

# Oil Review

## Africa

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Covering the Oil and Gas Industries

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**No end to oil's supply/demand cycle**

**Gas disputes in international waters**

**Nigeria leading a local content drive**

**Diversification essential for Angola**

**Effective fire detection**

**Rig refurbishment - taking responsibility**

**Paints and coatings in the corrosion industry**

**Clamp-on to African production surveillance**

**The smart future of flow measurement**

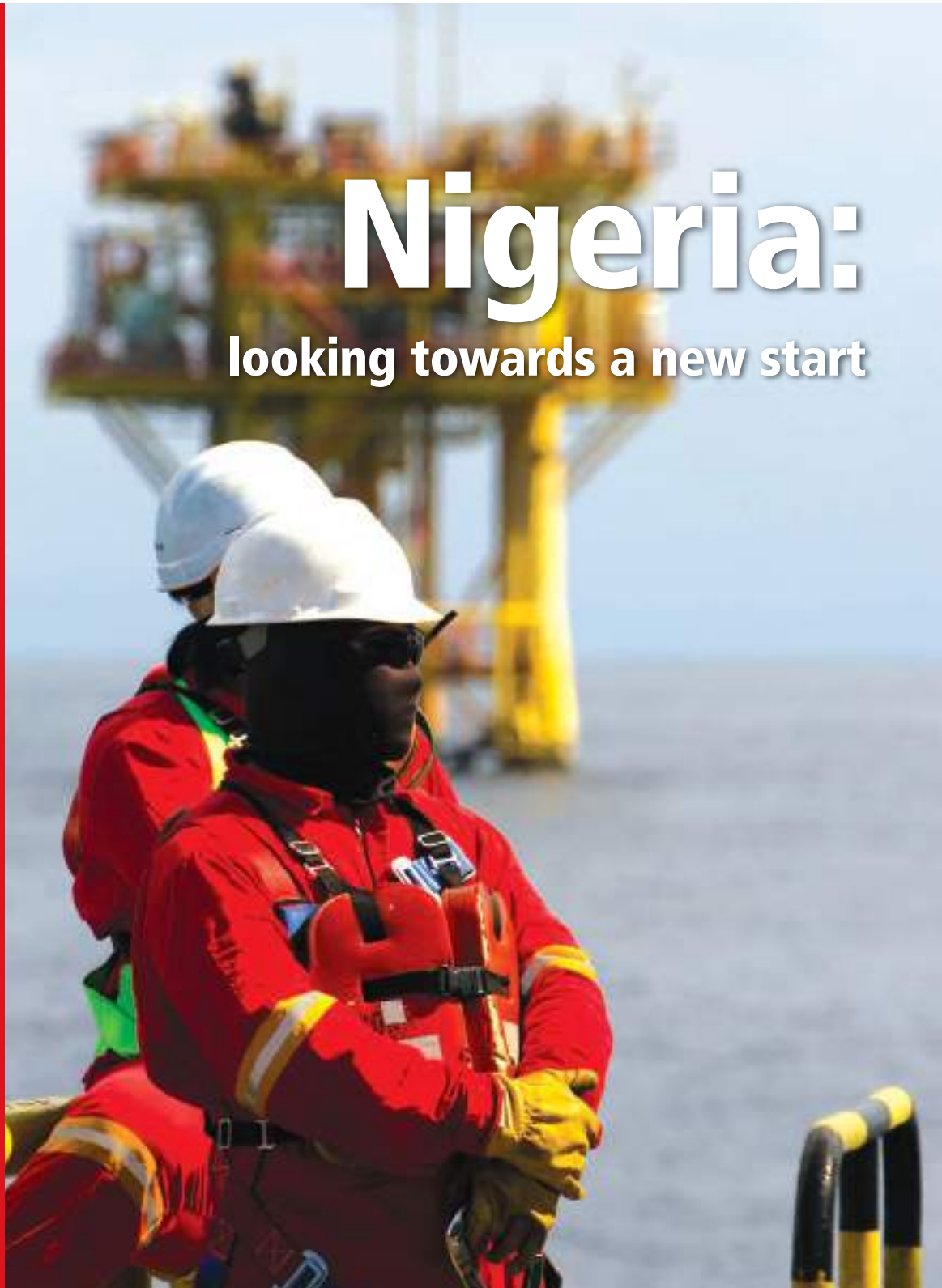
**Satellite capacity pricing**



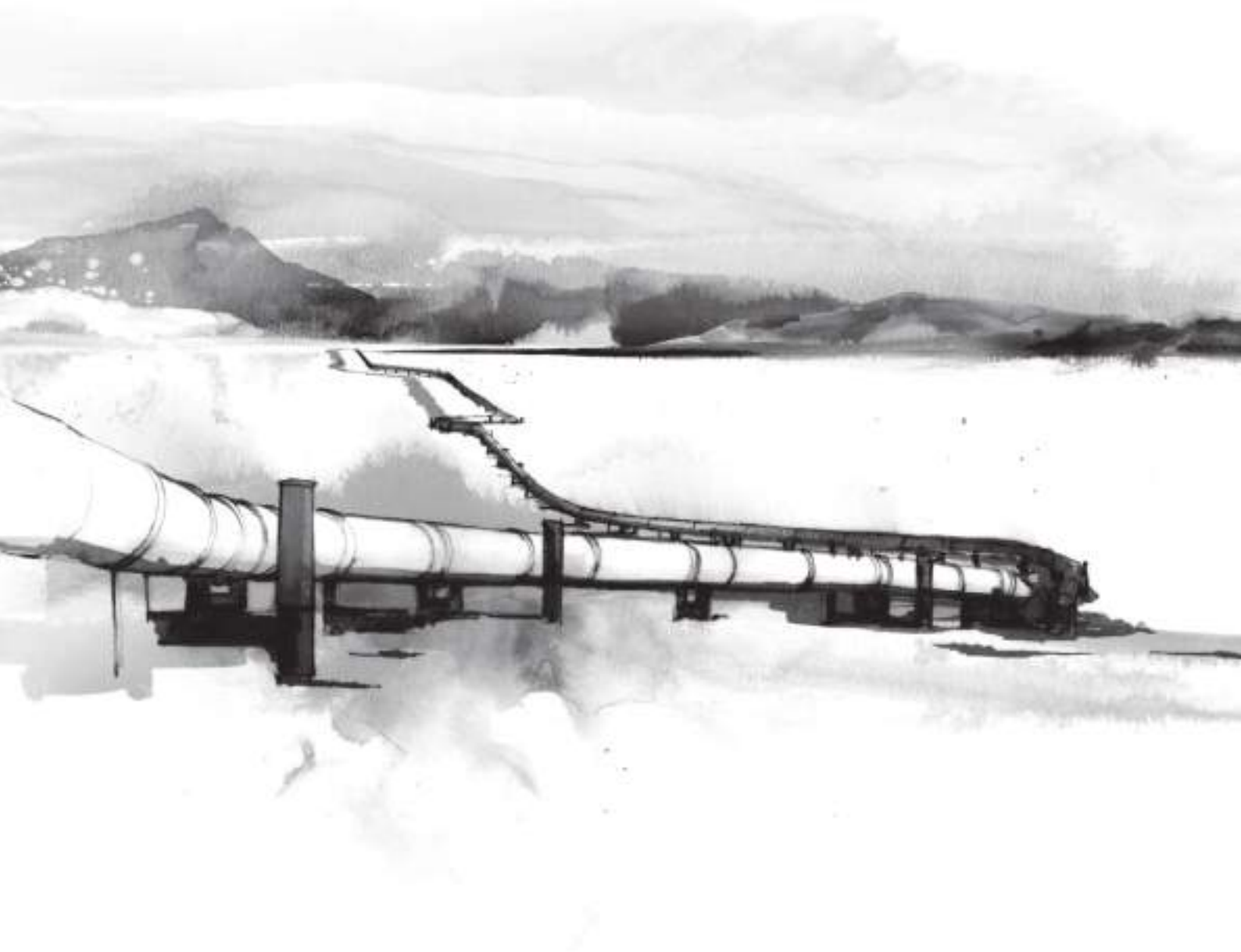
*Amy Jadesimi, managing director of LADOL. See page 18.*

# Nigeria:

## looking towards a new start



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**While prices are low the time is ripe for investment in the oil and gas sector. Copyright: Claffra**

## Editor's note

WHILE THE OIL price has caused activity to drop, it has also served as a wake-up call to many African governments, which are working hard to pass favourable oil and gas legislation in order to attract investment into the sector.

Nigeria, in particular, under new President Muhamadu Buhari, is making a serious effort to deal with corruption and mismanagement. In this issue we also look at Ladol, which is leading a local content drive in Nigeria and is providing a one-stop-shop for multinational oil and gas companies operating in West Africa.

Nearby Angola remains a high cost exploration and production-focused play and diversification needs to be at the forefront of its marketing strategy as further cuts are likely.

On the technical front, we look at rig refurbishment as sub-Saharan Africa prepares for a greater share of this market, and also paints and coatings in the corrosion industry.

Finally, we look at flow assurance - how an emerging technology in flow surveillance is making its mark in Africa and a valuable difference to field operators.



**Expro's sonar technology is expected to play a significant role in reservoir management and production optimisation.**

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## Executives' Calendar 2015 - 2016

### OCTOBER

19-30	Oil & Gas Mini Management & Business Administration	HOUSTON	www.cwcschool.com
24	4th SITEI	LAGOS	www.csr-in-action.org
27 - 29	Practical Nigerian Content	YENAGOA	www.cwpcnc.com
27-30	22nd African Oil Week	CAPE TOWN	www.globalpacificpartners.com

### NOVEMBER

3	OSCC 2015	ABU DHABI	www.opito-oscc.com
3-5	Deepwater Operations	GALVESTON	www.deepwateroperations.com
8-12	NAPE 2015 - 33rd Annual International Conference & Exhibition	LAGOS	www.nape.org.ng
9-12	ADIPEC	ABU DHABI	www.adipec.com
11-12	Africa Energy, Oil & Gas Conference 2015	NAIROBI	www.s-scg.com
16-18	World Oil and Gas Week	LONDON	www.oilandgascouncil.com
18-19	PEFTEC 2015	ANTWERP	www.peftec.com
23-24	2nd Storage & Distribution Forum	GABORONE	www.afraa.org
23-24	Project Financing in Oil & Gas	LONDON	www.smi-online.co.uk
23-25	SAOGE 2015	DAMMAM	www.saoge.org
27-29	Angola Recruitment Summit	LONDON	www.eliteic.net

### DECEMBER

1-2	West Africa Energy Assembly	LAGOS	www.oilandgascouncil.com
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### 2016

#### JANUARY

26-28	Offshore West Africa	LAGOS	www.offshorwestafrica.com
27-29	Global Oil&Gas Middle East & North Africa Exhibition	CAIRO	www.global-oilgas.com/mena

#### FEBRUARY

22-25	Nigeria Oil & Gas	ABUJA	www.cwcnog.com
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#### MARCH

15-17	CAPE VI, 6th African Petroleum Congress and Exhibition	ABUJA	www.cape-africa.com
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#### APRIL

20 -21	Ghana Summit	ACCRA	www.cwcghana.com
28-29	MMEC (Mozambique mining, Oil & Gas and energy)	MAPUTO	www.mozmec.com

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

## Kentebe to discuss Nigerian content and wealth creation

OVER THE LAST five years, the Nigerian Oil and Gas Industry Content Development Act (NOGICDA) has arguably been the single most impactful piece of legislation for the Nigerian oil and gas industry since the Petroleum Act of 1969.

At the current time, the implementation of Nigerian Content is all the more crucial for wealth creation and capital retention for the sustenance and growth of the Nigerian economy. The executive secretary of the NCDMB, Denzil Amagbe Kentebe, who will be addressing the oil and gas industry at the Practical Nigerian Content Forum (PNC) in Yenagoa noted, "The profile of the Nigerian oil and gas industry has gone through greater transformation than seen in previous decades; there are more indigenous players in the industry than ever before, a wider pool of skilled Nigerian professionals and indigenous asset ownership has increased steadily as has the domiciliation of manufacturing and fabrication."

And, indeed, the enactment of the NOGICDA added impetus to the local capacity development initiatives some of the multinationals were

already undertaking and galvanised others to work towards compliance. In just one year Shell producing companies in Nigeria awarded US\$2.4bn worth of contracts to indigenous companies and Total launched the Total Supplier's Financing Scheme worth US\$7.5bn to be made available through Nigerian banks to bridge the gap between local vendors/suppliers and financial institutions.

Indigenous operators have also emerged as key players as a new dawn has broken for the Nigerian oil and gas industry. Divestment of onshore assets by the likes of Eni, Chevron and Exxon, spurred by the NOGICDA and the incessant pipeline vandalism and oil theft, provided the opportunity for indigenous producers and service providers to rise to the occasion and in no small measure; during Q2 of 2014, Nigerian firms Taleveras and Aiteo placed the highest bid for Shell's OML 29 at US\$2.85bn. In the same year, Oando Energy Resources completed its landmark acquisition of ConocoPhillips' onshore and offshore businesses in Nigeria for US\$1.5bn.

By the third quarter of 2014, it was recorded that US\$5bn was contributed to the country's revenue as a result of the NOGICDA. It was also noted that Nigerian Content in the Nigerian oil and gas industry grew from around five per cent to 18 per cent; 89.2 per cent of marine vessels were either built in Nigeria or owned by Nigerians and domestic fabrication facilities had increased by 40 per cent.

Kentebe will be summarising the progress of Nigerian Content and discussing solutions to challenges that remain at the upcoming Practical Nigerian Content Forum, taking place from 20-22 October in Yenagoa. Government representatives, including senior management from NCDMB and PTDF (Petroleum Technology Development Fund) and industry players including Oando Energy Resources, Shell Petroleum Development Company of Nigeria, Bell Oil & Gas, Statoil, Marine Platforms and Platform Petroleum, will convene at the Forum to discuss plans to ensure Nigerian Content growth and in-country wealth retention for the next three to five years.



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## Tanzania oil and gas portal

TANZANIA HAS LAUNCHED an oil and gas portal to increase awareness and transparency in the industry. Known as the Tanzania Oil and Gas Almanac, the database will be available in Kiswahili and English, and will be available online and in hard copy.

A recent study conducted by research organisation Twaweza, indicates that 77 per cent of Tanzanians were not aware of oil and gas discoveries in their country.

"The portal will significantly increase stock of available information in local contexts. It will help interaction among stakeholders such as government, international oil companies, civil society groups and the media," retired controller and auditor general Ludovick Utouh noted during the launch.

According to the chief editor of the Almanac, Abdulla Katunzi, the portal has been created using the Media Wiki software and will draw information from publicly available sources.

However, officials urged the operators of the portal to provide information that can easily be interpreted by users.

Tanzania has discovered over 55 tcf of natural gas. Exploration is underway in both offshore and onshore making the country a lucrative frontier in the oil industry.

*Mwangi Mumero*

## DNV GL launches two new JIPs with potential to save the industry millions in costs

IN TODAY'S COST-CONSTRAINED climate, the subsea and pipeline sectors are actively looking at alternative means to drive down costs, cut complexity and reduce project overruns.

DNV GL, leading technical advisor to the oil and gas industry, is launching two joint industry projects (JIPs) to investigate affordable composite components for the subsea sector and qualify technology for more efficient linepipe production processes. It is estimated that the JIPs could deliver a combined saving of US\$10.2mn.

The DNV GL Affordable Composites for the oil and gas industry JIP aims to reduce the cost of qualifying composite components for subsea use by replacing large scale tests with 'certification by simulation'. Statoil, Petrobras, Petronas, Nexans, Airborne and the Norwegian University of Science and Technology (NTNU) in Trondheim, are participating in the project. The project is partly funded by the Research Council of Norway.

The project, which could potentially deliver a 40 to 50 per cent cost saving for certification and qualification of subsea composite components,

will seek to validate new advanced material models by experimentation, with the main focus on predicting chemical ageing.

"Composite components require full-scale testing to document long-term properties to achieve certification," said Jan Weitzenböck, principal engineer, DNV GL - Oil & Gas. "A typical qualification campaign for a subsea composite component can cost in the region of US\$1.2mn to US\$12mn. The results of this JIP could potentially save up to US\$1.9mn for re-certification of existing components."

DNV GL will also develop processes to accept mathematical material models in the certification process. This will be documented in a revised edition of the DNV GL offshore standard for composite components (DNV OS-C501).

The driver for the New Material Solutions for Flowlines JIP is to explore cost savings by use of HFW/SAW (high frequency welded or submerged arc welded) pipes. Within the envelope of production parameters, these may be a very attractive alternative to the traditional seamless pipes, due to their lower cost and shorter delivery time.

## Alcatel-Lucent Submarine to develop SOOC

ALCATEL-LUCENT SUBMARINE Networks, the undersea cables subsidiary of Alcatel-Lucent, has been awarded the development of the Sonangol Offshore Optical Cable (SOOC), a critical infrastructure project which will dramatically reduce the cost-per-bit associated with the delivery of data traffic to Angola, including its offshore oil and gas production facilities.

Spanning 1,900 km, the SOOC undersea network will connect to landing points at four locations along the Angolan coast and will allow the country's oil and gas industry to benefit from very large offshore data bandwidth with high availability, high reliability and low latency.

SOOC will enable better operational efficiency and optimise operational costs and will also bring significant benefits to the Angolan economy, as a high-speed connection will be established between the Luanda area and Cabinda to fulfill national telecom needs. The development phase is under way and construction work is scheduled to start in the second half of 2016.

Yohann Bénard, oil & gas general manager of Alcatel-Lucent Submarine Networks, said, "After connecting Angola to the global network through several undersea cables, ASN is pleased to further contribute to the development of the Angolan fibre-optical infrastructure. This award is a prime illustration that submarine fibre-optic technology is becoming the standard telecommunication medium for offshore assets. It further demonstrates our leadership in the platform connectivity market, which is one of the priorities of ASN's industrial plan to diversify into the oil and gas sector."

Alcatel-Lucent Submarine Networks leads the industry in terms of capacity and installed base with more than 575,000 km of optical submarine cables/systems deployed worldwide. From traditional telecom to new oil & gas applications, ASN provides every part of a global undersea transmission network, tailored to the customer's needs.

## Technip awards Harkand Ghanaian contract

A NEW JOINT venture between Harkand and Consolidated Shipping Agencies Ltd has resulted in its first contract win in Ghana, West Africa. The award will see the global inspection, repair and maintenance (IRM) company delivering onshore and offshore support to Technip in the region.

Having formed a strategic alliance with Consolidated Shipping Agencies Ltd, the company's Aberdeen-based Harkand Andrews Survey team will deliver services to Technip on the Tullow Tweneboa, Enyenra and Ntomme (TEN) project situated in the deepwater Tano block, approximately 60 km off the coast of Ghana.

When the campaign begins in October 2015, the survey team will manage and support all survey requirements on board Technip vessels during offshore construction activities which includes rigid and flexible lay, structure installations, spool metrology, pre-lay and as-built surveys. The work is expected to be completed by summer 2016.

Harkand Andrews Survey managing director Stuart Reid said, "We are delighted that Technip has chosen us to support them during this major project in Ghana and continues our successful long term working relationship with Technip."

"This contract award underlines Harkand's commitment to working in the West African region in general and Ghana in particular. I believe that this will be the first of many campaigns that we engage in with our local Ghanaian JV partner, Consolidated Shipping Agencies Ltd."

The joint venture with Consolidated Shipping Agencies Ltd is the latest in a series of high-profile partnerships Harkand has forged around the globe. Earlier this year, the inspection, repair and maintenance (IRM) specialists announced it had been awarded three major frame agreements which saw it expand its global footprint, including a new venture into Mexico for the first time.

Harkand provides offshore vessels, ROVs, diving, survey services, project management and engineering to the oil and gas and renewables industries. Headquartered in London with operations bases in Aberdeen, Houston, Mexico and Ghana, Harkand aims to be the leading subsea IRM and light construction contractor globally.





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## OE 2015 - confirming a positive outlook

SPE OFFSHORE EUROPE 2015 sent out a very clear message that the oil and gas industry has a future for many years to come.

The theme of the 2015 event, inspiring the next generation, allowed the industry to address the technical, business and people challenges it faces now and into the future. At the heart of this is the need to attract and encourage the next generation of talent into the industry.

"One of the challenges facing the industry is inspiring the next generation," said Charles Woodburn, CEO of Expro and technical chairman of SPE Offshore Europe 2015. "I hope that the honest and open conversation we have had over the last few days will lead to real progress in this area. While we don't have all the answers yet, it's important we take this dialogue and turn it into a clear framework that can be delivered by the industry as a whole."

Attendance figures remained very strong at 55,947 with delegates drawn from 104 countries. Attendance was the second highest in the long history of the show.

A record 1,535 global organisations from 44 countries exhibited this year, showcasing their products, services and expertise. This included 336 companies exhibiting at the event for the first time. Re-bookings for 2017 are looking strong already.

Stephen Graham, COO for the SPE, added, "The conference programme successfully addressed a number of relevant industry priorities, incorporating the theme of inspiring the next generation. Combined with a busy show floor where exhibitors met with existing and potential customers, I believe SPE Offshore Europe 2015 has been a great success."

## Technip to supply umbilicals for Block 15/06

TECHNIP'S WHOLLY-OWNED subsidiaries Technip Umbilicals Ltd and Angoflex Ltda have been awarded a contract by Eni SpA to supply umbilicals to the Block 15/06 East Hub Development offshore Angola.

This field is located approximately 350 km north of Luanda, at water depths of 450-600m. According to Technip, the contract covers project management and manufacture of about 15 km of dynamic and static steel tube umbilicals.



Technip says its umbilicals facility in Lobito, with support from Technip Umbilicals in Newcastle, UK, will manufacture the umbilicals that are scheduled to be completed in the second half of 2016.

Sarah Cridland, managing director of Technip Umbilicals, said, "This award of Block 15/06 East Hub Development is a recognition of the quality and performance of the umbilicals provided by Technip. We are proud to be awarded this contract and will utilise our expertise across multiple Technip Umbilicals sites whilst strengthening our relationship with ENI."

