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MOVING ON



President Muhammadu Buhari of Nigeria has appointed Dr. Thomas John as its acting alternate chairman of the Governing Board of NNPC. John's appointment brings Minister of State for Petroleum Resources, Emmanuel Kachikwu's tenure in the position to an end. NNPC also saw its Managing Director, Maikanti Baru, replaced by Mallam Mele Kyari. Prior to his appointment as the new MD of NNPC, Kyari served as Nigeria's national OPEC representative and the NNPC's crude oil marketing division group general manager. In addition to the above, NNPC saw some newly promoted personnel which included Musa Lawal to the position of group general manager of National Petroleum Investment Management Services; and Mansur Sambo, becoming managing director of NPDC.

C-Innovation, an affiliate of Edison Chouest Offshore, named John Michael Boquet as HSE manager. Boquet previously served in HSE roles for Edison Chouest Offshore, Sealand and Falck, as well as administrative manager for Sealand.

Chevron named David Inchausti as corporate VP and comptroller effective June 16. Inchausti succeeds Jeanette Ourada, who has elected to leave the company. Inchausti has been with Chevron since 1988 in a number of operational and corporate finance positions around the world.

Alex Beard, the Head of Oil at Glencore, retired effective June 30. Beard will be replaced as Head of Oil Marketing by Alex Sanna. Sanna has been with Glencore since 2006 and has been a senior member of the Oil Products division. The reporting lines for oil assets will be transitioned to Peter Freyberg, who will now become the Head of Industrial Assets across the Group.

Genel Energy appointed Mike Adams as technical director, and PDMR, with immediate effect. The appointment follows a repositioning of the role of COO, which is now split into preproduction and on-production business lines. Prior to joining Genel in 2012, Adams worked in a series of technical and leadership positions for companies including BG, Hess, Gulf Keystone Petroleum, and Sterling Energy.

KCA Deutag named Joseph Elkhoury as its new CEO, effective July 1. Elkhoury takes over from Norrie McKay who will retire later this year. McKay will remain with the group in an advisory capacity until December 31. Elkhoury has 26 years of experience in the industry, most notably serving 21 years with Schlumberger.



Mohammed Barkindo was re-appointed as Secretary General of OPEC. Barkindo was appointed for a second three-year term at the sixth OPEC and non-OPEC Ministerial meeting held on July 2 in Vienna.

Barkindo was acting secretary general in 2006 and represented Nigeria on OPEC's Economic Commission Board from 1993 to 2008.

Serinus Energy appointed Judicael Tinss as COO of the company. Tinss has 18 years of experience in reservoir management and business development within the international exploration and production sphere, including the US, West Africa, Middle East and Europe.



saw a change in its top management with the naming of Valerie Bosse as its new Managing Director. The change follows the merger of Wintershall and Dea activities. Bosse takes over

Wintershall Dea in Brazil

from Gerhard Haase (Wintershall), who is retiring, and Christoph Schlichter (DEA), who is now in charge of integrating the recently acquired Sierra Oil & Gas in Mexico for Wintershall Dea.

Ole Martin Grimsrud has been appointed CFO of Aker Solutions, effective August 1. He replaces Svein Oskar Stoknes, who is taking over as CFO of Aker ASA. Grimsrud joined Aker Solutions in 2012 as VP, Finance for the Subsea business.

Kosmos Energy saw Steven Sterin join its board of directors effective July 18. Sterin is a senior executive with more than 25 years of extensive oil and gas, manufacturing, and financial experience. Most recently, Sterin was executive VP and CFO of Andeavor and Andeavor Logistics from 2014 until the merger with Marathon Petroleum Co. in October 2018. He currently serves on the board of DuPont de Nemours, Inc. and is the Chair of its Audit Committee.



The International Marine Contractors Association (IMCA) added Andy Seymour to its Governing Board. Seymour is the Global Director Operational Excellence at Fugro NV. Seymour started his career at Fugro

as a field surveyor progressing to shore-based management positions including country manager and regional director. In 2018 he moved into a corporate role as deputy division director and in 2019 was appointed into his current role.

Egypt's Minister of Petroleum and Mineral Resources, Tarek El Molla, announced new transfers in the oil and gas sector. El Molla assigned Mohamed Hassan Badran as the new deputy CEO for Production at EGPC, as well as a member of EGPC's Executive Council. Nabil Salah Nassar was named as the new Managing Director of Suez Oil Company. These appointments were effective July 31.

Schlumberger's board of directors appointed Olivier Le Peuch as the company's new CEO and member of the Schlumberger board. Le Peuch's appointment is effective August 1. Le Peuch succeeds Paal Kibsgaard, who will step down after more than 22 years of service to the company, including eight years as CEO and four years as chairman. The current non-independent director, Mark G. Papa, will become nonexecutive chairman of the board, while Peter Currie will continue to serve as the board's lead independent director.

BCCK Holding Company promoted John Peterson to senior VP of business development. Peterson will be responsible for leading the business development teams. He previously served as director of business development for BCCK.

To include a corporate personnel announcement in Moving On, write to *info@petroleumafrica.com*. Preference will be given to Africa-specific appointments and to those companies who have interests within the continent; all others will be included on a space available basis.

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Petroleum Africa Magazine is a Texas, United States-registered company. PO Box 1571 Montgomery, TX 77356

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MESSAGE FROM THE EDITOR

It's that time once again when I move off the oil and gas topic to discuss something most all of the African continent gets excited about. For those of you who regularly read my column, that's right, you guessed it, Sports! And not any sport, the Africa Cup of Nations to be exact. What a fantastic tournament this year's edition turned out to be, filled with surprises, sorrows, triumphs and great matches!

Perhaps the most surprising development was Madagascar's run in its first appearance in the tournament. The team made it all the way to the Final 16, leaving its fans feeling proud and looking forward to future performances of their "*Barea*." And then there was Mauritania scoring its first ever goal in the tournament. The Lions of Chinguetti also held their football powerhouse neighbor, Tunisia, to a draw. Quite a feat for the Mauritanian squad!

On a less upbeat note for the hosting nation, the Egyptian Pharaohs were sent packing after the South African squad handed them a defeat, putting an early end to the tournament's most successful team's run for the cup. Upheaval within Egypt's football world followed with Hany Abu Reida, head of the Egyptian Football Association (EFA), resigning shortly after the loss, and calling on members of the EFA board to also resign, while firing the coaching team led by Mexico's Javier Aguirre.

The most painful moment of the tournament came in the semi-final match between Senegal and Tunisia. At the 100th minute of the 0-0 match, Tunisia's goalkeeper, Moez Hassen, saw the ball bounce off the head of the defender Dylan Bronn and into the net for the only goal of the game, sending the Senegalese squad to the final and leaving the Tunisians in tears.

Perhaps my favorite match was the Algeria/Nigeria semi-final. It seemed for 70+ minutes the Algerians were on the way to taking the match, when Aissa Mandi was given a yellow card for a handball; Nigeria's Odion Ighalo subsequently converted the penalty kick and the match was tied up, breathing new life into the Super Eagles. At four minutes into the extra time period, it looked like penalty kicks were imminent, until the last minute of stoppage time when Algerian star Riyad Mahrez broke the Nigerians' heart with a beautiful free kick placed in the top left corner of the goal with what was practically the last kick of the game, winning the match for the Algerians. To be sure, it was a great, extra-time comeback for the fans!

The much-anticipated final between Senegal and Algeria was over 2 minutes into the match, with Algeria scoring a fluke goal. The team took one shot versus Senegal's 12 shots, and that was enough to land Algeria its second Africa Cup, coming 29 years after their first. Congratulations to *El Khadra* (The Greens) for the long awaited second victory!

And now, back to business! We have a great issue featuring both Morocco and Nigeria, two very different petroleum industries with new developments materializing rapidly. Also be sure to check out the technology section featuring an article on H2S detection while drilling by Geolog, along with a look at digital seismic data acquisition by Sercel in the second feature. As always, your comments and suggestions are welcome and can be sent to *info@petroleumafrica.com*.





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Agogo Appraisal a Success for ENI

ENI successfully drilled its first appraisal well on the offshore Angola Block 15/06 Agogo discovery with the Agogo-2 well. According to the firm, the well results confirm the 650 million barrels of oil in place at the Agogo field and indicate further upside in its northern sector that will be assessed with new appraisal wells.

The appraisal well encountered 58 meters net of light oil, in sandstones of Miocene and Oligocene age with excellent petro-physical characteristics. The result confirms the extension of the Agogo reservoir to the north of the discovery well and below the salt diapirs. The well has been planned and drilled as a highly deviated one, to reach the sequences below the salt diapirs and prove the existence of reservoir and oil charge also in this sector of the Agogo mega structure. Data acquired in Agogo-2 indicate a production capacity in excess of 15,000 bpd of oil.



West Hub

Agogo-2 was drilled using the *Paseidon* drillship, 3 km north-west of the Agogo-1 discovery well, approximately 180 km from the coast and 23 km from the *N'Goma West Hub FPSO*.

ENI plans to start first production from Agogo before the end of 2019 with a subsea tie back to the *N'Goma FPSO*. Meanwhile, it will continue the appraisal campaign to assess the discovery's full potential and size of its development.

NOC and Schlumberger Sign MoU

NOC, Libya's state-run oil and gas firm, and Schlumberger signed an MoU aimed at establishing a specialized training and development center in Benghazi. The training center is part of NOC's focus on "upskilling the next generation of oil sector workers."

The center will concentrate on professional excellence in exploration, drilling and petroleum engineering, and be equipped with the latest hightech equipment to develop qualified technical staff necessary to sustain the sector.

A statement on the NOC website said the development programs will deliver on-the-job

training and aim to upskill key engineering competencies to improve production rates, operational efficiency, and workplace safety. Courses will prioritize the teaching of additional recovery methods, innovative directional drilling and fracturing techniques, as well as the development of shale oil reserves.

Schlumberger has also offered to host Libyan engineers and technicians through on-work training programs across the company's worldwide operations.

NSCO Sees Gas Flows in North Sinai

Kuwaiti Holding Company subsidiary, NSCO Investments, completed the development of the first well in a North Sinai offshore natural gas concession. The company drilled the first well in the Kamos area at a depth of 1,698 meters at a cost of around \$15 million.

Production from the well began at a rate of 25 Mmcf/d, raising NSCO's production capacity to 40 Mmcf/d.

The second well at Kamos, drilled at 2,664 meters, is expected to begin production during Q3 2019. Seismic surveys previously indicated around 2.352 Tcf of natural gas and 112 million barrels of condensates in reserves in the concession.

DPR Threatens Sanctions

Nigeria's Department of Petroleum Resources (DPR) threatened to sanction oil companies for not uploading their respective oil production data on the DPR platform. Ahmad Shakur, acting director of the department, gave the warning at a sensitization workshop organized by DPR on the National Production Monitoring System (NPSM) for oil and gas operators in Lagos.

According to News Agency of Nigeria (NAN), about 75 compliance officers from the oil and gas firms attended the workshop.

Shakur, represented by Akpomudjere Okiemute, Assistant Director, Management Branch of Upstream Sector of DPR, said the purpose was to ensure full compliance to production and export data. Shakur said that a collective platform would deepen stakeholders' understanding of the operations and relevance of NPMS to the public.

"The NPMS is a web-based platform that provides rapid and efficient electronic data collection database and reporting system which replaced the paper-based reporting," he said.

Partners Plan Production Boost on Angola's Block 15

US supermajor ExxonMobil says that along with partners, it plans to invest in increasing production on Angola's Block 15. The company said the plan is to increase production by a further 40,000 bpd.

ExxonMobil, the operator, says that it will conduct a multi-year drilling program on the block and install new infrastructure technology to increase capacity of existing subsea flow lines.

Changes to the PSA will extend operations through 2032 and bring Angola's state-owned Sonangol into the Block 15 partnership with a 10% interest. In addition to ExxonMobil, BP, ENI, and Equinor are also partners on the block

GPPSL Acquires Equipment

Nigerian indigenous services firm, Global Process and Pipeline Services Limited (GPPSL), acquired three massive flooding pumps with the capacity of 3,150 USG per minute and close to 600 PSI each, together with three massive lifting pump (6,000 USG/Min) each and other connections that go with the equipment.

"They are high pressure, high volume and no other company can boast of such flooding pumps in West Africa," chief executive officer of GPPSL, Obi Uzu told reporters on the sideline of the recently concluded 2019 Nigerian Oil & Gas (NOG) conference and exhibition in Abuja.

Nigeria is on the verge of completing the 48-inch pipeline, the Ajaokuta-Kaduna-Kano (AKK) pipeline, and there are also plans for another big pipeline project that will run from Nigeria to North Africa.

"Those are massive projects that will need our kind of equipment. Besides there is also requirement for big pipeline services in-country," Uzu said.

GPPSL also acquired six Air Loaders, which include pneumatic suction pumps for cleaning of floating production, storage and offloading (FPSO) tanks. The FPSOs will require cleaning, according to the Department of Petroleum Resources related regulation.

Libya Hits Five Month Oil Flow Low

Libya saw its oil production drop by around 500,000 bpd to 1 million bpd, the lowest the country has seen in five months. The drop in production is mainly due to an unidentified group reportedly closing a valve and shutting down the

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AFRICA BIG FIVE

North African country's largest field, the Sharara, on July 20.

NOC, the state-run oil and gas firm, declared a force majeure on Sharara production. The declaration effectively removed 290,000 bpd from Libya's totals and removed roughly \$19 million per day from government coffers.

Commenting on the situation, NOC Chairman Mustafa Sanalla said in a statement, "Deliberate attempts to sabotage pipelines and production hurt both national oil revenues and critical power supply for everyday Libyans."

The force majeure was lifted on July 22 after it stopped loading crude oil for the weekend from the Zawiya terminal.

Total Achieves No-Routine Flare at Egina

Total Exploration and Production has achieved No-Routine-Gas-Flaring at its Egina FPSO offshore Nigeria. The achievement follows the commissioning of the gas compression system on the Egina field, according to Charles Ebereonwu, Total's country communications manager.

Ebereonwu said in a statement from Lagos, that the associated gas from the field was now being compressed, transported via the Akpo/Amenam gas export line and monetized through the Nigeria Liquefied Natural Gas facility.



Egina FPSO

He explained that Total has honored its commitment to the rule of law of its host country by fully abiding by the Nigerian Government's Gazetted Flare Gas Regulations of 2018.

Ganope Pushes Back Bid Deadline

Egypt's state-run firm in charge of oil and gas activities in Upper Egypt, Ganoub El Wadi Petroleum Holding Company (Ganope), extended the deadline for receiving offers for its international bid round in the Red Sea to mid-September, instead of August. The push back of the deadline allows more companies to submit their offers, Al-Shorouk reported.

The Red Sea licensing round was launched in March, offering up 10 offshore exploration blocks in the Egyptian Red Sea.

Under Egypt's PSA regime, bid winners will have the right to sell their share of production locally or export it globally after the Ministry of Petroleum's approval. The Minister of Petroleum, Tarek El-Molla, previously noted he expected increased exploration activities in the Red Sea after the maritime border demarcation with Saudi Arabia.

Ganope signed two contracts with Schlumberger and TGS to conduct seismic surveys and gather data in the Red Sea and Upper Egypt in 2018.

Phase II at Otakikpo Approved

Green Energy International (GEIL) received approval from Nigeria's Department of Petroleum Resources for the field development plan (FDP) and environmental impact assessment for the Phase II development of the Otakikpo marginal field in OML 11.

The approval follows the signing of a MoU with a consortium of international financiers for a package of more than \$350 million to move forward the second phase development of Otakikpo. The consortium includes an international bank based in London, a crude oil off-taker, and an EPIC contractor.

The FDP involves the drilling of seven additional wells and expansion of the crude processing infrastructure. The plan also includes the construction of an onshore terminal with a capacity of 1.3 million barrels and a 17-km export pipeline to connect the terminal to an offshore loading system.

GEIL director of corporate affairs, Olusegun Ilori, said that the company intends to increase production from 6,000 bpd to 20,000 bpd.

ENI Sees Egyptian Discoveries and Starts Production

ENI started production from the South West Meleiha Development Lease in the Egyptian Western Desert. The current production, delivered through two oil production wells, is around 5,000 bpd and is expected to reach 7,000 bpd in September.

The oil is transported and treated at the Meleiha Plant facilities operated by AGIBA, a company equally held by IEOC and EGPC. The oil discoveries in the South West Meleiha were made in 2018 with remaining prospects to drill.

AGIBA, the operating vehicle on behalf of EGPC and ENI, also recently made two additional near field oil discoveries in the Meleiha development lease in the Western Desert, specifically on the Basma and Shemy prospects. On Basma, two wells were successfully drilled and are already in production from the Jurassic Khatabta formation. On the Shemy prospect, a well is currently under testing and targeting oil from the Matruh sands. Moreover, in the Meleiha development lease, AGIBA has successfully continued a deepening campaign on existing shallow wells targeting the Alam El Bueib Cretaceous formation. These deepened producers are now contributing with about 6,000 bpd to the Meleiha production totals.

In the Nile Delta area, within the new El Qar'a onshore exploration lease granted in 2018, the company successfully drilled and tested the El Qar'a-NE1 well. This well encountered gas in the sandstones of the Abu Madi formation. During the clean-up, the well delivered 17 Mmscf/d and associated condensates. The well will be tied-in to existing facilities and the production will be delivered to the Abu Madi gas plant operated by Petrobel (IEOC 50% - EGPC 50%) upon the granting of the development lease.

Finally, in the Gulf of Suez, in the Abu Rudeis Sidri development lease, IEOC, through Petrobel, has successfully drilled a new structure on the Sidri South exploration prospect which resulted in an oil discovery. The new discovery has been made through the Sidri-23 well in pre-Miocene sequences. The discovery may hold up to 200 million barrels of oil in place. The well has been completed and brought on stream through production facilities available in the area. Petrobel plans to develop the new discovery with 10 wells that will be drilled in the near future.

New Licensing Round for Angola

Angola's recently formed National Agency for Petroleum and Gas (ANPG), the National Concessionaire for the Angolan petroleum sector, announced in June that a new petroleum licensing round will launch on October 2.

The licensing round is an implementing step of the 'General Strategy for Awarding of Petroleum Concessions' (2019-2025), publicized in February 2019.

Ten petroleum concessions in the Namibe and Benguela Basins will be put on offer: Blocks 11, 12, 13, 27, 28, 29, 41, 42 and 43 (in the Namibe Basin) and Block 10 (in the Benguela Basin).

The dates of the roadshows and the relevant Terms of Reference are expected to be disclosed shortly by the ANPG.

UK and Norway Pledge Support to Nigeria's O&G Sector

The UK and the Norwegian governments pledged their respective support to drive growth and development in Nigeria's oil and gas sector. The two countries reiterated their commitment at the Nigerian Oil and Gas Conference and Exhibition, in Abuja.

The British High Commissioner to Nigeria, Catriona Laing, said Nigeria was the country's second largest partner in Africa, adding that 95% of UK's import was from Nigeria. "We have a very strong bilateral and we have strong ambition with what we are doing with Nigeria," she said, and went on to say that the UK was ready to aid Nigeria in tackling some of its problems in the sector.

For his part, Norwegian Ambassador to Nigeria, Jens-Petter Kjemprud, said President Muhammadu Buhari needed the oil sector to tackle numerous challenges in the country. Intimating that Nigeria should take heed of Norway's example, noting that the oil sector had been used to develop Norway and by extension enhance growth and development.

"If the oil and gas sector is well developed and managed well, it will be useful in solving many of the problems in Nigeria. President Buhari needs to support the sector because it is very relevant for the development of the country," he said.

ENI and Sonatrach to Accelerate Developments

ENI and Sonatrach confirmed their intention to accelerate the development of new oil and gas projects in Algeria's North Berkine. The development of the projects will allow for the North African country to significantly increase its national production capacity.

The project is composed of two phases. The first, related to oil development, started up last May, just three months after the entry into force of the farm-in agreement on the block. The second phase, related to gas development, will see start up at the end of September after the completion of the BRN-MLE pipeline.

The project is an example of the "fast track" arising from a joint effort of Sonatrach and ENI, based on the shared strategy for an accelerated time to market as well as on the availability and know-how of Sonatrach's contractor companies

called to work on the project for their advanced technology and methodological approach which employs streamlined procedures resulting in faster operations.

The first phase of the oil project in North Berkine were planned to reach a plateau production of 10,000 gross barrels by the end of July, while the development of the gas project will reach an incremental production of 6 million cubic meters and 7,000 barrels of associated liquid by the end of the year.

SDX Achieves First of Three Project Milestones

SDX Energy updated its activities in Egypt with the news that its development of the South Disouq concession (SDX 55% working interest and operator) continues on schedule and on budget. The company saw factory acceptance tests for the central processing facility (CPF) and compressor conducted. This was the first of three project milestones to be completed.

SDX expects the equipment for the South Disouq to arrive in mid-August as they are currently being shipped to Egypt. First gas is set for Q4 of this year.

The company is now working on interpreting the South Disouq 3D data and according to Mark Reid, CFO and interim CEO of the company, once this is complete potential drilling targets will be assessed.

Remedial Tubing Patch Installed on Gbetiokun-3

Eland Oil & Gas revealed that a remedial tubing patch was installed on the Gbetiokun-3 well on Nigeria's OML 40. Lekoil, a partner on OML 40, previously announced that it was undertaking necessary remedial work on the Gbetiokun-3 short string. The well was drilled as an appraisal well in Q4 2018 with the dual completion on the D9000 and E4000 reservoirs being installed in Q1 2019.

During pressure testing, a small leak was identified on the shallower D9000 completion string. Following further diagnostic logging, the leak was located, and a remedial tubing patch was successfully installed.

At present, the short string is being produced with the temporary facilities on location. Initial gross rates of some 3,880 bpd have been recorded at a choke size of 36/64". The deep E4000 interval was tested in Q1 2019 and achieved choke-limited gross rates of 3,000 bpd, in line with pre-drill expectations.

