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GHANA PROMOTES upstream investment

The energy sector must grow awareness of industrial cyber security threats, Pg 19

Necessary measures to address oil spills

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Ghana's oil and gas sector is thriving even amid uncertainty.
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EDITOR'S NOTE

IN THIS ISSUE we take a closer look into Ghana's upstream sector as it is experiencing some very interesting turns in the moment. While the global spirit in oil and gas investments might be seeing a dip, Ghana is singing a different tune when it comes to flaunting its hydrocarbon potential. From Eni to Tullow, companies are especially gauging the merits of this West African country for upstream exploration.

AOW 22 that ended just recently, gave voice to the continent's urgency to end energy poverty before anything else. Africa is now looking towards gas as a means of just transition. Find out more details about the event inside.

From pipelines to FPSOs, the industry has come a long way in digitalisation too. Read our feature on FPSO to know more about the conveniences it offers and also how real-time leak detection systems for pipelines can deliver the most precise results. That and a lot more from oil spills, drilling and manpower to ADIPEC 2022.

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Executives Calendar 2023

FEBRUARY

13-15 **EGYPS**
Cairo
www.egyps.com

14-16 **SAIPEC**
Lagos
https://saipec-event.com/

23-25 **East Africa Oil & Gas**
Dar-es-Salaam
https://www.expogr.com/tanzania/oilgas/

MARCH

28 Feb - 2 Mar **International Energy Week**
InterContinental London Park Lane and online
https://www.ieweek.co.uk/

APRIL

16-20 **Nigeria International Energy Summit**
Abuja
https://nigeriaenergysummit.com/

MAY

1-4 **Offshore Technology Conference**
Houston
https://2023.otcnet.org/

16-18 **Africa E&P Summit**
London and online
https://www.africaenergiessummit.com/

18-20 **Oil & Gas International Trade Exhibition**
Nairobi
https://www.expogr.com/kenyaoil/

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SAIPEC 2023 is all set to highlight local content

IT IS HIGH time Africa puts up a united front in the global arena to navigate the pressures of net zero goals while meeting its energy needs. The Sub Saharan Africa International Petroleum Exhibition and Conference (SAIPEC) 2023 that is set to run from 14-16 February 2023 at the Eko Convention Centre, Lagos, Nigeria, will be the perfect platform for it.

The 2022 United Nations Climate Change Conference or COP27 – also being called the 'African COP' – that ended last month in Egypt, saw African leaders strongly defend the urgency of exploiting the continent's rich gas reserves against climate lobbyists.

"When only 10% of our population has access to electricity, what energy transition do you expect them to make?

"First, we need to make electricity accessible for 90-100% of our people, then we can think of energy efficiency, green energy and making the transition to renewables," said Tosi Mpanu-Mpanu, lead climate change negotiator for the Democratic Republic of Congo.

This recent chain of events will make for a heightened discourse at the SAIPEC 2023, where key stakeholders and the most senior representatives from the sub-Saharan Africa oil and gas industry will be taking part.

Hosted by the Petroleum Technology Association of Nigeria (PETAN) with the strategic partnership of the Nigerian Content Development and Monitoring Board (NCDMB) and NNPC Limited, SAIPEC becomes the meeting point for all the national oil companies (NOCs) and international oil companies (IOCs). The platinum sponsors for this year's show include the Shell Nigeria Exploration and Production Company Limited, TotalEnergies and Uniterm Nigeria Limited, among others. Some of the principal partners are Ghana Gas, Petroleum Authority of Uganda, The National Petroleum Institute, Ministry of Petroleum and Energy, Republic of the Gambia, National Oil Company of Liberia, and National Oil Corporation of Kenya.

A solid global presence can hold only when there is a firm local foundation. Ghana has introduced programmes such as the Ghana Upstream Sector Internship or Associated Oil and Gas Capacity Building, providing internationally accredited certifications to candidates. The Niger-Morocco Gas Pipeline is promoted as a 'project for African economic integration and for co-development'. Nigeria and Senegal had signed a deal early this year to address the challenges of tapping the continent's huge hydrocarbon resources. More such examples will be set at SAIPEC's African Content Series. Presented in partnership with the NCDMB, it will provide companies with insights on African oil-producing countries and advocate economic diversification and local content evolution.