Technip says that this new contract follows another project awarded to Technip last year for the fabrication and installation of flexible and rigid pipelines at Block 15/06.

## Nexans to supply umbilicals to Libra project

NEXANS HAS WON a contract to deliver 48 km of static umbilicals to BP, and partner DEA, for the West Nile Delta Taurus Libra project offshore Egypt. The Taurus Libra development is a subsea project tied in to existing BG Group-operated Burullus facilities.



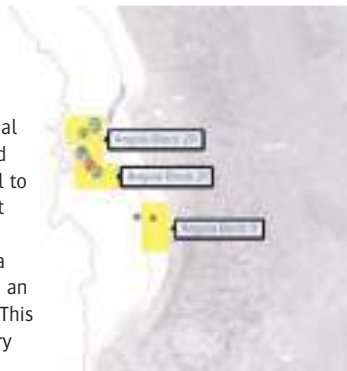
The umbilicals consist of electrical and fibre-optic cables as well as hydraulic and chemical lines. They will be designed, engineered and manufactured at Nexans' specialized subsea cable and umbilical facilities in Halden and Rognan, Norway. The company will also deliver accessories for this project. Delivery is expected in May 2016.

The West Nile Delta project involves the development of gas and condensate fields located within the North Alexandria and West Mediterranean deepwater concessions in the Mediterranean Sea, approximately 65 km to 85 km off the coast of Alexandria, Egypt.

Discovered in 2000/2001, the Taurus Libra development is part of the first development phase of the West Nile Delta fields.

## Sonangol to acquire Cobalt's Angola blocks

THE ANGOLAN NATIONAL Concessionaire Sociedade Nacional de Combustiveis de Angola – Empresa Publica (Sonangol) and Cobalt International Energy Inc have signed a Sale and Purchase Agreement for Sonangol to acquire all of Cobalt's 40 per cent participating interest in Blocks 21/09 and 20/11 offshore Angola (the "Blocks") for US\$1.75bn with an effective date of 1 January 2015. This transaction is subject to customary Angolan government approvals



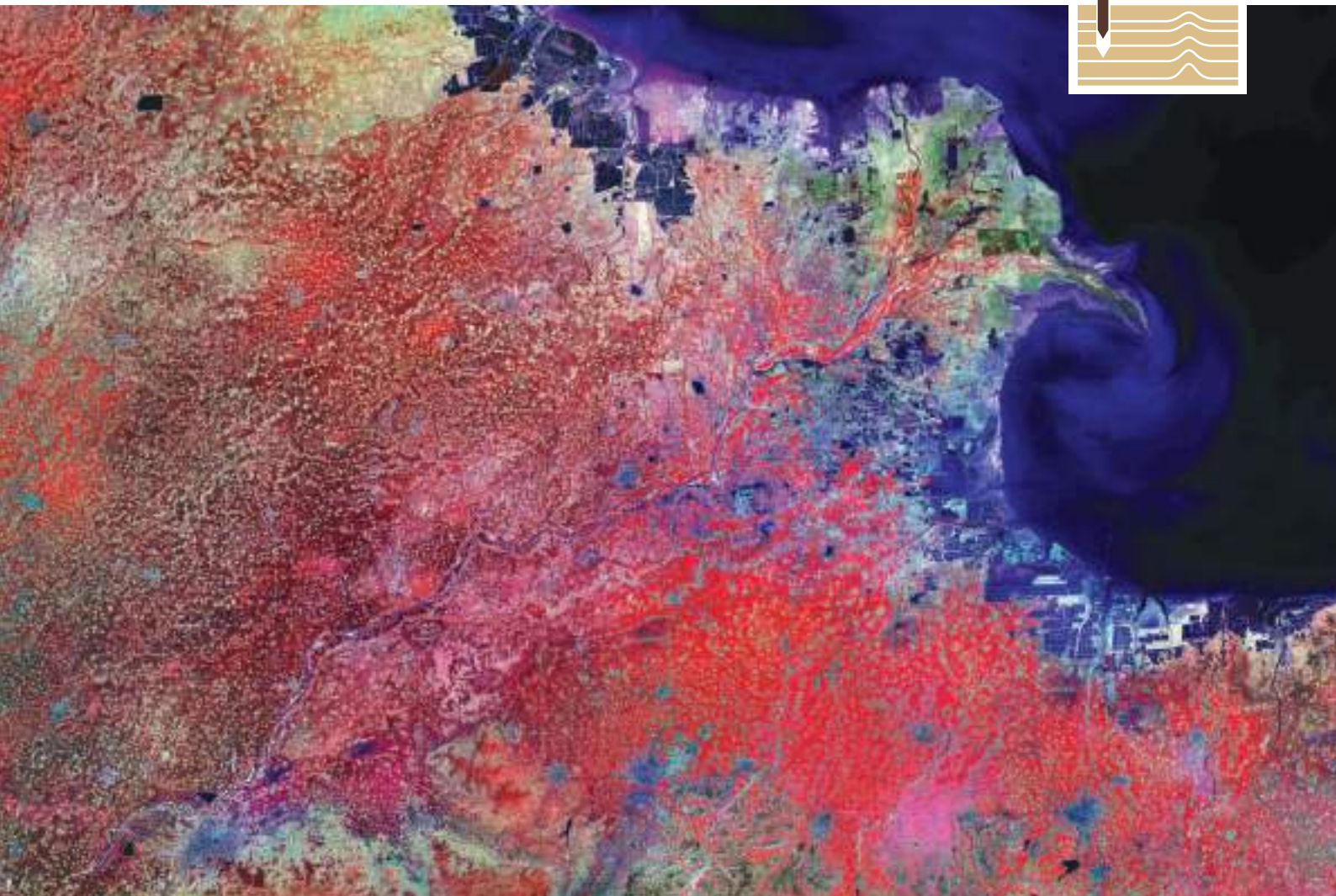
which are expected prior to the end of the year.

The Sale and Purchase Agreement provides for a smooth transition to a new operator and underscores the parties' commitment to attain the final investment decision for the Cameia development in Block 21/09 by year end 2015 in order to deliver first oil from Cameia in 2018. Notwithstanding Cobalt's continuing as operator for an interim period, all costs going forward will be borne by Sonangol.

Commenting on the transaction, Francisco Lemos José Maria, chairman and CEO of Sonangol said, "Over the past seven years, Cobalt International Energy has had outstanding exploration success in Angola's pre-salt, which will accrue considerable prosperity to the Angolan people over coming generations. We are thankful and appreciative of their efforts and dedication to the task and wish them well in their future endeavors in the global industry."

"We are proud of the tremendous success that our partnership with Sonangol has achieved in opening the pre-salt play in the Kwanza Basin with five significant discoveries and a deep portfolio of exploration prospects," said Joseph H. Bryant, Cobalt's chairman and CEO. "We remain committed to continuing our joint efforts with Sonangol to move the Cameia development project to sanction by year end."





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The glut continues to depress prices, but there's tightening on the way.

# No end to oil's supply/demand cycle

**T**HE GOOD NEWS for all Africa's oil producers is that OPEC's market share strategy is working. Demand for crude in the industrialised countries is on the rise, and sources of non-OPEC supply – notably unconventional ones – could be trimmed by up to 0.5mn bpd next year. The result is likely to be yet another supply crunch.

The bad is that, despite stocks being high, an unwelcome degree of price volatility has recently re-appeared, making it difficult for operators and energy officials from Algeria to Mozambique to deal with budget issues in any realistic way. International gas prices are being affected too. The signs of this are already showing in the condition of infrastructure in production and trading centres such as high-cost Luanda.

## Game-changing decision

The backdrop to all this of course was the game-changing decision taken in Vienna nearly a year ago to confront the unconventional challenge (coming from the USA especially) head on. There have been ups and downs as a result, but basically the unexpected about-turn seems to have paid off, although with most of the gains for OPEC members yet to come.

"On the face of it, the Saudi-led OPEC strategy to defend market share regardless of price appears to be having the intended effect of driving out costly, 'inefficient' production," maintains the International Energy Agency in its latest Oil Market Report (11 September). The goal

seems to be to keep the swing-producer role within the traditional producers' grouping, which of course includes key local suppliers such as Algeria, Angola and Nigeria.

At a glut-based US\$43.8/barrel\* (OPEC's reference price for a basket of grades on the 24th) few shale firms – and arguably some complete basin operators such as the North Sea's – can compete in the long term.

## Enduring over supply

"Enduring over supply" conceded OPEC's Monthly Oil Market Report on 14 September, pointing the finger at economic turbulence in China (stock-market weakness and currency devaluation leading to sharp falls in the commodity markets generally) in particular. The Peoples' Republic is of course the major market for Angola's oil, and the source of funding for exploration ventures widely elsewhere too. India and other emerging countries are also showing signs of slowing economic growth.

The main features of the crude markets

**This month's complicated story is essentially one of tightening supply in the short- to medium term as non-OPEC producers lick their wounds.**

identified recently by the IEA include the observations that international prices fell to six-year lows in August, due to a combination of "supply overhang" and concerns over the health of the wider economy.

Nevertheless, "oil's latest tumble is expected to cut non-OPEC supply in 2016 by nearly 0.5mn bpd – the biggest decline in more than two decades," with most of the pain being borne by US light-tight producers – in other words the highly efficient but cost-squeezed fracking community.

On OPEC's own contribution the consumer-dominated agency notes that supply of crude fell by 220,000 bpd in August, led by losses in both the Gulf (widely) and Angola. The producers' group pumped 1.2mn bpd more than a year ago nevertheless, with the call on its supplies rising to an average 31.3mn bpd next year, which will be well up on 2015's expected outturn as "lower prices dent non-OPEC supply and support above-trend demand growth."

## World consumption up

This year's total consumption growth is expected to reach 1.7mn bpd, which will be a five-year high widely celebrated in West Africa in particular. But not the prices at which those extra barrels are being sold.

## Enhanced contribution from Iran possible

Some good, some bad for all concerned therefore, but looming on the horizon will be the effects of a possible enhanced contribution from Iran now that the US-led nuclear sanctions issue has been resolved at last. Producing widespread consternation elsewhere in the Gulf, the effect of this other game-changer on the oil market was still unclear as we went to press.

So this month's complicated story is essentially one of tightening supply in the short- to medium term as non-OPEC producers lick their wounds. Despite the hovering of OPEC's daily reference price below the notional US\$50 level OPEC remains bullish, mainly about developments beyond 2016. But, on the reactions of its own members so far, it is unusually cagey, citing "secondary sources" as to where the 31.54mn bpd figure for its own total August crude output came from (in a fast-changing market, admittedly). A typical 32mn bpd call on its supply capability is expected within the second half of 2016, the IEA says, "a level last pumped seven years ago". ■







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Africa is attracting a great deal of interest from international investors given its potential oil and gas reserves. While countries such as Nigeria and Angola have already established themselves as major centres for the oil and gas industry, other African jurisdictions are hoping to develop their own lucrative markets.

# Gas disputes in international waters

**C**OUNTRIES WISHING TO capitalise on their natural resources, as well as the companies hoping to tap potential new reserves, need to be aware of the possible problems that may arise when drilling in international waters. One of the key forums that resolves disputes pertaining to international waters is the International Tribunal for the Law of the Sea (ITLOS).

## Provisional measures under the ITLOS: What to expect

State parties entangled in energy-related disputes before the ITLOS have requested provisional measures seeking the suspension of all exploration activities and a prohibition on a state's ability to grant new oil or gas licenses in disputed international waters. One could also imagine a state applicant requesting provisional measures to halt production activities, or to apportion a percentage of production proceeds to an applicant state who asserts rights in a disputed area where oil and gas extraction is taking place.

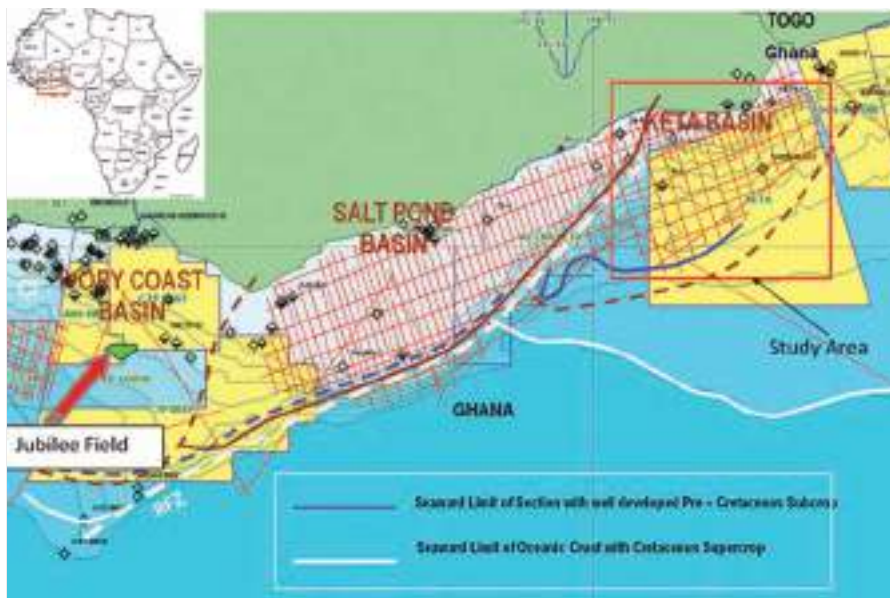
A state applicant could also apply for "catch all" relief that the parties do nothing to aggravate the dispute. If granted, this could have far reaching repercussions on the activities of the respective states, pending a tribunal's award. ITLOS (one of the four possible outlets to resolve disputes related to international waters, established by the United Nations Convention on the Law of the Sea in 1994) has given previous direction that will be of interest to African states and investors that find themselves in disputes over international water.

African states that wish to obtain urgent interim relief through a provisional measures application to the ITLOS can expect the following:

First, when faced with a provisional measures application, the ITLOS will require the applicant state to demonstrate the following criteria: prima facie jurisdiction; urgency; necessity for the preservation of rights; and/or necessity to prevent harm to the marine environment.

Second, a state applicant's meritorious submission of a request to the ITLOS for the prescription of provisional measures is likely to result in the Tribunal's issuance of an order.

The vast majority of requests have been submitted pending the constitution of an arbitral tribunal, pursuant to Section 290(5) of the convention. The ITLOS has not shied away from ordering provisional measures in this instance,



*Côte d'Ivoire and Ghana reached a resolution on their long-term maritime border dispute earlier this year before ITLOS could rule.*

## States and international oil companies can take some comfort in the efficiency of the ITLOS in its issuance of provisional measures.

despite the potentially limited timeframe between the order and the tribunal's constitution, or the fact that it will not be the ITLOS that eventually hears the case on its merits. Indeed, the only instance in which ITLOS refused to grant provisional measures was in a request that presumably suffered from a dearth of evidence. Accordingly, states and investors can expect that meritorious applications for provisional measures will result in some form of an order.

Third, while the ITLOS has demonstrated a propensity to prescribe provisional measures in almost all the cases it has decided to date, it often tailors the measures ultimately granted, and in some instances, it grants relief not requested by either party.

### A pragmatic approach

This pragmatic approach has allowed ITLOS to react to events which unfold in the course of oral

hearings, placing great importance on the assurances given by state parties in lieu of an order. The ITLOS also seems willing to order provisional measures requiring co-operation between states, and many of its orders have included a mandatory measure requiring battling State parties to work together.

Importantly for international oil companies and the states which offer concessions in disputed waters, the ITLOS has been careful to balance the parties' respective interests when granting interim relief, including the economic detriment caused by ceasing ongoing oil and gas projects in offshore locations.

Fourth and finally, states and international oil companies can take some comfort in the efficiency of the ITLOS in its issuance of provisional measures. As a review of all interim relief applications submitted to the ITLOS demonstrates, the average time between the request for provisional measures and the Tribunal's ultimate order is slightly more than five weeks. By international dispute resolution standards, this makes the ITLOS an effective course of action for states that require urgent, practical relief. ■

*By Sarah Vasani and Charity Kirby, King & Spalding*

Because He founded the earth upon the waters...  
And four fifths of the earth is under water



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For the first time in many years there might be a serious impetus to deal with corruption and mismanagement in the Nigerian oil sector, under new President Muhamadu Buhari. Samuel Ciszuk reports.

## Looking towards a new start

*The improved production rates are particularly important at a time of plunging oil prices.*

**W**HETHER IT IS a new start, or another false start, remains to be seen, not least as the direction of reform remains shrouded and concrete policies are yet to be revealed. At the same time, Nigeria is facing low revenues from the collapsed oil price, as well as quite possibly a second wave of marketing challenges for its crudes.

Nigeria has suffered output problems on a grand scale in the past years, due to political instability and a failure to deal with widespread oil theft. Production has, however, recovered from the lowest levels of around 1.8mn bpd in 2009 to around 2.4mn bpd currently.

The improved production rates are particularly important at a time of plunging oil prices, although not enough to compensate for it.

At the same time, the rising oil output in the years 2009-2013 did not strengthen Nigeria's economy by anywhere close to how much it should have. Audits of Nigerian state champion NNPC's flawed accounts show that around US\$18bn could have disappeared just in the space between January 2012 and late May 2015, according to the National Economic Council.

In fact, while oil prices rose and output recovered, payments from the oil industry to the state coffers – through the NNPC – actually fell. President Buhari has himself estimated that Nigerian losses from corruption over the past decade could come in as high as US\$150bn, Platts wrote.

To make matters even worse, it was not only a surplus, or rising income, which was fritted away from the state, but money which should have been paid to IOCs, for the oil they sold through the NNPC. Estimates of state-company debts to IOCs differ, but are likely to exceed US\$5bn in total.

**Amid a low oil price, attracting investment into deepwater exploration and development might prove to be an impossible task.**

Unpaid debts to IOCs is a poor start for any country trying to improve an unattractive investment climate; a lack of clarity is another. Nigeria's new oil law, the Petroleum Industry Bill (PIB) has been stuck in parliament since 2008. Although it has changed shape several times, it has failed to garner anything else but opposition from oil companies, who have also largely halted investments in Nigeria's offshore, particularly in the country's hitherto prolific deepwater areas. The PIB was, almost from the outset, seen to be rather resource-nationalistic and to not provide IOCs with sufficiently attractive profit margins to make their investment worthwhile, save at some mature onshore projects, where juniors with good local knowledge in many cases stepped in as

larger companies withdrew.

This movement led to the reinvigoration of a portion of Nigeria's mature onshore, however, while its effect was to dampen mature decline considerably, the country's substantial deepwater growth opportunities were largely abandoned.

Amid a low oil price, attracting investment into deepwater exploration and development might prove to be an impossible task. The result could be that Nigeria will struggle to maintain its current oil production capacity in the coming two years, even without a new deterioration in the security situation – a risk which, however, has to be taken very seriously.

### **Promising statements from NNPC**

NNPC's new managing director, Emmanuel Kachikwu, told Platts in mid-August that all PSAs and JV agreements would be reviewed to "reflect current day realities in the global oil and gas industry", asking, "what do we do to energise recovery and income growth so that the government will have money to work with?" The statements sound promising, but there have been many promises to IOCs in the past years that the PIB was to be scrapped or radically rewritten, only for largely the same text to continue being stuck in a parliamentary tug-of-war.

Yet this time around, signs abound that the new president is about to shake-up the country's oil and gas sector and implement radical reform. While the president had yet to finalise a cabinet



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by mid-September, following his late May installation, he moved quickly to change the MD at NNPC in early August. Kachikwu was last executive vice chairman and general counsel at ExxonMobil and himself did not waste time, sacking all the heads of NNPC's eight directorates, as well as several other senior managers and advisors.

Some promotions within the NNPC have filled the vacancies, but a striking number are recruits from the corporate world. As with the general Nigerian policy, clarifications about the intended road ahead are needed soon. However, such a thorough shake-up in a company which previously has not been touched by government officials despite corruption in the NNPC being so rampant and obvious that it had to be addressed, is a good first step and raises the feeling that real change could be afoot.

Re-modelling or restructuring the Nigerian state champion is necessary as soon as possible for yet another reason. Nigeria's crude marketing problems might be returning in a second wave, again forcing the country to accept falling differentials to the Brent benchmark.

West African crudes were in the past few years hit hard by the US shale oil boom, which led to a sharply rising internal supply of light, sweet crude, allowing the US and Canada to back out particularly the similar crudes coming from West Africa.

In search of new markets, Nigeria was aided unexpectedly by the chaos in Libya, which shut in significant levels of similar crudes normally destined for Europe. Most of the Nigerian crude backed out of North America in the past few years has, however, had to end up in Asia, something which was made possible by the confluence of low shipping costs and a period of very high Asian refinery runs.

Tanker rates from West Africa to East Asia have picked up strongly in the past months, however, while refining margins in East and South



Training Nigerian engineers at GE's Onne facility.

## For the longer term, work to improve investment terms needs to be started anyway.

Asia have weakened in something which looks likely to be a prolonged trend, largely thanks to weakening gasoline (petrol) economics.

With lower refinery runs in Asia, light crudes from far away destinations might again be at a disadvantage, while the commensurate demand is unlikely to materialise in Europe, despite the European refining industry's vastly improved margin situation, since mid-last year.

A firm hand might be needed to guide the marketing of Nigerian crude sales in the months ahead and Kachikwu's stated intention to try to sever dependence on middlemen in Nigeria's international oil marketing could lead to just that.

Further clarity on strategy and reform will have to wait for President Buhari's announcement of a cabinet. News on who will get the Oil Minister post – it is not entirely unlikely that president Buhari retains it for himself given how pivotal he sees the role – will be eagerly awaited and in itself say much about whether large NNPC

restructurings, like, for instance, splitting the regulator function from the oil company function, are on offer.