Eland expects the field to be brought onstream in July through the Early Production Facility, presently being installed, with initial gross production of approximately 12,000 bpd (net 5,400 bpd) from the Gbetiokun-1 and -3 wells.

Over the period, the field development plan for the Gbetiokun was approved by Nigeria's petroleum department. Five additional production wells are planned during Phase one of the development, followed by the drilling of a further six production wells and a single workover well during Phase 2.

Pertamina Plans Ambitious Drilling Program in Algeria

Indonesia's PT Pertamina is looking at an ambitious drilling program in Algeria. As it looks to boost production, the company unveiled a plan for growth in the North African country, which forecasts a 10% increase in oil and gas production before the end of 2020.

The current production of oil is at 20,000 bpd and is expected to reach between 22,000 and 23,000 bpd, eventually. Of the 20,000 bpd that Pertamina currently produces in Algeria, 18,000 bpd is exported home by the company.

In a press release, the company's managing director, Denie S. Tampubolon, said that its 20-well drilling program over several fields that have seen little drilling, leads to optimism that production can be raised.

Pengassan Calls on Kyari to Act Fast

Nigeria's oil and gas union, Pengassan, called on the new board of NNPC to act fast on the challenges facing the industry. In a letter to the new NNPC boss, Mele Kyari, signed by the General-Secretary Comrade Lumumba Okugbawa, the union said challenges such as pipeline vandalism, crude oil theft, inadequate infrastructure and pricing uncertainties should be looked into.

"We agree that the nation's oil and gas industry is on a steady progression to the next level. However, the challenges associated with pipeline vandalism, crude oil theft, inadequate infrastructure, pricing uncertainties, and the obsolete refineries as well as the contentious fuel subsidy issues and resting of the Petroleum Industry Bill (PIB), are issues the Nigerian masses expect the new NNPC Board to champion." The union described Kyari's appointment as welldeserved and a recognition of his 27 years of contributions and exemplary service to the NNPC group, the nation's oil and gas sector and the growing economy that is majorly dependent on the industry.

Ghana Keeps Drillships Busy

Tullow Oil and its various partners in Ghana have kept two rigs busy over H1 of this year. The Stena Forth and Maersk Venturer drillships worked in tandem on Ghana drilling and completion operations throughout the period with four wells drilled and three wells completed.



Maersk Venturer

The Stena Forth drillship has now left Ghana and is headed across the Atlantic to commence drilling in Guyana. The Maersk Venturer will remain in Ghana and will complete the ongoing Enyenra-14 production well, a Jubilee producer and an Envenra water-injector, before switching to drilling operations for the remainder of the year.

The completion of the Enyenra-14 production well is taking longer than anticipated and consequently will be onstream later than planned. This delay has been reflected in a small revision to full year guidance for TEN which has been adjusted to around 71,000 bpd gross, from 73,000 bpd. Following strong performance from Jubilee, production guidance for the year has been adjusted to around 95,000 bpd gross, up from 93,000 bpd.

Reservoir performance in H1 from existing and new wells has been in line with expectations at both fields and Tullow expects to reach gross production from Ghana of around 180,000 bpd in H2.

Invictus Reveals Resource Report

Invictus Energy released the findings of an Independent Resource Report carried out by Getech Group for its Cabora Bassa Basin Project. The report by Getech estimated substantial resource potential at the project in Zimbabwe.

Invictus Managing Director Scott Macmillan commented, "The Mzarabani Prospect has grown significantly in its scale and represents one of the largest conventional exploration targets globally. The Independent Report by Getech has estimated the net mean recoverable conventional potential of the massive stacked Mzarabani prospect of 1.3 billion boe (barrels of oil equivalent) consisting of 6.5 Tcf and 200 million barrels of condensate net to Invictus. The estimate for the primary Upper Angwa target within the Mzarabani Prospect has increased to 4.4 Tcf plus 187 million barrels of conventional gas-condensate on a gross mean unrisked basis.

"In addition, the newly identified Msasa Prospect, a new substantial structural prospect within SG 4571 which is also a stacked anticline feature, is estimated to contain 1.05 Tcf and 44 million barrels of conventional gas-condensate on a total gross mean unrisked basis," he added.

Invictus has engaged UK-based ENVOI to run the farmout process for SG 4571. The company has received significant industry interest ahead of the data room opening and is currently executing confidentiality agreements with several parties.

It has also engaged the Scientific and Industrial Research and Development Center (SIRDC) to conduct an Environmental Impact Assessment (EIA) of SG 4571. The commencement of the EIA aims to ensure all necessary pre-drilling permits and activities are completed well ahead of schedule. SIRDC has experience in carrying out EIAs of developmental projects in fields such as agriculture, mining, energy generation and construction projects.

Senegal Adds to Greater Tortue Resources

Additional resources have been added to the bounty already discovered offshore Senegal. BP and Kosmos Energy, along with the state-run firms from both Mauritania and Senegal, drilled the Greater Tortue Ahmeyim-1 well with success.

The well, drilled on the eastern anticline within the unit development area of Greater Tortue, has encountered approximately 30 meters of net gas pay in high-quality Albian reservoir.

The Greater Tortue Ahmeyim LNG project is on track to deliver first gas in the first half of 2022, and the well (which has been designed as a future producer) will be used to further optimize the development drilling plans for the BP-operated project.

Commenting on the results of the GTA-1 well, chairman and CEO Andrew G. Inglis of Kosmos said: "The GTA-1 well confirms our expectation that the gas resource at Greater Tortue Ahmeyim will continue to grow over time and could lead to further expansion of this worldscale 10 MTPA LNG project. In addition, Kosmos' process to sell down its interest to 10 percent has received considerable interest from the industry, with initial bids expected over the

summer, and transaction conclusion anticipated by year end."

Located offshore Senegal, the GTA-1 well was drilled in approximately 2,500 meters of water, approximately 10 kms inboard of the Guembeul-1A and Tortue-1 wells, to a total depth of 4,884 meters.

The Ensco DS-12 rig, working on behalf of the operator BP, will now drill the Yakaar-2 appraisal well in Senegal, which was expected to spud in the coming month, before drilling the Orca-1 exploration well in Mauritania, which is expected to spud late in O3.

ENI and Vitol Garner More Ghanaian Acreage

ENI and Vitol have gained new acreage offshore Ghana. The two firms picked up a stake in the Block WB03 exploration and production license. The block was offered in Ghana's competitive bidding process.

Located in Ghana's Tano Basin, ENI will hold a 70% stake and Vitol will hold the remaining 30%. ENI will be the operator of the license and besides Vitol, the JV will include GNPC and a local registered company that will be identified during contract finalization.

The contract award is subject to approval from Ghanaian authorities.

ENI also holds rights to the development areas of Sankofa and Gye Nyame as well as to the exploration and production area of CTP-Block 4. The new block is located approximately 50 km south-east from the FPSO John Agyekum Kufuor that is currently producing oil and gas from the Sankofa Field. The proximity of the FPSO will allow for synergies in case of new discoveries in Block WB03.

Morocco Drilling Campaign Planned

SDX Energy's planning of a 12-well drilling campaign in Morocco has begun. The company holds a 75% interest and is operator in Morocco. According to the company, it has ordered long lead items, with the drilling rig and all other key contracts finalized.

The drilling campaign is targeting 15 Bcf of gross unrisked prospective resources. The campaign is expected to commence in Q4 2019 and is targeting sufficient reserves to satisfy existing customers' forecast demand, as well as testing new play-opening areas of prospectivity across the portfolio.

تحــت رعايــة صاحــب الـسمــو الـشيــخ خليفــة بــن زايـد آل نهيــان رئيــس دولــة الإمــارات العربيــة المتحـدة UNDER THE PATRONAGE OF H.H. SHEIKH KHALIFA BIN ZAYED AL NAHYAN, PRESIDENT OF THE UNITED ARAB EMIRATES Host





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A GLOBAL MEETING POINT FOR THE OIL & GAS INDUSTRY & TODAY'S MODERN ENGINEER



Total Congo Uses Cementless Completion Technology from Welltec[®]

Welltec[®] saw its first deployment of a truly cementless completion in the Republic of Congo (ROC) during Q2. Total E&P Congo pushed the boundaries of Metal Expandable Annular Sealing technology by deploying the world's first cementless completion using the Welltec[®] Annular Isolation (WAITM) in an open hole on its Moho North Albian field. This builds on the E&P firm's experience gained through the continuous deployment of the Welltec[®] Annular Barrier (WAB[®]) on the same field in Q1 2017.



The WAITM uses multiple metal expandable packers to provide long length open hole zonal isolation to replace the functions of traditional cement, leading to significant gains in efficiency in the overall well construction process. The technology significantly reduces the free annulus space between the liner/casing and the open hole which can be beneficial in highly layered reservoirs of varying permeability where selective production, stimulation or water shut off is required.

In addition to the efficiency gains, the simplified well completions operations enabled by the WAITM eliminated multiple operational risks associated with the cementing process in depleted and overpressured reservoirs.

Lesedi 3 Building Pressure

Thou Energy saw its Lesedi 3 production pod in Botswana successfully reach Critical Desorption Pressure (CDP). CDP is the pressure that gas begins to come out of the coal after a careful dewatering process. Gas is now starting to come out of the coal and is steadily building pressure inside the closed casing.

A short-term gas flow test at Lesedi 3 took place after a significant gas pressure build-up inside the well casing. The result of this test is considered by Tlou to represent a positive indication of the pod's potential.

Post the short-term test, dewatering has continued with the plan to hold the water level just above the coal and continue to draw down pressure in the well allowing gas to flow in a controlled manner, ideally leading to a long-term gas flow from the Lesedi 3 pod.

4D OBN Contract Award in West Africa

Seabed Geosolutions was awarded a 4D ocean bottom node (OBN) monitor survey in West Africa for an unnamed major oil firm. The project, for which the data is expected to be acquired over a two-month period during Q3, will cover about 151 sq km in water depths up to 600 meters. The ocean bottom nodes will be deployed by remotely operated vehicles.

Contract for Chinguetti Decommissioning Phase II Awarded

Expro won a contract from Pacific Drilling's subsidiary, Pacific Santa Ana, for the provision of an Intervention Riser System (IRS) for a decommissioning project in Africa. The contract comes from Petronas for its Chinguetti Field Phase II plug and abandonment offshore Mauritania.

The contract, valued at \$20 million, will see Expro provide its IRS system with associated surface support equipment, to be deployed from Pacific Drilling's drillship, Pacific Santa Ana. The contracted work will take place for an estimated 360 days.

Worldwide Oilfield Machine (WOM) will support Expro with the provision of the subsea well access system and technical support team.

The IRS safely establishes and maintains well access throughout riser to surface operations, replicating the functionality of the blow-out preventer and providing a safe and reliable means of well control, connected directly to the production tree. With increased coiled tubing cutting and disconnect capability, the IRS system provides an alternative dual barrier, throughtubing system.

The award includes supplying a range of services, including the subsea well access system, lubricator valve, surface flowhead, umbilicals, topsides control equipment and IWOCS (installation and workover control system) package. Expro will also provide an onshore project management team to support Pacific Drilling throughout the project planning and execution phases, based in Expro's office in Kuala Lumpur and then locally onshore in Mauritania. West Gemini Secures Nine-Well Contract Seadrill secured another contract offshore West Africa. The contract, for use of its *West Gemini* drillship, is for nine wells. The contract contains three options for two wells each.



Source: West Gemini

The company said that the total value for the firm portion of the contract is expected to be approximately \$84 million with commencement expected in early Q4 2019 and running through Q4 2020.

The rig is currently finishing out its contract with ENI in Angola. The ENI contract expires at the end of August.

Seadrill announced previously that it had secured a one-well contract with PC Gabon Upstream S.A. for the *West Polaris* to work offshore Gabon. Backlog is expected to be approximately \$22 million excluding mobilization fees with commencement expected in September 2019 and running to the end of 2019.

Rig Secured for South Africa Drilling Campaign

Africa Energy Corp. and the JV partners on Block 11B/12B offshore South Africa have contracted a rig for an exploration program on the block. The partnership contracted the *Deepsea Stavanger* semi-submersible rig from Odfjell Drilling for their multi-well drilling program.

Garrett Soden, Africa Energy's President and CEO, commented, "We are very pleased that Total was able to secure the *Deepsea Stavanger* rig again for the next phase of drilling on Block 11B/12B offshore South Africa. Using the same equipment and crew that drilled the Brulpadda oil and gas discovery earlier this year should save time and reduce cost. We look forward to starting the multi-well drilling program with the spud of the Luiperd Prospect in Q1 2020."

Block 11B/12Bis located in the Outeniqua Basin 175 km off the southern coast of South Africa. The block covers an area of 19,000 sq km with water depths ranging from 200 to 1,800 meters. The Paddavissie Fairway in the southwest corner of the block includes the Brulpadda discovery made by the partners, as well as several submarine fan prospects.

The success at both the Brulpadda primary and secondary targets significantly de-risks the other similar prospects identified on 2D seismic. The JV partnership for Block 11B/12B recently completed the first phase of the 3D seismic acquisition program over the Paddavissie Fairway. The Brulpadda well results will be integrated with the 3D seismic data in advance of next year's drilling program, which will include up to three exploration wells.

Africa Energy holds 49% of the shares in Main Street 1549 Proprietary Limited, which has a 10% participating interest in Block 11B/12B. Total SA is operator and has a 45% interest in Block 11B/12B, while Qatar Petroleum and Canadian Natural Resources Ltd. have 25% and 20% interests, respectively.

Angolan and Mozambican Service Firms to Participate in Equa G's O & G Meeting Day Angolan and Mozambican services companies will participate in Equatorial Guinea's Oil & Gas Meeting Day in Malabo on October 1 and 2, 2019. The delegation will be led by President of the African Energy Chamber in Angola, Sergio Pugliese.

The growth of Africa's oil & gas sector presents the continent's services companies with tremendous opportunities for partnerships and regional expansion. As Africa's second largest oil producer and thanks to its strong local content efforts, Angola is now home to countless services

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companies with the necessary capacities to expand across sub-Saharan Africa.

"Angola is known for having strong local services companies," said Sergio Pugliese. "The growth of our local content is now accelerating thanks to the reforms made by President João Lourenço and his administration. We now have Angolan companies that developed strong capabilities and are ready to expand beyond Angola. They are seeking partnerships and deals with other African and international services and technology companies, to serve both their regional expansion plans but also to further support the growth of the Angolan industry at home. The Oil & Gas Meeting Day provides the perfect platform to seal such deals."

The African Energy Chamber is supporting the Oil & Gas Meeting Day, a Year of Energy event organized by Equatorial Guinea's National Alliance of Hydrocarbons Service Companies (NAHSCO).

The services industry is a massive job creator and a strong pillar of the global oil & gas industry. As cooperation among African oil markets increases, the need for services companies to step up their game and pursue an aggressive outreach has become a necessity.

Qatar Petroleum Picks Up Stakes Offshore Kenya

Qatar Petroleum has picked up stakes in three blocks offshore Kenya through a deal with ENI and Total. The three offshore blocks are L11A, L11B, and L12. The blocks are located in what is considered to be a frontier and largely unexplored area in the Lamu Basin.



The agreement is subject to customary regulatory approvals by the government of Kenya. Following such approval, the partners comprising the consortium will consist of affiliates of each of ENI (operator) with a 41.25% participating interest, Total with a 33.75% participating interest, and Qatar Petroleum with a 25% participating interest.

Commenting on this occasion, Saad Sherida Al-Kaabi, the Minister of State for Energy Affairs, and President & CEO of Qatar Petroleum, said: "We are pleased to sign this agreement to participate in exploring these frontier offshore areas in Kenya and to further strengthen our presence in Africa."

Al-Kaabi also added: "We hope that the exploration efforts are successful, and we look forward to collaborating with our valuable partners Eni and Total, and the government of Kenya in these blocks. I would like to take this opportunity to thank the Kenyan authorities and our partners for their ongoing and continued support."



AFRICAN POLITICS

AU to Launch Operational Phase of AfCFTA, Buhari Signs On

The African Union launched the operational phase of the AfCFTA on the July 7 in Niamey, at an Extraordinary Summit of Heads of State and Government. Moussa Faki Mahamat, Chairperson of the AUC, hailed the upcoming launch as a



"remarkable" and "historic" achievement. The launch was part of a series of statutory and technical meetings being held in the Nigerien capital from the 4th to the 8th, which included the first coordination meeting between the AU and the Regional Economic Communities (RECs).

The launch of the AfCFTA follows the coming into force of the trade area on May 30, after the deposit of the required minimum of 22 ratifications by member states of the AU. Since then three more instruments of ratification have been deposited, bringing the total number of countries that have ratified the AfCFTA to 25.

With the launch of the operational phase, traders across Africa will be able to make use of preferential trading arrangements offered by the AfCFTA, with the understanding that the trade transactions are among the Member States that have deposited the instruments of ratification and those that conform to the provisions on rules of origin governing trade in the AfCFTA.

The Assembly also decided on the location of the AfCFTA secretariat which will have the principal function of implementing the agreement. Seven member states – Egypt, Swaziland, Ethiopia, Kenya, Ghana, Madagascar and Senegal submitted bids to host the secretariat – with Ghana being named the host nation. Actual trading under AfCFTA is expected to begin a year from now

At the AU summit, Nigerian President Muhammadu Buhari signed up to the \$3-trillion AfCFTA. Nigeria was one of the last countries to commit to the trade pact. At the signing, Buhari called on the continent's nations to band together to attract investment, grow local manufacturing and combat smuggling.

The African Continental Free Trade Agreement aims to unite 1.3 billion people, creating a

\$3.4-trillion economic block that could usher in a new era of development.

Sudan: Power Sharing Agreement Reached

The military council and a coalition of opposition and protest groups in Sudan have come to an agreement on power sharing. The groups have agreed provisionally to share power for three years.

The agreement is seen as the first step towards moving Sudan beyond its history of dictatorship. It also gives rise to hopes of a peaceful transfer of power.

For decades Sudan was ruled by Omar al Bashir, whose regime was plagued by internal conflicts and years of economic crisis for the country which eventually triggered Sudan's own version of the Arab Spring of late-2010/2011 with disgruntled Sudanese taking to the streets in protest. These protests led to the removal of Bashir.

The country saw relations between the military council and the Forces for Freedom and Change (FFC) alliance break down when security forces killed dozens as they cleared a sit-in on June 3. But protesters were not deterred and huge protests against the military on June 30 led to African mediators brokering a return to direct talks.

The two sides agreed to "establish a sovereign council by rotation between the military and civilians for a period of three years or slightly more," African Union mediator Mohamed Hassan Lebatt told a news conference.

The council will be led for the first 21 months by the military, and for the final 18 months by civilians, a statement from the Sudanese Professionals Association (SPA) said. The council will be Sudan's highest authority. It will comprise five military members and five civilian appointees, with an additional civilian member agreed by the two sides.

URP Candidate Wins Mauritanian Presidential Vote

On June 22, about 1.5 million Mauritanians went to the polls to cast their vote for president. Mohamed Ould Ghazouani, from Mauritania's ruling party, Union for the Republic Party (URP), won the election taking 52% of the vote.

Biram Dah Abeid, Ghazouani's nearest rival, and the anti-slavery campaigner, amassed 18.58% of the vote, while the remaining candidates were in single digits. Three of the losing candidates lodged an appeal, alleging irregularities in the voting process. The African Union, acting as observer, was satisfied the process was transparent.

This election represents the country's first peaceful transfer of power by elected presidents since the country gained its independence from France in 1960, albeit both were from the URP.

Tunisia's President Dies

Tunisian President Beji Caid Essebsi passed away at age 92 in a military hospital on July 25. Essebsi had previously been hospitalized in late June for a "severe health crisis." The next day, a presidential



adviser said that his condition was improving. Reports also had it that he phoned the prime minister to discuss the bombings that took place the previous day. Less than a month later, on July 24 he was readmitted to the hospital and subsequently died from his illness.

President Essebsi was the country's first freely elected president following its 2011 prodemocracy uprising that started the Arab Spring. Essebsi had announced before his death that he would not seek re-election in the upcoming November polls, saying a younger person should lead the country.

Twin Suicide Attacks in Tunis

Tunisia suffered two suicide blasts in the capital of Tunis on June 27. A police station was targeted in the first attack. One police officer was killed, and several other people were wounded.

According to an AFP report, body parts could be found cast about on the road around the police car.

The second attacker blew himself up moments later at a national guard base in the al-Qarjani district, the Ministry of Interior confirmed. Four security personnel were wounded in that attack.

Libya's GNA Retakes Gharyan

According to regional reports, forces allied to the UN-recognized government in Libya, armed with weapons from Turkey, were able to retake Gharyan, located just south of the capital of Tripoli, in late June. This town is strategic to opposition military commander Khalifa Haftar's troops, the Libya National Army (LNA). The LNA is largely backed by the UAE, Saudi Arabia, France and Egypt. Government of National Accord (GNA) spokesman Mustafa al-Mejii, told the AFP, "Gharyan is under our total control." He also said 18 LNA soldiers were taken prisoner and dozens were killed.

The battle between the LNA and GNA has heated up considerably over the last two months. LNA has a self-stated goal of taking over the country and has been lobbying Washington for support. It has gone so far as to hire PR firm Linden Government Solutions, to help put on a good face.

The GNA, for its part, has called on the US to exert pressure on its allies to stop supporting Haftar's Libyan National Army. "We urge the US administration to use its leverage to end the support provided by Egypt and Saudi Arabia to Haftar," Ahmed Mitig, deputy head of the Libyan Presidential Council, said on Fox News earlier in June.

