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Oil Review Africa

Oil · Gas · Petrochemicals

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Southern Africa: New frontiers?

Nigeria update: Developing the downstream sector

Big data for the compressed air market, satellite communications, asset management and artificial lift

Change management for oil and gas operators

Aliko Dangote commits to finishing Lekki refinery project ahead of schedule (p18)

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Aliko Dangote is committed to the timely completion of the Lekki refinery (p18).

EDITOR'S NOTE

IN THIS ISSUE, the focus is on the emerging oil and gas markets of southern Africa (p12). Whether it's the exciting new exploration projects of Namibia, Botswana's drive to reduce economic reliance on diamond mining, South Africa's commitment to moving away from coal dependence, or Mozambique's promising nascent gas industry, there are certainly opportunities for bold investors and ambitious service companies.

It is timely that we feature the southern part of the continent in this issue as we look forward to Africa Oil Week, which will be held again in Cape Town. *Oil Review Africa* is delighted to be a media partner for this event and we look forward to providing updates from new and established oil and gas markets.

We've also got an update in this issue on the outlook for Nigeria (p18). The country is moving closer to passing the Petroleum Industry Bill after 17 years.

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Cape Town
www.africa-oilweek.com

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Nairobi
http://10times.com/the-east-africa-oil-and-gas-summit

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NAMCOR REBRANDS FROM GREEN TO DIFFERENT SHADES OF ORANGE

We changed both our look and corporate colours from the dominant green oil drop to the orange NAMCOR spiral. Apart from the old brand being outdated, our key strategic objectives specifically the retail fuel agenda served as a key motivation for the rebranding. A study of the NAMCOR brand revealed that it was not suitable to be adopted onto our new fuel retail sites. After further extensive research of oil brands locally, regionally and internationally we took the decision to revisit our brand and develop a new brand that is in line with our goals as well as with industry modern trends.

THE ROLE OF E&P

NAMCOR Exploration and Production Department focuses on upstream activities of the oil and gas industry. Its institutional role is to participate in hydrocarbon exploration on behalf of the Namibian Government and to ensure the optimum exploitation of Namibia's petroleum resources. Other main upstream activities include being a technical advisory to the Ministry of Mines and Energy, active promotion of Namibian acreage at local and international platforms in order to attract hydrocarbon investments, and storage and brokerage of Namibia's hydrocarbon exploration data which includes 2D and 3D seismic data; and core and rock cuttings from exploration wells.

NAMCOR's Participation

At present, 38 exploration, 5 reconnaissance and 1 production licenses have been issued by the Ministry of Mines and Energy. NAMCOR has 10% carried interest in more than 90% of hydrocarbon exploration licenses issued in Namibia. NAMCOR has recently been awarded 100% working interest in Block 1811A and 20% working interest in Block 2914A; both these exploration blocks are located offshore Namibia in the Namibe and Orange Basins respectively. NAMCOR's participation in hydrocarbon exploration and future production activities ensures a Namibian presence in this industry, while contributing to local capacity building.

Hydrocarbon Exploration Data

- A total of 32 wells have been drilled offshore Namibia (15 exploration, 7 appraisal (KUDU gas field) and 10 ODP/DSPD wells.
- 10 exploration wells have been drilledonshore.
- Namibia has excellent offshore seismic coverage.
  147 000 line km of 2D seismic
  40 423 km^2 of 3D seismic data offshore.
- Onshore, the 2D seismic database comprises of 2500 line km of 2D.
- 28 000 km of aeromagnetic data has been acquired covering the whole offshore Namibia.

Kudu Gas Project

The Kudu Gas-to-Power Project is a key strategic power generation project for Namibia, which will decrease reliance on imported power and accelerate economic development.
NAMCOR has a 44% stake in the national gas to power project:

PROJECT SHAREHOLDING

- BW Kudu Limited became the operator of the Kudu field on 26 January 2017 and has taken 56% equity in the project.
- NAMCOR will continue engaging potential investors interested in taking up some of the remaining 44% equity.

DEVELOPMENT CONCEPT

- Three vertical wells are to be drilled and the produced gas will be transported via subsea flowlines to the FPS (gas treatment vessel).
- The treatment gas from the FPS will be transported via export pipeline to the Kudu Power Station, where this gas will be burned to produce electricity.

DOWNSTREAM

Commercial and Marketing

NAMCOR markets a range of petroleum related products ranging from fuels and lubricants to various clients. The corporation's stakeholders are from various sectors within the economy such as Government, Mining, Transportation, and Farming amongst others. All products marketed by NAMCOR meet Namibian product specifications!

RETAIL

The National Petroleum Corporation of Namibia plans to enter the fuel retail sector are at an advanced stage, with our first retail site expected to become fully operational before the end of 2017. This will be followed by a number of NAMCOR branded service stations at strategic locations around the country.

LOGISTICS

The Commercial Business Unit has since its inception established and developed a number of bulk fuel storage depots in key locations, from where it services valued customers.

NAMCOR has successfully refurbished a 650,000 litre capacity state of the art bulk storage depot in Otjiwarongo, from where it trades a full range of refined petroleum products (Fuels, Lubes and IP) and serves customers in the surrounding areas and Government agencies (near north & far north).

The company has a stake in the following depots
- Otjiwarongo Bulk Fuel Storage with a capacity of 600 000 litres (100%)
- Mariental Commercial Bulk Storage with a capacity of 166 000 litres
- Keetmanshoop Depot

The company also plans to set up a new depots in Gobabis, Windhoek and Ondangwa.

All these facilities comply with the relevant environmental and safety standards!

FUELS

NAMCOR offers a number of main fuels, including Diesel 50ppm, 500ppm and Unleaded Petrol 95 at a price based on the Government regulated wholesale price, as applied by the Namibian Government from time to time. Pricing (site specific) is available upon request.
Additionally NAMCOR offers Illuminating Paraffin (IP) and Heavy Fuel Oil (HFO) at competitive prices. The quality of petroleum products to be supplied by NAMCOR conforms to the specifications set out by the Namibian Government. Please also note that the latest amendments shall apply. Quality certificates of all the products are regularly supplied on request.

SUPPLY AND TRADING

Our main objectives are to secure alternative sources of supply and to establish reliable networks with various suppliers from which products can be sourced. We are also dedicated to the establishment of export markets to contribute revenue through cross border trade of products through the port of Walvis Bay. NAMCOR is still an active participant in the country's downstream industry, holding a wholesale license and servicing a number of clients.

LUBRICANTS

NAMCOR added branded lubricants, in collaboration with SASOL Oil Limited, to its product range for the mining, agriculture and automotive sectors. The company also plans to introduce its own Lubricant offering to effectively compete nationally and export to regional markets.

LIQUEFIED PETROLEUM GAS

The company intends to explore re-entering the LPG market to create value as a National Oil Company, to serve the less privileged with reliable and cost-effective energy source.

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NAMCOR
EXPLORING & FUELLING NAMIBIA

Africa Energy acquires interest in Namibia

AFRICA ENERGY CORP has acquired one-third of the shares in a subsidiary of Australia-based Pancontinental Oil & Gas NL which holds 30 per cent participating interest in Petroleum Exploration Licence 37 (PEL 37) in Namibia.

Commenting on the acquisition, Garrett Soden, president and CEO of Africa Energy, said, "We are pleased to partner with Pancontinental for an effective 10 per cent interest in PEL 37 offshore Namibia. This transaction completes the discussions we began some time ago and demonstrates our commitment to this oil-prone play."

(Image credit: Ded Pixto/Adobe Stock)

Namibia is looking forward to start operation in 2018.

"We look forward to the exploration well that may be drilled as early as next year," Soden added.

Africa Energy has paid Pancontinental US$2.2mn at closing and will pay an additional US$5.5mn upon spudding of the first exploration well, provided that certain commercial conditions exist on the spud date.

Petrochemical sector to play a role in African development

HELPING AFRICAN COUNTRIES with industrialising to promote growth, job creation and economic transformation is a priority of the Economic Commission for Africa (ECA), said Stephen Karingi, director of regional integration and trade division (RITD) at ECA in an Intergovernmental Authority on Development (IGAD) meeting.

He said that value addition in the petrochemical sector could contribute to Africa's industrialisation, especially given the continent's endowment in crude oil and gas.

"Although Africa's starting point is unfavourable, its potentials in industrial development are tremendous," he said, adding some developing regions including east Asia that had proven such potential through industrialisation.

Image Credit: World Trade Organisation

Stephen Karingi talks of petrochemical potential.

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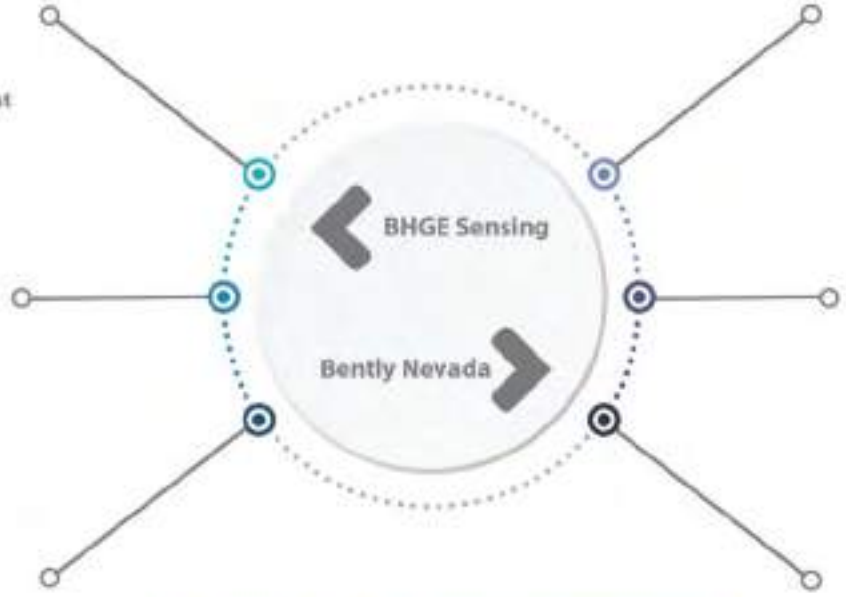

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Ghana and Gazprom sign sales agreement to supply LNG for energy security

GHANA NATIONAL PETROLEUM Company (GNPC) and Russian energy giant Gazprom, have signed a gas sales agreement (GSA) to supply LNG. The GSA is expected to increase Ghana's energy supply by 1,000MW after a regasification plant is constructed at Tema. It is the second-biggest LNG supply contract in Gazprom's portfolio.

President Nana Addo Dankwa Akufo-Addo said the agreement will have a positive impact on Ghana's economy.

"If we are going to succeed in pushing the industrial development of our country rapidly, the supply of gas to our country is now a matter of very great importance to for us," the president said.

The agreement replaces two competing contracts for the same Tema LNG project, which the government decided were overpriced and oversized for Ghana's requirements.

"All of us are going to do whatever we need to do to make sure that this relationship that we have now begun to build becomes a strong, positive and successful one," said President Akufo-Addo.

Pavel Oderov, head of international business for Gazprom described the signing of the GSA as "a very big day for us".

Image Credit: SarahTz/Flickr

Gazprom's Ghana deal will be its second-biggest LNG supply contract.

Quantum Power refutes claims it required state assistance for LNG infrastructure

QUANTUM POWER HAS released a statement to refute media reports that it required investment from Ghana National Petroleum Corporation (GNPC) for its project to provide infrastructure to import LNG.

The company said in a statement that all projects costs, including pipelines "were to be fully borne by Quantum and Höegh LNG. It was GNPC who insisted on having the right to invest in the project."

"This has been distorted in the media to suggest that Quantum required GNPC to invest in the project. This is false," the statement continued.

Höegh LNG has, according to the statement, vetted Quantum's technical solution. Additionally, Quantum said it has not offered to provide the LNG as the project only offers Ghana the mechanism for transporting the gas, allowing Ghana to choose its LNG supplier. (See Gazprom story above for more.)