While it will be virtually impossible to attract large-scale deepwater investment commitments in the near term given the current price environment – even with a drastic revision and passage of the PIB – a lot of low hanging fruit can be picked in the meanwhile. The fight against oil theft and sabotage can be better co-ordinated; mature decline can be at least somewhat stymied even given the deep cuts in capex, which need to be made; and the domestic fuel import situation can be brought under control through the restart of domestic refineries. Work on all these issues and others have been launched by Kachikwu and could, in a relatively short space of time, yield positive results for the state coffers.

For the longer term, work to improve investment terms needs to be started anyway, in order to lay the groundwork for a turnaround in the country's offshore as quickly as possible, when the price conditions are again right. Prospective upstream investors in Nigeria only have to hope that the reforming zeal is not derailed by those vested interests which over past decades have had a hand in the embezzlement of billions. ■

## A fresh start for Nigeria's oil industry?

WHEN MUHAMMADU BUHARI took power, it marked the first ever handover of national power from one political party to another in Nigerian history and also the first defeat of an incumbent president.

Buhari promised to investigate the disappearance of billions of dollars in oil and LNG income, fuel scams, irregularities surrounding crude oil swaps and the inability of the state oil company, the Nigerian National Petroleum Corporation, to bring its four oil refineries fully on-stream.

Buhari had been fairly non-committal when it came to his timetable for reforming the NNPC, but here at least he has acted quickly. His first move was the selection of a new group managing director for the parastatal.



Emmanuel Kachikwu.

He sacked Joseph Dawha and replaced him with Emmanuel Kachikwu, who was previously executive vice-chairman and general counsel at ExxonMobil.

For his part, Kachikwu sacked the heads of all eight NNPC directorates, while dozens of other managers were removed from their positions. He has pledged to ensure that the government receives all of the money due to it from the NNPC. Many of the new managers come from International Oil Companies operating in Nigeria, although there were still a number of internal appointments. Kachikwu said, "Over the next five to six months, you will begin to see emerging a new NNPC ... Having said that things have been done wrongly, things need to be done rightly. We are doing a lot of work of repositioning, re-strategising, getting the right personnel in the key places and setting a culture for accountability and service delivery."





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Providing a one-stop-shop for multinational oil and gas companies operating in West Africa, Ladol is now the region's largest base for rig and vessel repair. As Ladol's MD, Dr. Amy Jadesimi says, "For the first time Nigeria has a 100 per cent indigenous deep offshore logistics base in Lagos, whose 24/7 operations are 50 per cent cheaper than the bloated government-funded monopoly that used to be the only option." She talked to *Oil Review Africa's* contributing editor, Stephen Williams.

## Leading a local content drive

**A**MY JADESIMI HAS an unusual background for an oil and gas industry pacesetter. She studied medicine in Oxford UK before going on to Stanford in the US and returning to London to work for Goldman Sachs. Then she went home to Nigeria, to help found the Lagos Deep Offshore Logistics Base, better known as Ladol.

Jadesimi has an almost evangelical tone, and certainly a patriotic zeal, as she talks about her country's challenges and potential. When the UK's Financial Times listed the '25 Africans to Watch' in July, she was among the names.

She serves as the managing director of Ladol that is, among many other projects, fitting out the hull of a Floating Production Storage and Offloading (FPSO) vessel. It is the first time such a project has been undertaken in Nigeria.

The project stems from Nigeria's determination to introduce local content to the country's oil and gas extraction value chain, embodied in the 2010 Nigerian Oil and Gas Industry Content Development Act.

Typically, an FPSO weighs more than 100,000 tonnes (dwt), and has a length of 300m and a width of 60m. To date, much of the work on constructing these giant vessels that operate in Nigeria's Gulf of Guinea deep-offshore waters is executed overseas, but Ladol's US\$500mn joint venture with Samsung Heavy Industries (Nigeria) will see the Engina's FPSO hull built in South Korea and then towed to Ladol's Takwa Bay, Lagos facility. There, approximately 17,000 tonnes of super-structure will be manufactured, assembled and fitted out.

Once completed, the vessel will be used for the OML130 field in which Total has a 24 per cent stake; NNPC has 10 per cent; China National Offshore Oil Corporation (CNOOC) 45 per cent; Petrobras, 16 per cent; and South Atlantic Petroleum five per cent.

"I cannot tell you the Engina's FPSO's exact schedule," Jadesimi told *Oil Review Africa*, "but I can say that the work in Korea is ahead of schedule and that fabrication work began at Ladol in August."

### Not all plain sailing

However, it has not been all plain sailing. Delays have caused an estimated 18-month overrun, and legal disputes have dogged the project.

As reported in *ORA's* previous issue, a Federal High Court, sitting in Lagos, granted injunctions restraining President Goodluck Jonathan (before



**LADOL and Samsung broke ground on the US\$300mn state-of-the-art facility, Africa's first and largest vessel fabrication and integration facility.**

he lost the presidential election to President Buhari) and other relevant government agencies from carrying out an order to relocate the US\$500mn FPSO project from Ladol's Free Trade Zone (FTZ) in Lagos to Agga in Bayelsa State.

Jonathan had tried to direct that all oil and gas related cargoes coming into Nigeria, destined for any facility or port, must be discharged at one of Intels' facilities at Onne, Warri or Calabar, and that Ladol's privately developed facilities be moved from Lagos to Bayelsa or to an Intels facility until a suitable site in Bayelsa was built.

The court found for Ladol in determining that this order was a restraint of trade and was tantamount to creating a monopoly for Intels.

More recently, a number of articles appeared in the Nigerian press arguing that the Ladol

facility was unsuitable to berth the FPSO hull, and raised questions over the safety of the vessel entering the Lagos channel to reach the 1000m quayside.

But Jadesimi insists that this story has no foundation in reality. "We took senior officials of the Nigerian Ports Authority (NPA) to London to demonstrate, with computer simulations, the moving into position of the FPSO hull at Ladol.

"We demonstrated the FPSO could routinely be safely moved into position at Ladol, and there was more than adequate turning capacity.

"In fact, the same simulation for Port Harcourt and Onne actually showed that it was impossible to move the FPSO into the facility at Onne, because to move it into the position would first require a huge amount dredging.


"Furthermore, from the open sea into Ladol takes about 20 minutes but sailing into Onne would take the FPSO about two hours. And taking any large vessel into Onne would require a huge investment.

"So taking an FPSO into Ladol is, comparatively, a piece of cake, and that's why we have been consistently pushing this message about maximising the utilisation of Nigeria's natural geography, to ensure that as much work as possible is undertaken in Nigeria; and yes, Ladol is ideal location."

When asked about just who was raising all these concerns over the Ladol location, Jadesimi admits to being perplexed. Clearly, there are a

**Taking an FPSO into Ladol is, comparatively, a piece of cake, and that's why we have been consistently pushing this message about maximising the utilisation of Nigeria's natural geography, to ensure that as much work as possible is undertaken in Nigeria.**

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number of vested interests at play with such a large project, but Jadesimi insists she is still puzzled.

"We have seen the media reports and a lot of mis-information, but we don't get distracted by things like that! We are a private sector organisation with a US\$300mn dollar investment - a 100 per cent private sector initiative, with no government money in here. This is the private sector investing in infrastructure in Nigeria, which is an enormously difficult thing to achieve.

"If we could not have demonstrated certainty, beyond any doubt, that this plan was viable we would not have got off the starting blocks. We definitely would not have invested money ourselves.

"Again, there are lots of different businesses that anybody can deliver in Nigeria, and the location of Onne and the facilities in the Delta are fantastic, for certain purposes. It just so happens that Ladol is an ideal location for bringing large vessels on shore.

"By utilising the benefits of Ladol to do that, it opens up the possibilities for other parts of the country because once the FPSO is at Ladol, clearly Ladol can be the aggregator of fabrication from across Nigeria."

### A game-changer

In short, Ladol's vision emphasises that this project is a game-changer. By bringing the FPSO on shore in Nigeria, Ladol is creating a situation where, automatically, all those jobs that might have been gone to South Korea can be done in Nigeria by Nigerians. Jadesimi believes Ladol will be creating some 60,000 new jobs – both direct and indirect – with the FPSO project.

"In the past we had a lack of skills capacity," Jadesimi says. "We had a lack of human capital. But the reason they were lacking was that there was no local demand. FPSOs were being constructed in Korea or elsewhere. The FPSOs never touched land in Nigeria.

"Why would you invest hundreds of millions of dollars on building up capacity here? But now the FPSO is coming to Nigeria, it's absolutely makes sense. You are going to see fabrication demand quadruple, and that will not only benefit Nigeria but will economically benefit the entire region."

However, the question remains as to what advantages Samsung Heavy Industries sees in moving the FPSO work to Nigeria.

"I think it is fair to say that moving work to Nigeria is not something any foreign company would volunteer to do. The oil and gas market, in particular, doesn't like change, and the market is characterised by hugely powerful vested interests. Even when that change ultimately benefits them, it is enormously difficult to get them to change. "That's why a combination of a local content act and a private indigenous company with the ability and willingness to make the types of investments that Ladol has made, was required to get us to this point.

"Now we are at this point I can tell you that Samsung is a very good partner for a Nigerian



Amy Jadesimi

company – they have very high standards, they work extremely hard and they want to produce a quality product, and working side-by-side with them our Nigerian team have learnt a lot.

### Developing a long-term relationship

"I think it will be very possible now to develop a longtime relationship between Samsung and Ladol, and I also feel like its positive example of a Nigerian company willing to invest heavily in infrastructure and people, and a foreign company willing to transfer technology skills, working together openly, the end result is more money and more business for both sides

"I also think that going forward Samsung will benefit, because they will have the status of accessing the only facility in West Africa that can manage the manufacturing of an FPSO of the size of the Engina, and the truth is that with the competitive global market that we are facing now, and the economic down turn in Korea, there is a need for companies like Samsung, Daewoo or Hyundai to rethink their global strategies."

"In summary, they may have been uncertain initially, but I think they would now see the benefit of working with a Nigerian partner – and we certainly see the benefit of working with company with such high-standards and advanced technological skills."

What is particularly interesting about Ladol is that, although the oil and gas sector is the primary concern, providing a one-stop shop for oil and gas companies with interests in West Africa, the development vision is even broader.

Jadesimi says that a new First Phase 22MW power plant will be built to make the Ladol site self-sufficient in terms of electricity, and she has already begun talks with an electronic manufacturing company to open a factory within the complex.

She also has her eye on the new transport infrastructure that will link the north of Nigeria to the coast – new rail links between Kano and both Lagos and Port Harcourt – that will facilitate the movement of agricultural products and inputs

**It just so happens that Ladol is an ideal location for bringing large vessels on shore.**

such as fertiliser.

That could see agro-processing industries set up factories within Ladol, ideally placed to serve domestic, regional and even international markets. And Ladol being a Tax Free Zone clearly has attractions.

Nevertheless, Jadesimi sees the oil and gas sector in Nigeria changing profoundly, and for the better, in the near term. She points to the fact that the new government is popular internationally and that has already instigated changes in the way the sector has operated in recent years.

"The refineries are working for the first time in four years," she says. "They are not operating at full capacity, but they are producing more power than at any time before."

She also takes enormous encouragement from the way that, even before the government has really announced major policy decisions, they already have created a different environment, have started to change things.

In such an environment, Jadesimi believes, a company like Ladol can thrive and can actually attract domestic private investors who are interested are adding value, and foreign companies who have been holding back on investing in Nigeria for various reasons. "Look at Shell, Exxon and Chevron; they may have divested from shallow water fields but already have huge deep-water assets that they have been holding off from investing in."

But is she concerned about the fall in the oil price? She affords a laugh at this suggestion and points out that when Shell began developing the Bonga field, the oil price was at US\$25. "Now it is around US\$60 and that is fantastic for Nigeria. My guess is that for the international oil companies, they are much more concerned by Nigeria's business environment than anything else."

Jadesimi adds, "The environment is now characterised by a government with a clear commitment to law and order, and that is now creating an ideal environment for investment, and just as importantly I think, an indigenous private sector that has shown the ability and willingness to make investments.

"That is what is going to make local content work and the effort of the government to change Nigeria be successful because you now have private Nigerians with the confidence to invest in their own country's infrastructure." ■



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## Nigeria and Angola emerge as production hubs for paints and coatings used in offshore oil & gas applications

NIGERIA AND ANGOLA present attractive growth and operational expansion opportunities for manufacturers in the offshore oil and gas (O&G) paints and coatings market. With raw material availability and local manufacturing capabilities catalysing production and supply lines, the two countries are rapidly emerging as the African hub for the offshore O&G paints and coatings market.

New analysis from Frost & Sullivan, *Analysis of the Offshore Oil & Gas Paints and Coatings Market in Nigeria and Angola*, finds that the market earned revenues of US\$675.1mn in 2014 and estimates this to reach US\$1.13bn in 2019. The applications covered in the study are offshore O&G facilities, dry docks and fabrication yards.

"The subsidisation of manufacturing makes Nigeria and Angola vital to the production of offshore O&G paints and coatings in Africa, with the goal of African needs being fulfilled by African countries," said Frost & Sullivan chemicals and materials research analyst Abdul-Basit Abdullah. "The drop in crude oil prices has reduced the base costs of paint through a reduction in raw material cost of 8.3 per cent, driving competitive pricing and consumption."

Construction of local production facilities will be vital in order to ensure cost-competitiveness, as transportation costs of raw materials are steep. Local construction will be further justified once higher import tariffs are implemented by the Nigerian and

Angolan governments. As import duties are lower for unfinished than for finished goods, suppliers could consider setting up a local presence in the form of a mixing plant where imported raw materials are blended.

"While in-country manufacturing is a must-have, building a brand reputation will be essential for long-term, sustainable growth," noted Abdullah. "Partnerships between local and international companies will speed up the development of high-quality products and assist offshore O&G paints and coatings manufacturers in meeting demand in the Nigerian and Angolan markets."

*For more information on paints and coatings see pages 46-48.*

### Lekoil announces first oil from Otakikpo in Nigeria

AIM-LISTED LEKOIL has announced the start of oil production from the Otakikpo Marginal Field in OML 11 in Nigeria.

Following the successful re-entry of the Otakikpo-002 well, first oil flowed to surface on 5 September. The well produced oil from the first of four planned production strings, and flowed oil at various choke sizes for over 24 hours at a peak rate of 5,703 bpd at a 36/64 inch choke.

In January this year, the company has said that it expected to produce around 6,000 bpd from the four strings at Otakikpo-002 and Otakikpo-003 wells. Based on the preliminary results, Lekoil now believes that this guidance is likely to be exceeded substantially but the company will provide formal guidance only after further testing and analysis.

Lekan Akinyanmi, CEO of Lekoil, said, "We are delighted to announce that Lekoil is now an

oil producer. We always believed in the potential of Otakikpo but the production rate from the first re-entered well has exceeded our expectations."

Otakikpo-002 will be temporarily suspended now to allow completion and testing of the upper C5 zone, following which an official well-test programme will commence and the rig will move to start re-entry operations on Otakikpo-003. During the well test, oil will flow into onshore storage tanks. The second production well, Otakikpo-003, is expected to come on stream towards the end of the year. Otakikpo is situated in a coastal swamp location in OML 11, adjacent to the shoreline in the south-eastern part of the Niger Delta. Lekoil Nigeria has a 40 per cent stake participating and economic interest in Otakikpo through agreements signed in May 2014 with Green Energy International.

### Oriental takes reins at Ebok

ORIENTAL ENERGY RESOURCES and Afren have concluded a transition plan for the shallow-water Ebok field offshore Nigeria.

Following Afren's announcement of insolvency at the end of July, Oriental is taking control of the field's operations, including the FPSO which currently delivers around 30,000 bpd oil.

The process includes the transfer of all Afren's duties as technical advisor to Oriental, including all obligations not already held by Oriental under the prevailing Ebok agreements.

All Ebok contracts with suppliers and contractors will have to be renegotiated and reassigned to Oriental.

Oriental has already secured a framework of key personnel to staff drilling, production and facilities, and subsurface and reservoir activities during the transition.

Implementation of the Okwok field development plan continues, with the same handover process likely to be affected.

### Nigeria to deploy drones to fight oil theft

NNPC MANAGING DIRECTOR, Ibe Kachikwu, has announced a plan to deploy drones to monitor the movement of ships in a bid to fight oil theft on the country's waterways.

"We are launching an armada of approaches which will include the incorporation of drones to check movements of vessels within our territorial waters," he said, according to an NNPC official statement. "We are looking at the current logistical nightmares of changing staffing at the loading bay of crude oil export terminals virtually every 90 days", he added.

Kachikwu said NNPC was also trying to help the Nigerian navy make up for a lack of equipment to carry out patrols.



Lekoil's first oil significantly exceeds expectations. (Image courtesy: proactiveinvestors.co.uk).



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## Conoil hit large pay dirt in southeast offshore

NIGERIAN INDEPENDENT CONOIL has encountered over 98m of net hydrocarbon sands in about eight levels in Anim-1, in the Oil Prospecting Lease (OPL) 290, in the prolific south east shallow offshore Niger Delta. The figure is derived from a 'first pass' interpretation of Logging While Drilling (LWD) Tools. The company has been running a more detailed wireline facility recently, but there's clear excitement at the Department of Petroleum Resources (DPR), the regulatory agency, which has been keen on getting companies to do more exploration work. Five of those sands are at least 12 metres thick, the rest are between 6-7.5m. The reservoirs are part of the Biafra sands sequence, which is 'native' to the south east offshore Niger Delta.

"There was an 'Amenam moment' in the course of the drilling", said a DPR source, referring to the French major Total's discovery of the Amenam field in 1990.

In the same south east offshore neighbourhood, Total famously drilled into 9,114m of shale in Amenam-1, without encountering a single pocket of sand, emerging, after the ordeal, into an entirely different deltaic sequence, hosting over six hydrocarbon reservoirs between 3,353m and 4,572m below sea level. By the time a final investment decision on the field was taken eight years later, Total was proclaiming Amenam as a billion barrel tank.

The drilling experience in Conoil's Anim-1 was not so dramatic. In chugging through the massive shale, there were small sand intercalations. But the DPR sources think that this well may be significant.

Anim-1 was spud on 30 June 2015 with the Monarch rig, operated by Depthwize. The well is prognosed to reach total depth at 3,658m true vertical depth, (3,962m measured depth). The well will also fulfill the obligations of the Production Service Contract (PSC).

Conoil, with production of around 9,000 barrels of oil per day (bopd), has been aggressive with the drill bit on exploration plays in the last three years; and it has had a string of discoveries to show for it, the most widely discussed of which is the Ango field, in Oil Mining Lease (OML) 59, which is now being completed and will soon be tied to existing production facilities in the lease.

## NNPC inks interim deals for offshore crude oil processing

NIGERIAN NATIONAL PETROLEUM has entered into interim agreements with three trading companies for offshore processing of Nigeria's crude in return for oil products to bridge the shortfall in domestic fuel supply, the state-owned company said.

The Offshore Processing Agreement, which would run from October to December, was signed with three of NNPC's trading subsidiaries - Duke Oil, Carlson and Napoil - NNPC spokesman Ohi Alegbe said in a statement.

"The stop-gap OPA arrangement, which is designed to run for three months, obliges the corporation to allocate a certain volume of crude oil within the period for refining at offshore locations in exchange for petroleum products at pre-agreed yield patterns," Alegbe said.

"The OPA arrangement will help augment in-country production of refined petroleum products from the nation's refineries to meet local demand," the spokesman said.

The temporary OPA deal will lapse with new contracts expected to come into effect at the end of the ongoing public tender process, he added.

Under the OPA contracts, Nigerian crude is refined in neighbouring countries such as Côte d'Ivoire and then the refined products are shipped back to Nigeria.

NNPC last month cancelled the OPA entered into with three trading companies -- Duke Oil Company, Aiteo Energy Resources and Sahara Energy Resources - in January and which involved the allocation of a total of 210,000 barrels of oil per day (bpd) of crude.



It then invited bids from local and foreign companies including Total, Oando, Sahara Energy, Calson, MRS, Duke Oil and BP/Nigermed.

The previous OPA was the subject of controversy as NNPC said late August that they were skewed in favour of the sacked trading companies in such a way that the value of product delivered was significantly lower than the equivalent crude oil allocated for the programme.

Despite producing around two million bpd of crude oil, Nigeria imports more than 80 per cent of its oil product requirements due to limited domestic refining capacity.

Nigeria issued supplementary permits to marketers last week to import an additional 300,000 metric tonnes (mt) of gasoline for the third quarter.

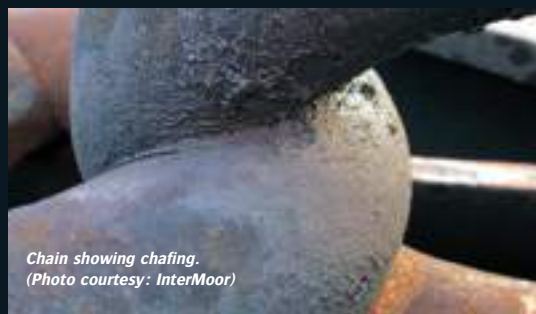
Platts

## InterMoor completes Okoro field work

INTERMOOR RECENTLY COMPLETED a top chain replacement project on an FPSO offshore Nigeria.

The Armada Perkasa FPSO is spread-moored in shallow-water in the Okoro field. InterMoor's crew completed top chain replacement of all 10 mooring lines of the FPSO. The scope of work also included the uncrossing of two mooring lines.

Top chains had worn out due to chafing at high tensions. InterMoor provided engineering/ procedure development, procurement, and offshore implementation. The job was completed safely and with no production shutdown required.



Chain showing chafing.  
(Photo courtesy: InterMoor)

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Following a period of bullishness regarding deepwater and onshore opportunities, the realities of a profoundly changed oil market are starting to set in. Amid capex cuts and an industry-wide re-focussing on low cost production, the West African producer might also find renewed challenges in the marketing of its crude. Samuel Ciszuk reports.

