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Oil Review Africa

Oil · Gas · Petrochemicals

VOLUME 13 | ISSUE 2 2018

Transforming Nigeria:
Egina project

Technology: Drones, seismic surveys, piping fabrication, graphics processing units, smart oilfields

Industry news: Update on Mauritania plus major international events

Namibia: Exciting times for exploration

Angola: New leadership, new horizons

Dr Amy Jadesimi talks about Ladol's role in the Egina project. (P15)

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Learn more about the Egina project on page 15. (Image Credit: Total)

EDITOR'S NOTE

In this issue of *Oil Review Africa*, we focus on the Egina project, which is set to go onstream by the end of this year. Located 150km off the Nigerian coast, the development of the Egina field has sparked enormous investment thanks to the sheer size of the resources. On page 15, we profile some of the companies that are involved in the project.

As well as Nigeria, Namibia and Angola are in the spotlight. Namibia (page 22) is undergoing a busy time of exploration with big ambitions for transforming the nation with improved access to energy. Angola, meanwhile, is an established market but the country is undergoing significant changes which will impact on the country's oil industry. Find out more on page 24.

This issue is also packed with features on technology, with everything from drones (page 23) to graphics processing units (page 28) to pump maintenance (page 32) covered, along with the latest innovations from page 37.

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9-10 **Oil & Gas Investment Symposium**
New York City
www.ipaa.org/events/ogis-new-york-2018

9-11 **Operational Excellence in Refining & Petrochemicals**
Houston
www.opexinrefiningandpetrochem.iqpc.com

30-3 May **OTC**
Houston
www.2018.otcnet.org

MAY

29-21 **East Africa Oil and Gas Expo 2018**
Nairobi, Kenya
www.expogr.com/kenyaoil

23-24 **Africa E&P Summit**
London
www.africaepsummit.com

JUNE

14 **5th East Africa Oil & Gas Summit**
Nairobi, Kenya
www.eaogs.com

20-22 **Upstream West Africa**
Dakar, Senegal
www.upstreamwestafrica.com

NOVEMBER

5-9 **Africa Oil Week**
Cape Town, South Africa
www.africa-oilweek.com

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

Mauritania actively seeking investment in hydrocarbons

THE OIL AND gas discoveries off the coast of Mauritania have enhanced the west African country's appeal as a foreign investment destination.

This was the message at a March networking and information event hosted in London by the Mauritanian British Business Council, with plans afoot for a 2018 trade mission.

Introducing the session, Ayana McIntosh-Lee, vice president - communications and external affairs, BP Mauritania and Senegal, described the commercial atmosphere in Nouakchott, the Mauritanian capital, as "buzzing".

Iron ore extraction is the country's biggest industry, at 46 per cent of total exports, but this may change if hydrocarbons are successfully exploited. Mauritania's other extractive industry sectors are gold and copper. The Tasiast gold mine is in the second phase of an expansion project which will take production from 12,000 tons per day to 30,000 tons per day. However, development of the Askat iron ore prospect is on hold until commodity prices rise. This is where hydrocarbons development could take over from iron ore.

Improved access to energy could be a boon to Mauritanian farmers..

Image Credit: John Spooner/Flickr

BP, ExxonMobil, Petronas, Sonatrach, Total and Tullow are the major players in Mauritania's nascent hydrocarbons industry with big plans for gas production to go online by 2021.

The Chingetti field, operated by Petronas, was productive from 2006 until 2017 but the geology proved too challenging and the field is being decommissioned.

The 15tcf Tortue field, discovered in 2015 by BP and Kosmos, is looking promising with extensive seismic survey work being undertaken by license-holders.

Total has three blocks and is looking to start drilling at the end of 2018 following encouraging seismic survey results. ExxonMobil is still undertaking seismic work with no immediate plans to drill. Meanwhile, onshore, Sonatrach, the Algerian national oil company, plans to drill its TA1 block either late 2018 or early 2019.

Gas rather than oil is the big focus of Mauritania's hydrocarbon prospectors with plans for a FPSO to be built by KBR, with McDermott and Baker Hughes winning contracts for front-end development.

There are also plans for a moored production site, with gas used to meet local energy needs. Investment opportunities along the value chain are expected to arise for Britain and beyond.

It is hoped that oil and gas development will boost the fisheries and agricultural industries, as was the case with parallel development in the North Sea. While Mauritania is 90 per cent desert, agriculture focuses on meat and milk. But, as is the case with the fishing industry, better processing facilities and access to energy via gas reserves are needed for agriculture to grow.

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East Africa focus at Nairobi event with technology for the whole value chain

EAST AFRICA IS attracting investment in the wake of oil discoveries in Kenya and Uganda, as well as gas deposits off the coasts of Mozambique and Tanzania.

To bring potential partners together, Oil & Gas Expo Kenya 2018 will be held from 29-31 May in Nairobi.

In keeping with the strong push across the entire continent for regional cooperation, the event, while located in Kenya, is aiming to draw in traders and importers from neighbouring countries. Regional trade bodies from Congo, Ethiopia, Kenya, Mozambique, Somalia, Tanzania and Uganda are expected to be represented at the event.

"The East African region is emerging as one of the most prolific oil and gas exploration sites in the world," said Trevor Daniel, exhibition manager, Expogroup. "Kenya's diverse economic structure, pro-market policies and brisk consumer spending growth have led to the emergence of this market and, to add to that, the new oil and gas discoveries in East Africa, especially in Kenya's Turkana county, have the power to be drivers of development in the region."


Image Credit: Gihan Dias/Flickr

Nairobi, the Kenyan capital, will host Oil & Gas Expo Kenya 2018.

For more information, log on to www.expogr.com/kenyaoil

Keynote speakers announced for Africa Oil Week 2018

JOHN D. HOFMEISTER and John Simpson CBE have been confirmed as keynote speakers for the 25th edition of Africa Oil Week, which will be held in Cape Town fromm 5-9 November.

Industry heavyweight John D. Hofmeister in a 'Hard Talk'-style session. This will see the former CEO and president of Shell Oil's US company speaking candidly about his experiences in the industry, the real challenges and opportunities in realising energy security and facing the threat of peak oil.

Meanwhile, John Simpson, BBC world affairs editor and foreign correspondent, will be getting to grips with the big questions to ensure we move the needle on Africa's hydrocarbon conversation and uncover the answers needed to unlock its full potential in the global and regional energy mix.

At this year's event, the American Association of Petroleum Geologists (AAPG) will co-locate its international conference and exhbiyion with Africa Oil Week.


Image Credit: Chatham House/Flickr

John Simpson will be leading important discussions at Africa Oil Week 2018.

For more information, log on to www.africa-oilweek.com

Dangote to deploy graduates at new refinery

NIGERIAN GRADUATES WHO have returned to the west African country after studying engineering at an Indian refinery will be deployed at the Dangote Refinery which is being built at Lekki, Lagos.

The graduates trained at Bharat Refinery, one of the biggest in the world, and have reported to Dangote management that their experiences in India were extremely valuable.

The young engineers spent two months in classroom training and three months on the job training.

Opeyemi Oyedepo, a process engineer, and Igwe John, a petroleum and gas engineer, told the management that being involved in troubleshooting during their training has boosted their confidence that Dangote Refinery with will help eradicate fuel scarcity in Nigeria.

Dangote's director of human capital management and project support, Mohan Kumar, said the company is laying a solid foundation with the training of the engineers.

Kumar explained that the engineers were trained by experts who had more than 45 years experience in refinery operations, stressing that the training became imperative due to the commitment of Dangote Group to promote local content by developing indigenous capacity.

He added that "the engineers are expected to also transfer the skills acquired to other Nigerians when the refinery comes on stream".

When it is operational, it is expected that the US$11bn refinery will be able to produce 650,000 bpd. First Bank National Quest Capital has described the project as a "game-changer".

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Nigeria third in planned FCC unit capacity additions, with India leading the way

ANALYSIS OF PLANNED Fluid Catalytic Cracking (FCC) unit capacity of refineries shows that the Ratnagiri refinery in India has the highest planned FCC capacity globally, with 312mbd during 2018 to 2022. China and Nigeria follow with 304mbd and 247 mbd, respectively, according to GlobalData, a data and analytics company.

The Dangote-built Lagos I refinery, currently under construction at Lekki, Lagos, has given Nigeria third-place status.

Leading the way is the Ratnagiri refinery in India, with planned FCC capacity at 312mbd during 2018 to 2022.

The refinery is expected to start operations in 2022 with a total capex of $40.0bn. Indian Oil Corporation Ltd is the operator of the refinery.

Meanwhile, the Dayushan Island refinery in China has the second highest planned FCC capacity with 304mbd. The refinery is expected to start operations in 2018 with a total capex of $15.0bn. Zhejiang Petrochemical Co is the operator.

The Lagos I refinery in Nigeria has the third highest planned FCC capacity in 2022, with a capacity of 247mbd.

The refinery is expected to start operations in 2019. Hyundai Heavy Industries has won the US$58mn contract to build 15 LPG tanks for the project. They will store 75,000cu/m of gas.

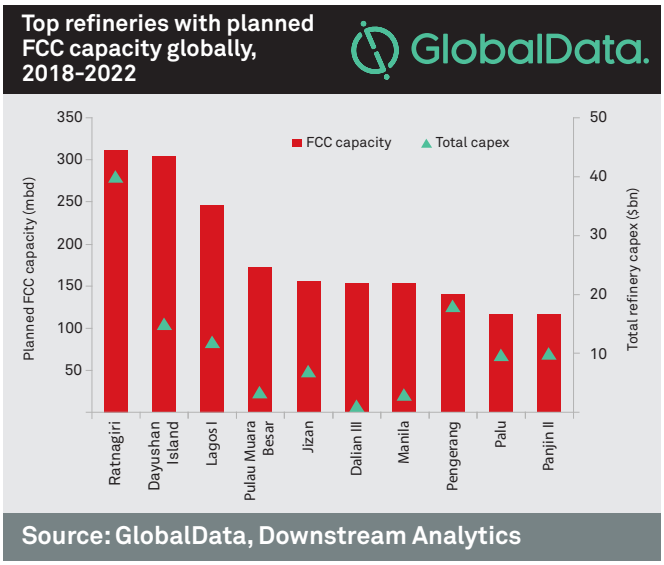

Image Credit: GlobalData

India is leading in planned FCC capacity at its refineries.

OPEC hails "outstanding performance" in conformity to production adjustments

OPEC HAS PRAISED OPEC and non-OPEC countries for the highest-ever conformity level in regard to voluntary production adjustments.

A level of 138 per cent has been achieved, according to the OPEC-non-OPEC Joint Ministerial Monitoring Committee (JMMC).

In a statement, the JMMC said that the Declaration of Cooperation "continues to have a transformative effect on the global oil industry. Participating countries, working in concerted action, have once again demonstrated their dedication to expediting the rebalancing of the oil market".

The statement then goes on to say that "this has benefitted a broad range of energy stakeholders, including producers and consumers, as well as the world economy."

In February, OECD commercial stocks fell to 2,855mb, further reducing the global oil inventory glut. In response to this reduction, the JMMC called on participating countries to consider further opportunities to institutionalise their collaboration, stressing that participating countries shoild aim to achieve or exceed conformity.

Image Credit: OPEC

The Joint Ministerial Monitoring Committee.

Possible pipeline deal for Kenya by mid-2018

AN AGREEMENT ON the construction of an oil export pipeline could come to fruition by mid-2018, according to Africa Oil, one of the partners in the planned project.

Tullow Oil, which has been active in Kenya for six years, and its partners proposed in January to transport oil from the land-locked Amosing and Ngamia fields via pipeline to the Indian Ocean port of Lamu 750km away.

Tullow Oil and Maersk Olie og Gas are the other two partners in the joint venture.

"We've got two pipeline companies bidding ... Sometime before mid-year we expect to come to an agreement," Africa Oil Chief Executive Keith Hill told an industry conference.

In February, Africa Oil released an update on it Kenyan operations, which included plans for the pipeline.

According to the February update, an an early Final Investment Decision (FID) would take full advantage of the low-cost environment for the field and infrastructure development. The update went on to say that "installed infrastructure can then be utilised for the optimisation of the remaining and yet to be discovered South Lokichar oil fields, allowing the incremental development of these fields to be completed in an efficient and low cost manner post-first oil."

The initial stage is planned to include 210 wells through 18 well pads at Ngamia and 70 wells through seven well pads at Amosing, with a planned plateau rate of 60,000 to 80,000 bopd. Additional stages of development are expected to increase plateau production to 100,000 bopd.

