would deliver tangible benefits for Mauritania and Senegal over the long term.

And if we look at the more immediate picture, we are building a fantastic local team based out of our Dakar and Nouakchott offices, as well as working with local suppliers to support our in-country activities.

What qualities do you look for in a company when you are awarding supplier contracts?

First and foremost, BP will never compromise safety – international standards are key to our industry, so we want to cultivate and uphold those standards in Mauritania and Senegal. We cannot look at working with any supplier that falls below our defined levels of quality, safety or ethics.

So, given the highly complex and technically challenging nature of the oil and gas industry, we are prioritising people and companies with the right experience and capability to safely deliver our activities in accordance with those international standards.

But we are committed to supporting the growth of the supply chain within both countries too – and we think the greatest near-term potential in that area is through partnerships between local suppliers down the chain and international 'tier 1' contractors. In fact, we have built in a requirement into all our tier 1 contracts for the GTA project that our international suppliers look to develop such partnerships where the opportunity exists – a great example of that is the construction of the GTA hub terminal. The concrete for the large caissons – or blocks – that will form the hub wall will be constructed in Dakar, Senegal and the rock which will form the foundation for the wall will be quarried in Mauritania – which has a strong mining heritage.

So companies that share our commitments to safety, international standards and developing local content are the supplier partners we are looking for when we award contracts. ♦

MARINE MONITORING SYSTEM DEVELOPMENT POWERED BY INNOVATION

Innovation is driving advanced monitoring and control technologies for environmental and safety compliance in the marine sector, says Gérard Baldellou, marine business unit manager at CMR Group.

THE MARINE DIESEL power sector continues to face significant challenges, particularly in areas where emissions resulting from combustion inside engines, along with fuel consumption levels need reducing. Escalating operating costs, tighter margins and pressures in the oil and gas sector signal challenging times for ship owners and fleet operators. Because of this, there's more focus than ever before on achieving savings and operating efficiently wherever possible.

According to a survey of the international shipping industry by a firm of accountants and shipping consultants, vessel operating costs are expected to rise by 2.4 per cent in 2018. The cost of repairs and maintenance are also expected to increase by 2 per cent, while expenditure on spares and drydocking will grow by 1.9 per cent and 1.8 per cent respectively. It's clear that the marine sector must strive to cut costs and operate more efficiently and effectively – and the latest in advanced instrumentation and control systems can help here. New technology is firmly on the wish-list of shipping operators, who are looking to drive-up performance levels while cutting operating costs in tough trading conditions. Many are turning to sector specialists for added value technologies supported by advanced digital solutions and



Precision-engineered solutions are essential.

Image Credit: CMR Group

installation engineering capabilities. Furthermore, moves by instrumentation and control manufacturers to partner ever closer with engine OEMs are also underway to meet the reliability and lifetime challenges for industrial engine sensors, in efforts to try to minimise final engine delivery cost. The approach can typically deliver savings without any compromise around the quality and standard of the final solution. How can this be achieved? Global specialists like CMR Group are focused on the business of providing effective and high-quality precision-engineered solutions, built around meeting individual requirements and delivered through partnerships.

Working systems and procedures dovetail to reflect this single-minded purpose, and processes are entirely geared to ensuring that work is carried out efficiently, in line with the technical standards required and with close attention to planning and project management. This

focus enables us to work closely with customers and end users to ensure that projects are completed as quickly as possible and that vessel downtimes are reduced to a minimum.

International Maritime Organisation (IMO) regulations for MARPOL Annex VI Tier III, which is aimed at reducing pollution emissions, have also led to upheavals for diesel engine manufacturers when it comes to control and power management systems. In turn, this has directed CMR to develop a new generation of advanced engine and IAMCS (integrated alarm, monitoring and control system).

Now being designed and built around 'smart' wiring, instrumentation and engineering packages for wider applications in the marine sector and featuring proprietary J-SENSE technology (analogue to digital conversion electronics are embedded within the sensor, allowing for a direct CAN connection to the engine ECU), IAMCS can be directly linked to

CAN smart sensors and harnesses, as well as data transfer onshore for predictive analysis, intervention and maintenance.

Marine vessel owners and operators value, perhaps more than ever, the availability of their craft. This means that routine engine maintenance schedules must be optimised and planned very carefully. So, in achieving this, the need to pay close attention to the details in the project management and planning of system jobs is paramount; it cannot be underestimated – and partner suppliers can often be better placed to provide this.

Understandably, OEMs have priority interests in manufacturing and new product development, sales of new engines and warranty support. External suppliers like CMR can respond to these interests, adding value through wholly focusing on providing a fully responsive engineering service – one that is geared towards meeting the specific timing, location and technical needs of the customer. In this way, with strong pressures on operating costs and assured vessel availability, sector specialists are responding and adapting to changing market needs, demonstrating their capabilities and system solutions. ♦

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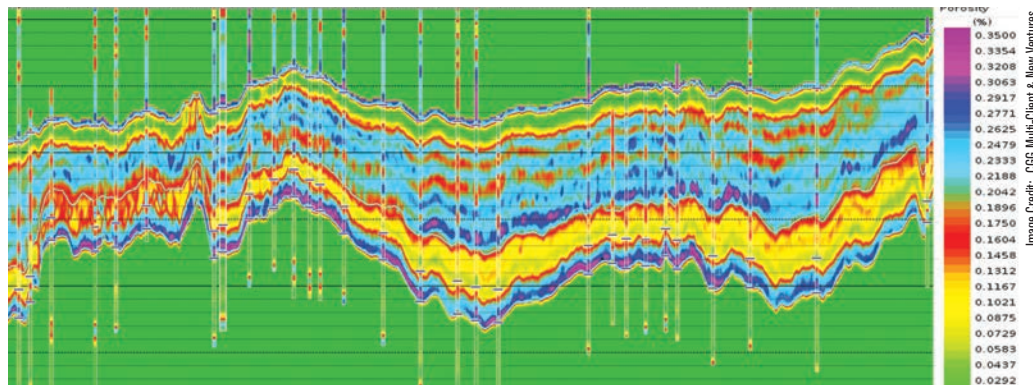
GEOSCIENCE DIGITALISATION CONTINUES APACE TO REVOLUTIONISE WORKFLOWS

Rapid expansion in machine learning applications alongside migration to the cloud advances workflows. Digitalisation has become a growing talking point at industry events and operators are already reaping the benefits.