## Angola's lack of diversification could haunt it whilst prices are low

**A**NGOLA'S OPTIMISM ABOUT achieving an average 1.84mn barrels per day (bpd) crude production rate throughout 2015 and to hit two million bpd output rate, might be giving way to more tempered feelings. It is not that ambitions were unrealistic; in fact, so far this year, Angolan output has neared the 1.8mn bpd mark most months, even hitting it once or twice. Several sizeable greenfield projects are also lined up for ramp-up starting end 2015 and throughout 2016.

On the contrary, factors mostly exogenous to Angolan oil policy might be turning against it, exposing, if a fault is to be found, perhaps an over-reliance by Angola on the future sub-salt oil play as a single source of investor interest generation.

### Remarkable discoveries deepwater

Angola's deepwater has seen some remarkable discoveries and oilfield developments in the past decades. Ultra-deepwater subsalt discoveries offshore Brazil, in geology widely recognised as analogous to the Gulf of Guinea and the waters off Angola, have further spurred exploration interest. Recent discoveries in sub salt layers off the Republic of Congo have also underlined the potential as late as earlier this year.

Yet, while subsalt discoveries have been made off Angola, there have been some key disappointments, dampening spirits at a point when investors across the table were concentrating on cutting costly projects and taking a second look at success rates.

ConocoPhillips, Cobalt and Statoil all reported dry wells in November last year, with Statoil as a result cancelling a three-year deepwater rig contract two years in advance, while Cobalt – the junior player among the deepwater operators – in the past months took the step to farm down some of its Angolan exposure, selling stakes in key discoveries to Angolan NOC Sonangol.

Importantly, no player has yet exited Angola's deepwater and the dry wells have to be weighed against the discoveries. Yet, at a time of drastic capex cuts, the perception of a falling success rate in a frontier, high-cost basin, is bound to impact investment sentiment negatively.

### Further cuts likely

The second wave of the oil price plunge which global markets are currently going through since mid-2014, will be reinforcing this trend and produce even deeper capex cuts. Not only exploration, but also development projects are likely to see cuts, leading to delays and first production deferrals. Meanwhile, mature decline in Angola might be reappearing as more than a spectre.



BP's Greater Plutonia FPSO - Phase III is slated for near-term completion.



ExxonMobil's development of the 70,000 bpd Kizomba Satellites Phase II project came onstream more than six months before schedule.

Importantly no player has yet exited Angola's deepwater.

### Closely calibrated growth strategy

Angola's growth strategy has in a sense been closely calibrated: the line-up of projects in development and, before that, projects in exploration/evaluation, has never exceeded decline rates at mature fields by much, with regards to production capacity loss and gain. Hence, project delays and, in particular, delays in the exploration pace could quite quickly translate into a shrinking Angolan production capacity.

A recent report on Angola by the US Energy Information Administration (EIA) in fact pours cold water on Angola's hopes of reaching a production rate of two million bpd of crude given its current short-term project line up, citing the prevalence of technical problems at commissioning, production outages and completion delays in Angola over the past decade as signs that adjustments to expectations need to be made. One could argue that such downside adjustments to output expectations are now needed even further, given the ever deepening cost-cutting in the industry.

The total targeted capacity of upstream projects in development, where a FID has been taken, comes in at around 510,000 bpd. Targeted completion dates for those projects fall into the 2015-2016 timeframe, although slippage into 2017 looks likely for some of the volumes.

Yet, the list of projects with FID is noteworthy for being very front-loaded. The Chevron-led 70,000 bpd (plus an additional 10,000 bpd of NGL - natural gas liquids) Mafumeira Sul expansion of the Mafumeira field, bringing the total plateau to 110,000 bpd including NGLs and the company's 23,000 bpd Lianzi cross-border development with the Republic of Congo have suffered some delays. Mafumeira Sul was initially scheduled to have been completed already, but has slipped into early-2016, with the same looking likely for Lianzi.

However, ExxonMobil's development of the 70,000 bpd Kizomba Satellites Phase II project came onstream more than six months before schedule, in late April. Production ramp-up has reportedly progressed well since.



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Completion of the Chevron-led 250mn cfd Congo River Crossing Pipeline project should help stabilise gas flows to the LNG plant.



Remaining on the FID list is the Total-operated Kaombo Project.



Eni brought first oil onstream from its 100,000 bpd West hub development last November, from the Sangos field. The Cinguvu oilfield was added earlier this year, bringing production to around 60,000 bpd by mid-year. The plateau is expected to be reached with the connection of the Mpungi field late this year, as well as the Mpungi North and Vandungu satellite fields.

Another project slated for near-term completion is BP-led Greater Plutonio Phase III, with a targeted 22,000 bpd incremental capacity. The project is expected to come onstream early in 2016, or at the very end of 2015. Remaining on the FID list is the Total-operated Kaombo Project, with a targeted 230,000 bpd production capacity and a 2017 completion target.

## Angola today remains a high cost exploration- and production-focused play.

This means that of the roughly 510,000 bpd of targeted production capacity in ongoing, well-advanced upstream developments, around 150,000 bpd of production capacity has already come onstream, without having noticeably shifted Angola's overall output figure upwards in the past months.

Indeed, technical problems elsewhere might also be to blame, with some key producing assets having come on-and-off during the year. Problems with integrated gas offtake destined for the shut-in Angola LNG terminal in Soyo can also have helped to create system imbalances at some oil projects. The troubled liquefaction plant, which, after much delay, delivered its first cargo in 2013, but has been offline mostly since, has still not received a firm new start-up date, although some official Angolan communications have pointed towards Q1 2016.

Completion of the Chevron-led 250mn cfd Congo River Crossing Pipeline project, hoped for sometime late this year, should help stabilise gas flows to the LNG plant, helping to alleviate some of the operational challenges for the 5.2 mmtpa facility.

### Operational integrity must improve

Unless operational integrity radically improves in Angola over the coming three to four years, output capacity growth might be absent from today's levels. Although, in the short run, there should not be much down side for output either, as soon as the projects now in the pipeline have seen ramp-up, Angola will face a dearth of new supply. In the meantime, mature decline is unlikely to

slow, particularly not amid IOCs' general cost-cutting and state company Sonangol's increasingly strained cash flow situation. It might well prove that Angola, although having had more success in the past decades than practically all its African oil exporting peers, has focused far too narrowly on attracting investment to the offshore part of its sub salt Kwanza basin. Efforts to launch a licensing round for the onshore part of the Kwanza floundered earlier this year, partly amid political unwillingness to relax too onerous local content requirements.

This means that Angola today - as we enter a period of low oil prices likely to last for at least two years and cast its shadow over the industry capex spending for more than that - remains a high cost exploration and production focussed play.

While it is probably too late to diversify away from this situation during this current cycle, Sonangol and the Angolan government also need to take care not to focus its oil marketing strategies too much on one market. Like the rest of its West African crude exporting peers, Angola has suffered in the past half-decade from the US shale boom and its backing out of West African crudes. Given its, on average, heavier and sweet crude slate, however, it has not suffered as heavily, but found markets more easily than for instance Nigeria. Nevertheless, Angola has come to rely heavily on the Chinese market, not the least courting it politically, as oil prices have fallen further, to secure buyers and economic support.

### Diversification essential

In June, July and August, Chinese purchases of Angolan crude seemed to have peaked, however, with Angola becoming the country's second largest crude supplier, at around 905,000 bpd during July. But during August it became apparent that winds were turning and perhaps in a more than sporadic way.

Rising freight rates for the West Africa-China route made other nearer alternatives to Angolan crude economical, while the period of high refinery runs in Asia looked as it was coming to a close. With diesel cracks weakening in Asia the appetite for heavy sweet-type crudes like Angola's is likely to be tempered, a situation which will probably last for some time. With transport economics then favouring regional Asian alternatives, or even South American crudes, government efforts to court more market share in China might be misdirected - particularly at a time when China actively seeks to diversify its own supplies. Diversification needs to be at the forefront of Angola's marketing strategy too for the foreseeable future. ■

## Survitec hawser secures offloading tanker offshore Angola

SURVITEC GROUP HAS supplied an offloading tanker serving an ExxonMobil-operated oil field offshore Angola with a 180m single leg mooring hawser.

The rope, which has a diameter of more than 150 mm and weighs just less than nine metric tons (mt), is designed to provide a minimum breaking

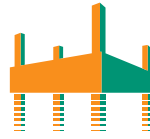
load (MBL) of 924.

It will be used to connect the tanker to an FPSO. According to Survitec, the braided nylon construction ensures the hawser has sufficient energy absorption to provide a secure mooring even in rough seas.

The company assembled the system at its

Lowestoft centre in eastern England. The package included protected thimble eyes, high-grade chain, integral flotation and a messenger line. The hawser was designed in compliance with the latest OCIMF 2000. "Guidelines for the Purchasing & Testing of SPM Hawasers" and certified by ABS prior to delivery.

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## Saldanha Bay plans envisage a sub-Saharan hub

**A**S PART OF Operation Phakisa, both the government and the Cape Town-based South African Oil & Gas Alliance\* are encouraging the development of the south-western port of Saldanha Bay as an attractive base for specialised hub/service operations for the oil and gas extraction industries throughout sub-Saharan Africa. The 23-metre-deep port already has a busy fabrication yard specialising in energy developments, with drydock facilities existing at nearby Sturrock.

The existing port of Saldanha Bay offers a sheltered harbour with deep water entry, anchorage and shore-side access. Under common-access arrangements a multi-purpose quay is available, offering a 200-metre deep laydown area.

Privately-operated facilities within the port include an offshore fabrication yard along with a 40-metre load-out quay, eight metres of which is alongside.

Access to the cosmopolitan and well-connected city of Cape Town with all its advanced facilities is excellent; many of South Africa's oil and gas suppliers have their own branches within the port area itself, and there is a steel fabrication mill nearby. Accommodation and personnel training facilities are being extended as part of the development plans.

South Africa's government is especially keen to develop all these facilities because it sees potential for the creation of well over 100,000 jobs and the making of a major contribution to South Africa's energy supplies. These include a permanent resolution of the ongoing power crisis.

The whole programme is being jointly promoted by Transnet's own Ports Authority division in association with the local Industrial Development Zone authorities. Their shared vision is to develop an energy and marine repair base that can provide full-house engineering and supply services to offshore operators from as far away as West and East Africa under the supervision of a single contiguous Customs Controlled Area.

### Equivalence to freeport status

CCA equivalence to freeport status means that no VAT or customs duties will be payable on any items landed within the Zone, vastly increasing operational handling efficiency for far-field energy markets. The plans cover a total of 330 ha; one-half of this on Transnet's own water-side land.



An aerial view of the port of Saldanha Bay showing the multi-purpose quay, the general maintenance quay and the quayside at the offshore fabrication yard.

Building on a recent track record of high-quality rig repair work by local companies for major customers such as Transocean and ENSCO, this will be the only sector-specific industrial development zone anywhere in South Africa.

**Their shared vision is to develop an energy and marine repair base that can provide full-house engineering and supply services to offshore operators.**

As part of the infrastructure development plans that are already being carried out (see details including annotated aerial photography on the SAOGA website listed below) it is intended to complete the extension of the energy service port's general maintenance quay into the offshore supply base, construct a dedicated deep water quay to accommodate enlarged rig and vessel repair activities, construct a new 400 metre-long berth offering 20-metre depth that will be used exclusively for rig and vessel repair, dedicate shallow-water access for vessel building (including a 500-metres jetty in 9-12 metres of water adjacent to the existing Moss gas facilities

which will be used exclusively for vessel and equipment fabrication and repair), and provide the logistics support quay expected by operators within any comparable modern supply base serving the offshore industries.

And all this in addition to installing various bulk and internal civil and other services infrastructure facilities such as new access roads, utilities, security fencing and state-of-the-art ICT cabling to encourage further investment in such a major multi-region facility.

### Supporting infrastructure projects

Planned supporting infrastructure projects include construction of an access complex including a new link road bridge, new water supply and solids disposal facilities. A completed environmental impact study is currently being reviewed and the existing waste water treatment works at Saldanha Bay are being upgraded. All these improvements are being invested in through the government's (dti) Special Economic Zone Fund infrastructure capital expenditure allocation.

Strongly linked with the city of Cape Town and specifically targeted for future energy-related development, "This is the most viable deepwater rig servicing option in the region," says the O&G Alliance's CEO Ebrahim Takolia. ■

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P N Rajesh gives an overview of the challenges of fire detection and potential solutions for the oil and gas industry.



*Oil, gas and petrochemical facilities are particularly vulnerable to fire*

# Effective fire detection

**OIL, GAS AND** petrochemical facilities are particularly vulnerable to fire. The potential costs of disaster are high in terms of disruption and loss of assets and human life. Early fire detection is crucial to prevent fires from developing quickly and enveloping plants and materials. Oil and gas companies need to take action to address incidents that might occur, however stringent the safety measures in place.

Fires at oil, gas and petrochemical facilities are not unusual in the Middle East. Indeed, there were two fatal incidents claiming eight lives in total at the same refinery in 2000 and 2011, while fire broke out in August this year at the 466,000 bpd Mina Al Ahmadi refinery in Kuwait.

## Key risks

Some petrochemicals are notoriously volatile. Fires can be started from sources of ignition in close proximity. As the petrochemicals vaporise, they do not necessarily need to be in direct contact with the facility to ignite a fire.

High temperatures, sometimes reaching over 50 degrees in the summer in the region, present a very real danger.

Petrochemical facilities are complex extraction facilities and supply chains with distribution terminals, offshore and onshore plants. The potential is there for an incident

involving a hazardous substance at any part of the process.

Neighbouring sites must also be considered, not only in the context of fire detection, but also in terms of the potential damage that can be inflicted on them when in close proximity – for instance, at port facilities.

Terrorism is more prevalent today than it has been in the past. Security must be combined with fire security systems. Fire detection solutions that employ a Visual Smoke Detection solution, such as FireVu's, can combine the two.

The oil and gas industry is one where the benefits of installing fire detection and prevention solutions for facilities over and above the legal requirement more than outweigh the cost implications. There is no room for accepting risk – a factor that does not apply to all sectors. The cost of a disaster in terms of People, Environment, Assets and Reputation – the PEAR acronym – outweighs the cost of investing in effective safety technology. Higher insurance

premiums for less stringent fire detection and prevention can also be factored into the financial decision making process.

## Fire detection systems

Fire detection solutions can generally be grouped into Aspirating Smoke Detectors (ASD), Infrared (IR) and Visual Smoke Detection (VSD) Solutions. Each has its own attributes for different environments.

Aspirating systems identify particles of smoke suspended in the air to alert safety operators to fire danger. They are highly sensitive, often detecting smoke before it is visible to the human eye. ASD can be effective in indoor environments, but it can take time for the smoke particles to reach the detectors in large spaces, thereby impacting the response time, and where outdoor locations are concerned it can be compromised further. ASD can also struggle to distinguish between dust and smoke particles.

IR are transducers of radiant energy, converting radiant energy in the IR into a measurable form. Detecting IR energy emitted by objects takes away reliance on visible light, so obscured conditions should not affect their effectiveness. However, thick smoke, oil and grease can be problematic. Most IR detectors are designed to ignore constant background IR radiation, focusing on the modulated part of the

**The cost of a disaster  
outweighs the cost of  
investing in effective safety  
technology**

radiation. However, they can be prone to false alarms when exposed to modulated non-flame IR radiation.

Visual Smoke Detection is a mature technology developed, refined and tested over the past 20 years or so. It uses flame as well as smoke detection and analysis of smoke to give early alerts by identifying characteristic smoke patterns across a video image. It analyses changes in a range of variables such as colour, brightness, contrast, shape, edge content, motion, colour matching and loss of detail to alert operators early to potential fire danger. Since it is a video solution, distance is no issue and it can be combined with security. It is used in the Gulf on petrochemical facilities as well as for other sites where petrochemicals are present, such as military and civilian air hangars. Detectors can be linked to alarm systems and integrated into control systems, setting off AC shut down, positive air pressurisation of escape staircases, and total suppression activities such as foam systems.

### Further considerations

Oil and gas facilities offer a range of hazardous scenarios. So it goes without saying that the most appropriate fire detection solution for each scenario is dependent on the danger.



PN Rajesh

For example, during the construction or decommissioning of a site, high temperatures are very likely. The nature and light frequency of a gas torch flame, a welding arc, or grinding sparks, are different from the light frequency emitted by a fire flame. This might have a bearing on

selecting a fire detection solution.

There are strong arguments in favour of having an off-site emergency control centre. As fires around the world have shown, on-site facilities can easily be destroyed in large-scale incidents. Some systems such as IR and VSD can be remotely monitored to avoid such a potential scenario.

Oil companies also need to take into account the resources that are available from the local emergency service in terms of the specialist equipment it has and how quickly it can be deployed. Can the fire detection system be connected to the emergency service? Time is of the essence.

Fire detection technology is generally becoming more sophisticated and refined. Its use is stipulated to different degrees throughout the Middle East, but the cost of implementing effective solutions is more than compensated for by the benefits of minimising the likelihood of fires and their consequences. ■

PN Rajesh is director for Middle East, Africa and India operations at fire detection solution provider FireVu, email: [enquiry@firevu.co.uk](mailto:enquiry@firevu.co.uk). FireVu has offices in the Gulf and representation throughout the region; contact Malcolm Gatenby, director BSSME, email [bssme@eim.ae](mailto:bssme@eim.ae). [www.firevu.co.uk](http://www.firevu.co.uk)

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## Move to standardise basin references

TGS AND THE African Petroleum Producers' Association (APPA) have signed a letter of intent to "harmonise the stratigraphic nomenclature of the sedimentary basins of 13 countries in Africa."

The project is intended to provide a standard and consistent framework for future exploration of these basins, contributing to a reduction of the exploration risks and an improvement of productivity.

The project will use TGS' skills in sequence stratigraphy and seismic interpretation to create new stratigraphic columns for each basin and country. The project will extend the interpretation to include gross depositional environment mapping, seismic facies analysis, and play fairway analysis over time. The results will be primarily delivered using TGS' proprietary Facies Map Browser.

The project will incorporate data from more than 1,300 wells and 200,000 km of 2D seismic. The countries concerned cover from the Republic of the Côte d'Ivoire to Angola. Each of the 13 countries involved is committed to using the new stratigraphic nomenclature in all future exploration work.

It is anticipated that the new nomenclature will be complete by the end of 2018 with the additional studies completed thereafter.

The project, anticipated to start in January 2016, is currently seeking further industry support.

## 3D survey underway offshore Senegal

POLARCUS ADIRA HAS started a 3D seismic survey for Cairn Energy and partners over the Sangomar Deep, Sangomar, and Rufisque permits offshore Senegal. The focus will be on the northern and eastern parts



of the permits, along trend from existing mapped prospects where there is currently no 3D coverage. Acquisition should be completed during 4Q 2015 with final processed results due to be delivered in mid-2016.

The survey will also assist delineation of last year's SNE oil discovery. Cairn's partner FAR expects the first of three firm wells on the permits to start drilling this October. Two appraisal wells will be drilled on SNE in the Shelf Edge play along with an exploration well on the Bellatrix prospect. This will also be the first wildcat on the prospective Buried Hills play. FAR estimates resources from prospects mapped on existing 3D seismic over the permits at 1.5 barrels, with the new programme likely to identify further prospects on the shelf, where the company sees extensions of both the Shelf Edge and Buried Hills plays.

## New-build survey vessel from Fugro

MAKING HER DEBUT at the Martin Midstream Dock in Galveston, Texas, Fugro's premier geophysical survey vessel, the Fugro Americas, was showcased to top clients, with over 100 in attendance. Fugro gave guided tours of the new-



build vessel, with geophysical, geoscience, survey and HSE professionals on hand to demonstrate its state-of-the-art equipment and features along with the working parts of a geophysical survey. Clients were able to view the advanced survey instrumentation, including Fugro's 3,000-metre-rated AUV, from a first-hand perspective, which prompted positive comments on the vessel's impressive equipment and exceptional design. The two-day event provided an important opportunity for clients to not only view the Fugro Americas and its equipment, but also to understand how Fugro's capabilities consistently meet their survey needs.

The Fugro Americas departed the construction shipyard in Louisiana on 13 April and was immediately mobilised to the Caribbean for a highly successful geochemical coring campaign. Measuring 59 metres in length, the multi-purpose vessel is well suited for high resolution geophysical surveys and seafloor mapping and is permanently mobilised for rapid deployment to locations throughout North and South America.

Fugro also owns and operates three Hugin AUV systems, two depth rated to 3,000 metres and one to 4,500 metres, all of which are portable and able to be mobilised onto the Fugro Americas or other vessels of opportunity.

## ION to conduct two 2D seismic surveys offshore East Africa

THE PUNTLAND PETROLEUM Minerals Agency (PPMA) has awarded ION Geophysical a contract to acquire 8,000 km of seismic data covering the entire Somalia Puntland offshore margin.

The regional 2D multi-client survey, known as PuntlandSPAN, is being conducted to support a future license round initiative and to assist in gaining a better understanding of the architecture of the sedimentary basin and the hydrocarbon potential of this unexplored offshore margin. Data acquisition is expected to begin in 4Q 2015.

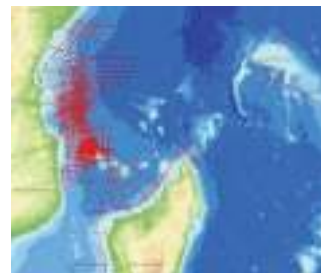
In addition, the PPMA announced the demarcation of its offshore territory into 25 exploration blocks covering 180,000 sq km of the Somalia Puntland seaboard. In total, there are seven blocks in the Gulf of Aden and 18 blocks in the Indian Ocean that have been defined. Block sizes range from 5,000 sq km in the inshore area to 25,000 sq km in deeper water.

Dr Issa Farah, director of the PPMA, said: "The creation of the block scheme is an important milestone in the development of oil and gas exploration within the jurisdiction of the autonomous State of Puntland. The PPMA is pleased to announce the availability of these blocks and looks forward to engaging with the industry to discuss their plans for the region."

