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Covering the Oil and Gas Industries

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The future for deepwater drilling

Emmanuel Armah-Kofi Buah, Ghana's Minister of Petroleum

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Image: Ed Schipul/Flickr

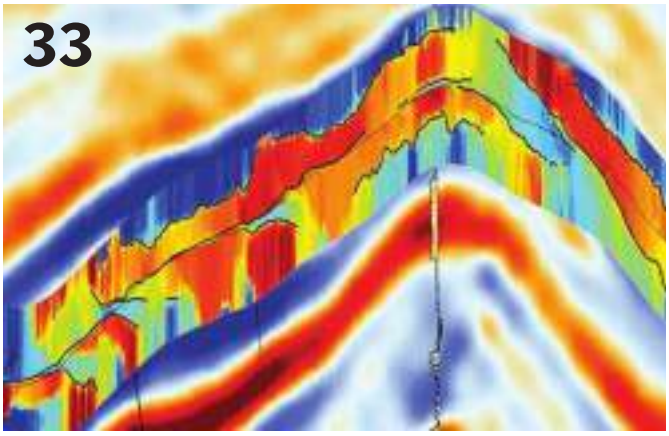
Major oil companies are starting to invest billions of dollars in deepwater drilling.

Editor's note

DESPITE THE SLUMP in oil prices, exploration activities are continuing in sub-Saharan Africa in 2015. Nigeria's planned deepwater projects have the potential to bring online about one million barrels per day of new production over the next five years.

East Africa is fast becoming one of the world's most interesting oil and gas hotspots. For many years the area was neglected by the world's oil and gas industry. However, with the discovery of both oil and gas reserves in the region over the past five years, opportunities are being created within a number of East African nations. In this issue we look in detail at Mozambique and Tanzania. Mozambique is poised to become a major supplier of gas in Africa over the next decade, but Tanzania, although overshadowed, also has ample deepwater gas reserves; however, with the continuing lower oil price, risk appetite is continuing to fall throughout the industry.

As always, we bring you news of the latest oil and gas related developments throughout the region, as well as the latest technological innovations.



The GeoSphere reservoir mapping-while-drilling service reveals subsurface-bedding and fluid-contact details more than 30 metres from the wellbore.

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Executives' Calendar 2015

JULY			
6	**Gabon Local Content Summit**	LIBREVILLE	www.thecwcgroup.com
6	**Examining the FLNG Market**	LONDON	www.smi-online.co.uk
20-22	**Gulf of Guinea Security Summit**	ACCRA	www.handsonwade.com
AUGUST			
20-21	**Gas Africa Conference**	SANDTON	www.gasafrica.co.za
27-29	**East Africa Oil & Gas Expo 2015**	DAR ES SALAAM	www.expogr.com
SEPTEMBER			
8-9	**Africa Expo: Oil & Gas 2015**	JOHANNESBURG	www.africaoilexpo.com
16-17	**Uganda International Oil & Gas Summit**	KAMPALA	www.uiogs.com
17-19	**Offshore Africa Conference 2015**	PORT HARCOURT	www.s-scg.com
21	**Mozambique Gas Summit 2015**	MAPUTO	www.thecwcgroup.com
22-24	**5th U&D Oil & Gas Expo 2015**	ABUJA	www.oilandgasexpos.com
OCTOBER			
6-8	**ECOWAS Mining and Petroleum Forum**	ACCRA	www.ecomof.com
7-9	**Gulf of Guinea Oil & Gas Exhibition.**	MALABO	www.cwcgog.com
7-9	**Oil & Gas Fundamentals**	LAGOS	www.cwcschool.com
7-9	**Gulf of Guinea Oil & Gas**	MALABO	www.cwcgog.com
8-9	**Africa Oil & Gas Expo 2015**	JOHANNESBURG	www.africaoilexpo.com
8-11	**Offshore Europe**	ABERDEEN	www.offshore-europe.co.uk
12-14	**Enterprise Mobility Nigeria Oil & Gas**	LAGOS	www.nog.cwcenterprisemobility.com
13-14	**West Africa Assembly**	LAGOS	www.oilcouncil.com
13-14	**Offshore Energy 2015**	AMSTERDAM	www.offshore-energy.biz
13-15	**Global Local Content Council's Annual Summit**	LONDON	www.glccsummit.com
19-30	**Oil & Gas Mini Management & Business Administration**	HOUSTON	www.cwcschool.com
27–29	**Practical Nigerian Content**	YENAGOA	www.cwcpnc.com
27-30	**22nd African Oil Week**	CAPE TOWN	www.globalpacificpartners.com
NOVEMBER			
3-5	**Deepwater Operations**	GALVESTON	www.deepwateroperations.com
11-12	**Africa Energy, Oil & Gas Conference 2015**	NAIROBI	www.s-scg.com
18-19	**PEFTEC 2015**	ANTWERP	www.peftec.com

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

OTC attendance remained strong in 2015

MORE THAN 94,700 attendees from 130 countries gathered at the annual conference, demonstrating OTC's position as the leading forum to exchange ideas and opinions to advance scientific and technical knowledge for the safe, environmentally friendly and sustainable development of offshore oil and gas resources. It is the sixth largest attendance in the 47-year history of OTC.

The sold-out exhibition was the largest in show history. This year's conference also had 2,682 companies exhibiting, up from 2,568 in 2014, representing 37 countries. International companies made up 42 per cent of exhibitors.

"OTC continues to bring the world to Houston. The record-setting number of paper submissions ensured a high-quality technical programme, covering the latest innovations and applications. Coupled with superb panels, in-depth executive keynotes, a new crop of Spotlight on New Technology award winners and a record-setting exhibition, OTC drew everyone from CEOs to engineers to government officials," said Ed Stokes, chairman of OTC.

This year's event featured 11 panel sessions, 29 executive keynote presentations at luncheons and breakfasts, and nearly 300 technical paper presentations. Speakers - including major, independent and national oil companies; federal and regional government officials; and academics - presented their views on a wide variety of topics, including future industry directions, operational integrity and risk management.

OTC's Spotlight on New Technology Awards recognised 17 technologies for their innovation in allowing the industry to produce offshore resources, including two companies in the new category of Small Business Awards.

Gulf of Guinea Security Summit

IN 2015 THERE has been a spike in militant activity across the Gulf of Guinea. Some of the most recent hijackings offshore have been reported off Rivers State and Akwa Ibom State; these attacks provide a stark reminder of the importance of improving collaboration between industry professionals and the local government to improve the protection of personnel and assets operating across this complex security region.

The Gulf of Guinea Security Summit is the culmination of Hanson Wade's highly successful and well respected Combatting Piracy West African Maritime Security & Energy Infrastructure Security Summits, which have been influential in assisting the maritime, oil and energy sectors collaborate, network and share intelligence since 2010.

As Nigeria enters a new era under APC's Buhari, new threats emerge as we look to secure West Africa's operating industries. Falling budgets, increased legal complexity and a lack of clarity on employable solutions, means it is becoming forever harder to ensure the protection of personnel and assets across this complex region. Split into government, offshore and onshore streams, attending this year's conference will allow you to understand how the exact threats you face are evolving and help develop immediate and long-term measures you can put in place to mitigate them.

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OFFICES IN AFRICA

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Revolutionising subsea field architecture from concept delivery and beyond

FMC TECHNOLOGIES INC and Technip have formed an exclusive alliance and launched Forsys Subsea, a 50/50 joint venture that will unite the skills and capabilities of two subsea industry leaders. This alliance will redefine the way subsea fields are designed, delivered and maintained.

Bringing the industry's most talented subsea professionals together early in the project concept phase, Forsys Subsea will have the technical capabilities, products and systems to significantly reduce the cost of subsea field development and provide the technology to maximise well performance over the life of the field.

By combining the industry-leading technologies of the parent companies, Forsys Subsea will reduce the interfaces of the subsea umbilical, riser and flowline systems (SURF) and subsea production and processing systems (SPS). It will also simplify the seabed layout, reducing complexity, accelerating time to first oil, and maximising sustainable peak production. This unique combination will drive a new, step-change approach to how equipment designs and installation methods converge in a new generation of subsea architecture.

Gathering the expertise and experience of its parent companies, Forsys Subsea will focus on:

- Early involvement in the concept selection phase of front-end engineering and design, when ability to influence cost is greatest.
- Integrated life-of-field well surveillance, monitoring, data interpretation and advisory services.
- Joint R&D to drive technological innovations that will boost efficiency and further reduce development costs.

In addition, the alliance will be uniquely positioned to deliver and install a seamless subsea infrastructure from seabed to topside by eliminating interfaces and by integrating SPS with SURF, attaining the highest reliability and uptime and the lowest total ownership cost available in the industry.

"The world needs new sources of oil, and deepwater holds the greatest promise of meeting this demand. But these sources are expensive to develop, and operators will not pursue them unless they can significantly reduce costs," said John Gremp, FMC Technologies chairman, president and CEO. "This requires not just incremental improvements, but step changes and new ways of thinking. Service providers must be involved at the project concept stage, provide innovative technology that reduces costs, standardise processes and equipment for greater efficiency, and execute flawlessly. The creation of Forsys Subsea with an industry leader such as Technip embodies this new way of thinking to a degree that's never been done before."

"In today's fast-changing environment, clients require closer relationships with, and more integrated solutions from, their partners of choice. This imposes a new way of working in the industry," said Thierry Pilenko, Technip chairman and CEO. "Beyond products, we need to design optimised development concepts. Beyond concepts, we need to be strongly focused on the practicalities of project execution. Simplicity, standardisation, innovation, technological creativity and delivering tangible results to clients — this is exactly what Forsys Subsea is about, and we are delighted to make this step a reality with FMC Technologies."

Forsys Subsea CEO, Rasmus Sunde said, "With Forsys Subsea we are launching an exciting and compelling business proposition by providing front-end engineering and life-of-field decision support to our customers. Based on this, we will enable customers to take advantage of lower costs, reduced execution time and execution risks, and higher uptime of the installed base by leveraging the combined technologies and execution capabilities of the parent companies."

The company is headquartered in London, with regional hubs in Houston, Oslo, Paris, Rio de Janeiro and Singapore.

Trelleborg to moor two FPSOs off Angola

TRELLEBORG HAS WON a contract to supply tandem mooring systems for two FPSOs offshore Angola.

The tandem mooring-winch and integrated Quick Release Hawser Hook (QRHH) are installed onto the stern of the FPSO and used to moor a shuttle tanker in open sea conditions, with a separation of up to 150 metres. The mooring system includes integrated mooring tension monitoring, as well as a remote release system that can instigate an emergency release of the FPSO/shuttle tanker mooring from the FPSO stern deck or vessel's control room.

The capacity of the QRHH is generally 250 metric tons safe working load (SWL), and 30 metric tons for the hawser winch.

OneSubsea wins contract off North Africa

ONESUBSEA, A CAMERON and Schlumberger company, has been awarded a subsea production systems contract totaling more than US$330mn for a gas project offshore North Africa.

The scope of supply for the 13-well development includes subsea production equipment, tooling, and installation and commissioning services. Deliveries are expected to begin Q3 2016.

"The award represents phase two of this development and is the largest award for a subsea production system within the North Africa region to date," said Cameron chairman and CEO Jack Moore. "Having already supplied the first phase of this development, OneSubsea now looks forward to progressing with this second phase."

Chinese firm contracted for Ethiopia

INDEPENDENT OILFIELD SERVICES provider in China, Anton Oilfield Services, has signed a contract to provide technical services, including cementing and drilling fluid services, for a Chinese project in Ethiopia

Worth US$32.23mn and effective for a period of two years, the project is expected to commence operation in the second half of 2015 and be completed in two years.

According to the company, the signing of this contract signifies Anton Oilfield Services' efforts to establish strategic co-operation with Chinese non-SOE investors in overseas markets.

The group's drilling services have expanded further into new overseas markets, which will provide new impetus for its growth, Anton Oilfield Services' sources added.

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WHO WE ARE

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Buoyancy repair service launched in Africa

TRELLEBORG'S OFFSHORE OPERATION has formalised its drill riser buoyancy modules (DRBM) repair offering in Africa, following its collaboration with flotation repair provider, ProFloat. Trelleborg is the only DRBM supplier offering a repair centre in Africa approved by Original Equipment Manufacturers (OEMs).

This new service will deliver significant time and cost savings to Trelleborg's customers, who will now be able to have their buoyancy repaired at ProFloat's facility in Cape Town, or at an agreed location in Africa, instead of shipping it to Trelleborg in Houston. ProFloat underwent a stringent onsite audit to ensure that its processes and workmanship met Trelleborg's high standards. Following the assessment, ProFloat was named as an authorised DRBM repair center for Trelleborg.

Shaun Louw, managing director at ProFloat, said: "We are thrilled to be appointed as Trelleborg's exclusive repair agent in Africa. Damage to DRBMs can happen at any time and have an adverse impact on meeting project deadlines, so it is critical that the module is assessed, repaired and returned to site as quickly as possible."

Mark Angus, executive VP for Trelleborg's offshore operation, said: "When we supply customers with our products, the service doesn't stop there. We believe that after sales care and value added services, such as local buoyancy repair to OEM standards, are imperative. As such, we are delighted to be able to offer this service to our customers operating off the African coast, through our partnership with ProFloat. This is the first step to providing a global repair offering, so that we can support our customers whenever and wherever they need us."

Exova to test, qualify Kaombo pipe

CRC-EVANS OFFSHORE has contracted Exova to provide pipeline material, welding, and AUT qualification testing for the Kaombo project offshore Angola. The contract value is US$3.88 mn.

As well as AUT validation, the pre-production qualification requirements include mechanical testing, fracture mechanics, fatigue and sulphide stress cracking corrosion tests.

Pipelay at the ultra-deepwater project off Luanda is scheduled to start early next year. It will include 59 subsea wells connected by 300 km of pipelines in 1,400 m to 1,950 m of water.

Crack tip opening displacement and routine mechanical testing will be done in Edinburgh, with Exova's corrosion centre in Dudley performing the sulphide stress corrosion tests and single edge notched tension, and full scale riser fatigue testing is set at Daventry, also in the UK. The large number of specimens requiring sub-sized straining and aging will be shared between Exova's Daventry and Spijkenisse, the Netherlands facility.

Alderley reveals new sales manager for Africa

ALDERLEY SYSTEMS HAS appointed Tarik Mechaouat as the new regional sales manager for Africa.

The oil and gas engineering firm noted that the appointment centres around the promotion of Alderley's metering business across Africa and Europe.

Eric Maddock, group business development director at Alderley plc, said, "Tarik has a strong metering background and a good knowledge of working within Africa and Europe."

"We are very pleased that Tarik is joining us at Alderley as we look to further strengthen our presence and customer relationships within Africa and Europe."

Mechaouat has 13 years of experience of working with flow metering solutions at companies such as Bopp & Reuther and Endress+Hauser, and is fluent in French, English and German.

NOG - The journey towards transformation

THE NIGERIAN OIL and Gas Conference and International Exhibition (NOG) was held in Abuja in March, 2015. The NOG 2015 Conference theme was "The Journey towards Transformation" – very apt in view of the price shock being experienced globally and as the country strives to secure its future position. The conference was well attended with hundreds of participants from Federal and State Ministries, departments and agencies, the public service sector, representatives of the IOCs, the oil and gas private sector and other stakeholders across the Nigerian oil industry.

The NOG conference was established fifteen years ago as a meeting place for oil and gas industry players in Nigeria to establish best practice and discuss practical solutions, geared towards enabling the country's growth, development and transformation.

Key presentations and panel discussions were made by industry leaders. As usual, the four day programme began with the Oil and Gas Finance Seminar held on Day One, followed by a two day Strategic Conference and concluded with the Nigerian Content Seminar held on the last day.
Key themes included the following:

- Changing face of the oil and gas industry
- A new era for gas and power
- Effective solutions driving industry change
- The rise of Nigerian independent producers
- Security challenges faced by the Nigerian oil and gas industry
- The journey to transformation
- Accessing financing
- Nigerian content

US$150mn investment to build global business focused on subsea integrity

A NEW COMPANY was launched at OTC. Underwater Integrity Solutions (UIS), headquartered in Houston, is an independent company focused on underwater integrity, production assurance and life extension for subsea fields.

HitecVision, the leading European private equity oil and gas investor, has committed US$150mn of equity to finance the build-up of the company. UIS has been established by five well-known subsea industry leaders with over 140 years' combined global experience. UIS will acquire businesses, and form strategic partnerships, to build an independent and global company solely focused on integrity and production assurance with the aim of maximising the operators' financial return on their subsea assets over their operational life.

Bill Boyle, CEO of UIS said: "UIS is launching at a time when the trend for operations in deeper water and in more hostile environments is continuing. There are about 5,000 operational subsea wells around the world with almost 7,000 predicted by 2020. Subsea global annual operating expenditure is currently around US$10bn and expected to grow strongly over the course of the next few years. Today, there is a need to significantly reduce subsea operating costs and increase efficiency and hence value from subsea fields. Against that background, the UIS vision is to become a leading provider of independent underwater integrity and production assurance solutions. Our independence, global presence and sole focus on subsea integrity and assurance will be our competitive edge, differentiating UIS from what is currently being offered in the marketplace."

UIS boasts a leadership team on both sides of the Atlantic, comprising, in Houston HQ, Bill Boyle, CFO Mark Webster and COO Guido Bressani, and in Aberdeen, chief commercial officer Neill Kelly, and chief technology officer, Geoff Fisher.

Rolf Magne Larsen, who recently retired from Statoil, is chairman of the board of UIS, which also includes Quinn Fanning, CFO of Tidewater Inc, Lasse Andresen of ForgeRock and Tor Espedal, senior partner of HitecVision.

HitecVision is a leading private equity investor in the international oil and gas industry with offices in Stavanger, Oslo and Houston. The investment focus is on middle market investments in oilfield services and technology companies, and exploration and production companies across the oil and gas value chain.

ABB to power Cabaça FPSO off Angola

BUMI ARMADA BERHAD has commissioned ABB to supply electrification and automation systems for an FPSO on an Eni-operated oil field development offshore Angola.

The former Armada Ali supertanker is undergoing conversion to the 1.8-mmbbl storage capacity FPSO Armada Olombendo, to be chartered by Eni.

It will be serve the Cabaça North and Cabaça Southeast fields, with estimated reserves of 230 mmbbl. The location is 350 km northeast of Luanda, and it should be producing up to 80,000 bpd by the end of 2016.

The FPSO will control the entire extraction process, storing production for offloading to shuttle tankers.

ABB will deliver e-house solutions, containing medium voltage and low voltage switchgear, and equipment for integrated electrical distribution, control, safety and power management, including the 800xA distributed control system.

The systems will distribute and manage power for injecting 120,000 bpd of water into the reservoir and compressing up to 120,000 MMcf/d of natural gas.

This is the fourth collaboration between ABB and Bumi Armada. Previous projects include a modular e-house package for FPSOs operating off India's west coast, EnQuest's Kraken heavy-oil field in the UK northern North Sea, and an automation package for the Balnaves field FPSO offshore Western Australia.

Eni is the concessionaire of the Cabaça fields, which were discovered in 2009. The total value of Bumi Armada Berhad's contract to supply, operate, and maintain the FPSO is about US$2.9bn.

Second Nigerian training provider accredited

INTERNATIONAL OIL AND gas skills organisation, OPITO, is making Nigeria safer for oil and gas workers with the accreditation of a second training company.