As part of 'SAIPEC Prospecting', visitors will get a chance to network and hear first hand from national oil companies presenting their current blocks on offer, understanding their objectives and opportunities within their respective countries.

Alongside these, are the geoscience companies and independent oil companies, all looking to break in to nascent and existing oil and gas markets.

SAIPEC 2023 may pick up where it left off this year, when discussions revolved especially around gas investments. Africa is looking towards gas as a sustainable alternative to oil to achieve energy security.

GlobalData reveals industry leaders are on the road to energy transition

Industry players are using carbon capture and renewable power generation in their energy transition journey.

Image Credit: Adobe Stock

INDUSTRY LEADERS, SUCH as BP, TotalEnergies and Shell are steadily incorporating transition fuels as well as low carbon energy sources into their portfolios, says leading data company, GlobalData, in its 'Energy Transition in Oil & Gas' report. The companies have set net zero emissions targets for 2050.

"To meet their medium and long-term decarbonisation targets, oil and gas players are investing in both existing and emerging technologies. Renewable power, particularly solar and wind, is one of the prominent areas where big oil companies are investing," said Oil and Gas analyst, GlobalData, Ravindra Puranik.

Equatorial Guinea Minister will take over OPEC Presidency in 2023

THE MINISTER OF mines and Hydrocarbons of Equatorial Guinea, Gabriel Mbaga Obiang Lima, is set to take over presidency of the Organisation of Petroleum Exporting Countries (OPEC) in 2023, aiming to re-establish Africa as a leading powerhouse in the global oil industry.

As one of the largest producers of oil on the continent, Equatorial Guinea has witnessed an exponential growth in GDP as a result of its oil industry, with exports being the biggest driving force behind the socioeconomic development in the country. The establishment of Minister Obiang Lima as the new president of OPEC is expected to facilitate a platform through which interest in African oil is advanced.

"We at the African Energy Chamber (AEC) are very pleased to see the appointment of Gabriel Obiang Lima as the president of OPEC," said NJ Ayuk, executive chairman of the AEC, "With a global climate that is pushing Africa and OPEC countries to abandon oil and gas, demand for oil and gas is increasing, especially in emerging economies that need to industrialise, eradicate energy poverty and promote clean cooking."

"What Africa and the world needs more than anything right now is market stability. We are confident that Minister Obiang Lima will work with all OPEC member countries to ensure the needs of the producers and consumers are met," Ayuk commented.

OPEC holds a significant influence over the global market, with the organisation and its members accounting for nearly 40% of global oil supply, thus having a critical role in the stabilisation of the oil market worldwide.

Acquiring the presidency of OPEC places Equatorial Guinea in one of the most prominent positions within the global energy arena, thus giving a voice to an African perspective within the organisation.

bp wins exploration blocks offshore Egypt

THE EGYPTIAN NATURAL Gas Holding Company has awarded two exploration blocks in the Mediterranean Sea to bp.

The first of these, the Northwest Abu Qir Offshore Area, is located west of the recently awarded North King Mariout block and north of the Raven field. bp holds a 82.75% share in the area which covers approximately 1,038 sq km with water depths ranging from 600 m to 1,600 m.

Both bp and Eni (the operator) hold a 50% share in the Bellatrix-Seti East block which is located west of the Atoll field and North Tabya blocks. This covers an area of approximately 3,440 sq km with water depths between 100 m and 1,200 m.

Karim Alaa, bp's regional president, Egypt, Algeria, and Libya, commented, "We have been awarded four new exploration blocks and a block extension in 2022 which offer the potential for gas discoveries that could be developed using existing infrastructure. Acquiring this acreage is part of our strategy to maintain a longer-term plateau production rate."

Image Credit: Adobe Stock

bp is aiming to help Egypt meet its growing energy needs by providing cost-competitive supplies of gas.

The two new blocks have been awarded to bp after a strong regional performance for the company which saw it also awarded the King Mariout offshore area (100% bp), the North El Fayrouz offshore area (50% Eni and 50% bp), and the North El Tabya area extension (100% bp).