Joe Gagliardi, senior vice president of ION's Ventures group, said: "We are very pleased to assist the PMAA in demarcating a block boundary scheme, which heralds an important step in their preparation for future licensing rounds offshore Puntland. The acquisition of the PuntlandSPAN data will provide valuable insight into the petroleum prospectivity of the region, and we are pleased to be a part of this ground-breaking programme."

ION also won a contract from the Tanzanian Petroleum Development Corporation to acquire 4,058 km of 2D seismic, gravity, and magnetic data over offshore blocks 4/1B and 4/1C in the Rovuma Delta region.

The 2D multi-client survey, to be known as TPDC Phase I 2015, is planned to be acquired in 4Q 2015.



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## Mozambique and Tanzania go different ways

DOUGLAS-WESTWOOD'S (DW) World Drilling & Production Market Forecast has identified 83 exploration wells drilled offshore Mozambique and Tanzania since Anadarko's play-opening Windjammer-1 well in the offshore Rovuma basin in 2009. Many have been in ultra-deepwater (>1,000 metres), and the resultant discoveries have lifted the two countries' combined proven gas reserves from 739mn boe in 2010, according to the Eni Oil & Gas Outlook, to 29.5bn boe between 2010 and 2015.

Following Windjammer-1, Anadarko made a further eight commercial discoveries off Mozambique, notably Prosperidade and Golfinho-Atum, both likely to be developed via a subsea-to-shore production system with 31 subsea wells producing to the onshore Afungi LNG facility.

DW expects first gas from this project in 2019, with prospects for a go-ahead better now than from Anadarko has secured non-binding contracts for 80 per cent of its 246,000 boepd export capacity.

Eni has taken a different approach to developing its Mozambican gas finds, DW points out. To exploit the Coral and Mamba discoveries in water depths of up to 2,300 metres, the company has opted for an FLNG solution.

The analyst expects two FLNG vessels to be operating by 2021, with combined output by this point of around 96,000 boepd. Development will require 38 ultra-deepwater subsea wells to be drilled over 2018-2021.

If both projects go ahead, Mozambique's production could soar from 71,000 boepd this year to 469,000 boepd by 2021.

To the north, off Tanzania, BG Group's Pweza-1 discovery was quickly followed by gas finds from the Chaza-1 and Chewa-1 wells. These and five subsequent discoveries are now the subject of a development concept study with the preferred option thought to be two TLPs producing to an onshore LNG facility co-owned with Statoil. Statoil's own exploration campaign in offshore block 1 has delivered seven finds and 4.2bn boe in gas reserves. As with Anadarko's plan, development will likely involve tie-backs to shore. But due to indecision over the site of the onshore LNG plant and uncertainty over Asian LNG demand, DW does not expect either company's plans to come to fruition until after 2021.

As a result, Tanzania's production looks set to hover at around 60,000 boepd for the forecast period with only small additions from onshore projects and Orca Exploration's development on Songo Songo Island.

## Eni reports huge deepwater discovery off Egypt

ENI HAS WHAT could prove to be a huge gas discovery offshore Egypt in its deepwater Zohr prospect. The company says it will immediately appraise the field with the aim of accelerating a fast-track development of the discovery.

Eni says the well and geophysical data available indicate the field could hold 30 tcf of lean gas in place, making it one of the world's largest natural gas finds. Eni holds 100 per cent of the contractor's working interest.

The discovery well Zohr 1X NFW is located in the economic waters of Egypt's offshore Mediterranean, in 1,450 metres of water, in the Shorouk block. Zohr 1X NFW was drilled to a TD of 4,131 metres and hit 630 metres of hydrocarbon column in a carbonate sequence of Miocene age.

Zohr's structure also has a deeper Cretaceous upside that will be targeted in the future with a dedicated well.

This comes on the heels of Eni's Nooros gas discovery in the Abu Madi West license offshore Egypt's Nile Delta, which was announced about a month ago.

The find has the potential to transform Egypt's gas industry and raises hope for gas exports.



## SNH, Perenco sanction Kribi FLNG project offshore Cameroon

GOLAR LNG LTD has announced that its Cameroon floating liquefied natural gas project has reached a major milestone with the final approval by all parties of the Gas Convention for the project. This final investment decision commits the project to a targeted start date for commissioning of second quarter, 2017.

At a signing ceremony in Yaoundé, Cameroon's state owned oil and gas company Société Nationale des Hydrocarbures (SNH), Perenco Cameroon (Perenco), Golar Hilli Corporation and Golar Cameroon (together Golar) executed a fully effective and binding Gas Convention with the Republic of Cameroon which endorses and governs the installation and operation of the GoFLNG vessel in Cameroon waters offshore Kribi.

The binding Tolling Agreement, having already been agreed between Golar and Perenco, is expected to be formally approved by the 25 per cent upstream partner SNH imminently. This agreement establishes the terms under which Golar shall provide liquefaction, storage, and off-loading services to SNH and Perenco as upstream joint venture partners.

The signing of the Gas Convention and the finalisation of the Tolling Agreement terms facilitates the financing structure previously announced and will enable Golar to draw down up to US\$700mn from the facility to fund the ongoing conversion cost. It is estimated that no further direct funding from Golar will be required for the Hilli conversion, with the remainder of the conversion project being financed through this debt facility.

## Noble considers Aphrodite gas exports to Egypt

NOBLE ENERGY AND its partners have started pre-front-end engineering and design for a potential development connecting the deepwater Aphrodite field offshore Cyprus to gas customers in Egypt.

Earlier the partners submitted a declaration of commerciality and preliminary development plan to the Cyprus government. During 2Q, Noble's sales from its gas fields offshore Israel averaged 6.14mn cmd, similar

to the corresponding quarter in 2014.

The company has completed the associated Ashdod onshore terminal compression project, designed to increase peak natural gas deliverability at the deepwater Tamar field to 34mn cmd.

It has also been working with Israel's government to establish a regulatory framework to provide certainty needed for future investment – the government is progressing toward final approval.

Elsewhere, Noble says decommissioning has started of the MacCulloch field in the UK North Sea.

Early last month a Noble-operated well started drilling on the Cheetah prospect in shallow water offshore Cameroon. The four-way structure, the company's first test of a Cretaceous oil prospect in Cameroon, could hold more than 100mn boe.





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## Shell starts production at Bonga Phase 3

SHELL NIGERIA EXPLORATION and Production Company Ltd (SNEPCo) has announced that production has started at the Bonga Phase 3 project offshore Nigeria.

Bonga Phase 3 is an expansion of the Bonga Main development, with peak production expected to be some 50,000 barrels of oil equivalent per day. This will be transported through existing pipelines to the Bonga floating production storage and offloading (FPSO) facility, which has the capacity to produce more than 200,000 barrels of oil and 150mn scfd of gas.

The Bonga field, which began producing oil and gas in 2005, was Nigeria's first deep-water development in depths of more than 914 metres. Bonga has produced over 600mn barrels of oil to date.

The Bonga project is operated by SNEPCo as contractor under a production sharing contract with the Nigerian National Petroleum Company, which holds the lease for OML 118, in which the Bonga field is located.



Image courtesy: Shell

SNEPCo holds a 55-per cent contractor interest in OML 118. The other co-venturers are Esso Exploration & Production Nigeria Ltd, Total E&P Nigeria Ltd and Nigerian Agip Exploration Ltd.

## Egypt awards four oil, gas exploration licences

EGYPT HAS AWARDED four new licences to explore for oil and gas off its Mediterranean coast, weeks after Eni's giant Zohr gas find piqued fresh international interest in the area.

Egypt's state gas company EGAS said in a statement it had awarded one licence to Britain's BP and one to Italy's Edison. A consortium involving BP and Eni's Egyptian subsidiary had also picked up a bloc as had another consortium involving Eni, BP and France's Total.

EGAS head Khaled Abdel Badie told Reuters, after the announcement, that Egypt was preparing to launch a new bidding round for offshore gas exploration in the Mediterranean in the first half of 2016.

Eni announced in late August it had discovered the largest known gas field in the Mediterranean off the Egyptian coast. The Italian major predicts the Zohr field could hold 30 trcf of gas, covering an area of about 100 sq km. It could be a game-changer for Egypt, whose US\$3.5bn debts to foreign energy companies had made it increasingly difficult to attract major investments.

Egypt, which once exported gas, has become a net energy importer over the last few years as production has failed to keep up with domestic demand.

Not only has Egypt diverted to the domestic market gas originally earmarked for export, but it has failed to keep up payments to the companies producing it. The crisis had discouraged international energy companies from making major investments in Egypt's oil and gas sector. However the Zohr find is likely to encourage oil majors to look more carefully at the eastern Mediterranean region, which has yielded some significant discoveries in recent years.

The EGAS statement said the new concessions would see the companies making total investments of at least US\$306mn, conducting seismic studies and sinking eight discovery wells.

## RoyalGate to drill new well in Block Z

ROYALGATE ENERGY HAS announced that it will drill a new well in Equatorial Guinea's Block Z in the first quarter of 2016.

The company plans to drill the Z-1 well close to the location of previous offset wells and in the vicinity of known producers. Located to the north of Bioko Island and south of the Marathon Oil-operated Alba field, Block Z has estimated gas reserves of more than 3.6 tcf, according to RoyalGate Energy's website. The company entered the block as operator in 2013.



RoyalGate Energy president Frank Ene commented in a company statement: "We are proud to announce the drilling programme for the Z-1 well.

This is the continuation of what we see as a long term partnership with Equatorial Guinea and we see a lot of development potential for Block Z. We are bullish about the prospectivity of this block and our other assets in Equatorial Guinea."

RoyalGate is also working with Xuan Energy and GEPetrol to explore Equatorial Guinea's Block Y. The Okume field, which began production in 2006, is located at the southwestern boundary of the block and the Ceiba field, which has been producing since 2000, is located slightly further southwest. These fields have historically been two of Equatorial Guinea's most prolific.

The latest development follows a statement from IMF (International Monetary Fund) staff economists on 15 September 2015 that Equatorial Guinea's decade-long hydrocarbon boom is ending and the country's oil and gas extraction has plateaued. Economists at the organisation also predicted that Equatorial Guinea's oil-dependent economy will contract through 2020, under pressure from low oil prices and falling hydrocarbon production, and claimed that the government's savings buffer is rapidly diminishing.

## Uganda planning to open up more oil basins

UGANDA'S MINISTRY OF Energy and Mineral Development (MEMD) plans to open up at least one more oil basin in the country.

Frank Mugisha, the acting commissioner in charge of exploration in the Petroleum Directorate, said that the country was going to start exploring for oil in Lake Kyoga in central basin and Moroto-Kadama basin in Karamoja sub-region. He said the opening up of these basins could come as early as within this financial year.

"The ministry plans to undertake speculative surveys in the two basins. These surveys will be followed by seismic surveys. We hope that in the future, these areas will also be opened for licensing," Mugisha said.

The planned move comes almost ten years after the country hit its first well in the Albertine basin. Uganda is currently concentrating on licensing out six oil blocks in the Albertine basin. After the issuance of bid documents, prospective companies would be given three months within which to submit the bids, according to Mugisha. After that, the government would take one month to evaluate the bids and another month for negotiations and issuance of exploration licences.

Consequently, exploration licences are expected to be issued in Q1 2016. Already, 16 companies have been pre-qualified to submit bids. The country has opened up six blocks for the new licensing round and expects to bring on board six other companies in the exploration.

## Tower takes dip in shallow water Thali

TOWER RESOURCES HAS signed a production-sharing contract (PSC) for the shallow-water Thali (ex-Dissoni) concession in the Rio del Rey basin offshore Cameroon. The company has a 100 per cent interest in the 119.2-sq km PSC, which carries three exploration phases. Initial three-year period commitments comprise geological and geophysical studies, acquiring 100 sq km of 3D seismic, and drilling one well with a minimum financial commitment of US\$13mn. Water depths over the concession range from 8-48 metres.

To date, the Rio del Rey basin has produced more than one billion barrels of oil, Tower said, with remaining reserves of 1.2bn boe thought to lie mainly in water depths below 2,000 metres.

## First oil from North Tchibala

VAALCO ENERGY HAS announced that the North Tchibala 1-H well, the first development well drilled by VAALCO in the North Tchibala field offshore Gabon, was brought online at a rate slightly in excess of 3,000 gross bpd of oil (approximately 750 bpd net revenue interest to VAALCO). The well was drilled to a measured depth of approximately 3,353 metres, targeting the undeveloped Dentale reservoir. The Dentale formation is productive in fields onshore Gabon, but this well represents the first Dentale production for the industry from that horizon in the offshore waters of Gabon.

The North Tchibala 1-H well was initially brought on production utilising an electrical submersible pump (ESP), but was subsequently allowed to produce naturally. The well is not producing any formation water or hydrogen sulfide (H<sub>2</sub>S) and has a strong flowing tubing pressure in excess of 1,000 PSI (pounds per square inch). VAALCO plans to continue to produce the well without artificial lift while monitoring surface and downhole pressures.

This is the second well drilled and placed on production at VAALCO's new Southeast Etame/North Tchibala (SEENT) platform located in approximately 79 metres of water offshore Gabon. VAALCO is the operator of the Etame Marin permit area and owns a 28.1 per cent working interest and a 24.4 per cent net revenue interest. The Transocean's GSF Constellation II (400' ILC) jackup is mobilising over to the Avouma/South Tchibala platform to conduct workover operations to replace ESPs on three existing development wells, two of which are off production.



Steve Guidry, VAALCO's chairman and CEO commented, "I am pleased to announce that the results from the North Tchibala 1-H well exceeded our expectations. This industry milestone is particularly exciting as it is the first production from the North Tchibala field and the producing interval in this well is one of several within the Dentale formation known to be oil-bearing. We will monitor production and reservoir performance over the next few months while we complete our workover programme at the Avouma/South Tchibala platform to determine the appropriate timing to drill a follow-up North Tchibala development well. We believe this field has significant reserve upside and results from this well over the coming months are important as this will allow us to better understand the potential of the newly-producing reservoir."

## Bowleven encounters hydrocarbons onshore Cameroon

AFRICA-FOCUSED ENERGY company Bowleven recently announced that its Moambe exploration well, located on the Bomono Permit onshore Cameroon, has encountered hydrocarbons. The well was drilled to its planned total depth of 1,524 metres and made its discovery in Paleocene (Tertiary) aged target reservoir intervals. Moambe is the second in a two well exploration programme on the Bomono Permit (the other one is Zingana) to have discovered hydrocarbons. The Moambe well will now be tested before further testing takes place at Zingana. Kevin Hart, Bowleven, CEO, commented, "In line with our drill-drill, test-test strategy, preparations are now underway for an extended well test at Moambe. Moreover, the advanced discussions with Actis and Eneo regarding a gas-to-power scheme to supply the nearby Cameroon national grid, demonstrates the strengthened commercial environment for the timely monetisation of success at Bomono."

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## SEPTEMBER 2015 - OFFSHORE

Country	SEPTEMBER 15	AUGUST 15	VARIANCE	SEPTEMBER 14	AUGUST 14	VARIANCE
	Offshore	Offshore	From Last Month	Offshore	Offshore	From Last Month
ANGOLA	19	15	4	23	23	0
NIGERIA	13	13	0	14	14	0
GABON	6	6	0	6	5	-1
CONGO (BRAZZAVILLE)	3	3	0	5	5	0
MOZAMBIQUE	0	0	0	1	2	-1
GHANA	3	3	0	3	3	0
CAMEROON	2	2	0	3	3	0
EGYPT	14	16	-2	17	18	-1
TUNISIA	1	1	0	1	1	0
SOUTH AFRICA	1	2	-1	3	3	0
TANZANIA	1	0	1	2	2	0
EQUATORIAL GUINEA	0	0	0	2	3	-1
NAMIBIA	0	0	0	0	0	0
LIBERIA	0	0	0	1	1	0
LIBYA	1	1	0	2	2	0
COTE D'IVOIRE	1	1	0	0	0	0
SENEGAL	0	0	0	1	1	0
BENIN	0	0	0	1	1	0
KENYA	0	0	0	0	0	0
MOROCCO	1	1	0	3	2	1
MAURITANIA	1	1	0	0	0	0
TOTAL	67	65	-2	88	89	-1

Source: Infield Systems Ltd.

## Senegal wells to assess potential of SNE discovery

CAIRN ENERGY HAS confirmed it will drill an exploration well on the Bellatrix prospect as part of an upcoming appraisal and exploration drilling campaign offshore Senegal.

The programme, likely to be performed by the ConocoPhillips-contracted drillship Ocean Rig Athena, should start in early October with two appraisal wells on last year's deepwater SNE oil discovery, according to partner FAR.

The aim is to prove an economic threshold for a development, said to be around 200mn barrels.

Cairn Energy exploration director Richard Heaton said the third well would target the Bellatrix prospect, which 3D data processing suggests also overlies the



northern end of the SNE field. "This will define the northern end of the (SNE) field," he added. "It allows us to characterise the reservoirs there.

"We'll have an extensive logging programme here, but at the moment there isn't a firm coring programme here or a firm testing programme. Obviously results will depend a little bit on how the first two wells go too, so we have some flexibility here."

FAR managing director Cath Norman said: "The Bellatrix prospect is one of a number of high-quality targets the joint venture has identified in both the Rufisque and Sangomar license areas offshore Senegal. "The great attraction in drilling Bellatrix is that it will allow us to gain additional information on the extent of the SNE field while also testing a high-quality exploration target of 168mn barrels in its own right."

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## South Africa keen to resume Iranian oil imports

A SENIOR OFFICIAL in the South African government has said the country is ready to resume importing oil from Iran.

Deputy foreign minister Nomaindiya Mfeketo was recently quoted by Reuters as saying the two countries would begin trading “tomorrow” if the international sanctions were lifted.

Six major world powers – the US, UK, France, Germany, China and Russia – agreed in July of this year to lift the longstanding international economic sanctions on Iran, following the Middle Eastern state’s decision to curb its nuclear programme.

“We are definitely negotiating and looking at when to fully resume oil imports from Iran,” Mfeketo told Reuters. “For South Africa, if there’s a process of doing that lawfully tomorrow, we will do it, if there are no obstacles to that.” Following the decision in principle to lift the sanctions two months ago, South Africa said it had never agreed with the trading restrictions, which had harmed its own oil refiners.

Iran was once the largest supplier of crude oil to South Africa, exporting some 380,000 bpd to Africa’s most industrialised country.

## Aggreko hosts OECD at Côte d’Ivoire power facility

AGGREKO RECENTLY WELCOMED a senior delegation from the OECD (Organisation for Economic Co-operation and Development) to the Aggreko power plant on the outskirts of Abidjan. The 200 MW gas-powered facility plays an important role in supporting the local grid, providing a stable power supply to local businesses and households.

The OECD group were visiting the country for high level discussions with the government to help support the national strategy of developing Côte d’Ivoire into a fully-fledged emergent economy by 2020.

With access to reliable power being a fundamental requirement of a strong economy, the group was keen to visit Aggreko, being the main independent power producer in the county.

“Aggreko is proud of the role we play in supplying Côte d’Ivoire with reliable energy. By supporting the national grid

we are helping ensure key industries have access to the power they need to help build a solid and stable economy, while also bringing power to homes and small businesses.” commented Christophe Jacquin, managing director, Aggreko North and West Africa. “Having the government bring such an important delegation to our facility is recognition of the important role we play in supporting the local economy.”

Aggreko has maintained a presence in Côte d’Ivoire since 2010 supporting CI Energies, the national utility, with additional generating capacity to help power the country’s rapidly growing economy. In 2013 Aggreko introduced the Aggreko Technical University training scheme in conjunction with CI Energies to support the development of the next generation of technicians and engineers for the Ivorian energy sector.

## Second floating LNG import terminal for Egypt

EGYPT HAS TAKEN delivery of its second liquefied natural gas (LNG) import terminal and plans to start operations in the third week of October, Khaled Abdel Badie, chairman of state gas board EGAS, told Reuters.

The floating storage and regasification unit (FSRU) was provided by Singapore-based Norwegian firm BW Gas.

FSRUs allow Egypt to import LNG and convert it to natural gas to feed into its energy-starved power grid.

Egypt took delivery of its first FSRU from Norway’s Hoegh LNG in April, allowing the country to begin LNG imports.

Declining oil and gas production and increasing consumption has forced Egypt, once an energy exporter, to divert energy supplies to the domestic market and have turned it into a net energy importer. The deal with BW Gas was worth about US\$60mn per year, then-oil

minister Sherif Ismail told Reuters in August. Ismail is now prime minister. The new terminal has a capacity of 750mn cfd, EGAS said.



BW Gas is to provide Egypt with a floating LNG terminal.

## Nigeria resumes crude exports to the USA

SOME CARGOES OF Nigeria’s crude oil, Qua Iboe and Bonga, are heading to US refineries, say reports.

Exports of Nigeria’s major crude grade, Qua Iboe, to the US had started declining from July 2014 and reached zero by the end of last year, following increased shale oil production by the USA.

Traders have said that at least two cargoes were heading to US east coast refineries as well as potentially down to the US Gulf Coast. One cargo of Nigerian crude is heading regularly to the Delta Airlines refinery in Trainer, Pennsylvania, while Philadelphia Energy Solutions (PES) has also reportedly bought Nigerian crude, including an end-September loading cargo of Bonga and, potentially, also a cargo of Qua Iboe. “It is bits and pieces, not massive flows,” Platts quoted a crude trader as saying.

Shipping fixtures seen by Platts showed PES, Exxon and Statoil chartering vessels taking West African barrels to the US for end-September loading cargoes, and traders have said Vitol’s October 3-4 loading Qua Iboe cargo was also heading to the USA.

India and Europe have emerged as the largest markets for Nigerian crude, while the OPEC member still struggles to dispose of its oil to the USA, leading to a growing overhang of unsold Nigerian cargoes.

European refiners have been the main buyers of Nigerian crude in October so far due to good refining margins on the continent, but other light sweet crudes in the North Sea and Mediterranean are coming off and could compete, traders told Platts.

## Tullow restores gas exports from Jubilee

GAS EXPORTS HAVE re-started from the deepwater Jubilee field offshore Ghana, following repairs to the gas compressor on the FPSO Kwame Nkrumah.