In terms of credit support, the statement said that Quantum has been working in collaboration with the African Development Bank (AfDB) in seeking to "provide an AfDB partial risk guarantee to cut the government's credit cost burden to a quarter of the original amount".

Image Credit: Clara Sanchiz/Flickr

Quantum Power says it is collaborating with AfDB on the LNG project.

Tullow Ghana wins local content award

THE SEKONDI-TAKORADI CHAMBER of Commerce and Industry (STCCI) has awarded Tullow Ghana two local content honours. The event was part of STCCI's annual international safety conference for the extractive industries.

This is the first time that STCCI has recognised an oil and gas company for its local content initiatives, which are required under Ghanaian law.

Tullow was awarded for taking steps to create opportunities and develop capacities for local businesses.

Jennifer Bruce-Konuah, Tullow Ghana's local content business partner, accepted the award, saying the company is committed to delivering shared prosperity and mutual value to its host countries.

She also reiterated Tullow Ghana's determination to ensure that Ghanaian enterprises in the country benefit from local content opportunities available across a wide range of work.

Tullow's initiatives to boost local content and stimulate more inclusiveness include reserving work for indigenous companies such as payroll, human resource management, communication, catering and cleaning.

On presenting the award, Ato Van-Ess, chairman of STCCI, said: "As the first son of Ghana's young Oil and Gas Industry, Tullow Ghana has demonstrated immense commitment to effective and open engagement on local content improvement issues in Ghana."

In Ghana, Tullow is the operator of the Jubilee and TEN fields, which are loacted offshore in the Western Region.

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ADIPEC programme expands to downstream sector

FOR THE FIRST time, ADIPEC, the annual oil and gas technical conference held in Abu Dhabi, will include the downstream industry in the programme.

The expansion to include the downstream sector reflects one of the emerging industry trends in oil and gas, as upstream and midstream companies are increasingly looking towards integration, collaboration and diversification across refining and petrochemicals, processing, and end-product sales to boost overall profitability.

Additionally, the technical programme will include more sessions for specialised areas such as offshore and marine exploration and production.

The expanded technical programme will encompass all layers of the industry, including upstream and midstream sessions organised by the Society of Petroleum Engineers, while dmg events, Global Energy, will oversee a new programme of downstream sessions.

Organisers say the change reflects the accelerating search for efficiency and integration in a challenging global marketplace.

The conference will be held at the Abu Dhabi National Exhibition Centre from 13-16 November. More than 900 speakers are on the programme.

www.adipec.com

Deepwater gas development on Mozambique agenda

Oil and gas are expected to aid development.

Image Credit: Julian Legarde/Wikimedia Commons

MOZAMBIQUE'S FIRST DEEPWATER gasfield development will be high on the agenda at the Mozambique Gas Summit. The event will be held in Maputo from 18-20 October. This follows on from the announcement in June that Eni and the Mozambican government signing off the Coral South floating LNG facility, the first of its kind for the country.

The development of the Coral Sea LNG project marks the beginning of the implementation phase for Mozambique's gas industry. it is expected that this will be the catalyst for more such deals progressing from the planning stages and coming to fruition.

www.mozambique-gas-summit.com

Samia Suluhu Hassan opens Tanzania Oil & Gas Congress

SAMIA SULUHU HASSA, vice president of Tanzania led a distinguished panel of speakers at Tanzania Oil & Gas Congress, held in Dar es Salaam in September.

In her opening address, Ms Samia said the government had passed legislation to help Tanzania build a strong oil and gas industry.

"Under these legislations, Tanzania hopes to ensure that appropriate standards of providing local content principles, including the requirement for technology transfer and skills to Tanzanians are met," she told the conference.

Ms Samia highlighted the importance of local content, sayng the country is working with partners to "ensure that the Tanzania gas sector will eventually be developed and staffed by Tanzanians".

The upstream sector was emphasised in her address, with Ms Samia talking about the importance of oil and gas as the basis for chemical, pharmaceutical and petrochemical products as well as a means of meeting energy needs.

"I therefore urge local companies to ensure that they identify and engage right partners so that they can start transferring appropriate technology in order to improve their competitiveness," she said.

Image Credit: CWC

Samia Suluhu Hassa.

Higher oil prices a factor in South African fuel price hike

A 12 PER CENT increase in oil prices since the start of September has been cited by the South African Department of Energy as a factor in fuel price rises.

Improved compliance with the OPEC production freeze by member countries, slower US drilling activity, and evidence of falling stocks of crude oil in the US have contributed to oil prices in September climbing above $55 a barrel. In line with the crude oil price rise, the price of petroleum in international markets has also increased, impacting on South African fuel prices.

The third factor which the department cites for the fuel price increase is the rand appreciating against the US dollar in August, although there has been a slight slip in the average exchange rate during September.

The price of petrol, diesel, illuminating parrafin and LPG have all increased for South African consumers and businesses.

South African consumers will feel the pinch at the pump.

Image Credit: Rama/Wikimedia Commons

ITLOS rules on Ghana-Côte d'Ivoire maritime boundary issue

THE SPECIAL CHAMBER of the International Tribunal for the Law of the Sea (ITLOS) has delivered a judgement on a long-running maritime border dispute between Ghana and Côte d'Ivoire.

It was found by the chamber that ITLOS has jurisdiction to delimit the maritime boundary between the two countries in the exclusive economic zone and on the continental shelf, both within and beyond 200 nm.

Unanimously, the tribunal found that Ghana did not violate the sovereign rights of Côte d'Ivoire and a boundary has been drawn between the two countries in the southern Atlantic Ocean, starting at the coordinates 05° 05' 23.2" N, 03° 06' 21.2" W.

The maritime border dispute has been running since 2014.

Image Credit: fellfromatree/Flickr

It was also found that there is no tacit agreement between the countries to delimit their territorial sea, exclusive economic zone and continental shelf both within and beyond 200 nm, and it rejected Ghana's claim that Côte d'Ivoire is stopped from objecting to the"customary equidistance boundary".

SOUTHERN AFRICA'S GREAT OIL AND GAS OPPORTUNITIES

Recent discoveries of major gas and oil deposits in southern Africa could dramatically improve the overall economic prospects for the region, reducing imports, driving economic growth, and lowering carbon levels in power generation.

ONCE UPON A time, scattered pockets of natural gas off the coasts of South Africa and Mozambique were all that southern African countries seemed to offer in terms of oil and gas resources. That changed in 2010 and 2011, when a potential 500 tcf of gas was identified across Mozambique and South Africa, along with 11bn barrels of oil in Namibia. Together, these countries' gas reserves equal those of Canada or Venezuela.

These discoveries could transform the region. In this article, we examine some of the economics of oil and gas in the region, consider their possible impact, and offer recommendations for handling these resources.

The highest-profile recent discoveries are in Mozambique, where estimates of offshore gas reserves range from 50 to 100 tcf in depths of 1,000 to 3,000m.

The largest potential reserves are in South Africa's shale beds beneath the Karoo region, estimated by the US Energy Information Administration to exceed 400 tcf. These reserves may now be extracted in an economically viable manner, thanks to hydraulic fracturing techniques.

In addition to gas, oil deposits amounting to an estimated 11bn barrels were found off the coast of Namibia in mid-2012. This discovery has spurred further exploration along the west coast of South Africa in the Orange River basin, an extension of the Namibian fields.

Image Credit: 600.d.za/Flickr

The Orange River basin has been the site of extensive exploration to determine its potential.

Yet the full potential of oil and gas in the region remains uncertain for three reasons. First, most fields are in the early exploration phase; the estimated volumes are technically recoverable resources, not proven reserves. Second, gas and oil sources have relatively high extraction costs: They're either deepwater sources, such as those off Mozambique, or unconventional gas sources, such as Karoo's shale gas and Botswana's coal-based methane. Third, new areas are opening for exploration promising even greater volumes, for instance the southern extensions of the fields off the coast of Namibia and the coal bed methane deposits in Botswana

The energy outlook

Southern Africa's economy is based on coal, and is short of liquid fuels. In 2011, South Africa imported 130mn barrels of crude oil. This high import volume exposes South Africa to both political and supply risk. The country's primary source of crude oil is Iran, followed by Saudi Arabia, Nigeria, and Angola. In June 2012 sanctions against Iran led to the cancellation of all imports from the country and a rapid search for alternative sources.

South Africa's total refining capacity is 250 mn barrels per year, or about 700,000 barrels per day. Of the daily total refining capacity, 500,000 barrels is crude oil and 195,000 barrels coal-to-liquid synthetic fuel. So with total consumption at about 24.5bn litres of fuel annually – mainly petrol and kerosene – there is a 7 per cent shortfall of 1.5bn litres of fuel per year, accounting for South Africa's need to import refined products.

Against this backdrop there have been a series of fuel shortages due to refinery-maintenance issues. The most

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significant event was in January 2012 when several planned and unplanned refinery shutdowns combined with problems at the Single Buoy Mooring facility off Durban to cause widespread fuel shortages. Also, South Africa's refineries are old, an average of 43 years old, and need increasing levels of maintenance – and in some cases, significant upgrades – to keep them operational, efficient, and in line with environmental standards. With fuel prices regulated, funds for making upgrades are limited.

South Africa's general energy environment is constrained. Electricity utility Eskom operates with a very narrow reserve margin – about 17 per cent, and much lower when affected by maintenance – and depends on diesel generation to cover peak demand.3 Two open cycle gas turbines (OCGTs) running on gasified diesel started on 11 August 2012. They consume an estimated 220 mn litres (nearly 60mn gallons) annually—about 2.5 per cent of South Africa's total diesel consumption.

Southern Africa has abundant and cheap sources of coal, making it still the primary energy source; it provides 85 per cent of Eskom's total generation. The region's coal-fired power fleet is the cheapest option for producing power and at current coal production, reserves could last at least a century.

However, coal dependency for generating electricity and for conversion to liquid fuels makes South Africa one of the most CO2-intensive countries in the world. Were South Africa part of the European Emissions Trading Scheme (ETS), the Sasol Secunda plant would be the single largest CO_2-emitting site.

The potential of gas

Gas is a low-cost, flexible power source. It can provide generation primarily above the base load in peak-demand periods. Replacing expensive diesel generation during these hours reduces the cost of generation for Eskom and mitigates consumer price rises.

Coal is expected to maintain a high position in the southern African energy mix. The South African Department of Energy's Integrated Resource Plan expects a coal share of 46 per cent in 2030, with OCGTs expected to contribute about 8 per cent of the mix. If gas were increased to 25 per cent and based on combined cycle turbines, the coal share could be reduced to a third of total generation capacity.

Gas generation also plays a role in enabling the build-up of renewable energy sources. Wind and solar units experience down periods when they cannot generate due to intermittent loss of wind or when clouds block the sun. Since these periods are unpredictable, there is a need for short-term generation sources to cover loss of output; gas turbines with start-up times of between 10 and 30 minutes are ideal to meet this need. The more southern African countries develop renewable energies, the greater will be their need.

Finally, since gas generates only about half the CO_2 emissions of coal and two-thirds those of oil-fired power facilities, increasing the gas share would significantly lower South Africa's overall CO_2 emissions.

Liquid fuels

Namibian oil is the simplest source of newly discovered liquid fuels. When in production it will provide a local, relatively secure additional source of crude oil for the region. Reduced reliance upon the Middle East and Angola would substantially improve the security of crude oil supply to South African refineries. The proximity will also reduce freight costs and provide more flexibility in scheduling supplies and managing stocks.

Gas is a more complex source, requiring conversion from gas to liquid. With PetroSA's Mossel Bay gas-to-liquids (GTL) plant operating at 60 per cent of capacity, according to the company's annual report, there is immediate potential to increase the utilisation of existing assets. PetroSA's plan to extend its operations to the F-O gas field should bring capacity back up to 100 per cent.

The large gas sources of southern Africa offer the possibility of increasing GTL refining capacities to further address South Africa's short position. An additional GTL plant would enable South Africa to close the shortage of liquid fuels.

Image Credit: Clint Mason/Flickr

Meeting energy needs is an ongoing challenge for South Africa.