United Oil & Gas takes positives as ASH-4 falls short of expectations

UNITED OIL & GAS, a growing oil and gas company with a portfolio assets, has provided an update on its ASH-4 development well in the Abu Sennan licence, onshore Egypt.

ASH-4 is a step-out development well in the ASH field which was brought on stream on 17 November 2022 on the 32/64" choke size. Preliminary test results indicated average flow rates of 1,325 bopd and 1.8 mmscf/d on a 32/64" choke, with no water production and encouraging reservoir pressure.

Although initial flow rates were in excess of the well test average, the rates from the well began to sharply decline, suggesting that the well is connected to a smaller volume of oil than had been expected pre-drill. As a result, the choke size has now been reduced to 24/64" to manage the reservoir and production rates from the well, which are expected to stabilise, but these will be at a lower level than had previously been anticipated.

Image Credit: Adobe Stock

The ASH-4 well is located in the northern, more heavily faulted part of the ASH field.

The additional data and insights from ASH-4 are already being incorporated into updating the models and building on understanding of the field. The next development well planned at ASH lies in the southern, better-imaged part of the field, and is in a location independent of these updated ASH-4 results.

The company is now working with partners to finalise a drilling programme for 2023.

PetroNor confirms lifting and revels in drilling success

PETRONOR E&P ASA, an independent oil and gas exploration company, has announced that the second lifting this year of 334,061 bbls of the company's entitlement was lifted and realised a price on an average for Djeno crude during November of US$89/bbl.

The lifting was completed by the PNGF Sud operator with the next lifting scheduled with the Djeno Terminal operator in 2023.

In addition, the company also provided an update on its drilling programme, recording multiple successes. Previously, the last two of the four planned Litanzi wells were brought onstream during August. Litanzi now boasts a daily production average more than 7,870 bopd during October and November which is a production rate significantly higher than expectations.

The company has also completed drilling the two Tchibeli NE development production wells. One well includes an additional exploration target which has encountered an oil column of 75 m in the Vandji sandstones. The Vandji exploration target is currently flowing 37 API oil at 1,300 bopd. The second well is currently flowing 38 API oil at circa 2,500 bopd from the Cenomanian.

Interim CEO of PetroNor, Jens Pace, stated, "We are pleased to see that the infill drilling programme is progressing well and is yielding even better results than expected, and a new discovery as well."

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Update on Gazania-1 well, offshore South Africa

ECO ATLANTIC, THE oil and gas exploration company focused on the offshore Atlantic Margins, announces that the Gazania-1 well on Block 2B, offshore South Africa, which spudded on October 10 2022, reached target depth of 2,360 m but did not show evidence of commercial hydrocarbons. The well will now be plugged and abandoned as planned.

The well logging is currently ongoing and the JV Partners will undertake a detailed analysis of the results, which will inform its future plans. The JV Partners submitted a Production Right Application to the Petroleum Agency of South Africa ("PASA") on November 15, 2022, for Block 2B, based on the existing oil discovery of AJ-1 and potential future operations. Therefore, the JV Partners have time to conduct further analysis and integration of the Gazania-1 well data to allow them to determine the next steps on the Block.


Image Credit: Adobe Stock

Commencing detailed analysis and plans to drill at Block 3B/4B

The company, alongside its respective JV Partners, will now move on to executing its plans for more exploration wells, including a two-well campaign on Block 3B/4B offshore South Africa planned to begin in 2023, and at least one well into Cretaceous targets on the Orinduik Block offshore Guyana. As announced by the Operator of Block 3B/4B, a collaborative farm-out process, up to 55% gross WI, has been ongoing and the company looks forward to updating the market on this in due course.

Filipe Jacinto Nyusi inaugurates world's first ultra-deep-water FLNG in Mozambique

THE PRESIDENT OF Mozambique, Filipe Jacinto Nyusi, has visited and inaugurated the Coral-Sul FLNG installation, located in the ultra-deep waters of the Rovuma basin.