Rates have increased steadily to around 2.8mn cmd, with oil production also back up to its former level prior to the technical issues with the compressor.





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## **SALES • RENTALS • CONVERSIONS**

Container World is a South-African based company that has been providing specialised container conversions to the African Onshore market since 1983. With growing demand from its long-term onshore customers, the company recently expanded its product range and is now able to offer a wide variety of Offshore containers, baskets, skips, reefers and accommodation modules, all certified to DNV 2.7-1 and EN 12079.

Strategically located in Cape Town and with most units available ex stock, Container World is well placed to be able to service demand from both East and West Africa, with short lead times and at competitive prices. The company's onshore division remains a leading supplier of converted containers to the African market, including accommodation, dining, kitchen, ablution and office units. With more than 30 years of experience servicing the African market, and with 13 strategically located branches, Container World is ideally positioned and experienced to handle any onshore or offshore container enquiry.

Contact: Darren Singh, Operations Director • Ashley Smith, Divisional Manager - Oil and Gas Division  
Darren: Mobile +27 (0) 83 625 3070 • Ashley: Mobile: +27 (0) 60 986 5429  
email: darrens@containerworld.co.za • asmith@containerworld.co.za





Sub-Saharan Africa prepares for a greater share of the rig refurbishment and repairs market.

# Rig refurbishment - taking responsibility

**W**ITH MORE WORK being sourced inside Africa to comply with national targets for local content, it seems logical that more rig repair and refurbishment work will also be conducted closer to home.

Africa's growing energy sector is maturing, both onshore and offshore, as evidenced not just by the general swell in production, but also the number of new countries now producing oil and gas.

And, with Mozambique and Tanzania targeting huge gas export projects in the next few years, and oil being uncovered in frontier spots like Liberia and Sierra Leone, there seems more to come yet.

Though Africa may lack the infrastructure and resources surrounding areas like the North Sea in Europe or other more developed producing regions, there is some catching up taking place.

Of course, Asia's reputation for delivering state-of-the-art drills to the industry is not under threat just yet - an area dominated by the likes of Singapore, South Korea, China and Japan - but more complex work is now being handled in-country across all major producing territories across Africa.

As well as huge economic benefits for the host nation in terms of job creation and investment, it is a trend that could potentially save operators millions of dollars in lost time hauling rigs half way across the planet for repairs.

**The Lagos free zone has hosted huge state-of-the-art rigs for the likes of Noble Drilling and Transocean for various repair and maintenance jobs.**

## Saldanha oil hub

Africa's most developed economy, South Africa, has long been an important centre to equip and repair drilling rigs for operations along the West African coast, and that role continues today. Officials are looking to exploit new opportunities too.

Current investment plans include Transnet's upgrade of Saldanha Port, the country's deepest natural port, about 120 km from Cape Town, which already handles most of South Africa's crude oil imports.

The state-owned logistics group intends to build a new jetty and deep sea oil rig repair quay valued at around 10 billion rand (US\$870mn) as a resource for the large and growing number of oil companies in the area.

The country's proximity to West Africa and any new gas finds in East Africa gives it a clear edge over rival repair yards in Europe, Singapore or Dubai in terms of distance.

Indeed, it's not unknown for rigs working offshore Angola to head to Singapore or other far distant territories for essential repair work.

The Saldanha project, which will help position South Africa as a leading repairs hub for the region, is expected to be commissioned by 2018, Transnet officials said earlier this year.

The investment is still going ahead, in spite of the fall in oil prices, they said.

## Prime location

Such a facility could potentially save oil companies millions of dollars, enabling rig refurbishment closer to home, instead of towing all the way to the big yards in Asia, a round-trip journey which could take up to 100 days for a rig that, at its peak, could rent out for \$500,000 a day.



*LADOL's developments are key drivers of the Nigerian economy.*

But Saldhana is not the only option for oil companies, with lots of other yards up and down the West African shoreline each offering varying levels of expertise to the industry.

These are heavily concentrated in key producing countries like Nigeria, where facilities such as the Lagos Deep Offshore Logistics Base (Ladol) and the Onne Free Zone play an important role in servicing rigs active in the local market.

The Lagos free zone, for instance, has hosted huge state-of-the-art rigs for the likes of Noble Drilling and Transocean for various repair and maintenance jobs.

Three recent projects - on the Transocean Baltic, Noble Percy Jones and Noble Lloyd Noble rigs - injected about US\$60mn of much-needed foreign capital into Nigeria's economy, creating more than 1,000 jobs.

The site is anchored around an initial 200 metre quay with an 8.5 metre draft, although plans are underway to expand the quay length to 1,000 metres, paving the way for more vessels.

Similarly, in Angola, Soyo and Lobito have grown to become important hotspots for the country's fast-growing offshore industry.

## Across West Africa

But such facilities can now be found across the region too, such as Cameroon's Rig Repair International, which was only set up in 2008 to respond to industry demand.

More work is taking place at the Port of Limbe where the Atwood Hunter rig was recently upgraded by a joint venture of Harris Pye Engineering and a subsidiary of Atwood Oceanics Inc.

The refurbishment project, to enhance the facility's overall capabilities, minimised transit time from the rig's operating market to another shipyard and back again, a key factor in locating the work closer to home.

The scope of work included a complete blast and paint of the underdeck and columns, approximately 250 tonnes of general steel and pipe renewals, change out of eight shale shakers for four state-of-the-art units, renewal of five fairleaders weighing eleven tonnes each, and major modifications to the mud pits and associated piping.

It is estimated to have avoided 48 days of transit time for towing to and from a conventional shipyard capable of executing the scale of work involved.

In North Africa, operators have more of a choice available to them with facilities in Europe and the Middle East, where companies such as Lamprell

offer a full suite of refurb services for jack-up rigs out of Dubai and Sharjah.

The Gulf's mammoth oil industry means plenty of work for these regional providers.

### Competitive business

Despite the increase in Africa's rig traffic and the region's ability to accommodate more repair work, it still lags behind other parts of the world.

And it's not always the big international firms guilty of placing their orders elsewhere.

In June, Nigerian independent Oando Energy Services took control of the swamp drilling rig, OES Respect, after it had undergone major refurb work at a US yard.

The company engaged Beacon Maritime in 2011 to execute a 15-20 years lifetime refurbishment and upgrade on the rig after the US company carried out modifications on the asset back in 1990.

The rig, formerly known as Searex V1, had been stacked for several years between 2007 and 2011 due to security issues in the Niger Delta which held back Oando's project.

Under its old name, the rig previously drilled more than 50 wells for the likes of Shell, Chevron and Agip in the Niger Delta.

But, with the drive to funnel more work through Nigeria – as in other host

**With the drive to funnel more work through Nigeria - as in other host states - a shift is occurring, with more work being allocated to local industries.**



*Soyo has grown to become an important hotspot for Angola's fast-growing offshore industry.*

states – a shift is occurring, with more work being allocated to local industries.

Another Nigerian player, Lonestar Drilling, handed the complete refurb of two of its rigs recently to Jayvic Crewing Management.

And Ladol managing director, Dr Amy Jadesimi, who heads Nigeria's emerging maritime logistics hotspot, was recently named by the FT as one of 25 Africans to watch.

After pulling in a US\$300mn investment from Samsung Heavy Industries to develop Africa's largest vessel fabrication and integration facility it's no wonder.

At the ground-breaking ceremony earlier this year, Jadesimi commented: "It shows that, for the first time, Nigeria is seriously entering the lucrative upstream oil and gas development value chain." ■

## NRC announces arrival in Angola

LEADING GLOBAL PROVIDER of diversified environmental, industrial, and emergency response solutions, NRC, has announced that it will soon be opening a facility in Luanda to service the Angola oil and gas market.

With its local Angolan partner, NRC has evolved their service offering and specialist technologies to meet the unique challenges associated with the offshore Angola oil and gas industry. NRC Angola's in-country capabilities include: industrial cleaning of heavy oil cargo, slops and ballast tanks, water jetting, NORM management and descaling, asbestos management, HVAC/duct cleaning and oil spill response services. NRC's wholly owned subsidiary, Sureclean, has already gained essential experience in Angola having worked on various rig, platform and FPSO maintenance, shutdown and decommissioning projects in the country over the past five years. Sureclean has been collaborating throughout the industry to provide their specialist equipment and technical expertise.

NRC's specialist, multi-disciplined local workforce are highly trained to ensure they have the appropriate knowledge and expertise to tackle the challenges associated with this industry. When combined with their wholly owned, extensive equipment



*NRC's subsidiary Sureclean provided essential tank cleaning and water jetting services during the Kuito phased decommissioning offshore Angola throughout 2014.*

fleet of ATEX certified equipment and remotely operated technologies, they will be providing a safe comprehensive service in support of commissioning, maintenance and decommissioning activities.

Senior vice president, NRC International, Neil Challis commented, "The opening of our Angola office is a significant milestone for NRC and is something we have been working towards for a few years. The Angolan oil and gas industry is an exciting market for us with

potential opportunities for all of NRC's industrial and response services. Many of our clients are already established in Angola and this new base will give us the opportunity to support them on a global scale."

The NRC group of companies employs over 1,000 people globally with operational facilities throughout Africa, Europe, Middle East, the Caspian region, Asia, Caribbean and the Americas.



Chikezie Nwaoha talks to corrosion specialist, Fakhruddin Habiby\*.

# Paints and coatings in the corrosion industry

## WHAT IS PAINTS and coatings in relation to the corrosion industry and why use it?

Metallic materials comprise of a significant portion of industrial infrastructure and are often subject to harsh service environment. The referred environment could be a combination of moisture, oxygen, heat, industrial salts or atmospheric pollutants. The rate at which metallic materials degrade with respect to corrosion depends on the environment that surrounds them. Paints and coatings tend to provide a protective barrier between the harsh service environment and metallic materials and hence, prolong their service life span.

## How have paints and coatings in the corrosion industry evolved over the past decade? How are the paints and coatings technologies of today more effective/efficient than the technology of previous generations?

The use of paints or coatings is not new to humans. Lacquer which was derived from tree sap or through resinous secretion of lac insects was known in Indo-China about 7,000 years ago. Since those times, paints and coatings have kept evolving and changing.

The key drivers of the changing trend are mainly: (i) the industrial requirement to protect its infrastructure from corrosion and erosion damage; (ii) higher industrial throughput requiring higher temperature and pressure to operate, and, hence, creating a need of higher performance-based coating specifications and; (iii) the growing demand from environmental and health conscious end-users.

The paints and coatings of today offer broad temperature and pressure range to be applied in varied service environments. They also offer more resistance to chemical attack and a range of colours and shades for decorative purposes.

## In order to extend the life of process equipment, are there key considerations (from the end-user) when selecting the appropriate paint and coating?

Coating selection is a specialised task and requires knowledge of multiple engineering disciplines as well as a thorough understanding of the requirement of intended applications. Apart from ensuring that the surface finish of the material to be coated is properly prepared, the effects of temperature and pressure on coating's adhesion and permeability are just a few key selection parameters to be primarily evaluated. The electrical



It is essential to reduce the risk of corrosion in the oil and gas industry. (Image source: Knovel)

properties of the coating are also a factor in the selection process in certain applications.

## What are some best practices you can offer end-users in the areas of design, specification and maintenance of paints and coatings to ensure their long-term performance?

To ensure long-term performance, the most important step is to select an appropriate paint and coating for the application. Economic factors also come into consideration in coating selection in view of the anticipated designed life of the equipment to be coated.

A very important parameter in ensuring long-term performance of coatings is to keep the coating surface as clean as practically possible. With specific reference to pipelines and storage tanks, there are practical and cost effective technologies available that keep the surface of the coating clean from debris and deposits. In a given environment, if

the coating surface is not kept clean, corrosion can develop under the deposit and debris and the protective role of paint and coating is severely compromised.

## What are the plans for the future, from the industry stand point?

The paints and coatings industry can be categorised into three sectors which are: (i) decorative and architectural, (ii) general purpose industrial and (iii) special purpose coatings.

All three sectors have their own needs, requirements and future projections. Some of the common requirements of all three sectors could be listed as (i) faster application and preference of single layer rather than multiple layers, (ii) short curing time, (iii) improved chemical and abrasive resistance, and (iv) 'smart' properties such as self-healing or ability to transmit certain electrical or thermal signals as well the ability to dampen those signals for defense application.

## From your viewpoint, what are the high-level best practices you typically propose?

I would greatly emphasise that coating selection should be carried out by individuals with the required knowledge and expertise of material properties and their behaviours in various environments. Once an appropriate coating is

**To ensure long-term performance, the most important step is to select an appropriate paint and coating for the application.**

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# CAPE VI



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selected, the surface preparation and its coating application should be performed as per the specification. I would like to add that temperature and humidity level at the time of coating application plays a significant role in determining its service life and protective characteristics.

**What are the plans for the future, from the industry stand point? How will the paints and coating technology of tomorrow be more effective/efficient than the paints and coating technology of today?**

Regulatory compliance to meet stringent conditions aimed at protecting the environment and the public are driving future trends in paint and coating

**Riding on nano technology, the future development in this area would change the entire landscape of applications of paints and coating.**



Applying the final coating to an oil pipeline.  
(Image source: arabianoilandgas)

development and selection. End-users are also now asking and making sure that the paint and coatings they are procuring meet the regional as well as international health and safety requirements.

Apart from the requirement for improved durability and extended life cycle, end-users are also willing to pay for 'smart' properties of paints

and coatings. These include temperature sensitive paints, self-healing coating and enhanced electrical and optical signal transmitting properties.

Another emerging area in coating is the development of nanotechnology. There have been a host of patents issued recently for industrial coatings where a very small quantity of ceramic or metallic particles are added to significantly modify the properties of paints and coatings.

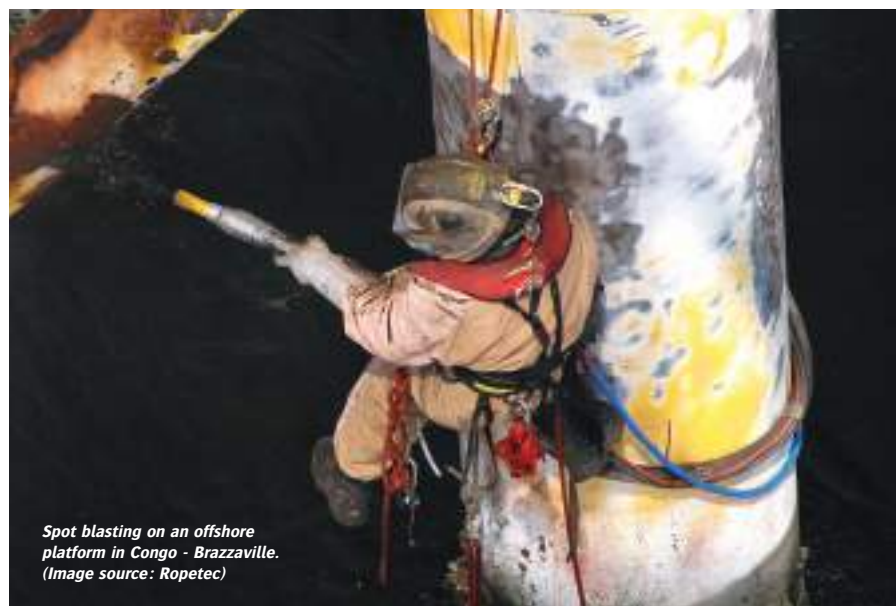
For general awareness, the average size of a nano particle ranges between 10-80 nanometers. A non-meter is equivalent to a billionth of a meter which can also be visualised as 10,000 times smaller than the diameter of a human hair. To visualise the effect of a nano particle, at two nanometers the conductivity of a metal particle changes and at 20 nanometers, the transparency of a ceramic particle changes.

Reportedly, for 20 nanometers particles, gold turns red and their plasticity disappears. Hence, one can visualise that riding on nano technology, the future development in this area would change the entire landscape of applications of paints and coating for industrial as well as decorative applications. ■

*Fakhruddin Habiby, PhD; PEng is team leader, Integrity Engineering, Trans Northern Pipeline Inc, Calgary, Canada.*

*NACE Certified Material Selection and Design Specialist.*

*NACE Certified Corrosion Specialist.*



Spot blasting on an offshore platform in Congo - Brazzaville.  
(Image source: Ropetec)

## Jotachar's safety, time and cost benefits drive huge sales volumes

JOTACHAR JF750, THE industry's first mesh-free Passive Fire Protection (PFP) epoxy coating system for structural steel, is rapidly setting new standards in the oil and gas sector – in terms of both its benefits and sales volumes. Launched just two years ago by Jotun, the ground breaking performance coating has already attracted substantial orders from some of the biggest names in the industry. Jotun is happy to confirm that "many millions of kilograms" of Jotachar JF750 have already been installed since its launch, now protecting key assets. One recent project award will consume over half a million kilograms for a major Middle East operator choosing Jotachar to protect two large offshore units against a broad range of fire scenarios, including jet fires.

"These significant volumes are an indication of the interest Jotachar JF750 has generated in the market," stated global PFP sales director performance coatings, Andy Czainski. "Third party data and customer

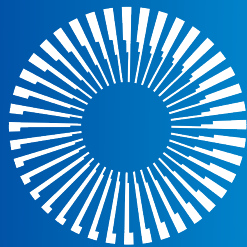
experience has shown that Jotachar reduces risk, time and cost during installation and increases safety during operation. Major oil and gas companies are approaching us to protect their high-value assets."

When compared to traditional mesh containing products, independent tests show that Jotachar can cut material costs by more than 20 per cent and application time by 60 per cent (on a typical 6,000 sq m project).

In addition to certification by all major classification societies, Jotachar JF750 is also approved under the underwriters laboratories listing scheme for up to 240 minutes protection.

Jotachar is fully compliant to the latest revision of Norsok M-501, widely considered to be the industry's most rigorous durability test standard, proving corrosion resistance, material durability, mechanical and fire performance after exposure.

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How an emerging technology in flow surveillance is making its mark in Africa, and a valuable difference to field operators.\*

# Clamp-on to African production surveillance

**I**N A PERFECT world, production and reservoir engineers would have unlimited access to accurate production data on every field with flow measurement details down to each individual well, no matter how remote or limited the infrastructure. This wealth of data would keep production reporting on track, facilitate a fuller understanding of the behaviour of each well over time, improve inputs to reservoir models, and ultimately enable better decisions to improve overall field production.

The unfortunate reality is that the world most of us operate in is not as straightforward. Time constraints, testing budgets, loss of production, logistical obstacles, security issues, and ongoing operational considerations are just a few of the influences that force us to make production testing compromises, ultimately resulting in our acceptance of what is essentially an inadequate volume of production surveillance data.

**The unfortunate reality is that the world most of us operate in is not as straightforward.**

One route to vastly improving this utilises a flow meter designed with operational simplicity, minimal disruption, and yet accuracy in mind. Expro's non-intrusive clamp-on PassiveSONAR and ActiveSONAR flow meters are installed by a single technician on existing pipework with no process shutdown, and allow data to be logged and processed, providing the end user with multiphase flow reporting in a range of applications.

## Tracking vortical structures

Sonar array processing is used in this type of flow measurement to determine the rate at which naturally occurring flow turbulence, known as coherent vortical structures, move past an array of sensors. These coherent vortical structures are created by the flow in a pipe, due to the pipe wall shearing mechanism naturally present in practically all flow streams. These vortical structures maintain their characteristic shape, hence the term coherent, for a distance of approximately 20-40 times the diameter of the pipe. This fundamental coherence allows the structures to be tracked as they pass through the sensor array, the speed of which is a direct indication of volumetric flow rate (Figure 1).



Expro's sonar technology is expected to play a significant role in reservoir management and production optimisation.

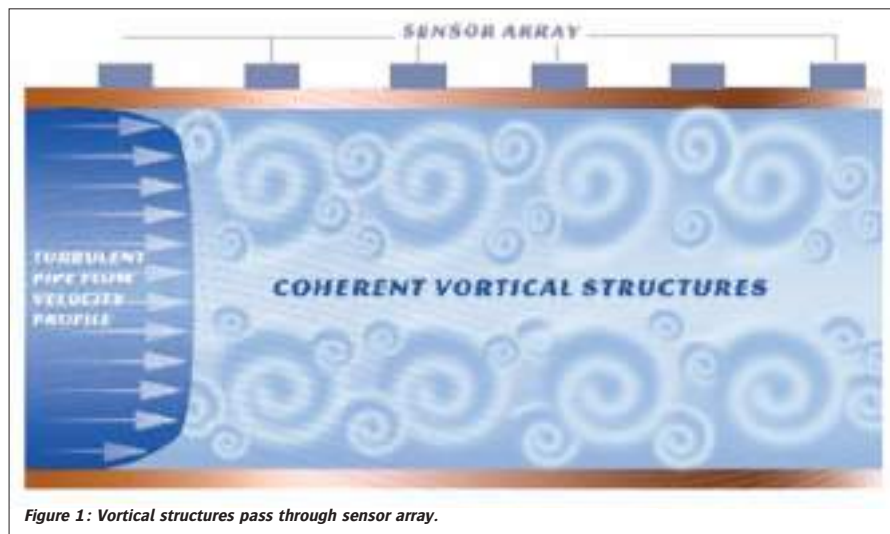


Figure 1: Vortical structures pass through sensor array.

Tracking of the flow-generated vortical structures through the sensor array is accomplished by looking at the relationship between the spatial wavelength (distance) and temporal frequency (time) of sensor signals. Sonar processing looks at the spatial wavelength/temporal frequency over a range of values, which are typically determined based on the flow velocity and pipe size.

Two different methods of sonar flow measurement have been developed, PassiveSONAR and ActiveSONAR flow meters. The PassiveSONAR meter utilises a passive array of strain-based sensors clamped-on to the outside of the pipe. These sensors listen to the strain generated by the naturally occurring flow turbulence. These signals are amplified and processed using sonar algorithms to determine

the flow rate of the medium in the pipe.