Petrochemicals

The chemicals industry is a critical part of South Africa's economy. The industry's US$23bn in annual revenues contribute more than 5 per cent to the gross domestic product (GDP), accounting for approximately 25 per cent of all manufacturing activity. Despite its local importance, the industry's poor access to local feedstock and remoteness from major developed markets are fundamental weaknesses.

South Africa's current feedstock sources are Sasol's coal-to-liquids Secunda plant and imports from the Middle East and Asia. Chemicals margins are declining and Sasol in particular is suffering as a result of cheaper imports. Its competitive position was weakened further with the removal of import duties on polymers in January 2012. This has deepened a strategic shift in the South African chemicals industry to one that focuses more on higher-value chemicals products, greater customer service, and innovation.

The new hydrocarbon sources have the potential to transform this landscape. Local sources would secure low-cost supplies of feedstock for southern African chemicals companies, reducing their reliance on imports and improving profitability. This would open up new possibilities for manufacturing further down the value chain.

This leads to a fundamental question: where should the chemicals feedstock come from? Today the major production operations are around the Secunda plant in Sasolburg and the six other refineries. The new feedstock sources are off the western and eastern coasts and in the Karoo.

There are a number of possible answers. While using Namibian oil could allow expansion of the existing refineries, potentially building new capacity, Namibian oil is a relatively small source and offers few cost advantages over existing crude oil sources. Further, due to overcapacity in Europe and the United States,

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refining margins are falling worldwide. Adding southern African conventional refining capacity would expose the market even more to the dynamics that are making refining unattractive in most regions.

The opportunity, then, is first to take advantage of offshore gas and, ultimately, shale gas. With gas trading at about half the price of oil on a recoverable-energy basis, achievable margins are significantly greater.

This means that southern Africa's energy infrastructure would have to be developed to use gas rather than oil. The way to do this is to add GTL refining capacity in South Africa. One option would be for PetroSA, the country's national oil company, to convert its planned Mthombo refinery project from a conventional refinery to a GTL plant. Rather than adding more conventional capacity in an unattractive refining market, this would give PetroSA a leading position in a market where margins are potentially more attractive.

However, this would leave PetroSA exposed to changes in the energy landscape and "unhedged" should the oil-gas gap narrow. It would also constrain competition.

Another option could be for a local player or group of players already active in southern Africa to construct a plant. This would result in downstream integration, foster competition, and provide balance across a number of suppliers and sources.

Implications and opportunities

The South African government has the opportunity to use oil and gas discoveries to boost its economic and social development. Low-cost energy and feedstock sources have the potential to give South Africa the same cost advantages in manufacturing enjoyed by other hydrocarbon-rich nations. In the short term, such sources also could alleviate the shortfall in electricity generation and facilitate development of renewable energy sources.

These towers are all that remains of a coal-fired power station in Johannesburg.

Image Credit: Tim Abbott/Flickr

To capitalise on these opportunities, South Africa must support the development of gas as a low-cost energy source and a feedstock source for chemicals beneficiation. It should work with Eskom and other potential electricity providers to explore options for gas generation around the Southern Africa Power Pool. Finally, as owner of PetroSA and sponsor of the Mthombo refinery project, the government should consider redesigning the plant as a GTL facility.

Mozambique's government has more direct opportunities to capitalize on the gas found off its shores. Supplies are already set for export, with Anadarko and ENI preparing two LNG liquefaction facilities. However, the real development opportunity for Mozambique is the potential for bringing gas onshore, first for energy generation and second, for liquid fuels and chemicals manufacturing. The imperative for the government is to make sure it explores all possible opportunities and puts in place policy and investment frameworks needed to promote that development.

With their ageing assets, refiners and retailers are at some risk from new developments. They will find it difficult to compete with new large-scale, efficient refining facilities, whether GTL or crude oil-based. They should first explore options for partnerships in emerging projects to exploit gas supplies.

Second, they should concentrate on maximising the performance of their legacy assets. Third, they should focus on commercial positioning around sources of potential cost advantage, crude oil from Namibia, new-build refineries, or a GTL plant.

Chemical companies have the most to win from the exploitation of gas in the region. With a looming worldwide oversupply of chemical capacity, only regions with a source of local, low-cost feedstock will stay competitive. Southern African gas offers that opportunity. Chemical firms must advocate the immediate exploitation of offshore natural gas and opportunities to access it as feedstock, whether in ethane from pipelines, LNG deliveries, or a GTL plant.

Over the longer term, the Karoo shale-gas basin offers the greatest, albeit least well-defined, opportunity. Chemical companies must treat this undeveloped area as an option that has the potential to increase greatly in value over time. Right now they must ensure that the opportunity is fully recognised and developed. As the chemical composition and economics become clearer, chemical firms must take increasingly concrete steps to work with the companies developing the basin to access its gas as feedstock. Finally, they must work with governments and their customers to identify manufacturing opportunities and assist in investing to realise them.

The discoveries around the coast of Southern Africa present major opportunities for South Africa, Mozambique, and Namibia, from reducing the cost and carbon intensity of power generation, to creating a supply of chemical feedstock to drive manufacturing development.

The challenge is for those involved to find the best way to take advantage of these opportunities. There are no simple paths to combining the locations, production timing, logistics, and market opportunities. However, those governments and companies that create and develop a range of options will most likely benefit from long-term development, the kind that can transform the southern African economy.

This is an edited version of an article from the AT Kearney website. www.atkearney.com

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PIB PASSAGE AND DOWNSTREAM DEVELOPMENT IN FOCUS FOR NIGERIA

After 17 years, the Petroleum Industry Bill is inching closer to becoming law in Nigeria. Meanwhile, there has been increased focus in 2017 on developing the downstream sector. *Oil Review Africa* editor Georgia Lewis examines this year's events so far.

THE PETROLEUM INDUSTRY Bill (PIB) has cast a long shadow over discussions in regard to the Nigerian oil and gas industry for several years now. This year, there was much optimism about the bill's passage being imminent at the Nigeria Oil and Gas conference (NOG), in February.

In May, the optimism, after 17 years of debate and amendments, was partly justified when the bill passed in the senate. The bill now awaits passage in the House of Representatives and presidential assent.

The long saga of the PIB took a dramatic turn in September when Omatayo Alasoadura, chairman of the Senate Committee on Petroleum Resources (Upstream), told local journalists that he has been offered bribes from "high places" to ensure the bill would not be passed. He also accused an unnamed senator of receiving a US$10mn bribe to kill the bill.

Image Credit: Dangote Group

Aliko Dangote meets Dr Ibe Kachikwu in Lekki, Lagos.

What will change if the PIB is passed?

If the bill becomes law, it will herald a new governance structure for managing the Nigerian oil industry's assets and the Nigerian National Petroleum Company (NNPC). The bill provides for the scrappage of the NNPC, the Department of Petroleum Resources (DPR) and the Petroleum Products and Pricing Regulatory Agency (PPPRA), as well as other government agencies in the oil sector. In its place would be three new entities - the National Petroleum Company (NPC), the National Petroleum Assets Management Commission (NPAMC) and the Nigeria Petroleum Regulatory Commission (NPRC).

> **"The PIB is important for further development, particularly in the petrochemical industry"**

Under this new structure, the NPC would be an integrated oil and gas company. The expectation is that NPC would be a fully commercial entity run like a private company, while NPAMC would function as a regulatory commission. Responsibility for health and safety would be part of the remit of NPAMC and it would be expected to work closely with the Ministry of Environment.

Funding for the regulatory commission would be via retaining 10 per cent of the revenue it generates for the government, with expenditure subject to approval by the National Assembly. The NPRC, meanwhile, would take over the roles of PPPRA and DPR.

The importance of the downstream sector

Ifeanyi Okowa, governor of Delta State, spoke out in September, urging the National Assembly to pass the bill to boost investment. He made his comments during a visit by the Nigerian ambassador to Vietnam, Francis Efeduma.

"Nigeria is still very attractive for foreign direct investment," Mr Okowa said. "We are lucky that as at today, we have been able to stablise our forex policy with a stable currency, which makes it easier for investors to plan."

In particular, he cited the importance of developing the downstream sector: "We will continue to call on the National Assembly to speed up issues concerning the bill because it is

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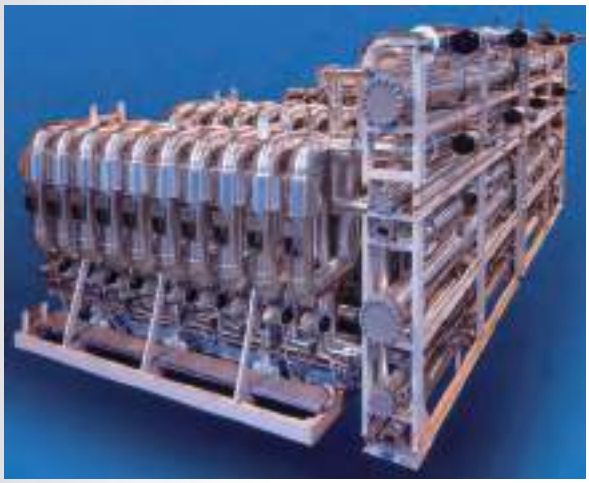

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important for further development, particularly in the petrochemical industry."

His comments reflect the focus this year on Nigeria's downstream sector, particularly in regard to developing refineries beyond those owned by the government.

> **"The refinery component of the Dangote project should come earlier than the set date of December 2017"**

At NOG, Ibe Kachikwu, NIgeria's petroleum minister, spoke about the importance of private sector involvement in developing and running refineries. When he visited the Dangote oil refinery construction site at Lekki Free Trade Zone in August, he said the government is ready to assist in ensuring the project is completed ahead of schedule. It is slated to be completed by December 2019.

"The challenge I will give you today is that of time; I see your time for completion is 2019 December, but I am sure you will understand my greed if I tell you that the refinery component of this project should come earlier than the set date," said Mr Kachikwu.

In response, Dangote Group president, Aliko Dangote said he would see what could be done to fast-track the refinery process and spoke about the importance of adding value in the petroleum industry: "What the minister is trying to do is the best so far for our country, his own version is that Nigeria should not think of exporting crude; you know the problem we have in Africa is that we only export raw materials, not finished goods, so he is saying that, look, we should all do this by adding value and I pray that even at 2.5 million barrels, we should not export much, in terms of the crude."

Mr Dangote talked about the importance of further diversification of the Nigerian economy beyond oil at the UN General Assembly in September, saying "we should pray that oil prices remain low".

"This helps wean us off the dependency on revenues from petroleum. We must take oil to be the icing on the cake. We already have the cake," he said.

These sentiments were echoed in an article by Professor Ehiedu Iweriebor, a professor of history in the Department of Africana and Puerto, Rican/Latina Studies, Hunter College, City University of New York. He wrote that Nigeria's plastics manufacturing industry and the wider economy would benefit from locally refined feedstock.

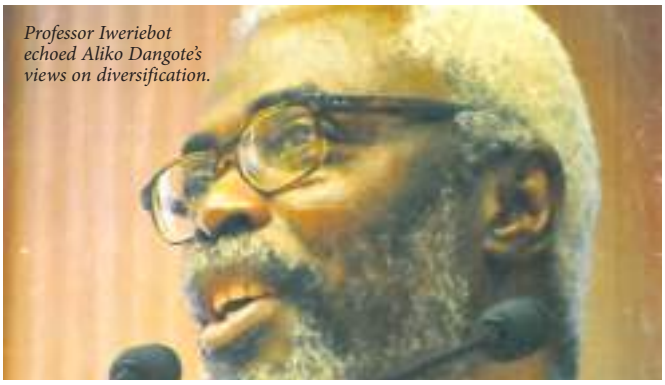
"All these ancillary industries will contribute to expanded manufacturing production in the various sub-sectors of the plastics industry and other economic activities and the generation of substantial employment opportunities," he wrote.