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Nigeria to look beyond oil for fiscal recovery: IMF

THE NIGERIAN ECONOMY is coming out of recession but needs to look beyond oil revenues to ensure the country reaches its long-term potential. This is according to a report released in March by the International Monetary Fund (IMF).

Growth in Nigeria recovered to 0.8 per cent in 2017 after the collapse in oil prices, exacerbated by falling oil production, took a major toll on the economy. The recovery in oil prices is supporting the recovery, but more needs to be done to reduce unemployment and address poverty and develop the non-oil sectors, the report said. Non-oil sectors make up 65 per cent of the Nigerian economy.

According to the report, rising oil prices, new foreign exchange measures, attractive yields on government securities, and a tighter monetary policy have made foreign exchange more readily available and helped contain inflation. Consequently, investors are returning to Nigeria

The report praised the Nigerian government's Economic Recovery and Growth Plan.

Gabon Upstream announces ultra-deepwater oil and gas discovery from Boudji-1 well

PETRONAS SUBSIDIARY, GABON Upstream announced a new oil and gas discovery from its Boudji-1 exploration well in Block F14, in South Gabon. The ultra-deepwater exploration well, drilled in depths of 2,800m, encountered 90m of gross high quality hydrocarbon-bearing pre-salt sands.

"The discovery in Gabon is an encouraging development for Petronas, as we continue to pursue growth activities beyond Malaysia, in line with the strategy to expand our core oil and gas business by growing our resource base," said Petronas executive vice president and upstream CEO, Datuk Mohd Anuar Taib.

Image Credit: Petronas

Datuk Mohd Anuar Taib, Petronas executive vice president and upstream CEO.

Nigerian natural gas plant adds two Grove GMK5130-2 cranes

NIGERIA LIQUID NATURAL Gas (NLNG) has purchased two Grove GMK5130-2 all-terrain cranes for the maintenance and construction work for its gas liquefaction plant on Bonny Island, Nigeria.

The company runs one of the world's largest gas liquefaction plants from its facility on Bonny Island, Nigeria. The cranes broaden NLNG's Grove fleet, joining an 80-tonne capacity GMK4080, a 100-tonne capacity GMK5100, a 160-tonne capacity GMK5160 and a nine-tonne capacity YB4410.

The latest additions were supplied in late 2017 through Savvytech, the Grove dealer for Nigerian plants, as part of a long-term commercial relationship.

"NLNG has maintained a very strong relationship with Manitowoc for many years and has a lot of confidence in its cranes," said Seun Awoniyi, director of Savvytech. "The most reliable cranes in its fleet are 20-year-old Grove machines. The return on investment has been fantastic for them. Now NLNG has updated its fleet with two GMK5130-2 cranes, which we're confident will serve the company just as well,"


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Leading international speakers to address OTC in Houston

PATRICK POUYANNÉ, CHAIRMAN and CEO, Total, Ryan Lance, Chairman and CEO, ConocoPhillips, and Harry Brekelmans, Project and Technology Director, Royal Dutch Shell will be among the industry leaders speaking at this year's Offshore Technology Conerence (OTC). Now in its fiftieth year, OTC will be held in Houston from 30 April to 3 May.

"OTC is celebrating a significant milestone in the life of the conference," Mr Pouyanné said. "For 50 years, OTC has encouraged scientists and engineers to develop innovative technologies that have unleashed the potential of offshore energy sources needed for global growth and progress."

OTC will be honouring high achievers in the industry.

Brian Skeels, TechnipFMC's technology fellow, will receive the Distinguished Achievement Award for Individuals for his work in pioneering new subsea completions in record water depths and for the development of new tieback connections.

Shell and SBM Offshore will be presented with the OTC Distinguished Achievement Award in recognition of its development of the world's deepest oil and gas project, the Stones field, using a leased FPSO.

Image Credit: World Economic Forum

Patrick Pouyanné, CEO of Total, will speak at OTC.

The Heritage Award will be presented to Cesar Del Vecchio for his contribution to the development of deepwater floating systems by establishing, proving, and gaining worldwide acceptance for polyester mooring systems. OTC will recognise Tom Sifferman with a Special Citation, based on his contributions to production enhancement, complex rheology mitigation, and chemical flow assurance of difficult-to-handle reservoir fluids.

Closer oil trade ties proposed for Nigeria and Indonesia

DWIYATNA WIDINUGRAHA, HEAD of economic affairs of the Indonesian Embassy in Nigeria, has expressed interest in buying more Nigerian crude oil. The request was made when he led a delegation from the country on a courtesy call on the group managing director of the NNPC, Dr Baru Maikanti.

Mr Widinugraha commended NNPC for its support in crude oil supply, adding that the country needed further assistance in the form of increased crude oil allocation.

He stated that Indonesia, with a population of more than 250mn people, needed about 1.6 mmbbl of crude oil daily to meet its burgeoning energy needs as an emerging economy and would love to have a government-to-government arrangement with Nigeria in that regard.

Anizar Burlian, vice-president of Pertamina, the Indonesian National Oil Company, said they were in Abuja to thank Nigeria for helping them meet their local oil demand and to further explore better arrangements for buying high-grade crude oil.

He said they were interested in investment opportunities in the Nigerian upstream, midstream and downstream sectors of the Nigerian oil industry.

Mele Kyari, group general manager for crude oil marketing division at NNPC, said that NNPC would continue to assist Indonesia in the area of crude oil supply, adding that the request for a government-to-government crude supply arrangement should be routed through the President of Nigeria.

Image Credit: Prayitno/Flickr

Nigerian oil has helped Indonesian energy security.

Eni sells 10 per cent stake in Shorouk

ENI HAS AGREED to sell a 10 per cent stake in the Shorouk concession, offshore Egypt, where Zohr's super-giant gas field is located to Mubadala Petroleum, a wholly owned subsidiary of Mubadala Investment Company.

Eni, through its subsidiary IEOC, currently holds a 60 per cent stake, while the other partners are Rosneft with 30 per cent and BP with 10 per cent interest.

The agreed consideration is US$934mn. The completion of the transaction is subject to the fulfilment of certain standard conditions including all necessary authorisations from Egypt's authorities.

The Zohr gas field was successfully started up in December 2017, in only 28 months after its discovery, and is currently producing 400mn scf per day. The production is set to gradually ramp up to reach the plateau by the end of 2019.

Eni has been present in Egypt since 1954, where it operates through the subsidiary IEOC Production BV. The company is the main producer in the country with an equity production of around 230,000 boepd.

Musabbeh Al Kaabi, CEO of petroleum and petrochemicals at Mubadala Investment Company and Chairman of Mubadala Petroleum, said, "This is an important and attractive investment for Mubadala, adding a world-class asset to our portfolio with long-term cash flows. We are joining a strong partnership with Eni as operator, who have delivered the project in record time and with the full support of the Egyptian authorities."

Ajaokuta-Kaduna-Kano gas pipeline contracts signed

NIGERIAN NATIONAL PETROLEUM Corporation (NNPC) has signed engineering, procurement and construction contracts to develop 614km Ajaokuta -Kaduna-Kano (AKK) trans-Nigeria gas pipeline project.

The gas pipeline and stations, which are of more than US$2.8bn, are described as the biggest gas pipeline in Nigeria and one of the major in Africa's oil and gas operations.

The project is scheduled to be completed in two years. The AKK pipeline is expected to improve connectivity between the eastern, western and northern region of Nigeria. In addition, the project is set to boost gas supply in Africa by utilising major commercial centres in the northern corridor of the country, boosting power generation and industrial growth.

Image Credit: Allan Leonard/Flickr

Access to gas will help develop Kaduna.

Togo and Equatorial Guinea sign strategic LNG deal

TOGO AND EQUATORIAL Guinea have signed a strategic agreement to facilitate the trade in liquefied natural gas (LNG) between them, a move that aims to boost upstream and midstream LNG activities in the western and central African countries.

Under the terms of the agreement, Togo will import LNG from Equatorial Guinea. According to the Ministry of Mines and Hydrocarbons in Equatorial Guinea, this agreement is a part of the LNG2Africa initiative, in which the country promotes utilisation of LNG within Africa, using gas sourced and processed in the continent. The government of Togo said that it will explore the regasification opportunities of LNG, to study its use for power generation in the country.

Gabriel Mbaga Obiang Lima, minister of mines and hydrocarbons of Equatorial Guinea, said, "It is imperative that African nations monetise their gas, and that energy users benefit from this cheaper, cleaner, locally produced resource."

The ministers agreed to follow a detailed plan to supply LNG to power plants in Burkina Faso. Once approved, Burkina Faso is expected to quickly benefit from Equatorial Guinea's LNG.

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CONFIDENCE IN NIGERIA: THE EGINA PROJECT

The Egina project represents massive investment in the Nigerian oil and gas industry. We talk to some of the major players in the deepwater project about what it means for the economy, the people of Nigeria and the wider region. Georgia Lewis and Bola Olowo report.

THE EGINA DEEPWATER oilfield is located 150km off the coast of Nigeria in a water depth of up to 1,750m, 20km away from Akpo field, it covers around 500 square miles on lease block OML 130. Discovered in December 2003 when the Egina-1 well was drilled, the Egina-2 appraisal well was then drilled in October 2004. An appraisal and seismic data processing programme then led to the drilling of Egina-3 in September 2006, followed by Egina-4 in November 2006 and Egina-5 in January 2007. Oil reserves are estimated at 550mn barrels. It is a light oil rated at 28° API. Originally planned as a subsea tieback to the Akpo FPSO, the true scope of the discoveries soon became apparent. A major development programme was born with engineering studies commencing in 2008.

As well as the 330m-long FPSO, the US$16bn development will include an oil offloading terminal and subsea production systems, which includes risers, more than 50km of oil and water injection flowlines, 12 flexible jumpers, 20km of export pipelines, 80km of umbilicals and subsea manifolds.

By 2009, the development plan was approved by the Nigerian authorities. In July 2010, the first front-end engineering and design was completed by JP Kenny and MCS Kenny. In January this year, the US$3.3bn FPSO unit arrived from Korea.

The FPSO is an important part of the Egina project, involving a wide range of suppliers.

Image Credit: Laddol

The field is expected to come on stream this year with production from the Egina-5 well expected to hit 12,000bpd. The field's peak production rate is expected to be 200,000bpd and peak production capacity of the FPSO will be around 208,000bpd.

> **"Bigger plans for the Egina field were made when the true scope of the discoveries became apparent. This included the building of the FPSO"**

It will ultimately add 10 per cent to Nigeria's oil output.

Egina is being developed by Total Upstream Nigeria (24 per cent), CNOOC (45 per cent), Sapetro (15 per cent) and Petrobras (16 per cent).

But, like any major oil and gas project, it is not possible without the work of multiple companies.

LADOL

The arrival of the FPSO at the LADOL facility in January this year was a significant milestone for the Egina project. LADOL's managing director Dr Amy Jadesimi talked to *Oil Review Africa* about the importance of the project.

In particular, Dr Jadesimi stressed the importance of meeting local content requirements with the project: "The Egina project was the first project that was done after the passing of the local content act 2010, the National Content and Development Board, determined

that it was critically important for the integration of the FPSO to be partially done in Nigeria, and made it a perquisite that before they would approve any contract for Total for the FPSO, they had to build a capacity that would be suitable for local integration. LADOL was chosen because we have the optimum location, because we had, at that point, already built a track record of over a decade of investing in facilities and we infrastructural facilities and we had the financial capacity to invest in the yard alongside other contributions."

Dr Jadesmi said that Total "effectively helped us to build the yard" with the facility's first project being "the fabrication and the integration of the modules onto the FPSO". Samsung Heavy Industry is another important partner on the project.

"Those modules were fabricated over the last two and half years, and now that the FPSO has arrived, we are in the process of integrating the modules into the FPSO," she said.

While some parts of the project were not made at LADOL or in Nigeria, Dr Jadesmi said that some aspects were manufactured in Nigerdock and barged in to be integrated into the FPSO. However, she said it was important to bear in mind that "construction of the yard did not start until the after the Egina project, yet we managed to complete the fabrication on time ahead of the FPSO arriving."

She added: "This serves as a good reference point for current and future levels of local content and that we can achieve even higher levels of local content in future projects, we have proven that an FPSO can safely and reliably berth at the yard and the crane that we are using in the yard can effectively be used for future integration."

"The reason Nigerian Content Development Monitoring Board (NCDMB) made it as prerequisite to build capacity in Nigeria is because it is a game changer," she said. "Once we can integrate FPSOs in Nigeria, the centre of gravity for all future developments will shift to Nigeria. Therefore, there is now a strong financial incentive to do engineering and as we fabricate more in Nigeria, there is a strong incentive to keep the Nigerians that we are training to be perpetually employed and there is a huge market demand that is real."