AT INDUSTRY EVENTS over the last couple of years, digitalisation has become a major point of interest with dedicated technical sessions and exhibition feature areas to explore this growing topic. CGG has likewise embraced this technology to transform many areas of its business. Perhaps the biggest area of interest in the industry right now is around machine learning and the opportunities it offers to potentially revolutionise geoscience workflows.

To help geoscientists take advantage of machine learning and deep learning technology, CGG GeoSoftware has developed a machine learning ecosystem. It provides open access to data within its geophysical and petrophysical applications. Python-scripted machine learning lets users get their hands dirty if they like to tinker under the hood, or take advantage of carefully selected pre-built recipes. Many tasks can now be completed more quickly and with more detailed results, for example, well log editing and petrophysical analysis, facies classification and reservoir property prediction. Meanwhile, deep neural networks provide benefits for tasks as varied as reservoir quality assessment and near-surface characterisation.

Even if geoscientists are not using machine learning personally,



This ResPack Fast porosity volume, predicted by HampsonRussell, emerges from seismic data using a neural network trained on well log data. It highlights higher porosity targets in Oklahoma.

they'll find it increasingly involved across various aspects of geoscience projects and workflows around them. CGG's Subsurface Imaging experts now benefit from the addition of machine learning to improve tasks such as surface wave inversion, processing QC, job logistics and resource utilisation.

Before the industry gets to the point where it can truly benefit from big data analytics and take full advantage of machine learning there is a need to reach a minimum common denominator in terms of the data itself. Recent efforts have seen the liberation of huge volumes of data from legacy formats, migrating to new data management platforms which include an increasing mix of cloud storage. CGG Smart Data Solutions help to ease this digital transition with end-to-end services from expert upcycling of

legacy data into the cloud to the deployment of their modern and flexible GeoTrove data management platform.

Integration and interoperability of geoscience data becomes important to really take advantage of data analytics and machine learning applications. CGG has spent the last few years gaining valuable experience while taking its

“ The industry can benefit from big data analytics but there is a need to reach a minimum common denominator for the data itself ”

geological library into the digital realm, using a proprietary taxonomy and ontology to create a unique framework for its GeoVerse data set. Meanwhile, its multi-client seismic library is now assessable through its new GeoStore portal, with controlled access to historical client entitlement data. Upload to the cloud is underway for the entire multi-client seismic library.

The cloud offers more than just data storage – cloud computing provides scalable and flexible solutions to compute-intensive reservoir characterisation workflows and very large projects. Through its technical collaboration with Microsoft, CGG's latest GeoSoftware releases run seamlessly in the Microsoft Azure Cloud Environment. Other major cloud platforms will soon follow. ♦

There will be new opportunities for existing oil and gas workers if they are upskilled to keep up with industry changes.

THE OIL AND GAS JOB MARKET OF THE FUTURE

What will the oil and gas job market look like in years to come? What skills will be needed and what can be done now to ensure skills shortages do not affect the industry? Georgia Lewis reports.

THE OIL AND gas industry needs to plan ahead if it is to remain relevant and competitive – and this is acutely apparent when it comes to ensuring there are enough people with the right skills in the right places. Looking ahead, the industry will need a balanced blend of people with skills in digital fields as well as ensuring traditional but vital skills, such as geology, do not fall by the wayside.

OPITO, an energy skills body released the Skills Landscape 2019-2025 report, which outlines a skills strategy for the UK oil and gas industry but it contains lessons for the wider world. The report features four components – Retain, Retrain, Recruit and Renew to develop a flexible, multi-skilled and technology-enabled workforce.

Mark Cullens, Director of

Strategic Engagement at OPITO said: “Oil and gas skills requirements are changing rapidly. Equipping the current workforce with the skills to adapt to this dynamic business environment is essential and work needs to begin right away.”

The report found that 28 per cent of people’s time is spent on repetitive, transactional activities which are likely to be automated. For people in these positions, the report recommends upskilling and reskilling. In particular, upskilling is required at all levels of organisations in regard to technology, and development of future leaders should be a priority.

In terms of training, the way people learn and develop new skills is changing and the report recommends the industry embraces new training methods, such as virtual and augmented

reality, simulation and situational analysis. Those surveyed by the report’s authors said they want short but formally structured “nuggets” of learning, increasingly delivered through simulation.

New jobs will be created in the oil and gas industry and these could be filled by existing employees who either retrain or upskill, or by newcomers who have specifically trained for these emerging jobs.

According to the report, future job titles may include artificial intelligence business developer, virtual reality journey builder and 3D material scientist.

Geologists are, in general, getting older across the oil and gas industry so it is essential to find ways to ensure the next generation of geologists is on hand to leverage their expertise

in finding hydrocarbon deposits. As well as encouraging young people interested in a scientific careers to study geology, geologists could be sourced for oil and gas work from other industries, albeit with extra training required.