Meanwhile, despite Egypt, France and UAE backing Haftar, the three joined with Italy, the US and the UK in issuing a joint statement calling for a cessation of hostilities on July 16. "The governments of Egypt, France, Italy, the United Arab Emirates, the United Kingdom, and the United States of America reiterate their deep concern about ongoing hostilities in Tripoli, call for an immediate de-escalation and halt to the current fighting, and urge the prompt return to the UN-mediated political process. There can be no military solution in Libya. Persistent violence has claimed nearly 1,100 lives, displaced more than 100,000, and fueled a growing humanitarian emergency. The ongoing confrontation has threatened to destabilize Libya's energy sector, and exacerbated the tragedy of human migration in the Mediterranean.

We note our deep concerns about the ongoing attempts by terrorist groups to exploit the security

vacuum in the country, call on all parties to the Tripoli conflict to dissociate themselves from all such terrorists and individuals designated by the UN Sanctions Committee, and renew our commitment to see those responsible for further instability held accountable.

"We fully support the leadership of UN Special Representative of the Secretary-General Ghassan Salamé as he works to stabilize the situation in Tripoli, restore confidence in order to achieve a cessation of hostilities, expand his engagement throughout Libya, promote inclusive dialogue, and create the conditions for the resumption of the UN political process..."

Central African Republic: Armed Group Kills 46 Civilians

Fighters from the armed group Return, Reclamation, Rehabilitation, or 3R, killed at least 46 civilians on May 21, 2019, in three attacks in Ouham Pendé province in the Central African Republic. In February, 14 armed groups, including 3R, signed a peace accord with the Central African government and in March, the 3R commander, General Sidiki Abass (also known as Bi Sidi Souleymane) was appointed by presidential decree as a military adviser to the prime minister.

"The killings of these civilians are war crimes that need to be effectively investigated and those responsible brought to justice," said Lewis Mudge, Central Africa director at Human Rights Watch. "That the evidence implicates 3R and Abass, who have signed a peace accord designed to end such crimes, makes a prompt and independent investigation all the more urgent."

The May 21 attacks took place in the town of Bohong and the villages of Koundjili and Lemouna, in the northwestern part of the country, all at around the same time, which suggests they may have been coordinated. Several people who attended a meeting with Abass in Bohong the day before the attacks told Human Rights Watch that in the meeting, he threatened to carry out attacks on civilians.

The 3R group emerged in late 2015 asserting that they were needed to protect the minority Peuhl population in the region from attacks by anti-balaka militia who were targeting Muslims in the aftermath of violence that started in early 2013. In April and May 2016, 3R conducted attacks on villages in the Koui subprefecture, allegedly in retaliation for anti-balaka activity. 3R attacks on civilians in 2016 and 2017 led to the displacement of tens of thousands in the Ouham Pendé province.

Somaliland Makes Gains on Recognition Quest

Somaliland made a diplomatic breakthrough with the state visit of the country's president Musa Bihi Abdi to Guinea at the invitation of President Alpha Conde.

The visit is a sign of Somaliland's rapid acceptance across the African continent and its growing economic and trading links with other nations as it looks for recognition as an autonomous territory. During the meeting, both presidents pledged to find ways of working together in trade and fostering cooperation.

The Somaliland government is steadily building its case for recognition based on trade and business opportunities with its fellow Africans, arguing that an independent Somaliland capable of trading with African and international partners will be a benefit to all and strengthen peace, prosperity and security.

Somaliland's Minister for Foreign affairs and International Cooperation, Yassin Haji Mohamoud, said the mission to Guinea is to build the same kind of close relations with West African countries as Somaliland enjoys with East African nations.



Work Begins on Coral Sul FLNG Hull

ENI started the installation works on the hull of the *Coral Sul*FLNG vessel that is destined to sit offshore Mozambique. The FLNG unit is part of the Italian firm's Coral South project. The Coral South is expected to produce 450 Bcm from the Coral reservoir.



The hull is expected to be launched in 2020, in line with the planned production startup of the Coral South Project in 2022. The *Coral Sul*FLNG facility will have a gas liquefaction capacity of 3.4 million tons per year when completed and will be the first FLNG vessel ever to be deployed in the deep waters offshore Africa.

Construction works on the *Coral Sul* FLNG project started in 2018 and are ongoing. Construction of the mooring turret began in March; construction of the hull's 24 modules that contain the LNG storage tanks and sections of the treatment facilities began in September. Construction of the topside, consisting of 12 gas treatment and LNG modules, started last November, along with the living quarters. By the end of 2019 the overall progress of the project is expected to exceed 60% completion with the total man-hours worked shortly expected to reach 10 million.

ExxonMobil Eyes Damietta for Logistics Center

Tariq Shaheen, president of Egypt's Port Authority Damietta (DPA), told reporters that the US supermajor ExxonMobil plans to make the port of Damietta an important logistics center. The news comes following a meeting between DPA officials and representatives of ExxonMobil.

ExxonMobil, which has very little presence in the Egyptian oil and gas upstream, could thus become an important player in the gas value chain, currently being built on site, which will make Egypt the most important regional energy hub.

No further details on the content of the meeting were given, but Shaheen said the port is ready to offer all the facilities available to carry out such a project. Both sides have planned to hold further discussions to define the project.

NNPC to Divert 10% of Production to India

NNPC said it will divert 10% of its crude oil production to India to aid the country in resolving its energy crisis. Group Managing Director of the NNPC, Mele Kyari, said Nigeria will continue to support India's energy security challenge in whatever way it can.

The NNPC spokesperson, Ndu Ughamadu, said in a statement that Kyari stated this during the visit of the Indian High Commissioner to Nigeria, Abhay Thakur, to the NNPC headquarters in Abuja.

According to Ughamadu, Kyari said the recent MoU in energy security between Nigeria and India would further strengthen the bilateral relations between the two countries.

"We are ready to have robust engagement with the Indian trade team to Nigeria, to provide a win-win energy scenario. Every trade opportunity that is available will be fully explored," Kyari said.

Sonatrach Oil Tanker Freed from Iranian Authorities

Sonatrach, Algeria's state-run oil and gas firm, revealed on July 21 that Iranian authorities had freed its oil tanker one hour and 15 minutes after it was forced to enter Iranian territorial waters on July 19.

The tanker, *MESDAR*, of 2,000,000-barrel capacity, sailing in the Strait of Hormuz was asked by the Iranian coastguard to enter territorial waters.

Sonatrach said in a statement that the situation was cleared after an emergency hotline was set up between the two countries. The company also indicated that there were no human or material casualties and the cargo continued its journey to Tanura in Saudi Arabia to onload oil for the Chinese company UNIPEC.

El Molla and Bechtel Discuss Petchem Investment

Egypt's Minister of Petroleum, Tarek El Molla, met with Bechtel to discuss the development of a new petrochemical complex. The proposed petrochemical complex would be located in Egypt's Suez Canal Economic Zone.

Nader Saad, the official spokesman of the Egyptian Cabinet, said that Bechtel is seeking to invest further in Egypt. The firm has been operating in the country for decades.

Juba and Khartoum Work on Export Constraints

South Sudan and Sudan have agreed to work together to find a solution to the constraints experienced exporting Juba's crude through Khartoum ports. Local media in South Sudan cited Awow Daniel Chuang as saying that the two countries agreed to set up a coordination unit in Port Sudan to look at easing movement of oil production equipment coming to South Sudan through Sudanese territory.

Chuang said the new arrangements would ease oil exports and also help South Sudan to further increase its daily oil output from the current 170,000 bpd.

"We are going to monitor all the petroleum production materials that are coming into the country because oil producing companies are currently facing some challenges," Chuang said, adding that South Sudan and Sudan are trying to solve these issues to increase production.

Sasol Celebrates Opening of New Alkoxylation Plant in China

Sasol Limited opened its new alkoxylation plant in Nanjing, China. This facility, Sasol's largest expansion project in China, will more than double its alkoxylation production capacity in the region and will be supported by growing research and development and technical customer support capabilities.

Located at the Nanjing Jiangbei New Material Hi-Tech Park (formerly known as Nanjing Chemical Industrial Park), construction of this 35-acre site commenced in June 2017 and the plant reached commercial operation in April this year. The plant will expand Sasol's current alkoxylation capability to approximately 150 kilotons per annum (ktpa), with additional facilities for the production of anionic surfactants.

The new plant can operate using either branched or linear alcohols to meet the differentiated customer requirements in applications such as detergents, personal care, textile and leather, metalworking and lubrication, inks, paints and coatings, as well oil and gas, enhanced oil recovery and industrial cleaning.

This is Sasol's first fully owned production facility in Asia. The project is not only a significant expansion of Sasol's current operational footprint in the market, but also the first step towards a robust, differentiated expansion strategy for Sasol's Performance Chemicals business throughout the broader Asian region.

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EMG Gas Pipeline Tests Complete

Delek Drilling revealed that the month-long tests on the EMG gas pipeline that will transport natural gas from Israel's gas fields to Egypt have been concluded. Testing on the pipeline began on June 3.



According to comments by Global Platts, the technical aspect of work has been verified and the pumping of the gas should start at the end of 2019. Once the gas is transported to Egypt, it will be converted into LNG before being exported. Part of this stream is expected to be redirected to Israel.

Noble Energy, Delek Drilling, and the Egyptian company Sphinx EG worked to put the gas pipeline back into service, with a flow reversal capacity from the Leviathan field to Egypt. The pipeline has been inactive since 2012.

ENH Puts LNG Fund Raising on Hold

Omar Mitha, the CEO of Mozambique's stateowned ENH, said the government plans to suspend fund-raising to secure its stake in the Mozambique LNG project. ENH, which controls 15% of shares in the project, is supposed to mobilize \$2.3 billion dollars for its development.

Mitha explained that this measure was being taken due to the recent scandal regarding hidden public debt. He said that when the scandal was put to rest it would result in reduced risks and allow the company to obtain better results in the market.

"We will return for funding when conditions become more attractive," he said, according to reports in the local press.

New NNPC Boss Promises Refining Increase

The new boss at NNPC, Mallam Mele Kyari, on July 8 promised to run the four state-owned refineries at 100% capacity before President Muhammadu Buhari's term ends in May 2023. Currently the country's refineries run at around 10% of their nameplate capacity, forcing the government to import more than 90% of petroleum products consumed in the country at times.

According to reports in Vanguard, the new official pledged to make Nigeria a net exporter of petroleum products before that date. As a reminder, plans to stop petroleum product imports before the end of 2019 are technically already falling behind as the planned Dangote refinery is unlikely to go into production this year.

Kyari also said that under his leadership, efforts will be made to promote and encourage publicprivate partnerships in the construction of conventional and modular refineries.

Port Talks for

Eastern Libya May Bear Fruit

The Guidry Group out of the US is close to finalizing an agreement to develop a major port in Eastern Libya. Talks between the US firm and Eastern Libyan authorities have been going on for about one year. The port would be constructed in Susah.

"The Guidry Group and the State of Libya through the Sea Port Authority officially signed the concession agreement on May 13 for the development of a multi-purpose, deep sea port in Susah, Libya," the Guidry Group said in a statement to *Reuters*.

"Next steps for the project will involve establishing all the technical, financial, operational and commercial requirements," the firm said.

Salah Elhasi, head of the eastern port authority, said no final deal had been signed yet but 90% of work was done. "We are in the final stage of the agreement. ...and are reviewing the agreement's details," he said.

ENI and Tunisia Sign Algerian Gas Transport Agreement

ENI CEO, Claudio Descalzi and the Tunisian Minister of Energy, Slim Feriani, signed a new agreement for transporting Algerian natural gas through Tunisia. The agreement was signed in the presence of Tunisian Prime Minister Youssef Chahed.

The agreement follows previous pacts reached with Sonatrach in May in relation to the purchase of gas and transport in the Strait of Sicily (the TPMC system). It also completes the contractual framework that allows the Italian firm to import Algerian gas into Italy. With this agreement, ENI undertakes to operate the pipeline for the next 10 years, through its subsidiary Trans Tunisian Pipeline Company (TTPC), ensuring necessary reinvestment for modernizing infrastructure and taking advantage of the exclusive rights to the entire transport capacity.

Fire Breaks Out at Sonatrach Processing Unit

In Algeria, a fire at state-run firm Sonatrach's GNL1Z gas production unit broke out. The fire was followed by many explosions, according to reports from a local television station. The facility is located in the Algerian city of Oran.

Two people were injured in the fire, Sonatrach said in a statement, but no casualties were reported. The company also said that the fire would have no impact on production.

Nigeria Awards DSDP's

In Nigeria no fewer than 14 local, regional and international oil companies that bid for the 2019 Direct Sale of Crude Oil and Direct Purchase (DSDP) contracts have emerged successful, according to an article in the Premium Times.

Although many of the companies applied as individuals, sources at NNPC said many of the eventual winners formed consortiums with other applicants to emerge successful.

McDermott Wins Pre-FEED in Argentina

McDermott International was awarded a contract by Argentina-based YPF to provide pre-FEED services for a 5 mtpa LNG facility, with the potential expansion to 10 mtpa, at the Vaca Muerta Shale field in Argentina.

The scope of work is a continuation of a previous conceptual study developed for the YPF LNG Export Facility in Argentina under a contract in 2018. McDermott's London office will provide engineering services while the Houston office will perform project management and estimation services.

The project will promote the development of the Vaca Muerta Shale field in the Neuquen region of Argentina. Work on the project will begin immediately, and the contract award will be reflected in McDermott's Q2 2019 backlog.

Approval Received for Abadi LNG POD Inpex, through its subsidiary Inpex Masela, received official approval from the Indonesian government on its revised Plan of Development (POD) for the Abadi LNG Project submitted on June 20. The FID is subject to a series of subsequent evaluations including FEED work.

In addition to the revised POD, the authorities also approved the application for a seven-year additional time allocation and a 20-year extension to the PSC for the Masela Block, extending the term of the PSC until 2055.

"The approval of the revised POD by the authorities is a significant milestone for the Abadi LNG Project. While the project's development concept has been changed from a floating LNG scheme to an onshore LNG scheme, I am confident that the economics of the Project based on the revised POD are now sufficiently strong for Inpex and Shell given the PSC term until 2055 and sufficient financial conditions have been secured following a series of constructive discussions with the authorities. Inpex aims to make this project competitive and will continue to work toward the production startup scheduled in the latter half of the 2020s," said Takayuki Ueda, President & CEO of the company.

Moving forward, the company will continue to work closely with Shell to begin the necessary preparations to commence FEED. Preparations will mainly consist of the mobilization of operational personnel and bidding-related work for the selection of contractors undertaking FEED work.

The project is the first large-scale integrated LNG development project operated by Inpex in Indonesia and follows on from the Inpex-operated



INPEX Receives Approval of Revised Plan of Development

Ichthys LNG project in Australia. The Abadi gas field features excellent reservoir productivity and has one of the world's largest resources, raising expectations of efficient development and stable LNG production operations over the long-term.

The project will provide significant contributions to Indonesia and bring multiplier effects to Indonesia particularly in the eastern region.

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NEW PRODUCTS & SERVICES

New Technology to Revolutionize Offshore Flow Measurement Signals

GM Flow Measurement Services Ltd, has developed smart, disruptive technology which could see it become a global market leader in flow measurement. The start-up business, whose products have secured the support of Scottish Enterprise, is now gearing up for rapid growth after completion of successful field tests.

Their technology is based around two metering products which are safer, more robust and more accurate than others on the market. The meters have a smaller footprint, so they can save on space on the well site as well as eliminating the need for manual intervention and costly production shut-downs.

Meeting industry demand for a bespoke gas flow measurement tool, GM Flow has launched Adjusta-Cone[®] - the world's first automatic and fully adjustable, differential pressure cone meter for natural gas. Having recently completed successful field trials in the North Sea and the Middle East, the device is a safer, more accurate and cost-effective alternative to conventional dual chamber orifice plate fittings for flow measurement.

For well services, GM Flow can also resolve the common problems associated with measuring high pressure nitrogen gas flow during well testing, coiled tubing milling and gas lift operations with Integra-Cone[™]. The device is specifically designed and developed as a high-pressure nitrogen flow meter.

Established in 2014, GM Flow has been developing a range of smart, safe and reliable flow measurement services and products to



support production, exploration, and well services operations.

Gavin Munro, managing director of GM Flow Services Ltd, said: "We've spent the last four years developing and testing our products and are confident we have an intelligent but simple solution to the challenges in getting accurate flow data and then using the analysis more effectively.

"We are aiming to become the industry's new standard in gas flow measurement metering and, as a result, grow the company significantly in the UK and overseas. Our expert team helps customers to fully understand and manage their flow measurement requirements; whether it be for fixed or portable well testing separator, custody transfer, gas-lift, fuel gas or highpressure gas re-injection. Our new range of technology can overcome field operational constraints and functional concerns with conventional devices and equipment."

From robust test and production separator applications to intelligent flow meters to accurately analyze gas and water injection, GM Flow designs, develops and delivers disruptive technology and invaluable expertise for both on and offshore developments around the globe.

The firm also specializes in gas lift and general oilfield liquid and gas pumping flow measurement applications. Its service portfolio includes design, provision, commissioning and testing of specific flow projects, large and small.



Coretrax Drill Pipe Cleaning Ball Wipes Away 11 days of Rig-Time Cost and Risk

Eliminating the need for costly equipment or hazardous manual handling, Coretrax, the wellbore clean-up and abandonment specialist, has seen the deployment of its drill pipe cleaning tool, the CX-Ball, bypass more than 2,000 sales within five years, saving more than 11 days of rig-time cost and risk.

Based on an average time savings of eight minutes per ball, this in total has saved 278 hours of rig-time, equivalent to 11.58 days since the product was launched in 2014. In one North Sea campaign, it has been used consistently for the last 74 well abandonments saving 57.6 hours of rig time alone.

"The CX-Ball essentially embodies the concept of marginal gains," said John Fraser, global business development director with Coretrax. "The simplicity of the tool allows easy and quick deployment and reduced time in the 'red zone'. While this doesn't initially suggest big time savings, over multiple applications in a campaign, significant financial, safety and rig-time savings can be achieved."

After a cement job, foam wiper balls are used t o a v o i d

potential residual cement, fluids or debris, from setting and

setting and building up on the internal diameter (ID) of the pipe. However, competently loading the large foam balls into the restrictive tool joint is challenging and can involve the use of expensive equipment and the safety risks associated with manual handling and machinery.

Unlike other products on the market, the CX-Ball is encased in a soluble material which temporarily restricts the shape of the ball. This allows it to be easily and accurately deployed by a launch tube directly into the drill pipe. When the CX-Ball comes into contact with water, the ball expands and returns to its original shape. The high parting stretch ratio of the foam ball allows it to pass through small restrictions undamaged as it is pumped downhole.

Honeywell Unveils New Approach to Engineering Industrial Control System

Honeywell recently unveiled Experion[®] PKS Highly Integrated Virtual Environment (HIVE), a fundamentally new approach to engineering and maintaining industrial control systems. This is an evolution of the company's flagship Experion Process Knowledge System (PKS).

Experion PKS HIVE uses Honeywell's LEAP[™] project execution principles, software and networking to unchain control applications from physical equipment, and controllers from physical IO. This enables control systems to be engineered and implemented in less time, at lower cost and risk, and with simpler, modular builds. The solution also transforms the way control systems are maintained over their lifecycle, shifting day-to-day management of servers to a centralized data center, where experts and established protocols mitigate cybersecurity risk, allowing plant engineers to focus more proactively on optimization of their control systems.

"ARC market research shows that solutions like Honeywell Experion PKS HIVE address key issues for customers around project risk and ultimately project cost," said Mark Sen Gupta, research director, ARC Advisory Group."A more fascinating aspect is the greater flexibility in control architecture design and implementation allowing for a more optimal use of physical and computing control system assets."

Experion PKS HIVE incorporates three elements – IT HIVE, IO HIVE and Control HIVE – which can be used individually or collectively, in tandem with customers' existing systems and infrastructure:

• Experion PKS IT HIVE centralizes up to 80% of the IT infrastructure traditionally used in project engineering to lower project delivery and lifecycle costs, better leverage skills, and drive consistent physical and cybersecurity management across an enterprise. Experion PKS IO HIVE provides flexible IO and control distribution enabling the control system to become a natural extension of process equipment and to facilitate modular and parallel project execution.
 Experion PKS Control HIVE uniquely applies control containers to provide flexibility and standardization of control hardware platform, control location, and control engineering. With multiple physical controllers operating as part of the Experion PKS Control HIVE, control engineering is dramatically simplified through automated load balancing.

"In developing Experion PKS HIVE, Honeywell worked closely with customers across the chemical, refining and oil and gas industries," said Jason Urso, chief technology officer, Honeywell Process Solutions. "Many of these organizations want a more efficient approach to control system engineering, yet one that can be adopted incrementally and used interchangeably with their existing

Continues on next page

systems and infrastructure. Experion PKS HIVE provides these benefits and is truly a distributed control as it applies and geographically distributes technology to where it is needed." Experion PKS HIVE shifts IO to the field and makes it fully accessible to any controller, taking individual physical controllers and distributing the load so that they appear as a single controller to eliminate complexity. The solution distributes IT compute from onsite to offsite providing a seamless operations experience. The Experion PKS IT HIVE and IO HIVE can be ordered now, with deliveries beginning Q1 2020. Experion PKS Control HIVE will be available in the second half of 2020.

Formation Evaluation Software Release Boosts Understanding of Reservoir Conditions

Emerson announced the release of GeologTM 19, the latest version of its formation evaluation software suite. This release includes new display formats that enhance collaboration between subsurface specialists. This includes representation of zonal data as crossplot and histogram tracks so that geoscientists can better understand the relationships between rock formation pressures, stresses, and mud weights, for example.

The release also enhances its data connectivity and "openness" features with direct streaming of wellsite information transfer standard markup language (WITSML) data into Geolog's geosteering application, expanded connectivity to thirdparty applications, and the integration of Python scripts for enhanced customization with no separate installation.