Image Credit: Ladol

Dr Amy Jadesimi has been a long-term champion of developing local content in Nigeria and sees the Egina project as another great opportunity.

"It is actually cheaper to fabricate locally and use qualified Nigerian engineers than do the same work outside Nigeria," she told *Oil Review Africa*.

The Egina project is a boon for investment into Nigeria, according to Dr Jadesimi: "LADOL's is an industrial Free Zone, within which we have have built an ecosystem that provides an ideal environment for companies wanting to engineer and manufacture in West Africa. Such companies will benefit from being on the doorstep of the fastest growing market in the world. There are an increasing number international companies that have sustainable approaches to local engineering, manufacturing and partnering. The success of Egina makes it clear that the government has created an enabling environment for such projects and that LADOL Free Zone is a place where they can successfully complete any manufacturing project."

"As we fabricate more in Nigeria, there is a strong incentive to keep the Nigerians that we are training perpetually employed – there is huge demand."

Deux Project

Deux Project built on years of experience on other major projects for its work on Egina. Dr Walter Olatunde, the company's project director told us more about the company's work.

Deux Project started out in the engineering, procurement and construction for the health and education sectors but ended up diversifying into other sectors, particularly when infrastructure needed to be built. Now they have ambitions to expand to other parts of West Africa. The company developed construction expertise on major projects such as the rehabilitation of Lagos' Teslim Balogun Stadium (which was used for 2009 Under-17 World Cup), the building of Agege Stadium and the second-biggest stadium in Nigeria with sporting facilities in Port Harcourt.

"When Samsung was looking for contractors to build the facilities for the mega fabrication yard for the integration of the Egina FPSO, we bidded alongside others and we won the bid," said Dr Olatunde. "We basically did all the piling for the buildings, the foundations, all the drainage, the 500m quay wall to which the Egina FPSO is now anchored and today we are working in Dangote Fertilizer, we are doing all the buildings in the Dangote Fertilizer plant, and the civil works for Train 2."

Dr Olatunde explained Project Deux's involvement in Egina to *Oil Review Africa*: "Coming to Egina, because we had done piling for the stadium, we basically did our own piling, we brought our own equipment, and we did our own piling. The first contract we had on the Egina

EGINA

Celebrating Nigeria's Local Content

As the $3.3 billion Floating Production Storage Offloading (FPSO) finally berths in Lagos, **DEUX PROJECT LIMITED** join millions of Nigerians to commemorate the momentous occasion. The 200,000 barrels per day capacity Egina Deepwater oilfield is the largest FPSO ever installed in Nigeria (330-metres long) where the integration of six locally fabricated modules will take place over the next few months. This represents a significant boost in the Local Content Production.

DEUX PROJECT's involvement which includes the construction of the quay walls, the execution of full civil works, comprising of preworks, piling and all concrete works. typifies the competence of indigenous contractors in the execution of large scale fabrication, integration and construction of unprecedented magnitudes in Nigeria.

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- National Petroleum Investment Management Services (NAPIMS)
- Nigerian Content Development and Monitoring Board (NCDMB)
- Total Upstream Nigeria Limited (TUPNI)
- SAMSUNG Heavy Industries
- Lagos Deep Offshore Logistics (LADOL)

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was piling, then we had to do land reclamation, the drainage, foundation for all the buildings before they put the steel structures on them, then the cladding before the equipment was moved in, then the lay-down areas with all the layer works, and the quay wall."

He said the experience of working with Samsung Heavy Industries was a positive one because of the "spirit of cooperation and discipline".

"They were hands-on all through and the crew were able to build a strong capacity in terms of attitude - the skills are always there but it is the attitude to work that is key, knowing that there is a sense of responsibility, knowing that you must deliver, do quality work, do it right first time, and do it safely."

Like Ladol's Dr Jadesimi, he is a medical doctor as well as the company's managing director, Dr Tunji Olowolafe.

"We are medical doctors, but we are also managers," Dr Olatunde said. "Sometimes it is better when one is not practising in one's core, as such a person is likely to think out of the box and bring solutions to long-thought, rigid practices."

He said that making the move from medicine to construction has been "a challenge but exciting".

"Attitude is key, but we engage the experts to do the work – where you need the skills set, you get it," he told *Oil Review Africa*. "The professionals are doing the work, our duty is to manage the professionals. As a medical doctor, you are under a lot of pressure especially in emergency cases as lives are involved, so when we do projects, we think through the project from end to end in the value chain."

He said that Deux Project aims to be one of the biggest EPC companies in Nigeria and in Africa, working in a range of sectors including health, technology and education as well as oil and gas.

Image Credit: Deux Project

Deux Project has built on its experience in other major projects for its work on Egina.

"We build factories, we want to continue to grow," said Dr Olatunde. "The philosophy we have is hard work. Our focus for now is Nigeria but certainly we see West Africa in our sight."

Aveon

Aveon Offshore has played an integral role in the Egina project. In 2013, The company was awarded the Egina contract by FMC Technologies for the fabrication and load-out of approximately 5,000 tons of subsea structures including six manifolds with associated Suction piles, various subsea tree frame elements, jumpers and control systems.

Most recently, the Lagos-based engineering and fabrication services company completed the fabrication of six foundation support structures which were then loaded out and shipped off.

Prior to this, Aveon Offshore delivered 16 umbilical termination boxes and subsea tree fabrications (frames, permanent guide base and gasmats) between 2015 and 2017. The fabrication of six manifolds was delivered during 2017 together with five completed subsea distribution Modules. Twenty one multibore production well jumpers were delivered throughout 2017 and the rest will be delivered in 2018.

Aveon Offshore has undertaken this important project at its 300,000 sq m fabrication yard in Rumuolumeni near Port Harcourt. To accommodate the workload generated by the project, capex investment was made by FMC Technologies and Total in upgrading Aveons' site in Rumuolumeni. As a result a dedicated carbon steel workshop, duplex welding facilities, painting workshops, and facilities for electrical power and distribution were added to the yard's infrastructure. Meanwhile, existing premises such as Quayside were completely reinforced. The Egina project has generated more than 3,000,000 productive working hours in the last three years.

> **"We know there is a sense of responsibility, knowing we must deliver, do quality work, do it right first time and do it safely."**

"The successful completion and delivery of these subsea structures showcases the capabilities of our experienced team and our capacity as a local fabrication yard to deliver complex oil and gas projects meeting safety and quality standards as well as validating Nigeria's local content vision" said Tein George, chairman, Aveon Offshore.

Aveon Offshore has been working on EPC projects in Nigeria since 1999 and their work on Egina builds on their experience on other major assignments, such as fabrication for Bonga Northwest and Akpo FPSO topsides fabrication.

Nigerdock

Nigerdock has played an important role in the Egina project. Adebola Adesoye, the company's General Manager, Operations, told Oil Review Africa about Nigerdock's success in meeting the challenges of fabricating and loading out 7000

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tonnes of major components for the FPSO without any lost time incidents on more than 4 million man-hours of execution.

"There are always challenges in any project of this nature," said Mr Adesoye. "One of the main technical challenges was in planning and construction sequencing. Typically, some structures have over 7,000 joints to be welded. This required a major planning and project management approach to prioritising work flows, ensuring just in time materials and sub-component readiness, simultaneous operations and parallel critical path work execution; simply to define what to weld first."

"We also had to do a lot of logistic movements of very large structureswithin the yard, which was only possible because Nigerdock owns such a vast array of equipment specifically for that purpose. In terms of work execution, it was extremely challenging for fabricators and welders to complete their works on these complex structures due to awkward weld angles, inconfined spaces and the likes, so we had to increase the training of our professional workforce," he said. "Other challenges on such a scale of project boil down to identification of risks and planning, and mitigation of those to avoid injury or harm to people or the assetsas well as maintain quality and schedule. This approach was very much a collaborative effort between Nigerdock, Samsung Heavy Industries, and the main Client, Total Upstream Nigeria."

"There are always challenges in any project of this nature, such as a structure with 7,000 joints – we had to look at what to weld first."

Image Credit: Guilhem Vellut/Flickr

TechnipFMC, headquarted in Paris, France, has played an important long-term role in the Egina project.

Of interest to many was that Nigerdock fabricated and loaded out the 732-ton flare tower structure for the Egina FPSO which was then transported to Korea for initial integration on the vessel. So when the Egina vessel arrived in Nigeria it already contained some "made in Nigeria components" fabricated in Nigerdock. Mr Adesoye said this was only made possible by the fact that Nigerdock owns all its equipment and has developed competent professional personnel over the years. Such development and achievements are a testament to the effectiveness of the Nigerian Oil and Gas Industry Content Development (NOGICD) Act and collaborative efforts of the NCDMB and the investment appetite of the Nigerdock owners - Jagal.

Like other Nigerian companies involved in the Egina project, local content was an imperative to Nigerdock. Mr Adesoye said thatthe training and development required to create acompetent Nigerian workforce together with associated capacity-building has resulted in the graduation of the country's top fabrication professionals fully committed to World Class safety standards.He also stressed the importance of adequate attention and compliance to the holistic benefit for the workforce and their families, professionalism with our vendors and suppliers, alignment with the community and solid compliant and professional relationships with clients and associated Government departments so that everyone'sneeds are understood and aligned within budget and schedule "creating a stakeholder win-win situation."

"NOGICD Act has been a huge enablerfor us to achieve the level we are now at," said Mr Adesoye. "Local content imperatives haveassisted in building human capability and the country's capacity and specifically has been beneficial to Nigerdock over the years by assuring domestication of work that previously would have been exported. This approach together with the Nigerian Shareholders investment appetite has enabled us to create a world class facility at Nigerdock.

He added that Nigerdock stands out above its peers because of the professional, dedicated, competent workforce and by taking care of corporate social responsibility: "We always strive to be in harmony with the stakeholders with whom Nigerdock operates."

TechnipFMC

TechnipFMC 's involvement with Egina dates back to 2013 when construction began. In 2015, the company delivered four subsea wellheads in Nigeria for the project, the first to be entirely fabricated in the country.

The wellheads were fabricated by Nigeria's Oiltools Africa. The project was undertaken by a team of 44 local employees, trained by TechnipFMC, and was completed on time and without any safety incidents.

In 2016, TechnipFMC opened its state-of-the-art subsea services support centre in Onne, Port Harcourt and completed its first subsea tree for Egina. In October 2017, six manifold modules built by TechnipFMC were installed in the field for the project, and manufactured at Aveon's Port Harcourt yard.

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EXPLORATION CONTINUES APACE IN NAMIBIA

Namibia is one of the newest players on the African hydrocarbons scene and drilling in the Walvis Bay area is expected to commence soon. Georgia Lewis reports on the latest developments in the nascent exploration sector.

AT THE BEGINNING of March, Africa Energy announced the renewal of the Petroleum Exploration License 37 (PEL 37) contract for continued offshore work, as well as the signing of a rig contract. The second renewal period was approved by Namibia's Ministry of Mines and Energy and it commenced on 28 March, running for a period of two years with the obligation to drill a well.

Tullow Namibia is the operator of PEL 37 and it has contracted the Ocean Rig Poseidon, a sixth-generation deepwater drillship that is transitioning to Walvis Bay. There are now plans in place to spud the well in September 2018.

"ExxonMobil's recent entry in a block adjoining PEL 37 confirms our positive view of the geology of this region," said Jan Maier, Africa Energy's vice president - exploration.

PEL 37 covers an area of 17,295 square kilometres in the northern Namibian offshore region. The Cormorant Prospect is located in the Walvis Basin in a water depth of approximately 550m. The prospect is one in a series of extensive base-of-slope turbidite fan prospects with significant combined resource potential. The fans are in close vertical proximity to a mature oil-prone source rock of Aptian age that was recently proven by the nearby Murombe-1 and Wingat-1 wells, the latter of which recovered light oil.

EcoAtlantic, operator of the offshore Cooper Block (PEL 30), is also looking to drill this year. In February, the company published a public notice for the Environmental Clearance Certificate (ECC) for drilling an exploration well. The ECC is an important step towards commencing drilling the Osprey lead in the block.

> **"ExxonMobil's entry into a Namibian offshore block confirms the positive view of the area's geology"**

Image Credit: Warner Boyer/Flickr

Developing fuel products from Namibian hydrocarbons will help keep cars on the road.