In a company newsletter for Subsurface Consultants & Associates, chairman emeritus Daniel J. Tearpock, wrote the following: “Geologists coming from the environmental, coal, glacial, vulcanology, and mineral industries have an excellent basic education in geoscience. But when it comes to the required knowledge to be proficient in oil and gas exploration and development, they will need additional training in certain areas to enter this industry ready to be contributing members of the team.” ♦

UNDERTAKING SITE SURVEYS BEFORE SHALLOW DRILLING

While there has been an increased focus on deep- and ultradeepwater drilling, plenty of operators are still focusing on shallow plays. At the Africa E&P Summit, Karen Ware, principal adviser, RPS Group, advised delegates on what to be aware of before commissioning offshore site surveys.

KAREN WARE GAVE a presentation to the Africa E&P Summit, held in London, on reducing shallow drilling risk. Here are some of the main points from her presentation.

In regard to whether a site survey is needed before shallow drilling, it depends on the water depth, and operators need to ask the following questions: What type of rig is to be used? What data do we already have? What risk are we trying to manage?

A site survey can be necessary to obtain permission to drill, sometimes rig operators demand it, particularly if another operator has done the same thing – large and small operators may have different processes in this regard and it may come down to economics and affordability.

If an operator proceeds with a site survey, it is important to minimise the risk of harm to personnel and equipment during planned operations; minimise the impact on the natural environment; identify all possible natural, geological and man-made constraints and hazards which could affect the operation. In some cases, a 100 per cent desk study with no offshore operation is appropriate.

Costs are a major consideration with offshore surveys in Africa. Geophysical surveys can cost between US\$350,000 and US\$2mn,



Shallow water operations, such as this one in the Gulf of Thailand, may require serious pre-drilling preparations.

geotechnical boreholes can cost between US\$500,000 and US\$mn, obviously depending on

“ Meeting local content requirements can be challenging but processing and reporting can be created locally, with local geological knowledge”

area and numbers. For some parts of Africa, between 20 per cent and 50 per cent may be added to the cost for security.

In contrast, desk-based surveys are cheaper. Regional geohazard studies cost between US\$50,000 and US\$100,000, and site-specific geohazard studies cost between US\$50,000 and US\$70,000. Additionally, desk-based surveys offer limitless flexibility to move to another wellsite later.

In parts of Africa, meeting local content requirements is vital. This can be challenging in regard to site surveys. There are African site survey contractors

but they are not widespread across the continent, mostly concentrated in Nigeria. As a result, a lot of European and US-based subcontractors work with local African contractors on a project-by-project basis offshore. Acquisition is frequently local with processing and reporting commonly shipped out of country. However, this is an element that can be completed in-country as local geological knowledge is very important. Keeping track of vessel availability can flag up opportunities to get work done on fly-bys. ♦

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EXTENDING ASSET LIFE IN THE OIL AND GAS MARKET

As the oil and gas market continues to make changes, organisations have initiated a core focus on introducing sustainable operations that are financially suitable, including solid asset integrity management plans.

OPERATORS ARE OFTEN faced with the decision of extending or ending offshore production asset life. As a result, pre-decommissioning planning has emerged as a major challenge for the industry.

Mitigating uncertainty, enabling decision making and justification as to whether to end or extend asset life, as well as detailed knowledge of asset conditions is crucial.

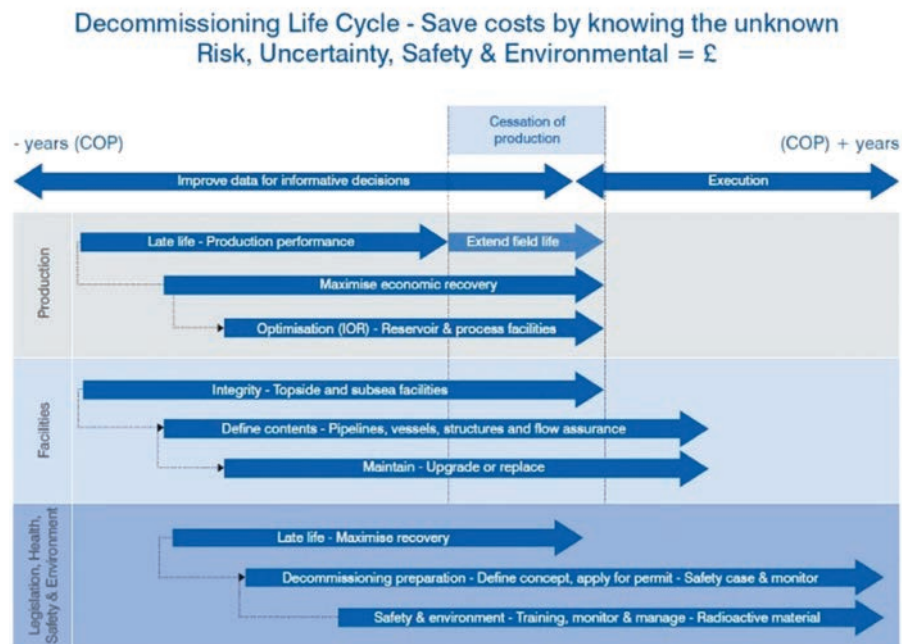
Range of diagnostics services can be used to provide this detailed knowledge throughout late life operations.

If you're looking to extend asset life, each item must be properly evaluated to see if they are in the right condition to safely extend.

In cases of initial assessment, technologies that can confirm structural integrity with regard to pipeline corrosion and erosion, flexible riser liner and carcass inspection, midwater arch/buoyancy tank inspection, platform member inspection and grout monitoring is essential. These technologies, all of which are provided by Tracerco, are vital during extended life campaigns, as regular inspection is required to confirm the viability of the asset. Through collecting the right type of data through diagnostics and measurement technology, businesses can ensure cost-effective methods.