Additional innovations include:

Streamlined processing and interpretation workflows for acoustic waveform data.
A new mud gas analysis module provides key information about hydrocarbons in drilled formations and allows safer drilling through early detection of gas kicks and lost circulation.

• The ability to translate equations from Geolog into the Roxar™ RMS geoscience and reservoir engineering



collaboration platform and SKUA-GOCADTM modeling solution, as well as the Python, Petrel and Excel formats.

"Although Geolog has been the recognized leader in the petrophysical analysis/formation evaluation market for many years, we are not resting on our laurels, and are constantly striving to further improve the product to enhance our customers' bottom line," said Somesh Singh, chief product officer, exploration and production software business, Emerson Automation Solutions. "Geolog's close links with other applications and platforms are part of our overall strategy of collaboration and openness, to help our users work more efficiently and productively."

Emerson's exploration and production software portfolio and cloud-based platform integrate and forecast oilfield data with production and reservoir engineering fundamentals. They are designed to help operators increase efficiencies and achieve Top Quartile performance on investment and operational goals within new and established oil and gas reservoirs. Top Quartile performance is defined as achieving operations and capital performance in the top 25 percent of peer companies.

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Boreal is Launches New Plastics Recycling Technology

Borealis, a leading provider of innovative solutions in the fields of polyolefins, base chemicals and fertilizers, announced the introduction of a new plastics recycling technology, Borcycle[™]. This evolving technology will be used to produce high-quality compounds made of recycled polyolefins (rPO) such as the newly-launched Borcycle[™] MF1981SY, an rPO with over 80% recycled content intended for use in visible appliance parts.

Borealis also announced a series of significant material improvements to existing recyclates in the established Purpolen[™] brand portfolio. These market launches and product improvements are important technology advancements and thus accelerate the transformation to a circular economy of plastics. Borealis and its wholly-owned subsidiary, mtm plastics, will showcase the new Borcycle technology and recyclate innovations at the K 2019 in October.

Borealis is leading the industry by applying its Visioneering PhilosophyTM to the development and implementation of novel polyolefins-based solutions that enable plastics reuse, recycling, and recovery, and by designing for circularity. These wide-ranging activities are gathered under the symbolic roof of EverMindsTM, the Borealis platform dedicated to promoting a more circular mind-set in the industry. By capitalizing on its profound expertise in virgin polyolefins and collaborating with value chain partners, Borealis keeps discovering new opportunities for business growth within the circular economy.

Advancing technology to bring about polyolefin circularity

The new technology, Borcycle, transforms polyolefin-based waste streams into recyclate material such as pellets. As a transformative technology, it complements the existing Borealis virgin polyolefins portfolio with a range of pioneering, circular solutions. It unites state-of-the-art technology with the profound Borealis polymer expertise gained over decades.

As a scalable and modular technology, Borcycle has been developed to meet growing market demand for high-quality recyclate. Leading appliance brand owners, for one, have pledged to increase the amount of recycled plastics in their goods. Yet until recently, producers have not been able to rely on a consistent supply of high-quality recyclate. The Borcycle technology will help address this challenge. Compounds made using the Borcycle technology deliver high performance, add value and offer versatility. Producers and brand owners in a range of industries will profit from the availability of high-quality recyclate that helps them meet environmental

"Advancing technology is crucial if our aim is to implement value-creating solutions in the circular sphere," claims Maurits van Tol, Borealis Senior Vice President, Innovation, Technology & Circular Economy Solutions. "Building tomorrow together' means

and regulatory challenges.

innovating, collaborating, focusing on the customer, and above all taking action. The launch of our new recycling technology Borcycle is tangible proof of our commitment to achieving plastics circularity."

New and improved recyclate for high-end applications

Borcycle MF1981SY is the first of several upcoming launches of rPO solutions made under the umbrella of the Borcycle technology. Borcycle MF1981SY will be available to Borealis customers in Europe. The compound is an exciting addition to the rPO portfolio because it is a 10% talc-filled compound that contains over 80% recycled material. It offers an ideal balance between stiffness and impact. The compound is especially suited for use in visible black parts, for example in small appliances.

Like its relatives in the mtm plastics family of recyclate materials, Borcycle MF1981SY is a truly sustainable offering. Recyclates from mtm save approximately 30% of CO₂ emissions compared to virgin materials.

A number of significant improvements have been made to existing recyclate grades in the Purpolen portfolio.



Purpolen[®] PP Y40

- A recycled polypropylene (PP) with higher and improved flowability
- Melt flow index now improved to 40g/10min for the injection moulding of thin-walled parts, and long flow paths
- Target applications: pails, thin-wall packaging, appliance parts and more

Purpolen[®] PE FF

- A fine-filtered (FF) polyethylene (PE) regranulate
- Improved gel level via extrusion setup:
- Modified screw by means of integrated mixing element
- Finer melt filtration
- Higher quality is now more comparable to competing conventional grades; is suitable for general purpose applications

Purpolen[®] PE Y01

- A 100%-PCR grade with low melt flow rate (MFR); for extrusion processes for pipes or larger bottles.
- In extrusion processes, lower MFR and lower gel content are prerequisites for the production of bottles and pipes (among other products), offering improved aesthetics, better surface finish and processing stability.

"Mechanical recycling is presently a most ecoefficient method to implement the principles of the circular economy," explains Guenter Stephan, Head of Mechanical Recycling, Borealis Circular Economy Solutions. "Borealis and mtm plastics are leveraging their respective areas of expertise to make significant progress in achieving polyolefin circularity by upscaling recycling output and ensuring the reliable supply of high-quality plastics recyclate for European producers, in particular." By Ricardo Silva

Partner and Co-Head, Energy and Natural Resources Practice Miranda Alliance

When the Time Comes...

Brief considerations on the new Angolan abandonment and decommissioning framework

F or decades the main concern of both oil companies and Host Nations was to discover hydrocarbon reserves and monetize them as quickly as possible, so as to generate value for shareholders on the one hand, and State revenue on the other. As more fields were discovered and brought on stream, new technology developed to allow for secondary and tertiary recovery, and then with smaller companies taking over mature fields, decommissioning and abandonment of depleted oilfields was far from most players' minds. This state of affairs has, however, come to a swift end, as all over the world both companies and States are beginning to struggle with the environmental and economic legacy of fields that were first developed at a time when the environment was far from the priority that it has become in recent years.

Everywhere from the North Sea to West Africa, to faraway South East Asia and Australia, companies and regulators are coming to terms with the amount of work to be done in the near future to decommission depleted fields, and the financing, technical and regulatory challenges to do so. This latter point is critical especially in relation to small companies that have taken over operations towards the end of field life from larger IOCs, and that have a much weaker financial position and technical capacity.

The state of the play in Angola

The same situation briefly mentioned above can also be found in Angola, where mature fields have over the years been taken over and redeveloped by smaller players and/or Sonangol. Environmental



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concerns have already arisen in respect of some of these fields, where the structural integrity of certain facilities has recently been questioned by the regulators. Additionally, some of the larger companies have also come to the point where they are starting to plan for decommissioning of older facilities and plugging and abandoning depleted wells and require certainty in terms of technical rules and decommissioning-related financial aspects.

Up until recently the Angolan Petroleum legal framework was mostly silent on decommissioning and abandonment, and not 100% clear on other environmental issues.

In terms of decommissioning and abandonment, Article 75 of the Petroleum Activities Law required Sonangol and the contractor group to jointly submit an abandonment plan and carry out the activities required to abandon wells and decommission facilities in

accordance with the law and good oilfield practice. However, the law did not further regulate these issues, and "good oilfield practice," being a great catch-all term, often raises significant interpretative complexities. For instance, probably the area of the world where decommissioning has been most developed in the past is the North Sea; but does it make sense for the North Sea standards to be applied in West Africa, where the habitats, operational environment and oil producing facilities are different to those in the north of Europe?

On the other hand, in terms of environmental claims, while it appeared clear that IOCs would be responsible generally for damages arising out of petroleum activity-related claims under a presumption of fault regime contained in the petroleum legislation, the environmental legislation applied a strict liability framework to any environmental damages irrespective of how they were caused. In turn the allocation of liability between the IOCs and the then national concessionaire, Sonangol, E.P. would have to be assessed under the respective petroleum contract. Most contracts also stated that IOCs would be liable towards the State and Sonangol for any damages they caused to them. To add another layer of complexity, over the years there have been different petroleum contract "generations" in Angola and, although they mostly follow a common root, there are variations from contract generation.

Some of the biggest issues that companies have struggled with include how to treat residual liability, what provisions exactly are applicable to abandonment, how will the decommissioning accounts established under certain PSCs be operationalized and used, and what happens to decommissioning liabilities in case of takeover of facilities and operations by the NOC?

New decommissioning regulations

In 2018, the restructuring of the Angolan oil sector to make it more attractive to investors was the perfect opportunity to also address the above identified issues, notably through the enactment of Presidential Decree 91/18, of 10 April 2018.

The first notable issue that the new regulations addresses is the requirement of all contractor groups to constitute abandonment funds by depositing the relevant funds into an escrow account that will be mobilized to pay for decommissioning at the end of field life. This statute establishes the "rules and procedures for abandonment of wells and decommissioning of oil & gas facilities in national territory," setting forth a regulatory framework that is mandatory for all companies carrying out petroleum operations in Angola and applies as of 1 January 2019. In practice, this means that the Angolan government seeks to apply all provisions of Presidential Decree 91/18 to existing petroleum concessions, therefore superseding contractual provisions which are not aligned with the new rules.

The first notable issue that the new regulations address is the requirement of all contractor groups to constitute abandonment funds by depositing the relevant funds into an escrow account that will be mobilized to pay for decommissioning at the end of field life. The provision of the abandonment fund shall commence at different times depending on whether or not we are dealing with new concessions, new development

areas, or development areas and concessions existing prior to the effective date of the new statute. The fund shall serve the purpose of securing and holding the contractor group members liable for funding of the amount necessary for well abandonment and facilities' decommissioning.

In turn, the value of the abandonment fund shall be determined in accordance with an estimate of final decommissioning and abandonment costs. For this purpose, the provisional abandonment plan shall contain a forecast of the funds needed for its implementation, including a detailed cost breakdown for well abandonment and decommissioning of facilities. This forecast shall be updated regularly, prior to being finalized in the definitive abandonment plan to be submitted prior to commencement of decommissioning and abandonment operations. From a technical standpoint, the Presidential Decree establishes rigorous, objective, but at the same time flexible rules and procedures which ensure that wells and oil and gas facilities are abandoned and decommissioned without economic and social constraints. Learning from past experience and ongoing regulatory discussions in other oil producing regions, it foresees the definitive decommissioning of facilities and plugging and abandonment of wells with a view to ensuring their integrity, and safeguarding the safety of local communities in the areas where petroleum operations were previously conducted, notably in terms of navigation, fishing, movement of persons and other activities.

The statute also seeks to encourage the development and use of new technologies for well abandonment and decommissioning of facilities, provided they are aligned with environmental conservation principles, cost reduction objectives, and in compliance with international oilfield industry rules and practices. To harmonize the approach to decommissioning and abandonment (and thus hopefully streamlining review and approvals) the definitive decommissioning plan shall follow the procedures and model form included as an Annex to the presidential decree, which allows for the proposals to include the total or partial decommissioning facilities, if so justifiable and aligned with the overarching principles of the statute.

Finally, the new regulations also include rules for situations where the operations and facilities are transferred to a different entity, and also for handover of facilities and operations.

If the contractor group members are replaced by new members, the new entities shall be responsible for the abandonment and decommissioning of wells and facilities. For such purpose the statute includes clear rules on the handover of facilities, inspection and audit, establishing, notably, that an inspection be carried out to ensure that decommissioning and abandonment has been performed in compliance with the approved plan, following which the regulator shall issue a certificate of completion of the works and release of liability according to a form attached as an annex to the statute. Additionally, there are requirements for continued monitoring after conclusion of the works.

In this situation of take over of operations and facilities, which is one of the most complex issues that, for instance, the UK and Australia are currently being faced with, the new Angolan regulations establish that the new contractor group entities shall be responsible for funding the abandonment costs, clarifying that if the funds are insufficient to cover the costs the liability for providing additional funds lies with the contractor group members, if such costs can be recovered, in accordance with their respective participating interests, and the Angolan authorities shall be released from all such liability. If the costs cannot be recovered, the contractor group entities shall be required to agree with the authorities on the recovery or deductibility of such additional costs.

What does the future hold?

The new Angolan decommissioning and abandonment framework is a significant improvement, bringing added certainty and clearer rules in an area that has become critical in recent years, while previously being devoid of adequate provisions, mechanisms and procedures. This has been welcomed by the industry as the existence of a clear regime covering abandonment and decommissioning operations has been one of the major demands of the IOCs in recent years, mainly due to the proliferation of maturing fields in Angola.

This said, there are a number of matters that the regulations do not cover, and that will need to be addressed sooner or later. One such area is how to deal with integrated upstream, midstream and downstream projects, since the new rules only apply to onshore and offshore upstream operations. Decommissioning and abandonment is a complex area, where technical, commercial and legal aspects need to be considered together, and where solutions are often driven by new engineering developments. Only the future will tell if the new regulations approved by Angola indeed have the necessary clarity and flexibility to allow the country's depleted fields to be definitively shut down in a manner that is satisfactory to all stakeholders.

* Ricardo Alves Silva is a Partner and Co-Head of Miranda's Energy and Natural Resources Practice and is involved in advising oil and gas companies, Host Nations and regulators in their operations in Africa and Asia. Ricardo may be contacted at Ricardo.Silva@mirandalawfirm.com.



The 4th annual edition of RES: West will make its first appearance in Dakar, Senegal, from 10-11 October 2019 at the King Fahd Palace Hotel. **RES: West Africa** will bring together over 300 investors, project leaders and utilities stakeholders to engage and present the latest developments on enhancing the energy mix within the wider West Africa region.

The Summit will feature project focused discussions on Gas, Wind and hydro and will showcase investment opportunities through regional anchor projects, infrastructure financing and the future of renewable energy within Senegal and beyond.

For more information please contact: res-west@energynet.co.uk quoting RESW_PE



OPPORTUNITY UGANDA

Uganda has announced that it will be hosting its second competitive licensing round. The blocks on offer, located in the prolific Albertine Graben, sit next to some of the country's largest oil finds.

arlier this year, Uganda's Ministry of Energy and Mineral Development issued a Request for Qualification (RFQ) inviting interested firms and/or consortia to submit Statements of Qualifications within a period of not less than three months for government to determine their eligibility to participate in this licensing round. The submission deadline was recently extended until November 20, allowing additional review time for interested parties

The blocks on offer in Uganda's second competitive bid round are nearby some of the country's major oil blocks that are currently held by Tullow, Total E&P and CNOOC Uganda Ltd. So far, an estimated 6.5 billion barrels of oil in place and 500 billion cubic feet (Bcf) of natural gas has been confirmed from exploration work undertaken in less than 40% of the Albertine Graben, leaving much prospectivity for new exploration.

The Blocks

For the second licensing round (the first was held in 2016), five blocks will be on offer, all highly prospective exploration areas with good data coverage available. Highlights on each of the blocks are summarized below:

Turaco Coucal Block (Semliki Area): 2D and 3D seismic surveys were undertaken in the Semliki Basin and three exploration wells were drilled on the Turaco prospect in approximately the same geographical position (between 1998 and 2004). All the three wells encountered oil, but the Turaco-3 well was specifically used to test the oil zones. Various reports and datasets are available for this 635-sq km block.



Riwu Omuka Block: This 750 sq km block is located in the former Exploration Area 1 in the districts of Buliisa, Packwach, Nwoya and Nebbi. 2D seismic surveys were undertaken and three wells were drilled in this area (Riwu-1, Ondyek-1, and Raa-1) which did not encounter any oil. This block is located in proximity of the Buliisa oil fields which have been issued production licenses. It is also in proximity to the Buliisa Central Processing Facility. Additional reports and data are also available for this block.

Kasuruban Mutonta Block: Located in the districts of Hoima, Buliisa and Masindi, the block has seen three wells drilled. The Taitai-1, Karuka-1 and Karuka-2 were drilled on the Taitai and Karuka prospects during 2007. None of the three wells encountered hydrocarbons. 2D seismic data, as well as additional reports are available. The block is in close proximity to the Buliisa and Kaiso-Tonya oil fields and production infrastructure. The size of the block is approximately 1,285 sq km.

Ngaji Mpundu Block: The block is located in the districts of Rukugiri, Kanungu and Kasese. The Ngaji-1 well was drilled during 2009 and did not encounter any hydrocarbons. The prospect is heavily faulted and compartmentalized. However, an optimal location within a good migration passage was not drilled which may explain the failure to encounter hydrocarbons. Based on the 2D seismic and the aerogravity data that was acquired, there are other drillable locations in this area. The areas also have various reports available and the block size is approximately 895 sq km.

Mvule Avivi Block (Rhino Camp Area): Located in the districts of Madi-Okollo, Adjumani, Obongi and Yumbe, it has about 200 km of high quality 2D seismic data and an Airborne Tensor Gradiometry was also acquired over the Block. Three exploration wells (Mvule-1, Iti-1 and Avivi-1 were drilled but did not encounter any hydrocarbons. Based on the 2D seismic data, the resource accounting of the hydrocarbons in place in the entire Block indicates highly risked recoverable reserves. Various reports are available and the license area is approximately 1,026 sq km.

Some of the additional reports mentioned and available for the various blocks include geochemical and palynological reports, field mapping reports, borehole seismic reports, geological end of well reports, mudlogging reports, well completion reports, among others.

Award Process

Once government has evaluated the submissions under the RFQ, the qualifying firms will then be issued a detailed request for bids which will be evaluated by the Government. The companies submitting the best evaluated bids for each of the blocks will proceed to negotiations with Government prior to signing production sharing agreements. The licensing round is expected to be concluded with the award of Petroleum Exploration Licenses to successful firms.

The award of licenses will be guided by the Petroleum (Exploration, Development and Production) Act 2013 and the National Oil and Gas Policy for Uganda (2008). It follows the first license round which was conducted in 2016 and resulted in the award of three licenses; two licenses (Ngassa shallow play and Ngassa Deep play) were awarded to Oranto Petroleum Ltd. and one license (Kanywataba block) was awarded to Armour Energy Ltd.

Details on the licensing round are scheduled to be presented at upcoming conferences, including Africa Oil & Power being held in Cape Town during October, as well as at Africa Oil Week in November, also in Cape Town. Roadshows have been scheduled for Dubai (September 11), London (October 14), and Houston (October 17), for investors to learn more. Alternately, more information on the second licensing round can be found at *www.petroleum.go.ug* or by contacting The Commissioner's office at *pepdebb@petroleum.go.ug* or *licensing@petroleum.go.ug*.

The five blocks are available to potential applicants after going through the prequalification stage successfully. Entry into the prequalification stage is subject to prior payment of a non-refundable application fee of \$20,000. Upon the payment, the RfQ document can then be taken at the Petroleum Exploration, Development and Production Department in Entebbe or delivered through an email by the Manager, Second Licensing Round. The payment of the Application fee shall be made to the following bank account:

Account Name: Uganda Petroleum Fund Bank Name: Bank of Uganda Account Title: Uganda Petroleum Fund – USD Account No: 003300328400010 Swift Code: UGBAUGKA

Sealed applications for qualifications must be delivered to the address below at or before September 20, 2019 at 10:00 am local time to:

The Permanent Secretary, Ministry of Energy and Mineral Development



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By Nicolas Tellier, Chief Geophysicist Sercel

Moving Over to MEMS FIVE BENEFITS OF DIGITAL SEISMIC DATA ACQUISITION

he move from analog to digital technology has happened gradually rather than suddenly in the seismic industry, with the first digital seismic sensors based on microelectromechanical systems (MEMS) accelerometers launched almost 20 years ago. Since then, these small and highly-accurate devices have undergone continued technological development, to the point where they now offer several distinct performances advantages compared to traditional geophones. Here we outline five key drivers behind the migration from analog to digital technology.

MEMS delivers digital fidelity

While the response of geophones is damped below their natural frequency and distorted above their spurious frequency, MEMS sensors offer linear and flat amplitude and phase responses from DC to 800 Hz in the acceleration domain. Their specifications are not affected by temperature, aging or manufacturing tolerances, making the signal recorded accurate in both phase and amplitude on the entire seismic bandwidth of interest. The preservation of amplitudes has been recognized for amplitude versus offset applications. The coil-free design makes the sensor insensitive to electromagnetic noise, and the sensor distortion is much lower than that of geophones. This digital fidelity is viewed as a significant benefit for high trace density, single receiver surveys.

Low noise floor and low-frequency performance

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

These days, MEMS sensors achieve a significantly lower noise floor than previously available designs, achieving -10dB and thus a higher dynamic range in the region of +10 dB, providing ideal conditions to record low frequencies down to 1Hz. Also, recent research shows it is



MEMS-based digital seismic sensors

possible to develop MEMS accelerometers with a noise floor below New High Noise Model down to 0.1Hz and showing only a slight increase down to 0.001Hz, opening up new possibilities for below hertz signal recording.

3C recording and vector fidelity

3C acquisition has a proven track record of success in complex geologies. From an operational perspective, the 3C MEMS channel is omni-tilt and compact, and removes potential errors when connecting geophones to three digitizers. The same sensor can be used for the three components, while geophones must be compensated for gravity when operated horizontally. The MEMS' tiny size allows for a correspondingly small housing form-factor, thus enabling an efficient rejection of parasitic signals, such as ground-roll induced rotations. The compactness of the 3C sensor also favors optimal coupling to the ground - a paramount factor for the proper recording of horizontal components. Another significant benefit of 3C MEMS lies in the excellent vector fidelity it provides to seismic measurements. Indeed, good MEMS accelerometers are fitted with a feedback loop that enables the measurement of static signals, such as the Earth's gravity. Thanks to this feature, 3C MEMS sensors can be easily factory-calibrated by using a very accurate gravitational acceleration reference, and consequently, the manufacturing orthogonality tolerances of the three axes can be compensated for.