OPEC caps and Nigerian production increases

A meeting between OPEC representatives from Algeria, Kuwait and Venezuela and non-OPEC Russia and Oman was held in Vienna in September. The reduction of the oil glut and the impact of production cuts were the main topics of discussion, particularly in light of oil prices rising above US$55 a barrel.

Global oil inventories have shown indications of falling, although the efforts by oil producers to reduce stockpiles to their five-year average has taken longer than forecast. Despite the oil price rise, prices remain at half the level of mid-2014.

The supply pact sets production limits of 1.8mn bpd for participating OPEC and non-OPEC states, with exemptions for Nigeria and Libya because of crises in their oil and gas sectors. Nigeria's ongoing issues with militants damaging essential oil infrastructure has been one of the main reasons for its exemption from the OPEC cap. Many companies have declared force majeure in recent years as a result of militancy and pipeline vandalism.



Professor Iweriebot echoed Aliko Dangote's views on diversification.

Image Credit: Ehiedu Iweriebor

In September, Aiteo Eastern Exploration and Production Company released a statement saying it had declared force majeure on the Nembe Creek Trunk Line in the Niger Delta after the discovery of a new leak.

Kuwaiti oil minister Essam Al-Marzouq, who chaired the meeting, said that since July "the oil market has markedly improved".

"The market is now evidently well on its way toward rebalancing," said Mr Al-Marzouq.

Following the meeting, Iran's oil minister, Bijan Namdar Zanganeh singled out Nigeria and Libya for special attention by OPEC, referring to the exemption for the two countries from capping production.

"OPEC's actions are working and compliance is acceptable overall, although there needs to be some change," Zanganeh rold reprters in Tehran. "Changes are really related to Libya and Nigeria and the 100 per cent compliance of everyone."

This was reiterated by OPEC Secretary General, Mohammad Sanusi Barkindo: "There are clear signs that the market is rebalancing. However, now is not the time to let up."

Dr Kachikwu addressed concerns about Nigeria's oil production in an interview with Bloomberg and in a press conference after the Vienna meeting in mid-September. Nigeria's production of 1.7mn to 1.75mn bpd is up from an all-time low of about 1mn bpd, Kachikwu told Bloomberg. He added that output will be "back in full swing" in five to six months.

In Vienna, Dr Kachikwu said that Nigeria was averaging "about 1.69mn bpd".

"The reality is the cap we agreed on is 1.8 million bpd and as long as we are producing below that, we are already in it," he said in Vienna.

Eland Oil & Gas is boosting its output despite the comments from the Iranian oil minister. The company announced in September that it was ramping up its Nigerian production volumes.

It reported that net production of 5,275 bpd in the first half of its financial year. A total of 23,000 barrels of crude were lifted in June, once Forcados restarted operations, and an additional 355,500 barrels have been extracted in the first three months of H2 2017.

Production resumed at the OML 40 asset in January, using a single well, after the company decided to ship oil exports rather than use pipelines.

"The first half of 2017 has been very positive for Eland with the restart of production resulting in increased cashflows to further grow the business," said George Maxwell, Eland's chief executive.

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A NEW ERA OF BIG DATA FOR THE COMPRESSED AIR MARKET

Charles Joel, global IoT and analytics director at Gardner Denver, explains how digital data looks set to provide analytics with real value for oil and gas operators using compressed air services.

THE FOURTH INDUSTRIAL revolution is driving businesses to share and analyse asset data, and the Internet of Things (IoT) is showing no signs of slowing down. But the compressed air market has yet to truly capitalise on the opportunities that the IoT presents. High-quality energy and performance at a cost-effective price continues to be a major consideration for all businesses, and data-driven insights that can help achieve this are to be encouraged.

With generating compressed air accounting for 10 per cent of total energy costs in industry, ensuring wastage is kept to a minimum should be a concern. Industry averages suggest that energy costs account for more than 80 per cent of the total cost of ownership of a compressor, so initiatives that help identify inefficiencies and assist with performance optimisation, leak reduction and practical air management processes should be welcomed. IoT devices can offer great opportunities to help organisations work smarter.

Yet many organisations do not make the most of the data they collect. Alternatively, the trend seems to be to only consider data when an issue arises, rather than using it to manage a system effectively on an ongoing basis, which can render data meaningless.

Leveraging big data can boost management of compressed air systems.

There are three main stages to analytics. The first is as simple data, which is where data is collected but not processed in any meaningful way. Most of the world's digital data is unstructured, and lacking value. The next phase is predictive, where analytical tools are used to consume data. This will make predictions about unknown future occurrences, using techniques such as data mining, statistics, modeling and machine learning. "Edge analytics" refers to analysis that is performed at the point of data being generated.

When based on logical, intelligent rules, predictive analytics can give businesses the information they need when they need it. For the IoT to succeed in the compressed air market, businesses need to collaborate with an informed, knowledgeable organisation with the in-depth understanding to establish the right rules within a system. Those rules provide valuable insights into how a compressed air system is running, and offer recommendations on optimising operations.

The final stage is cognitive analytics. This is a strategy that describes how analytics and technologies can be applied to help humans make smarter decisions. A cognitive system will learn through its interactions with data and responses from the end user. It draws inferences from existing data and patterns; draws conclusions from existing knowledge bases; and then learns from this to inform future decision-making and business intelligence. And because a cognitive system is in a perpetual state of learning, it will keep adapting to deliver the required outcomes efficiently.

Cognitive analytics blends human and artificial intelligence, and the desired outcome for those that are really trying to develop the analytical models available on the market. These systems learn automatically, helping to improve business productivity, efficiencies and the overall customer experience. The potential for this level of insight is exciting, as it is technology that will automatically learn from past data and experiences, and create new systems as a result.

To this end, Gardner Denver launched a digital platform, iConn. It is a cloud-based air management platform that delivers advanced analytics. The system provides historic, real-time, predictive and cognitive analytics, so potential issues can be fixed before they happen.

The platform is beneficial for businesses with multiple remote or unstaffed sites, as it enables users to monitor compressor performance from a single location, via mobile device, tablet or PC. Data can be transferred securely via GSM, Ethernet or Wi-Fi. iConn helps minimise fault incidences for increased uptime, and provides detailed machine parameters and over-time trend analysis to optimise performance.

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WHEN YOU NEED TO BE SURE

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African oil and gas operators are increasingly obtaining certification to boost credibility.

Image Credit: Nightman1965/Adobe Stock

SMARTER QUALITY MANAGEMENT FOR OIL AND GAS

As field operations play a crucial role in overcoming challenges in oil and gas industry, attaining internationally recognised certification develops an efficient quality management system and increases operators' credibility in global market. Deblina Roy reports.

WITH SUB-SAHARAN African countries projected to see significant changes in the upstream and midstream sectors in next 20 years, operators in the region are mainly in charge of meeting health and safety, product quality, environment and social responsibility to increase their credibility and acceptance to a globally competitive market.

Because oil and gas by nature is most exposed to catastrophic risks, a high level of operational integrity is critical to safely keep operations up and running. An efficient way to reach this excellence and assure stakeholders is through attaining an internationally recognised certification.

According to the industry experts, certification is the most credible way to demonstrate excellence and drive continuous improvement in field operation in the oil and gas value chain.

Speaking to Oil Review Africa, Ohioze Unuigbe, chief executive of Bureau Veritas Nigeria Ltd, said that African oil and gas operators are increasingly attaining certifications to improve their processes and systems in a more efficient way.

Quality Management Systems Training Courses (ISO 9001:2015 Awareness, Foundation, Internal Auditor and Lead Auditor courses), Occupational Health and Safety Assessment Series (OHSAS), Internal Auditor and Lead Auditor courses as well as Environmental Management Systems (EMS) Internal Auditor and Lead Auditor are in the top-priority list for the continent's oil and gas operators, said Unuigbe.

ISO

Particularly, attaining certification from ISO has become more popular for the operators to improve global consistency in maintaining supply chain quality of the goods and services.

This internationally recognised standard aims to regulate the quality management system to manage the high-risk, staff safety, environmental protection and business continuity that require high levels of control and operating safety.

> **"ISO reflects operators' commitment to high-risk management, staff safety and environmental protection during operation"**

Unuigbe explained that the ISO 9001:2015 Quality Management System standard leads to improved customer satisfaction, improved business results, improved compliance and continual improvement. In addition, certification to the ISO 14001:2015 standards leads to improved environmental and occupational health and safety performance respectively.

Attaining ISO/TS 29001:2010 provides a technical standard for the petroleum, petrochemical and natural gas industry, guaranteeing an elevated level of quality for the operators in petrochemical market, including the production chain for both upstream and downstream.

As a direct result of the partnership between ISO and the international oil and gas industry, implementing ISO certification improves operators' market position in supply chain management, performance, reliability, customer satisfaction, environmental protection. This in turn allows for a sound structure for the overall internal development and a continuous improvement in the sector.

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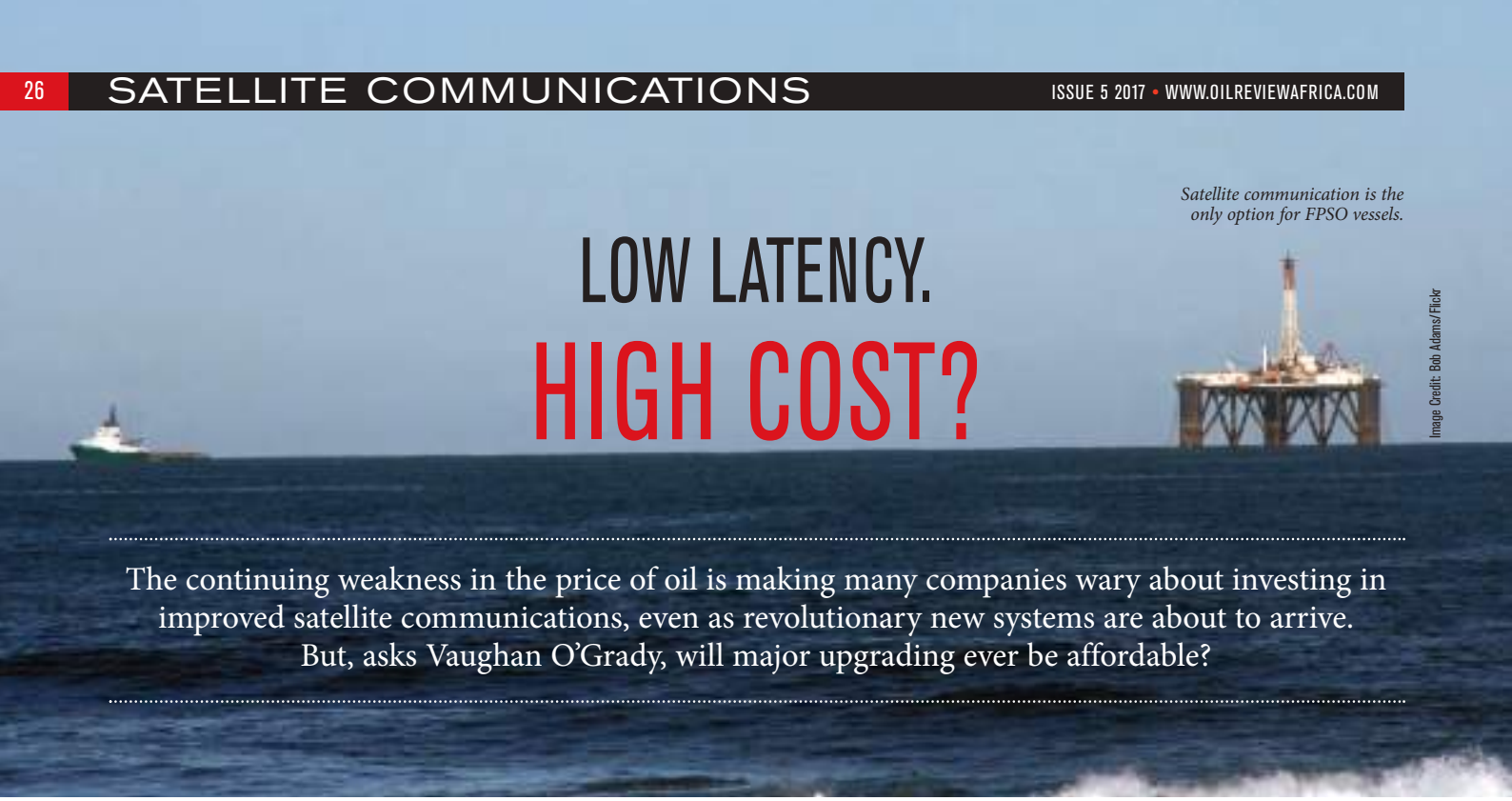

Satellite communication is the only option for FPSO vessels.