Reservoir recovery is circa 30 per cent to 40 per cent, and with IOR/EOR technologies, as

“ To extend the life of any asset, each item must be evaluated to see if they are in the right condition to safely extend ”



A chart which demonstrates the cost savings that can be made during the decommissioning life cycle.

an industry we have experienced a significant impact, where these percentages have been significantly increased.

In IOR/EOR applications, chemical tracer technology can be used to manage fluid movement and maximise hydrocarbon output by establishing water entry points, providing a water cut profile along the wellbore and confirming the water source from the formation or injection water movement when combined with waterflood tracing.

When it comes to field development planning, operators can detect high flow permeable channel blocking and determine how impactful the chemical treatments can be.

In addition, operators can measure waterflood effectiveness, residual oil saturation, water and oil inflow can often be used

as an alternative to PLTs where they are deemed too risky, costly, or well design does not permit, as well as effective water injection and mud invasion.

Tracerco also offers added safety measures during logging while drilling (LWD) using a specially designed monitor for source detection.

If you have carried out thorough asset assessments and find that they are no longer good to use, you must begin the process to get rid of them.

Do ensure that the route taken mitigates risk and is carried out safely, considering the best interests of the environment and complies with local regulations. ♦

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DREAMING THE IMPOSSIBLE DREAM FROM NIGERIA TO MOROCCO

Slowly, but surely, things are moving forward on one of Africa's most ambitious projects: the proposed 5,700km-long Nigeria-Morocco gas pipeline. Martin Clark reports.

NOT SO LONG ago, experts dismissed the idea of a gas pipeline linking Nigeria with Morocco as far-fetched – and yet work continues to realise this “impossible dream” with early engineering works now underway. The project originates from a smattering of bilateral agreements in 2016, when the sovereign wealth funds of each country floated the so-called Trans-African Pipeline idea.

With more than 5 trillion cubic metres (tcm) of reserves locked away, Nigeria has the gas to support it, with probably more waiting to be unearthed.

Moreover, new oil and gas discoveries along the coast, in territories like Senegal, Mauritania and Ghana, could play a role. While a final route is still to be determined, the pipeline could entail a mix of both onshore and offshore construction.

It would ultimately feed nascent markets in a dozen or so states across West Africa, bringing gas from the Gulf of Guinea along the shoreline, via Cape Verde and the Canary Islands, before making landfall in Morocco.

Such a project, sharing resources across an entire region, certainly fits with the current mood among multilateral donors like the African Development Bank, which would almost



An ambitious pipeline project could forge closer ties between Nigeria and Morocco.

certainly get involved in bankrolling the venture.

It could later be extended to carry gas onwards into the hungry European market. For now, though, it is still early days.

UK firm Penspen is conducting the first phase of the front-end engineering and design (FEED) work which will draw together previous studies and further define the route and technical specifications of the pipeline. It was awarded a contract earlier this year by the state energy firms of the two nations, Morocco's Office National des Hydrocarbures et des Mines (ONHYM) and the Nigerian National Petroleum Corporation (NNPC).

The contract follows a feasibility study completed by the same company in 2018.

The FEED work includes an

in-depth evaluation of gas supply and demand, as well as further design of the pipeline system and environmental assessments.

Other firms engaged in the work include Dar Al-Handasah, Crestech and Control Risks. Crucially, Penspen is also making first moves to market the proposed pipeline to potential stakeholders, likely to include the multinational oil corporations.

It describes the idea as a “strategic project” for the whole region.

The results of its latest activities are expected to pave the way for a second wave of FEED work, which is then expected to lead to a final investment decision, although there is no clear timetable for this.

The challenges are many, however, given the scale and complexity – and potential cost,

which would stretch into many billions of dollars.

One of the areas studied will include the stability and security of supply from Nigeria, which has long been plagued by disruptions to output from the restive Niger Delta. The fairly tortuous construction and subsequent operation of the West Africa Gas Pipeline, which tracks an offshore route between Nigeria to Ghana, via Benin and Togo, may also provide some lessons.

The 678km pipeline, owned by a consortium of private investors (including Chevron and Shell) and state backers (including NNPC), has long faced challenges, not least erratic gas supplies from Nigeria, as well as financing and agreeing commercial terms along the route.

Initially proposed in 1982, it took some 25 years to complete, underscoring the complexity of rolling out trans-national pipelines, especially in under-developed gas markets.

The new Trans-Africa Pipeline between Nigeria and Morocco takes this to a different level altogether and would require the participation of up to 13 other countries along the route. It is a monumental project for sure, with lots of potential for offshore pipeline contractors, but there remain plenty of unanswered questions before work can begin. ♦

ARTIFICIAL INTELLIGENCE: A GLIMPSE INTO THE FUTURE

While technology and automation are prevalent in today's oil and gas industry, the emergence of AI presents even greater opportunities for better operational efficiencies. Martin Clark reports.

THE GLOBAL OIL and gas industry has come to rely increasingly on technology and automation in recent years — and it is a trend continues. This shift has been mirrored across much of Africa's energy sector, where process automation on upstream and downstream facilities has brought with it improvements in efficiency, productivity and safety, as well as trimming costs.

Advances in using Artificial Intelligence (AI) in process automation is moving things a step further. Yet the term AI likewise embraces a whole host of technologies. These include machine learning (ML), natural language processing (NLP) and robotics, among others.

Collectively, these allow machines to sense, interpret, act and learn on data to aid decision-making. According to Ernst & Young (EY), a leading consultancy firm, AI has the power to “disrupt and transform the relationship between people and machines, and drive greater productivity in businesses.”