Operational benefits result in savings

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

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

Lower power and lower costs

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

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

For more information on the transition from analog to digital technology, download the new white paper entitled Moving over to MEMS: Assessing the Analog to Digital trend in Seismic Data Acquisition on www.sercel.com



By Luca Mascheroni, Gas and Geochemistry Specialist Geolog Technologies

H2S Detection While Drilling A New Approach

EOLOG presented a paper entitled "H₂S detection while drilling: a new approach" at the 14th Offshore Mediterranean Conference and Exhibition in Ravenna, Italy, March 27-29, 2019. The paper illustrates the potentialities of the alternative methodology GEOLOG is proposing for H₂S detection onsite, based on core or cutting analysis.

Whether it is oil or gas bearing, conventional or unconventional, when a field contains H_2S above a certain value it is qualified as sour. Even though it presents several difficulties, the development of sour (rich in H_2S and CO_2) oil and gas fields is quickly emerging as a major industrial and technological theme. Such interest for sour resources arose because of two main factors: first, the diminishing accessibility of easy-to-produce conventional oil and gas makes attractive also the development of high H_2S fields; second, there has been an increase of operations in areas traditionally rich in sour resources like Russia and the Middle East (*Figure 1*).



Figure 1. Source: Eni, World Oil and Gas Review, 2016. Annual statistic report on world reserves: crude production quality based on data from 2015

 H_2S detection, together with the identification of formations and well intervals bearing it, is therefore crucial for oil companies since it heavily impacts completion strategies and field development. For many years, inorganic scavengers were used and through mud acidification it was possible to release H_2S and to get an evaluation of its concentration. Nowadays, the use of organic scavengers which bound irreversibly to H_2S , makes impossible its detection and hinders all the information regarding well sourness. In this paper, GEOLOG have presented a novel methodology which aims at overcoming this problem by core/cutting analyses. Methodology development started from the hypothesis that part of the formation gas is still preserved in cutting pores. Experimental evidences, collected in the last few decades, show that gas (hydrocarbons and contaminant gases, including H₂S) is mostly released by the rocks while drilling into mud (so-called mud gas); nevertheless, some further gas can be released by cuttings e.g. in sealed vials (so-called head space gas) and, finally, a last portion is still preserved in cuttings. Our experimental approach implies the analysis of this last portion, also called interstitial or residual gas, that can be recovered by grinding the cuttings in a sealed mill, gas recovery from the gastight chamber and its analysis by GC-TCD H₂S detector (*Figure* 2).



Figure 2: Sketch of interstitial gas operating procedure. 1) Dried cuttings are placed in gas tight agate container; 2) Once mill to fine powder residual gas is released and 3) Sampled through a gastight syringe or directly connected to a GC-TCD detector 4) where H2S is quantified.

It must be highlighted that the obtained H_2S concentration value is not only depending on its abundance but also on many other concurring factors which are difficult to precisely evaluate and quantify, such as rock permeability, sample preservation and treatment and rock-gas interactions. Therefore, the detected concentrations cannot be interpreted on a strict quantitative basis, but they still give us an important indication of H_2S presence and of its relative abundance.

In one of the first successful applications of these methodology, a sandstone reservoir in South-West Africa has been subjected to investigation. The analyzed interval was comprehending 600 meters of the horizontal drain of the exploration well. Oil base mud was used



Figure 3: Depth log of mud gas and Interstitial gas analyses of a sandstone reservoir section. Results are displayed vs total measured depth (TMD). If col.: lithology; 2rd col.: total vertical depth (TVD); 3rd col.: rate of penetration (ROP); 4th col.: mud gas hydrocarbon data, from methane (C1) to pentane (C3), with isomers; 3th col.: mud gas H2S from mud logging sensors and interstitial H2S (with associated error bars).

as drilling fluid, without any addiction of H_2S scavengers. At the time the well was drilled, mud gas logging was employed, among its other tasks, in order to keep H_2S abundancy monitored for safety reasons. Since the well spud, deployed electrochemical sensors registered a signal oscillating from 0 to 1ppm, as first hint that H₂S was potentially present in the drilled formation. Later on, once finished drilling, downhole fluid analysis confirmed that the reservoir was producing gas with 1% (mol) of H₂S. In order to test the applicability of the methodology described in this paper, the cuttings coming from this well were requested to be analysed, almost two years later since the well was completed. Cuttings from 600 meters of the reservoir horizontal drain were analysed for interstitial gas with a 20m frequency. Results are shown in *Figure 3*.

Hydrogen sulfide was detected below the dolomitized section in variable concentration through all the reservoir. Being one of the very first applications of this methodology, H₂S presence and abundancy was confirmed by repeating three times the measurement on the same cutting sample (its concentration is reported together with the associated standard deviation). The variability of the magnitude of H₂S could be due to different reasons, among which sample heterogeneity has been identified as the possible major contribution. Knowing that cutting dimensions could influence the capability of the rock sample to store the gas in its pores, it was found very interesting that the use of a PDC bit caused the analysed cuttings to be in the state of fine/medium disaggregated sandstone and yet H₂S was still preserved in these samples.

These results are the proof that the methodology can be not only applied even on several years old cuttings, but also on very small size cutting samples, i.e.: PDC bits are not a limitation for this methodology.

Other case histories were included in the paper in order support the presented methodology and shed light about the potentialities of such kinds of analyses. Although this methodology can be exploited at its best in combination with petrophysics analyses, it can still provide unique pieces of information about H₂S distribution through drilled formations. In fact, the possibility to discriminate H₂S abundancy though a reservoir in near real time could be used, for example, to help in selection of kick off points for horizontal drains or when programming the well completion in the packers positioning.



Refinery Strikes Liquid Gold with Efficiency Increases in Catalytic Reformer

Process Overview

atalytic reforming converts low-octane, straight-run naphtha fractions, particularly heavy naphtha, into a high-octane, lowsulfur reformate, which is a major blending product for gasoline/petrol. The process is endothermic and is carried out by feeding a naphtha and hydrogen mixture to a furnace, where it is heated in a series of fired heaters to the desired temperature, 450° to 520°C (840° to 965°F), before passing through a series of reactors.

Thermal Inefficiencies

In a high temperature environment, steel alloy process tubes will immediately oxidize, and scale will develop. This oxidation scale layer acts as an insulator and will lead to a decrease in heat transfer as the scale increases in thickness. To compensate for the insulating effect of the scale, the heater is subjected to excessive fuel firing. The resulting increased temperate promotes the development of further scale. As oxidation continues, tube metal is consumed leading to a decrease in tube wall thickness, which shortens the tube life.



Side-by-side comparison of process tubes with and without ceramic coating much of the energy is reflected back and is absorbed into the flue gas and carried out of the radiant section, into the convection section and out the stack, with the majority never reaching the process.

High emissivity coatings for refractory surfaces increase surface emissivity to 0.92, a near blackbody. Radiant energy is absorbed by



Typical process tube condition

Process tubes under IR illustration

Refractory coating

Ceramic Coatings

Ceramic coatings for process tubes prevent oxidation and scale formation for approximately two turnarounds. This thin-film coating maintains the process tube in a like-new condition, maximizing conductive heat transfer to the process and increasing radiant section efficiency. Likewise, by stopping oxidation, tube metal loss is prevented.

Coating Refractory Lining

The Emissivity of typical refractory linings in fired heaters ranges from 0.45-0.65. When radiant energy encounters these refractory linings,

the high emissivity lining and reradiated across a broad spectrum. The reradiated energy is able to penetrate the flue gas and be absorbed by the process increasing radiant section efficiency.

Heater Evaluation at a Refinery

A refinery reported that excessive process tube scale on their catalytic reformers was creating a limitation and contacted Cetek, the preeminent global turnkey provider of ceramic high-emissivity coatings, for an inspection and recommendation. Cetek visited the site to conduct an infrared inspection of the heaters. After reviewing the infrared images and the data supplied by the refinery's process engineer, Cetek's fired heater expert recommended both high emissivity coatings for process tubes and refractory surfaces for all heater cells. The results of this evaluation are summarized in the chart below:

Benefit Category	Benefit Percentage
Radiant Section Efficiency	7.0%
CO ₂ Emission Reduction	6,5%
NOx Emission Reduction	~10%

With the predicted fuel savings and capacity increase from the application of high emissivity ceramic coatings, a payback period and return on investment was calculated over the life of the coating. Keeping the same production rate, the coating would produce over \$2.9 million in fuel savings; when keeping the same firing rate and increasing throughput, over \$10.5 million in additional profit could be realized from the increase in production.

Post Application Report

After the coating was applied and the catalytic reformer was returned to service, and conditions in the heaters were similar to the pre-



Before

After the application of Cetek coating

evaluation conditions, a fired heater study was completed to measure the actual benefits of the ceramic coatings. The increase radiant efficiency of 10% was achieved.

Taking the cost of the project and the benefits into consideration, the payback was 14 months in terms of fuel savings or four months for capacity rate or process severity increase.



Seas off West Africa World's Worst for Pirate Attacks

The seas around West Africa remain the world's most dangerous for piracy, the International Maritime Bureau's (IMB) latest report reveals. Of the 75 seafarers taken hostage onboard or kidnapped for ransom worldwide so far this year, 62 were captured in the Gulf of Guinea – off the coasts of Nigeria, Guinea, Togo, Benin and Cameroon.

orldwide, the IMB Piracy Reporting Center (IMB PRC) recorded 78 incidents of piracy and armed robbery against ships in the first half of 2019, compared with 107 incidents for the same period of 2018. Overall, 57 vessels were boarded successfully, representing 73% of all attacks. Pirates killed one person, took 38 crewmembers hostage, and kidnapped a further 37 for ransom.

Gulf of Guinea world piracy hotspot

The IMB report reveals 73% of all kidnappings at sea, and 92% of hostage-takings, took place in the Gulf of Guinea. Armed pirates in these high-risk waters kidnapped 27 crewmembers in the first half of 2019, and 25 in the same period in 2018. Two chemical tankers were hijacked, as well as a tug that was then used in another attack. Of the nine vessels fired upon worldwide, eight were off the coast of Nigeria, Africa's top oil producer. These attacks took place on average 65 nautical miles off the coast – meaning they are classified as acts of piracy.

But there are some encouraging signs of improvement. IMB PRC reports "a welcome and marked decrease" in attacks in the Gulf of Guinea for the second quarter of 2019, commending the Nigerian navy for actively responding to reported incidents by dispatching patrol boats. While recognizing that many attacks go unreported, IMB recorded 21 incidents around Nigeria so far in 2019, down from 31 in the same period of 2018.



Naval vessels from Equatorial Guinea and Spain also intervened in May 2019 when a Nigerian tug was hijacked 41 nautical miles off Luba, Equatorial Guinea. Soon after, the pirates used the tug to launch an attack on a Maltese heavy load carrier. The crew retreated into the ship's citadel, a safe room for protection against attackers. When the navies responded, the pirates left the vessel and the crew were freed.



Warning to stay alert

Despite the recent fall in Gulf of Guinea attacks, IMB is urging seafarers in the region to remain vigilant and report all suspicious activity to regional response centers and the IMB PRC. "Early detection of an approaching suspicious craft is key to prevent boarding and give time to raise the alarm and retreat into a citadel, if needed," said an IMB spokesperson.

Meanwhile, in Malaysia, 10 crew were kidnapped from two fishing boats off eastern Sabah in June. Of these, nine crew are reported to have been released. Around Indonesia, ongoing information-sharing cooperation between the Indonesian Marine Police and the IMB PRC continues to show positive results. The 11 incidents reported in Indonesian waters remains the lowest Q2 figure since 2009 when three incidents were reported.



Violent attacks in South America

A vessel was fired upon in the Guayas River after departing from Guayaquil, Ecuador's second largest city. This is the first time an incident involving the firing of weapons has been reported to the IMB PRC in Ecuador.

Elsewhere in South America, incidents of violent armed theft against ships at anchor have been reported in Callao in Peru, Jose Terminal in Venezuela and Macapa in Brazil. On May 2, 2019 when armed robbers boarded a yacht in San Ignacio de Tupile, Panama, shooting and killing a family member and injuring another. The surviving family members including two children were rescued by Panamanian Marine Police.

Global anti-piracy support

Since 1991 the IMB PRC's 24-hour manned center, has provided the maritime industry, governments and response agencies with timely and



transparent data on piracy and armed robbery incidents – received directly from the Master of the vessel or its owners.

The IMB PRC's prompt forwarding of reports and liaison with response agencies, its broadcasts to shipping via Global Maritime Distress and Safety System (GMDSS) Safety Net Services and email alerts to Company Security Officers, all provided free of cost, has helped the response against piracy and armed robbery and the security of seafarers, globally.

IMB strongly urges all shipmasters and owners to report all actual, attempted and suspected piracy and armed robbery incidents to the IMB PRC globally. This first step in the response chain is vital to ensuring that adequate resources are allocated by authorities to tackle piracy. Transparent statistics from an independent, non-political, international organization can act as a catalyst to achieve this goal.



African Focus



Politics & Economy

uhammadu Buhari has been the president of Nigeria since winning the election in March 2015. At the time it was big news as he was the first opposition candidate to do so in Nigeria's history. Buhari has been plagued by ill health for much of the last two years and has left the running of the country to his vice president, Yemi Osinbajo. His absences have led to calls for a replacement, yet despite Buhari's absenteeism and ill health, he was on the ballot in the February 23 elections this year. Not only was he on the ballot, but he won another term as president.

The elections had initially been scheduled for February 16; however, the country's electoral commission postponed the vote by a week, citing logistical challenges in getting electoral materials to polling stations on time. In some places, the vote was delayed until February 24 due to electoral violence, while other areas polling was subsequently delayed until 9 March, when voting was carried out alongside gubernatorial and state assembly elections.

Buhari defeated his closest rival Atiku Abubakar of the People's Democratic Movement (PDM) by over 3 million votes and was sworn in on May 29. This does not mean that the vote was without controversy. A petition was filed by both the PDM and the Hope Democratic Party, challenging the re-election of President Buhari. The matter is before a five-man tribunal currently.

On the economic front, given that the petroleum industry plays a significant role in the country, this sometimes means, unfortunately,

that its economy, budget, etc. are tied to the price volatility that is the global crude market. According to a recent report by the World Bank Group, "between 2006 and 2016, Nigeria's gross domestic product (GDP) grew at an average rate of 5.7% per year, as volatile oil prices drove growth to a high of 8% in 2006 and to a low of -1.5% in 2016."

The outlook has improved somewhat from 2016, emerging from a recession in 2017 with a growth rate of 0.8%, driven mainly by the oil sector, the report indicated. "Growth was higher in 2018 (at 1.9%) and more broad-based; however, it still fell below the population growth rate, government projections and pre-recession levels. The oil and gas sector reverted to contraction from the second quarter of the year and the non-oil economy was thus the main driver of growth in 2018. While agriculture slowed down significantly due to conflict and weather events, non-oil, non-agricultural growth, which remained negative up to the third quarter of 2017 strengthened through 2018 – but remained weak – with services (primarily information and communications technology) resuming as the key driver."

Economic growth is expected to hover just above 2% in 2019 and over the medium term. The oil sector is likely to stagnate in the face of regulatory uncertainty, limiting investments in the sector. Agriculture may remain affected by conflicts and climate and weather events; and the non-oil/non-agriculture sectors will likely continue to struggle in the face of sluggish demand and constrained private sector credit growth. Swift focus on macroeconomic and structural reform priorities articulated in the country's Economic Recovery and Growth Plan (ERGP 2017-2020) by the renewed government administration and acceleration of their implementation could immediately promote needed economic resilience and can be expected to strengthen growth further than current projections.

The World Bank also pointed to development challenges going forward in its report: "While Nigeria has made some progress in socio-economic terms in recent years, its human capital development remains weak due to under-investment and the country ranked 152 of 157 countries in the World Bank's 2018 Human Capital Index. Furthermore, the country continues to face massive developmental challenges, which include (as always) the need to reduce the dependency on oil and diversify the economy, address insufficient infrastructure, and build strong and effective institutions, as well as governance issues and public financial management systems.

"Inequality in terms of income and opportunities has been growing rapidly and has adversely affected poverty reduction. The North-South divide has widened in recent years due to the Boko Haram insurgency and a lack of economic development in the northern part of the country. Large pockets of Nigeria's population still live in poverty, without adequate access to basic services, and could benefit from more inclusive development policies. The lack of job opportunities is at the core of the high poverty levels, of regional inequality, and of social and political unrest in the country."

On the transparency front for its extractives industries, Nigeria had its best yet report card. The International Board of thes Extractive Industry Transparency Initiative (EITI) revealed that Nigeria has attained the highest rating in implementation of its standards by member countries. Waziri Adio, the Executive Secretary Nigeria Extractive Industry Transparency Initiative (NEITI) said that the West African country was among the countries that attained "Satisfactory Progress", the highest rating of the board. Adio went on to say that Nigeria was rated as having satisfactory progress in 29 out of 31 criteria, adding that it was only on two levels that it rated below satisfactory. "For us achieving satisfactory progress on EITI validation is not a destination, it is a journey. And the journey of continuous progress continues. Nigeria will continue to raise the bar in EITI implementation," he said.



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UPSTREAM

The country is the continent's number one oil producer, generally producing in the 1.8 to 2.0 million barrels per day (bpd) range. According to the state-run Nigerian National Petroleum Corporation's (NNPC) former Managing Director, Maikanti Baru in June, Nigeria's production hit 2.32 million bpd of crude. "Since we came in July 2016, we are focused on increasing production of oil and gas and condensates. At some point, our national combined production was about a million barrels; I am happy that as at the end of 2018, we have moved on averaging last year, about 2.1 million barrels. As I am speaking, this morning, I look at our production figures, combined with oil and condensates, we are pushing 2.32 million bpd," he said.

According to NNPC, Nigeria has around 202 trillion cubic feet (Tcf) of proven gas reserves plus about 600 Tcf unproven gas reserves. Despite this abundance, only about one-quarter of these proved resources are being produced or under development. The government has made the unlocking of its gas resources a priority to increase domestic and industrial power supply, raise living standards and support sustainable economic growth and diversification.

With the launch of Nigeria's New Gas Policy (NGP) in Q3 2017, both indigenous and international companies are working on developing their respective natural gas assets. Royal Dutch Shell, one of the country's largest producers, operates through two Nigerian units Shell Petroleum Development Company (SPDC) and Shell Nigeria Exploration and Production Company Limited (SNEPCo). Both of these units are busy helping to keep Nigeria's oil production totals up and boost the country's natural gas production numbers. SPDC is working closely with NNPC to increase gas supply for power generation. To this end, in 2018 SPDC expressed its commitment to the Nigerian government in executing three out of seven Critical Gas Development Projects – the first being the Assa North/Ohaji South field – partnered with Total, ENI and indigenous producer Seplat. (see inset)

The project, located in south-eastern Imo State, covers OML 21 and OML 53. Assa North, on OML 21 operated by Shell, and Ohaji South, on OML 53 operated by Seplat, are in communication with one another and are being developed under a 50/50 unitization agreement. NNPC expects the fields to produce 600 Mmscf/d of gas and says a doubling of output is possible. It estimates the resource at 4.3 Tcf of gas and 215 million barrels of condensate. Part of the resources developed will be used at a processing plant being developed by Seplat. ANOH Gas Processing, which is owned and managed by Seplat and the Nigerian Gas Co, a unit of NNPC, will develop, build, operate and maintain the gas plant. Production from the processing plant will be used mainly by domestic industrial customers.

Shell is also working toward FID on its Bonga Southwest Aparo (SWA) project. The first phase of Bonga SWA will include an FPSO, capable of producing 150,000 bpd of oil, tied to more than 20 subsea wells. The project straddles OMLs 118, 132 and 140 and is located about 135 km offshore Nigeria, in around 1,400 meters depth. Shell operates the project with a 55% share. Partners are ExxonMobil (20%), Total (12.5%) and ENI (12.5%). In February Shell invited prospective bidders

Seven Critical Gas Development Projects

In July 2018, NNPC signed agreements on the Seven Critical Gas Development Projects. Once all are up and running, the projects are set to bring 3.4 Bcf of gas online by 2020.

Assa North-Ohaji South Field Development (ANOH) – NNPC, SPDC and Seplat Petroleum

- Full field development of Assa North and Ohaji South Gas fields
- EPCI of a 2 x 300 Mmscf/d gas processing plant
- Construction of 16 km dry gas pipeline from Assa North to OB3

OML 24 and OML 18 joint development – NNPC, Newcross and Eroton

- Joint field development of OML 24 and 18
- Construction of a 12 km gas pipeline to transport Ekulama gas to Awoba
- Expansion of the existing 12" x 30 km Awoba to Cawthorne Channel Pipeline
- Development of the Trans Nigeria Gas Pipeline segment from Cawthorne Channel-Alakiri-Obigbo Node

Four Unitized Gas Fields – SPDC JV/NAOC JV

- Full field development of the four-unit area gas
- Construction of gas gathering pipelines from the unitized fields to a central hub (Assa North CPF) for processing
- Gas to be evacuated to the domestic market through OB3 pipeline

OML 26, 30, 42 Development – NPDC and OML 49 Makaraba Cluster Development – Chevron Nigeria Limited • Joint development of OMLs 26,30 & 42

- Construction of gas pipelines from both OMLs 26 & 30 to Utorogu Gas Plant for processing and evacuated to the domestic market through ELPS
- Construction of a gas pipeline from Odidi (OML 42) to WEND CPF for processing

Gas supply to Brass Fertilizer Company – SPDC JV and Brass Fertilizer Company

- A full field development of OML 33 with 2P reserves of 2.2 Tcf and unlock other satellite fields that are less than 60 km from Brass
- Construction of eight gas gathering pipelines from the identified supply sources to Brass Fertilizer
- Construction of Pre-Treatment Facilities

OML 13 Cluster Development - NPDC

Cluster gas development of OML 13 with 2P reserves of about 5 Tcf

Cluster Development of Okpokunou/Tuomo West (OML 35/62) –NNPC, SPDC and NAOC

- Joint development of Okpokunou and Tuomo West unit area with a combined 2P gas reserves of 5 Tcf
- Construction of gas pipelines from Okpokonou and Tuomo West to Utorogu Gas Plant







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African Focus



Egina FPSO

to submit tenders for the execution of the \$10-billion deepwater project, however, it was recently reported that Shell pushed back the bidding schedule for the Bonga SWA project. Technical and commercial bids for the FPSO vessel were due to be submitted at the end of July, but Shell has granted bidders six more weeks, until mid-September, to send in their respective bids. This follows an earlier two-month extension to the bid process. Shell is said to be targeting the FID, with first oil flowing in 2023 or 2024.