Cegelec Oil and Gas, based in Ogere, has secured approval from OPITO to deliver mechanical, electrical and instrument training to standards recognised by the oil and gas industry globally.

A unique, not-for-profit organisation, OPITO is wholly owned by the oil and gas industry and responsible for ensuring it has a safe, skilled and competent workforce. The organisation develops the highest training standards to improve offshore safety. With operations centres in Aberdeen, Dubai, Kuala Lumpur and Houston, OPITO delivers standards, qualifications and workforce development frameworks used by employers in 42 countries worldwide.

Cegelec Oil and Gas has been initially approved to deliver mechanical, electrical and instrument and control Level 2 training and expects to conduct additional OPITO-approved courses going forward. The training provider is currently in the process of seeking OPITO accreditation for process operations training for production trainees.

OPITO group CEO David Doig said: "This approval marks another move forward for OPITO in the drive towards common safety standards in the industry around the world.

"Following the accreditation of the first OPITO approved training centre in Nigeria, there has been an increasing awareness of the value in ensuring the competency of the offshore workforce and dramatically improving safety levels. If the continent's oil producing countries are expected to meet these targets, they need a highly skilled and safe workforce."

As the skills and standards body for oil and gas globally, OPITO has a vital role to play in ensuring the safety of the industry's workforce worldwide.

The "mid-caps" offer excellent investment opportunities, so delegates to a financial conference in April were told. "Now's the time" was the message.

Focus on West Africa at Bloomberg-hosted forum

"RISK, REWARD, REALITY" were the three key words used to attract delegates to the special West African O&G conference arranged by the Natural Resources Forum at Bloomberg's London premises on 23 April. Three Rs plus one, all carefully chosen to spur interest amongst local investors and industry analysts/commentators in the opportunities offered by mostly medium-capital operators, recently under significant pressure, within the region. Well over an estimated 200 were present to hear the various cases put.

"The road to and from US$50 oil" sums up the term most widely used on the platform itself, happily as it turned out because within just a few weeks a US$13 premium (on OPEC's reference basket price, of course) was being comfortably exceeded. Soaring demand for refined products, as successfully predicted at this event by Bloomberg's own oil commodity application specialist Andrew Toumazi, was the cause.

The independent forum meets regularly to enable industry advisers to meet with professional investors to discuss "high-quality companies that are developing noteworthy investment opportunities" (www.naturalresourcesforum.com). Bloomberg is one of the NRF's regular supporters.

Of course the wider context, against what was essentially a pitching exercise took place, was that last winter's sharp fall in the price of crude - and OPEC's unexpected response - has not curbed unconventional E&P activity nearly as much as some had predicted, far away from conventional West Africa of course. Output in the USA (now generally agreed to be the main swing producer) was still on the way up in March, benefiting from the fall in most input costs, and from the expansion of high-flow horizontal drilling, too.

So new owners can now acquire fresh assets relatively cheaply, a trend which is already creeping into the West African region. The US may be dropping out of the energy import market in the long term, but for WA's oil resource holders the prospects for increased sales in Asia in particular remain excellent. It's just a matter of adjustment, the panel seemed to be saying.

For WA's oil resource holders the prospects for increased sales in Asia in particular remain excellent.

Key presentations came from the head of O&G Research at RFC Ambrian, the CFO and CEO respectively of T5 and Eland Oil & Gas, the energy manager of Tudor, Pickering, Holt & Co, African Petroleum's finance director, and a managing partner from Mildwaters Consulting. TPH & Co are energy investment specialists and Mildwaters concentrates on the successful negotiation of oil and gas contracts.

Not a bad line-up to turn around flagging interest in investment in West Africa after such a severe shock to the system therefore.

Time to invest

"This is the time to invest" said a confident Stephen West of African Petroleum.

But as Anish Kapadia of TPH put it rather more bleakly, "Stock performance of the West African focused E&Ps has been dire" - though he did exclude Nigeria with its active M&A scene from this analysis. And others spoke warmly of this year's smooth political handover there, and of the newly enhanced operating environment in the Niger Delta, too.

New owners can now acquire fresh assets relatively cheaply, a trend which is already creeping into the West African region.

The search for green shoots continues.

To sum up what was essentially a marketing exercise before a very influential audience, the search for green shoots continues, but no-one is expecting another Jubilee ("the poster child of the region", as described by RFC's Stuart Amor)) soon. And AfP's bullish representative was referring to the whole region's huge remaining exploration potential, otherwise described by Eland's George Maxwell as "low hanging fruit", as well as the general squeezing of costs. Though it was acknowledged that these continue to vary widely across such a vast swathe of on- and offshore territory, encompassing very different experiences of E&P activity.

And all ahead of an expected cut in OPEC quotas, probably within just a year or so. But until then, delegates were warned, the pace of exploration onshore, and in WA's benign shallow waters, is expected to continue to slow. ■

How promising is the future of deepwater drilling at a time of market uncertainty? And is Africa still an important part of that future? In the first of two articles on the subject, Vaughan O'Grady discusses the prospects for this essential but economically and technically challenging market with Mark Adeosun, author of Douglas-Westwood's recently published World Deepwater Market Forecast 2015-2019.

Deepwater: High costs

DRILLING IS ONE of the most significant cost elements in deepwater E&P, often accounting for more than half of project capex. Douglas-Westwood's recently published World Deepwater Market Forecast 2015-2019* makes this clear. However, report author Mark Adeosun noted that, on average, costs of offshore drilling form roughly 45-50 per cent of total project capex, while onshore drilling costs are approximately 55-60 per cent. "This is due to the lack of onshore infrastructure that would otherwise be included in total offshore project costs," he explained. But figures can deceive; while onshore drilling costs represent a greater proportion of drilling, nominal project costs are significantly lower onshore.

Onshore day rates, for example, average US$20,700, which, said Adeosun, "represents 4.6 per cent of the average day rate needed for deepwater drilling." The average day rate for a deepwater drilling rig is an eye-watering US$447,000, though high-specification units have been known to command day rates reaching approximately US$600,000. And of course drillships and semi-submersibles used for drilling wells at great water depths have higher day rates compared to jackup rigs, as they are technologically more complex and in great demand. Overall, as Adeosun put it, "Compared to shallow water drilling, deepwater presents additional unique technical challenges related to lower temperatures and higher seabed pressures. All of these factors add to drilling days and time, thereby driving cost."

But surely, you might ask, falling equipment costs and greater innovation (through ROVs and FPSOs, say), can help operators to control costs? Not yet it seems. "Hardware costs increased threefold from 2010-2014, even as the oil price stalled at around US$108 per barrel," Adeosun said. "This was something identified by operators, and many announced plans to cut capex in 2014 to ensure that projects remained commercial."

> Africa is forecast to experience the greatest future deepwater growth.

Industry standardisation is key

It's true that not only has the demand for new innovation in equipment such as ROVs increased but that it has helped to develop deepwater and more complex reservoirs. But Adeosun pointed out, "These [pieces of equipment] remain expensive and so far have not compensated for the low oil price." While developing such complex innovation is expensive, this could be mitigated by industry standardisation, which might keep field development costs at sensible levels — but there's little evidence of a drive to standardise at the moment.

Mark Adeosun.

> African oil tends to be of high quality and as a result requires less refining.

Nevertheless operators do have a few other cards to play. "Operators are still looking to delay project sanctions to ensure that equipment costs drop even further to account for the current low-price environment," Adeosun pointed out. "Shell recently postponed the FID of the Bonga SW-Aparo development in Nigeria till 2016 in an effort to cut costs by around 25 per cent by asking manufacturers to lower their bid on various tenders."

Which brings us to Africa, which, the report says, is forecast to experience the greatest future deepwater growth. In particular, the development of East African gas basins and numerous large projects in West Africa over the next five years will further drive capex growth in the region. "Examples of such large projects," said Adeosun, "include TEN (Tweneboa, Enyenra, Ntomme) in Ghana, Egina and Bonga SW-Aparo in Nigeria, and Kaombo and the Kizomba Satellites Phase 2 in Angola, [which] will account for a large amount of development wells to be drilled in the region in the next five years." He added, "East Africa has the potential to become a major hub for natural gas as further discoveries are made, driving subsea capex."

Quality of oil is important and will have an impact on field developments as oil that is more difficult to refine will be more difficult to sell, especially at the present low oil price, but, said Adeosun, "African oil tends to be of high quality and as a result requires less refining."

On the face if it, investing in gas production may seem slightly trickier. The report says "The development of East African natural gas basins has not been aided by the plunge in Asian gas prices." However, it still regards the development of these gas basins as inevitable.

Adeosun explained that the development of East African basins will be aided by the expected future oil price recovery as most LNG contracts are linked to oil prices. "Hence, oil price recovery will spur stimulation in LNG-related activities," he said. In any case operators are also moving ahead with various development plans within the region. A notable example is ENI's expectation that it will reach a final investment decision for the Coral FLNG development, located in Area 4 offshore Mozambique, in the second half of 2015.

"The amount of gas reserves in the East African basins," Adeosun pointed out, "cannot be over-emphasised. Eni has made the greatest discovery in its exploration history with a potential of about 2,500 bcm of gas in place. The long-term forecast of demand for LNG demonstrates the need for the development of massive East African gas basins."

But is it all good news for African deepwater oil and gas? Not quite. In the second part of this interview we look at the social, political, technological and economic drivers to continuing development — and some of the barriers. ■

Mark Adeosun joined Douglas-Westwood in 2013, and has since conducted research into various oil and gas projects, with a focus on offshore drilling and deepwater activity. The World Deepwater Market Forecast 2015-2019 is published by Douglas-Westwood, which carries out advisory work, strategy development, business research and analysis for the international energy industries. It is the leading provider of commercial and market due diligence on the oilfield equipment and services sector and also provides services to players in upstream and downstream oil and gas, power and renewables. For more information and pricing see http://marketreports.douglas-westwood.com/report/oil-and-gas/world-deepwater-market-forecast-2015-2019

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Even though the current global outlook in the price of oil is not favourable to producing nations, Ghana is confident of positive development in its infant oil and gas sector because there are deliberate policies being put in place to ensure that the resources eventually benefit the nation as a whole. Emmanuel Yartey reports from the Ghana Summit, recently held in Accra.

Ghana sees the industry as profitable, despite falling price of oil

GHANA'S OIL INDUSTRY began in 2007 when oil was first discovered by Irish exploration company Tullow Oil in the offshore Jubilee field in the Gulf of Guinea, 60 km away from West Cape Three Points of Ghana's coast. Since then other major discoveries have been made, leading to the creation of thousands of jobs in the energy sector.

Ghana has had the benefit of experiences in the oil and gas sector from producing nations that preceded it, like Nigeria, Libya, Equatorial Guinea, Gabon, Angola and Algeria among others, and it is bent on working assiduously to ensure proper management of the resources for the benefit of Ghanaians since it does not want to commit similar mistakes its earlier counterparts committed.

The government has been training a lot of indigenous people to acquire knowledge and skill to handle the affairs of the oil industry with limited expatriates. The government alone cannot do it; the private sector is in a very good position to contribute immensely by creating a variety of jobs related to the industry. It is in this way that they will be in a position to have a firm grip of the oil industry.

At the recently ended 6th Annual Oil & Gas Summit in Accra, the minister of petroleum, Emmanuel Armah–Kofi Buah, said that, despite the current continuous worrying low price levels of oil and gas globally, Ghana's oil and gas sector still has positive prospects.

According to the petroleum minister, as Ghana prepares to be the hub for oil and gas activities, the country has already put in place, legislative framework and institutional structures so as to make things simple and less difficult in oil and gas business transactions.

Emmanuel Buah said the new Petroleum Exploration and Production Bill 2014, currently before Parliament, will add more strength to the management of the country's petroleum resources.

Ghana's oil and gas sector still has positive prospects.

He said, "Two projects, the Tweneboah Enyera – Ntoumme (TEN) and ENI Sankofa projects are being developed steadily and are poised to deliver first oil in the last quarter of 2016 and that of 2017 respectively."

The private sector is creating a variety of jobs related to the industry. Image: Expro.

The Ministry of Petroleum (MoPt) chief said that with the discovery of gas by ENI Sankofa projects, it will provide the critical infrastructure that will deliver gas for the catalytic development of Ghana's economy.

Sounding very confident, he said, "The ENI project, which is a major gas project, will deliver gas for the catalytic development of our national economy. We are proud that we can now feed our power plants with indigenous gas.

The minister of petroleum, Emmanuel Armah–Kofi Buah.

This, among other measures, will certainly go a long way to cure the power challenges we have been facing and bring stability to our power supply."

Now that the International Tribunal for the Law of the Sea (ITLOS) has unanimously dismissed Côte d'Ivoire's call for the stoppage of oil exploration and exploitation activities on the disputed area where the TEN project is ongoing, operated by Tullow Oil Plc and its partners, there is the certainty that expansion of the oil and gas sector in Ghana will be a reality.

Côte d'Ivoire had in February this year petitioned the ITLOS to suspend all activities on the disputed maritime boundary until the final determination of their disagreement over the boundary. But the international tribunal held that work could go on uninterrupted.

The gas reserves at Anglo-Irish explorer Tullow's Jubilee and TEN fields, as well as Italian IOC Eni's Sankofa and Gye Nyame fields have been put at about three tcf and could play a critical role in meeting Ghana's future energy demand.

Issac Kirk Koffi, chief executive of Volta River Authority (VRA) said in 2014 that, "The future for us is to depend on our own gas. We cannot 100 per cent depend on Nigeria. The future is to get this gas from Ghana and to have LNG and invest in LNG infrastructure; that's what we are looking at. The future is to get that massive infrastructure in this country to help drive thermal generation to drive the economy. The levels of gas from the fields in the country are high."

The Ghana government is hoping to generate 5,000MW of electricity by 2017, with several gas–fired power plants expected to come on stream over the next few months. The plants, which include an additional 360MW of capacity at the Sunon Asogli plant, 230MW Kpone thermal plant and TAQA's new 300MW plant, are expected to be completed in 2015 and 2016 and will require gas volumes of about 500 mmcfd.

It is crystal clear from the above analysis that the energy sector needs massive financial injection in order to bring the current frequent unbearable power outages back to normalcy, and Dr Kwabena Donkor, minister for power has promised to pursue an aggressive policy of investment on energy in Ghana to ensure that government meets its target of generating 5,000MW of electricity by 2017. ■

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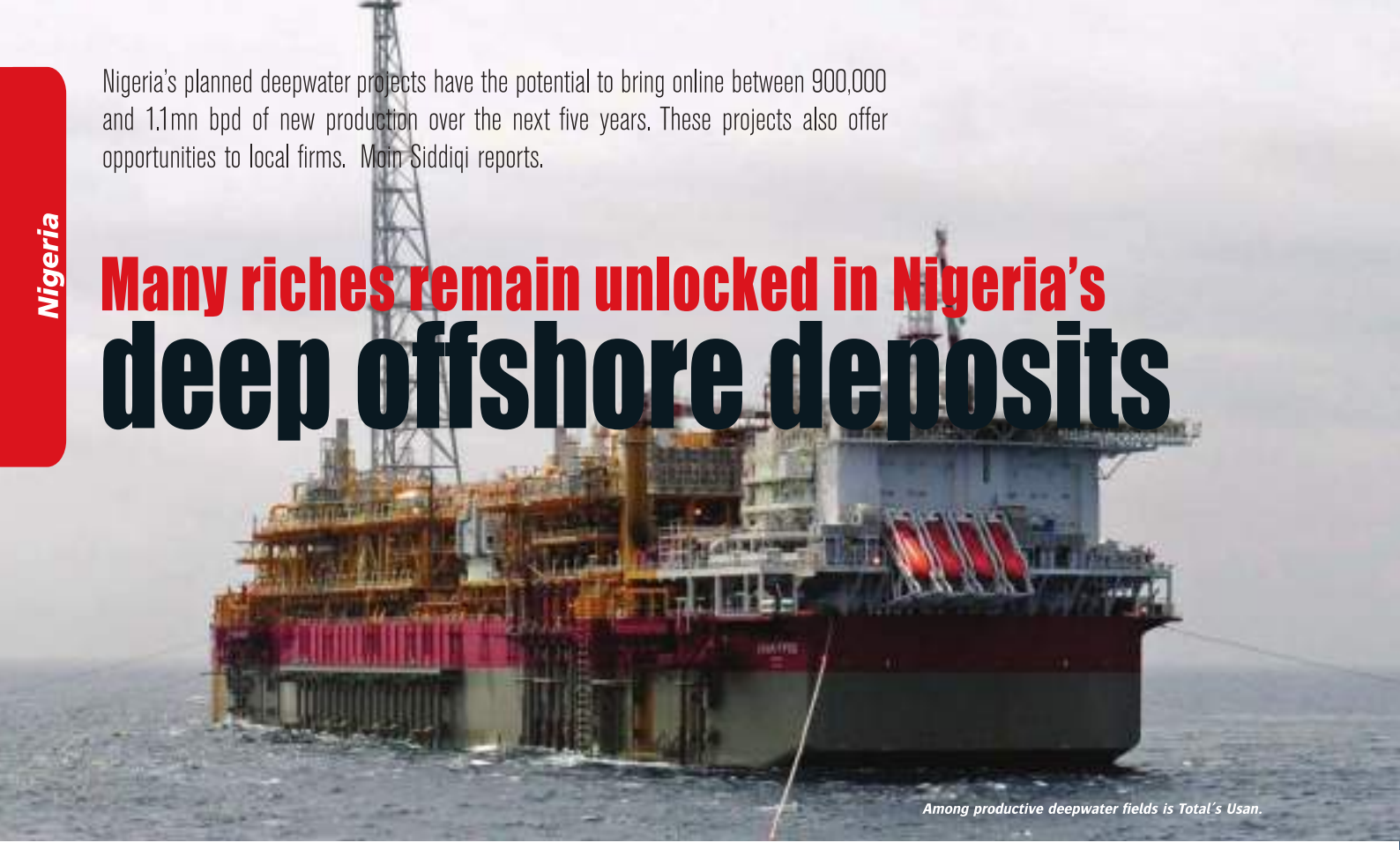
Nigeria's planned deepwater projects have the potential to bring online between 900,000 and 1.1mn bpd of new production over the next five years. These projects also offer opportunities to local firms. Moin Siddiqi reports.

Many riches remain unlocked in Nigeria's deep offshore deposits



Among productive deepwater fields is Total's Usan.

FROM THE VERY beginning of oil exploration in Nigeria in 1937, until the early 1990s, virtually all exploration and development (E&D) activities were confined to onshore Niger Delta and swamps (shallow waters). But then in 1993, the Federal Government opened up a new frontier in hydrocarbons E&D by allocating some offshore blocks in water depths reaching 2,500 metres. "These deepwater depths and plans for even greater depths than 2,500 metres will undoubtedly impact positively on the country's production and reserve blueprint," said the state-owned Nigerian National Petroleum Corporation (NNPC).

The bulk of proved reserves (37bn barrels) are found along the Niger River Delta and offshore in the Bight of Benin, the Gulf of Guinea, and the Bight of Bonny. Most deepwater activities are in, so-called, virgin or frontier territory, thus lacking infrastructural support and services, and so the cost of prospecting is vast. Though such operations are technically challenging and heavily capital-intensive, foreign multinationals have been awarded some deep offshore blocks and even ultra-deep concessions. Nigeria, Africa's No 1 crude producer, has over 150 productive oilfields and some 1,400 wells in operation, according to the Ministry of Petroleum Resources. Now about half of Nigeria's oil comes from deepwater fields, a notable success since production started only 10 years ago.