It expects this impact to be felt in the oil and gas industry, which has been slow to take up the opportunity. That may be a good thing for an industry facing unprecedented change and challenge from new, clean energy technology and environmental pressures, all at a time when older, more skilled workers are



Data collection for the oil and gas industry can be transformed by artificial intelligence.

closing in on retirement, and younger workers are moving on to fresh pastures elsewhere.

In a 2019 report on the implications of AI for the sector, one EY executive, Lance Mortlock, said: “An ageing, depleted workforce and the relentless pressure on operational efficiency creates an opportunity for technology to play an even greater role.”

So, where does AI and its smorgasbord of technologies fit in? For the most part, the oil and gas sector has invested proportionally less on AI-related technologies than other sectors

such as banking, IT and software.

In a 2018 survey of global oil and gas super majors charting which technologies they were implementing, AI and ML did not even rank in the top five. The respondents predicted that robotic process automation and advanced analytics would have the most significant and positive effect on their businesses.

And yet, AI, when combined with modern high-powered super computing, has the potential to transform the large volume of data collected by oil and gas companies, enabling them to use that data in ways it has never been

used before – processing quickly, drawing correlations, learning and ultimately helping make better predictions to cut costs.

Potential uses range from asset maintenance and rapid well data analysis through to improved financial planning and human resources. If anything, it is an opportunity waiting to happen, both globally and in Africa, as the continent's energy industry expands.

“The AI revolution is already here for some,” the EY report concludes, “and for others – such as oil and gas – it's just around the corner.” ♦

AFRICAN RIG COUNT

COUNTRY	March 2018	April 2018	March 2019	February 2019
ALGERIA	55	55	52	52
ANGOLA	3	2	5	5
CÔTE D'IVOIRE	0	0	1	1
EQUATORIAL GUINEA	0	0	0	0
GABON	0	0	0	3
GHANA	0	1	3	3
KENYA	8	8	8	8
MAURITANIA	0	0	2	2
MOZAMBIQUE	1	1	0	0
NIGERIA	12	13	14	14
SENEGAL	0	0	2	2

Speedy data logging and delivery with digital telemetry

PROBE, A SUPPLIER of cased-hole logging and advanced monitoring technology to the global oil and gas and geothermal industries, is offering its customers additional resources to dramatically increase their data-logging capabilities through the adoption of its high-speed digital (HD) telemetry platform.

Known as the HD Platform, an increasingly wider range of high-speed, highly configurable digital sensors play critical – and unique – roles in helping operators to log data much more efficiently. In addition to its range of Standard and Array Production logging tools, Probe has been focusing on cased-hole formation evaluation solutions.

These include: the MAC 24™ Multi-arm Caliper Tool, which makes it possible to identify integrity problems, such as mineral deposition, corrosion, wear or mechanical deformation, inside a completion; the RADii™ Segmented Bond Tool, which measures and maps the quality of cement behind casing in oil and gas wells; the RAS™ Reservoir Analysis Sonde, a three-detector pulsed-neutron logging tool for measuring reservoir saturation

using Sigma and Carbon-Oxygen techniques; and the Spectral Gamma-ray Tool, an evaluation tool that offers insight into the radioactivity and mineral composition of cased-hole formations.

The HD Platform consists of two parts: an inter-tool communications bus and mono-conductor telemetry which is managed by the Telemetry Control Unit (TCU).

The inter-tool communications bus is a single wire bi-directional system that operates at 500kbps, which is ample speed to accommodate many different combinations of logging tools. The controlling telemetry – or alternative memory tool – samples sensors at a rate of 50 times per second, allowing high data rate tools and, for example, multi-arm calipers to provide high vertical resolution. Commands and instructions are sent to the sensors on the same single wire bus.

The TCU handles all communications to surface. This device controls the data collected by the tools below, and packages it for transmission to the surface system. It receives commands from the surface system via the fast

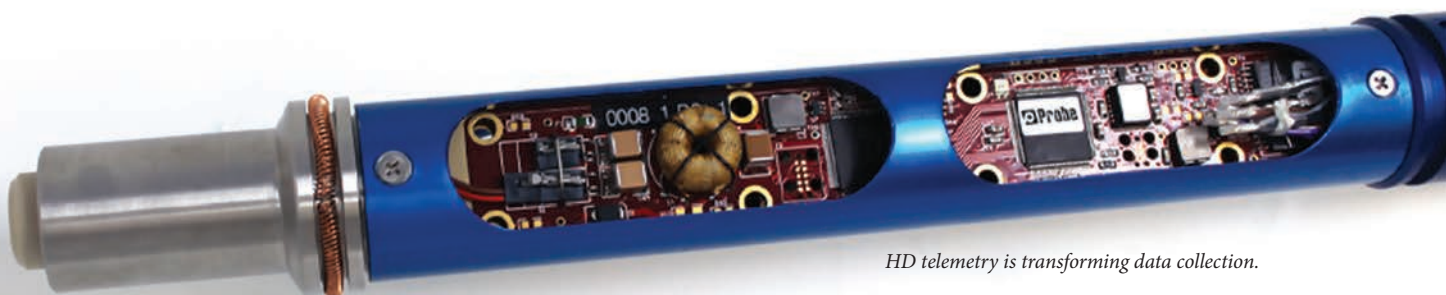
downlink, and responds back to the surface, as necessary.

The TCU can be replaced by the Memory Logging Tool (MLT) allowing all HD sensors to be deployed on slickline and coil tubing, among others. The HD Platform is a modular design offering simple mechanical maintenance and supported by plug-in electronic boards. It is well suited to conventional and remote operations.

Looking ahead, as part of its continuing commitment to developing technologies that gather comprehensive data, Probe plans to integrate HD telemetry technology into all current and future case-hole logging tools.