Image Credit: Bob Adams/Flickr

LOW LATENCY. HIGH COST?

The continuing weakness in the price of oil is making many companies wary about investing in improved satellite communications, even as revolutionary new systems are about to arrive. But, asks Vaughan O'Grady, will major upgrading ever be affordable?

"**AT $100 A BARREL** oil and gas companies could pretty much afford anything. If they just needed decent communications coverage and a reliable flexible supplier they would pay for it."

However, adds Susan Bull, senior consultant at VSAT and satellite consultancy COMSYS, things have now changed. "Today," she says,"price makes a difference."

Judson Jacobs, a senior director with IHS Energy's Upstream group, leading its technology practice, notes that upfront costs are now holding back communications investment in general, even where oil and gas fields are close enough to shore for fibre to be a logical option. "The guidance I've been giving is that over the lifetime of a field fibre will be less expensive — but it's just justifying that upfront cost. Right now the idea of spending tens of millions of dollars to do anything is a big constraint." He adds: "A lot of companies are continuing to use satellite and they've made a decision, even in the last few years, not to run fibre out to their platforms."

Is that a bonus for satellite operators? Not if companies won't buy into new services. However, there is a sort of silver lining, suggests Brad Grady, senior analyst at Northern Sky Research, which provides strategic consulting for the satellite communications industry. He points out: "Every dollar has a much higher meaning in this constrained capital environment than it did before. That means [oil and gas companies] are looking to get a higher return on all of their investments: communications and IT infrastructure, drilling, extraction, production, health and safety operations. They're looking to improve those efficiencies across everywhere they operate, which means the demands for connectivity are as high as they've ever been."

One obvious efficiency could be in staff deployment. Jacobs says: "They're not looking to de-man their platforms. It's more about using data to improve performance." Thus, for example, if communications technology permits it, instead of three control room operators offshore, one can be onshore liaising directly with his or her office-based colleagues. "There's a business case for having someone onshore that goes beyond cost reduction," Jacobs says.

He adds, however, "That said, there are companies that are looking to design their platforms completely differently and either go to completely unmanned or to what we call extreme demanning. In that case, the communications infrastructure is going to be absolutely critical."

Can communications make this happen? Where fibre can be laid alongside pipelines to and from a rig, it can, although, as we have noted, the outlay is high. If the rig is too far out to sea, or operating with FPSO vessels, satellite is the only option, and is also useful for backing up fibre services. However, right now, it's not as efficient as fibre.

One beneficiary of the need for better communications at a reasonable cost has been the new HTS (high throughput satellite) services "because," says Grady, "they offer greater throughput at a better price point than a traditional FSS [fixed-satellite service] technology". Thus if you're on a traditional FSSC-band or Ku-band link and you're switching to an Intelsat Epic-based HTS system, the cost of doing so may be acceptable.

Also, HTS is not necessarily a major change for ground infrastructure – antennas in particular – as far as oil rigs are concerned. On the other hand, it's usually a GEO [geostationary earth orbit] service. GEO constellations are high enough in space to cover the earth with only a few satellites. If your requirement is not time-sensitive, that's fine. As Bull says: "The only area where GEO has a problem is latency."

Bringing satellites closer [MEO – medium earth orbit] and closer still [LEO – low earth orbi]) can help to solve the latency problem, which is a real issue for certain applications. As Grady points out, moving from traditional GEO architecture to closer-in orbits allows you to consider cloud applications and real-time communications, where latency matters more.

The latency question also applies to oil service companies. Grady mentions Oceaneering, a company that provides engineered services and products primarily to the offshore oil and gas industry, with a focus on deepwater applications.

"They'll do real-time video links in HD where they're pushing massive amounts of data over satellite," he says."There's something like 700 milliseconds of delay between the ROV operators in HQ and the ROV off, say, the coast of Ghana. But

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every time you can lower latency it enables better efficiency." In addition, he points out that reducing antenna footprints while keeping higher throughputs allows smaller vessels and the extension of technology into more places.

He continues: "There's also the benefit of even greater throughput, so if you're comparing a MEO deployment on satellite operator SES's O3b constellation versus a traditional GEO deployment today, O3b is going to be able to provide much higher throughput to that site – but it's also going to bring a lot less latency, which means you can deploy a lot more remote applications; you can have an Office 365 deployment across your entire enterprise without worrying about extensive customisation or deployment issues."

Using a LEO satellite service would reduce the latency even more but there are some challenges. The main one is that, while Iridium and Globalstar offer LEO services, higher throughput versions are limited – or possibly even non-existent – at the moment.

And there's another issue: ground infrastructure, and in particular antennas. As Bull explains: "The closer to earth you get the faster those satellites are moving over your head." The O3b MEO service covers most of the earth with eight satellites. As for LEO,"OneWeb [whose launch schedule starts next year] is talking about 800 satellites. SpaceX [2019], an even lower constellation, is talking about 1,600 satellites. Closer to earth, the more satellites the more you have to switch because you have less coverage area."

That brings up the question of the antenna that LEO services will use. "Satellites aren't always going to be in the same place, and particularly when you start talking about mobility – sticking antennas on top of cars or planes or ships or aircraft – there are going to be times when those things are going to move and therefore the look angle is going to change."

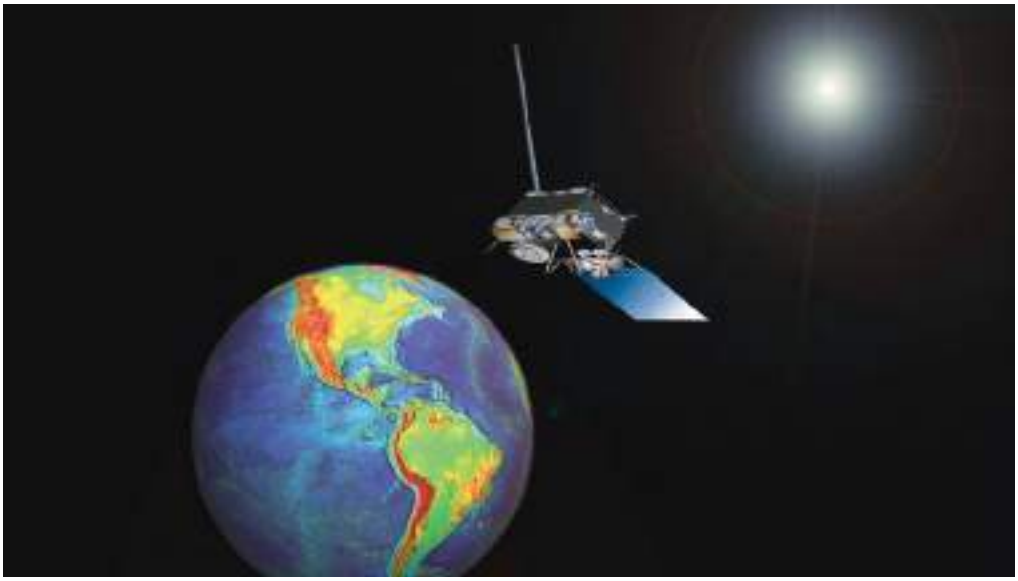

Image Credit: Wikimedia Commons/National Oceanic and Atmospheric Administration

A rendering of a GEO satellite. These are most useful for operstors when latency is not an issue/

Grady agrees. "The scan rate is a really limiting factor of the antennas. You can imagine a lot of these satellites going overhead and moving very quickly; there's a lot that needs to move in a stabilised antenna to keep tracking."

If money is no object you can just buy antennas and put them everywhere. Otherwise you are going to need what Bull calls a CESPAA, "a conformable, electronically steerable – because it needs to be able to jump from satellite to satellite – phase array antenna".

However, she says: "Do we have antennas that can switch and be conformable and efficient enough at a reasonable price point? Right now, no. And that's just on the technology side before we get on to the ecosystems, and the business strategies and everything else."

Above all, the price of such antennas needs to fall. "A lot of people are saying today if you want one of those [CESPAA] antennas, or something like it, it's going to cost in the region of $150,000 to $250,000 for a one to two metre equivalent antenna. Some people are saying it's only going to be $50,000." She suggests that once antennas dip below $1,000 LEO systems are more likely to be game-changers.

But MEO services are already available and getting cheaper, says Grady, and, despite the cost-consciousness of today's industry, would-be LEO constellation operators are still interested in oil and gas. "When the oil price was collapsing, even though it was pretty high at $70-$80 a barrel, oil and gas was very much top of the list. Everyone wanted to go after oil and gas because they were still expanding. Now it's cruise ships – and passenger connectivity for those sorts of vessels – but oil and gas is still in the top five markets for them to look at."

Even now, says Bull, "There's a lot more capacity and it's cheaper. Volume is not the issue." More likely questions are whether LEO can actually offer high-quality real time connectivity for things like video-conferencing.

And there's another problem. "The LEO system", says Bull, "is somewhat challenged on the amount of bandwidth it delivers." This isn't a major drawback, but it implies the need for an affordable antenna than can not only track LEO satellites but switch to GEOs when latency is not an issue.

Of course as we don't yet have an affordable, effective antenna for LEO satellites, let alone the satellites themselves, that may be a moot point. Nevertheless, Bull is optimistic.

She says: "If all this stuff comes together satellite is going to have a major advantage over terrestrial, as it did 20 years ago." In places without a reliable public cellular or fibre service a low latency LEO service with the option of more bandwidth through GEO would be ideal.

Beyond all that, suggests Bull, we can one day expect global automation: software that intelligently chooses a route – cellular, fibre, satellite, microwave – based on price and availability. However, that's even further off.

For now the expectation seems to be that LEO and MEO could play a big part in the ongoing offshore oil and gas efficiency drive. However, LEO in particular implies a lot of additional costs, notably very expensive antennas. Prices will go down, of course, but until that happens the oil and gas industry will remain cautious about investing in the revolutionary satellite systems of the future.

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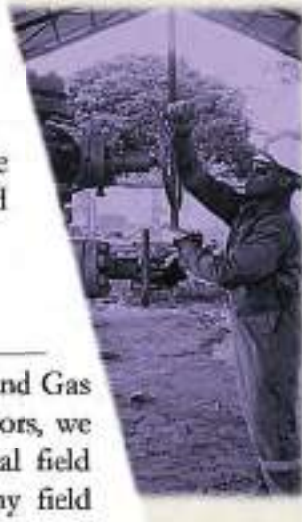

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LOOKING AFTER THE BOTTOM LINE

Asset management takes a leading role as the energy sector grapples with longer-for-lower oil price scenario. Martin Clark explores how leading industry players are maintaining optimum performance.

IT'S NOT JUST about waiting for a rise in oil prices: there are plenty of things energy companies are doing on the ground to shore up the bottom line. Asset management goes right to the heart of all oil and gas operations.

Major players serving the energy market include the likes of Siemens, Honeywell, Bentley, ABB, Emerson and Rockwell Automation.

For any oil company looking to stay in business, it's essential to record every detail of every asset to maintain optimum performance, productivity and maximise return on investment.

Sometimes that's obvious. During high cost drilling programmes off Angola or Mozambique, the last thing an operator needs is for a rig to sit idle while maintenance is carried out or spare parts are fetched. During production it's the same story in order to minimise operational downtime.

And, in an era of lower oil prices, the topic has become even more significant, as the big oil companies have slowly but surely prepared for a lower-for-longer oil price environment.