The ActiveSONAR meter utilises an active array of sensors clamped-on to the outside of the pipe, which transmit a signal through the pipe and flow medium to receiving sensors at the opposite side of the pipe. The received signals are amplified and signal processed using sonar algorithms to determine the flow rate of the medium in the pipe.

### Multiphase flow surveillance

SONAR meters measure the velocity of the mixture flowing through the pipe. For reservoir surveillance at the wellhead, the typical requirement is to provide rates of individual phases – produced gas, oil/condensate and water. To provide these multiphase measurements, Expro has developed the Total Production Surveillance (TPS) system for multiphase reporting of black oil (naturally flowing, Electric Submersible Pump (ESP) and gas lifted) and gas condensate production wells. The TPS system leverages a combination of PVT models and multiphase flow correlations.

The TPS (TPS1000) System utilises PassiveSONAR and ActiveSONAR flow meters (depending on the application) to clamp-on to wellhead piping to measure mixture volumetric flow rate at actual conditions. The measurement is then combined with process pressure, temperature, and user supplied compositional information to determine individual phase flow rates (Figure 2). This process is broadly applicable

monitoring on oilfields in the Middle East(1) to optimising production in liquid loading prone offshore gas wells in Europe(2). In Africa, there is also an increasing demand and usage of this type of technology, with early adopters already operational with sonar in Cameroon for ESP production testing, Nigeria for production optimisation in gas lifted oil wells and Equatorial Guinea for gas condensate production surveillance.

What makes clamp-on sonar distinctly appropriate for the African region is its flexibility and operationally simplistic approach. Expro can deploy clamp-on sonar technology through one of two delivery methods; SONARMonitor and SONARTest.

SONARMonitor gives operators the ability to purchase a flow meter system for permanent installation; the meter is installed, commissioned and tied into the existing facility data acquisition system. This delivery method is suitable for critical applications that require 24/7 flow surveillance for reservoir management. It is also used by operators to non-intrusively replace meters that are faulty or out of operating range, consequently saving the operator costly shut downs. The SONARTest method deploys the company's sonar meter and technician on a rental basis for periodic surveillance campaigns or one-off production/injection well tests. It allows operators to acquire reservoir data periodically for large volumes of wells without the need for capital expenditure. The acquired production data is presented to the client in the form of a SONARTest report.

**It is more important than ever to optimise production and minimise capital and operational expenditure.**

### Production optimisation and reservoir management in Nigeria and West Africa

An operator in Nigeria was one of Africa's early adopters of sonar and did so by launching a campaign in their field aimed at production surveillance and gas injection optimisation. The field operator compared SONARTest results against those from a conventional test separator. Sonar technology was considered to be a viable alternative based on different criteria including increased testing frequency, reduction in lost production opportunities as well as cost and ease of portability (small footprint). The pilot test was considered a success, with the meters successfully acquiring reliable data on the production lines (black oil multiphase flow) as well as the gas injection lines. Going forward, Expro's sonar technology is expected to play a significant role in reservoir management and production optimisation for this field.

Recently, another operator launched a testing campaign in a gas condensate field in Equatorial Guinea. Sonar technology was used for flow surveillance on the wellhead flow lines as well as the separator gas outlet. The testing campaign is ongoing, but early results have proven to be very encouraging, particularly with regard to comparison with the test separator data. The primary advantage of the sonar testing campaign (especially on the wellhead flow lines) is the reduction in lost production which occurs while swinging each well individually through the test separator.

### In summary

In a challenging oil and gas market, it is more important than ever to optimise production and minimise capital and operational expenditure. Throughout the world, and increasingly in West Africa, field operators are using clamp-on sonar technology to obtain production and injection flow data in a cost effective way with minimal HSE impact. This data is used as an important part of their production optimisation strategy. ■

\* Lucien Moolhuizen, meters sales manager – Africa & Middle East, Expro

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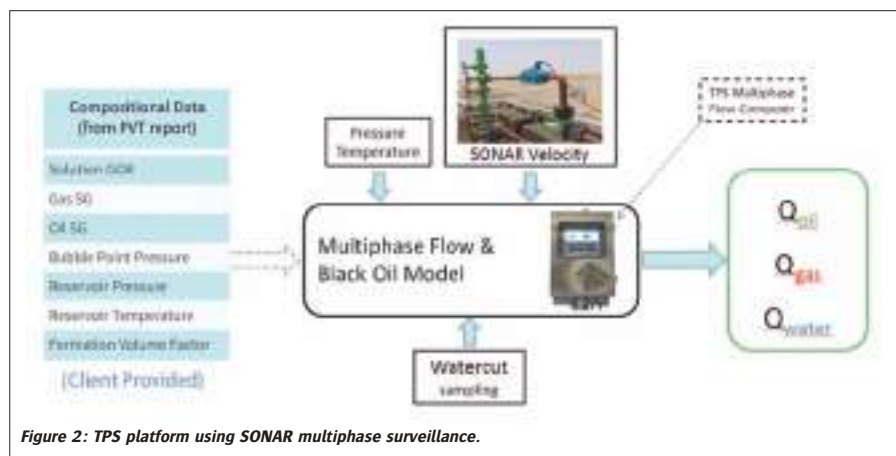


Figure 2: TPS platform using SONAR multiphase surveillance.

to a wide range of production and injection flows. The TPS1000 system can be applied on gas condensate, black oil production wells, gas lifted black oil wells and black oil wells fitted with ESPs.

The TPS1000 system complements a programme of conventional well testing by offering a quick, reliable, and cost-effective solution for applications requiring recurring production surveillance, especially where the reservoir conditions remain fairly stable over time.

### Flexibility and simplicity in operation

Across various areas of the globe, operators have already started utilising the benefits of sonar technology, from zero flaring and reservoir

Thus far, SONARTest has been the most appropriate method of operating in Africa, mainly due to the simple approach. Considering a complete clamp-on sonar system (equipment, cabling, even personnel) is compact enough to fit in an SUV or helicopter, accessibility to remote well locations on land, offshore, or even in the swamp becomes a lot simpler. Power supply from the site, SUV vehicle, or a portable power unit can be selected as appropriate to the location. Not only does this simplify logistics, but it also keeps the operations on a low profile when moving to location and while operating, which is important when considering relations with local stakeholders and remaining discreet for security purposes.



As the oil and gas industry continually pushes for more efficient and cost-effective processes, there is an increased need for more information from flow meters. Craig Marshall, project engineer at NEL, discusses.

# The smart future of flow measurement

**N**O LONGER ARE flow meters used solely to estimate flow, but are now expected to operate in non-ideal conditions or to estimate operating performance.

Examples within the oil and gas industry, where accurate flow measurement is imperative, includes the potential consequences of incorrect measurement from fiscal metering where the measurement is used to calculate the value of a product and therefore company profit and tax paid to the government.

Another key measurement area is in allocation metering. This is where multiple parties operate a shared facility or resource, and inaccurate metering could result in loss of earnings, aiding competitors, and in some cases legal disputes.

The efficacy of flow metering technologies is determined by a number of factors, including the fundamental operating principle of the devices, the quality of design and manufacture, the calibration status and conditions at the operating environment.

Flow measurement technology has now advanced to a point where it is within an order of magnitude of national standards with respect to measurement uncertainty. The next key milestone will not be improving on this figure, but instead making the equipment more cost-effective for the end user. This process will be enabled by the correct use of flow measurement diagnostics and secondary measurements to create smart flow meters.

## Smart meter technology

Advances in electronics have not only enhanced data acquisition, but also the digital signal processing techniques which enable the meter to obtain more information. This has allowed the detailed monitoring of all the recorded data to be used as diagnostic tools to identify any problems within the metering system and to complete a 'health-check' of the meter in operation.

The diagnostic parameters can also be trended over time to monitor any slight variations. These changes can be linked to various flow disturbances or problems and can be used to help resolve measurement issues. Some manufacturers have also created bespoke software for their meters, automatically generating easy-to-read reports which can be used by engineers to assess the meter's performance.



Flow meters being calibrated under laboratory conditions.

Alarms can also be set on the diagnostic software that allows real-time monitoring of any problems. As these alarms can be time-dependent, any erroneous measurement will not be recorded as a fault until the software has confidence that the problem is real, rather than one due to one instantaneous fault with the system.

Another successful application of the diagnostic software is the remote access facility. Using a high-speed connection, the automatically-generated reports or live data can be accessed from anywhere in the world.

Such diagnostic information gives confidence that the measurement systems are functioning correctly. Additionally, trending of the data over time can then be used to provide regulators and auditors with information on the

**Another successful application of the diagnostic software is the remote access facility.**

present state of meters, with the aim of reducing the need for recalibration.

## Reduced cost, increased accuracy

It is widely known that to calibrate a fiscal measurement device, the cost, including shut-down, packaging, transport, calibration, witnessing etc, could be in the region of US\$46,000. This cost is typically an annual expense and does not include the planning and preparation. Depending on meter size there may be issues in finding accredited laboratories available to complete the calibration. Recalibrations are both costly and labour intensive, particularly when multiple meters are involved.

However, incorporating diagnostics and utilising smart meters could easily reduce this cost – as long as they are used correctly. Taking a fingerprint of the diagnostic parameters during calibration can provide a traceable link to meter performance. Once the meter is installed for use in a process stream, comparing the fingerprint with calibration values can ensure no change or shift from the calibration, providing confidence that the calibration is successfully transferred to

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the operating location and conditions.

Using qualitative information about the flowing fluid and embedded technical knowledge, the resultant flowrate information can be reassessed and a confidence level applied. If there is no shift in meter diagnostics over a period of time, this indicates that the meter has not shifted in service and therefore does not need a recalibration.

As an example, consider an ultrasonic meter installed that has been installed with diagnostic capabilities built in. An ultrasonic meter operates on the principle of transit-time where the times taken for a pulse of ultrasound to traverse between two axially spaced transducers in both the forward and reverse directions are measured. The difference in these times is directly proportional to the velocity of the fluid. The process can be likened to a boat travelling across a river where it takes longer when you are fighting against the current than it does going with it.

The ultrasound traverses through the flowing fluid medium where the signal is attenuated and distorted to some level. Measurement signal diagnostics such as signal strength, signal to noise ratio (SNR) and signal amplification (gain) can be monitored and trended over time to give an indication of the measurement quality and hence performance of the meter. If these diagnostics do not change over the time period, there is an added confidence that the meter is still operating within specification and does not need to be recalibrated.

In addition to these signal diagnostics, a functional diagnostic parameter can be found in the form of the calculated speed of sound from each measurement path in an ultrasonic meter. The speed of sound can also be calculated using knowledge of the process conditions (i.e., temperature, pressure and gas composition and industry standard calculations). By comparing the meter calculated speed of sound with one calculated from other process measurements it is possible to further verify not only the meter's performance, but also the performance of the other measurement instruments involved.

As this method uses flow, temperature, pressure and composition measurements, it is a technique that can be used to validate a full measurement system, which can be extremely powerful and beneficial. For example, if the temperature measurement began to operate with a systematic bias in the measurement, this would ripple through the speed of sound calculation method resulting in a discrepancy between the meter calculated value and the process measurement calculated value.

This discrepancy would be highlighted by the alarm software and the user could take the appropriate action with the added benefits still of

**The use of diagnostics is not limited to the correction of measurement faults.**



*An ultrasonic meter operates on the principle of transit-time.*

the flow meter diagnostics to help inform the fault finding procedures. Whatever the end cause of the discrepancy, it can only be highlighted in real-time by using diagnostics and smart meters. Examples exist in industry where this methodology has been used in fault finding exercises and to extend recalibration intervals for ultrasonic meters.

### **The future is smart**

The use of diagnostics is not limited to the correction of measurement faults. Any other meter issue that would cause flow meters to lose their accuracy over time and require recalibration can potentially be measured and corrected using diagnostics.

Utilising diagnostics and secondary information will lead to a condition-based monitoring recalibration timescale rather than a calendar-based one. However, most end users are either unaware or don't understand the technologies or huge potential savings on offer through the use of diagnostics.

Potentially, the benefits do not stop at extending recalibration intervals and diagnostics could take industry a step closer to the realisation of a recalibration-free utopia. If shifts in diagnostics can be detected and attributed to a specific source then models could be used to predict and correct the meter performance.

By having a good understanding of how diagnostics are generated in different metering technologies and how the different sources of shift in measurement performance influence

their generation it may be possible to develop these relationships. Coupling this knowledge with new measurement techniques to identify and quantify the sources of shift would result in a very powerful tool for flow measurement technologies.

Technology is now advancing to a point where much more computer processing can be completed in real time allowing for the opportunity to further develop the field of diagnostics and smart metering. However, for true industrial scale uptake of smart meters, there will have to be evidence to support any models or systems developed in order to give end users confidence in their operation.

At present, meters are much smarter than previous generations and are now able to qualitatively alert operators if something has gone wrong, but they are still unable to quantify the problem and correct themselves. More work is required to reach this situation and it is currently an area of research at NEL, supported by the National Measurement System. In the near future, the use of diagnostics could eliminate the errors associated with installation effects and other issues that affect meter performance.

If confidence can be built in such systems it will inevitably lead to the removal of unnecessary calibrations altogether. Meters would then truly be recalibration free for the entirety of their operating lives. The history of the oil and gas industry, coupled with the technology available today, it can be said with confidence that smart meters are the future of flow measurement. ■



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# Supporting the Global Aspirations of Africa's Oil and Gas Industries



Situated in the English Channel, the Island of Jersey has emerged as an increasingly popular location for the headquarters of mining and natural resources companies. With representatives of the Island attending events around the forthcoming Africa Oil Week, Mike King, Chief Executive of the Government of Jersey's Economic Development Department, who has over 20 years' experience in the oil E&P sector, offers his thoughts about Jersey's rise in the oil and gas sector.

## Q What sort of growth has Jersey seen in the oil and gas exploration and production (E&P) sector in recent times?

**Mike King (MK):** There has been considerable growth in the sector, most notably in recent years. The first natural resources company was established in Jersey in the mid-90s. Since then a significant number of mining and international oil and gas E&P companies have established their headquarters in the Island.

At the end of last year, there were more than 20 such businesses located in Jersey. In early 2015, Digby Wells Environmental, a South African environmental services business with global operations opened a Jersey office in order to bring its business closer to its current and prospective clients in Europe and Africa.



## Q What is driving this growth?

**MK:** Firstly, in terms of location, Jersey is well positioned for the major investment markets and operating regions in Africa. For executives, particularly those in Africa, Jersey offers professional support and high quality financial and corporate expertise within a stable jurisdiction. This is of great value as in the development of multi-jurisdictional business strategies.

As a leading offshore finance centre with one of the most attractive tax regimes in Europe, Jersey is well placed to deliver the kind of services international E&P companies demand. In addition, overseen by the Jersey Financial Services Commission, Jersey's regulatory standards are rated highly by institutions such as the World Bank, IMF and OECD.

In addition, Jersey company structures offer access to capital markets with around 110 Jersey companies currently listed on major exchanges worldwide, with a combined market capitalisation of £216bn. From a time-zone point of view, Jersey is also conveniently positioned for the major investment markets and operating regions in Africa.

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- Ferry links to the UK and France



**Q Are there strong links with Africa’s oil and gas industries?**

**MK:** Jersey has focused on building positive relationships with Africa’s natural resources community for some time. As a result we have seen a number of firms from Africa or with strong African connections selecting Jersey as their main European headquarters. This year’s Mining Indaba event, for instance, saw the biggest ever delegation from Jersey attending, including a cross-section of finance and business professionals as well as government representatives.

It’s worth noting a report published by Capital Economics last year, ‘Jersey’s Value to Africa’, calculated that extractive industry companies with a presence in Jersey are responsible for around £50 billion of investment into Africa in the form of the construction of sites, equipment, and related infrastructure.

A further report published by Capital Economics this year analysed Jersey’s contribution to global Foreign Direct Investment (FDI). It found that 18 ‘Greenfield’ projects, largely in the mining sector, were undertaken in Africa with Jersey-originated FDI between 2003 and 2014, valued at \$4.9bn in total.

**Q How do you see Jersey supporting Africa’s oil and gas sector in the coming years?**

**MK:** The direction of travel is one of greater partnership between Africa and Jersey. Businesses seeking to relocate their headquarters’ operations will continue to need a simple and transparent corporate and personal tax regime, first class regulatory and legislative frameworks, a simple and fast no-nonsense approach to business from government, and a safe business environment – all areas where Jersey excels.

For executives and their families it is important that a location offers first class education and health systems and a good quality of life, facets in which the Island can justifiably claim to be world class.

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Contractors are investing in responses to ever more challenging demands on pipelines and pipelay.

# Pipelines confront new extremes

**D**EMANDS ON SUBSEA pipelines are increasingly complex as they operate in remote and harsh environments, and transport increasingly aggressive products across longer and/or deeper seelines.

Lay vessels must align wider and heavier pipelines, and new concepts such as pipe-in-pipe (PIP), to specified routes in difficult conditions such as steep slopes, narrow corridors, rough seabeds and harsh metocean. Critical inline structures must meet stringent targets.

"Such demands require high capacity equipment to handle, hold and protect pipelines during installation and to monitor lay parameters in real-time," said Roberto Bruschi, vice president of advanced engineering services and innovation technology projects at leading international contractor Saipem SpA, Italy.

Continuous investment in new and upgraded vessels is a key part of Saipem's strategic response to offshore market needs.

## Critical inline structures must meet stringent targets.

### The art of smart

The Castorone dynamically positioned (DP) deepwater laying ship for operations in extreme environments, and the Saipem FDS 2 (DP) field development ship, illustrate this. Castorone monitors lay progress. It displays easy-to-read charts and data generated by integration of instrumentation and advanced calculation, such as real-time configuration of pipelines on the stinger and along the lay span.

"The stinger is really smart, not just a steel truss," Bruschi said. The stinger tip can extend up to about 40 metres aft (rear) of Castorone, and more than 90 metres below the sea in steep lay configuration, to guide pipelines carefully. This, and skilful operators, maintains the working level of the pipe within allowance limitations, right up to seabed touch down.

Stress on pipelines at points along the stinger and, after exit, along the lay span is continuously controlled. "Monitoring the working level of each part of the equipment can be quite crucial during the most demanding operations and therefore for the laying season." This enhances control of pipe-laying operations and schedule, and allows speedy responses to unexpected events that cannot be excluded in open sea.



Saipem's deepwater laying ship Castorone operates in extreme environments.

Powerful computing underpins Bruschi's belief that future challenges can be met: "I started in the industry in 1980, and computers are now doing things 100 or even 1,000 times faster."

Applications include numerical simulation of most conditions and scenarios. Examples include the pipe and the lay vessel position near seabed targets under a specific setting for laying parameters, and for dynamic conditions under wave-induced oscillations and slow drift counteracted by DP.

### Design for safe life

On the mechanical design, Bruschi noted "a general consensus" around reliability-based design criteria and load-resistance factor design, and on continuous upgrading of design to reflect research and development.

However, he argued that for environmentally sensitive and remote locations, criteria for applying design to new applications should include assessment of consequences to health, property and environment across the widest range of factors and for the pipeline's lifecycle. "It is not a case of just modelling the capacity of the actual material to perform in normal conditions,"

Bruschi said. Numerical modelling should anticipate and verify line pipe capacity to handle realistic demands under severe environmental events such as wave storms, geohazards or ice gouging, he explained.

"It is about safe life rather than fail safe. The most important consideration for Saipem is safety. This applies to every element of planning, design and pipelaying operations, and across all our people and levels of management. We have put a lot of effort into training and competency throughout the organisation."

### Robustness is the key

For pipelines to be safe, cost-effective and efficient 20 to 50 years on, the key is "robustness" throughout the lifecycle, Bruschi stressed.

"With pipelines in shallow to medium depths, across crowded and near-to coast offshore basins, you have the possibility to intervene. You have a state of preparedness that can maybe accept a minor fail where it is not jeopardising the structural integrity and carrying capacity in the short-term, without the need to intervene quickly."

If intervention is needed, then vessels and other resources can be lined up in good time. Experiences in the North and Mediterranean Seas help to understand criticality. "But what do you do if you have a winter season incident at Sakhalin or in the Barents Sea?" he asked. "Then you have to do something involving a huge spread of very specific working vessels in a very short time, and vessels are in short supply. Would you not prefer to have a robust solution from the beginning?"

An increasingly integrated multidisciplinary approach across surveying, design and installation is inevitable in his opinion, as is collaboration between industry, academia and others. His view of DNV GL's role in this ecosystem is that it has "a big ear" to what is happening worldwide through clients, and through DNV GL's joint industry projects (JIPs) and the Pipeline Committee and Innovation Forum.

Standardisation, along the lines of the DNV-OS-F101 Offshore standard for submarine pipeline systems, can help to raise quality, reduce risk and lower cost. However, Bruschi also pointed out that responses to needs in deep waters off Brazil, for example, may be very different to those off West Africa. ■

*This article originally appeared in DNV GL's Perspectives*

## DNV GL launches two new JIPS with potential to save the industry millions of dollars

IN TODAY'S COST-constrained climate, the subsea and pipeline sectors are actively looking at alternative means to drive down costs, cut complexity and reduce project overruns. DNV GL, the leading technical advisor to the oil and gas industry, is launching two joint industry projects (JIPs) to investigate affordable composite components for the subsea sector and qualify technology for more efficient linepipe production processes. It is estimated that the JIPs could deliver a combined saving of US\$10.3mn.

The DNV GL Affordable Composites for the oil and gas industry JIP aims to reduce the cost of qualifying composite components for subsea use by replacing large scale tests with 'certification by simulation'. Statoil, Petrobras, Petronas, Nexans, Airborne and the Norwegian University of Science and Technology (NTNU) in Trondheim, are participating in the project. The project is partly funded by the Research Council of Norway.

The project, which could potentially deliver a 40 to 50 per cent cost saving for certification and qualification of subsea composite components, will seek to validate new advanced material models by experimentation, with the main focus on predicting chemical ageing.