The inauguration was attended by the minister of mineral resources and energy Carlos Zacarias and by representatives of Mozambique's government. They were accompanied by an Eni delegation led by Guido Brusco, chief operating officer natural resources.

The event took place after the shipment of the first LNG cargo on 13 November from Coral Sul FLNG (Floating Liquefied Natural Gas), the world's first ultra-deep-water FLNG and the first LNG producer in Mozambique. Coral South, a landmark project for the gas industry, is projecting Mozambique onto the global LNG stage, paving the way to a transformational change of the country through development of gas resources, an important contribution to the security and diversification of supplies to Europe and one of the most effective solutions to ensure a just energy transition. It is the result of an outstanding collaboration among Eni, partners, and the people and government of Mozambique.


Image Credit: Adobe Stock

The president and the representatives of Eni also discussed the possibility of replicating the success of the Coral South project with further FLNG development.

On the sidelines, Nyusi and Eni representatives also discussed the possibility of replicating the success of the Coral South project with further FLNG development, as well as other onshore projects. They also discussed Eni's initiatives towards carbon neutrality.

Kibo signs MoU with Tanzanian Utility, TANESCO

KIBO ENERGY PLC, the renewable-energy-focused development company, has announced the signing of a renewed Memorandum of Understanding (MoU) with Tanzania Electric Supply Company Limited (TANESCO) in relation to the development of the Mbeya Power Project as first announced in a company RNS dated 14 February 2018. The renewed MoU is in essence an agreement between the parties on the process to agree and conclude a Power Purchase Agreement ('PPA') whereby TANESCO will purchase power with a capacity of 300MW from Mbeya Power Limited (MPL), a subsidiary of Kibo.

The objective of this MoU is to establish a general framework of collaboration and cooperation to enable the design, development, financing, construction, commissioning and operation of the Mbeya Power Project and its associated infrastructure. The MOU sets out clear guidelines, deliverables and timelines for the conclusion of a PPA and related implementation agreements.

This is Kibo's initial flagship energy project based in Tanzania, where the company aims to build a 300MW steam-powered power station in alignment with the Tanzanian Power System Master Plan (2020).

The renewed MoU provides the opportunity to reintroduce the project into its development plans, alongside the company's new bio-fuel initiative.

Cooperation on new subsea concept

THE NEW CONCEPT named 'The Dual Pipe Separator' (DPS) will solve the challenges of high-cost field development, increasing water production and higher Environmental Sustainability Goals (ESG) requirements.

Aker Solutions and Seabed Separation A/S have agreed to promote this technology together to the market for field applications. Subsea separation using the DPS system will give less backpressure to the reservoir, thereby giving higher production and recovery. "Adding the Dual Pipe Separator solution to the low carbon toolbox gives us even more alternatives to increase the recovery factor on a field development for our clients," said Morten R. Pedersen, senior vice president of Subsea Engineering at Aker Solutions. Benefits of this system include reduced material usage, lower energy consumption, in addition to lower CO2 emissions. The lifecycle CO2 footprint is much lower than for conventional platform topsides. The DPS components are qualified, approved and now available on the market. "Joining forces with Aker Solutions to promote subsea separation as a tool for oil companies strengthens our efforts to meet the ESG and EOR. These are issues I am personally committed to finding solutions to, and I'm looking forward to working with," said Jon Berntsen, chief executive officer of Seabed Separation. The DPS system consists of a modularised unit with inclined pipe separators that give a stable flow and separation process, and increased oil recovery.

TotalEnergies raises stake in the Waha field in Libya

TOTALENERGIES HAS COMPLETED the joint acquisition with ConocoPhillips of the 8.16% interest held by Hess in the Waha concessions, in Libya.

As a result of this transaction, TotalEnergies' interest in these concessions is increased from 16.33% to 20.41%.

This acquisition reflects TotalEnergies' commitment to support Libya's National Oil Corporation (NOC) in its efforts to restore and increase the country's oil production, together with reducing gas flaring to increase supply to power plants for additional electricity supply. They are also studying the development of dedicated solar projects to supply electricity to. In parallel, and in order to increase the country's renewable electricity supply, TotalEnergies has finalised with its partner Gecol the location and commercial terms to launch a 500 MWp solar plant project south of Misrata.