The Osprey lead is in approximately 500m of water. EcoAtlantic has already completed the interpretation of several thousand kilometres of 2D seismic data as well as a 1,100km 3D survey, which was carried out by PGS Geophysical. Tullow is being kept busy in this block as well as PEL 37 as EcoAtlantic has contracted Tullow's exploration team to oversee the processing of the data for the block partners. All partners in the block have concluded, based on the data, that there is a highly justifiable lead and now an exact drilling location is being determined.

As well as the promising oil plans, Namibia is also looking to develop its gas industry with the Kudu project. The Kudu gas field is located offshore and the plan is to transport gas via a 170km pipeline to a power station that will be built in Uubvlei, 25km north of Oranjemund in southern Nigeria.

The development of Namibia's oil and gas reserves is part of a bigger plan for the country to meet its energy needs. This will come as welcome news to the people of Namibia - according to figures from the World Bank from 2014, 49.6 per cent of Namibians had access to electricity, although this was a significant increase from just 25.2 per cent in 1990. Additionally, the government has increased the tax on fuel but dropped the fuel price to ensure that Namibian motorists do not suffer. However, developing its own fuel products is part of the Namibian hydrocarbon agenda in order to keep prices competitive at the pump.

READY FOR TAKE-OFF

THE RISE OF DRONES

Cyberhawk has used drones to great effect on a West African offshore project.

Image Credit: Cyberhawk

The impact of drones on the oil and gas industry is set to soar. Martin Clark talks to Phil Buchan, Cyberhawk's commercial director about how their aerial vehicles are making an impact in Africa.

IT MAY STILL seem the stuff of science fiction but unmanned aerial vehicles (UAVs), or drones, are already playing a huge role in Africa's oil and gas industry. These small tech-laden flying machines, typically piloted by a human close by, have become integral in helping operators to assess critical equipment in hard-to-access places, such as gas flare towers or under offshore rigs.

In the past, these were places where workers would have to take to ropes and other safety gear to gain any visual insight into the integrity of equipment. Using drones in this way makes the task quicker, easier and safer.

Cyberhawk, a Scottish engineering and inspection firm that uses drones to collect data on industrial facilities, has completed a project assessing the condition of an 80m gas flaring unit on board a floating production storage and offloading (FPSO) vessel anchored offshore West Africa.

The company carried out daily drone inspections over three months without any need to shut down the tower; a manual inspection would have resulted in a certain production shutdown.

Cyberhawk's close visual inspection (CVI) advised on the condition of the tower and assisted in predicting damage development, by sizing the cracks on the flare bolts. Using the visual and technical data captured by the UAV, the oil company was able to schedule repairs, minimising downtime.

Phil Buchan, Cyberhawk's commercial director, says the project involved a two-man team – a drone pilot and an inspection engineer – to gather a live high definition video feed to assess damage to the tower.

"It basically reduces the need for people to go to height during inspection work. The drones can go to places where people can't."

In another project, in Nigeria, to inspect five onshore flares, he said the client calculated cost savings of around US$11m as a result of keeping its production flowing during the work.

The company also works on other facilities, including internal inspections of storage tanks using a resilient drone located inside a caged ball, in case it bumps into the sides. And the increasing level of sophistication of UAV technology continues to advance.

"At this stage it doesn't do the repairs, it doesn't replace the requirement of people to work at height," says Buchan. Typically, the drone is used as a scanning tool to assess conditions and pinpoint areas for repair work that will be undertaken by human beings.

But he draws an analogy with the evolution of remotely operated vehicles (ROVs) in the subsea market. "Gradually, ROVs developed, so at first they're looking at things, but later they're touching things." It's not hard to imagine a future where aerial drones start to perform similar tasks too.

The use of drones across Africa's oil industry is already "here and happening", adds Buchan. "We're working with all the multinationals, all the independents, and all over Africa."

AFTER A TURBULENT 2017, ANGOLA MOVES AHEAD

The Angolan oil industry has not let political change or limitations from OPEC stand in the way of progress. Ambitious new projects are continuing apace with big companies leading the way. Georgia Lewis reports.

Angola is looking forward to a busy time offshore in 2018 with exciting projects coming onstream.

Image Credit: Eni

LAST YEAR WAS a turbulent one for Angolan politics with the long-serving president José Eduardo dos Santos being replaced after 38 years by João Lourenço. Then President Lourenço replaced Isabel dos Santos with Carlos Saturnino as head of Sonangol, that national oil company, in a move that was widely welcomed in Angola and across Africa.

But, particularly for the big names in the Angolan oil industry, it is business as usual. Total is going ahead with its ambitious Kaombo project. The block is expected to produce its first oil by mid-year with the first pumping and storage vessel leaving Singapore for Angola in March. In a statement, Total announced that the FPSO vessel will be capable of pumping and storing 230,000 barrels per day, and will be handling around 100,000 bpd when it becomes operational in August. When it is running at full capacity, it will add around 14 per cent to Angola's average 2017 output of 1.632mn bpd. There is a second FPSO in Singapore but it is unclear when that will be deployed to Angolan waters.

Eni, together with Sonangol, is also moving forward with offshore production plans. In March, Eni announced that the two companies have commenced oil production from the deepwater Ochigufu field, which will add 25,000 bpd to current production levels.

> **"Total, Eni and Sonangol are all moving ahead with ambitious offshore projects, including an FPSO vessel that will be operational in August"**

Additionally, Eni said that the Vandumbu field, in west hub is expected to start production in early 2019. For 2018, it expects start-up of the UM8 reservoir in east hub and the subsea boosting system for Mpungi field. The company, which operates eight oilfields in the east and west hub projects of the block, said the start-ups would boost overall production by 30,000 barrels.

Whether the latest developments will affect Angola's ability to comply with OPEC production cuts remains to be seen. The deal to reduce output by 1.2mn bpd started in January 2017 and has been extended to the end of 2018. Angola has been complying so far, although this is partly attributed to declining production from its mature fields. Sonangol has said in a statement that production will be steady this year, and the above-target cuts could keep its average compliance within the limits of the OPEC deal.

Ecobank is also optimistic with a research report launched late last year citing Angola as a country which will be boosting infrastructure investment on the back on increased oil production.

The other positive for Angola, according to the report, is gas development, with an emerging trend pointing to busy times in 2018 for the West African gas sector from Senegal to Angola, with the development of gas pipelines, floating liquefied natural gas (FLNG) platforms and major gas field projects.

ENERGY CO-OPERATION IS A WIN-WIN OPPORTUNITY

Tarek El Molla, Egypt's Minister of Petroleum, gave an address at IP Week in London earlier this year on the country's plans to become an energy hub with benefits to the Middle East and North African region.

EGYPT'S PLANS TO become an energy hub will bring benefits to Egypt and the region as well as contributing to Europe's energy security, said Tarek El Molla, Egypt's Minister of Petroleum and Mineral Resources, in his keynote address at IP Week.

The Minister said that Egypt is working to transform its oil and gas industry into a world class sector with the highest standards, under the framework of the Vision 2030 programme. A core element is turning Egypt into an energy hub – a regional centre specialising in oil and gas, from which energy can be exported, whether from Egypt's own resources or from neighbouring countries.

The minister said this strategic decision is based on three important factors – Egypt's strategic position, which gives it the potential to transit, store, blend and trade both crude and refined products; the strength of the domestic market; and potential competitive advantage.

> **"This is a big step in building Egypt into an energy hub in line with the new gas law, which opens the Egyptian market to the private sector"**

Image Credit: Bengt 1955/Flickr

Infrastructure projects on the Red Sea and Mediterranean coasts will boost the gas industry.

"Once the large-scale storage and blending facilities for crude oil and refined products are complete, with delivery options to eastern and western markets, this will attract neighbouring players in the supply chain to optimise their own positions by trading into and out of the hub," he explained.

Outlining the steps Egypt is taking to fulfil its ambitious plans, he said, "At a domestic level, Egypt has taken bold steps to reform the gas market, issuing a new gas law which mandates the establishment of an independent gas regulator as well as an intergovernment committee to facilitate challenges."

There are various infrastructure projects under study or underway in the Red Sea and Mediterranean, along with the construction of marine platforms and storage facilities. Egypt has huge existing refining capacity in addition to pipeline networks for transporting refined products and natural gas throughout the country, which are being upgraded and extended. Egypt has two LNG plants, maximising the flow of natural gas. In addition, recent gas discoveries and developments in the Mediterranean have opened horizons for more discoveries and co-operation with neighbouring producers. The first successful result of such cooperation has been announced this week, between partners of Israel's Tamar and Leviathan offshore gas fields and an Egyptian company to supply 64 bcm of gas over the next 10 years.

"This is a big step in monetising Eastern Mediterranean gas discoveries and building Egypt into an energy hub, in line with the new gas law which opens the Egyptian market to private sector companies," he commented.

He added that Egypt is in discussions with regional stakeholders, and that Egypt's ambition to become a regional hub is in line with the EU's energy strategy. An updated MoU of energy with the EU will be signed this year whereby the EU will be the main consumer of energy transported and traded from Egypt. There are ongoing discussions on a pipeline between Cyprus and Egypt and "robust" co-operation between Egypt and Jordan, as illustrated by the latest MoU signed between Egypt, Jordan and Iraq to co-operate in transporting gas and crude from Iraq via Jordan to Egypt.

GROWING AFRICA'S MARITIME GATEWAYS

Investment is flowing into Africa's ports, the primary gateways to the region's offshore industry. Martin Clark reports on the increased opportunities across the continent.

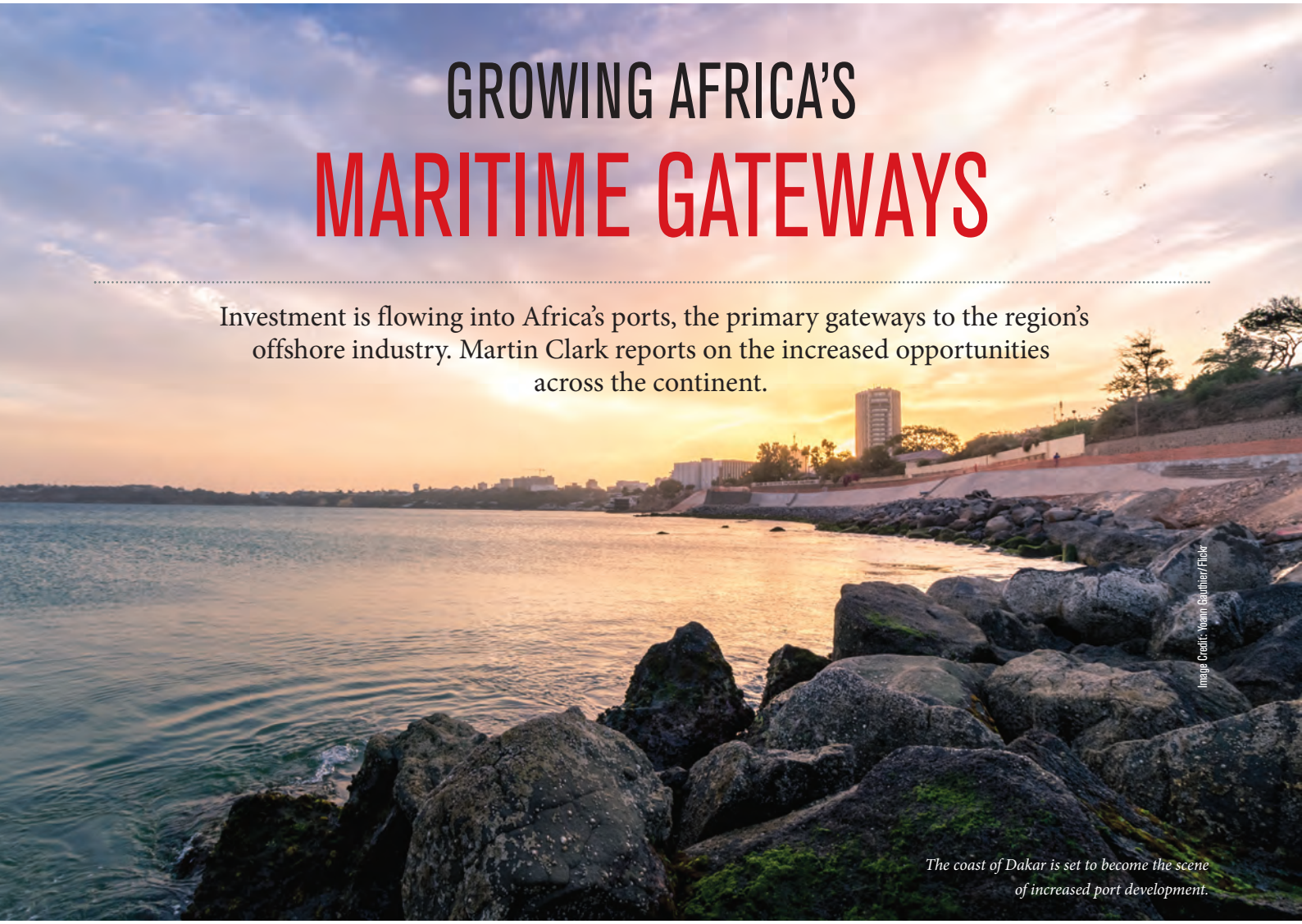

Image Credit: Yoann Gauthier/Flickr

The coast of Dakar is set to become the scene of increased port development.