Like every other year, Nigeria's petroleum industry remains one of the busiest on the continent. One of the projects that will add to its production flows is the Gbetiokun field on OML 40. Eland Oil & Gas announced that first production from the Gbetiokun oilfield was achieved via an early production facility (EPF) in July. The EPF will process all reservoir fluids produced under the initial phase of the Gbetiokun development. The facility has a nominal capacity of 22,000 bpd, which will allow for production from the additional Gbetiokun development wells being drilled in 2019. The development is envisaged in two phases. Phase 1 will address production from the deep reservoirs while providing additional appraisal information on the shallow reservoirs.

The Field Development Plan focuses on the development of the deeper reservoirs and envisages the re-entry and completion of the Gbetiokun-1 discovery well and the drilling of the first development well – Gbetiokun-3. These well activities were started in Q3 2018 and the Gbetiokun-3 well was completed in Q1 2019. Five more wells are planned, two in 2019 and three in 2020. A new dedicated pipeline will be installed to link up with the Forcados export system.

In early 2019 Total's CEO, Patrick Pouyanne, said his firm would move forward with the development of the Ikike project. The project would add around 60,000 bpd to Nigeria's totals and is just one of several projects Total plans to take the final investment decision this year. The company could also take the FID on the deepwater Preowi project which would add another 70,000 bpd to Total's production totals in the West African country. The French firm also plans to expand its Nigerian LNG project in 2019 with Pouyanne saying that the market for the resource was "very good today" and the partners are in line to expand the facility.

Total Upstream Nigeria ended 2018 by bringing the Egina field online. At plateau the Egina is expected to produce 200,000 bpd. The FPSO used to develop the giant Egina field is the largest Total has ever built. This project has also involved a record level of local contractors. Six of the 18 modules on the FPSO were built and integrated locally, and 77% of hours spent on the project were worked locally. Startup has been achieved close to 10% below the initial budget, which represents more than \$1 billion in capex savings, due in particular to excellent drilling performance where the drilling time per well has been reduced by 30%. The Egina field is the second development in production on OML 130 following the Akpo field, which came online in 2009. In mid-July the company achieved No-Routine-Gas-Flaring at its Egina *FPSO*. The achievement follows the commissioning of the gas compression system on the Egina field. The associated gas from the field is now being compressed, transported via the Akpo/Amenam gas export line and monetized through Nigeria LNG. Total operates the Egina with a 24% interest, in partnership with NNPC, Sapetro (15%), CNOOC E&P Nigeria (45%), and Petrobras Oil and Gas (16%).

Another major happening occurred in mid-July when the government approved the field development plan (FDP) for Green Energy International (GEIL) and Lekoil's Phase II development of the Otakikpo marginal field on OML 11. The FDP involves the drilling of seven additional wells and expansion of the crude processing infrastructure.



Otakikpo Marginal Field workers

The plan also includes the construction of an onshore terminal with a capacity of 1.3 million barrels and a 17-km export pipeline to connect the terminal to an offshore loading system. GEIL director of corporate affairs, Olusegun Ilori, said that the company intends to increase production from 6,000 bpd to 20,000 bpd. The approval follows the signing of a MoU with a consortium of international financiers for a package of more than \$350 million to move forward the second phase development of Otakikpo. The consortium includes an international bank based in London, a crude oil off-taker, and an EPIC contractor.

DOWNSTREAM

Nigeria's downstream sector is busy as well. The main issue the West African country faces is upgrading its refining industry to eliminate the need for costly imported fuel products. This state of affairs has long been an issue, and over various governments along with NNPC management changes, plans to rehabilitate the industry have come and gone, but the *status quo* is set to change!

Nigeria's wealthiest man, Aliko Dangote, founder of Dangote Industries, set in motion plans to bring the world's largest single train refinery online at 650,000 bpd. The ambitious Nigerian project, pegged at around \$15 billion, is projected to annually produce 10.4 million tons of gasoline, 4.6 million tons of diesel and 4 million tons of jet fuel by 2020. Dangote plans to export about 35% of the plant's products, while the rest will serve the domestic market.

The facility is at around 50% completion, but recent reports seem to suggest the project's final completion will be delayed. Dangote Group Executive Director Devakumar Edwin, who oversees the project, told Reuters, "We will be able to complete the (refinery) project by the end of next year – mechanical completion," and suggested the company could start using the refinery's tank farms as a depot to warm up operations. Other experts think the end of 2020 is optimistic and are estimating 2022 as a more realistic completion date.

The Dangote complex will also include a 3-million metric ton per year fertilizer factory and a petrochemical plant. The unit will be powered by gas, which will be piped from the Niger delta via two 550-kilometer underwater pipelines. This should result in the Dangote project being able to supply fertilizer, kerosene and gasoline to the entire Nigerian population and still have plenty of products to export to neighboring

countries, bringing in important foreign exchange reserves. In March, Dangote Fertilizer entered into a long-term agreement with Chevron Nigeria Limited (CNL) for the delivery of LNG from Chevron's supply portfolio to the fertilizer plant.

On the pipeline front, in February it was announced that the planned Nigeria-Morocco Gas Pipeline (NMGP) is moving forward, with the first phase of the FEED already launched. Penspen was awarded a contract by NNPC and Morocco's ONHYM to execute the first phase of the FEED. The award is a follow-up on the feasibility study completed by Penspen in July 2018. The FEED Phase I consisted of a detailed review of the feasibility study results and in-depth evaluation of the gas demand and supply study. At the end of the study, key detailed outcomes will help the client prepare for the second phase of the FEED which is expected to lead to the FID. The FEED signals the implementation of one of the three economic cooperation agreements signed in Rabat by leaders of both countries last year. Morocco and Nigeria expect to complete the project in phases over a period of 25 years.

"The pipeline will help in the industrialization of these countries and also meet the needs of consumers for heating and other uses. We see gas as a fuel to take Africa to the next level," Minister Kachikwu said. Also commenting on the pipeline was the NNPC chief who said the gas pipeline would traverse at least 15 West African countries and connect to the existing Europe gas pipeline. According to former NNPC MD Makanti Baru, the feasibility study of the gas pipeline has been concluded and the pre-FID Greenfield optimization study is currently ongoing. The NMGP, designed to be 5,660 km long, will reduce gas flaring in Nigeria and encourage diversification of energy resources in the country.



African Focus

MOROCCO

Chief of State: King Mohammed VI (since July 1999) Head of Government: PM Saad-Eddine al-Othmani (since March 2017) Independence: March 2, 1956 (from France) Population: 34,314,130 (July 2018 est.) GDP (purchasing power parity): \$298.6 billion (2017 est.) Real GDP Growth Rate: 4.1% (2017 est.) Per Capita GDP: \$8,600 (2017 est.) Minister of Energy, Mines and Sustainable Development: Aziz Rebbah Oil Production: NA **Refined Oil Consumption:** 278,000 bpd (2016 est.) **Proven Oil Reserves:** 684,000 barrels (1 January 2018 est.) Natural Gas Production: 87.78 Mmcm (2017 est.) Natural Gas Consumption: 1.218 Bcm (2017 est.) 1.444 Bcm (January 2018 est.)

Politics & Economy

orocco has long been part of the history of not only Africa but Europe as well, being under the control of both France and Spain at one time or another. The country has an Arab majority having been the subject of the Arab invasion in the 7th and 8th centuries, although through the next seven or so centuries, dynasties and religious movements came and went, including the Almoravid movement which at its peak controlled not only Morocco, but parts of present day Algeria and Spain.

The current ruling family in Morocco dates back to the 17th century, the Alaouite Dynasty. Following independence from France in 1956 the current monarch's grandfather, Sultan Mohammed V, organized the new state as a constitutional monarchy and in 1957 assumed the title of king. Today's ruler, King Mohammed VI in early 2011 responded to the Arab Spring protests that erupted across North Africa and the Middle East by implementing a reform program that included a new constitution, passed by popular referendum in July 2011, under which some new powers were extended to parliament and the prime minister, but left ultimate authority in the hands of the monarch. In September 2015, Morocco held its first direct elections for regional councils, one of the reforms included in the 2011 constitution.

Since its appointment in April 2017, Morocco's government coalition led by the Justice and Development Party (PJD) has moved forward

with the roll out of pro-poor reforms initiated under the previous government, focusing mainly on social protection programs, job creation and reducing economic disparities across the country. According to the World Bank, the government is working to develop a new development model for the country based on enhanced education and vocational training programs and bolder policies to boost job creation and promote inclusive growth through a modernized social protection system.

On the economic front, Real GDP growth slowed down in 2018 to an estimated 3% compared to 4.1% in 2017, owing to the decline of agricultural value-added growth, which was only partially compensated by otherwise good performance of non-agricultural activities. Mining activities contributed the most to growth apart from agriculture, mostly driven by phosphates production and exports. Morocco saw its unemployment rate decrease slightly to 9.8%, yet it masked a protracted decline in the labor force participation, which dropped by 0.5 percentage point to 46.2%.

The fiscal deficit fell short of the government's target, which did not allow to generate the envisaged savings in the context of low growth. On the revenue side, measures to improve tax collection through extension of the tax base, harmonization of tax rates, and efforts to fight tax evasion compensated for the impact of weaker economic activity on tax revenue.

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African Focus

UPSTREAM

While the country is not a powerhouse producer, it does manage to attract a significant amount of attention from oil and gas firms from around the world. Firms operating in Morocco come in every size from the smallest of independents to the largest of the majors. While the country only produces a small amount of oil, its natural gas resources are on the uptick. Below is just a sampling of what is taking place in the country's oil and gas sector.

One of the small independents that are keeping things interesting in Morocco is SDX Energy. The company's acreage consists of five concessions, all of which are located in the Gharb Basin in northern Morocco: Sebou, Lalla Mimouna Nord, Gharb Centre, Lalla Mimouna Sud, and the Moulay Bouchta Ouest. The Lalla Mimouna Sud and the Moulay Bouchta Ouest were just awarded to the company earlier this year. The Moulay Bouchta Ouest exploration license, covering an area of 458 sq km, was awarded to SDX for a period of eight years. SDX has a commitment to reprocess 150 km of 2D seismic data, acquire 100 sq km of new 3D seismic and drill one exploration well within the first three-and-a-half-year period. The Lalla Mimouna Sud was originally part of the Circle Oil acquisition in 2017; the concession expired after all the work commitments were fulfilled. SDX reapplied for the acreage after the acquisition of additional 3D seismic in the area. The company has a commitment to acquire 50 sq km of 3D seismic and drill one exploration well within the first three-year period.

SDX holds these concessions, all located in the Gharb Basin, with a 75% working interest and operatorship. During 2018, the company completed a nine-well drilling program, starting in September 2017, which covered six appraisal/development wells in Sebou, one appraisal/development well in Gharb Centre, and two exploration wells in Lalla Mimouna Nord. Out of the nine wells drilled, seven were successful, including the LNB-1 and LMS-1 exploration wells in Lalla Mimouna Nord, which resulted in a two-year extension being granted to the concession, extending its validity from July 2018 to July 2020 with no additional work commitments. Planning for the 12-well drilling campaign targeting 15 Bcf of gross unrisked prospective resources has commenced. Long lead items have been ordered with the drilling rig



and all other key contracts finalized. The campaign is expected to commence in Q4 2019 and is targeting sufficient reserves to satisfy existing customers' forecast demand, as well as testing new play-opening areas of prospectivity across the portfolio.

SDX Energy saw an increase in gas sales out of Morocco, with production remaining stable. During 2018, SDX began selling natural gas to the following new customers: Peugeot, Extralait, and GPC Kenitra. In addition, during Q1 2019, natural gas sales began to another new customer, Setexam, and natural gas sales agreements were signed with Citic Dicastal and Omnium Plastic. The company said in its quarterly report that it would target an average gross production of 6.0 - 6.5 Mmscf/d of conventional natural gas sales, this is down significantly from its previous guidance of achieving 9.0-11.0 Mmscf/d of conventional natural gas sales by the end of 2019. The new guidance is based on customers currently under contract and also reflects that, in Q1 2019, the company's second largest customer reallocated a production line from Morocco to Spain and thus has reduced its volumes by 30% compared to 2018 levels.



In Q4 2018 Sound Energy and its partners, including Schlumberger, signed an eight-year petroleum agreement covering the Tendrara and Matarka areas. The new Greater Tendrara Petroleum Agreement covers

SDX assets in Morocco



validation, ENI will retain its operator status and hold a 45% stake. QP will hold 30% and state-run ONHYM will hold a 25% stake. ENI is currently conducting geological and geophysical studies as part of the first exploration period.

Another new entrant is Predator Oil & Gas Holdings, who saw its application for an exclusive license for onshore acreage in northeastern Morocco accepted by the government. Predator was awarded a 75% stake in the 7,269 sq km

an area of approximately 14,500 sq km extending across eastern Morocco and surrounding the development concession application area relating to the Tendrara gas discovery. The new Greater Tendrara Petroleum Agreement will unite the areas covered by the Tendrara petroleum agreement granted in April 2013 and the Matarka reconnaissance license granted in July 2017.

The work commitments under the Greater Tendrara Petroleum Agreement includes an initial period of four years with two exploration wells drilled. The optional first complementary period of two years includes one exploration well with the minimum Triassic objective. There is also an exploration well required in the optional second complementary period of two years with the minimum Triassic objective. Sound drilled both the TE-9 and the TE-10, fulfilling its first period commitment. Unfortunately, neither were the success Sound and its partners were looking for. The TE-9 well encountered 60 meters of dolomitized silty sandstone, interpreted as an age equivalent to the primary target TAGI sandstone. The petrophysical analysis of the wireline data indicated the interval was of low porosity and therefore poor reservoir quality. The well was subsequently plugged and abandoned.

While the TE-10 was deemed a discovery, it failed to find success while on test. Although the well flowed gas to the surface, it did not achieve commercial flow rates following the stimulated well test. After the initial clean up, two nitrogen lift operations were subsequently performed in an attempt to increase the gas flow rate, followed by nitrogen injection into the fracture network. Despite the nitrogen lifts and injection, the company reports that the gas flow rates achieved were below the 1.5 Mmscf/d to 2.0 Mmscf/d commercial threshold required for development. In total approximately 64,500 scf of gas and approximately 2,300 barrels of liquid were recovered over an 11-day period. The hydrocarbon gas was sampled and flared at the wellsite.

Morocco saw new entrants over the past few months with Qatar Petroleum entering a deal with ENI, this time to gain access to an exploration permit offshore Morocco, the Tarfaya Offshore Shallow I-XII exploration permit. ENI, who controls a 75% stake in the license, signed a lease-out agreement with QP to sell 30% of it. The Tarfaya Offshore permit includes 12 exploration blocks. This agreement is subject to approval by the Moroccan authorities. In the event of Guercif I, II, III, and IV permits in the east of the Gharb Basin. ONHYM will hold the remaining 25% of the license. The license covers an eightyear period, divided into three phases. According to the terms of the agreement, Predator has the possibility to acquire the shares of ONHYM, if the license is sufficiently developed, and if the share of investments made by the public part is refunded.

In April of this year Chariot Oil and Gas added to its acreage in the North African country. The company was awarded a 75% interest and operatorship of the Lixus Offshore license while ONHYM holds a 25% carried interest. The Lixus license covers an area of approximately 2,390 sq km, 30 km north of Chariot's existing Moroccan acreage, with water depths ranging from the coastline to 850 meters. The area has been subject to earlier exploration with legacy 3D seismic data covering about 1,425 sq km and four exploration wells, including the Anchois gas discovery.

The Anchois-1 well was drilled in 2009 in 388 meters water depth some 40 km from the coast. The well encountered an estimated net gas pay of 55 meters in two sands with average porosities ranging from 25% to 28%. A new independent audit of this discovery by Netherland Sewell and Associates Inc. (NSAI) estimates a 2C contingent resource of 307 Bcf. A deeper target not penetrated by the well has 2C prospective resources estimated by NSAI of 116 Bcf, with the Anchois discovery containing a remaining recoverable resource of 423 Bcf. An additional five prospects have been identified in Lixus in similar geological settings as Anchois but currently without the appropriately conditioned 3D seismic data to confirm comparable anomalous seismic signature, and these prospects have gross mean prospective resources ranging from 66 Bcf to 330 Bcf, as estimated by the company.

Seismic reprocessing will be undertaken to reduce the risk for these additional prospects. NSAI will be preparing a Competent Persons Report on these prospects and on Anchois N and Anchois NW. Chariot is also evaluating leads identified in the section below the Nappe which has the potential for giant scale prospective resources. The initial license commitment, for which Chariot is fully funded, includes a technical program of 3D seismic reprocessing and evaluation to access the additional exploration potential of Lixus. Chariot will also further evaluate the gas market, test development concepts through a feasibility study and seek strategic partnerships and alliances to progress towards the development of the Anchois discovery.

DOWNSTREAM

On the downstream end, the government has been focused on LNG. In Q4 2018 the National Office for Electricity and Water (ONEE) launched a tender for a \$4.5-billion LNG import terminal project. The project is to be located at the Jorf Lafsar port in El Jadida province, near Casablanca, and will supply the industries based in the region. The jetty, regasification terminal, and 400-km pipeline are expected to be complete by 2025. Morocco intends to use the facility to import up to 7 Bcm of natural gas in the context of the national gas-to-power initiative.

There is also a pipeline in the works between Nigeria and Morocco with the first phase of the FEED already launched. Penspen was awarded a contract by ONHYM and Nigeria's NNPC to execute the first phase of the FEED of an approximate 5,700-km gas pipeline proposed to run from Nigeria to Morocco. The award is a follow-up on the feasibility study completed by Penspen in July 2018.

The FEED Phase I consisted of a detailed review of the feasibility study results and in-depth evaluation of the gas demand and supply study. Further design of the pipeline system, in addition to the execution of an Environmental and Social Impact Assessment, will then be carried out with the aim of optimizing the proposed pipeline route and project economics.

Penspen will also support the client in marketing and promoting the pipeline project to potential stakeholders showcasing the wider benefits of its development. At the end of the study, key detailed outcomes will help the client prepare for the second phase of the FEED (FEED Phase II) which is expected to lead to a final investment decision (FID). The FEED signaled the implementation of one of the three economic cooperation agreements signed in Rabat by leaders of both countries last year.

One of the major deals agreed on was the extension of the West African Gas Pipeline (WAGP) from its source in Nigeria to Morocco and Europe, providing gas through the regional pipeline to other countries in West Africa as well. Both countries expect to complete the project in phases over a period of 25 years. This is similar to the development of the WAGP, which was originally proposed in 1982 but not developed fully for a couple of decades.







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AROUND THE WORLD

Churchill Technology Severs Stuck Pipe in Just One Hour

Thanks to Churchill Drilling Tools a major Middle East operator was able to recover a stuck pipe by severing its drill string in just one hour. According to Churchill, this is the third time already in 2019 that its HyPRHoleSaver[™] technology has been successfully deployed in the Middle East.



The unique dart activated HyPRHoleSaver™ enables operators to recover quickly and safely from stuck pipe incidents, which can add millions of dollars to the costs of an operator's campaign. To recover from a previous stuck pipe incident in the same well Churchill's client, an Emiratesbased operator, contracted high energy source cutting services. However, the additional equipment, personnel and logistics cost two days of valuable rig time. So, when the operator became 'differentially stuck' in the same well at 12,785 ft on May 28 due to heavy losses, the team were ready with the HyPRHoleSaver[™] to sever, plug and abandon the section much more quickly. The simple HyPR[™] system requires no additional topside equipment or personnel.

To provide the optimum circulation parameters, the operator first activated Churchill's DAV MX[™] CircSub which had been placed beneath the HyPR[™] sub in the drill-string. The HyPRHoleSaver[™] dart was subsequently dropped and pumped to redirect the flow of mud creating a high velocity stream of fluid, using the existing mud system, to erode and sever the string.

The operator witnessed the expected drop in circulating pressure over a period of 45 minutes of pumping at 520 gallons per minute. Satisfied that enough progress had been made, applying torque and overpull parted the string with ease. On previous HyPR[™] severs operators have cut through around 90% of the HyPR[™] sub's full-strength inner connection before applying torque to twist-off, generally taking two to three hours. However, on this occasion the operator applied torque (25 klbf.ft) much earlier to save the extra time. In total, the process took just an hour, a record for Churchill, and widely thought to be the industry's quickest planned severance from stuck pipe. The operator subsequently plugged

and abandoned the section and moved operations to another well.

Working in partnership with the operator the Churchill team optimized the tools' configuration and supported the client to get out of hole quickly and safely. The Drilling Manager was delighted with the performance of both the DAV MX[™] CircSub[™] and the 'excellent' HyPRHoleSaver[™].

C-I Awarded GoM Contract

C-Innovation, LLC (C-I), an affiliate of Edison Chouest Offshore (ECO) and its family of companies, was awarded a significant contract to perform Riserless Light Well Intervention (RLWI) activities for BP in the Gulf of Mexico.