Divestment to indigenous producers

The international oil companies (IOCs) operating onshore and in coastal areas of the Niger Delta have been affected by security problems and ageing infrastructure. In recent years, onshore E&D work has declined because of oil theft and vandalism (pipeline sabotage). Consequently, there has been a trend since 2008 for majors, notably Royal Dutch Shell, Total of France, Eni of Italy, and US-based Chevron, ExxonMobil and ConocoPhillips to divest their interests in smaller, 'marginal' fields to indigenous producers, such as Seplat, Oando, Energia Ltd, Shoreline Natural Resources, Lekoil and Tempo Energy.

In 2014, the largest divestment deals were reportedly Shell's US$2.7bn and Eni's US$2.6bn asset sales, respectively, to local consortiums. The Western majors are now focused on deepwater prospecting, where they boast a competitive advantage due to sophisticated technologies and ample resources to invest in 'risky' long-term, high-cost operations. The cost of drilling deepwater wells exceeds US$100mn, according to industry experts.

Among productive deepwater fields are Shell's Bonga Northwest (yielding 240,000 bpd); ExxonMobil's Erha (140,000 bpd); Chevron's Agbami (estimated reserves one billion barrels); Agip's Abo; and Total's Akpo and Usan. Subject to a final investment decision, Shell plans to develop a new Bonga Southwest field (estimated cost US$12bn), which is due online after 2020 using an FPSO vessel, with an output capacity of 225,000 bpd – one of the world's biggest platforms. Bonga Southwest is Nigeria's first development at depths of over 1,000 metres. Also, ExxonMobil's Erha North Phase-2 project is expected onstream in 2018 with initial output of 60,000 bpd.

> Now about half of Nigeria's oil comes from deepwater fields.

Meanwhile, Total has sanctioned a huge US$15bn Egina deepwater field development – comprising 44 wells connected to the 2.3mn barrel capacity FPSO with a 200,000 bpd of oil equivalent processing capacity.

The planned deepwater projects (see Table) have the potential to bring online between 900,000 and 1.1mn of new production over the next five years. The schemes (if fully implemented) should boost Nigeria's sustainable capacity above 3mn bpd for the first time and help to offset the natural decline in output. However, as of end-2014, only 260,000 bpd of planned new production had reached critical development stages – the majority of greenfield projects have yet to receive a final investment decision (FID) by respective operators.

Nurturing indigenous expertise

Deepwater projects offer opportunities to local firms to win or participate in large front-end engineering design (FEED) contracts with global counterparts and foster in-house expertise – objectives promoted by the Nigerian Local Content Act (NLCA) 2010. It stipulates that multinationals bidding for work must "incorporate Nigerian content in their product and service proposals."

The Act has created 38,000 jobs and generated US$5bn worth of investment, according to the Nigerian Content Development Monitoring Board (NCDMB). Former executive secretary of NCDMB, Ernest Nwapa, said: "Local ownership and operatorship of high technology vessels and rigs and expanding investment by indigenous service companies demonstrated that NLCA has changed the industry's operating environment." Recently, Nigerdock and DeltaAfrik had carried out some engineering work locally for Total's Usan and Egina projects.

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Regulatory hurdles

Continuous uncertainties over the long-delayed Petroleum Industry Bill (PIB) – first proposed in 2008 – have led to fewer mega projects receiving a FID. Therefore, start-up dates for many projects have been pushed back. Some contentious areas of the PIB include the potential renegotiation of existing contracts with IOCs, changes in tax/royalty structures, a concentration of oversight authority in the Minister of Petroleum Resources, and a mandatory contribution by IOCs of one-tenth of monthly net profits to the Petroleum Host Communities Fund.

Much depends on where the oil price goes and the legislative agenda of the next government.

Currently, production-sharing contract (PSC) fiscal terms on new and existing deepwater projects are more favourable than those governing onshore and coastal areas projects in joint-venture arrangements. To encourage greater investments into ultra-deep acreage, the IOCs receive a higher share of revenue as the water depth increases. IOCs cautioned that proposed changes to fiscal terms (involving higher taxes/levies) would undermine the viability of new upstream projects, especially in 'high-risk' ultra deepwater terrain.

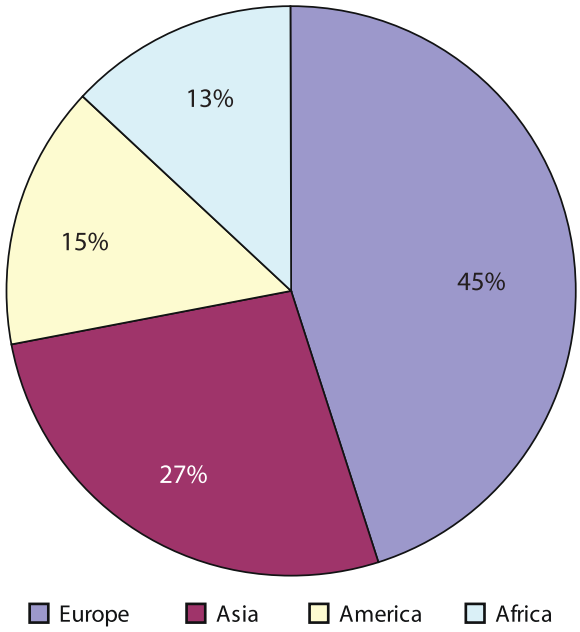
The Oil Producers Trade Section, a lobby group of supermajors, estimated the cost of the PIB (if passed) could be US$185bn over the first 10 years – with output plunging by 20-25 per cent. There has not been a licensing round since 2007, mainly because of lack of clarification about future PSC terms.

Furthermore, protracted cheap oil would render most greenfield deepwater projects uneconomical – considering their complexity, colossal capex and longer-lead times from discovery, production and sales. It can also impact merger and acquisition (M&A) deals in the upstream sector and project finance businesses. Dapo Okubadejo, head of M&A Africa, at KPMG, observed "We think the IOCs will hold on to their planned divestment programmes to the extent that there will be a reduction, if not a complete stop, on the divestment of assets right now because of the impact of crude oil prices on the valuation." In 2014, when Brent averaged almost US$100/barrel, Nigeria's upstream industry recorded US$7.4bn worth of deals, up steeply from US$2.2bn in 2011, according to data from IHS Inc.

In sum, deepwater acreage is pivotal to economic development and future growth in both output and recoverable hydrocarbons reserves. Hence, encouraging ongoing E&D work in frontier terrain is essential. Nigeria needs a stable climate and estimated US$100bn in investment to achieve official target of 4mn bpd by 2020, of which deepwater is expected to make a major contribution.

Tim Newbold of Africapractice, cautioned, however: "I thought you could potentially see the indigenous sector driving production growth onshore, the IOCs focusing on building up their deep offshore assets and Nigeria producing at a higher level than it's produced in a long time. That is now unlikely and the wider political context makes it very uncertain. Much depends on where the oil price goes and the legislative agenda of the next government." If oil prices remain low, this will exacerbate project delays in Nigeria and beyond.

Nigeria's Oil Exports by Regional Destination 2014



Source: US Energy Information Administration based on Lloyd's List Intelligence (APEX tanker data)

Note: In 2014, Nigeria exported 2.05mn bpd of crude oil andcondensate, according to APEX tanker database. Largest importers are India, Holland, Brazil, Spain and South Africa. Nigeria produces high-value, low-sulphur content, light oil: Antan Blend, Bonny Light, Bonny Medium, Brass Blend, Escravos Light, Forcados Blend, Odudu Blend, Pennington Light, Qua-Iboe Light and Ukpokiti.

Planned Crude Oil Projects in Nigeria

Project	Operator	Type	Output 000' bpd	FID*	Est.date Start-up
Dibi Long-term project	Chevron	Onshore	70	Yes	2016
Erha North Phase-2	ExxonMobil	Deepwater	60	Yes	2018+
Egina	Total	Deepwater	200	Yes	2019+
Bongo Southwest and Aparo	Shell	Deepwater	225	No	2020+
Bongo North	Shell	Deepwater	100	No	2020+
Zabazaba-Etan	ENI	Deepwater	120	No	2020+
Bosi	ExxonMobil	Deepwater	140	No	2020+
Satellite Field Development Phase-2	ExxonMobil	Deepwater	80	No	2020+
Uge	ExxonMobil	Deepwater	110	No	2020+
Nsiko	Chevron	Deepwater	100	No	2020+

*Final Investment Decision.

Source: U.S. Energy Information Administration based on reports from foreign oil majors.

Footnote

An important element in NNPC's exploration success over decades is the Integrated Data Services Ltd (IDSL), a subsidiary of NNPC. IDSL is one of the largest and most advanced earth science facilities in Africa. Field data is sent to IDSL for analysis using advanced computer systems, providing the company with a critical edge in upstream operations. IDSL processes and interprets in 3-D configurations data from the hydrocarbon reservoirs. This technological capability is instrumental in developing reservoir management strategies, which provide optimum recovery rates over lifespan of an oilfield. IDSL has been responsible for most of the country's major oil discoveries and is continuing an intensive E&D programme to increase the country's hydrocarbon reserves. ■

PFL - meeting and surpassing expectations

PFL ENGINEERING SERVICES Ltd is a Nigerian independent company that was initially established in 2002 as Perfect Facilities Ltd. At the time, its main focus was to provide skilled technical manpower and logistics support services to companies operating in the oil and gas, petrochemical, energy and marine sectors.

The company was restructured in 2008 and its name changed to PFL Engineering Services Ltd with its scope of services expanded to include access, inspection, maintenance (AIM), technical manpower supply, emergency response and training.

In line with this diversification and to make PFL a serious player in AIM, in April 2015 the company extended its ISO Certification to include ISO 1401-2004 and OHSAS 18001-2007 along with its existing ISI 9001-2008.

Early last year PFL also received its IRATA (rope access) membership and LEEA (lifting engineering equipment association) certification as operators and trainers making it fully compliant and one of two indigenous companies in Nigeria currently certified to operate and train in these disciplines by the certifying international corporate bodies.

Preye Berezi, managing director and CEO of PFL.

This move proved positive for the company as it has been awarded many inspection and rope access contracts. It is currently active on the Bonga North West FPSO (Shell), The Sea Eagle (Shell) and the Mark Lorenceau Production unit of Fred Olsen.

It has also passed the technical phase of tenders for several fabric maintenance, confined space entry, and rope access/inspections services contracts on several FPSOs for Mobil, Chevron, Total, SNEPCO and Addax.

In addition, it has recently been awarded the contract to provide field joint coating on offshore pipelines for Egina via Saipem Contracting Nigeria Ltd. The company is very proud of this, as no other indigenous company in Nigeria is providing this service today for 3LPP and 5LPP.

The company's most exciting component is its ability to train its multi-skilled technicians and supervisors utilising its in-house certified and accredited training facility. The PFL training school in Port Harcourt is fully operational and has been audited and accredited to be the best facility of its kind in West Africa, according to the company.

Training has begun in the facility for rope access, NDT (MPI, DP, RT, UT & VI), scaffolding and lifting gear inspection services and certification.

Its partners in the UK, Newcastle College, are presently developing OPITO-certified courses. PFL has also offered several engineering courses to EPCs including subsea engineering which is certified up to degree level by the college.

With its keen interest in local content and empowerment, the company intends to train, certify and employ as many young as possible, especially from the various project host communities.

Nigeria's drive for increased local content and the need to attract foreign investments, collaboration and partnerships in the oil and gas sector came up for discussion at the inaugural Nigerian Content Investment Forum (NCIF), held in Houston in May.

Experts chart course for Nigeria's oil sector

THE NIGERIAN CONTENT Investment Forum (NCIF), was held in Houston during OTC 2015. Speakers and delegates at the Forum were unanimous on the potential of Nigeria as a preferred investment destination, taking into account the country's human resources, its leadership position in Africa, huge mineral resources – including oil and gas – and the hoped-for stability the new government, which came into office on 29 May, will bring to the nation, especially in the oil and gas sector.

Nigeria depends on oil for more than 80 per cent of its foreign exchange earnings signifying the importance of the sector to the nation. Schlumberger chairman of Africa, Sola Oyinlola, who chaired the event, noted that the collaboration which had birthed the NCIF has the capacity to facilitate interfaces between Nigeria and sub-Saharan Africa on one hand, and other parts of the world.

Oyinlola noted the many success stories of the Nigerian Content Act within a short period, stating that PETAN has become a formidable force in the petroleum scene, through the support of the Act.

Deep challenges persist

Oyinlola maintained, however, that despite the success of the Act, deep challenges persist in its implementation, including the lack of in-country financial capacity to undertake big ticket transactions and inadequate infrastructure such as the deplorable state of supporting industries for prototyping, manufacturing or assembling locally engineered solutions.

Other challenges, he says, are the lack of technical capacity, dearth of research and development institutions and culture; and the limited access to technology limiting the possibility of innovation and domestic technological creativity, as well as the lack of supporting import duty regimes.

For the Nigeria Content Act to achieve its full potential, Oyinlola said these challenges must be addressed through continuing pursuit and commitment by the NCDMB and the Ministry of Petroleum Resources.

"The critical missing link between strategy and action must also be addressed to avoid the persistent incapacitation that public policy initiatives and actions of many government programmes and projects have suffered," Oyinlola said.

He added that the NCDMB and the Ministry of Petroleum must collaborate with development partners, including international oil companies, original equipment manufacturers (OEMs) and multilateral agencies for overall success of the Nigeria Content Act

Nigerdock's shipyard division is the largest facility of its kind in West Africa with an outstanding history in the marine industry.

Speaking on the global challenges of low oil prices and Nigeria's "peculiar domestic challenges", the Schlumberger chief stated that despite these, "the nation was brimming with investment opportunities – with a high growth economy, a large, well educated but under-employed youthful population, government agencies, such as NCDMB, working to optimise these opportunities, a PETAN domesticating petroleum technology, Nigerian independents developing newly acquired E&P assets and international service providers such as Schlumberger, GE, and a host of others continuing to operate in-country".

According to Oyinlola, the new government has its work cut out for it, while the oil and gas industry awaits with bated breath new policy directions from the government.

Also speaking at the event, Ernest Nwapa, the former executive secretary of the NCDMB, dwelt on the achievements of the board, lauding local companies for their successes in playing active roles in the oil and gas sector in terms of providing personnel and technology required in the industry.

He spoke of the government's industrial park scheme, inviting OEMs from the USA, Europe, Asia and South America to take advantage of the scheme by establishing industrial plants in the park.

According to Nwapa, it was also for this purpose of establishing their presence in Nigeria that many of the SMEs that attended the NCIF had come to seek partners from the OEMs.

In his contribution, Manssour Jarmakani, the executive director of Nigerdock, pointed to his company as an example of the success story of the Nigerian content policy. His company, he said, was currently handling high-tech projects that were hitherto handled abroad, thereby saving the nation huge foreign exchange and contributing to the growth of the nation.

Jarmakani said that in spite of the challenges facing Nigeria, the country provides a good atmosphere for investment, saying his company would continue to do business in Nigeria.

Fubara Anga, principal partner at Aelex, disclosed the view that Nigeria provides better tax incentives for investors than any other country in the world, maintaining, for instance, that only in Nigeria are foreign companies allowed to repatriate their entire profits.

In a welcome address, editor-in-chief of forum organisers SweetcrudeReports, Hector Igbikiowubo, said the forum was put together to bring Nigerian oil and gas small and medium enterprises (SMEs), with manufacturing pedigree together with international original equipment manufacturers of components used in the industry.

Igbikiowubo said the forum aims to "create a sustainable platform for interaction between credible professionals and stakeholders in the oil and gas industry, particularly in sub-Saharan Africa, USA, Europe, Asia and the Middle East".

"We also intend to showcase the gains of the Nigerian Content Act and the opportunities for collaboration, growth and development contained therein," he explained.

The forum included a plenary session, as well as a technical session, and there was also a panel discussion on the way forward for Nigerian Content, unlocking opportunities for OEMs through Nigeria's Oil and Gas Park Scheme, and fiscal incentives in Nigeria to attract foreign investors. ■

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Ladol obtains anti-monopoly injunction

LADOL IS ONE of several indigenous oil and gas companies that operate in Nigeria. It has built a US$500mn industrial complex along with a US$300mn vessel fabrication and integration facility, on-course to create 50,000 local jobs.

With its high-value industrial projects, which range from deep off-shore logistics support and vessel fabrication to electronics manufacturing and agricultural processing for exports, this 100 per cent indigenous company is, in many ways, an exemplar of Nigeria's private sector vibrancy.

But Ladol ran up against various entrenched private interests that resulted in an attempt to ensure that all oil and gas related cargoes had to be discharged at Onne oil and gas free zone or other discharge facilities at Warri in Delta State or Calabar.

Making the argument that this was a restraint on free trade, and was enforcing a monopoly, Ladol obtained a pivotal court injunction not only against the past President of the Federal Republic of Nigeria, but also the National Assembly, Federal Ministry of Transport and the Attorney General, restraining each of them from implementing the directive of President Jonathan.

Professor Fidelis Oditah QC, SAN who filed the action on behalf of Ladol, said these injunctions ensure that all related agencies, including the Nigerian Ports Authority, must allow vessels and cargoes to proceed directly to any port of their choice to discharge their cargoes, including oil and gas cargoes.

In addition, vessels from foreign waters can berth directly at Ladol's Free Zone in line with Ladol's Designation as a Deep Offshore logistics Base, permitted to receive two international vessels each week.

The injunctions further prevent the passing of amendments to the Oil and Gas Export Free Zones Act which sought, among other changes, to impose a foreign-owned monopoly on the movement of oil and gas cargoes in Nigeria; as well as to transfer effective control of a dozen free zone's in Nigeria under the widely considered as flawed NEPZA Act, to the control of the world's largest Oil and Gas Free Zone (at Onne) that is controlled by a foreign-owned entity.

This court ruling is a further indication that Nigeria is determined to take local control not only of its extensive oil and gas reserves but the industry's whole value chain.

LATC Marine purchases Damen vessels

AFRICA-FOCUSED PROPRIETARY investment firm LAT Cleveson (LATC) has signed an order with Damen Shipyards Group for the supply of two PSV 3300 platform supply vessels and two FCS 5009 fast supplier vessels. This landmark transaction will bring next generation Damen PSVs to the offshore industry of Nigeria and the Gulf of Guinea for the first time.

The purchase is being made by LATC Marine Ltd, a subsidiary of LAT Cleveson, which has quickly established a positive reputation by providing state of the art marine vessel supply and offshore operation support services to leading oil and gas operators in Nigeria. The company's aim is to set new standards in the West African offshore oil sector through acquiring modern and technologically advanced assets to serve international and local clients operating in the region. Vessels servicing the offshore industry in the Gulf of Guinea, and specifically Nigeria, typically are substantially older than those operating elsewhere in the world – until now.

The purchase has been financed by Fidelity Bank Plc, a progressive and reputable Nigerian bank, with a dynamic transport & shipping division which is poised to support value-adding projects and new/efficiently run companies in the industry, in particular those with a strongly local content status.