“For years, the demand for logging tools that are highly configurable and capable of gathering high quality data more efficiently has continued to rise unabated, so we believe that continuing to expand our truly intelligent, effective formation evaluation solutions is critical to our customers’ success,” said Martin Barratt, VP global sales for Probe.

www.probe1.com



Leveraging wind power in offshore operations

DNV GL is urging offshore operators to use floating wind turbines to power water injection for oil recovery.

'WIN WIN' (WIND powered Water INjection) was conceived in 2013 by DNV GL and is ready for prototype development after two joint industry projects (JIP) have shown the concept to be cost-efficient and technically feasible.

By using a floating wind turbine, the WIN WIN concept allows the injection system to operate independently, eliminating the need of long flowlines from the platform.

DNV GL has worked with oil and gas companies since 2015 to bring the 'WIN WIN' concept to prototype readiness. The first phase of research explored the techno-economic feasibility of the wind-powered water injection, while, the second stage involved advanced proof-of-concept lab tests.

President & CEO of DNV GL, Remi Eriksen says, "Wind power working for oil and gas, and oil and gas working for wind power, not only captures the imagination in these times of transition, but makes a lot of business sense. The question, now, is who is going to take this concept into physical reality?"

In the latest round of research, DNV GL conducted JIP with funding provided by ExxonMobil and Vår Energi AS. Jayme Meier, Vice-President, ExxonMobil Upstream Research Company, says, "The completion of phase 2 of the WIN WIN JIP drives us one step closer to a technically viable and commercially deployable system."

www.dnvgl.com

Logan Industries introduces a passive heave compensation winch at OTC

LOGAN INDUSTRIES, A hydraulic repair, manufacturing and rental company, has launched a Passive Heave Compensation Winch.

The system, a set of winches engineered to safely provide constant tension through the rated range of motion, is primarily used in subsea drilling and completion activity. Far less complex than an active compensation system, the winch is electrically powered and uses a custom-built hydraulic power unit and control set to monitor winch status and activity.

With a design life of 20 years, the winch provides passive compensation over a wide range of movement. Traditionally, passive compensation is provided via hydraulic cylinders, whose compensation range is limited to



A winch with a 20-year lifespan could transform subsea drilling.

the overall stroke of the cylinder. This winch widens this window, providing passive compensation in a small footprint.

The winch, which can be controlled from a local operator console, is equipped with two independent winch drums per winch skid. Each winch skid features an energy regeneration

circuit to provide continuous heave compensation. The system is designed to operate the winches autonomously and only requires periodic pressure monitoring and maintenance. To date, two Winch Skids with a common power unit have been delivered and installed on a semi-submersible.

Sercel-GRC celebrates 1,000 sales of the Spy Pro ESP gauge for downhole systems

SERCEL-GRC, AN oil and gas service company that designs, manufactures and markets downhole data acquisition instruments and surface equipment, has announced the sale of the 1000th Spy Pro gauge for downhole ESP systems.

Officially released in 2018, the Spy Pro ESP gauge is

complete plug-and-play package that is manufactured in various models to accommodate multiple applications. Rated for 5,000 and 10,000 psi at 150 Celsius, Spy Pro can record up to 11 downhole parameters which are used to monitor the health and wellness of the ESP production system including

intake and discharge pressures, intake and motor temperatures, X, Y and Z vibrations, water motor ingress, line voltage, current leakage and wye point voltage imbalance.

The Spy Pro ESP gauge data gives operators more detailed premature data insight into the long-term vitality of their wells which in turn can help them decrease ESP system downtimes and expenditures. The unique sealed design extends the run life of the gauge while providing minimum re-dressing when running it from one well to another, which saves OPEX and extends CAPEX. The fit-for-purpose Spy Pro ESP gauge can be used in reservoir and well testing, production and troubleshooting applications.



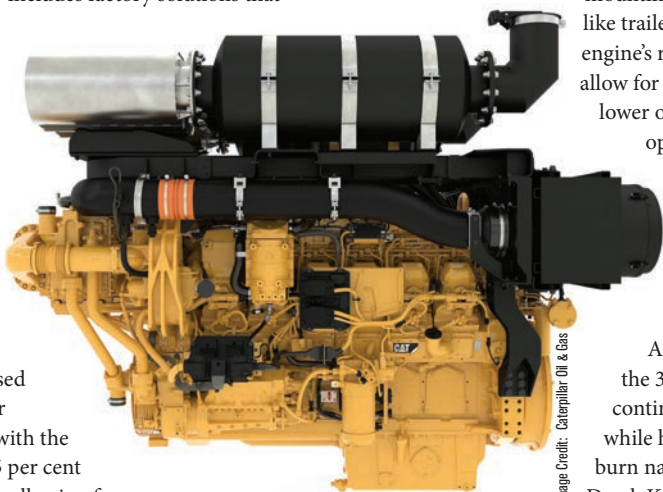
The device helps operators obtain detailed data from downhole ESP systems.

Image Credit: Sercel-GRC

Dual-fuel gas-blending engine meets US EPA Tier 4 final emissions standards

CATERPILLAR OIL AND Gas has launched the land well service 3512E Dynamic Gas Blending dual fuel engine. The 3512E DGB™ engine will be certified to U.S. EPA Tier 4 Final emissions standard while offering the highest natural gas substitution in its class.

The 3512E DGB includes factory solutions that emit approximately the same or less greenhouse gas emissions as a comparable 3512E Tier 4 Final diesel engine. Additionally, the dual fuel performance of the new 3512E DGB has significantly increased compared to similar engines in its class with the ability to achieve 85 per cent diesel displacement, allowing for lower operating costs.



This engine lowers costs as well as emissions.