AS THE MAIN arrival points for equipment and the big infrastructure facilities used in the oil and gas sector, much work is going on to beef up Africa's ports. This includes Maputo, where Mozambique's offshore gas industry is accelerating, and the creation of new logistics services in Pemba in the northern part of the country. In the main port of Maputo, dredging work is underway to open access to larger vessels, while bunkering services have been extended to provide fuel ships calling at the port, and those at outer anchorage.

Eni, Anadarko and ExxonMobil, the major operators looking to develop offshore LNG projects, are also currently exploring how best to utilise Pemba. A dedicated logistics hub is planned by ENHILS, which groups Mozambique's National Hydrocarbon Company (ENH) with the Nigerian company, Orlean Invest. It has extensive experience in developing logistics bases in support of the industry in Nigeria, including the busy Onne Port.

Onne has long served as a hub for the oil industry in and around the Port Harcourt area, providing a one-stop service from cranes and shipping support through to housing complexes, bars and swimming pools for workers.

ENHILS hopes to roll out the same concept in Mozambique to serve its nascent offshore industry, although the idea has been delayed as operators explore Pemba's existing facilities. In Kenya, the future development of Lamu port is also being mapped out with Tullow Oil pressing ahead with various onshore oil developments that would include an 80,000 barrels per day (bpd) processing facility and export pipeline to the coast. It's a vital integrated project, with initial exports expected to be trucked by road to Mombasa until the pipeline and Lamu port facilities are ready.

In another emerging oil territory, in West Africa, Senegal is ramping up capacity at Dakar, already a major regional sea port. One of Europe's biggest port operators Antwerp said in March that it would intensify collaboration with Dakar to help fast track growth.

Recent offshore discoveries have likewise resurrected interest in Senegal's energy industry. Dakar plans to build a new port 50km away from the present facility which, with a keel depth of 18 metres, will be able to handle the latest generation of giant container carriers without difficulty. Together with the new port, the city plans a 600-hectare economic and logistics zone.

The creation of new ports could also open up other frontier territories in Africa. Dubai ports behemoth DP World, for instance, is investing in a new site in Berbera, in Somaliland, a true oil and gas exploration frontier.

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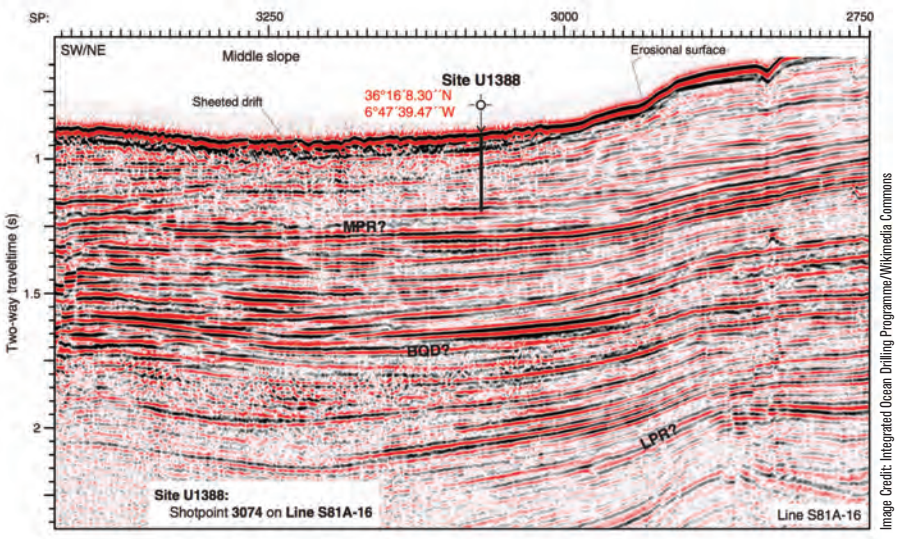
HOW GRAPHICS PROCESSING UNITS TRANSFORM OIL AND GAS OPERATIONS

The oil and gas industry can benefit enormously from the latest graphics processing unit (GPU) technology, with the promise of obtaining top-level data for the exploration workflow. By Joe Eaton.

TRADITIONAL INTERPRETATION METHODS are increasingly challenged by the volume of data, fewer experts in the industry and slow compute, which can no longer keep up with the demand. Over the years, many companies have become constrained by the compute power, memory bandwidth, and the amount of power and cooling that's needed to run their technical operations.

The speed and accuracy of seismic interpretation are critical in the exploration workflow. Multi-GPU and multi-node GPU technology boosts throughput for visualisation and heavy computation. This improves calculation of 3D seismic trace attributes and visual analysis of complex regional basins right at the interpreter's desk.



Interpreting seismic data accurately is essential for cost-effective operations.

The high compute power, massively paralleled processors and high-speed memory of GPUs allow oil and gas companies to: visualise and analyse petabytes of well location data in milliseconds; implement advanced algorithms to locate faults in underground structures; and use deep learning training on raw seismic trace data to accelerate exploration and discover faults in geology

The result is dramatically reduced model processing cycle times and sharper images of region-of-interest datasets. This can lead to more effective lease bidding, higher service revenues and, ultimately, greater chances of striking oil.

Well operators can visualise and analyse massive volumes and high cardinality of sensor data. Real-time analytics and alerts allow them to predict which piece of equipment might fail, which similar gear might do the same, and well loss of circulation in drilling. MapD, a GPU-accelerated database and platform, allows operators to identify regions of high activities to predict better bid prices.

Oil and gas companies also use machine learning algorithms to determine the best way to save money and adjust operations as conditions change. For example, if multiple submersible pumps fail without prediction or warning, the downtime would cost oil and gas companies millions of dollars a day.

Another example is oil and gas companies that take small samples of rock to extrapolate the value of the huge volumes within the reservoirs underneath. Without the prediction capability, there are huge risks with human errors. Machine learning techniques are more repeatable and reliable than human interpretation.

By running simulation of the core and matching that to the data collected, oil and gas companies can train the machine learning models to predict the behavior of the fluids of the core sample. This is very computational intensive and that's where GPUs come in.

To determine where to drill, oil and gas companies rely on seismic imaging, a tool that uses microphone arrays to image the surface rock layers and other geological features. GPUs help companies like Chevron turn these large volumes of seismic data images into 3D maps to improve the accuracy of reservoir predictions, and mitigate the risk associated with expensive drilling and production activities.

Other companies are using deep learning to train models to predict and improve the efficiency and safety of hydraulic fracturing. The fracking process can cost tens of millions of dollars. Companies want to quickly find effective fracture recipes for each shale region. Deep learning helps oil and gas companies learn how to fracture a given field as efficiently as possible, by suggesting effective spacings, proppants and pressure patterns for each well.

This is an abridged version of an article from Nvidia. To read the full article, log on to https://blogs.nvidia.com/blog

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HIDDEN TREASURES: SEISMIC SURVEYS IN AFRICA

A new wave of seismic is looking to unearth Africa's hidden oil wealth, particularly in the continent's new markets, such as Mauritania. Martin Clark reports.

THE INCREASING SOPHISTICATION of seismic technology continues to unlock new oil and gas riches across Africa. That includes finding resources in some of the continent's less developed locations. Total is looking to resurrect excitement in Mauritania's offshore sector after initial hopes surrounding the Chinguetti field, discovered by Woodside Petroleum back in 2001, waned amid erratic production flows.

The French oil giant recently completed a large 9,000 sq km 3D seismic survey in Block C-18, which it shares with Tullow, Kosmos and BP.Another 3D survey in Block C-3 to cover new shallow water plays was completed at the end of 2017.

According to Tullow, both blocks offer potential drilling opportunities for late 2019.

Further south, Kosmos and BP are looking to acquire a new 3D seismic programme totalling 12,000 sq km across five offshore blocks in Côte d'Ivoire.

Kosmos acquired an interest in the five blocks (CI-526, CI-602, CI-603, CI-707 and CI-708) in late 2017, spurred on by recent finds in neighbouring Ghana.

As an extension of Ghana's Tano Basin – which the Kosmos exploration team opened with the Jubilee discovery in 2007 – offshore Côte d'Ivoire provides an opportunity for a new frontier, emerging basin exploration push.

Nigeria's established Bonga field is the site of new seismic exploration.

Image Credit: Shell

The outlook for more seismic work ahead looks promising too. Polarcus announced in February that it had secured a contract for a 4D marine seismic project in West Africa, scheduled to commence in the second quarter of this year. It says the project will run for approximately one month.

In the region's more traditional oil states, activity levels remain high in support of ongoing exploration and production.

In Nigeria, Africa's leading producer, Seabed Geosolutions – part of the Fugro group – is currently working on a 4D ocean bottom node (OBN) monitor project on the deepwater Bonga field. This project is using Seabed Geosolutions' Hugin Explorer vessel equipped with CASE Abyss nodes on behalf of the Shell Nigeria Exploration and Production Company.Across the border, CGG is supporting Cameroon's latest licensing round, which runs until June 29, 2018.

The seismic contractor has an agreement with national oil company, Société Nationale des Hydrocarbures (SNH), to promote multi-client E&P data packages for the eight onshore and offshore blocks on offer.These cover areas in the established Rio Del Rey and Douala/Kribi-Campo basins.CGG says its TerraCube suite of integrated data packages offer explorers access to 'workstation-ready' 2D and 3D seismic, well data and other products, to facilitate rapid technical evaluation of the blocks' potential.

Away from oil-rich West Africa, there is plenty of activity going on elsewhere too. That includes South Africa, the continent's biggest economy, which has seen a rise in the amount of seismic activity offshore as it seeks to inject momentum into its nascent upstream gas industry.

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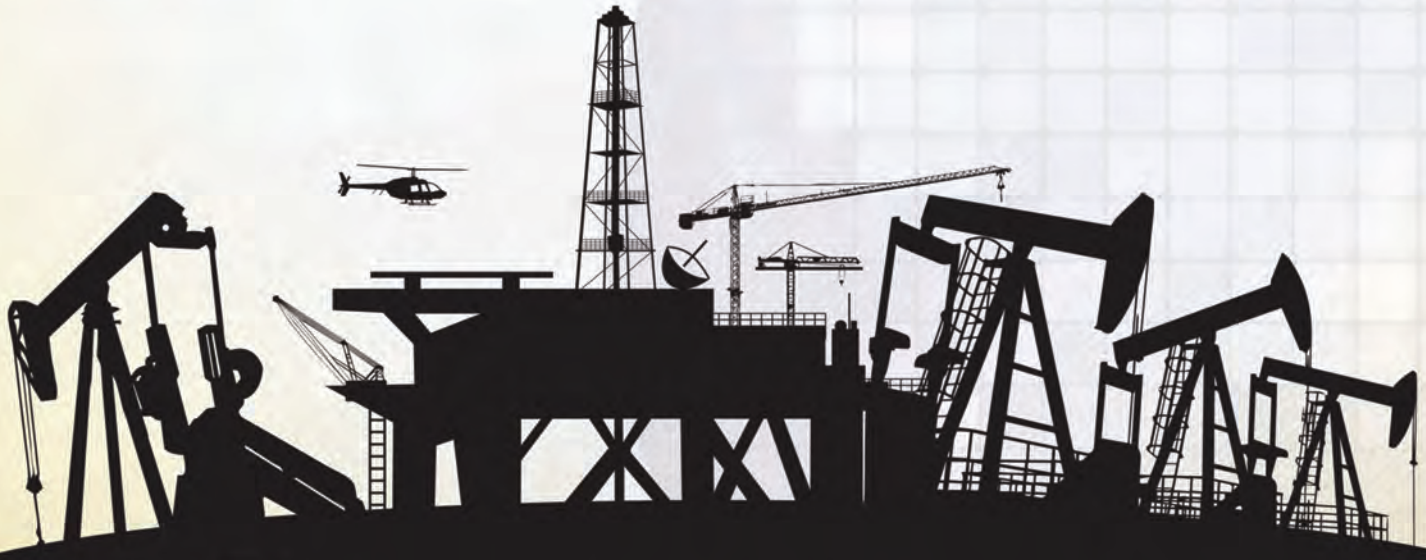

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A BASIC GUIDE TO OPERATING AND SERVICING PUMPING UNITS

It is important to understand the principles of maintenance and servicing for pumping units, particularly for operators who find this method more straightforward and cost-effective than artificial lift.