Mr Gbolahan Shaba, COO of LATC Marine commented: "Our aim is to redefine the concept of quality tonnage in the Gulf of Guinea and particularly in Nigeria. We plan to locally develop the necessary skill sets that will sustain our quality service to the most demanding clientele who run very complex operations in the most challenging environments. Ultimately, our strategy is to attain the capacity to build and maintain quality tonnage in Nigeria. We anticipate strong demand for repair and docking services in our region and we plan to create the facilities to meet that demand, professionally and safely".

The platform supply vessels and fast suppliers vessels acquired by LATC Marine will have the full support of the Damen service hub in Port Harcourt, as well as the Damen regional office in Lagos. An additional service hub in Ghana is being planned.

Nigeria could boost oil output with changed funding

NIGERIA CAN BOOST its oil and gas production by changing the way capital investments are funded in its joint ventures with energy companies, according to Seplat Petroleum Development Co.

NNPC, holds an average 55 per cent stake in five joint ventures with Shell, ExxonMobil, Chevron, Total and Eni that pump more than 80 per cent of the country's crude. It pays the same share of capital contributions for the operation of the oil ventures.

Seplat, a Nigerian producer now running a joint venture with NNPC after buying assets sold by Shell, wants the current funding arrangement in Africa's biggest oil producer scrapped in favour of a method less dependent on the government. The "cash call" requirements are a "constraint" affecting production, Ambroise Orjiako, the company's chairman, said in an interview at the World Economic Forum Africa in Cape Town.

"We need to find a situation where the joint-venture partners sit down and agree on what percentage of production should be dedicated to operation and capital expenditures," Orjiako said. "That way you ensure that growth in the industry is guaranteed, that the production will increase, that the reserves will be increased and that there will be room for exploration activities as well," he said.

The Nigerian government struggles to meet its share of funding to the operation of the joint ventures with energy companies, thereby limiting the scope for increasing production. It is currently indebted to companies including Shell, ExxonMobil, Total and Eni, which had provided loans in the past to fill the funding gap.

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With more than two-thirds of East Africa's natural gas discoveries located in Mozambique, the country is poised to become a major supplier of gas in Africa over the next decade. Moin Siddiqi reports.

Mozambique's emergence as a potential future global gas hub

The monetisation of Rovuma resources requires the development of a completely new natural gas hub and large-scale LNG facilities.

THE DISCOVERY OF huge gas fields in the prolific Rovuma basin in 2010 represented one of the most exciting upstream exploration successes of the post-2000 period thanks to advanced seismic and deepwater drilling technology for identifying a string of colossal finds. Standard Bank noted: "Mozambique has probably made the world's biggest gas discovery in the past 10 years and will probably become the next Qatar."

The hydrocarbons-containing sedimentary basins include offshore northern Rovuma, Angoche and Zambezi as well as onshore Pande-Temane and Palmeira basins. Exploration/drilling began during the 1950s with little success, the most significant discovery being the Temane field in the early 1960s (Inhambane province). Over the past five years, Mozambique surged rapidly through the global exploration ranks with total natural gas resources, tentatively estimated at about 276 trillion cubic feet (tcf), of which 128 tcf has already been discovered – equivalent to total proved reserves of Iraq and Australia - with 148 tcf yet to be discovered. Around 70 per cent of gas deposits are in the Rovuma basin to date, according to Empresa Nacional De Hidrocarbonetos (ENH), the state oil company.

High-quality gas

Mozambique, in fact, only became the focus of foreign energy majors during 2010/11 when Anadarko (US) and Eni (Italy) made astonishing 'world-class' finds within the Rovuma waters – hence causing immense industry excitement. Estimates of commercially recoverable gas in Area-1 (operated by Anadarko) and Area-4 block (operated by Eni) are 50-70+ and 85 tcf, respectively. Scotland-based energy consultancy, Wood Mackenzie reckoned that offshore blocks [one and four] contain 120 tcf of technically recoverable reserves – exceeding total proven reserves of Indonesia and China.

The monetisation of Rovuma resources requires the development of a completely new natural gas hub and large-scale LNG facilities.

Petronas, Malaysia's national oil company, and Statoil (Norway) hold offshore leases to the south of Palma, where drilling has started and, if successful, they may develop new gas fields. Currently, four productive fields - Pande, Buzi, Temane, and Inhassoro - are located onshore in the Mozambique Basin, according to the National Petroleum Institute (INP). Sasol's operated Pande-Temane fields (holding 3.1 tcf reserves) supply natural gas to South Africa via an 865-km pipeline from daily production of 400mn cubic feet.

Still much of Mozambique's total resource base has not been fully evaluated – thus the probability of additional discoveries. There could be coal bed methane (CBM) opportunities around the southern areas of Tete. Sasol has also started exploration work offshore the Inhambane province.

Estimates of Conventional New Field Resources (Tcf)

Supply Regions	Total Assessed	3P* Discovered	Undiscovered
Rovuma offshore North	199.4	124.4	75
Rovuma offshore South	36	0	36
Rovuma onshore	3.1	0	3.1
Maniamamba Basin onshore	1.2	0	1.2
Central offshore	17.9	0	17.9
South and West onshore	5.7	3.5	2.3
South offshore	13.1	0	13.1
TOTAL	276.5	127.9	148.1

Source: Consulting firm ICF International (2012).

*3P is defined as proven plus probable plus possible resources.

First East African LNG producer

The Oxford Institute for Energy Studies wrote: "Mozambique is virgin terrain, both in terms of the gigantic scale of the Rovuma discoveries and of liquefied natural gas (LNG) infrastructure. The monetisation of Rovuma resources requires the development of a completely new natural gas hub and large-scale LNG facilities geared towards servicing, particularly Asian markets."

The LNG trains (up to 10 are planned) are being developed by Eni and Anadarko in Cabo Delgado province. The first LNG export is expected in 2020 (probably ahead of Tanzania), assuming a stable fiscal and legal framework for hydrocarbons ventures is implemented. The overall plan is for 50mn tonnes/year production capacity by 2030. "We believe, as we go into the next decade, Mozambique will emerge as the third-largest exporter of LNG in the world," said Al Walker, president of Anadarko. Anadarko has reportedly signed non-binding long-term supply agreements with Asian buyers covering two-thirds of capacity from the first 5mn tonnes/year liquefaction train.

The cost of envisaged investment for the first phase of LNG development – assuming construction of four onshore liquefaction trains – is about US$40bn (or 2.5 times 2014 GDP) – among the biggest projects in sub-Saharan Africa. The total investment could reach US$100bn later on, if the number of trains is expanded, or if offshore floating conversion facilities are constructed. Eni has issued an Expression of Interest for initial designs of a floating (FLNG) facility that would process and liquefy natural gas for export solely offshore.

A report by Standard Bank on 'Economic Impact of the Project' shows that a six-train facility would add US$39bn/year to the local economy by 2035 and create over 700,000 jobs. Also, it will raise GDP growth to 8.4 per cent over the long term.

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Area 1 and Area 4 Technically and Commercially Recoverable Reserves

AREA-1	Condensate /	Gas //	AREA-4	Condensate /	Gas //
Atum	24	6,773	Agulha	42	4,823
Espadarte	25	7,216	Coral	30	8,533
Golfinho	65	18,50	Mamba North	20	5,746
Lagosta	32	9,086	Mamba North East	32	9,000
Orca	11	3,235	Mamba South	14	3,908
Tubarao	4	1,000	Mamba North East 2	32	9,000
Barquentine (commercial)	36	10,119			
Mamba South (commercial)	59	16,708			
BeCamarao (commercial)	10	2,845			
Windjammer(commercial)	13	3,745			
TOTAL	**220**	**62,519**		**229**	**57,718**

/ million barrels; // billion cubic feet.

Source: Wood Mackenzie, estimates as of 1st January 2014.

Mozambique stands to earn US$143bn and US$212bn from four and six LNG trains, respectively, in the form of royalties, profit share and taxes over the project's lifespan (until 2044). Similarly, swelling export revenues will transform a balance of payments deficit of US$2.8bn in 2019 into a surplus of US$15.9bn by 2035, according to the Bank's calculations.

Monetisation

In June 2014, Mozambique approved the Natural Gas Master Plan (GMP) devised by US-based consulting firm ICF International and funded by the World Bank. Esperanca Bias, Minister of Mineral Resources, stated: "This is a detailed road plan for taking strategic, political and institutional decisions, on the basis of which investments in this area can be designed and implemented in a co-ordinated manner. Through this master plan, the government intends to maximise benefits from the gas, not only through the revenue from sales, but also as a factor for the industrial development of Mozambique."

The GMP recommended key initiatives to nurture broad-based growth:

- Encourage strategic location of mega-projects, thereby contributing to local economic development – especially of Beira, Palma and Pemba regions.
- Establishing mid- and downstream gas-utilising industries for exports.
- Supporting local businesses capable of supplying goods/services to the hydrocarbons industry and envisaged industrial projects.
- Transparency in taxation and ensuring higher returns from gas-linked mega-investments for the government over coming decades.

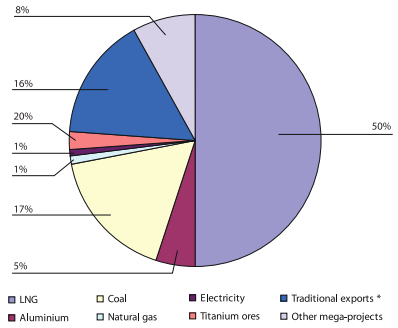
In parallel with LNG plants, the GMP's vision is to develop the domestic industry and associated infrastructure – supporting job creation in both mega-projects and small-medium sized enterprises (SMEs). Mozambique has a golden opportunity to beneficiate gas as cheap feedstock in production of fertiliser, methanol and gas-to-liquids (GTL) and/or use gas to process heat for power generation, iron/steel production, aluminium smelting and petrochemicals.

Standard Bank believes present and forward gas exploitation activities provide "the opportunity to transform Mozambique's internal energy position through multiple downstream projects, such as fertiliser and methanol production. These projects "would have significant domestic benefits, for example, creating new manufacturing industries as well as in some cases developing new export industries, which will further boost employment, exports, etc."

In total, expression of interest received by the government from various energy-intensive projects amount to demand for about 27 tcf of gas a year. Shell in partnership with ENH and Sasol (ENI) have announced feasibility studies for constructing GTL plants, while Japanese and European companies have submitted bids to build fertiliser and methanol plants in Mozambique.

Future industrialisation depends heavily on more gas to power generation. According to state-owned power utility EDM, Mozambique must increase electricity capacity by 100-160 megawatts (MW) a year. EDM views Rovuma discoveries as opportunities to develop medium to large-scale gas-fuelled power plants in the 200-1,000 MW range across the country.

Projected 2023 Exports from Mega-projects #



percent of total exports; * include sugar, lumber & tobacco.

Source: International Monetary Fund, Country Report 2013.

Building local capacity

A new Petroleum Law, passed in 2014, has tightened local content requirements (the percentage of a product or service who's value-added originates domestically). It permits Mozambican firms a "10 per cent price margin of preference, assuming equal quality, time in delivery and quantity availability". The overriding goals are job creation, technological transfers and upgrading local knowledge/skills. The new law also stipulates that one-quarter of production from future gas extraction projects goes to the domestic market and encourages ENH and local firms to expand their participation in projects beyond their respective current 10-15 per cent stakes.

Domestic supply obligation is, however, controversial, because Mozambique has yet to devise a pricing formula to impose on gas producers. Texas-based law firm, Andrew Kurth, observed: "International oil companies (IOCs) looking to participate in Mozambique's oil-gas industry will require certainty that the price received for oil and gas produced and reserved under the 25 per cent quota is economically competitive for IOCs and ensures sufficient shareholder value for shareholders. It added: "Equally, the government will look to employ a pricing mechanism that is economically competitive and avoids any domestic concern that the government is 'overpaying' for the oil and gas reserved under the 25 per cent quota."

Game changer

The International Energy Agency (IEA) calculated that Mozambique's gas reserves (potentially the highest in Africa) could be worth over US$115bn over the next 25 years. The construction of LNG/related industries will enable Mozambique to reach middle-income status in the near future and offer lucrative opportunities for global upstream and service companies.

The gas bonanza will have multiplier-effects in the economy through massive foreign direct investment and socio-economic development. Natznet Tesfay, head of Africa at IHS Country Risk, explained: "The massive investment followed by the infrastructure boom will transform the northern Mozambican provinces. We expect this will facilitate and attract the entry of foreign investors, exploring not only the opportunities in the energy sector, but also other areas, such as chemicals, power, manufacturing and mining."

In sum, Mozambique is set to join the ranks of world's major energy producers in the coming decade. In-country monetisation of gas reserves opens up 'value-added' export opportunities in downstream sector. Benjamin Chilenge, director of planning and development at the Mineral Resources Ministry, said the strategy should ensure "Mozambique does not become a mere exporter of unprocessed raw materials." ■

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Tanzania needs to start moving forward with reforms and tangible political support for the development of its ample deepwater gas reserves, or it is bound to see investor enthusiasm cool considerably. Sam Ciszuk reports.

Overshadowed but stable, a tough but possible, sell

RESERVE SIZE AND political decisiveness both look better in its southern neighbour Mozambique, but on the other hand Tanzania presents a more stable and institutionalised political climate than most African states. Showing that stable does not equal moribund, will however be a challenge.

A quick search of the keywords 'Tanzania' and 'gas', reveals a dominating trend of calling a race between Tanzania and Mozambique for the construction of East Africa's first LNG export capacity. Article passages to that effect seem to have been written almost habitually for some time. While certainly pedagogically sound, drawing a reader's attention to projects being mulled on both sides of the border and – at least recently – being similarly advanced, the message might by now be obsolete. Tanzanian deepwater gas reserves have, since the first discoveries in 2010 by Ophir and BG Group, mushroomed to as much as 53 tcf. However, in nearby Mozambique, reserves have, since the first deepwater discoveries by Anadarko and Eni in 2011, ballooned to almost twice Tanzania's amount. In addition to that, Mozambique's political situation, while fraught with challenges, has seemed more open to rapid and broad-based decision making.

In Tanzania, on the other hand, there has been investor uncertainty over the country's fundamental political direction. The government called a cabinet reshuffle at the start of the year, while a new constitution was presented to the electorate ahead of an April referendum. Political question marks remain, as the country goes to the polls to choose President, parliamentarians and local government in the coming October, meaning that virtually all of 2015 will have passed amid a political decision-making stalemate.

Added to this, the fact that Tanzania's deepwater reserves are overshadowed by its southern neighbour's, at a time of uncertainty over the direction for oil and gas prices and large capex cuts by upstream developers, puts Tanzania in an unfavourable position. By mid-2015, it is starting to look relatively certain that Tanzania's goal of monetising its gas through an LNG facility will not come into fruition until around mid-2020s at best. This is likely a few years after a larger Mozambique facility commences production. It is a particularly risky time frame to be a second-mover in, as East African LNG will reach primary markets in Asia at the same time, or hot on the heels of, US and second wave Australian LNG projects. Australia's second wave projects are likely to enjoy considerable economics of scale compared to East African LNG, while the US liquefaction projects are set to benefit from much lower production costs than the already expensive East African deepwater gas.

The successful development of both Mozambique's and Tanzania's LNG promise hinges on strong demand growth. Any further US LNG export projects, in addition to those already mooted, would probably eat into the market share potential of East African LNG. Arriving as the second high cost LNG supplier to the region from East Africa sometime in the middle of next decade therefore amplifies investor risk.

Likely project inflation

Another factor, which hits the whole region equally, is the likely project inflation which two or so megaprojects will bring. Both Tanzania and Mozambique have deeply underdeveloped infrastructures and a shortage of skilled workforces. They also suffer from considerable red tape issues. This means that it is hard to model the actual end-costs for such large and complex projects as integrated deepwater-to-liquefaction, but that relatively large cost overruns are likely. In the current climate of capex cutting, committing to such uncertainties is likely to be daunting for any oil and gas company, even if their calculations show that the market will

Tanzania activity map May 2014. Image: Tanzania Petroleum Development Corporation

The successful development of LNG promise hinges on strong demand growth.

be there for the incremental LNG. Right now risk appetite is continuing to fall throughout the industry, despite the rebound in oil prices seen this year.

Tanzania would need to meet this reversal in investor appetite head on, with a broad-based political support for the gas development being manifested and acting as a long-time guarantor for stability. Otherwise market doubts are bound to persist regarding the country's willingness to reform and more crucially, the ability of its political actors to stay the course.

Whether some broad-based political agenda agreement can be reached is, however, still an unknown given the positioning ahead of elections. The need to cut red tape and increase the speed of political decision making, including pushing development decisions down the chain of command, is urgent.

Tanzania's onshore gas development is a case in point, where comparatively small, but easy-to-monetise, developments remain stranded given the

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The big important hydrocarbon game changer for Tanzania remains its technically complex deepwater gas.

Right now risk appetite is continuing to fall throughout the industry.

government's inability to agree on offtake prices and a framework which could unlock the construction of local and regional gas grids. That is particularly true for Aminex' Kilwani North project, where a gas sales agreement would unlock other small-scale projects throughout the Rovuma Basin.

The bell weather for the deepwater gas developments will be the purchase of land for the LNG facility, which the government finally has earmarked money for. Purchase of land will, however likely be held up by complex negotiations with some larger land owners, as well as by the forthcoming general elections, despite money being budgeted from the start of the forthcoming fiscal year on 1 July.

The large discoveries need to be put in context in the Tanzanian debate. Together with the onshore exploration success recently in Kenya and Uganda, there was briefly a sense that both the country's onshore and offshore could harbour bountiful hydrocarbon reserves.

Woodside's recent withdrawal from acreage in the Lake Tanganyika rift valley system, only about a year after originally farming in, has left operator Beach Energy "assessing all options", but also put a serious question mark over northwest Tanzania's upstream potential. Southeast onshore gas reserves have, as noted above, been identified, but they remain small-scale and effectively stranded until a domestic market is built and connected.

Deepwater gas the big game changer

The big important hydrocarbon game changer for Tanzania remains its technically complex deepwater gas, led by Shell, who recently acquired BG Group, as well as Statoil and ExxonMobil. Unlocking an LNG export project and fostering broader co-operation between the actors on the country's blocks will be a challenge, but might have been helped on by Shell's acquisition of BG Group. Shell has stronger financial muscles and a wider experience of megaprojects in a frontier region.

Ultimately, some of the discoveries furthest to the south, on the maritime border with Mozambique would probably be rational to develop jointly for exports. Fostering cross-border integration is, however, likely a challenge to far to yield much results in the coming five-10 year period.

Nevertheless, despite being overshadowed reserves-wise, Tanzania has better legacy of political stability and institutionalisation of the state, than its southern neighbour. While the challenge for Tanzania will be to create broad-based political understandings about the direction and terms for the gas industry, it is not haunted by the spectre of civil war and fundamental political fragmentation.

Securing a first mover advantage would have been beneficial for Tanzania, given that it does have a bit of an edge in infrastructure over its southern neighbour, but now that this opportunity seems to have been lost, it should focus on debottlenecking decision making to make sure that investors see progress and stay. With a high-quality line up of main developers, led by Shell and the Statoil-ExxonMobil partnership, the Tanzanian government and opposition should quickly settle on terms which all sides are comfortable with and then give the companies as much room to manoeuvre as possible, to put their own experience to work. Stability can be a very strong asset, as long as it applies to the political fundament and does not come to signify rigid, inflexible frameworks. ■

Tanzania: Training for effective local content in the oil and gas industry

THE GOVERNMENT IS currently working to establish clear local content requirements to set a foundation on which the future of the gas and oil industry will be run for the benefit of the country.