Image Credit: Adobe Stock

TotalEnergies has completed the joint acquisition with ConocoPhillips.

"With nearly 70 years of presence in the country, TotalEnergies is firmly committed to working alongside Libya's National Oil Corporation to develop the Waha fields, provide its expertise in reducing gas flaring and support the country in its energy transition with the development of solar energy projects," said Patrick Pouyanné, chairman and CEO of TotalEnergies.

International energy companies submit proposals to explore the Mozambique Basin

INTERNATIONAL ENERGY COMPANIES Eni Mozambico SpA and CNOOC Hong Kong Holding Limited, submitted proposals to explore areas under the 6th Licensing Round for the concession of areas for oil and gas exploration and production. Eni showed interest for the area A6-C, in Angoche, and CNOOC for the areas S6-A, A6-G, A6-D, S6-B and A6-E, located in Angoche and Save, respectively.

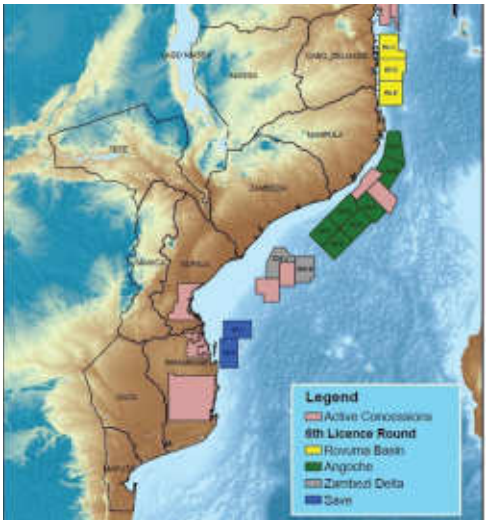


Image Credit: National Petroleum Institute

The two companies propose to form a partnership with Mozambique's National Oil Company.

Both companies proposed to form a partnership with Mozambique's National Oil Company, namely Empresa Nacional de Hidrocarbonetos, E.P,

Speaking to the representatives of the energy companies during the opening ceremony of the proposals, Nazário Bangalane, chairman of the upstream regulator, the National Petroleum Institute - INP, thanked Eni and CNOOC for their interest in investing in those areas with proven petroleum potential and stressed that the evaluation process of the proposals will be made by a multisectoral team composed of senior officials from different state institutions with technical capacity and experience in evaluating such proposals, assisted by an external consultant, in order to ensure a fully transparent process. The deadline for submission of proposals ended today and the announcement of the results is expected to take place by 30 December 2022.

GHANA NAVIGATES UNCERTAIN UPSTREAM ENVIRONMENT

The West African country's oil and gas sector is thriving – though it faces a number of critical long-term challenges, as energy markets around the world changes. Martin Clark reports.

GHANA, LONG KNOWN for its exports of cocoa and gold, first began commercial crude oil production in 2010 from its flagship Jubilee field, becoming one of the continent's more recent hydrocarbon economies.

The Jubilee field – brought on stream barely 40 months from discovery – is located offshore between the Cape Three Points (CTP) and Tano offshore blocks, an area that has generated considerable excitement among the upstream community in the past decade or so.

But a lot has changed in the world in the short years since Jubilee's start up, a field name to mark the 50 years of national independence when it was first discovered, in 2007. Despite plenty of investment in other fields and exploration since, Ghana, like other African states, is also caught in a conundrum.

While the need to exploit its oil and gas is clear as a means to expand the economy and boost living standards, the closing off in demand from traditional markets in Europe, which is phasing out hydrocarbon use in favour of renewables, presents something of a headache. Ghana has also felt the tailwinds from the Ukraine conflict in Europe as well.

> **"Most of the world's major oil and gas companies have been drawn by the Ghana opportunity."**

Image Credit: Adobe Stock

Ghana began commercial crude oil production in 2010.

Norway's Aker Energy recently postponed submission of a development plan for its Pecan oilfield amid sanctions fears due to the involvement of Lukoil, a Russian oil firm.