MANY LIVELY OIL wells are only slightly producing wells converted to artificial lift. In fact, the portion of wells using mechanical lifts is so high, many wells on multiple leases utilise pumping units. Why? Because mechanical lifts are reliable and straightforward to run. Therefore, the majority of lease pumpers favor this method over all other types of artificial lift systems. To understand more about the maintenance and services required for these dependable devices, operators should understand these basic pumping unit fundamentals.

Wells using electric prime motor mechanical lifts are easy to operate and programme. Generally, in electrical control setups the power line will carry the electrical energy to an area close to the site, but away from the guy line location. Usually an underground power line with a mounted fuse pane0. Many locations utilise a second electrical panel, which is typically equipped with an on/off switch, automatic control box, and is placed on a post. Lease pumpers should be able to comprehend how to run the components and identify issues that could occur.

Natural gas engine mechanical lifts are fairly dissimilar from electrical prime motor units. This is particularly true for wells using the gas from the well for its fuel supply. With these conditions, lease pumpers need to vent the gas within the well not being utilised for fuel in order to sustain the formation backpressure. The goal is to be as close to zero as possible.

Image Credit: Clara Sanchiz/Flickr

Old-style oil pumping is still in operation in many places, despite the advent of artificial lift.

In most cases, lease pumpers are on site each day for eight hours or less. In situations where workers utilise manual controls, only a limited amount of schedules are available for pumping. While a pumping unit can operate 24/7, it won't always result in higher oil production.

Another option for lease pumpers is to turn on the pumping unit right before they leave, while shutting it down once they arrive the following day. This results in roughly 16 hours of operations, and can cause lower overall oil production. The last option is to run the unit throughout normal business hours. During this timeframe, the lease pumper can utilise multiple scheduling options. However, the most capable approach is for the lease pumper to utilise an engine controlled approach. This approach permits the engine to operate automatically without anyone having to be present.

Engines provide options not available for electric motors. For instance, by setting the controls, the pumping unit can be positioned to tag the bottom within as close as one inch. However, if the pump is unable to pump oil, raising the engine RPM will cause the rod to stretch and the device to tag the bottom. After the pump has re-established operations, the worker can fine-tune the RPM to avert issues with tapping the bottom. In order for the best possible operation reliability, the pumping unit engine must be modified accurately. When workers do not use a proper maintenance schedule, it can end in a production loss, as well as add additional responsibilities to already hectic schedules.

This is an abridged version of an article from Greasebook Oil and Gas Production Software. To read the full article, log on to www.greasebook.com/oil-and-gas-production-software/

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OVERVIEW

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AN EXPERT'S MANIFESTO FOR BETTER PIPING FABRICATION

Image Credit: axelle b

The computer is the new tool of the piping fabricator with the technology now existing to share 3D models.

Better piping fabrication means improved operations. David Myall, managing director of Alias, shares his thoughts on how better piping fabrication can be achieved for faster, more cost-effective workflows.

HOW CAN WE get "better" (faster and cheaper with fewer errors) at piping fabrication? What would the elements of an improved workflow be? Let's start by understanding the classic workflow, in which an integrated 3D computer model of a new process plant – refinery, offshore platform, chemical plant, power station or pharmaceuticals facility – is built by a team of expert designers. The 3D model ensures clash-free design and an accurate material take-off so that the physical components can be ordered in the right quantities at the right time.

Usually, the pipe and fittings that are required are welded together into small sections – known as spools – which are then shipped to the construction site for installation. Sometimes an entire section of the plant is built in the relative comfort and safety of a workshop and the module is then transported and installed on site. The team who built the computer model is not the same as the team (usually more than one) who fabricate the pipe spools. In turn, another team constructs the final plant. How do they communicate?

Typically, drawings generated from the 3D model are the medium – they express the requirements that the engineering team put on the fabricators (in fact, the hard copy piping isometric is usually the contractual document). Once the drawings are issued, the 3D model continues to evolve.

If the piping fabricators works with hard copy (including PDF documents), any data they need must be extracted by reading the drawing and transferring information to a spreadsheet, and if any changes to the drawing are necessary – for example to show the position of a field weld which splits the pipe into spools – the drawing must be recreated. This is slow, error-prone, and inevitably expensive.

Why isn't the 3D model shared with the fabricators? In fact, this can be done in an integrated project such as building a ship where engineering, fabrication, and construction are all departments within a single organisation. But this is not so easy where the piping fabricator must work with multiple different customers, who use different 3D modeling systems and are often unwilling to share their important IP with third parties.

Some years ago, Alias, the company behind the Isogen software for automated piping isometric drawing generation, pioneered the use of the Isogen data file (IDF) and the more modern format the Piping Component File (or PCF) for transferring data from engineering to fabrication. Alias is now part of Hexagon PPM, and our Spoolgen software has been used for many years to support a data-centered workflow.

The engineering company uses Isogen to create the piping isometric drawings and then sends the drawings together with the Isogen data from which the drawing was created to the fabricator, who can use Spoolgen to quickly create the drawings and to extract reports to drive the internal processes. It's a tangible example of a practical process where complex engineering data can be transferred between parties involved in a project without the need for interconnected IT systems.

Working with companies around the world has led us to an understanding of the key principles if we are to build on this foundation and create a truly integrated solution which exploits the new opportunities presented by better computer infrastructure.

This is an abridged version of an article on the Hexagon PPM website. To read the entire article, log on to www.hexagonppm.com

CRYOGENIC VALVES: TRANSFORMING LNG OPERATIONS

Demand for cryogenic valves is increasing, with the booming LNG sector a major factor driving growth. With this growth comes the need for high standards, which are being achieved across the sector.

"**THERE IS A** trend towards cryogenic valves," confirms René Speckmaier, product manager, Goetze KG Armaturen. The consumption of technical gases is rising annually. This includes oxygen, nitrogen, and argon, as well as the inert gases xenon and krypton. Separating air into its single elements is only economically viable using a thermal separation process, with cryogenic valves an important component of low-temperature air separation.

Valves have to resist temperatures as low as minus 200 degree Celsius, handling inert gases, oxygen and LNG. LNG has a temperature of minus 163 degree Celsius. Most valves are therefore designed for temperatures of minus 200 degree Celsius.

Special temperatures require special materials, for example stainless alloyed and high-alloyed steels, nickel-based alloys, copper and copper-based alloys such as bronze and brass. "These materials show high enough ductile values and do not tend towards embrittlement," emphasises Schulenberg.

Depending on the valve, nominal diameters range from DN6 to DN300, and larger. Pressure can range between 0.2 bar to 500 bar, and above. The application decides the dimensions. "For storage of cryogenically liquefied gases the valve is designed for a maximum of 40 bar pressure, for carbon dioxide also up to 80 bar, and LNG even higher," comments Schulenberg.

Image Credit: BP

LNG operations around the world are expected to benefit from cryogenic valves.

"The increasing level of standardisation of systems for cryogenic gases means that precise design of pressure-relief systems is vital, particularly in view of the potential effects of an incorrectly designed safety valve or a supply line of inadequate dimensions," emphasises valve manufacturer Herose. Costs can be horrendous, should an unscheduled replacement campaign become necessary as a result of an incorrectly dimensioned valve.

Various types of valves are required for cryogenic processes, including isolation valves and control valves with manual actuators, pneumatic and electrical actuators – as well as poppet valves, butterfly valves, ball valves and slide valves. Safety valves, pressure-relief valves, check valves, filter and pressure regulators are also used.

Worldwide LNG capacity amounted to around 275 million tonnes in 2015. A further 65 million tonnes will be added by 2018. Demand "is set to grow at twice the rate of gas demand, at four to five per cent a year between 2015 and 2030," foresees Maarten Wetselaar, integrated gas and new energies director, Shell.

The attractions of LNG include the fact that its volume is 600 times smaller compared to natural gas, in its gaseous state. This allows it to be transported and stored far more efficiently. And it is versatile: LNG can be used as a raw material and as a source of energy, as well as a fuel for ships and trucks. In addition, it is more environmentally friendly than other fossil fuels.

"LNG contains neither sulphur nor heavy metals and reduces CO emissions by 20 to 30 per cent and NOX emissions (nitrogen monoxide and nitrogen dioxide) by approximately 90 per cent compared to fuel oil," reports valve manufacturer Herose. "The future belongs to the construction of LNG-operated ships." Trucks are also increasingly using LNG as fuel; in Europe more than 900 LNG-operated trucks are in service.

"Trailers for cryogenic liquefied natural gas are exposed to frequent filling, transportation and unloading at the destination under extreme conditions," explains Herose. For LNG storage, service life and performance are just as important as absolute safety and reliability. High-performance valves are also required for fuelling LNG. This is proof of the high requirements cryogenic valves must fulfil.

SMART OILFIELDS: A RESERVOIR OF EMERGING TECHNOLOGIES

A joint venture between Chevron and USC Viterbi has created innovative technologies that will benefit the oil industry and go beyond applications in the oilfield.
By Alya Rehman and Daniel Druhora.

BIG DATA HAS become the oil of the new digital economy. So it's not surprising that energy companies, which rely on complex equipment for drilling and oil well maintenance, are in pole position to benefit from automation fuelled by advances in big data and machine learning.

According to a report by Credence Research, the Global Big Data Services Market for the Oil and Gas Industry is expected to reachUS $33.5 billion by 2023. A typical modern offshore oilfield has more than 10,000 sensors pumping petabytes of data, forming deeply intertwined cyber-physical systems that rely increasingly on algorithms and robotics. As sensor technology becomes cheaper and wireless, there is a premium on the ability to extract and manage large volumes of data in real time. Enter artificial intelligence.

In 2003, Donald Paul, then Chevron's chief technology officer and C.L. Max Nikias, then USC Viterbi Dean, envisioned a paradigm in the world of engineering – CiSOFT – the Center for Interactive Smart Oilfield Technologies, a joint venture between USC and Chevron. Now into its 15th year, the partnership redefined the relationship between academic and industrial research.

"As we were expanding sensor technology at Chevron, the Internet of Things (IoT) model was a trend that wasn't really accounted for," Paul said. "We needed another structure and another model. One that could produce hybrid engineers who live at the intersection of petroleum engineering and information technology."

Image Credit: Paul Brennan

Smart oilfied-big data technology could have applications beyond oil, such as medicine.

CiSOFT hosts large-scale collaborations between electrical engineering and computer science to tackle complex issues like production efficiency, safety, environmental impact, data integration and automation.

Viktor Prasanna, director of Center of Energy Informatics (CEI) and Professor of Electrical Engineering and Computer Science, is developing a fundamental way of representing networks of very large cyber-physical systems like oil fields and power grids.

"The key driving factor of this research is data science," said Prasanna. "You can gather these large amounts of data, but can you understand that data?"

Prasanna and his CiSOFT collaborators worked to develop a networked system that went through data pulled from the oil rigs, coupled with weather, historical archives, market conditions, and even tweets.

"If you're going to institute things like machine learning you need history," said Paul who explained that the petroleum industry often collects data that can never be collected again. "You drill a well and that location, those measurements that are cut through virgin rock can't be duplicated."

Few modern industries can boast historical data that goes back to the turn of the 20th century. Using machine learning techniques, historical and real-time data integration and automation, Prasanna's team has given petroleum engineers and the machines they operate the ability to respond immediately to problems as they arise. Solutions like this become imperative when minute adjustments can mean preventing field accidents, especially in highly sensitive operations such as underwater or coastal environments.

In the future, Prasanna wants machines to not only collect and process data but also to start making some of the decisions.

"It has a way to adapt automatically and it scales," Paul said. "It was developed for oil and gas but has rolled over successfully to power grids."

Smart oilfield research at CiSOFT will spill into the IoT age, when electronic devices will communicate with each other across an internal network for a variety of industries. The need for the integrated data solutions proposed by Prasanna may become invaluable for a variety of applications where real time data processing is needed, from smart cars to open heart surgery.

This is an abridged version of an article from USC Viterbi School of Engineering. To read the full article, log on to www.viterbischool.usc.edu

New software to manage meters on-site

FLUENTA HAS LAUNCHED UFM software which is designed to provide customers with an accessible software program that manages meters on-site.