This was made evident when the vice president Dr Mohamed Gharib Bilal said during the Pan-African Conference on Oil and Gas Vocational Training Initiative that, in the next few years, they will build strong partnerships with stakeholders to train a new generation of local workers in the hydrocarbon industry.

"However, the local content polices alone will not suffice, we must ensure that Tanzania can deliver locally-born workforce, equipment and supply chains and this can only be attained through training of our people," Dr Bilal noted.

The discovery of natural gas amounting to over 50 tcf gives hopes of meeting the aspiration of the country of catapulting itself to becoming a middle income economy by 2025.

"Natural gas that has been discovered in Tanzania can play a pivotal role for substantial transformation of the industrial base with an immense impact on job creation and overall social-economic development," he stated.

Training of workeres. Image:Proactive Solutions Tanzania.

The meeting aimed at finding solutions to challenges inherent in meeting local content requirements and developing workforce talent pools capable of filling vocational and artisanal gas across the hydrocarbon industry.

Indeed the meeting came at an opportune time as the African oil & gas sector continues to expand rapidly, with the long-established industries in Northern and Western Africa now supplemented by major finds in countries such as Tanzania, Kenya, South Sudan and Mozambique.

Even in those African countries where no established oil and gas sector exists, exploration activity continues apace. The potential economic upsides for the region are huge but many obstacles to the realisation of the sector's full potential remain.

He further noted that despite the impressive economic growth rate in Tanzania, there is a widespread agreement that the growth has been limited in terms of filtering through to poverty reduction and employment creation, especially for the growing youth population.

"As the Tanzania hydrocarbon sector develops over the coming years, we must also talk about the critical importance of training our people to work in the oil and gas sectors, and the industries that support them, and the role that will play in the future economic development of our country," the VP stated.

In order to achieve this, Tanzania must firstly work with the industry to make sure that the hydrocarbon sector in the country is given every chance to flourish, Dr Bilal insisted.

"We made the sector attractive for foreign investors, upgrading our Production Sharing Agreements and opening up a number of licenses in deepwater blocks," the added.

Tanzania is now working with some of world's leading oil and gas companies like BG Group, Statoil, Petrobras, ExxonMobil, Pavilion Energy and Ophir Energy, among others.

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Organisations in the Oil and Gas sector are realigning their HR strategies to match their core business objectives. The roles of HR personnel are becoming increasingly challenging due to the talent crunch in the sector, writes Global Energy Talent.

HR strategies in the oil & gas sector

THE HUMAN RESOURCES (HR) discipline is becoming a lot more central to any organisation today. It's a truism that the best asset that most organisations have are their people. The traditional functional department that managed people is HR, and this function is becoming more strategic in its scope. There is a widening of activities managed by HR teams - change management, succession and retention planning, continuous learning, and 360 career planning.

More and more companies in the oil and gas sector are now recognising the importance of HR in the entire value chain. The talent crisis is making the task of organising their resources all the more difficult. A key issue for HR managers is to operate in harmony with constantly changing business imperatives. Hence, they are not given enough time or wherewithal to design long-term strategies to handle the talent crunch. Typically, most business strategies are reviewed and modified periodically, whereas management sometimes fails to review the HR strategies which makes the task of the HR manager all the more difficult. The good news is that in recent years some companies have realised that there is a grave problem if the role of the HR function is not addressed by management.

New managerial techniques such as professional recruitment - based on systematic assessment tests and executive searches; competency based management; career and succession planning and tailored compensation plans have been increasingly gaining ground. Key focus areas for regional players are: HR marketing and recruiting; staff development and motivation; rewards and compensation, and performance management.

Companies should demonstrate exceptional performance in each of those areas in order to achieve long-term success. For a potential employee, rewards and compensation matter greatly, but training and development opportunities are just as important to differentiate a company from its competition.

Nationalisation a driving force

Emphasising the role of the HR department is more important in the oil & gas sector as nationalisation of the labour force is a major driving force. Additionally, every GCC (Gulf Co-operation Council) country is looking towards implementing innovative HR strategies. The HR departments of a large number of regional oil & gas producers are currently facing one of their biggest challenges in recent years. The prevalent talent pool comprising mainly of engineers who are vital for the sustenance of the entire industry may retire soon.

Motivation, performance appraisal and reward management contribute greatly towards employee retention and satisfaction. Image: Scottish Enterprise.

There is tremendous pressure on HR to replace the ageing workforce within the coming years.

Research indicates that the average age of production engineers in the region is already at around 51 years. Further, recent studies show that by the end of this decade there will be a 38 per cent shortage in the influx of talented engineers and a 28 per cent shortage of instrumentation and electrical workers. There is tremendous pressure on HR to replace the ageing workforce within the coming years. Training young professionals to replace senior employees, who often have more than 25 years of relevant experience, is not at all an easy task for HR departments. Additionally, job opportunities created in booming sectors such as IT and outsourcing appeals to today's youth, which further leads to a high rate of employee turnover every year. This talent shortage, along with other recruiting issues creates a big challenge for today's HR executives.

Retaining employees a challenge

Another big challenge faced by the HR department is employee development and retention. Motivation, performance appraisal and reward management contribute greatly towards employee retention and satisfaction. Satisfied and trained employees, rarely consider quitting their current profession, even when offered comparatively higher compensation packages elsewhere. The HR department is deploying newer and modern techniques to retain existing employees and to attract talented young professionals to the oil & gas sector. One technique that is gaining a lot of recognition is e-learning and several companies are slowly implementing it.

Besides, the Herzberg's motivation-hygiene factors including company policy and administration, supervision, working conditions, interpersonal relations (co-workers), company policies and job security also play a major role in recruitment and employee retention.

It is important to note that creating a strong HRs department is not going to show results immediately. It is a journey where the fruits are borne over a longer term. The way to get started is to link business objectives to HR objectives; and build a continuous feedback loop: business strategy drives people management, and people issues influence strategy. ■

Atlas and Amplo launch partnership in South Africa and Namibia

LEADING LEARNING TECHNOLOGIES provider Atlas Knowledge and its strategic partner Amplo Development Services have launched a new initiative that will bring internationally certified construction, commercial and oil & gas training to the burgeoning South African and Namibian energy industries.

The alliance is in response to soaring demand for accessible, affordable world-class training for the growing indigenous workforce in these rapidly developing energy regions. With certified training a prerequisite to enter the industry, it will make specialist e-learning training and qualifications more readily accessible to South African and Namibian nationals working in the sector, as well as new entrants.

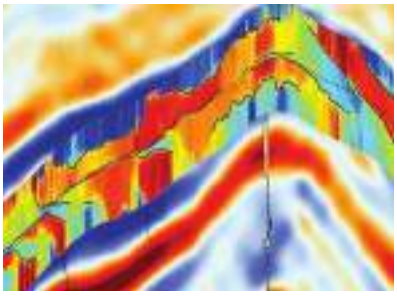
Reservoir mapping service enhances field development strategies

SCHLUMBERGER RECEIVED A spotlight award at the recent OTC for its GeoSphere reservoir mapping-while-drilling service.

Using deep, directional electromagnetic measurements, the GeoSphere service reveals subsurface-bedding and fluid-contact details more than 30 metres from the wellbore. This reservoir-scale view provides an unprecedented depth of investigation, enabling operators to optimise landing, maximise reservoir exposure, and refine field development plans.

Using deep, directional electromagnetic measurements, the GeoSphere service precisely maps the reservoir top. With a clear, real-time view of the reservoir, operators can land optimally and avoid losing lateral exposure or creating sumps. By exposing more of the lateral section to the reservoir, the GeoSphere service improves production potential and maintains wellbore integrity, says the company.

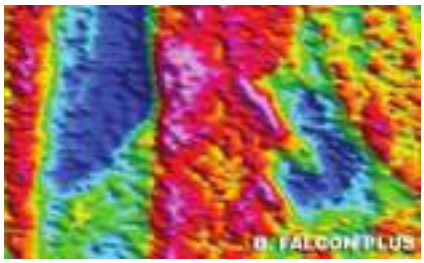
Pilot holes, which are often drilled to evaluate the formation before landing the horizontal, can cost tens of millions of dollars offshore. Even when drilled, pilot holes do not effectively mitigate risks in complex reservoirs where shallow or deep landings may occur. Resolving the reservoir and its boundaries, the GeoSphere service optimises well landing—eliminating drilling risks and costs associated with pilot holes.



The GeoSphere reservoir mapping-while-drilling service reveals subsurface-bedding and fluid-contact details more than 30 metres from the wellbore.

The GeoSphere service helps refine geological reservoir models to provide a deeper understanding of subsurface boundaries and fluid contacts in complex environments. Data provided by the service is integrated with seismic data to help operational engineers analyse the reservoir, adjust well paths while drilling, and deliver smoother wellbores.

CGG launches lowest-noise Falcon Plus



CGG HAS LAUNCHED its Falcon Plus, the newest release in the highly successful suite of Falcon airborne gravity gradiometer (AGG) systems, halving the survey data noise of the world's best AGG and providing more effective exploration capabilities. Falcon was already recognised as the world's quietest AGG system compared to other commercial AGG systems, having been designed specifically for use in light aircraft and engineered to isolate the instrument from aircraft-induced noise. Now, with multiple improvements in hardware, software, and data acquisition technology, the new Falcon Plus halves the noise of the Falcon system.

AGG surveys can be used to explore large prospective areas for only a fraction of the cost of 2D and 3D seismic surveys. This allows a greater return on subsequent exploration investments by prioritising the areas for seismic exploration. As explorers focus on increasingly deeper targets with subtle geophysical signatures, the noise level of the AGG instrument is of primary importance to increase survey accuracy.

Falcon Plus provides 20 times better spatial resolution (150 m vs 3000 m) and up to 10 times higher accuracy (0.1 mGal vs. 1.0 mGal) than conventional airborne gravity systems. Additionally, Falcon Plus surveys can immediately be assessed for data accuracy and system noise, assuring consistent high-quality data, while routinely covering in excess of 2,000 sq km per week in a fixed-wing aircraft.

Because of its higher resolution, Falcon Plus can be used for detailed mapping of near-surface geology, including ever smaller geological features. Its greater accuracy over conventional airborne gravity also results in superior mapping of basement topography to depths exceeding 6,000 metres. Falcon Plus can also be successfully deployed in areas of remote and rugged topography, which might pose significant challenges to ground-based gravity acquisition.

Polarcus signs seismic deal with NAMCOR

POLARCUS HAS SIGNED a memorandum of understanding with the National Petroleum Corporation of Namibia that will see it collaborate with NAMCOR on geoscience initiatives and also provide specialist business support services.

The deal will see Polarcus provide 3D and 4D marine seismic acquisition and processing services together with its geoscience expertise to help promote industry investment offshore Namibia.

Stephen Doyle, Polarcus's senior vice president for multi-client operations, commented in a company statement, "Namibia has an extensive yet still relatively unexplored shelf and we are excited at the opportunity to collaborate with NAMCOR on several initiatives to assist in realising Namibia's full potential. The country has seen an upturn in exploration activity over recent years with encouraging results that justifies further exploration and development to unlock Namibia's petroleum resources."

Sterling completes seismic shoot offshore Madagascar

STERLING ENERGY PLC, the AIM listed oil & gas exploration company and operator of the Ambilobe Production Sharing Contract ('PSC'), has completed a 3D seismic survey of approximately 1100 sq km over a high-graded portion of the Ambilobe Block, located offshore Madagascar. The acquisition was undertaken by CGG Services, on behalf of the Ambilobe joint venture partners Sterling and Pura Vida Mauritius. The 3D survey was acquired on time and on budget. Processing of the data will begin shortly to a pre-stack depth migration cube. Intermediary products will be available during the second half of 2015, allowing early interpretation with the final processed data, which is expected to be completed in Q1 2016.

The Ambilobe PSC, awarded in 2004, is in Phase 2 of the exploration period with all minimum work commitments for the current phase completed. In December 2013, Sterling completed a farm-out agreement with Pura Vida under which all costs associated with the acquisition of the discretionary 3D seismic programme were carried by Pura Vida.

Sterling expects that the carry will cover all the costs of the 3D seismic survey. Sterling and Pura Vida each hold a 50 per cent interest in the Ambilobe Block.

Despite being one of the early pioneers of gas-to-liquids technology, the idea has been slow to catch on in Africa, but that has not dented hopes.

Slow going for GTL in Africa

WITH OIL PRICES on the slide, investors are understandably more cautious about taking on new projects, especially those that utilise advanced technologies that can drive up costs.

Yet Africa's upstream sector has long championed many of these new technologies in order to access hard-to-reach oil and gas fields, both onshore and offshore.

This includes gas-to-liquids (GTL) technology, which dates back to South Africa and the innovations of local energy giant Sasol.

Indeed, South African national oil firm, PetrolSA, holds the distinction of operating the world's first GTL plant, producing 22,000 bpd back in 1992.

Sasol - which has been producing synthetic fuels for over 60 years, mainly using coal as a feedstock - has since gone on to extend its GTL footprint beyond its borders.

This started with the Oryx GTL plant in Qatar in 2007, which is now producing cleaner-burning fuels that command a premium price on the world market.

In fact, there are plans to construct more GTL facilities overseas in Uzbekistan, Canada and the United States, projects that are all at various stages of development.

In Africa, the Sasol portfolio also includes a showcase project in Nigeria.

All of these locations hold significant natural gas deposits to make GTL possible.

Indeed, Qatar is the largest gas exporter of them all, principally via its enormous liquefied natural gas (LNG) infrastructure that draws on gas from the country's mighty North Field.

Shell has since built the world's biggest GTL facility there, Pearl GTL, which is capable of producing 140,000 bpd of advanced fuels and other products. It was a costly and complicated venture but one that is now deemed a success and, above all, one that is now profitable.

South African national oil firm, PetrolSA, holds the distinction of operating the world's first GTL plant.

African uptake

Where there's gas - and lots of it - Sasol sees potential to take its technology forward. That includes, most recently, the glut of US shale gas, although again, project economics may be less favourable in the current oil price climate.

And nor is Sasol alone, with other leading energy firms like Shell also championing their own GTL process.

However, the advance of this technology, globally and especially in Africa, has not been at all rapid. Even in Nigeria, where no one doubts the abundance of gas, the advance of Sasol's pioneering project in the Niger Delta with Chevron has been painfully slow.

Towards the end of 2014, one Sasol official cited by Reuters said he now expects full production from the plant it is developing there to be on stream by the middle of this year.

The Escravos GTL plant - which is expected to produce 33,200 bpd of fuel when fully operational - has suffered multiple delays, and has been in the making for a decade or more. Front-end engineering and design was launched almost 15 years ago.

The Escravos GTL plant is expected to produce 33,200 bpd of fuel when fully operational.

Meanwhile, development costs have reportedly soared from an initial US$2.5bn to around US$10bn. That's difficult to swallow at any time, but especially so when oil prices are languishing.

Project challenges

So what's gone wrong?

For starters, the project is located in politically sensitive areas in the volatile Delta region. This has affected most operators in Nigeria at some point or another, although the commitment of the project sponsors, including the Nigerian National Petroleum Company (NNPC) has not wavered.

Indeed, hundreds of Nigerian employees have undergone specialist GTL training at Sasol's Secunda and Sasolburg plants in South Africa. That means learning about Sasol's proprietary Fischer-Tropsch technology and Chevron's own Isocracking technology.

The unique Sasol Slurry Phase Distillate Process gives versatility to natural gas, transforming it into a range of high-quality, high-value energy and chemical products, to be used for low-emission transport fuels, base oils, waxes, paraffins and naphtha.

The market for these products also remains unchanged, with Europe and the USA - not local markets - long identified as the primary buyers.

But given the minimal fanfare - unusual for such a large-scale, costly, and important project - it certainly seems that not all has been plain sailing for this innovative venture.

Emerging opportunities

While it's clear there are major challenges, both in terms of cost and technology, that has not deterred Sasol and others from exploring new project possibilities.

Current market conditions aside, the GTL opportunity exists where there is abundant gas, and that means eastern Africa too has come into focus in recent times.

Last year, Sasol teamed up with Shell and Eni to conduct GTL feasibility studies in collaboration with Mozambique's national oil company Empressa Nacional de Hidrocarbonetos (ENH).

The work will focus on gas from the emerging Rovuma Basin region, which borders Tanzania, and where there have been a string of world class gas finds in the past few years.

Recoverable reserves estimates for the area, from explorers such as Eni and Anadarko petroleum, which are both active in the area, stretch up to 100 trillion cubic feet.

Plans are already underway for LNG to ship this gas to overseas markets, and to make it available for local use, but the sheer volume opens up other avenues too.

The GTL idea is attractive for Mozambique - and likewise Tanzania - in that it could help offset the import of expensive crude oil from overseas for use as transport fuel.

With work getting underway, it's possible that commercial operations could begin by around 2022, but schedules are not likely to be high priority given the tough climate for projects right now.

Small-scale GTL

What could propel GTL more into the mainstream, both in Africa and elsewhere, is the advance of niche projects typically delivering smaller quantities of output.

A number of companies are already offering this kind of portable GTL technology, which bears a fraction of the cost of the larger project variety.

Among them is Compact GTL, a UK-based entity promoting a modular solution, which claims former BP boss Tony Hayward as its non-executive chairman.

Although it has battled financial challenges and allegations of patent infringements in the past year, the company is busy developing the world's first small-scale GTL plant in Kazakhstan, with a capacity of around 3,000 bpd.

It has identified Africa, especially West Africa, as a target market for further work. It shows that, where there is a glut of gas and a demand for high-end fuels, interest levels remain high.

Eastern Africa too has come into focus in recent times.

The advance of niche projects typically delivering smaller quantities of output could propel GTL more into the mainstream.

Given the emphasis on better-quality, low emission fuels, a trend that is sure to continue given climate change concerns, it may be that GTL's day is yet to come.

Qatar, for instance, is currently exploring the possibility of using synthetic GTL products as jet fuel with companies like Airbus and Rolls-Royce.

Oil and gas economics may not be so favourable right now, but if Shell's giant Pearl GTL facility in Qatar shows, this is a technology that can be developed commercially and profitably. ■

Anadarko selects contractors for LNG park

Conceptual design of LNG facility.

ANADARKO PETROLEUM HAS selected a consortium consisting of CB&I, Chiyoda Corporation and Saipem (CCS JV) for the initial development of the onshore LNG park in Mozambique.

On behalf of the co-venturers in Mozambique's Offshore Area 1 and after a front-end engineering and design (FEED) process, Anadarko president Al Walker said, "Selecting CCS JV for the development of the onshore Mozambique LNG park is a significant step toward reaching final investment decision (FID) and demonstrates our continued commitment to advancing this important project toward first cargoes.

"I am incredibly proud of our co-venture for all of the accomplishments achieved to date, including securing more than eight million tonnes per annum (MMTPA) in non-binding long-term off-take agreements, which are now progressing toward binding sales and purchase agreements (SPAs)."

The scope of the work for the onshore LNG park includes two LNG trains, each with capacity of six MMTPA, which is an increase of one MMTPA per train over the original plan, while maintaining an estimated cost that is consistent with the partners' original projections.