"Many international oil companies [IOCs] have started the process of 'right-sizing' their businesses to sustainably lower oil prices," said David Hussey of Manulife Asset Management in a September research note, although he adds that there is still more work to do.

Taking care of the details, through strong asset management, has been fundamental to this advance. "In fact, we find it heartening that some IOCs are churning off far more cash flow now than they did when crude prices were much higher."

Baker Hughes, a GE company, recently signed an agreement for the provision of its Asset Performance Management (APM) software and services for Nigeria LNG (NLNG), to enhance the performance of production trains at its vast Bonny Island gas plant.

"APM and similar digital solutions are crucial to securing the future of operations within the oil and gas industry," said Maria Sferruzza of BHGE (Baker Hughes GE).

APM uses sensors, connectivity, data and analytics to improve the reliability and availability of assets, minimising the cost of ownership.

And it underscores the role technology plays in making it happen. For onshore and offshore infrastructure, another player, Bentley, claims its solutions can help reduce risk, lower costs, improve safety, and increase performance, across the entire asset lifecycle.

That's now integral on projects of all sizes and complexity, both onshore and offshore. It means empowering a multi-discipline engineering team with a stream of accurate and up-to-date information, providing high visibility data into what is really going on.

Image Credit: Eni/Flickr

Good asset management will ensure the longevity of equipment and facilities.

Research by classification society DNV GL reveals that nearly half of all senior oil and gas executives believe digitising is now necessary to boost profitability.

Yet the asset information lifecycle – from feasibility stage through to end-of-life – currently suffers from disparity of information formats and no single source of essential asset information among owners, operators, designers, yards and manufacturers.

DNV GL teamed up with Siemens to bridge that gap, and to create a powerful new digital asset model. "Improved collaboration will enable the industry to transform to meet the demands of the new era and become profitable," said Joe Bohman of Siemens PLM Software.

EXPERIENCE PAYS DIVIDENDS IN KENYA AND TANZANIA

Octant Energy IS developing significant assets in Kenya and Tanzania, and ITS success relies heavily on the experience that president and CEO, Rick Schmitt, has in operating in the region. He talks about the company's work in East Africa ahead of speaking at Africa Oil Week.

FOR MORE THAN 12 years Rick Schmitt, president and CEO of Octant Energy, has built his knowledge of operating in the region, initially as the first CEO of Africa Oil, working in Somalia then Kenya. During those initial forays into African E&P he formed firm ideas on what regions had potential in East Africa. He planned to put his experience to use at Black Marlin Energy, Dubai, but that strategy never came to fruition. "I financed that company with an IPO and listed it on the Toronto Venture Exchange, but unfortunately five weeks after we were listed, we were taken over lock, stock and barrel by Afren. I then encountered a feature that was prevalent at the time – the cost of entry into projects in East Africa was astronomical. This was based on the success of Tullow in Uganda."

He then formed Octant Energy and in 2015 conditions were ripe to re-enter East Africa: "By October 2015 we had refined our approach to making an offer to acquire certain assets of Afren that we considered to be top class, and these were the L17, L18 in Kenya, the Tanga Block in Tanzania and Block 1 in northern Kenya. It took us over a year and a half to satisfy the conditions precedent. We still haven't secured Tanga, but we have secured L17, L18 and Block 1, and we intend to move forward on these assets very quickly."

It was Schmitt's relationship with the two governments involved that gave him the confidence to renegotiate the work programmes and obtain extensions.

"The wells are ready to go, but the exploration potential has not been proved yet," he says. "In fact, while these blocks have been sitting there waiting for exploration, drilling discoveries have been made all around. The play concepts have been proven by neighbouring operators. It's rather easy from my standpoint, being a geologist, to see that all the signs are good and that nobody has been able to capitalise on them yet. I fully expect to be at the helm of a company that makes some pretty significant discoveries in the next year or so."

Image Credit: Octant Energy

Rick Schmitt, president and CEO of Octant Energy.

The lull in drilling in East Africa means that there are abundant drilling assets in the region, although their readiness may be questionable. Some of these rigs have been stacked for extended periods and so deemed as cold stack rather than a hot stack.

"We've been approached cold by many operators, drilling operators offering their assets for our use," Schmitt explains. "It will be a hectic procedure to select which rig we want and then negotiate a contract with it, but it's a good position to be in, rather than trying to find a rig in a hot market. There are drilling assets available to us, and they are local. Many are stacked in Tanzania and Kenya. If we're looking for offshore units, that will come from further afield, but that won't be one of the crucial things that we need upfront. Right off the bat we'll be looking for a land rig, and we've got a very good choice in several stacks in both countries."

One of the challenges of operating in East Africa is security but Schmitt is confident of safe operations: "We have excellent relationships with both governments, and when you add to that the fact that I've been working there since 2005 and we've got an excellent team on the ground with experience going back to the 1990s, we are well placed. We are also well tied in with the communities. Afren didn't harm us in any way in this respect, because they were nominated year after year in both countries as being the company with the best community relations of any operating oil company.

"We try and employ as many locals as we can so that they can see the benefits of us being there in the first place."

Further south, the hot play has been the deep water far offshore gas discoveries between Tanzania and Mozambique. These have been proven to contain extensive gas and, although Tanga is an oil play, it's in the same context as the major plays that have been exploited to the south. "Technically it's a hot play, I guess is the best way to put it, and one of the few remaining offshore plays in Tanzania that has genuine oil potential rather than just gas," Schmitt continues. "The large gas plays will be difficult to develop, except for the majors, because gas of that size and in a remote area like East Africa needs to be fed into an LNG plant. That's not really the game that Octant are playing, we're looking for oil.

"The signs have been there that this is going to be a major oil province; if it's not already. It just needs some drilling in the right places to get a really big bonus here."

Schmitt is is keen to convey to Africa Oil Week the potential of their concessions in Kenya: "During that time, encouragement has been provided by discoveries made in adjacent parts of the East Africa Rift System, most notably in the Lokichar Basin and the Tembo Basin."

IN THE SPLASH ZONE: SURFACE-TOLERANT REPAIR

Historically, in all corrosion repair and protection applications, surface preparation has been essential. Offshore environments are no exception. Michael Harrison offers practical advice for operators in corrosive salt water environments.

OFFSHORE OPERATIONS ARE notoriously susceptible to problems stemming from their corrosive salt-water environment, difficult-to-access locations and contaminated surfaces, which are unlikely to see perfect conditions. This is in contrast to external or internal areas which can be tented, cleaned and prepared, providing the asset owner with a plethora of environmental barrier options. Yet, in areas where surface contamination cannot be removed, corrosion is still a major problem. For example, areas near the waterline pose many unique complications for coating manufacturers to face.

Historically, achieving adequate bond strengths required a highly adhesive, chemical and mechanical bond between both the coating and the substrate. A standard epoxy material, for example, relies heavily on a strong mechanical bond typically achieved by creating a rough angular profile, allowing the epoxy material to physically grip the substrate. This grip is proportional to the contact area of the bond, achieved by this rough profile.

Common standards for coatings and repair materials require a rough, angular profile of around 50-100 microns. In addition, SSPC-SP3 or SP6 are among the minimum standards required, although SSPC-SP10 is more commonly required. Overall, a dry and contaminant-free surface is required to ensure good adhesion is achieved.

Image Credit: Belzona

Corrosion is a major issue for offshore operators.

Unfortunately, being able to achieve the optimum bonding mechanism is virtually impossible in an offshore environment close to the waterline. Surface contaminants can reduce the contact area, preventing the coating from penetrating, wetting out and achieving the intimate contact with the substrate required for optimum adhesion.

Modern technology has led to the creation of new protection systems which will bond to surfaces which have differing levels of contamination. These materials are designed to be effective at displacing surface contaminants, such as water and oil, from the substrate and are suitably named "surface-tolerant". As well as this, the technology can achieve excellent bond strength using hand or power tools to prepare the surface.

So, for a surface-tolerant product to be able to bond to a contaminated surface it must first be able to displace contaminants. This can be achieved by innovative formulations and technology that allow the material to absorb or displace surface contaminants.

Once both the electronic and adhesive bond have taken place, the solution will create a strong mechanical bond once cured. This can be seen effectively via the offshore riser leg.

The data comparing the tensile shear adhesion values of Belzona 1212, a surface-tolerant repair composite, indicates the material can adhere strongly to contaminated surfaces. Overall, an abrasive blasted surface will offer better adhesion due to its irregular profile. However, this is closely followed by a manually prepared surface. This is mainly due to the technology's innovative chemical formulation that effectively wets out the substrate. The data also indicates this technology is capable of adhering strongly to contaminated surfaces.

Indeed, the adhesion of Belzona 1212 has been shown to be more effective when adhering to an oily surface than to a clean and dry surface. This is still not yet fully understood and will be investigated in future testing.

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INDUSTRIAL INTERNET OF THINGS TECHNOLOGY FOR SAFE REMOTE WORKING

The African oil and gas sector employs thousands of remote workers who are staffing compressor stations, pipelines and pump jacks. It is paramount that they have the highest standards of safety available during operations.

IT IS DIFFICULT for employers to continuously monitor the safety of remote workers and take appropriate action if necessary. These workers face a host of occupational hazards such as slips and falls, electrocution, falling objects, cuts and burns and toxic and flammable gas exposure, any of which could cause serious injuries or worse.

When it comes to monitoring and ensuring the safety of remote lone workers, safety managers have in the past only had a few options. They could equip workers with GPS tracking devices and panic buttons, or assign a wireless personal gas detector that sends alarm data to a controller.

However, a panic button is of limited use if a worker already is down due to gas exposure, a fall or other safety incident and is unconscious or cannot move to activate the alarm.

Personal gas detectors will warn of a gas emergency but not other hazards. They also only alert the worker, meaning that managers remain unaware of the emergency.

These individual personal solutions are usually installed, maintained and monitored as separate components, increasing the complexity for safety managers and potentially increasing the safety risk for remote workers.

Image Credit: Eni.

The IIoT can transform worker safety for offshore installations.

Industrial Internet of Things (IIoT) technology is helping to change this. Honeywell's cloud-based computing and wireless, mobile technology is creating a new era of safety for lone workers, going beyond current safety standards. With today's connected technology, safety managers now can receive a constant stream of real-time data on a lone worker's exact location as well as their biophysical and atmospheric conditions, and can monitor their safety and initiate or assist with decisive or pre-emptive safety actions like never before, from any location.

Workers thus continue to work remotely but they are no longer alone. Cloud-based, mobile, wireless monitoring solutions can relay essential information about a worker's location, the presence of dangerous gases and biometric data about the employee back to base so their safety can be constantly monitored.

With a connected solution, managers can locate workers on demand, check near real-time readings of gas monitors, receive automatic alerts of gas alarms and worker-down incidents, perform site check-in/check-out, send two-way text messages and track vehicle maintenance, fuel usage and driving habits. As such, conveying safety and location data from remote lone workers to safety managers via GPS in real or near-real time can increase the safety and productivity of remote workers.

Through adopting connected solutions, each worker and his or her vehicle comprise a portable, wireless network. Each worker should be equipped with a gas portable monitor that functions on its own WiFi network. The unit features a gas sensor, an onboard person-down inertial sensor, panic button and two-way texting. A router located in the worker's vehicle provides connectivity and visibility of the worker and the vehicle to the cloud-based platform, meaning managers can view the gas readings on a remote worker's detector at any time, from any place. The result is faster, smarter response planning that provides responders with a live update of the situation and hazards. Now, no one should be left behind.

Facility tour of Tolmann by the Executive Secretary, NCDMB Engr. Simbi Wabote with the Chairman/CEO Tolmann Group.

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WHERE OIL FLOW EQUALS CASH FLOW

The power of computing is being used for accurate flow measurement on Nigeria's deepwater Egina project. Martin Clark spoke to NEL about the success of the operation.

FLOW MANAGEMENT PLAYS a vital role in the oil and gas industry today, ensuring that production continues uninterrupted where possible. But it's a complicated process.