The initial contract calls for both mechanical as well as hydraulic acid stimulations, which will be executed from C-I's flagship Gulf of Mexico assets, the offshore construction and light well intervention vessels *Island Venture* and *Island Performer*:

The work will be performed in water depths of up to 6,500 feet on different assets within the Gulf of Mexico and is currently forecasted to commence as early as July 2019.

ADNOC Contract Goes to CGG

Subsurface Imaging, part of CGG's Geoscience division, won a landmark processing contract by the Abu Dhabi National Oil Company (ADNOC). Under its terms, CGG will perform high-end time and depth imaging of massive volumes of very high-spec data from what is believed to be the world's largest ocean-bottom node (OBN) seismic survey to date.

The contract, which started in May, is for a period of at least five years and a maximum of seven years, will see CGG process a minimum 20,000 sq km of high-density wide-azimuth OBN seismic data at its Abu Dhabi geoscience center.

This award, which also includes optional reservoir characterization work, builds on this long-term relationship with ADNOC. The sustained level of activity is expected to strengthen tailored R&D cooperation between the two companies and give ADNOC access to CGG's wider service offerings.

Safe Concordia Offshore Brazil

Equinor Brasil Energia Ltd a awarded a contract to Prosafe for the *Safe Concordia* to provide gangway connected operations supporting maintenance and safety services at the *Peregrino FPSO* in the Campos Basin offshore Brazil. Contract signing is subject to certain conditions, and the contract has a duration of 120 days commencing mid-January 2020 with up to 60 days of options.

The *Safe Concordia* pioneered gangway connection to turret moored FPSOs, having developed the concept in 2012, and has subsequently provided reliable and safe operations maintaining high connectivity to a large number of installations.

Keppel FELS Tags TMC for Environmentally Friendly Rig

Keppel FELS awarded TMC Compressors of the Seas (TMC) a contract to deliver an advanced energy-saving marine compressed air system to the first mid-water semi-submersible drilling rig the yard is building for Awilco Drilling. TMC has not disclosed the value of the contract, but states that this is a "major contract win for the company."

TMC's scope of work is to deliver a complete marine compressed instrument air system that consists of a compressor bank with a combination of both base-load and frequency-controlled TMC Smart Air® instrument air compressors, which reduces energy waste with up to 50% compared with other compressors. TMC will also supply associated air dryers and filters. The system will be equipped with peak shaving technology, which reduces power consumption during periods of maximum demand on the on-board power supply. This will reduce energy consumption substantially and keep operational costs to a minimum.



Source: Awilco

Boasting a low environmental footprint, Awilco's drilling rig is winterized and designed for operations in harsh environments, including the Norwegian Continental Shelf, UK Continental shelf and Barents Sea. According to Keppel FELS, the rig is also equipped with state-of-the-art digitalization, including condition monitoring systems, which will enhance the drilling efficiency and reliability of the rig, while reducing likelihood of downtime. According to Claus Mørch, project director at Awilco, the rig will become the most environmentally friendly drilling rig for harsh conditions.

Rever Offshore Consolidates Presence in North Sea

Rever Offshore continued to consolidate its North Sea presence with the completion of three standalone contracts for Total E&P UK (TEPUK). The contracts utilized Rever Offshore's multipurpose dive support and offshore construction vessel (DSV) the *Rever Polaris* and ROV support vessel (ROVSV), the *Rever Sapphire*.



ource: Rever Offshore

Operating over 100 days across North Sea assets during 2018, the scope of work included DSV construction services, inspection repair and maintenance (IRM) works, and unique operations.

All awards were the result of the long-standing frame agreement in place and represented a repeat of previous successful campaigns for the client. Reflective of the work undertaken, Rever Offshore's excellence in safety behaviors and performance was nominated for the annual Total E&P UK HSE Awards.

A further installation contract for the energy major was successfully completed in February 2019, having been brought forward at the beginning of the year. This project was recognized as being the first of its kind for TEPUK at this depth of water and based on its success, Total may consider this solution for future projects which display similar technical challenges. It is expected that further DSV and CSV work by Rever Offshore will continue into the latter half of 2019 as part of the continuous frame agreement and safe execution.

Sparrows Group Tagged for Rigging Loft Maintenance

Sparrows Group was awarded its first contract for the provision of rigging loft maintenance services in Qatar. The four-year contract includes the provision of services for the refurbishment, repair, load test and recertification of rigging lofts and contents.

Management of the equipment will also include six-monthly rigging loft change outs, provision of replacement or new equipment and ensuring availability of properly certified equipment as required offshore. In order to service the work, the company has established a new rigging loft management workshop within its Qatar facility with investment into new machinery and other office equipment. It has also created job opportunities locally as around seven new positions are required within the workshop.

Siemens Provides Turbines for GoM FPSO

Siemens will provide MODEC with three 34 MW SGT-A35 gas turbine power generation packages that will power MODEC's FPSO vessel. The vessel, referred to as the *Eni Mexico Area 1 FPSO*, will be deployed in the Offshore Area 1, approximately 6 miles (10 kilometers) off the coast of Mexico at a water depth of approximately 105 feet (32 meters). The field is owned by a consortium of two companies including ENI Mexico as operator along with Qatar Petroleum.

MODEC is responsible for the engineering, procurement, construction, mobilization, installation, and operation of the FPSO. Once operating in 2021, the FPSO is expected to process 90,000 bpd of crude oil and have a storage capacity of 900,000 barrels of crude oil.

In 2018 MODEC purchased four SGT-A35 gas turbine power generation packages for its *FPSO Carioca MV30* for the Sépia field operated by Petrobras, located in the giant "pre-salt" region of the Santos Basin.

Safeway Completes W2W Job for Woodside

Dutch Safeway successfully completed its 'first' W2W operation in Australian waters. The Safeway motion compensated offshore access system of the Dutch Van Aalst Group recently completed more than 1,200 safe personnel transfers and 40 gangway operations in only 24 days offshore Australia for Woodside Energy.

The campaign experienced no downtime and created significant risk elimination and cost savings, resulting in maximum efficiency of operations. This achievement also created hundreds of extra working hours for the *Pluto Alpha* (PLA) offshore turnaround in Q2, 2019, resulting in more than 40 days of work scopes being completed in 27 days.

The PLA gas production platform is operated by Woodside Energy and is located 190 km northwest of Karratha, Western Australia, in 85 meters of water. Gas from the Pluto field is piped through a trunk line to an onshore facility. For this particular project operator Woodside Energy, vessel owner MMA Offshore and Dutch Safeway collaborated intensively to install the unique 28-meter-long walk-to-work Seagull-type on the 87.8-meter-long multi-purpose support vessel *MMA Pinnacle*.

Woodside's Turnaround Excellence Manager Russell Probert said the fully overhead covered and weather-proof, telescopic motioncompensated gangway allowed the maintenance crew safe and direct access to and from the *Pluto* platform, even with the vessel's pitching and rolling motions.

KCA Deutag Scores Three Russian Drilling Contracts

KCA Deutag's (KCAD) land drilling operation won three new contracts in Russia worth approximately \$168 million. These contracts are for eight high-performance land rigs, seven of which were previously built by Bentec, KCAD's rig and oilfield equipment manufacturer.



ce: KCA Deutag

The first contract is with an existing client for five of those rigs to carry out drilling operations in two fields in Eastern Siberia. Each rig is expected to drill for varying periods of between three and four years. The contract increases the number of rigs currently have operating for this client from four to five.

The next contract is for two 1500 HP Cluster Slider rigs which will drill in northern Russia. It is an extension to an existing contract and will run until December 31, 2021.

In addition to this, KCAD has won a new contract for one of its 2000 HP land rigs to drill four wells in Southern Russia. This has an estimated duration of five months per well.

Petro Matad Spuds Heron-1 in Mongolia Petro Matad spud the Heron-1 exploration well in the Tamsag Basin of Block XX in Mongolia. The well is an appraisal of the T19-46 oil field immediately to the north in Block XIX and is being drilled with the DQE International 40105 rig.

AROUND THE WORLD

The Heron-1 well is targeting a prospect with 25 million barrels of oil of Mean Prospective Recoverable Resource and is planned to drill to a total depth of 3,050 meters. The well is expected to take up to 40 days to complete.

In the event of a discovery, the company will bring in a separate rig for testing. A call-off testing contract has been signed, which ensures testing operations, if warranted, can commence soon after discovery. Upon completion of drilling operations at Heron-1 the rig will move around 5 km to the Gazelle-1 location.

Saipem Wins Drilling Jobs in Romania and Abu Dhabi

Saipem was awarded new contracts for offshore drilling in Romania and Abu Dhabi worth over \$160 million. Under one contract the company will drill a well in Romania's Black Sea waters during Q4. Drilling will be carried out by the semi-submersible rig *Scarabeo 9*, a drilling unit suitable for operations in the area due to its ability to lower its tower which enables crossing of the Bosphorus Strait.

In addition, a contract has been awarded for drilling works offshore Abu Dhabi. The drilling activities will be carried out by the high spec jack up *Perro Negro &*, in continuity with current operations. The contract will have a duration of four years.

Arcticgas Completes Horizontal Well

Arcticgas, a JV between Novatek and Gazprom, successfully completed horizontal well number U2802 targeting the lower Achimov formation at the Urengoyskoye field.

An eight-stage hydro-fracturing program was successfully completed utilizing a record-high proppant volume of 2,187 tons at well number U2802 with a total length of 5,624 meters and a horizontal section of 1,500 meters. A unique wireless inflow monitoring technology using marked proppant was implemented. Permanent downhole pressure and temperature gauges are also used in the production to monitor real-time data.

Utilizing state-of-the-art technologies, the well achieved a daily flow rate of more than 1 Mmcm/d of natural gas and 500 tons of gas condensate, confirming significant prospect to develop the lower Achimov deposits.

Xanadu 3D Program Complete

Seismic acquisition operations on the Xanadu 3D Transition Zone seismic program on exploration permit TP/15 have been completed, according to Norwest Energy. Surveying of the western panel was completed on July 11 and, as with the eastern panel, excellent fold of subsurface coverage has been achieved.

Contractor Synterra Technologies is currently demobilizing from site and recovering data from the western panel geophones for dispatch to seismic processing contractor Earth Signal Processing, in Calgary, Canada. Earth Signal are already in receipt of the data from the eastern panel, and data processing is under way.

The 40sq km 3D Transitional Zone seismic program was designed to fully delineate the Xanadu oil discovery, focusing on the northern up-dip region, and the southern down-dip region extending out to the western flank of the structure. The Xanadu discovery was drilled based on only limited 2D seismic coverage, insufficient to provide the high-resolution subsurface model required to guide future appraisal drilling. The interpreted results of the 3D seismic program will form the basis for contingent resource estimation and appraisal well design.

Fugro and AGI Selling Canadian Data

Fugro and Amplified Geochemical Imaging (AGI) saw recent success selling multiple licenses for data from frontier regions offshore the east coast of Canada. The data were acquired during two separate hydrocarbon seep surveys in the Orphan Basin and the Carson Bason, both located on the continental margin of Newfoundland.

The comprehensive data packages are being licensed by Fugro and include multibeam echo sounder data (bathymetry, backscatter intensity and water column), sub-bottom profiler data, heat flow measurements and shipboard geochemical screening analyses; advanced geochemical analyses, including biomarkers on select samples, are also included.

The Orphan Basin package covers an area of 11,070 sq km and the Carson Basin package covers an area of 18,880 sq km; each survey was followed by heat flow and geochemical sampling and analysis. Both programs were planned so that purchasing clients would have the data in advance of the upcoming lease rounds.

McDermott Picks-Up Mega Middle East Contracts

McDermott International was awarded a couple of contracts in the Middle East. The first contract, worth in excess of \$3 billion, is Package 1 with Saudi Aramco, for its Marjan Increment Development Mega-Project. Under the contract McDermott will provide the EPCI of the gas-oil separation plant (GOSP) in a consortium with China Offshore Oil Engineering Company (COOEC). McDermott will lead the consortium with COOEC in an integrated execution model utilizing McDermott's extensive global assets and facilities.

The Package 1 GOSP separation platform is located offshore in the eastern flank of the Arabian Gulf. This is the operational center of the Marjan increment development mega-project and will draw upon McDermott's extensive interface and logistics management capabilities.

The award represents the single largest EPCI offshore contract awarded by Aramco. The Marjan Increment Project will increase production from 500,000 to 800,000 bpd of oil, with Package 1 GOSP facilities at the core of the development.

The second contract comes from Qatar Petroleum and is for McDermott to provide the FEED work for offshore wellhead platforms, pipelines and cables associated with the North Field Expansion (NFE) project.

The scope includes the design of four offshore trunk lines with intra-field pipelines, eight wellhead platforms and power and fiber optic (PFO) subsea cable rings. The FEED contract will be executed from McDermott's Doha offices, with drafting to be executed in Chennai.

Mubadala and Premier Sign Agreement on North Sumatra Acreage

Mubadala Petroleum signed an agreement with Premier Oil to farm out a 20% participating interest in each of the Andaman I and South Andaman Gross Split PSCs. Mubadala Petroleum is the operator of both the Andaman I and adjacent South Andaman PSCs in North Sumatra.

The Andaman I and South Andaman PSCs are located in the underexplored but proven North Sumatra Basin offshore Aceh. Mubadala Petroleum is also a partner with a 30% participating interest in the Andaman II PSC which is operated by Premier Oil.

With participating interests in these three adjacent blocks, Mubadala Petroleum is the largest net acreage holder in the area, securing the core of the North Sumatra Basin for future exploration growth. The PSCs have the potential to unlock a new material gas play for domestic consumption in North Sumatra and potentially long-term export to regional markets.

Oxy in Proxy Fight

Occidental Petroleum (OXY) is facing a fight with one of its shareholders, as Carl Icahn formally launched a proxy fight against the firm. Icahn is looking to control four board seats and launched the proxy fight when talks with Oxy CEO, Vicki Hollub, failed to reach an agreement.

Icahn previously blasted the Oxy CEO for failing to give owners a say on its \$38 billion acquisition of Anadarko Petroleum, which he has called "misguided and hugely overpriced."

According to an Oxy spokesman, the use of a consent solicitation to elect directors would require a majority of shares outstanding to be voted in favor, a greater hurdle than a special meeting of shareholders.

Otakikpo JV Enters MoU

Lekoil's Otakikpo JV with Green Energy International Ltd. (GEIL) entered into a MoU with Schlumberger and a subsidiary of an unnamed major international oil company operating in Nigeria. The MoU covers a comprehensive infrastructure sharing and drilling program geared around a group of marginal field assets in OML 11.

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

Capital expenditure to be incurred by the Otakikpo JV is expected to be approx. \$170 million covering new wells and processing infrastructure, of which Lekoil is expected to fund \$68 million. The anticipated costs consist of debt repayment to financing parties, including the major oil firm, in addition to a project implementation fee paid to Schlumberger. Repayment of the facilities anticipated to be provided to the Otakikpo JV pursuant to the project will be made from production revenues from Otakikpo, in priority to any existing lending facilities (subject to agreement with existing lenders), future Capex and returns to equity holders.

Centurion Law to Publicly List

Centurion Law Group is set to become the first African legal and energy advisory firm to be publicly-listed this year, as it prepares to join one of Europe's leading stock exchanges. This represents a natural step for Centurion given the group's strong market share within the oil & gas sector in sub-Saharan Africa and its increased activity.

In 2018 Centurion acquired IMANI-African Lawyers on Demand to launch Centurion Plus, Africa's leading flexible legal services model that offers cost savings and efficient flexible legal services across the continent. Through Centurion Plus, corporate clients throughout Africa can select from a pool of approximately 190 carefully vetted, on-demand attorneys for temporary and project-based legal services.

Ensco Rowan Changes Name

Ensco Rowan changed its name to Valaris plc, effective July 31. Following its name change, the company's ordinary shares will trade under the new ticker symbol VAL.

The name Valaris was selected following a comprehensive process that included participation from the company's employees around the world, feedback from customers and other market research.

This new name was inspired by the Latin root meaning strength, courage and signifying something of value, and the Valaris name embodies the company's ambition to be 'Boldly First' as the leader in the industry.

Weatherford Files Chapter 11

Weatherford International initiated its previously announced financial restructuring by commencing voluntary cases under chapter 11 of the U.S. Bankruptcy Code to effectuate its 'pre-packaged' Plan of Reorganization. The company's other entities and affiliates are not included in the Chapter 11 Cases.

Weatherford also expects to file Bermuda and Irish examiner ship proceedings in the coming months. The comprehensive financial restructuring would significantly reduce the company's longterm debt and related interest costs, provide access to additional financing and establish a more sustainable capital structure.

The company has received commitments from lenders for \$1.75 billion of debtor-in-possession financing (the DIP Facility). The proceeds of the DIP Facility will be available to fund Weatherford's capital needs throughout the Cases.

Additionally, upon exit from bankruptcy the company will have access to additional financing in the form of (a) an undrawn first lien exit revolving credit facility in the principal amount of up to \$1.0 billion, and (b) up to \$1.25 billion of new tranche A senior unsecured notes with a five-year maturity. In addition, on emergence from bankruptcy the company will issue \$1.25 billion of new tranche B senior unsecured notes with a seven-year maturity to holders of the company's existing unsecured notes.

Blue Ocean Big on HSSE

Ghana's leading Bulk Distributor of Petroleum Products, Blue Ocean Investments Ltd., was named the overall HSSE Company of the Year at the 2019 Health, Environment, Safety and Security (HESS) Awards held in Accra. In addition, the company has also taken the award for the HSSE Team of the Year 2019.

Organized by Ianmatsun Global Services Ltd, organizers of the Sustainability and Social Investment Awards in partnership with Firmus Advisory, a leading research company in Ghana, the HESS awards were established to recognize companies for their exceptional performance and innovation focused on occupational safety, security and the environment.

This award comes shortly after Blue Ocean Investments held a large-scale Tier-3 Emergency Simulation at its Tema Multi Product Terminal, to test the robustness of its emergency response systems. With the full involvement of the emergency services, NADMO, and the various municipal and regulatory authorities, the drill was a huge success.

It is also worth noting that since its inception in 2016, Blue Ocean Investments has had zero fatalities and zero major incidents across all operations.

Energean Acquiring Edison E&P Assets Energean Oil & Gas entered into a conditional sale and purchase agreement to acquire Edison Exploration & Production S.p.A. The cost of the acquisition is \$750 million, which will be adjusted for working capital, with additional contingent consideration of \$100 million payable following first gas from the Cassiopea development (expected 2022), offshore Italy.

Energean gains Edison E&P's portfolio of assets in Egypt, Italy, Algeria, the UK North Sea and Croatia. The deal gives the firm working interest of 2P reserves of 292 mmboe and 2018 net working interest production of 69,000 boepd.

Energean will initially fund the deal through a \$600 million committed bridge loan facility and

up to \$265 million of equity financing through a recently announced placing.

Aker Signs Bond Deal with AFC

Aker Energy signed a \$100 million convertible bond deal with Africa Finance Corporation (AFC), a multilateral institution specializing in infrastructure financing in Africa. According to the firm, these bonds have a coupon of 5.5% per annum and will be converted into shares in the event of Aker Energy's IPO, with a discount that will be agreed upon against a price.

Bond proceeds will be invested in financing the development of the Deepwater Tano Cape Three Points Block (DWT / CTP), a block located off Ghana and controlled by Aker Energy whose estimates say the block contains more than one billion recoverable barrels. Aker will need a little more than a \$1 billion to start the initial phase of production of the project.

Tullow Frustrated in Uganda

Endless negotiations with the Ugandan government are holding up Tullow Oil's attempts to sell a 21.75% stake in its Ugandan holdings. In a Bloomberg report Paul McDade, Tullow CEO, said efforts to offload the stake to its fellow partner in Uganda, Total, continue to stall with government persistently failing to give the deal a go-ahead.

"What we put together we thought was in the best interest of all parties, including the government of Uganda. We feel somewhat frustrated [two and half years] later that the efforts on that farm-down structure have been unsuccessful in completing," he said, noting that they were now looking for alternative ways to get the deal done.

"What we are doing is gently standing back and looking at: Are there other ways to structure the deal? It's really just about not continuing just to try and push the same thing," McDade told Bloomberg.

While Tullow may be frustrated, other reports have the Energy Minister, Irene Muloni, wondering at the frustration. Muloni told the *Daily Monitor* that the government was not aware of any frustration, wondering who Tullow had complained to. "... be fair. Tullow complained to who? To you?" she wondered in a brief phone interview, noting she would give a full response after understanding the contents of the alleged frustration.

The Ugandan cabinet, in February, okayed the sale to Total E&P. And near the close of 2018

Muloni told the *Daily Monitor*, government had endorsed Tullow's desire to sell its assets to Total E&P subject to the payment of \$167 million (about Shs614b) in capital gains tax.

"On November 21, 2018 I gave conditional consent for this transaction, subject to payment of the tax obligations as assessed by Uganda Revenue Authority (URA)," she said at a briefing about the status of Uganda's oil sector. "In principle, we do not have any problem with the arrangement: how they clear up the \$167 million is something they will have to arrange with URA," she said.

VAALCO Pays \$4.5 Million in Angola Exit

VAALCO Energy, paid \$4.5 million to the Angola National Agency of Petroleum, Gas, and Biofuels (ANPG). The payment falls under a previously announced Settlement Agreement executed earlier this year that finalized the termination of VAALCO's rights, liabilities and outstanding obligations for Block 5/06 in Angola.

The Settlement Agreement provided for a cash payment of \$4.5 million from VAALCO to the National Concessionaire as well as the elimination of the receivable from Sonangol P&P that was related to joint-interest billings.

Emerson Completes Zedi Purchase

Emerson completed the purchase of Zedi's software and automation businesses. The addition of Zedi's cloud supervisory control and data acquisition (SCADA) platform will further enable Emerson, a global leader in automation, to help oil and gas producers increase production and lower operating costs through cloud-based monitoring, control and optimization.