The scope also includes two LNG storage tanks, each with capacity of 180,000 cu m, condensate storage, multi-berth marine jetty and associated utilities and infrastructure. The selection of CCS JV is subject to negotiation and entry into a definitive agreement prior to taking FID.

BMT joins Ghana floating LNG studies

ENDEAVOUR ENERGY HAS appointed BMT Asia Pacific (BMT) as engineer and lead design consultant for the development of a floating LNG storage and regasification vessel offshore Ghana.

This would send supplies to the Ghana 1000 Gas to Power Project, and could also be Africa's first LNG import terminal.

Endeavour is leading this development with General Electric, Eranove, and Sage Petroleum. The project could supply over 1,000 MW to Ghana's national grid once completed.

Excelerate Energy will provide the FLNG and is additionally providing assistance in locating the FLNG terminal infrastructure.

BMT will work with Endeavour and Excelerate on front end engineering design studies that include operability assessments, infrastructure design, and optimisation for the supply of gas from the offshore, moored FSRU via subsea infrastructure to the onshore gas turbines at Aboadze, Ghana.

In March, Shell and the Ghana 1000 consortium entered into exclusive negotiations regarding a long-term supply agreement for liquefied natural gas.

The five-year project should boost Ghana's power generation capacity by 50 per cent from the current 2,000 MW installed capacity.

Nigeria's dom gas market constrained till 2025

NIGERIA'S DOMESTIC GAS market is estimated to remain tight until at least 2020, if not 2025. This is the view of Phillip Ihenacho, chief executive of Seven Energy, an aggressive local gas developer. "Nigeria's gas reserves, though some of the highest in the world, are highly under-developed". Out of about five billion cfd produced, "only 14 per cent reaches the domestic market, with the majority being exported as LNG, flared or used in E&P"

Seven Energy, with Frontier Oil as partner, supplies about 102 mmscfd of gas to two power plants, a fertiliser plant and a cement company, all in the south east of Nigeria.

Cobalt presses ahead with Cameia

COBALT INTERNATIONAL ENERGY expects to achieve formal sanction by year-end for its Cameia development project in block 21 offshore Angola.

Currently the Cameia #4 well is being drilled, and development drilling will likely continue until early 2016. Cobalt anticipates start-up in 2018.

The company continues to focus on optimising the Cameia production facility and subsea infrastructure design and costs to take advantage of favourable prices in the current market downturn.

Its current FPSO design is a nominal 75,000 bpd facility, with a likely production capacity of more than 80,000 bpd early in the field's life. Cobalt has re-affirmed that the project economics remain sound.

In Angolan block 20, the company's recent Orca #2 appraisal well and drillstem test results confirmed the presence of a large oil accumulation in the presalt Sag section.

Additionally, logging and sampling evaluation show oil is present in the deeper presalt Synrift reservoir.

Orca #2 is seven kilometres from the deepwater Orca #1 discovery well drilled last year. It is the largest oil find in the Kwanza basin to date, Cobalt claims.

The partners plan further appraisal work to determine the structure's development and production potential.

First E&P pays US$370mn for four acreages

DANGOTE'S PARTNER, FIRST E&P, will be the biggest indigenous shallow water player. This Nigerian independent paid slightly less than US$70mn for 40 per cent of OMLs 83 and 85, in shallow water offshore the country's Bayelsa State.

The company also paid just over US$300mn for 45 per cent equity in OMLs 71 and 72, in shallow water offshore Rivers State in eastern Nigeria.

Between December 2013 and late 2014, First E&P purchased Chevron's stake in OMLs 83 and 85 as well as the combined equity of Shell, Total and Eni in OMLs 71 and 72. The company finalised the approvals from government before the newly elected President Muhammadu Buhari took charge.

First E&P would seem to be the last of those indigenous Nigerian E&P firms who purchased assets from multinational companies in 2014, to scale through all the approvals. At the end of the aquisition, it holds the largest acreage footprint and is the only offshore player.

First E&P is in partnership with Dangote Industries. That partnership is named West African E&P Venture. Dangote is a funding partner in the venture. First E&P plans an aggressive work programme when it finally secures the assets. None of the assets is currently producing. OML 72, however used to be a producer.

The Kalaekule field on the asset produced oil between 1985 and 2002, peaking in 1999 at 22,000 bopd. As the only asset of the four acreages with some production history, it is considered the lowest hanging fruit. Much of the equipment has been rusted and vandalism has taken its toll but the company hopes to finalise integrity assessment and do minor repair works within nine months of securing the asset.

First E&P officials say: "We see first oil within 12 months of securing the assets".

Savannah finds 14 drill-ready sites in Niger

ENERGY FIRM SAVANNAH Petroleum has announced that 14 drill-ready exploration sites with prospective oil resources of 215mn barrels were found in Niger.

The prospects were found following detailed 3D seismic mapping over a 674-sq km area in the R1/R2 permit region, which is situated in the Agadem Rift Basin of southeast Niger. An additional 37 leads have been mapped by Savannah along the northwest and northeast areas of the R1/R2 license and a structure with a potential closure size of up to 39 sq km was found extending throughout the western section of R2 at the upper cretaceous and deeper horizons.

CEO of Savannah Petroleum Andrew Knott commented in a company statement,

"This update reflects the culmination of over nine months of technical work, with Savannah having had the equivalent of a team of six senior geologists and geophysicists working full time on this project. I look forward with confidence to the next phase of our analysis of the subsurface, as we move towards further seismic acquisition and the commencement of our drilling campaign on R1/R2."

Full-year results for 2014 showed that Savannah had no debt at the end of December after having raised a total of US$72mn in equity during two funding rounds last year. The results also revealed the firm made an operating loss of US$6.8mn.

Savannah Petroleum chairman Steve Jenkins commented in the firm's results statement,

"Savannah Petroleum has made very solid progress in its first nine months as a public company. We are working closely with our hosts within the government of Niger as we look to continue to explore and evaluate R1/R2, located in the proven hydrocarbon fairways of the Agadem Rift Basin where over one billion barrels of oil have been discovered to date. Our team is highly focused on operational delivery and I do not believe any other company could have achieved more than we have to date, and that energy and drive is very much a mark of our future intent."

Cairn follows up on Senegalese discoveries

CAIRN ENERGY IS looking forward to a three well drilling campaign offshore Senegal from the fourth quarter of 2015. The London-listed explorer has submitted a three year evaluation work plan to the Government of Senegal, including an initial programme of three firm and three optional exploration and appraisal wells. The programme calls for drilling to start in Q4 2015 "in Cairn's new basin play offshore Senegal focused on the acreage around the SNE-1 discovery well".

The Ocean Rig Athena, a 7th generation dual activity drillship, has been selected for the drilling programme. The rig is currently contracted to ConocoPhillips in Angola. Cairn is in the final stages of working with its joint

The Ocean Rig Athena.

venture partners to finalise the rig contract and associated support services, which are being tendered to secure current market pricing.

Cairn estimates that the existing discoveries and the currently identified prospects and leads have an estimated mean risked resource base of more than a billion barrels.

In 2014 Cairn made two significant discoveries in Senegal, "one of which is potentially the largest global oil discovery in the year", the company reported. "The discoveries occur in two separate plays and have significant follow-on potential". SNE-1, the bigger of the two finds, encountered 36 metres net of 320 API oil pay in a reservoir of 95-metres gross oil bearing column.

The firm's three well programme is currently planned to include two appraisal wells of the SNE-1 discovery which will core and test the reservoir, as well as one shelf exploration well. There will also be a 2,000 sq km 3D seismic data acquisition campaign over the Sangomar and Rufisque blocks to help fully map the prospectivity of the contract area.

RELIABILITY IN OIL WELL CEMENTS

Oil Well Cement (OWC) produced by Oman Cement Company (S.A.O.G) under accurate temperatures is an obvious choice for oil well cementing worldwide and now it is ready to face the challenges of highly specialized arctic and horizontal cementing:

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- Exported to GC Countries, Iraq, Yemen, Libya, Sudan, Tanzania, Turkmenistan, Ethiopia, Pakistan, India and Syria.

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Eni discovers gas and condensates off Libya

ENI HAS MADE a new discovery of gas and condensates offshore Libya, in the Bouri North exploration prospect in Area D, 140 km from the coast and 20 km north of the production field of Bouri.

The discovery was made through the A1-1/1 well, drilled at a water depth of 125 meters, which encountered gas and condensates in the Metlaoui Group of Eocene age. During the production test, constrained by surface facilities, the well flowed 1,340 boepd with a 64/64' choke size. In production configuration, the well is estimated to deliver in excess of 3,000 boepd.

The well represents the second discovery made by Eni in Libyan offshore Area D since the beginning of 2015.

Eni, through its subsidiary Eni North Africa BV, is operator of Contract Area D with 100 per cent working interest in the exploration phase. Eni has been present in Libya since 1959 and currently produces more than 300,000 boepd in the country.

Libya looks to ramp up production

LIBYA IS WORKING hard to lift production in the face of the damage to its oilfields, closure of its exporting terminals and unstable political environment, said Eng Mustafa Sanallah, chairman of Libya's National Oil Company (NOC).

Speaking at Platts Global Crude Oil Summit in London on 19 May, Sanallah said that production currently stands at around 436,000 bpd and is expected to average 400,000 bpd in 2015, down from pre-revolutionary levels of around 1.6mn bpd. However NOC is working hard to increase production by 200,000 bpd in the next two months through the repair of damaged oilfields.

"If political issues are resolved, we can easily increase production to 1mn bpd," he said, adding that NOC was keeping dialogue open with tribes who had closed terminals and blockaded oilfields. He noted on the plus side that the refinery had not been damaged, several discoveries had been made in 2011, and the cost of production is relatively low.

Sanallah was at pains to stress that NOC had maintained its neutral and independent position despite the existence of two rival governments, retaining the ability to sign contracts and operate under its existing framework. It continues to work with international stakeholders.

Sanallah said he agreed with OPEC's strategy, led by Saudi Arabia, to focus on market share, and did not anticipate that there would be any change in this strategy at the next OPEC meeting in June.

"The concensus is that the oil price will recover in the second half of this year and continue to rise in 2016," he remarked. He expected that the increase in global demand would absorb the rise in OPEC oil production, and that Libya would make a smooth return to the oil market without negatively impacting price levels.

"Over the past three years we have lost production because of our situation, and other producers have taken advantage," Sanallah commented. "We are working to resume production and develop projects, focusing in particular on offshore gas and condensate, to preserve market share."

Hydrocarbons makes a critical contribution to the Libyan economy, accounting for around 96 per cent of the country's hard currency revenues.

Pura Vida joins the rush for Morocco

AUSTRALIAN INDEPENDENT PURA Vida Energy has commenced drilling the MZ-1 well in the Mazagan Permit, offshore Morocco. This is being done with the deepwater drillship Atwood Achiever. Drilling is expected to take approximately two to three months.

Atwood Achiever.

"The well is ideally positioned at a location where a single well can test multiple stacked targets in each of the Cretaceous and Jurassic levels", Pura Vida said in a statement. "MZ-1 is expected to test four, and potentially five, independently risked, stacked prospects at an optimal location increasing the overall chance of success".

In the Cretaceous, the well is expected to intersect large structural four way dip closure at two levels. In the Jurassic, the well is expected to intersect large turbidite basin floor fans which are combined stratigraphic/structural traps.

The Jurassic fans are interbedded within the expected source rocks of the basin and thus they are ideally positioned to receive migrating hydrocarbons directly from the source rocks into the fan systems and carrier beds. In the event that the fan systems are not effective traps, then migrant hydrocarbons are likely to pass vertically up into the younger Cretaceous structural anticlinal traps.

MZ-1 will also penetrate the shallower Mid-Miocene turbidite channel fairway providing information on the Tertiary play that is expected to provide useful data in determining the second well in the drilling campaign.

The well is expected to drill to 5,600 metres Measured Depth (MD), in water depth of 2,176 metres. There is potential to deepen the hole, a straight hole, by 650 metres to 6,150 metres (MD). The Atwood Achiever is a dynamically positioned ultra-deepwater drillship capable of operating in water depths of 3,658 metres and drilling to depths of 12,200 metres.

Sterling takes a stake in Mauritania

TULLOW OIL IS looking to drill on its Block C-10 acreage offshore Mauritania in 2016, according to Sterling Energy.

Sterling, which has just agreed to acquire a 13.5 per cent stake in Block C-10 says Tullow has identified a drill-ready Neocomian carbonate prospect in about 100m water depth in the block.

The joint venture anticipates that the exploration well will be drilled in 2016, at a cost of about US$77mn.

Tullow currently holds 90 per cent interest in the Block C-10 Production Sharing Contract (PSC), with the Société Mauritanienne des Hydrocarbures et de Patrimoine Minier (SMHPM) holding the remaining 10 per cent.

Under the deal to acquire a 13.5 per cent stake, Sterling will pay Tullow US$50,000 in cash as consideration and in repayment of interim period costs.

Block C-10 PSC, which covers about 10,725sq km, was awarded in 2011, and is in the second phase of the exploration period. This will expire on 30 November 2017 and has a minimum work obligation of one exploration well.

The block surrounds the Chinguetti field and lies in 50-2,400 metres water depth with full 3D seismic coverage.

According to Sterling, the block lies within a proven petroleum basin and offers exposure to multiple play-types from the under-explored Jurassic and lower Cretaceous carbonates to Cretaceous and Tertiary clastic plays. Sterling says the potential for the extension of the Cenomanian and Albian plays recently established by the Tortue-1 well drilled by Kosmos in Block C-8 will be investigated on Block C-10.

Following the completion of Phase 2, the joint venture may elect to enter into Phase 3 (with a three-year term) with a minimum work obligation of two wells.

Eskil Jersing, Sterling's CEO, said: "We are very pleased to be joining Tullow and SMHPM in Block C10 in Mauritania, in addition to the recently announced inboard C3 block entry. We consider the block highly prospective with a drill ready prospect in an untested play segment. We look forward to working with Tullow in the exploration of

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AFRICAN RIG COUNT

The Infield Systems Ltd. Rig Count tracks industry-wide offshore rigs engaged in drilling and related operations, which include drilling, logging, cementing, coring, well testing, waiting on weather, running casing and blowout preventer (BOP) testing.

MAY 2015 - OFFSHORE

	MAY 15	APRIL 15	VARIANCE	MAY 14	APRIL 14	VARIANCE
Country	Offshore	Offshore	From Last Month	Offshore	Offshore	From Last Month
ANGOLA	20	19	1	22	21	1
NIGERIA	13	13	0	17	15	2
GABON	5	5	0	7	6	1
CONGO (BRAZZAVILLE)	3	4	-1	4	3	1
MOZAMBIQUE	1	1	0	2	2	0
GHANA	2	2	0	1	1	0
CAMEROON	1	1	0	3	5	-2
EGYPT	14	14	0	15	16	-1
TUNISIA	2	2	0	2	1	1
SOUTH AFRICA	1	1	0	1	1	0
TANZANIA	0	1	-1	2	2	0
EQUATORIAL GUINEA	1	1	0	0	0	0
NAMIBIA	0	0	0	1	0	1
LIBERIA	0	0	0	2	2	0
LIBYA	1	1	0	1	1	0
COTE D'IVOIRE	1	1	0	0	1	-1
SENEGAL	0	0	0	1	0	1
BENIN	1	1	0	1	2	-1
MAURITANIA	1	1	0	1	1	0
MOROCCO	0	0	0	1	2	-1
TOTAL	67	68	-1	84	82	2

Source: Infield Systems Ltd.

AGR and SP Offshore sign MoU for ultra-deepwater well off Comoros Islands

AGR AND SP Offshore Energy Services Ltd have entered into a Memorandum of Understanding (MoU) under which AGR will provide a range of exploration services and the drilling of an ultra-deepwater (UDW) well off the Comoros Islands, between Mozambique and the Comoros.

SP Offshore, through its subsidiary SPO E&P (Comoros) SARL, works exclusively for Western Energy (USA) and Safari Petroleum plc (Jersey) in the territorial waters of the Comoros.

Western Energy East Africa and Safari Petroleum Indian Ocean were awarded a Production Sharing Contract in blocks 38, 39, and 40 in the Comoros in March 2014. It now plans a programme of exploration studies including seismic interpretation, basin modelling and resource assessments, followed by the drilling of an UDW exploration well.

Ian Burdis, AGR's executive vice-president, UK and West Africa, said, "We are delighted to have been granted the opportunity to work alongside SP Offshore to fully assess the potential of blocks 38, 39, and 40, and to deliver the Comoros UDW exploration well safely and efficiently.

"AGR's exploration team has experience with petroleum systems all over Africa and the rest of the world and has worked in a variety of basins, play types and structural styles.

We have previously worked with the SP Offshore team on resource assessments in West Africa. AGR always strives to add value to our client's projects, and on the drilling side, the experience gathered from more than 500 drilling projects globally allows us to do just that. The combination of our reservoir management and well management divisions gives us the capability and the scale to support activities from exploration through to drilling and development, anywhere in the world."

Scott Spears, CEO of SP Offshore, said, "We are pleased to bring in AGR's capabilities to our exploration services for Western and Safari in the Mozambique Channel. They offer a wide range of skills and experience in ultra deep water which we feel will add value to our project requirements and we are certainly pleased to start working together in East Africa."

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Seven Energy begins gas supply to Calabar power station

BARELY A FEW weeks after Seven Energy International commenced supply of natural gas to Notore Chemical Industries, a leading fertiliser and agro-allied company in Africa, the company has begun the supply of gas to the 560 MW-capacity Calabar Power station in Nigeria, built under the National Integrated Power Project (NIPP).

The commercial delivery of gas to Calabar NIPP, which will facilitate the addition of 560 MW to the national grid, is being executed through Accugas, a wholly-owned subsidiary of Seven Energy.

When operating at full capacity, Calabar NIPP will increase national power generation by over 10 per cent.

According to a statement by the company, gas is being supplied to the power plant from Seven Energy's Uquo Gas Processing Facility in Akwa Ibom State through the Seven Energy pipeline network.

The gas supply will enable the power plant to complete commissioning and start delivering electricity into the national grid.

Commenting on the achievement, Seven's CEO, Phillip Ihenacho, noted that delivering a cost-effective and reliable gas supply is critical to providing sustainable power supply into the national grid to meet the government's reform objectives and to facilitate industrial development.

"I am delighted that our ability to deliver an indigenous gas solution, from end to end is now being recognised by a broad range of industrial and power sector customers. Not only will the gas we supply drive enhanced power generation, but when combined with improvements in transmission and distribution it will also facilitate industrial and commercial developments which will have a far reaching impact throughout the community, stimulating industry and generating employment as a result," he said.

The managing director of Accugas, Steve Tierney said the Calabar NIPP was a major power plant in Calabar and a further endorsement of the quality and reliability of his company's services.

"Our strong capability across the region with ownership of gas reserves and pipeline infrastructure has enabled us to commercialise our gas assets, delivering a solution that the market has been demanding for many years. We are ready and look forward to adding more customers to our network across the South East of Nigeria, bringing affordable and reliable gas to a wider audience," he said.

Seven Energy has continued to champion an industrial gas revolution through the development and production of natural gas, and, critically, its commercialisation through investment in processing and distribution infrastructure, where the company has invested over US$1bn in the south east region of the Niger Delta in the last five years.

With significant capacity built into its distribution infrastructure, the company is capable of providing a long-term supply of gas to additional off takers for power generation and for local industry.