"Composite components require full-scale testing to document long-term properties to achieve certification," said Jan Weitzenböck, principal engineer, DNV GL - Oil & Gas. "A typical qualification campaign for a subsea composite component can cost in the region of US\$1.2-12mn. The results of this JIP could potentially save up to US\$1.9mn for re-certification of existing components."

DNV GL will also develop processes to accept mathematical material models in the certification process. This will be documented in a revised edition of the DNV GL offshore standard for composite components (DNV OS-C501).



The driver for the New Material Solutions for Flowlines JIP is to explore cost savings by use of HFW/SAW (high frequency welded/submerged arc welded) pipes. Within the envelope of production parameters, these may be a very attractive alternative to the traditional seamless pipes, due to their lower cost and shorter delivery time.

The JIP has drawn the interest from pipe manufacturers, installation contractors and operators such as: Corinth PipeWorks, EMAS, JFE-Steel, Sumitomo, Tata steel, Tenaris/Tamsa and Woodside. The JIP is still open to additional partners.

"Though there is a considerable amount of research and full-scale reeling trials for the use of HFW or SAW linepipe, as well as a good track record in terms of executed projects, a joint systematic approach to optimise the design of these linepipe for reeling is lacking. There is much to be gained through this project - we estimate that it could deliver a 20-30 per cent reduction in pipeline material cost, corresponding to US\$6-7.6mn saving potential for a 30 km flowline," said Leif Collberg, VP - pipeline technology, DNV GL Oil & Gas.

The JIP will be run as a Technology Qualification (TQ) project and is expected to result in a qualification plan that will require qualification testing by the manufacturers.

## Decommissioning collaboration tool from Exceed

THE WORLD'S FIRST online information management system for the offshore decommissioning market has been launched by well management and performance improvement specialist, Exceed.

The company has invested in excess of US\$460,000 in the development of iVISION, an online platform which connects multi-location, multi-discipline teams and business units through one central point where information is securely stored and accessed. iVISION integrates safety management, technical information and video to drive continuous improvement, enhance knowledge transfer and reduce the cost of current and future projects.

Through the ability to create controlled access privileges for individual users, iVISION also provides a platform for cross-company collaboration, allowing operators to work closely with contractors and third parties around the globe.

iVISION has been developed by Exceed, and is being used successfully across global well management projects by its performance improvement division for clients such as Engie (previously GDF Suez), Tullow Oil and a major operator in South East Asia. The decommissioning edition of iVISION is now being launched to the decommissioning market to address the collaboration challenges outlined by the Oil & Gas Authority (OGA).

iVISION effectively enables the collaborative approach required by industry, providing a platform for operators to integrate safety management systems and technical knowledge, and realise cost-savings through lessons learned, knowledge retention and video capture.

Martin Slowey has recently been appointed to head up Exceed's iVISION business unit. Bringing with him more than 20 years' in the oil and gas sector and experience of building a successful software products business, Slowey is excited about the potential iVISION offers to the decommissioning world.

## Tracerco helps achieve radiation safety

LEADING INDUSTRIAL TECHNOLOGY specialist Tracerco has announced the launch of the ObservaTM radiation area monitoring system. ObservaTM is the latest ground breaking innovation from Tracerco that measures radiation dose rates and helps ensure radiation safety and source security.

With more than fifty years experience in producing industry-leading detection, diagnostic and measurement solutions, ObservaTM is one of the latest innovations from Tracerco. Combining several unique technological features, including the wall-mounted alarm unit, ObservaTM is ideal for use by the oil and gas industry, the nuclear industry, hospital x-ray facilities and in non-destructive testing environments.

Plug and play probes allow for simple installation, while the large, clear interface and sub menus make the device easy to set up and use. ObservaTM gives live radiation dose rate readings from multiple detectors simultaneously, making it the perfect system for use in larger sites.

ObservaTM is also available with unique software; the email and SMS alarm updates allow the user to have complete control over radiation safety standards and overall source security. Site floor plans can be uploaded into the embedded software module, complete with drag and drop detector positioning. Hence, it can be personalised to suit the user's needs.

The ObservaTM system can be accessed remotely, making it particularly suited to off-site monitoring. It also provides recent radiation data history, giving the operator clear evidence of safe working environments in the event of any incidents requiring investigation.

The device can also be supplied with ObservaTM 24/7, a 24 hour monitoring system which ensures that any alarm communication and data logging is secure 24/7 and not susceptible to the instability problems which can affect desktop computers. ObservaTM also runs a back-up power supply, so monitoring remains constant even in the event of a power cut.

Tracerco managing director Andy Hurst said: "Our key focus for our new ObservaTM fixed area monitoring is to help our customers combat potential radiation risks in line with the ongoing regulatory drive for safer working practices. We have also designed it to enhance radioisotope security, providing early warning of unintended or illicit movements and so allowing a rapid response to unauthorised activities."



# Project Databank

Compiled by Data Media Systems

## OIL, GAS AND PETROCHEMICAL PROJECTS

Project	Sector	Facility	Budget (US\$)	Status	Start Date	Completion Date
Chevron - Congo River Crossing Pipeline Project	Pipeline	Gas	2,000,000,000	Construction	2009-Q1	2015-Q4
Chevron - Lianzi Field Development	Oil	Oil Field Development	1,900,000,000	Construction	2004-Q4	2015-Q4
Chevron - Lucapa Field Development	Offshore	Oil Field	5,000,000,000	FEED	2006-Q4	2020-Q1
Chevron - Mafumeira Sul Field Development	Offshore	Oil & Gas Field	5,600,000,000	Construction	1998-Q1	2017-Q1
Chevron - Negage Field Development	Offshore	Oil & Gas Field	450,000,000	FEED ITB	2002-Q4	2020-Q1
Chevron - Sonangol - Angola LNG Plant	Gas	LNG	10,000,000,000	On Hold	1999-Q1	2016-Q1
Chevron South N'Dola Field Development	Offshore	Oil & Gas Field	3,000,000,000	Shelved	2007-Q1	
Chevron - Vanza Longui Area	Offshore	Offshore Platform	4,000,000,000	FEED	2009-Q3	2017-Q4
Cobalt - Cameia Field Exploration	Oil	Exploration	700,000,000	Construction	2009-Q2	2016-Q1
Eni - Block 15/06 Development	Oil	Oil Field Development		Construction	2010-Q2	2017-Q1
ExxonMobil - Kizomba Satellites Phase II	Oil	Oil Field Development	5,100,000,000	Construction	2008-Q1	2015-Q3
Maersk Oil - BLock 23 Exploration	Oil	Exploration		Construction	2006-Q4	
Maersk Oil - Block 8 Exploration	Oil	Exploration		Construction	2006-Q4	
Maersk - Chissonga Field Development	Oil	Oil Field Development	500,000,000	EPC ITB	2011-Q2	2017-Q4
Sonangol - Lobito Refinery	Refining	Refinery	6,400,000,000	Construction	1999-Q1	2018-Q1
Total - Kaombo Field Development	Oil	Oil Field Development	20,000,000,000	Construction	2005-Q1	2017-Q1
Vaalco Energy - Block 5 Exploration	Oil	Exploration	500,000,000	On Hold	2006-Q2	2017-Q4

### Project Summary

<b>Project Name</b>	ENE - Cambambe II Hydropower Plant
<b>Name of Client</b>	ENE (Empresa Nacional de Electricidade)
<b>Budget (\$ US)</b>	1,500,000,000
<b>Award Date</b>	2006-Q2
<b>Facility Type</b>	Hydro Power Station

<b>Status</b>	Construction
<b>End Date</b>	2016-Q4
<b>Location</b>	River Kwanza

### Project Backgrounds

THE CAMBAMBE HYDROELECTRIC Facility is one of two hydroelectric power stations currently in operation on the Kwanza River, 180 km southeast of Luanda. The Cambambe plant was built in 1964 and consists of a 102 metre high dam with an open crest-of-the-dam spillway, and an underground power house with four turbine generators rated at 45 MW each, of which only two are currently in operation. The Government of Angola, through the Ministry of Energy and Water and ENE, the state-owned power utility, has embarked on a capacity expansion programme.

### Project Status

July 2015	Three Linden Comansa tower cranes are helping to extend Cambambe dam.
March 2015	The project is progressing as per schedule.
December 2014	Phase 2 of the project is completed.
July 2014	The project, estimated to cost a total of US\$1.5bn, will double Angola's hydroelectric capacity.
June 2014	The project is expected to be producing 700 MW of electricity by the end of 2016.
March 2014	Phase 3 of the project is expected to be completed by 2017.
April 2013	The client awards Voith Hydro and Elecnor a US\$130mn contract, for the provision of mechanical and electrical equipment and services respectively, for Phase 2.
March 2013	HSBC prepares project Phase 2 environmental and social due diligence report.
December 2012	Engevix is going to provide electronic engineering services for Phase 2 of the project.
January 2012	The client signs a contract with Alstom Hydro to provide hydro-mechanical and lifting equipment for Phase 2 of the project.
June 2011	The client awards Odebrecht US\$624mn EPC contract for Phase 2 of the project.
December 2010	Phase 2 of Cambambe II hydropower plant project is scheduled to begin in January, 2011 and conclude in 2014.
November 2009	Phase 1 of Cambambe II hydropower plant project has been completed.
June 2009	Russia pledges to finance 2,000 MW of hydropower in Angola.
January 2007	Companies commence work on Phase 1 of the project.

***A consultant study of funding opportunities in the Southern Africa Power Pool region proves effectiveness of 520 MW Cambambe II hydropower plant project.***

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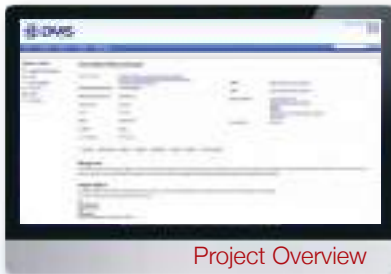
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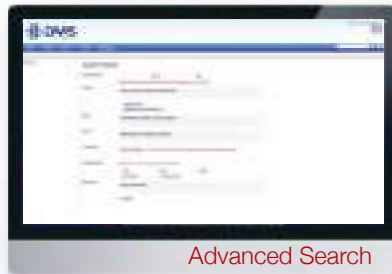
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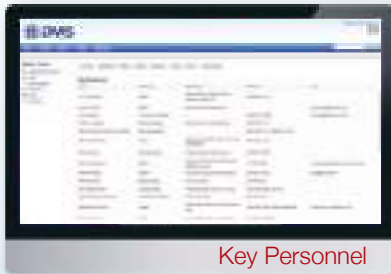
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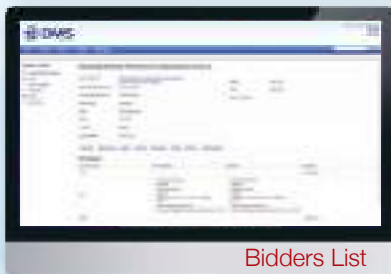
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The oil price is going down due to oversupply. So too is the price of satellite bandwidth – and for similar reasons. What does this mean for energy companies – and can they look forward to an extended period of falling communications costs? With the help of two industry experts, Vaughan O’Grady looks at the present – and possible future – of satellite capacity pricing.

## When oversupply is good news



*The extra capacity HTSs are supplying has had an effect on pricing in the energy sector.*

**A**S OIL PRICES tumble, some energy companies are trying to cut all costs – including their communications costs. But Susan Bull, senior consultant with specialised satellite communications consultancy Comsys, argues that this isn’t necessarily a rational approach.

For example, a communications service provider may charge an E&P operation, say, US\$10,000 a month, but the daily rig rental fee would dwarf that – at up to, and possibly beyond, US\$200,000 a day. Thus, if the energy company mandates 20 per cent costs across the board, this may not produce the desired efficiencies, Bull points out. Why cut a telecommunications service that costs, in relative terms, very little and that could make a major difference to operational efficiency – not to mention the health and safety of staff on the rig? “Blanket cost-cutting isn’t thinking things through and will have material effects,” Bull says.

### **A more measured approach**

But a more measured approach might be simply to wait for market forces to do the job.

### **It’s really HTS that’s changing the pricing dynamics and HTS could be any frequency.**

Telecommunications costs are already falling. On land, consumer prices haven’t risen much for services and yet bandwidth availability is going up, usage is going up and traffic is going up, effectively giving users more for the same outlay. “It’s no different for satellites,” says Bull. “Pricing for satellite capacity is coming down significantly across the world.”

What is causing this price drop? In part, it’s a result of the rush to market with HTS\* and Ka band services. These may not have directly addressed the energy sector, but the extra capacity they are supplying has had an effect on pricing in that sector. However, Brad Grady, senior analyst with satellite industry market research and consulting services company NSR, argues that bands are less influential than the service they operate on. “It’s really HTS that’s changing

the pricing dynamics and HTS could be any frequency,” he points out. “It’s people like Intelsat (with Epic), Eutelsat and SES, and others like O3B, which is a non-GEO\*\* HTS system, that are putting pressures on the market.”

As is the growth of certain non-oil sectors. Grady says: “A lot of people are bringing capacity onto the aeronautical market. That’s really changing the price points – and is going to trickle down to oil and gas and maritime. Also a lot more maritime customers are moving to VSAT. That means more bandwidth and a lot more maritime capacity coming online. So the price points are definitely lowering. And end users are recognising that.”

### **Bandwidth price fall unplanned**

But the falling price of bandwidth was not planned. “I do not believe that anybody looked at the business case,” Bull suggests, citing the lack of business model, the difficulties of selling space to multiple operators, and managing the extra bandwidth HTS implies, as well as the arrival of fibre in key satellite markets such as Africa and formerly underserved parts of the Middle East.



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**High Throughput Satellites: Laying the foundations for investment and financing. (Image courtesy: Fieldfisher)**



Even before HTS the price per mega amp was going down, and then HTS launches began offering five or 20 or more times the capacity of a normal satellite. What will that do to pricing? "It's already doing it," Bull says. "It will help the energy business because it's pushing the price of satellite capacity down."

However, the energy business doesn't necessarily hold all the cards. "Drilling has gone further offshore so satellite is more vital — certainly for deepwater," says Bull. "And you can't fibre up an offshore service vessel. Satellite will be there one way or another." Even here, however, newer service provider players like Speedcast and ITC Global are threatening the former dominance of Harris CapRock, and RigNet, and giving energy companies a bit more leverage when negotiating contracts.

**At the offshore installation end of the equation the bandwidth needs of the oil and gas market are going to change and grow.**

### **A non-satellite alternative?**

Grady suggests that there may be a non-satellite alternative in certain cases. "Terrestrial microwave communications continues to be able to push further and further and deeper and deeper — so there's still that hedge," he says, but he agrees that offshore needs satellite. However he adds: "The satellite industry needs oil and gas. I'm not saying you can build an entire satellite business case on this market. But it's not an insignificant amount of capacity and revenues being generated."

That's the situation at present. How about the future? Well, more flexibility in choosing bands might help energy companies save even more money. Harris CapRock, a major player in the provision of managed communications services in remote locations, might argue that this future is already here. It recently announced CapRock One — an intelligent service delivery architecture using proprietary multi-band stabilised antennas.

Bull is impressed with the ambition of the project and agrees that multi-frequency antennas are a likely way forward. She does, however,

question the timing of what is going to be a fairly expensive system — especially if you want built-in redundancy. On the other hand, when CapRock One was being developed, oil prices weren't expected to slip much below US\$100 a barrel, let alone US\$50. At that time, affordability may have been less important than reliability. Nevertheless, while it's easy to argue that the market for CapRock One may not be as strong, Bull says she understands the service shows promise.

### **A sign of things to come**

But CapRock One is still a sign of things to come. "Everything's going to go to multi-band flexibility," Grady says, "and there are a number of reasons." He cites changing prices, access or regulatory requirements from region to region — or just that one band works better than another in a given place. Clearly being able to change band would be helpful for energy companies moving rigs or vessels around the world or a region. But it also makes sense from a service provider perspective. "One of the biggest headaches for service providers is end users who want more capacity but they can't give it to them," says Grady. "They would have to make a deal with competitors or go to the spot market, which could be very expensive. If they had a multi-band terminal that could either switch to new frequencies or take in multiple frequencies at once it wouldn't be too big an issue to dynamically configure these remote networks. And a service provider could manage its costs because it could get the lowest available price for capacity that it needs."

### **Room to add antennas**

Multi-band is not the only possibility, he adds. There's now room to add antennas if you prefer. "Antennas are getting smaller and have higher performance, plus smaller dish size," Grady explains. "Companies are coming out with flat panel antenna architectures that have fewer moving parts. They're smaller, they're lighter, they don't take up so much space but they have similar performance to a 1.2 metre Ku band dish."

But there's another possibility — one that may bring better news for communications providers. At the offshore installation end of the equation the bandwidth needs of the oil and gas market are going to change and grow. Many more apps are becoming available for helping staff to

manage activity on the rig. Many more sensors are monitoring equipment, which means much more information being transmitted from the rig to the shore. Video feeds and streams — especially in real time — may use even more capacity — especially as the evolving rig automation process reduces staff numbers in remote locations. Much further down the line, drones and robots, undersea and in the air, could eventually send information to people in Houston or Aberdeen monitoring drill sites from thousands of miles away.

But some of this will be high bandwidth real-time data. How can it be sent back to head office? One possible answer is HTS — but not just from GEO and MEO constellations but low earth orbit (LEO<sup>\*\*\*</sup>) constellations — like the recently announced deal in which Intelsat and OneWeb plan to build, deploy and operate a LEO Ku-band satellite constellation. That means less latency and more capacity. That also means, in theory, more effective real-time monitoring of rig operations at a distance.

That scenario, admittedly, is some years off — 2019 in the case of Intelsat and OneWeb. But by then will service providers be serving a buoyant or troubled energy market? Will demand rise to meet extra capacity availability or will new entrants and established players end up dumping excess capacity on markets that don't need it, further depressing prices? Will the accelerating pace of technological change and new sources of capacity boost or challenge the companies that supply oil, gas and other sectors with satellite communications?

No one really knows. Even the experts aren't sure. Susan Bull spoke at the VSAT 2015 event, which took place recently in London. She summed things up rather well when she said: "The potential technological change — born from necessity — now promises to change the fundamentals of the satcoms market. And I'm not just talking about LEOs! Wherever you look — antennas, modems, spacecraft, launchers, business models, M&A, competition, demand — it's all being thrown into the air." ■

### **Notes:**

*"HTS refers to high throughput satellites, which use a number of technological advances to allow a significant increase in bandwidth capacity"*

*\*\*A GEO — or geosynchronous — orbit is one where a satellite maintains the same position relative to the earth's surface. It is usually more than 35,000 km above the earth. O3B is a MEO — medium earth orbit — satellite constellation at an altitude of about 8,000 km.*

*\*\*\*Low earth orbit (LEO) satellites are even closer to the earth. The closer the satellite the higher the bandwidth and the lower the latency. But a higher orbit gives greater coverage from fewer satellites.*

### **Links:**

<http://comsys.co.uk>

<http://www.nsr.com>

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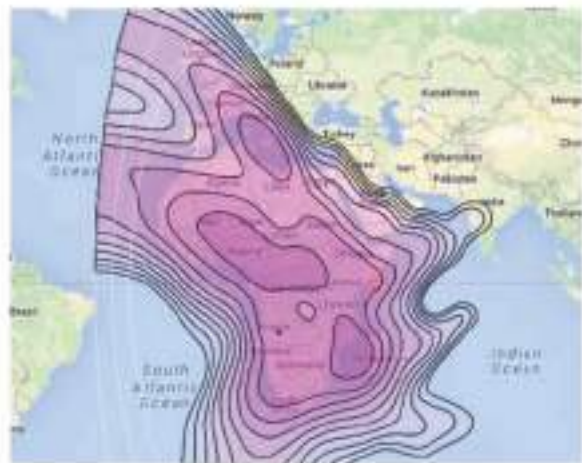
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## New generation of transfer devices

REFLEX MARINE, THE specialist in offshore personnel access by crane, exhibited its Frog-XT transfer device range, with its advanced design and cutting edge technology, for the first time at Offshore Europe.

The company is best known for its transfer devices, the Frog and Toro and now, the Frog-XT. The company is involved with more than one million safe personnel transfers annually.

More than 20 years' experience and expertise have gone into the development of the Frog-XT range. With a choice of four, six and 10 person capacity devices, the Frog-XT offers operators a flexible solution to their personnel transfer needs. The device can be converted to MedEvac mode in the case of an emergency to transfer a casualty and accompanying passenger.

Designed to protect from all the key risks associated with crane transfer, the FROG-XT is the safest range of personnel transfer devices on the market. The range has undergone a rigorous testing programme including full-scale immersion, self-righting, impact and free-fall testing.

Since the launch of the product in 2014 there are already devices in operation in more than 28 countries. The devices are used for a variety of applications including routing, high volume and contingency personnel transfer operations. Reflex Marine has already received extremely positive feedback from the industry.



## Second Damen platform supply vessel ordered for West Africa

IN JANUARY 2014, an order was placed with Damen Shipyards Group for two platform supply vessels (PSV). The first vessel, Mamola Reliance, was delivered in February 2015 and is currently in service, managed by PROMAR, in the West African



market. This second vessel, Mamola Defender, is expected to be operational in the same region. The naming ceremony of the vessel took place on 23 September 2015. Both vessels are at the forefront of technology in terms of equipment. The PSV 3300 design ensures reliability, excellent seakeeping behaviour and low fuel consumption and CO<sub>2</sub> emissions – crucial features for the offshore market.

During the construction of the vessel, PROMAR had a team based in Romania to supervise the project with Damen Shipyards Galati. According to Jérôme Bouchard, head of projects and commercial manager at PROMAR, "There was a fruitful collaboration between the PROMAR team and Damen. Thanks to the great professionalism of all teams, as well as Damen's excellent production capabilities, the project went well and was delivered on time. We are very proud to manage such a beautiful vessel. Like her Sister ship, Mamola Reliance, she has been designed and built to fulfill the highest requirements of the offshore industry. She features a broad package of options and is SPS compliant, offering therefore additional flexibility for clients."

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