Zedi's technology is currently enabling customers to monitor more than two million sensors and thousands of devices and applications. By combining Zedi's scalable cloud platform and applications expertise with Emerson's extensive applications, controller, instrumentation and flow metering portfolio, this acquisition expands opportunities for Emerson across the global oil and gas production market.

Emerson and Zedi's software and automation businesses share a common vision of automating the production process through edge and cloud analytics and machine learning. The combined software and expertise of the two companies will provide producers with scalable and easily deployable end-to-end connected solutions to optimize and manage their operations.

Egypt's Petro Industry Pays Down Debt According to recent reporting, Egypt's arrears to foreign oil companies declined to \$900 million at the end of June from \$1.2 billion a year ago. This information was provided by Tarek el Molla, the country's petroleum minister. He also said he expected the remaining balances owed to oil companies operating in the country to be paid soon.

In cooperation with the International Monetary Fund, a set of stringent reforms have been in place for the last few years, aimed at bringing down Egypt's debt and kick-starting the economy. Some of these reforms included the removal of subsidies previously provided by the petroleum industry to consumers, fuel and natural gas being among those that were costing the government billions.

Lincoln Completes Askaynak Buy

Lincoln Electric Holdings completed the purchase of the controlling stake of Kaynak Teknigi Sanayi ve Ticaret A.S. (Askaynak) to advance its regional growth strategy in Europe, the Middle East and Africa. Terms of the transaction were not disclosed.

As previously disclosed, Askaynak is located in Turkey and is the country's leading supplier and manufacturer of welding consumables, arc welding equipment, including plasma and oxyfuel cutting equipment, and robotic welding systems. Askaynak generates approximately \$70 million in annual revenue.

Samsung Wins Award for Egina Job

Samsung Heavy Industries Nigeria (SHIN) has won the Project of the Year award at the African Assembly, organized by the Oil and Gas Council in Paris.

SHIN received the award in partnership with Total for its work on the *Egina FPSO*, located offshore Nigeria. This is not the first award SHIN has received at the African Assembly, they also won 2018's "Breakthrough Deal of the Year".

The company beat out other nominees that included Eland Oil & Gas, ExxonMobil, and ENI.

USTDA's Kress Meets with Sonatrach and Sonelgaz

The Worldwide Energy Sector Team Leader and Regional Director for East Asia, MENA, Europe & Eurasia for the USTDA, Carl B. Kress, was in Algeria near the end of June to build on the USTDA's already long partnership with the North African country. Kress' visit is part of US efforts to partner with Algerians on economic development.

During his visit Kress met with the head of staterun oil firm Sonatrach's CEO, Rachid Hachichi, regarding the continued planning of a proposed reverse trade mission to the US. The reverse trade mission will be aimed at connecting Sonatrach executives with US firms that have equipment, services and technologies that can support Algeria's energy development goals.

Sonelgaz CEO Chahar Boulakhras also met with Kress as part of the proceedings for technical collaboration between the two. Boulakhras expressed his satisfaction with the previous USTDA-funded training for Sonelgaz staff under an agreement signed during Kress' last visit to Algeria. The USTDA funded executive and senior management-level training was conducted by GE.

Kress also met with the board of the American Chamber of Commerce in Algiers to discuss how best to promote US-Algerian economic partnership.

Nigeria's PTDF Awards Scholarships Nigeria's Petroleum Technology Development Fund (PTDF) is promoting its overseas scholarship program. According to the PTDF's executive secretary, Dr Bello Aliyu Gusau, the program is the best in the country.

Adamu-Waziri said that the program was tailored to help develop Nigeria's oil and gas sector during the induction of 342 beneficiaries of the fund for 2019/2020 overseas Masters of Science and Doctors of Philosophy scholarship program.

Rabiah Adamu-Waziri, manager, Education and Training at PTDF, said the beneficiaries were those that excelled in the oil and gas field during their first degrees.



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POWER & ALTERNATIVES

Egypt's NREA Plans Wind Farm

Egypt's New and Renewable Energy Authority (NREA) plans to build a 200-MW wind farm near the Gulf of Suez, according to an *Al Mal* report. Feasibility studies are being conducted for the new project, in cooperation with international institutions, to identify bird migration seasons and ensure environmental protection.

Investments in the project are expected to reach EGP 4 billion, according to NREA's Chairman Mohamed El-Khayat, who also revealed that the wind farm will be built by private-sector companies through international loans but will belong to the NREA.

Kenya Launches

Lake Turkana Wind Farm

Kenya took a step closer to achieving its goal of 100% green energy by 2020 with the unveiling of the continent's largest wind power plant. The farm consists of 365 wind turbines on the shores of Lake Turkana.

Currently, an estimated 70% of Kenya's power generation comes from renewable energy sources, the majority of which is hydropower and geothermal. The Lake Turkana wind farm will boost Kenya's power generating capacity by 13%. "Today, we again raised the bar for the continent as we unveil Africa's single largest wind farm," said President Uhuru Kenyatta at the launch of the wind farm. "Kenya is without doubt on course to be a global leader in renewable energy."

Kenyatta, who has announced plans to move the country to 100% green energy by 2020, said the new power from the \$775-million wind farm would help the government reach its goals of ensuring housing, health care, jobs and food security to all citizens.



Repsol to Develop 800 MW of New Renewable Energy Projects

Repsol will develop three renewable energy projects – two wind farms and a solar power plant with a combined installed capacity of 800 MW – as part of its commitment to an efficient and sustainable energy transition. These acquisitions represent a significant step in Repsol's strategic objective of strengthening its positioning as a low-emissions energy operator in a business with a high potential for organic growth and profitability.

This development adds two wind projects – one located in Zaragoza and the other between Palencia and Valladolid – and a photovoltaic power plant in Cadiz, which will be developed and start production in the coming four years. Their combined output from the 794 MW capacity is enough to supply the annual needs of about 650,000 homes.

With these projects, combined with the Valdesolar (Badajoz) and WindFloat (Portugal) projects and its current assets (2,952 MW), Repsol will have achieved 90% of its strategic objective of operating 4,500 MW of low-emissions generation in 2025.

The new renewable projects already have land secured as well as a guaranteed connection to the electricity transport network. The energy they generate will supply the company's existing client portfolio, which currently totals 890,000 clients (a 19% increase from the start of the business eight months ago), as well as new users.

CONCO to Build Swaziland Solar Plant Consolidated Infrastructure Group (CONCO), out of South Africa, won a \$16 million contract to build a 10-MW solar plant in Swaziland. The win comes from a successful bid in an international tender launched by the government of Swaziland a few months ago.

The solar plant will move Swaziland one step closer to its goal of weaning itself off its dependence on South Africa's Eskom for its power needs. Currently the Kingdom of Swaziland imports 80% of its power needs from neighboring South Africa.

The country launched, at the beginning of 2019, a call for tenders for the construction of a 40 MW solar park and plans to produce 100% of its own electricity consumption by 2034.

Ghana to Conduct Feasibility Studies on Nuclear Energy

The government of Ghana has put a team in place to conduct preliminary studies and collect data for its planned nuclear program. The government plans to add nuclear to the country's energy mix over the next 10-15 years.

It has also launched an awareness campaign to inform its citizens on the benefits of nuclear energy. The nine-person team was named "Nuclear Power Ghana" and will be in charge of coordinating the entire nuclear program.

Kwabena Frimpong Boateng, the Minister of Environment, Science, Technology and Innovation said that other nuclear powers such as China, France, Russia and the US were willing to aid the country in achieving its ambitions.

Nigeria Needs

N3.6 Trillion for Power Supply

According to electricity distribution companies (Discos) in Nigeria, it will take not less than N36 trillion to ensure a stable power supply in the country. The Discos said the investments will be needed over a period of 20 years.

The Discos disclosed that the investments will include N3.6 trillion in distribution networks over the next five years. The entire power supply value chain of the Discos, according to them, will also take about N14.4 trillion over the next two decades.

According to a November 2018 edition of the Monthly Business Expectations Survey Report of the Central Bank of Nigeria (CBN), insufficient power supply is the most compelling factor that constrains businesses in the West African Nation.

Similarly, research by the World Bank revealed "that power outages and deficient power infrastructure in Sub-Saharan Africa had a measurable negative impact on economic growth over the period of 1995-2007."

JUMEME Celebrates Lake Victoria Mini-Grid Launch

JUMEME Rural Power Supply Ltd. (JUMEME), together with the European Union Delegation in Tanzania and its project partners, launched the newly constructed solar-powered mini-grid on Lake Victoria, Mulumo Island in the region of Kagera. The facility in Mulumo is one of 11 minigrids to be commissioned on 10 different islands on Lake Victoria in June 2019, constituting the first roll-out phase of the "Micro Power Economy, Tanzania Roll-out" project co-funded by the EU.

Over the last 12 months, JUMEME has constructed more than 180 km of low and medium voltage distribution grids, electrifying 20 villages with a total population of more than 80,000 people and providing 24/7 electricity services based on solar-hybrid power systems to residential houses, schools, hospitals, businesses and local entrepreneurs.

JUMEME aims to build and operate solar-hybrid mini-grids in remote settlements of Tanzania with a total budget of €16 million. The project is cofunded by the European Union Energy Facility for a total amount of €7.4 million. The Rural Energy Agency (REA), through its result-based financing scheme, has also provided grant funding to the project, whereas the shareholders of JUMEME have contributed with equity.

Having run a pilot system on Ukara island since 2016, JUMEME will now operate the 11 additional minigrids spread across Lake Victoria on the islands of Goziba, Kerebe, Kasenyi, Mulumo, Rukuba, Kibumba, Maisome, Mahaiga, and Irugwa. In parallel to the first roll out phase, the construction of an additional 11 mini-grids, located on the shores of Lake Tanganyika is underway. These additional mini-grids are also co-financed by the European Union and will be finalized at the beginning of 2020, making JUMEME the energy service provider to more than 170,000 people.

Offshore and Marine

Owners Offered New Deal to go Green An innovative finance deal that will allow offshore

and marine asset owners to reduce their fuel consumption, costs and emissions has been launched. Blueday Technology, which designs and installs integrated energy systems for energy, marine and maritime customers, has teamed up with sustainable energy infrastructure fund manager SUSI Partners to offer a new financing structure for asset owners.

Fifty million euro is now available for Blueday Technology clients to install integrated energy systems. The scheme removes the biggest obstacle standing in the way of asset owners installing hybrid energy systems: the need for a significant, upfront capital investment.

Asset owners and operators in the oil and gas, drilling rig, maritime, aquaculture and shore power sectors could all benefit from the new deal. Hans-Petter Heggebø, CEO of Blueday Technology, said: "The offshore and marine industries are facing financial pressures at a time when their emissions and carbon footprints are coming under scrutiny.

"This is a fantastic opportunity for owners and operators to reduce operating expenditure and emissions while future-proofing their assets.

"Blueday Technology is at the forefront of hybrid technology. Our SMART hybrid solutions keep assets running at peak efficiency and customers report a return on investment within two years.

"We know that cash pressure is one of the main barriers to installing our systems and futureproofing assets – we've now solved that problem for owners and operators through our agreement with SUSI Partners."

Under the new arrangement, asset owners and operators who want to install hybrid energy systems will face no upfront costs; instead, they will pay a monthly fee.

Gustavo Coito, Director in SUSI Partners' investment team, said: "We are delighted to partner up with Blueday to deliver a combined solution to asset owners and operators, allowing for economic and environmental benefits while removing the key hurdle faced with when deciding to go electric."

Zimbabwe Plans Solar Panel Manufacturing Facility

China's Yaowei Technology plans to set up a solar panel plant in Zimbabwe to produce around 500 solar panels per day. Once launched, it is hoped that the project will reduce the energy deficit facing the country because of the dependence on hydropower.

Currently, the high cost of imported solar equipment makes this type of energy technology inaccessible.

"About one hectare of land will be enough to set up the first phase of the project. Zimbabwe needs investment in research to make the opportunities available in its economic sectors available," said Cheng Hangjian, director of Yaowei Technology. The country is currently facing an energy deficit of 1,000 MW, due to the reduced production of the Kariba dam, which supplies almost half of the energy consumed in the country.

Alten Commissions Solar Plant in Namibia

Alten Energías Renovables officially commissioned Namibia's largest solar power plant, with a generation capacity of 45.5 MWp. The plant, located in the south of the country, is a JV between Alten, state-owned power company NamPower and Namibian solar companies Mangrove, Talyeni and First Place Investment.



The southern African nation is a net importer of electricity and is promoting solar to reduce its dependence on domestic hydroelectricity and power imports from neighboring South Africa, Zambia and Zimbabwe.

Isabel Saracho, communication and marketing adviser at Alten Energías Renovables in Madrid, told *PV Magazine* the new plant will be productive because of the location's extremely high irradiation levels.

"[The] Alten Solar Power Hardap PV Plant is the largest photovoltaic solar power plant in Namibia," confirmed Saracho. The project occupies 100 hectares and will generate enough electricity to power 70,000 residents, she added.



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FACTS AND FIGURES

African Rig Count 2019 Country May April June Algeria 52 51 45 Angola 5 5 5 Renin 0 0 Λ

Definit	0	0	0
Cameroon	2	2	2
Chad	7	7	7
Congo	3	3	3
Congo (DRC)	1	1	1
Cote D'Ivoire	1	1	0
Djibouti	2	2	2
Egypt	25	24	22
Equatorial Guinea	0	0	0
Ethiopia	2	2	2
Gabon	7	6	6
Ghana	3	3	3
Guinea	0	0	0
Kenya	8	7	7
Liberia	0	0	0
Libya	15	15	15
Mauritania	0	0	0
Morocco	1	1	1
Mozambique	0	0	0
Namibia	0	0	0
Niger	1	1	1
Nigeria	14	14	14
Senegal	0	0	0
Sierra Leone	0	0	0
South Africa	0	0	0
Sudan*	0	0	0
Tanzania	0	0	0
Togo	0	0	0
Tunisia	2	2	2
Uganda	0	0	0

Africa Production of Crude Oil

(including Lease Condensate, Thousand Barrels/Day)

Country	2019		
Country	April	May	June
Algeria	1013	1029	1005
Angola	1413	1474	1418
Cameroon	75	75	75
Chad	111	118	120
Congo (Brazzaville)	335	326	331
Congo (Kinshasa)	19	20	20
Cote d'Ivoire (Ivory Coast)	27	26	26
Egypt	650	650	650
Equatorial Guinea	110	112	113
Gabon	186	214	208
Ghana	124	122	123
Libya	1176	1170	1113
Mauritania	0	0	0
Morocco	0.5	0.5	0.5
Niger	20	20	20
Nigeria	1819	1726	1855
South Africa	2.5	2.5	2.5
Sudan and South Sudan	188	172	170
Tunisia	49	49	48
Total Africa	7318	7306	7298

*Data not available

World Oil Production

(million baries per day)			
Country	2019		
Country	April	May	June
Americas	23.76	24.29	24.33
Canada	4.93	5.3	5.25
Chile	0.01	0.01	0.01
Mexico	1.93	1.91	1.9
United States	16.89	17.06	17.17
Asia Oceania	0.47	0.48	0.49
Australia	0.4	0.41	0.41
Others	0.06	0.07	0.07
Europe	3.38	3.17	3.1
Norway	1.73	1.6	1.49
UK	1.17	1.1	1.14
Others	0.48	0.47	0.47
Total OECD	27.61	27.94	27.91
Total Non OECD	31.05	31.05	31.39

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Country		2019		
Country	April	May	June	
Algeria	1013	1029	1005	
Angola	1413	1474	1418	
Congo	335	326	331	
Ecuador	528	530	528	
Equatorial Guinea	110	112	113	
Gabon	186	214	208	
Iran, I.R.	2554	2367	2225	
Iraq	4630	4745	4718	
Kuwait	2697	2710	2690	
Libya	1176	1170	1113	
Nigeria	1819	1726	1855	
Saudi Arabia	9742	9687	9813	
UAE	3060	3060	3083	
Venezuela	768	750	734	
TOTAL OPEC	30031	29898	29830	
OPEC exluding Iraq	25531	25153	25112	
* Based on secondary sources				

Source: IEA Oil Market Report

Source: BHGE

International Rig Counts										
AREA	Last Count	Count	Change From Prior Count	Date of Prior Count	Change from Last Year	Date of Last Year's Count				
US	Aug 2, 2019	942	-4	July 26, 2019	-102	Aug 3, 2018				
CANADA	Aug 2, 2019	137	10	July 26, 2019	-86	Aug 3, 2018				
INTERNATIONAL	June, 2019	1,138	12	May, 2019	179	June, 2018				



Gas Prices														
	July 03	S		Spo	t Prid	20			F	utur	⊃s Pr	ice*		
Henry Hub	July 00	2 29		spo					1	utuiv	-511			
New York		2.26												
	July 09													3.0
Henry Hub		2.41												
New York		2.41			•									
	July 12													
Henry Hub		2.54												-2.7
New York		2.43									↓			
	July 17										,			
Henry Hub		2.44		_										
New York		2.27		\square										-2.5
	July 22		_/							_				
Henry Hub		2.33	2											
New York		2.29									\backslash	-		
	July 24											-		-2.2
Henry Hub		2.33												
New York		2.20												
	July 26													
Henry Hub		2.23												20
New York		2.15	03 09	12	17 22	24	26		 03	12	17	22 24	26	2.0
		Dollars per BTU	July July	July	July July	July	July		July	July	July	July July	July	

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CONFERENCES

	OCTOBER	2019	
1-3	Congo International Oil & Conference and Exhibition (CIEHC 2019)	Brazzaville, Congo	www.ametrade.org
2-3	Tanzania Oil & Gas 2019 (TOG 2019)	Dar es Salaam, Tanzania	www.cwctog.com
7-8	Offshore Well Intervention MENA 2019	Abu Dhabi, UAE	www.interventionmena.offsnetevents.com
7-9	Offshore Energy Exhibition & Conference	Amsterdam, The Netherlands	www.offshore-energy.biz
8-8	Diversity in Energy Summit	London, UK	www.diversityenergysummit.com
9-11	AOP 2019 (Africa Oil & Power)	Cape Town, South Africa	www.africaoilandpower.com
10-11	3 rd Africa Oil & Gas Local Content & Sustainability Summit	Accra, Ghana	www.ametrade.org
15-17	MOC 2019 (Mediterranean Offshore Conference & Exhibition)	Alexandria, Egypt	www.moc-egypt.com
29-29	SPE Upstream Finance and Investments Conference	Central London, UK	www.spe.org
29-31	5 th Annual Southern Africa Power Summit 2019	Cape Town, South Africa	www.ssapower.com
	NOVEMBER	2019	
11-14	ADIPEC 2019	Abu Dhabi, UAR	www.adipec.com
11-14	Mozambique Gas Summit	Maputo, Mozambique	www.mozambique-gas-summit.com
26-27	GECF 5 th Gas Summit	Malabo, Equatorial Guinea	www.yearofenergy2019.com
	DECEMBER	2019	
2-3	Regional Energy Summit: West Africa	Dakar, Senegal	www.res-west.com
2-3	Mauritania Future Energy	Nouakchott Mauritania	www.cwcmauritania.com
		Troudinotti, Madintania	www.cwcinauritania.com
2-4	DRC Power, Oil and Gas Conference & Exhibition	Kinshasa, DRC	www.drcoilandgas.com
2-4 2-5	DRC Power, Oil and Gas Conference & Exhibition 9 th Annual Practical Nigerian Content (PNC) Forum	Kinshasa, DRC Yenagoa, Nigeria	www.drcoilandgas.com www.cwcpnc.com
2-4 2-5 4-5	DRC Power, Oil and Gas Conference & Exhibition 9 th Annual Practical Nigerian Content (PNC) Forum Oil & Gas Non-Metallics 2019	Kinshasa, DRC Yenagoa, Nigeria London, UK	www.drcoilandgas.com www.cwcpnc.com www.ami.international
2-4 2-5 4-5 10-11	DRC Power, Oil and Gas Conference & Exhibition 9 th Annual Practical Nigerian Content (PNC) Forum Oil & Gas Non-Metallics 2019 BBTC MENA 2019 – Bottom of the Barrel Technology Conference	Kinshasa, DRC Yenagoa, Nigeria London, UK Bahrain	www.dwcoilandgas.com www.cwcpnc.com www.ami.international www.bbtc-mena.biz
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2-4 2-5 4-5 10-11 10-12	DRC Power, Oil and Gas Conference & Exhibition 9 th Annual Practical Nigerian Content (PNC) Forum Oil & Gas Non-Metallics 2019 BBTC MENA 2019 – Bottom of the Barrel Technology Conference 9 th Middle East Artificial Lift Forum (MEALF 2019) MARCH 2	Kinshasa, DRC Yenagoa, Nigeria London, UK Bahrain Muscat, Oman O 2 0	www.dvcoilandgas.com www.cwcpnc.com www.ami.international www.bbtc-mena.biz www.mealf.net
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2-4 2-5 4-5 10-11 10-12 15-18 22-22	DRC Power, Oil and Gas Conference & Exhibition 9 th Annual Practical Nigerian Content (PNC) Forum Oil & Gas Non-Metallics 2019 BBTC MENA 2019 – Bottom of the Barrel Technology Conference 9 th Middle East Artificial Lift Forum (MEALF 2019) MARCH 2 NAPEC - North Africa Petroleum Exhibition & Conference APRIL 20 SPE Norway One Day Seminar DECEMBER	Kinshasa, DRC Yenagoa, Nigeria London, UK Bahrain Muscat, Oman O 2 0 Oran, Algeria 2 0 Bergen, Norway 2 0 2 0	www.dwcoilandgas.com www.dwcoilandgas.com www.cwcpnc.com www.ami.international www.bbtc-mena.biz www.mealf.net www.napec-dz.com www.spe.org

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