The new Fluenta UFM Manager software delivers a predefined list of features at two customer access levels, enabling installation, configuration and maintenance of the Fluenta FGM 160.

It comes with two levels of access – basic and operator.

Basic access enables live data previews from Fluenta flow meters and grants access to installation information, including the flow computer serial number and the flow meter's tag number.

Operator access, meanwhile, provides access to all the UFM software features needed for the program's day-to-day maintenance and to generate signal quality graphs.

The programme's intuitive user interface is designed to only show features when the user logs in with suitable verification or credentials.

"We have invested heavily in technology to provide our customers with an accessible and user-friendly software program to manage our meters on-site," said Sigurd Aase, CEO of Fluenta.

"Fluenta's new UFM Manager Software will improve the configuration, maintenance and installation of the Fluenta FGM 160 for current and future customers. By separating tasks into access levels, our customers can quickly set up and manage meters on site and gain access to granular flow and installation information, enabling more effective management and reporting of gas flaring."

High resolution streamer system for shallow target applications

THE SENTINEL HR, launched in 2017, is the latest member of Servel Sentinel's solid streamer range. With a close channel separation of 3.125m, Sentinel HR is designed for shallow target applications and high-resolution 3D surveys and delivers an industry-best hydrophone performance. Driven by Sercel's new-generation Seal 428 marine seismic recorder, up to 6km of Sentinel HR can be deployed with full data and power redundancy for non-stop acquisition.

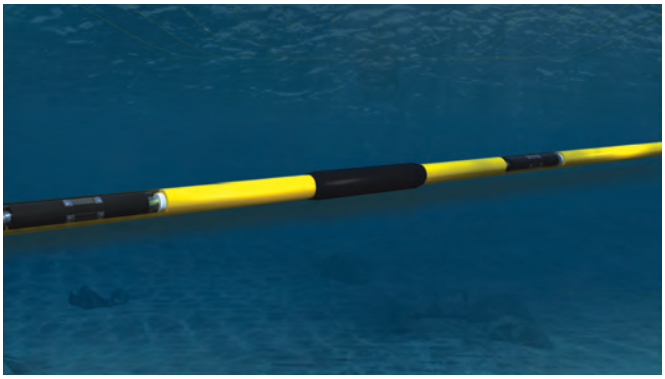


Image Credit: CGG

This solid streamer has multiple applications including hydrocarbon exploration.

The product has been purchased by the Alfred Wegener Institute (AWI) for research projects it is conducting to record critical data about the relationship between geological activity and ecosystems in order to gain a better understanding of the Earth's system. AWI has added the combination of Sercel's SeaPro Nav integrated high-end navigation system and QuietSea Passive Acoustic Monitoring (PAM) system to its marine seismic equipment portfolio to optimise marine mammal detection during seismic acquisition. SeaProNav provides the most accurate real-time positioning for all types of marine seismic surveys while QuietSea complies with international marine mammal monitoring regulations to offer one of the most advanced detection tools in the industry.

Micro downflow unit for FCC catalyst testing optimised for the market

HTE, THE HIGH throughput experimentation company and Instituto de Tecnología Química (ITQ) in Valencia, Spain, a joint research centre of the Universitat Politècnica de València and the Consejo Superior de Investigaciones Científicas, have entered the stage of commercialising micro downflow technology for testing fluid catalytic cracking (FCC) catalysts. This new technology is cost-efficient as only small amounts of catalysts and feeds are required. It offers an entrained catalyst flow concept, flexible handling of feedstocks, and operation under typical pressures for FCC.

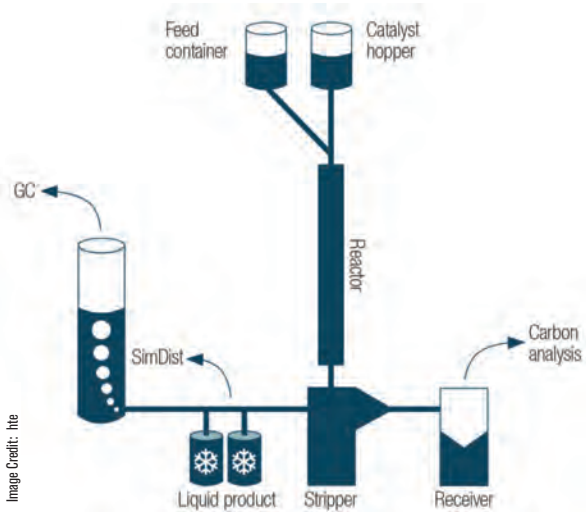


Image Credit: hte

A diagram of the new technology from hte.

The micro downflow unit offers an entrained catalyst flow reactor system analogous to commercial fluid catalyst cracking units (FCCUs). It can be operated within a range of process conditions, including elevated pressures which are typical for FCCUs. The unit is fully automated and cost-efficient as only small amounts of catalysts and feeds are required. Processability of a broad range of feedstocks has been demonstrated, ranging from naphtha and vacuum gas oil to residue feeds and crude oils. It includes the latest software solution myhteTM for integrating, storing, retrieving, analysing, and visualising data.

AFRICAN RIG COUNT

COUNTRY	February 2017	January 2018	February 2018	Annual change
ALGERIA	50	50	53	-2.7% (Oil) 23/1% (Gas)
ANGOLA	3	1	4	33.3% (Oil)
CONGO (BRAZZAVILLE)	1	3	3	200% (Oil)
GABON	0	2	3	300% (Oil)
KENYA	1	1	1	0.0% (Oil)
LIBYA	1	1	1	0.0% (Gas)
NIGERIA	7	12	16	128.6% (Oil)
SOUTH AFRICA	0	0	0	0.0%
TUNISIA	1	0	0	-100% (Oil)
OTHER AFRICA	3	3	2	0.0% (Oil) -100% (Gas)
AFRICA (TOTAL)	77	80	90	25% (Oil) 13.3% (Gas)

Source: EnergyEconomist.com

New subsea projects group formed for fully integrated solutions

C-INNOVATION (C-I), AN affiliate of Edison Chouest Offshore (ECO) and its family of companies, has formed a turnkey subsea projects group. The aim is for the group to provide a complete solution to its global customer base without sourcing outside the Chouest family of companies.

C-I's in-house project management team will provide engineering support, procedure development and review, project execution and final reporting requirements.

With access to ECO's inventory of mission-specific vessels, it provides flexibility in matching and scheduling of assets, delivering savings to the customer.

The group of companies also includes Chouest's various port facilities, a logistics company, tank cleaning services, shipyards and dry-docks, located throughout the U.S. Gulf Coast and Brazil. With corporate headquarters in Mandeville, La., C-I's advanced ROV capabilities provide a broad spectrum of support to subsea construction projects, as well as drilling, intervention, maintenance and heavy lift assignments.

The projects group aims to streamline subsea operations.

The new group is based in ECO's Houston office.

David Sheetz, manager of C-I's Subsea Division, said, "This represents a significant milestone for C-I, and it helps solidify our reputation as a true turnkey provider of subsea services with the backing and support of the diverse family of companies within the ECO group. The vertical integration amongst the vast network of Chouest affiliate companies provides a fully integrated subsea solution for any complex project for our customers."

"C-I is highly knowledgeable in all aspects of subsea field engineering and design," Mr Sheetz added. "We know how to get components to the sea floor and lay them out logically and efficiently to achieve the greatest result for our customers. This grouping of diverse services delivers enhanced savings to the customer and enables efficient cradle-to-grave control of projects in the current tight market."

Belzona boosts training facilities

BELZONA HAS OPENED a new training and distribution centre at its headquarters in Harrogate, United Kingdom, with a view to continuing to train staff at distributorships all over the world to internationally recognised engineering standards.

The US$8.4mn facility will double the company's distribution space with an extra 4,000 pallet spaces and 166,100 cubic feet of total floor area.

Additionally, the new training area features a fully equipped presentation suite as well as a new practical training and demonstration classroom, showing Belzona's continued focus on training and raising global application standards. In 2017, more than 40 courses were delivered to almost 200 delegates from distributorships located around the world.

"Here at Belzona we believe that training is vital to success. Training empowers people to meet the demands made of them in the work environment and prepares them for the unexpected situations that life will throw at them," said David Blackwell, Engineering Director at Belzona Harrogate. "Belzona's practical training courses are designed to enhance the theoretical aspects of Belzona solutions by placing them in a practical context."

The official opening ceremony of the Training and Distribution Centre took place in April.

In Africa, Belzona has an extensive presence with suppliers in Algeria, Egypt and Tunisia in the north, Côte d'Ivoire, Ghana, Senegal and South Africa in sub-Saharan Africa, and the island country of Mauritius.

GE services agreement to increase output at Shell's Afam VI gas-to-power plant in Nigeria

GE POWER SERVICES has signed a multi-year Service Agreement with Shell Petroleum Development Company for its 650MW Afam VI combined cycle power plant located in the south-eastern part of the country. The plant can provide enough electricity to power over 3 million Nigerian homes at peak performance. The agreement will help improve its availability, reliability and output for up to 200,000 Nigerian homes, while decreasing its operational costs.


Image Credit: GE

The Afam VI plant is bringing electricity to thousands of Nigerian households.

The agreement will cover planned maintenance for the three existing GE GT13E2 gas turbines as well as one GE steam turbine. In addition, the order includes GE's MXL2 upgrades to help increase the plant capacity by up to 30MW while increasing its efficiency.

In addition to increasing power output by up to 30MW, upgrades on the turbines are expected to deliver a combined-cycle efficiency increase, resulting in significant fuel savings and reduced CO_2 emissions. GE's solutions will extend inspection intervals for the gas turbines reducing maintenance and repair expenses which, in turn, will reduce overall plant costs.

Netzsch launches new line of multiple screw pumps for difficult media

NETZSCH HAS LAUNCHED its NOTOS line of multiple screw pumps for demanding pumping applications, particularly in the oil and gas industry.

These multiple screw pumps are designed to handle difficult media, including low to high lubricant fluids, and low to high viscosity, shear sensitive, or chemically aggressive media.

They are hydraulically balanced, delivering efficient pumping with very low axial force. The low-maintenance pumps offer quiet operation and continuous flow without pulsation or turbulence over a long service life. These pumps offer high suction power in a small footprint.


Image Credit: NETZSCH

This multiple screw pump is deisgned for challenging conditions.

The two-screw pump operates with a drive screw transferring torque through a hydraulic film to the intermeshing driven screw, while the three-screw pump operates with a drive screw transferring torque through a hydraulic film to the two intermeshing driven screws. In both the two- and three-screw pumps, the screws are surrounded by a ferrous pump housing, and together, the screw geometry and housing form the pumping chamber. Rotation, screw diameter, and screw pitch define the pump's flow rate.

CGG Multi-Physics sets new standard for marine gravity and magnetic data acquisition

CGG'S MULTI-PHYSICS MARINE group achieved a production rate of 99.7 per cent in 2017, including acquisition of gravity and magnetic (GravMag) data totalling nearly 24,000 sail line kilometres during one of the world's largest proprietary 3D marine seismic surveys.

With five years of sustained production rates of more than 97 per cent, 2018 marks the highest. CGG Multi-Physics attributes this year-on-year success to their field personnel, responsive support team and high operational quality standards. For example, data from the vessels are evaluated on a daily basis to ensure the best possible performance, each marine GravMag data acquisition system undergoes a meticulous maintenance routine and rigorous testing before and after deployment, and field personnel at its Houston facility receive regular training and evaluation.

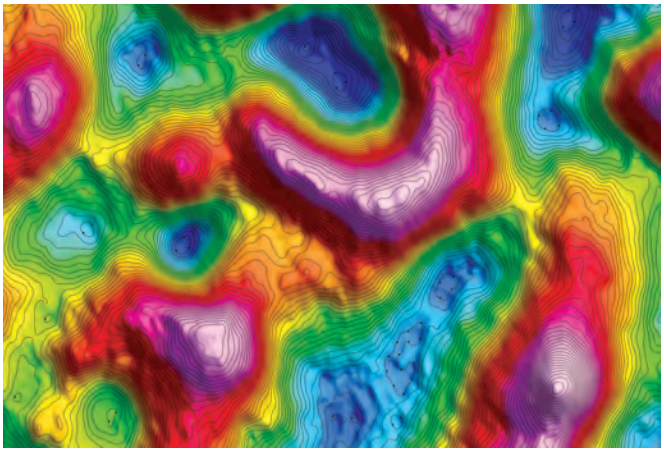


Image Credit: CGG

Seismic data should be processed efficiently for operational excellence.