To keep the oil flowing, there are multiple technologies and systems working away, and countless options from industry to choose from. These range from thermal solutions, including heated flow lines and pipes, through to chemical and hydraulic techniques. In some instances, a number of these options might work together.

And it's always better to know about problems before they occur. One advanced technique, known as Computational Fluid Dynamics (CFD), can be used to simulate complex problems that would otherwise be extremely expensive and potentially dangerous to physically test on site.

On the ground, operators face potential impediments such as the formation of hydrates or other deposits in wells and flowlines that could yield damage over the long-term, resulting in production loss.

CFD was used recently on one of Nigeria's new mega projects by NEL in the UK to model the performance of a vital piece of metering technology being designed and manufactured as part of the deepwater Egina project, which is operated by Total.

The latest flow management technology will benefit Gabon's operations.

Image Credit: Total/Flickr

"We ran analysis on the two system configurations proposed for the project," said NEL's Marc Laing, adding that the metering skid under assessment is to be located on a floating production storage and offloading (FPSO) vessel. "We found that both design approaches would meet these requirements."

> **"As well as Nigeria, the focus is on West African markets, such as Côte d'Ivoire, Ghana, Cameroon, Gabon and Angola with tailored metering training"**

Given the scale of the investment and high potential intervention costs, everything has to be just right. First oil from Egina is now expected during 2018, with production reaching 200,000 barrels of oil per day (bpd) at peak.

Onshore, operators face many of the same challenges, although theoretically access could be easier and cheaper, though any flow problems are always better avoided if possible.

Significantly, NEL is increasingly focusing its attentions on the West Africa market, which it says offers "significant potential" for the provision of meter calibration and other services.

After exploring that potential in Nigeria, Côte d'Ivoire, Ghana, Cameroon, Gabon and Angola, it is putting together a flow metering training package tailored to the region.

The company is building a new high pressure multiphase flow test facility in the UK which will have the largest test range in the world.

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DEFYING GRAVITY TO MAXIMISE WELL PRODUCTION

Ever more diverse upstream challenges, and the rise of unconventional oil production, drive innovation in artificial lift segment. Martin Clark reports on the latest technology for making the most of every well.

Image Credit: Oriental Energy Resources

Oriental Energy Resources has been using groundbreaking techniques at the Ebok site, offshore Nigeria.

ARTIFICIAL LIFT TECHNIQUES have long been deployed to maximise a well's production. This is especially true on some of Africa's more mature fields, where declining output can be halted, or even reversed, through such technology.

Upstream operators routinely work alongside expert firms like Schlumberger, ABB and GE Oil & Gas to make that happen, using a variety of techniques.

Essentially, the tools used to increase the flow of liquids out of a well range from the use of a pump, through to gas injection, or other flow enhancement techniques such as installing a velocity string.

And it is not just the oil majors adopting artificial lift to underpin well flow.

Oriental Energy Resources Limited, a privately held Nigerian oil exploration and production company, adopted a groundbreaking technique for its Ebok field, first discovered by ExxonMobil years earlier.

The offshore heavy oil project in block OML 67, which sits close to the Cameroon and Equatorial Guinea maritime borders, meant artificial lift was integral in the design. This included the installation of electric submersible pumps or ESPs. These are a widely used form of artificial lift that use centrifugal force to pump hydrocarbons to the surface, enabling high flow and enhanced production.

In fact, for Oriental, it marked the first use of ESPs for artificial lift in offshore wells in Nigeria, and is now the country's largest ESP-based offshore development.

The field is producing around 35,000 barrels of oil equivalent per day (boepd).

Beneath the waves, the field uses a complex and clever array of kit, with the first usage of wireline retrievable ESPs in Nigeria (and what was only the second offshore installation in the world) with a transverse valve allowing back-up gas lift.

> **"Oriental Energy now has Nigeria's largest ESP-based offshore development and the field is producing 35,000 boepd"**

A water injector well has also been drilled to optimise and support the producing wells on the field's North Fault Block, which is one of two production areas, alongside the West Fault Block.

Experts believe these kinds of solutions will become more common though as extraction gets ever more complex, and from more varied well types and resource, such as heavy oil.

The significant growth in the global unconventional oil and gas space "is a major energy trend driving further innovation in artificial lift technologies," reckons GE Oil & Gas.

It now offers a whole suite of products to help operators face up to the technical and challenges of unconventional wells, such as Vector Plus, a variable speed drive surface control system for ESPs.

The company made its first significant foray into the artificial lift segment in 2011, with its acquisition of the well support division of John Wood Group, a major ESP manufacturer.

The availability of this technology means complex projects involving artificial lift, even subsea ones like Ebok in Nigeria producing heavy oil, could become more common in the years to come.

PORTABLE GAS DETECTION SOLUTIONS FOR EMPLOYEE SAFETY

Martin Clark reports on the latest portable solutions for gas detection. These small but effective devices are now a familiar site at energy installations, helping to keep workers safer on the job.

OIL RIGS ARE inherently dangerous places; in such a highly volatile environment with flammable hydrocarbons, it's imperative that safety comes above all else. Gas detection is an essential part of that process, to counter fire and even explosions. And it's an area that has benefited greatly from technology breakthroughs.

Methane leaks, for instance, are literally explosive situations. UK-based Crowcon's lightweight and compact Laser Methane mini (LMm), allows leaks to be detected at a distance of nearly 100ft, ensuring operators can stay well clear of any hazards.

The unit remotely monitors for leaks from above-ground riser pipes, and can check valves, fittings and pipes inside pressure regulating stations. Because the laser beam penetrates transparent surfaces, such as glass, it can even detect methane through a window. This can remove the need to find whoever has the key or enter a potentially hazardous environment to survey for leaks. It's also used for monitoring closed premises or confined spaces. Such innovations – for single gases or multiple gases – are helping improve worker safety on rigs right across Africa and beyond.

Not surprisingly, portable gas detection has increased in popularity, not only because of the improved technology, but also its versatility, making it ideal for small spaces, spot leak testing and mobile use. Other leading players in this field include Germany's Dräger and Honeywell Analytics.

The worst case scenario from a gas explosion is a devastating fire, such as this one that happened last year in New Mexico.

Image Credit: John Fowler/Flickr

> **"Portable gas detection technology has increased in popularity as it has become more versatile, especially in smaller spaces"**

Honeywell's GasAlert MicroClip is a popular handheld multi-gas detection device, with a strong battery life even at extreme temperatures. Simple readings, like its flashing green IntelliFlash light, show compliance at a glance, with operatives able to simultaneously monitor for up to four gases (including including oxygen, combustibles and toxic gases).

Other more mainstream technology – including mobile phones – is also playing a role in connecting with more fixed gas detection technology. Sensepoint XCL is a wall-mounted device that monitors for hazardous levels of specific gases such as carbon monoxide, ammonia or methane, and is paired with a smartphone using an app.

"Controlling the detector from a mobile device not only makes the devices easier to install and maintain, it allows users to quickly and easily produce reports needed to meet safety and environmental regulations," said Duncan Gooch, product manager at Honeywell Industrial Safety.

HELPING INTERNATIONAL OIL OPERATIONS TO FLOURISH

When looking for a business-friendly location to base oil company operations, there are multiple considerations to take into account. Paul Burrows, inward investment manager for Locate Jersey, puts forward a case for the British Crown Dependency.

THE COMPLEX NATURE of the oil exploration and extraction industry inevitably means that companies operating in the sector rely heavily on having a robust network of regional headquarters that offer strategic benefits – logistically, geographically and in providing an environment that is conducive to a high-pressure, capital-intensive, global business.

Having built up a strong and reputable financial and professional services industry over a period of some decades, Jersey, the British Crown Dependency located 14 miles off the coast of France, offers a compelling proposition in terms of its corporate environment and global expertise, and consequently is increasingly on the radar of oil industry executives as a sensible location for their European headquarters.

This appeal is reflected by what Jersey is seeing on the ground. Over the last 20 years, a growing number of mining and international oil and gas exploration and production companies have established offices on the island. Today there are more than 20 natural resources and ancillary businesses successfully operating out of Jersey with exploration and production sites across Europe, Australia, the Americas and Africa, and that figure is growing.

Image Credit: Locate Jersey

Jersey has many benefits for oil companies seeking a head office close to Europe.

This is no coincidence. Jersey offers the kind of high-calibre business support and financial expertise not easily found elsewhere, while it also offers a straightforward, transparent low-tax regime, all of which helps to facilitate high-quality corporate structuring and an ability to easily access capital in key investor markets worldwide.

This is backed up by a tried-and-tested legal framework offering high levels of protection to investors – vital in the oil industry where up-front capital expenditure is significant and operational risk is often high.

In addition, Jersey's political and economic stability, independence (being outside the EU but with strong ties to the UK), and regulatory environment, which is rated highly by authorities such as the World Bank, IMF and OECD, gives oil companies operating internationally the confidence that their global physical and IP assets are well protected.

Adding to Jersey's business-friendly nature are its British time-zone and transport links, with regular fast, direct flights to London, other UK and major European hubs. The island also boasts a highly developed communications infrastructure, including island-wide high-speed gigabit and 4G connectivity.

Many executives also find that Jersey's position as a long-standing international finance centre means that there is a good selection of experienced, highly skilled, experienced and often multilingual professionals available locally when it comes to recruitment, enabling firms to expand and build a genuine on-the-ground substance in Jersey.

With markets around the world currently facing some significant regulatory complexity, political uncertainty and economic volatility, executives of oil firms will unsurprisingly be looking for straightforward solutions that can give them certainty as they roll out their growth strategies.

With a clear commitment to providing high-quality cross-border business support, Jersey is well placed to meet that demand, providing all the right ingredients to help an internationally dynamic oil business flourish.

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MEETING THE CHALLENGE OF CHANGE WITH ENGINEERING TECHNOLOGY

Rafi Hattar, vice president, Middle East & Africa, Hexagon PPM, discusses the challenge of change management and the technologies that can help make the process easier for operators.

ALL OIL AND gas plants and facilities are subject to continual change – technologies evolve, turnarounds are executed, modification and upgrading projects take place. However, the facilities themselves and the information that describes them are often not consistently updated in line with these changes, creating challenges for the effective and safe operation of the facility.

A recent study by Hexagon PPM showed that some of the biggest challenges faced by owner operators include the inability to find the necessary information for executing projects and being able to determine whether or not this information is accurate and up-to-date. This is often due to lack of change management and traceability, where companies don't have an integrated approach to engineering information management. If you have 30 years' worth of plant documentation in paper format scattered across the facility, it is no wonder that management of change (MOC) becomes a burdensome task.

A paper-based approach does not allow for tracking and prevention of unauthorised changes, making maintaining an integrated information asset difficult. In addition, safety issues are often linked to poor management of change, which can be a direct or indirect cause of major incidents, claiming lives and destroying facilities.

These issues have led to a growing focus from regulatory authorities on MOC processes, and demands for demonstrable compliance with auditable traceability are continuously increasing. Existing facilities are also often being operated longer than originally planned. In the worst-case scenario, extended lifetime, combined with poor traceability and insufficient processes in place, can lead to increased risk of losing one's licence to operate.

Image Credit: Hexagon PPM

Rafi Hattar, vice president Middle East & Africa, Hexagon PPM.

Managing continuous change in an operating plant is a complex, safety-critical work process.

These changes often have to be controlled in parallel, if the same equipment is impacted by several changes. This can get complex quickly, as multiple alternate solutions to the proposed changes need to be managed simultaneously, changes might be cancelled prior to implementation, or postponed for future turnarounds.

Executing the above-mentioned parallel activities in a manual, document-centric process can easily lead to erroneous decision-making based on incorrect or outdated data. The implications of this include extended plant downtime during change implementation.

To address these challenges, owner operators are searching for tools that offer the capability to maintain the dynamic engineering design basis and integrate with other information systems. An example of such a solution is Hexagon PPM's SmartPlant® Enterprise for Owner Operators which provides preconfigured work processes and out-of-the-box integrations with operating systems to provide improvements for management of plant operation changes.