With identical configurations as the 3512E diesel engine, the new 3512E DGB engine was designed for 2250 and 2500 bhp ratings. Separate circuit and air-to-air after-cooling options are identical to the core diesel, including mounting dimensions for like trailer design. The engine's robust design will allow for extended life and lower owning and operating costs.

"Caterpillar's 3512 platform has decades of experience operating in the oilfield.

And the addition of the 3512E DGB will continue that legacy while helping customers burn natural gas," said Derek Kamp, well service industry manager.

Image Credit: Caterpillar Oil & Gas

ABB launches non-invasive temperature sensor for simpler, safer processes

ABB'S NITEMP NON-invasive temperature sensor offers a simple, safe way of measuring process temperature without the need to shut down a pipeline, drill a hole, or install a thermowell. With its double

sensor architecture and specially developed calculation algorithm, NiTemp enhances safety and reduces installation costs without sacrificing accuracy.

The device is designed for surface measurement and

eliminates the need for a thermowell, avoiding process intrusion altogether, increasing the safety of people, plants, and the environment. As such, it can be used in a range of applications, including processes with hazardous media, special hygiene requirements and/or stringent cleaning requirements and high-pressure processes with high bending loads or use with abrasive media.

The NiTemp approach is inherently safe, compliant with safety standards, and simplifies environmental aspects. With the sensor able to be installed and maintained without shutting down a process, plant availability is improved and system costs are lowered, helping to reduce CAPEX costs.



Image Credit: ABB

Temperature measurements can be simplified, eliminating shut-downs.

ENI and University of Pavia develop technology

THE PRESIDENT OF University of Pavia, Fabio Rugge, and the CEO of ENI, Claudio Descalzi, signed a framework partnership agreement to work on the strategic areas of operational efficiency, decarbonisation and the circular economy.

The university will collaborate with ENI to lend its expertise to technological development. The university excels in mathematical, computer, geological and physical sciences, as well as engineering.

The agreement is valid for three years and is subject to a possible extension for a further 12 months. During this time, ENI and University of Pavia will develop a portfolio of innovation projects through knowledge sharing. The company and the university already collaborate on renewable energy research.

In addition, there are established partnerships in the geological sector, with reservoir rocks analysis, for ENI's most important discoveries, as well as environmental studies for the bioremediation of polluted soil.

They have also undertaken a circular economy project, as part of the innovation initiatives promoted by the Region of Lombardy for energy supply and water management.

The framework agreement widens the research partnership network that ENI holds with leading universities and Italian research institutes, with nine agreements signed by the company, corresponding to more than 140 ongoing or planned projects. The agreement aims to strengthen the local network allowing development between the Pavia territory and ENI sites such as Sannazzaro Refinery.

Hose management seminar highlights issues for terminals

MARSOL INTERNATIONAL HELD a marine hose management Seminar in Dubai, highlighting the trending topics in the hose industry, including the company's new methodology for the oil and gas terminals market.

Marsol offers an innovative solution that ensures a more effective and efficient hose assembly system with the potential to generate considerable savings on changeout time and cost. This new system provides benefits of faster management time and ensures long-term, cost-effective functionality of the terminal facility and assets, reducing risks while optimising the client's assets and resources.



Image Credit: mARSOL

Hose management involves ensuring safety as well as cost-efficiency.

"Our new hose launch system is an overall upgrade to ensure reliability and maintenance of the marine hoses," Mike Young,

director of Marsol International explained. "It is aimed at reducing degradation problems that arise over time."

Oil and gas marine hoses are the main conduits for offshore product transfer and are critical components in the distribution chain. These hoses can be exposed to harsh environmental and operating conditions, and must comply to Quality, Health, Safety and Environment (QSHE) standards. Marsol's hose management service is designed to avoid unplanned shutdowns, and instead improves reliability and asset availability while ensuring efficiency and minimising operational costs.

For more information on the seminar, go to www.marsol-international.com/hose-management-seminar-2019

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AMBITIOUS PLANS FOR THE ANGOLAN OIL AND GAS INDUSTRY

The African Energy Chamber (AEC), the continent's voice for the ongoing change and progression in the African energy industry named Sergio Pugliese as its president for Angola. He talks about change and reform in the Angolan hydrocarbon sector.

The rapid change and reform in Angola's oil sector since the 2017 election has caught the attention of many. Will this enhance Angola's work towards attracting more investment into local content development?

Investment into local content development needs to be channelled and supported by strong regulations. As more foreign investors get into the market, the country is currently working on a new regulatory framework to promote the development of the Angolan content and build domestic capacities. At the moment, several pieces of legislation touch on local content and there is a definitive need to make our local content framework more efficient and competitive. A draft presidential decree on local content has been in the works this year and is expected for release and public consultation.

There was an announcement this year by the Angolan Government that it will create a regulatory body for the hydrocarbons sector – what do you expect this move to encourage within the Angolan oil and gas industry?

The creation of the new Angola National Petroleum and Gas Agency (ANPG), officially launched through Presidential Decree 49/19 in February, is one of the most significant reforms since 2017. Its pioneer Chairman is non-

other that experienced oil and gas executive and former Secretary of State Paulino Jeronimo, who has earned a very good reputation within the industry following an impressive track record stretching over many decades. More importantly, it will be acting as Angola's national concessionaire for hydrocarbon licenses and be in charge of regulating the industry and implementing government policy. The creation of the agency is part of Angola's efforts to streamline and overhaul the governance of its hydrocarbons sector. Up until now, state-owned Sonangol was responsible for such licensing activities. Setting up the ANPG puts Angola at par with best oil and gas industry practices, and is a positive move to promote good governance and transparency within the Angolan industry. We expect foreign investors and operators to respond very positively to this measure.

What strategies does Angola have to further encourage the financing of expansion of SMEs in its petroleum sector?