Since the commissioning of the Uquo Gas Processing Facility in 2014, Seven Energy has begun the supply of gas to other off takers such as the Ibom Power Company, Notore Chemical Industries Limited and the United Cement Company of Nigeria, also in Calabar. Gas is being supplied at a rate of 25 mmcfpd by Seven Energy as part of the feedstock to Notore's fertiliser plant.

By this supply arrangement, Seven Energy is enabling the Notore fertiliser plant to improve its operational efficiency enhancing the plant's output. Natural gas is the core input into the production of fertiliser.

Sasol commissions Phase 1 of wax expansion

PHASE 1 OF SASOL's Fischer-Tropsch Wax Expansion Project (FTWEP) has been successfully commissioned at its Sasolburg Operations in South Africa.

"This is a significant milestone and we are very pleased with this development. It marks another step towards expanding our Southern African operations as part of our dual regional strategy, while demonstrating our commitment to South Africa through industrial investment," said Bernard Klingenberg, executive vice president, Southern African Operations, Sasol Ltd.

Commenting on the scale of the project, Stephan Schoeman, executive vice president, Group Technology, Sasol Ltd, said: "Phase I of the expansion of our wax facility in Sasolburg saw 31mn hours worked with an exceptional safety record. Resourced by 450 engineers and with approximately 5,500 construction workers on site, we erected 7200 tons of steel and used nearly 600 km of piping."

Phase II of FTWEP has commenced with major construction activity already underway and is expected to be commissioned in the first half of the 2017 calendar year. The entire project will see Sasol invest USS$1.1bn (R13.6bn) in the South African economy.

Marketed through Sasol Performance Chemicals, hard waxes, medium waxes, liquid paraffins and waxy oils are applied to a variety of industrial applications. Hard waxes are used in hotmelt adhesives, PVC processing, inks, paints and coatings, and asphalt applications; medium waxes are used in candle markets and emulsions in the manufacturing of construction boards.

Sasol Wax Expansion Project, Sasolburg, South Africa

Anadarko picks company for Mozambique LNG plant

ANADARKO PETROLEUM CORP has selected a group of developers for a potential US$15bn liquefied natural-gas project in Mozambique. Chiyoda Corporation, CB&I and Saipem's joint venture, CCS JV, will work on the onshore project that includes two LNG units with six million metric tons of capacity each, according to Anadarko.

The decision is a significant step toward reaching a final investment decision and demonstrates a "continued commitment to advancing this important project toward first cargoes," CEO Al Walker said in the statement.

The award of the contract comes at a time when some other energy companies have had to delay or cancel large developments after a collapse in oil prices. Anadarko says it will make a final investment decision by the end of the year.

Construction plans also include two LNG storage tanks, each with a capacity of 180,000 cubic meters, condensate storage, a multi-berth marine jetty and associated utilities and infrastructure, according to Texas-based Anadarko.

The company has secured non-binding, long-term "off-take" agreements for more than eight million tons a year of LNG from potential customers and is making progress in turning these into binding sales and purchase deals, Walker said. It's also getting letters of intent from lenders for project financing, he added.

Anadarko will work on a development plan to submit to the government in the coming months.

The project could be valued at as much as US$5 bn for CB&I and "further validates the company's strong position in the global LNG market," Chase Jacobson, an equity analyst with William Blair & Co., said in a note. It also provides CB&I "with improved earnings visibility beyond 2016," he said.

Spotlight on New Technology awards at the recent Offshore Technology Conference

Some of the OTC winners who represent the most significant advances made in the offshore industry.

Tracerco highlights subsea pipeline inspection tool

TRACERCO HAS WON an OTC Spotlight Award for the Discovery subsea pipeline inspection tool.

Discovery is said to revolutionise subsea pipeline inspection, allowing operators to externally inspect coated lines for flow assurance and pipeline integrity issues without removing any coatings.

The tool can non-intrusively visualise wall deterioration and the contents of unpiggable coated pipelines.

Discovery provides data without production interruption; identifies hydrate, wax, asphaltene or scale; and provides results in real time. It can also diagnose the effectiveness of any remedial treatment.

It achieves all this without the need to remove the pipe's coating or cleaning wax build-up. This reduces the risk of corrosion, eliminates the expense of deploying divers and saves time and money by not stopping production.

The world's first subsea CT scanner - Discovery.

Discovery technology is now completely field proven. Discovery scanned 10 flowlines including jumpers, steel catenary risers, and pipe in pipe flowlines all of varying diameters. Over 250 CT scan images over a pipeline length of 50,000 feet, at depths down to 4,200 feet, were generated. In the Gulf of Mexico, based on such data, Shell was able to build a complete profile of its pipeline, which helped to confirm the condition of the asset, Tracerco explained.

Jim Bramlett, business development manager for Tracerco's Subsea Technologies division, said: "Using Discovery we were able to quickly deliver data, drip feeding the scans through to Shell engineers then providing an in-depth analysis once we had all the information. We understand that for each day a pipeline is out of action, or not performing at peak, there are significant financial implications: safety, speed and efficiency were key drivers in developing this cutting-edge technology."

Chain connector design improves integrity of mooring lines

SBM OFFSHORE HAS received a Spotlight award at OTC for its ARCA chain connector, a new design of chain connector attaching mooring lines to floating units. This technology improves the integrity of mooring lines. With vessels now designed to be on station for up to 40 years, chain connector articulations need to be inspected. Currently this is a difficult task because these are built into the chain table.

The ARCA chain connector places the articulations on the mooring leg and connects into a static connector on the chain table, enabling inspection of the articulations and replacement if requried.

In response to market demand, the ARCA also enables diverless connection/disconnection to improve safety, and because articulations are not in the chain table, the size of the chain table can be reduced, allowing for optimisation of the turret.

The ARCA chain connector.Image: SBM Offshore

Subsea water-cut meter unaffected by free gas

WEATHERFORD RECEIVED AN award for the Red Eye subsea water-cut meter. Designed to handle the harsh subsea environment, the meter uses near-infrared absorption to provide water-onset detection, water-cut measurement and water-to-hydrate inhibitor-ratio measurement. The meter can operate in full three-phase flowstreams at any gas-volume fraction.

With its advanced technology, the Red Eye subsea water-cut meter provides extremely sensitive water-onset detection and is unaffected by changes in salinity, hydrogen sulphide or CO2 content. The unit is not required to correct for changes in these parameters, unlike other technologies. Also the hardware is ruggedised and marinised to accommodate the stringent requirements of subsea applications. The device measures water-cut and water-methanol concentration without being affected by the presence of free gas. There is no need to know how much gas is present (gas volume fraction) or the pressure-volume-temperature properties of the gas, which makes the meter easy to configure and operate.

Dreamliner speeds up drilling laterals

FISHBONES HAS RECEIVED an award for the Dreamliner. The concept of a multilateral wellbore is nothing new, but drilling laterals can be cumbersome, and limited by depth and time. This multilateral stimulation system defines a new level of simplicity, accuracy and efficiency in reservoir stimulation, according to the company. Dreamliner increases productivity by creating an array of targeted, small-diameter laterals into formations.

By using needles with rotation drillbits, reservoir contact is increased without fracturing.

Each Dreamliner joint contains three needles, which are secured in place by a drillthrough mechanism. Each of the drill bits is driven by a turbine powered by the main flow through the liner. Numerous laterals are individually but simultaneously drilled by harnessing fluid flow through the turbines using standard rig-pumping equipment and existing wellbore fluid.

Each Dreamliner assembly contains three small drill bits and the turbines that harness drilling fluid flow through the wellbore to power them. Operators can add up to 50 Dreamliner assemblies to the casing that is run into the well, each with holes already drilled in them so the drill bits can exit the casing string and branch out 35 feet into the formation, greatly increasing their reach. The entire operation can be done without bringing a stimulation vessel to the drill site, and gives the operator the ability to stimulate the reservoir more accurately.

Africa's oil producers are turning increasingly to artificial lift and other innovative solutions as they seek to maximise well recovery rates.

Lift me up

AccessESP installed the first rig-less ESP conveyance system in Nigeria.

WHERE THERE'S OIL production, there's artificial lift at work to increase the flow of liquids to the surface. This is bread and butter stuff to oil producers in Africa, tasked with maximising recovery rates from any upstream wells, onshore or offshore, or where reservoirs present additional challenges.

It's a routine trick deployed by operators the world over where reservoir pressure is deemed insufficient to lift crude oil to the surface.

There are two main categories of artificial lift: pumping systems and gas lifts. Typically, this means either gas or water injection to facilitate the flow of hydrocarbons, or the use of a mechanical device inside a well, such as a pump or a velocity string.

These technologies are almost universal. It's estimated that nearly all oil wells in the USA, as high as 96 per cent of them, in fact, require artificial lift right from the start of their production lives.

But it can also be used in free flowing wells too in order to increase production rates over and above what would flow naturally, even though the reservoir does not technically need it. And again, where oil is dense or thick, it can also be a vital tool to facilitate production.

All of these solutions are now routinely seen and utilised on fields across Africa.

Common technology

The spread of this fundamental technology seems almost certain to grow as world demand for oil increases over time.

Big players active in this market include major industry heavyweights such as Baker Hughes, Schlumberger, Weatherford and Halliburton, are all active in Africa's upstream sector.

A new industry report covering artificial lift systems across Africa and the Middle East from Mordar Intelligence, outlines some of the key types of technology most commonly used by these and other firms today.

It says the most popular type of artificial lift pump system in the region is 'beam pumping'. This uses equipment on and below ground level to increase pressure and push oil to the surface.

> For a region with plenty of mature wells there's lots of appetite for more of this kind of technology.

Consisting of a sucker rod string and a sucker rod pump, beam pumps are the familiar jack pumps seen on many onshore oil wells, it says.

The report, *Middle East And Africa Artificial Lift Systems Market: (2014-2020)*, states that all of these processes and technologies help enable the region to continuously produce oil at the same rates (more or less) year after year.

Other common pumping systems include the use of hydraulic pumping equipment and electrical submersible pump (ESP) systems.

The former applies a downhole hydraulic pump, rather than sucker rods, to lift the oil to the surface; the latter sees a centrifugal pump placed below the level of the reservoir fluids.

Industry demand

For a region with plenty of mature wells, especially in North Africa and West Africa, there's lots of appetite for more of this kind of technology, as well as space for further innovation and refinement.

With depletion over time, even natural and free flowing wells lose pressure and often require assistance through artificial lift technology to maintain flow rates and longevity.

Another recent industry report, *Artificial Lift Market*, from Markets and Markets, reckons the global artificial lift market will be worth as much as US$17.7bn by 2019, up from US$11.2bn in 2014, representing a huge chunk of upstream spending.

"The fastest growing region is expected to be South and Central America, followed by the Middle East and Africa," it states.

The same principles are being applied to new strands of the energy business too, including the shale side.

US-based Franklin Electric, for example, has been field testing artificial lift products in coal bed methane, shale gas, and oil-stripper fields throughout sub-Saharan Africa, as well as in Australia and the USA for some years.

The development of such pumping systems for alternative energy is likely to be a growing trend as the world hunts for more reserves to feed ever rising demand. These newer and unconventional wells frequently encounter steep flow decline rates which need to be countered in order to make the asset viable.

Still, with countless conventional oil fields in production too this is likely to remain the core area of focus for industry participants.

Offshore challenges

It is no miracle cure, however, and just one part of making oil field developments pay off.

Mauritania's Chinguetti field, for instance, could not sustain output, which plummeted once production got underway, despite multiple interventions, undermining the project's economics.

It means global oil service companies continue to seek ways to improve artificial lifting solutions, especially in challenging areas such as deep water.

This is a crucial area in West Africa that throws up plenty of additional challenges for service companies and operators.

The volume of hydrocarbons extracted from offshore fields with subsea wells, for instance, is typically far lower than for offshore fields with standard platform wells.

One obvious reason is the prohibitive cost of performing interventions on subsea wells.

There are alternatives, however. GE Oil & Gas and its partner Enpro Subsea recently unveiled plans to provide fluid intervention services offering operators a new way to boost production rates from their subsea wells.

The liquid intervention is a more cost-effective way to deliver services such as scale removal, which can impact on overall production rates over the long term.

During interventions, the wells are 'cleaned' on the inside, which helps alleviate production issues caused by scale and other conditions, which develop over time.

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The expertise in artificial lift technology, which Baker Hughes is bringing into the merger with Halliburton, should be particularly valuable going forward as it is used to increase production rates from older oil and shale gas wells.

West Africa has been identified by the companies as a core area of focus for the new technology.

Technology advances

Whilst upstream operators the world over have used artificial lift solutions for decades, further advances in lift technology will continue to shape the oil market and the cost profile of upstream assets.

This is especially important with field economics coming under great strain as a result of the now lower oil price environment.

Smaller players are also making a difference, like Houston-based AccessESP, formerly Artificial Lift Systems of the UK, which has worked on a number of high profile West African initiatives.

This year, it installed the first rig-less ESP conveyance system in Nigeria on the Ukpokiti-4 offshore well for Shebah Exploration and Production Company Limited.

The system offers significantly lower intervention costs, cuts lost production time and provides full-bore reservoir access by eliminating the need for a workover rig, it says.

It was deployed via slickline to a depth of 1,500 metres and took less than 15 hours to install.

As in all other areas of the production chain, these innovations – to produce more oil, to boost flow rates, to promote longevity – hold immense potential to unlock value from any upstream assets.

And in the oil and gas sector that's something that can be measured in millions of dollars. ■

Global oil service companies continue to seek ways to improve artificial lifting solutions, especially in challenging areas such as deep water.

Halliburton introduces Illusion frac plug

HALLIBURTON'S COMPLETION TOOLS business line, a long-standing industry leader in total composite plug technology, has introduced the Illusion frac plug, the only fully dissolvable frac plug on the market. The new high-performance, 10,000 psi rated product shortens the time to production by eliminating the need to mill out plugs after fracturing, saving time and money for operators.

The Illusion frac plug revolutionises plug-and-perf completions for fracturing in unconventional markets. Plugs can be installed at any position in the wellbore to enable optimal placement of perforations for improved fracturing, without prepositioned locator subs or other equipment that remains in the wellbore post-frac. Illusion frac plugs dissolve completely to leave an unrestricted bore for production, and since no intervention is required to clean the wellbore after the frac, risk is reduced and production may be brought on sooner to improve the net present value (NPV) of the asset.

Artie Burke, vice president of Completion Tools said, "We have successfully run Illusion plugs for our customers in the Eagle Ford, Bakken, and Woodford shale plays. This is a truly game-changing technology for the industry. We're excited to bring this next-generation product to the market that will reduce risk, allow production to commence sooner and improve the overall cash flow for our customers."

Emerson enhances reservoir modeling software

EMERSON PROCESS MANAGEMENT has launched the latest version of its reservoir modeling software, Roxar RMS. The new version - RMS 2013.1 - comes with enhanced structural modeling tools that acknowledge realistic uncertainties in the data and improve volumetric sensitivities. This makes it faster and easier for geo-modelers to build geological scenarios, investigate the full effects of structural uncertainty, and maximise the value of their reservoir assets.

"Too often in the past reservoir modelers have had to resign themselves to using best case estimates of faults and horizons, with the inherent uncertainty in these interpretations often neglected and thereby underestimating the actual uncertainty in reservoir volumes," said Kjetil Fagervik, managing director of Emerson's Roxar Software Solutions.

He continued: "With our new version of Roxar RMS and our tightly integrated structural modeling and gridding tools, users will be able to quantify uncertainty more effectively and increase confidence when it comes to crucial decisions on where to drill, what production strategies to adopt, and how to maximise recovery."

As part of the new enhancements, RMS 2013.1 also sees fault uncertainty tools further integrated with structural modeling and 3D gridding. This enables users to build fault uncertainty models in full and investigate a wide variety of scenarios corresponding to the uncertainty in the input data. In addition, horizon uncertainty modeling is significantly enhanced, allowing users to create horizons and zones based on uncertainty data and information derived from well picks, velocities, seismic travel times and isochores. Uncertainty modeling has also been extended with new parameters added such as the modeling of fault sealing effects and fractures.

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Even Gjesdal and Tore Grelland of Cubility looks at how increased drilling efficiencies and reduced waste management can be achieved.

Increased drilling optimisation and waste management efficiences

IN SPITE OF the current low oil prices, the African drilling & completion fluids and waste management markets are continuing to grow.

According to industry analysts micromarket monitor, the African drilling and completion fluid market is estimated to grow from US$797.2mn in 2014 to over US$1bn by 2019 – annual growth of around 5.2 per cent.

Out of this, onshore activities lead the way with a market share of 63 per cent in 2014, although offshore has high growth potential as well with MicroMarket Monitor expecting offshore to increase its market share rapidly in the coming years.

Key factors driving this growth include a long-term trajectory of increased drilling activities and production (despite the current drop in prices) together with increased exploration for unconventional fields and a growth in advanced drilling fluid chemicals.

Such drilling fluids play a crucial role in cooling and lubricating drill bits, carrying drill cuttings to the surface, controlling pressure at the bottom of the well, and ensuring that the formation retains the properties defined for that well.

In addition to drilling and completion fluids, the African drilling waste management market is also on an upward growth curve. According to an April 2015 report by RNR Market Research, the region accounts for 5.6 per cent of the global drilling waste management market and is expected to grow by four per cent from 2014 to 2019.

Driving this growth are ever more stringent government regulations forcing oil and gas companies to implement effective drilling waste management practices alongside environmental concerns. The Nigerian Department of Petroleum Resources, for example, requires industrial waste discharge/disposal permits relating to all forms of waste discharged either onshore or offshore.

It's with these issues in mind that it is essential for African operators today to use drilling fluids to their optimal potential as well as meet waste management requirements.

Focus on separation

One of the most important influencing factors in both the optimisation of drilling fluids and the reduction in operator waste management requirements in Africa today is the efficient separation of drilled rock particles from the fluids.

Through optimal separation, the cleaned drilling fluid can be incorporated back into the active fluid system and reused to control pressure in the well, ensure that the well remains stable, and enhance drilling efficiencies.

The solids removal efficiency of the MudCube system is said to be as high as 90 per cent.

The region accounts for 5.6 per cent of the global drilling waste management market and is expected to grow.

Drilling can also be optimised with increased rates of penetration (ROP), a reduction in ECD (equivalent circulating density) and the minimising of NPT (non productive time). In addition, the cleaner drilling fluid also leads to a reduced need for premix chemicals.

From a waste management perspective, optimal separation capabilities reduce the volume of drilling fluids lost and minimise the total tonnage of drilling waste generated, with significant savings in the logistics around waste disposal. In the already cited RNR Market Research report, the treatment and disposal of waste contributes over 39 per cent to the overall African drilling waste management market.

So, given their importance, are today's separation technologies meeting these clear requirements from operators?

For many years, the first line of defense in the maintaining of drilling fluids and the separation of rock particles (cuttings) has been shale shakers.

Shale shakers consist of vibrating screens where the drilling fluids and drilled solids - that return from the well - flow on to the screens. Through vibrating G-forces, the solids phase is then filtered out for overboard discharge or for treatment on the rig or onshore and the cleaned mud returned to the active fluid.

Yet, despite recent technology advances in vibration patterns, more efficient screens and more powerful motors, shale shakers have their limitations.

For example, the high G-forces used by standard vibrating type shale shakers tend to break down the cuttings into fine particles. This reduces the amount of solids being removed and increases the solids content in the drilling fluid with a negative impact on penetration rates, increased ECD and increased wear and tear on both the surface and downhole equipment.