This integration between operating systems and engineering information management allows for maintenance of the digital representation of the plant in an efficient and consistent way. Comprehensive solutions for capturing both unstructured and structured data, as well as data validation, ensure the transition from an existing manual, document-driven change process to a state-of-the-art electronic change process.

Often the existing engineering information and 3D plans of the existing facility might be insufficient, or completely missing.

This makes any brownfield project challenging, as there is no way to ensure that the planned changes or upgrades will fit into the existing piping and space. To facilitate this, more and more owners are using laser-scanning technology to capture the as-built information of their assets.

The whole process starts with surveying the plant with a laser scanner. Using the free Leica Truview software, the scan data is presented as a point cloud, in which each pixel has X, Y and Z coordinates. This means that even without building a new 3D model, the point cloud can be used for measurements and comparisons with existing CAD models of the plant.

Together with the photographs, the captured brownfield data and the point cloud data make it possible to do a virtual walk-through of the plant, from one scanning station to another, and to take measurements. Based on this information, a virtual presentation of the physical asset can be created, enabling owners to execute data-centric approach to change management, and overcome many of the challenges related to manual processes: inaccuracy, lack of traceability, and error-proneness.

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CASE STUDY:
A MULTIPHASE PUMP PROJECT

Leistritz has successfully installed a multiphase pump to lower field pressure, allowing energy wells to come back into production. Sven Olson, senior consultant, Leistritz Advanced Technologies, shares the story of how the project was completed for the client.

OUR CUSTOMER HAS oilfields, which are older and have produced oil and gas for many years. Over time the natural reservoir pressure has dropped off to a point where some wells are not able any more to overcome the back pressure generated by the surface flow lines and the first stage separator of the process facility.

The conventional alternatives considered by the operator would be increasing the flow line size and installing a low pressure first stage separator that would be significantly larger. These alternatives were carefully reviewed, however, it turned out that the costs and necessary permissions by the appropriate authorities would have been significant and not economical.

Then in early 2015 the company had heard about multiphase pumping. This more economic alternative caught the interest of management as production was expected to remain interesting for years to come.

A contact was established with Leistritz and a project study was initialised. The target of the study was to draw down the back pressure on the producing wells with the help of a multiphase wellhead pumping system to about 200 PSIG, which would allow all the wells to produce at an acceptable rate. To overcome the flow line pressure including some reserve, the pressure boosting of the multiphase pump had to be around 500 PSI in order to reach the line back pressure of 700 PSIG. The Multiphase Wellhead System (Model L300) based on the Leistritz twin-screw pump was purchased in summer 2015.

The multiphase pump has revived an old well for a Leistritz client.

Image Credit: Leistritz

The system had to be designed for remote unstaffed operation and outside of power supply had to be completely self-supporting. Remote access of the operating parameters was achieved over the Internet by a secure access for the operator and for Leistritz.

The liquid rates could vary between 300 to 1000 BLPD and gas rates between 0.5 and 1 million SCFD. The combined flow rate at pump inlet conditions would be between 6000 and 14000 BPDe (barrels per day equivalent) corresponding to a GVF (gas void fraction) around 95 per cent. The flow regime was expected to be slug flow and heavy slugs could affect the multiphase pump unit. In order to seal and protect the pump and remove the heat of compression from the pump a recirculation system was included, designed to gather liquids in a knock-out boot or separator downstream of the pump and circulate some of the liquids back to the pump suction. This system would assist the pump and provide the liquids necessary to maintain compression even during longer gas slugs.

Other design features included a VFD controlled 400 HP 1800 RPM electric motor and a double mechanical seal system with the API Plan 54 seal flush. The complete unit with piping, valves, instrumentation and controls was designed and manufactured in the Leistritz facilities. Installation and commissioning took place in Q2 of 2016. The unit has performed as expected and adding significant production for the operator.

This case study points to the opportunities using multiphase pumping in lieu of other back pressure reducing alternatives. The multiphase pump together with VFD speed control has shown its flexibility in instantly adopting to actual field conditions and optimising production with lower flowing wellhead pressure. One of the great features of the twin-screw multiphase pump is that pressure boosting is independent of inlet pressure giving the operator the best possible tools to produce ageing and low energy reservoirs.

www.leistritz.com

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AFRICAN RIG COUNT

COUNTRY	June 2016	June 2017	July 2017	Annual change
AFRICA OVERALL	82	86	89	8.5%
ALGERIA	55	57	58	8.6%
ANGOLA	5	2	2	-60%
CONGO (BRAZZAVILLE)	1	2	2	100%
GABON	0	1	1	N/A
KENYA	0	1	1	N/A
LIBYA	0	0	0	N/A
NIGERIA	5	8	9	80%
SOUTH AFRICA	0	0	0	N/A
TUNISIA	1	0	0	-100%
OTHER AFRICA	4	7	8	133.3%

Source: EnergyEconomist.com

New solutions to make LNG operations more efficient

LNGTAINER HAS ANNOUNCED that its new LNG container is ready for production in Finland. These containers use patented technology to make the storage and transportation of LNG more efficient and environmentally friendly than current available models.

The technology developed in Finland by LNGTainer gives its gas tanks a 60-day holding time, allowing the tanks to be transported to parts of the world that are traditionally difficult to access.

"The most revolutionary aspect of the new tank container, and what gives a basis for the advanced design, is the fact that the insulation has been moved from the outside of the cryogenic tanks to the inside," said Tom Sommardal, LNGTainer CEO. "The containers are designed as 40' ISO containers stackable as per international rules and regulations, and can be flexibly arranged for storage purposes at power plants when used for feeding gas turbines or engines," he continued.

LNGTainer's new gas containers have 15 per cent more volume and use 30 per cent less equipment by weight compared to regular gas shipping containers. The containers also use less insulation for maintaining internal temperature and need less energy to prepare the liquid gas for use.

Image Credit: LNGtainer

Improved transportation solutions, such as gas containers with increased volume which uses 30 per cent less equipment by weight, will be a boon for LNG operators, particularly as the market grows in Africa.

Meanwhile, GTT has launched a solution for reducing the level of daily evaporation of LNG cargo. Minimisng the boil-off rate is an ongoing challenge for LNG operators.

A new evolution of GTT's Mark III Flex technology has received the General Approval from the classification society, ABS.

The sea-proven technology features an enhanced secondary membrane, offering improved insulation. It allows for a daily boil-off of 0.07 per cent, compared to 0.085 per cent per day with the previous version.

"Taking into account the current economic environment and the level of LNG prices, this solution allows us to meet customer expectations," said Philippe Berterottière, CEO of GTT. "It represents a complementary solution to the Mark V, a system which demonstrates a real technological advance and the future of membrane containment systems."

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Consortium to tackle major pipe testing challenge in the North Sea

A CONSORTIUM HAS set out to tackle one of the most enduring challenges for offshore operators: the non-destructive testing (NDT) of corroded pipes under insulation and engineered temporary pipe wraps.

The group – which includes TRAC Oil & Gas; the University of Strathclyde; and Censis, the Scottish Innovation Centre for Sensor and Imaging Systems – will audit the tools, capabilities, and approaches used by industry to look at the steel surfaces of assets often obstructed by layers of material.

Many NDT technologies are ineffective when used on insulated pipes. They tend to average out wall thickness where corrosion "scabs" have formed, failing to pinpoint specific areas of vulnerability.

Image Credit: Censis

The North Sea project will benefit offshore operators around the world.

Taking and interpreting these readings is further complicated by the varying dimensions, materials, locations, and accessibility of different oil and gas assets. While insulation can be removed, it requires significantly more time in challenging conditions, making the task more dangerous and ultimately more expensive.

The consortium will explore how improvements can be made, including new techniques for accurately identifying and measuring corrosion. The resulting feasibility study will be shared with wider industry.

Decommissioning and demolition governance framework developed for energy industry

ABB'S ENGINEERING AND consultancy group has completed a decommissioning and demolition (D&D) Governance framework for SSE.

With a framework already in place for managing the delivery of large capital projects, SSE identified that the governance to manage D&D required a modified process.

The first phase involved a review of the existing processes against ABB's methodology. ABB identified areas where the process could be simplified or activities eliminated.

Image Credit: ABB

The ABB-SSE project could be replicated across the energy industry.

The second phase involved identifying the documentation required at each stage. Once this was agreed, the documentation was developed in accordance with SSE documentation standards. The framework, which was completed in July 2017, will be used on future D&D projects, including power stations, gas storage and wind energy.

Matthew Capstick, account manager for ABB's engineering and consultancy group, said: "Having delivered a range of engineering consultancy support across SSE's power generation and gas storage assets, we have a longstanding relationship with the organisation."

New pipeline monitoring solution from Fotech

IN A FIRST FOR the oil and gas industry, Fotech has developed a technology upgrade to extend the range of fibre optic sensing technology to 100km.

As operators across Africa face increasing pressure to boost pipeline security, Fotech has launched LivePIPE II, which enhances their existing real-time pipeline protection technology.

LivePIPE II's dual channel technology delivers a monitoring range up to 100km from each individual module, with no multiplexing, just continuous monitoring, and no loss of detection accuracy or sensitivity at any point. This lowers the cost of deploying a distributed fibre optic (DFO) sensing solution on a pipeline. Detecting leaks and third-party intrusions over vast distances will also be faciliated with this new technology.

The next generation of LivePIPE also introduces Fotech's EDAM (Enhanced Data and Acoustic Management) technology, giving operators better insight to their pipeline's integrity. EDAM allows operators to listen to activity at a specified location on the installed fibre in real time, offering new assistance in identifying the exact nature of potential threats. EDAM can also identify and record segments of data that can be stored for up to three months, replayed, listened to, and used to analyse and enhance LivePIPE's event detection algorithms.

Chris Shannon, CEO, Fotech Solutions, said: "LivePIPE II offers operators a major step forward in being able to prevent and mitigate the financial and environmental consequences of such integrity incidents."

Certified coriolis flow meter designed to save handling, installation and commissioning costs

ABB'S NEW CORIOLISMASTER coriolis mass flow meter has been launched as part of the company's total fiscal metering package to tie in with flow computers and software.

It features a compact design and easy-to-use human machine interface (HMI).

One of the main advantages of a user-friendly HMI is that it helps keep training and commissioning costs down.

The sensor tubes have been designed to enable the meter to run with significantly lower pressure costs compared to other meters – this enables users to select either smaller meter sizes or run meters with lower pumping costs.

Other features include a wide range of output options, through-the-glass displays and Modbus communication. The VeriMass built-in software diagnostics constantly check for changes that could affect meter accuracy. This helps prevent over- or underbilling.

When combined with ABB flow computers. pressure and temperature transmitters, the CoriolisMaster offers a complete custody transfer solution.

Image Credit: ABB

Improved flowmeters can save money for oil and gas operators.

ADVERTISER'S INDEX

Sulzer set to deploy wash tank technology to boost efficiency for offshore oil processing

SULZER'S CHEMTECH DIVISION has been granted a licence for Total-patented Wash Tank technology, which is used for oil processing. The main purpose of this technology is to enhance the removal of water, salt, and contaminants from oil and emulsions, by a controlled distribution of the feed into the bottom of a hull tank of an FPSO, FSO or FPU.

This, in turn, transforms the water-in-oil dispersion into an oil-in-water one where high efficiency phase separation can take place more easily. The technology also involves a significant simplification of the topsides crude oil process.

Offshore oil processing can be more efficient.

Image Credit: Sulzer

Sulzer, which has a presence in four locations in South Africa, will commercialise the licensed technology along with its static mixing technology and patented oil/water emulsion distributors which evenly distribute the feed across the full cross section of the hull tank and generate a constant droplet size (for a given flow). This maximises the system performance.

Other benefits of this technology include reduced topsides weight, capital expenditure and complexity; robust performance through more flexibility towards flow rate variations and potential future capacity increases; mitigation of risks associated with naphthenate formation; improved energy efficiency and operational expenditure through reduction of reduction of utility consumptions, such as heating, cooling and electrical loads; and improved safety through a more aerated layout of the FPSO topsides.

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