The government of Angola currently runs a number of programs, some of them, jointly funded with multilateral organizations which offer soft loans to SMEs in all sectors of the economy. These loans are accessible via state-owned banks but have especially since the 2014 financial crisis stringent criteria for



Sergio Pugliese, AEC president for Angola.

Image Credit: AEC

access attached to them. The Africa Energy Chamber continues to advocate for such loans to be made available to local entrepreneurs who are likely to employ more people in good-paying jobs whenever they have access to the right kind of financing. In the near future, I will lead a delegation to Europe, America and other African countries to see what they have done right and will build more coalitions to help the Angolan sector.

Are there any specific local content projects that Angola will be highlighting? What are the challenges, and how can local capabilities be strengthened?

I think the current approach by the Angolan government to encourage and strengthen local companies via tools such as offering them soft loans, rather than legislate them into projects is the best way of building local companies in a competitive manner. That is, they are more

likely to be capable of competing with internationally active companies and hence ensuring their survival in the long-term.

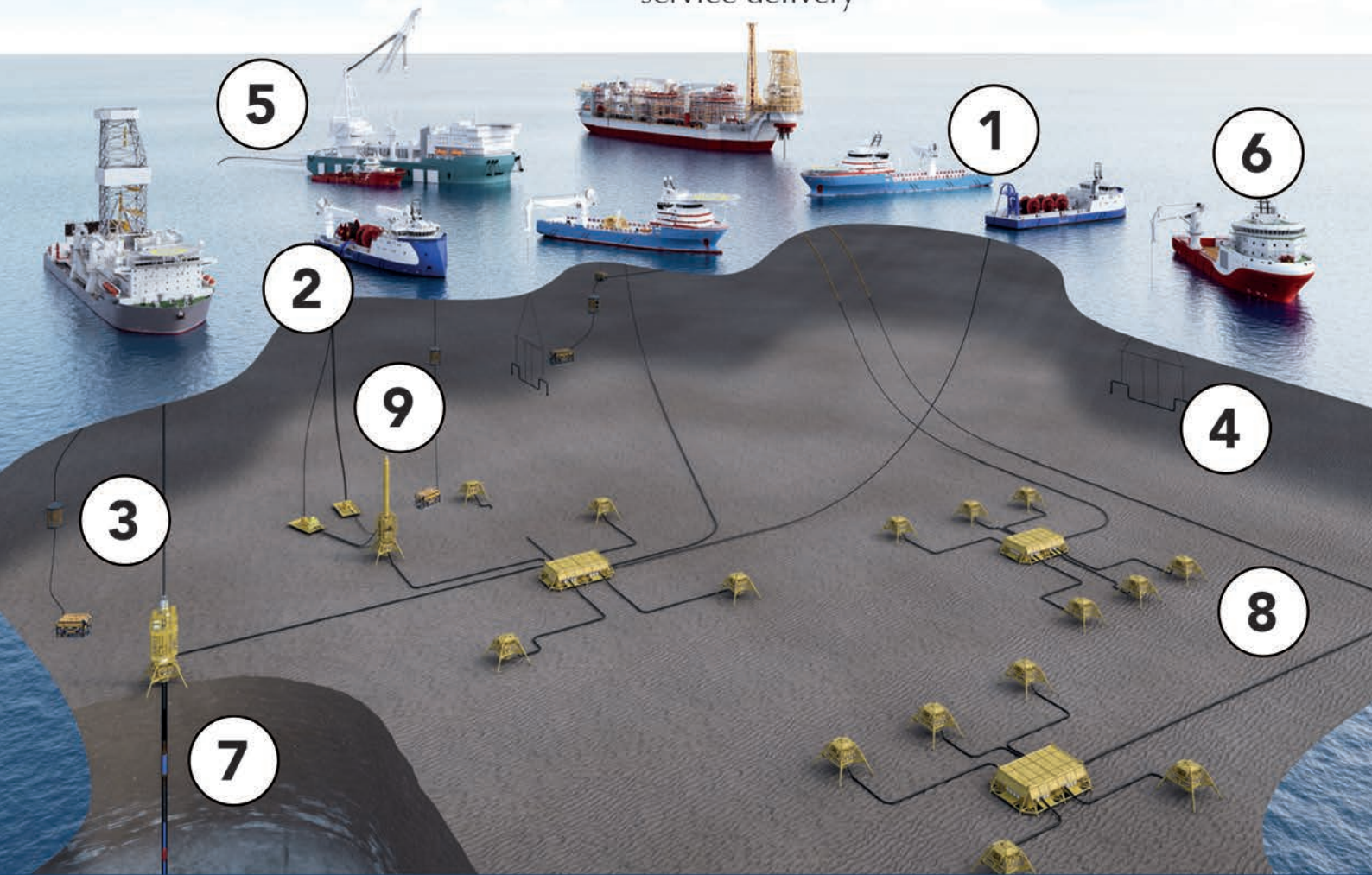
Some of the common challenges include the absence of capital, technology and deep industry know-how for local companies to carry out the high paying services in the industry. This eventually leads to local content being relegated to low paying and low jobs that do not in the long run help develop the kind of capacity needed to run the industry in the future with reduced dependence on foreign staff or capital.

Exposing local companies to best international practices, be it on an operational or managerial level, is very beneficial. National oil companies have grown a lot this way, by having stakes in licenses operated by international oil companies, and acquiring de facto the technology, know-how and practices that they now use to operate their own blocks. This move wouldn't have been made possible without their prior association with major IOCs and international oilfield services providers. The same thinking applies to engineering, procurement and construction, manufacturing and the overall value chain. Equatorial Guinea's Minister Gabriel Obiang Lima has been very vocal about this and we will work with the Angolan oil sector to ensure this happens. ♦

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