This lack of separations efficiencies can be particularly seen when facing low gravity solids content - in drilling deeper and ERD (extended reach drilling) wells, for example. Offshore West Africa has seen a significant shift in deepwater drilling activity over the last few years with many field development plans including step-out directional and ERD wells to reach large areas from a single drilling platform.

From a waste management perspective, high volumes of mud are also lost through shale shakers with implications from both a cost and operational standpoint. Such waste will either be

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The benefits of optimal separation for African operators relate to both drilling optimisation and reduced waste management.

treated onshore and then destined for burial or land application, or discharged into the ocean if environmental requirements are met.

Furthermore, while shale shakers are able to screen out and monitor cuttings for composition, size, shape, texture and hydrocarbon content, they are often less effective in removing the hydrocarbons themselves, thereby limiting waste management options.

An alternative solution

It's due to the limitations of current solids control, shale shaker technologies that the African upstream oil and gas sector is looking for alternative separation solutions. One such alternative is the MudCube from Norwegian-based company Cubility.

The MudCube is a vacuum-based, fully enclosed filtration system that effectively removes solids from the drilling fluid. Without the need for high G forces, drilling fluids are vacuumed through a rotating filter belt. The filter belt carries drilling fluid and drilled solids forward while air - at 20,000 litres per minute - is pulled through the filter belt, taking with it the drilling fluid.

In this way, the cleaned drilling fluids are returned to the mud system and the drilled solids - carried forward on the filter belt - are discharged to a cuttings handling system.

> Offshore West Africa has seen a significant shift in deepwater drilling activity over the last few years.

The solids removal efficiency of the MudCube system, which is field proven and currently being deployed on a global basis, is said to be as high as 90 per cent. The high airflow through the MudCube system also pre-empts the need for expensive mud coolers and is particularly applicable in high pressure/high temperature wells as can be found offshore Africa.

The benefits

The benefits for African operators are two-fold and relate to both drilling optimisation and reduced waste management.

Firstly, the improved separation capabilities of the MudCube leads to better quality mud, fewer chemicals required to maintain its properties, and more mud recycled back to the mud tanks to be reused for drilling. This leads to improved drilling efficiencies, higher rates of penetration (ROP), reduced stuck pipe incidents, and improved wellbore stability. There are also corresponding low maintenance requirements for rig circulating equipment with significant cost savings.

Furthermore, with the cost of drilling fluid as much as US$1,300 per cubic metre, it is also estimated that the reduced cost of drilling fluid per well can be as much as US$150,000. An operator and mud company, for example, recently reported the reduced use of premix chemicals as bringing savings of up to US$270,000 when using the MudCube as compared to similar operations with standard type shakers.

The MudCube also has a lower deckload than traditional shale shakers and, when taking into account the potential to replace other equipment, can save up to 25 tons on existing facilities and much more on new-builds.

In addition to drilling optimisation, there are also the waste management implications with reduced and 'cleaner' waste to dispose of. The new solution generates substantially drier cuttings with mud on cuttings being reduced to less than 30 per cent of drilled solids and oil on cuttings as low as five per cent.

With the drier cuttings and lower oil content, disposal is also cheaper. In the Gulf of Mexico, for example, the regulatory limit for oil on cuttings to allow for the disposal of cuttings directly to the sea is 6.9 per cent - something that the MudCube can deliver on for African operators as well.

Finally, the use of vacuum and airflow as opposed to high G-forces leads to a much-improved HSE environment compared to shale shakers with significantly less noise and vibrations and limited exposure to oil vapour and mist.

High on the agenda

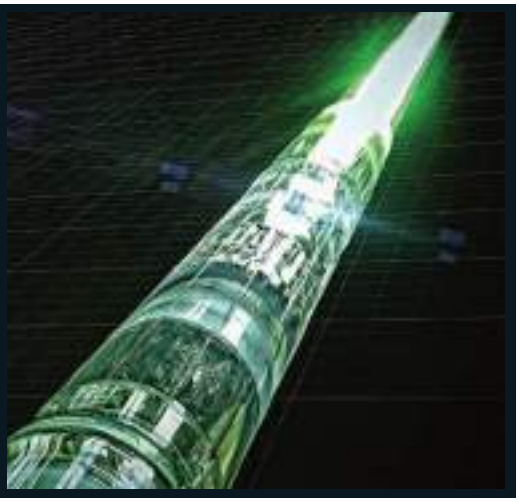
The intensity of drilling operations, focus on the bottom line and new environmental and waste management requirements has ensured that drilling optimisation and waste management technologies will remain high on the agenda for African operators for many years to come. By challenging traditional technologies, significant benefits are already being secured. ■

Baker Hughes introduces Hammerhead system

BAKER HUGHES HAS introduced its Hammerhead system—the industry's first fully integrated wellhead-to-reservoir ultra-deepwater completion and production system, which is designed for extreme conditions such as those found in the Gulf of Mexico's Lower Tertiary play.

The system includes an upper completion, a lower completion, an isolation assembly and intelligent production capabilities, and is fully compatible with subsea boosting. Designed and tested for conditions in well depths up to 10,060 metres and water depths up to 3,050 metres, including temperatures to 150°C and pressures to 1,700 bar.

"We expect the Hammerhead system to improve recovery factors by two per cent in the Lower Tertiary through enhanced reservoir stimulation, higher drawdown capability and long-term optimised production," said Richard Ward, president, global products and services at Baker Hughes. "Using a standard well in a lower tertiary field as an example, a two per cent improvement could translate to more than US$4bn at prices of US$50 per barrel over the life of the well."



Trelleborg provides floatover technology to first project in West Africa

TRELLEBORG'S ENGINEERED PRODUCTS operation has successfully completed its supply of floatover equipment for Phase 3 of the DSO Escravos Gas Project; the operation's first floatover in West Africa.

Contracted by Hyundai Heavy Industries (HHI), Trelleborg provided Leg Mating Unit (LMU) pads for the floatover process, as well as surge fenders, shock pads and rubstrips to constitute the project's boat landing systems.

SM Lee, section chief of engineering group at HHI, said, "Sea conditions are particularly rough in this region, meaning that the installation had to be very precise and the time frame in which the floatover process could be conducted would be minimal. As such, we needed a solution that could handle the challenging environments, preventing the jacket and topside from being damaged during installation. Trelleborg's floatover technology integrated well with our products and provided a successful floatover."

Trelleborg has completed the operation's first floatover in West Africa

Trelleborg's elastomeric pads were incorporated into HHI's LMU steel structures. The pads are designed to take up static and dynamic forces of the topside structure, as well as the horizontal forces of open sea motions during the floatover mating operation. Due to the large amount of load placed on the elastomer pads during the process, they must be carefully engineered to provide optimum protection of the jacket and withstand environmental impact.

Additionally, particularly adverse weather and sea conditions for this project meant Trelleborg engineers had to account for especially high sea swell and unpredictable winds when customising floatover technology for DSO Escravos.

Julian Wee, managing director from Trelleborg's engineered products operation commented, "If damage occurs to the jacket, it can result in downtime and costly rectifications. This simply isn't an option. We were able to supply reliable, tailored solutions that would perform for the long-term, providing HHI with peace of mind."

Through extensive testing at the company's in-house facility, Trelleborg was able to meet the strict requirements put in place by HHI. The company ensured performance throughout installation, with expert product knowledge and an in-depth understanding of the applications.

InterMoor completes mooring replacement project

INTERMOOR INC, AN Acteon company and part of its foundations and moorings business, finished replacing critical components in an FPU mooring system offshore Equatorial Guinea on schedule, enabling the prime contractor, Boskalis, to expand the InterMoor work scope.

The original contract covered replacing old mooring chains and wire ropes for eight of the 12 mooring lines along with two drag anchors on Mobil Equatorial Guinea Inc's (MEGI's) Zafiro producer floating production unit. During the operation, Boskalis contracted InterMoor to replace an additional mooring line.

The engineering work began in October 2014 in Houston and the Netherlands, where the Norwegian anchor handling and construction (AHC) vessel Olympic Zeus was mobilised. InterMoor completed the installation work on location 64 km west of Malabo, offshore Equatorial Guinea, from the Olympic Zeus.

During the installation, InterMoor thoroughly inspected all the mooring lines as they were being disconnected from the floating production unit to determine which portion of the line required replacement with new chain and connectors. The company also documented the installation to ensure the client had accurate, as-built information on the mooring system.

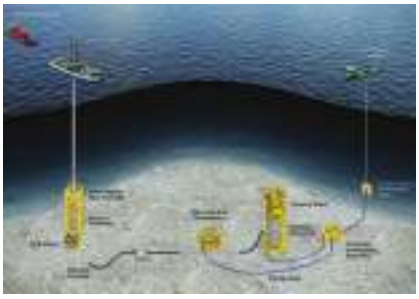
The offshore installation was completed in March 2015 to MEGI's satisfaction. InterMoor had previously worked for MEGI in the country, but this was the company's first time working in conjunction with Boskalis.

Jim Macklin, vice president of projects and engineering, InterMoor, said, "Our past experience working with MEGI on their mooring installation leveraged our ability to deliver this work safely and on schedule. The current market conditions in the oil and gas industry mean that more of our clients are focusing on integrity management to maintain their production levels. InterMoor will work to ensure production is uninterrupted by complications from mooring failures."

Not only was the project a success offshore, it also helped the local community onshore. InterMoor, MEGI, Boskalis and Olympic donated US$30,000 to a local school, based on the onboard safety performance of the crews.

Subsea well spill kit ready for global deployment

OIL SPILL RESPONSE Ltd (OSRL) and the Subsea Well Response Project (SWRP) have completed work on a containment toolkit that can be deployed to minimise the environmental impact of a subsea well incident.



This follows their delivery of four subsea well capping stacks, designed to shut in an uncontrolled subsea well, during 2013-2014.

The new toolkit, designed to work alongside standard industry well test hardware (ie, vessels, well test equipment, drilling risers, BOPs, inner strings, coil tubing units), incorporates long-lead items said to be not readily available.

It includes a flowline end termination; side-entry flow spool with subsea test tree latch; diverless subsea connectors; coiled tubing termination head; chemical distribution assembly; deployment reels for flying leads; flexible jumpers/flowlines; topsides transfer pumps and coolers; hose end valves; and offloading hoses.

In cases where a well cannot be shut in, the containment system can be used to flow hydrocarbons from a subsea well to the surface for safe storage and disposal.

During a response, it can be assembled in one, two, or three containment legs depending on the situation, providing additional response flexibility.

This toolkit will be stored in strategic locations to facilitate timely response worldwide. Its flexible subsea jumpers and subsea flowlines are too large to be transported by air, so three sets will be stored in the UK, Brazil, and Singapore ready for onward transit.

All other components are air-freightable and stored with the original equipment manufacturers in the UK, USA, and Norway. This toolkit includes guidelines to assist a well owner/operator in the development of a well-specific containment response plan.

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS

Project	Sector	Facility	Budget (US$)	Status	Start Date	Completion Date
Total - OML 99 Ikike Field	Offshore	Offshore Platform	1400,000,000	FEED	2009-Q2	2018-Q4
BRASS LNG - Brass River LNG Plant	Gas	Liquefied Natural Gas	15,000,000,000	EPC ITB	2004-Q4	2018-Q3
NNPC - Olokola LNG (OKLNG) Plant	Gas	Liquefied Natural Gas	10,000,000,000	EPC ITB	2005-Q1	2018-Q3
Shell - Bonga South West Project	Oil	Mining	600,000,000	EPC ITB		2020-Q1
Mart Resources - Umusadege Field Development	Oil	Oil & Gas Field	500,000,000	Construction	2008-Q4	2015-Q4
Federal Ministry of Works - Akure-Ilesha Road	Infrastructure	Roads	37,000,000	Construction	2013-Q4	2016-Q4
Federal Ministry of Works - Amanwaozuzu-	Infrastructure	Roads	7,000,000	Construction		2017-Q1
Federal Ministry of Works - Wukari-Akwana Road	Infrastructure	Roads	4,000,000	Construction		2017-Q1
FCTA - Nigeria Cultural Centre and Millenium Tower	Construction	Mixed-Use Development	1,500,000	Construction	2006-Q1	2017-Q1
Federal Ministry of Works - Calabar - Ugep - Ogoja - Katsina Ala road: Section 1	Oil	Oil & Gas Field	5,600,000,000	Construction	2009-Q1	2015-Q1
Block 14 Negage Field Development	Oil, Gas, Offshore	Oil & Gas Field	450,000,000	FEED ITB		2016-Q4
Block 14 Lucapa Field Development	Offshore	Oil Field	300,000,000	FEED	2006-Q1	2020-Q1
Maersk Oil - Chissonga Oil Feild	Oil	Oil Field Development	500,000,000	Engineering & Procurement		2017-Q4
SONANGOL EP/Total - Block 32 Field Development	Oil, Offshore	Oil Field Development	200,000,000	FEED		2018-Q2
Block 9 & Block 21 Development	Oil	Oil Field Development	700,000,000	Construction	2007-Q1	2015-Q1
Lianzi Development Project	Oil	Oil & Gas Field	1,900,000,000	Construction	2009-Q1	2015-Q4
Chevron - South Nemba Auxiliary (SNX) Platform	Offshore	Oil & Gas Field	510,000,000	Construction		2015-Q1
Sonangol - Chevron - Angola LNG Plant	Gas	Liquefied Natural Gas	10,000,000,000	On Hold	1999-Q4	2017-Q3
ExxonMobil - Kizomba Satellites Phase II	Oil	Oil Field Development	1,500,000,000	Construction		2015-Q2
Lobito Refinery	Oil, Refining	Refinery	8,000,000,000	Construction	1998-Q1	2018-Q3
Eni - SONANGOL - Block 15/06 Development	Oil	Oil & Gas Field	500,000,000	Construction	2006-Q4	2015-Q1
Vaalco Energy - Block 5	Oil	Oil	500,000,000	EPC ITB		2018-Q1
Ministry of Transport - Caio Litoral Port Phase 1	Infrastructure	Port	600,000,000	Construction	2010-Q2	2016-Q2
Greater Plutonio Offshore Oil & Gas Development (Block 18)	Oil, Gas, Pipeline, Offshore	Oil & Gas Field	4,000,000,000	Construction		2017-Q4
GAMEK - Caculo Cabaca Hydro Power Station	Power	Hydro Power Station	3,000,000	Engineering & Procurement		2020-Q1
Chevron - South N'Dola Field Development	Offshore	Offshore Platform	3,000,000,000	On Hold		2020-Q1

Project Summary

Project Name	Okwok oil field - OML 67
Name of Client	Addax Petroleum Development Nigeria Ltd Oriental Energy Resources Limited Afren Plc
Budget ($ US)	400,000,000
Award Date	Q1-2010
Facility Type	Oil Field Development

Status	Construction
End Date	Q4-2015
FEED	AMEC
Location	OML 67, Nigeria

Project Backgrounds

Oriental Energy plans to develop Okwok oil field in OML 67

Project Status

May 2015	Afren and its partner are currently reviewing the optimal development plan for Okwok. Okwok 13 was drilled to a total measured depth of 2,808 metres. The well has been suspended in readiness for the planned installation of a Mobile Offshore Production Unit.

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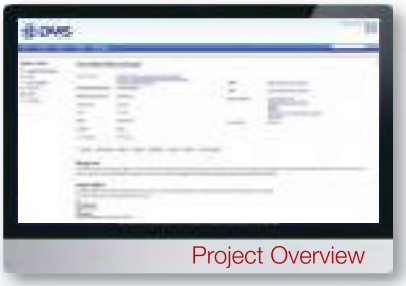
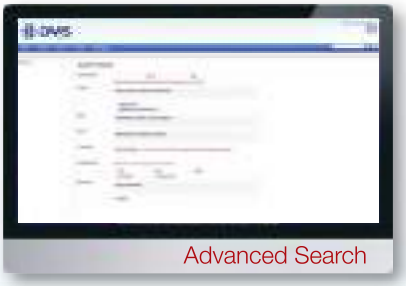


Project Overview



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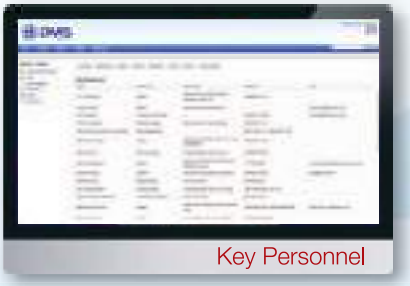

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Permasense launches enhanced integrity monitoring system

PERMASENSE, A LEADING provider of remote monitoring solutions to the global energy industry, has launched a new product for the real-time integrity monitoring of upstream oil and gas assets. The ET210 integrity monitoring system delivers continuous wall thickness and temperature measurements from topside or surface equipment directly to desk, and helps improve the economics and safety of offshore operations.

Permasense's ET210 system is engineered for safe, quick and simple online installation – the non-intrusive sensors are easily affixed to equipment with integral magnets. The technology is designed to measure metal wall thickness through external protective coatings – the integrity of the outer corrosion protection is not compromised by sensor installation.

Based on Permasense's existing WT monitoring technology, the ET210 system delivers continuous measurements directly to desk, eliminating the costs and safety risks associated with manual inspection methods. The high quality and frequency of the data delivered offers users a real-time insight into the impact of operations – including flowrates, sand and acid levels, on equipment integrity. This information provides operators with a platform for enhanced decision-making to maximise production rates, minimise downtime, and reduce the risk of corrosion or erosion-related incidents.

"The ET210 system represents a major step forward for Permasense, offering the same quality and frequency of measurements as our leading WT range, but designed to enable easier online sensor installation in upstream environments. This is an exciting progression, with the system incorporating our proven wireless data delivery and data management software," said Dr Peter Collins, CEO, Permasense.

TDW's SmartPlug aids safe execution of gas valve upgrade project offshore

PIPELINE SERVICES SPECIALIST, TD Williamson, has recently completed a gas valve upgrade project on a deepwater gas export pipeline offshore New Orleans in the Gulf of Mexico with its SmartPlug tool. TDW used its remote-controlled SmartPlug to isolate pressure in specific sections of pipelines and risers so that repairs or interventions can be carried out safely.

In order to commence operations on time, TDW re-verified the project engineering, performed additional communication and pull tests, and executed a new in-depth FAT. In addition, a comprehensive range of risk and peer reviews internally and with the client were carried out. Working in co-operation with the operator's team, 3,500 hours were invested in preparing for the isolation.

The SmartPlug tool was pigged for 18.28 metres into the riser toward its set location offshore. TDW used its remote-controlled SmartTrack tracking and monitoring system to track the tool's progress, control its speed and monitor conditions in real-time. Upon reaching its set location, the tool was set into position. On the same day, the isolation was confirmed and certified. The riser was securely isolated against a pressure of 1,711 psi for 79 days.

During the 11-week period, the three valves were replaced and the launcher extension installed, which would help enhance future inline inspections of the line. Upon completion of the project, the SmartPlug tool was retrieved intact.

Bjørn-Olav Gilje, project manager for TDW, said, "Because we worked in such close co-operation with this strategic partner, we developed an extremely high level of communication and understanding, which was essential to making the isolation a first-time run success. As a result, the complex valve upgrade project and launcher extension installation were completed with minimal downtime, without disrupting production or supply to millions living on the Gulf Coast."

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