Multi-Physics Marine has received excellent customer satisfaction ratings for its GravMag data acquisition and processing services. Using industry-leading LCT software, exclusive processing techniques, and state-of-the-art in-house GIS capabilities, its data processing team is acknowledged for quickly providing quality deliverables.

Advice for operators on reducing hose fatigue on reel transfer systems

KLAW HAS RELEASED a whitepaper providing advice on how to reduce hose fatigue on offshore reel transfer systems.

The hose reel method is increasingly used in offshore transfer operations due to its efficient use of storage space and convenient deployment. With some oil rigs coming out of cold stack, now is a good time to review operational practices.

The KLAW whitepaper entitled 'Reducing Stress on Hose Reel Transfer Systems' addresses the issues involved when hoses and marine breakaway couplings are wound onto reels.

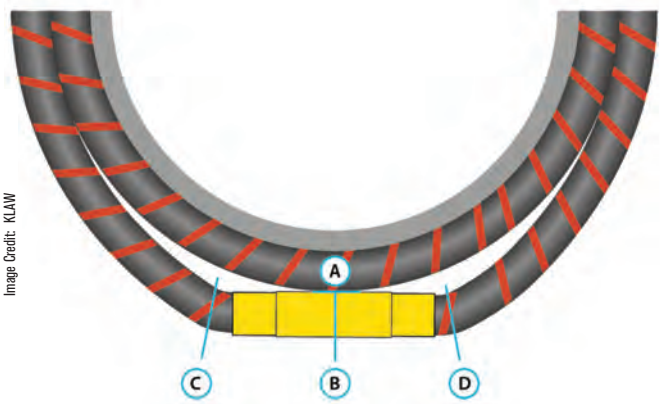


Image Credit: KLAW

Now is a good time for northern hemisphere operators to review hose practices.

For example, the nature of the marine breakaway coupling is such that there is an unavoidable interruption in the natural radius of the hose coil. This can cause stress to both components. The relationship between coil discrepancy and contact angle is considered and solutions proposed to minimise stress and fatigue. Stress factors include weight impact stress, caused by the physical weight of the coupling and its profile impact on the inner hose. Additionally there are displaced weight effects on each side of the coupling and hose kink stress caused by the extent of imperfect 'contact angle'.

www.klawproducts.com/klaw/reports-and-papers/reducing-stress-hose-reels/

Ultrasonic flow transducers for gas

FLUENTA HAS LAUNCHED two new ultrasonic flow transducers. They enable ultrasonic measurement of gas flow in challenging environments.

The high-temperature range transducer can accurately measure gas flow at up to 250°C, allowing Fluenta's ultrasonic technology to be deployed in a wider range of flare applications, as well as in the chemical processing industry. The cryogenic transducer is designed to work in processes as cold as -200°C, typically found in the liquefied natural gas (LNG) industry and other liquification and chemical processes.

New software and signal processing allows these transducers to function in processes containing up to 100 per cent methane or 100 per cent carbon dioxide, gas mixes which historically have challenged standard ultrasonic flow meters.

Fluenta's non-intrusive transducers do not interrupt gas flow and can be used across a wide range of pipe diameters from six inches up to 72 inches. The new range of transducers and software are compatible with Fluenta's FGM160, and can be fitted to existing installations.

With government regulation increasingly strict for monitoring flare gas emissions in multiple jurisdictions, companies are under pressure to accurately measure and record gas flow.

"These new transducers greatly increase the capacity of Fluenta to meet the needs of our existing customers, and to move into new markets such as chemical processing and liquified natural gas," said Sigurd Aase, CEO of Fluenta.

Low-capex floating platform solution granted US patent

ATKINS, A MEMBER of the SNC-Lavalin Group, has been awarded a United States Patent (US9828072) for its marginal field production facility, the Deep Draught Production, Storage and Offloading (DDPSO), a reusable, low-capex floating solution designed to operate in harsh environments that may otherwise limit small FPSOs.

The DDPSO's symmetrical hull uses an oil-over-water philosophy to store stabilised crude product following processing, and as a result requires only a minimal water ballast system. While this provides a practical benefit in saving volume and steel-weight cost in construction, the unique selling point of the DDPSO lies in in the hull shape that exploits this property. This step was to combine hull dimensions, fixed solid ballast, and topsides mass, in a new way that, with a water-plane area selected to balance stability and a high natural period in heave, reduces motions and loads in heavy seas. The deep draught and use of heave plates further improves the response of the system. The resulting hull form is, neither that of a conventional SPAR nor that of established circular FPSO designs, but combines beneficial features of each.

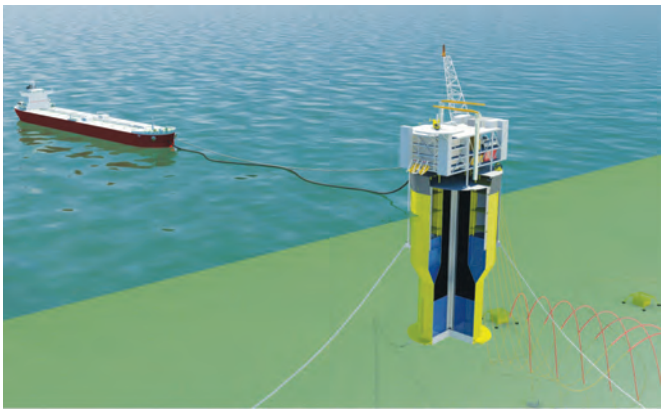


Image Credit: Atkins Global

This solution now has Great Britain and US patents.

The Deep Draught Production, Storage and Offloading (DDPSO) concept had already been awarded a Great Britain patent (GB2507370) in recognition of its novel hull form that provides a stable platform, combining oil storage with a high weight efficient, low-cost hull. The US patent recognises this and further enhancements to the concept.

ADVERTISER'S INDEX

MEETING MAJOR GOALS ON THE EGINA PROJECT

TechnipFMC has had a long-term involvement with the landmark Egina project off the coast of Nigeria. Anne Delmotte, Project Director, talks about how they provided project management, procurement, engineering and construction services.

How does it feel to be part of the milestone Egina project?

Since the beginning of the tender phase Egina was recognised as a challenging and exciting opportunity. Our feeling is one of pride in the successful delivery of the project which is an important contribution to increasing and sustaining the national oil output and development of the Nigerian economy. Around 1,000,000 items were shipped to four workshops in Port Harcourt, a tremendous logistical effort.

In the advanced technology we deployed, including six slot manifolds with retrievable multiphase flowmeters that have provided our customer with broad functionality.

Our technology supported the breaking of world record durations during the offshore drilling and completion campaign. No lost time injuries were recorded on the project.

The scope incorporated environments from cosy offices to noisy fabrication yards in which a multi-cultural community with 18 different nationalities contributing.

Can you explain TechnipFMC's commitment to the Egina Project?

Our primary commitment to the Egina project was to achieve a successful execution of the project in terms of safety, quality, budget and schedule, and today we can say that we have almost achieved our objective except for 2 per cent remaining hardware, documentation activities and offshore support to the installation contractor, which are still ongoing. But beyond the delivery of the project, there were other fundamental requirements of the project which were key to the growth and development of the Nigerian oil and gas industry and in which we have delivered on our commitment.

They are human capacity development and local procurement gap analysis. We committed to train a number of Nigerian engineers, involving 50,000 man hours across our various sites. The analysis identified the gap between present capacity and what was required to meet the upgrade target.

> **"We believe that our growth and the growth of the oil and gas industry in Nigeria are linked. We have demonstrated this by investing in the Nigerian people"**

Image Credit: TechnipFMC

Anne Delmotte, Project Director, TechnipFMC is positive about investing in Nigeria.

How has TechnipFMC strengthened local content for Nigeria via the Egina project?

Our contribution is better assessed through the lens of our stakeholders who range from government to people and host communities. But having said that, we consider that the technological solutions we deploy to develop and maintain oil and gas infrastructure, contributes to the sustainability of the economy to that extent.

How strong is TechnipFMC's level of commitment in Nigeria's oil and gas industry and what gives you confidence to keep investing in the Nigerian economy?

We consider ourselves a key stakeholder in the Nigerian oil and gas industry, and believe that our growth and the growth of the industry in Nigeria are linked. We have primarily demonstrated this belief by our investment in the Nigerian people who make up our company and have achieved this through capacity development and knowledge transfer initiatives.

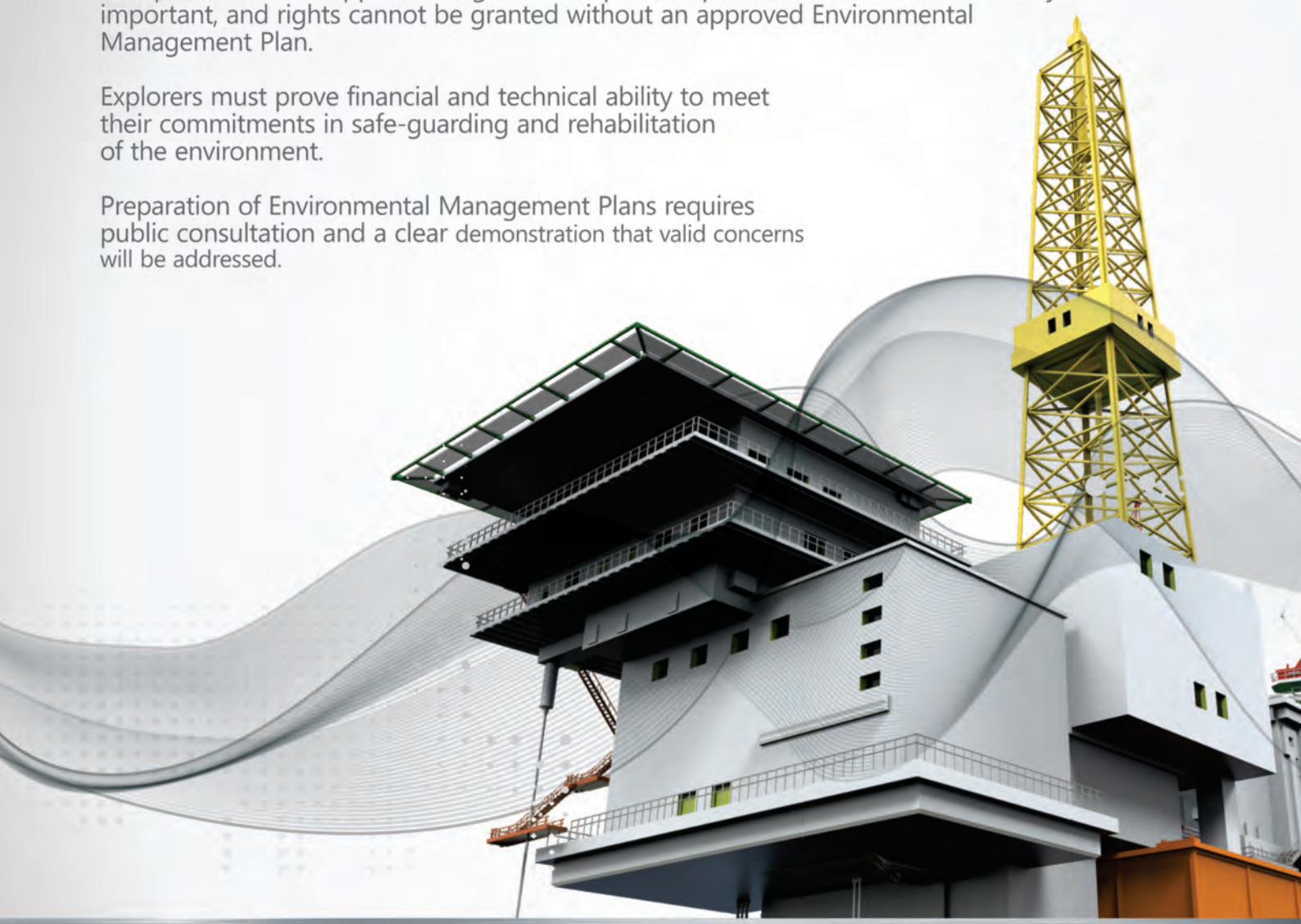
Explore South Africa!

Petroleum Agency SA encourages investment in the oil and gas sector by assessing South Africa's oil and gas resources, and presenting these opportunities for exploration to oil and gas exploration and production companies.

Compliance with all applicable legislation in place to protect the environment is very important, and rights cannot be granted without an approved Environmental Management Plan.

Explorers must prove financial and technical ability to meet their commitments in safe-guarding and rehabilitation of the environment.

Preparation of Environmental Management Plans requires public consultation and a clear demonstration that valid concerns will be addressed.



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