Lukoil joined Ghana's oil hunt in 2014, taking a share in the Tano block, in the western part of Ghana's offshore, where seven fields have been discovered.

The Pecan Field was originally discovered by Hess back in 2012.

Upstream production

Most of the world's other major oil and gas companies have also been drawn by the Ghana opportunity, including Italy's Eni, which announced a significant oil discovery on the Eban prospect in its CTP Block 4 in mid-2021.

The Eban-1X well is the second well drilled on the block, following the previous Akoma discovery. Preliminary estimates place the potential of the whole Eban-Akoma complex between 500 and 700 thousand barrels of oil equivalent (Mboe).

The Eban-1X well is also located 8 km northwest of the Sankofa hub, where the John Agyekum Kufuor floating production storage and offloading (FPSO) vessel is located.

Across the Sankofa field and the Eban-Akoma complex, the

estimated resource is now in excess of 1.1 Bboe. Further upside could also be confirmed with additional drilling across the block, which is operated by Eni, alongside partners Vitol, Ghana National Petroleum Corporation (GNPC), Woodfields, and GNPC Explorco.

Apart from Jubilee and Sankofa, Ghana's other main producing field is the TEN (Tweneboa-Enyenra-Ntomme (TEN) complex. Collectively, the three producing fields provide an average daily production of about 150,000 barrels per day (bpd), with a peak production rate of approximately 200,000 bpd.

Investor roadshows

Despite the prolific nature of Ghana's upstream over the past decade, all the complexities of the modern era are influencing investment decisions among the top tier oil companies. ExxonMobil, for example, walked away from its Deep-water Cape Three Points project in 2021. It may herald a sign of things to come as the majors walk away from high-profile hydrocarbons investments to shift their attentions to alternatives and renewable energy.

Occidental Petroleum also vacated its role in the Jubilee and TEN fields to make way for Kosmos Energy. Nonetheless, Ghana remains as committed as ever to the promotion of its strategic upstream sector.

The country's energy minister, Matthew Opoku Prempeh, was on the road recently showcasing five available blocks to would-be investors at various international cities. He was accompanied by senior teams from the Petroleum Commission, GNPC, Ghana Oil Company (GOIL) and Base Energy as part of an oil and gas roadshow tour. The goal was to promote five available oil blocks offshore Ghana – Deep-Water Cape Three Points Block (DWCTP); Offshore Cape Three Points South Block; Shallow Water Cape Three Points Block; Southwest Saltpond Block, and the Expanded Shallow Water Tano (ESWT) Block.

Speaking at the Aberdeen event, Egbert Faibille Jnr, chief executive of the Petroleum Commission, said the roadshows were critical to drawing in the investment needed to ramp up reserves and production that will underpin Ghana's long-term economic growth.

GOIL Offshore is seeking a farm-in partner for its DWCTP block, in which it now holds an 85% interest following the departure of ExxonMobil; GNPC holds the remaining 15%.

Elsewhere, the Petroleum Commission recently entered into an agreement with Norway's Exploro Geoservices to acquire 3D seismic multi-client data over the shallow water Saltpond Basin.

Ongoing investment

Despite the disappointment of ExxonMobil's departure, other companies still see strong upside in Ghana's undoubted hydrocarbon potential. Eni, for example, sees it as one of its main growth countries and, in 2019, added a further block, WB03, located in the medium deep waters of the prolific Tano Basin offshore, alongside partner, Vitol.

This block sits approximately 50 km south-east of the FPSO that is currently producing oil and gas from Sankofa. There are other investors that also remain bullish about the country.

Aker Energy last December landed an additional US$100mn in financing from the Africa Finance Corporation (AFC) for the development of the Deep-water Tano Cape Three Points (DWT/CTP) block in Ghana, where the Pecan field is sited. It took AFC's total bond investment to US$200mn, a reflection of its confidence in the West African country and its energy sector.

Last year, Aker Energy also appointed Ghanaian national, Kadijah Amoah as the new chief executive of Aker Energy Ghana Limited, a reflection of industry-wide moves to increase local involvement in the energy sector.

Team Tullow

One of the frontrunners in Ghana's upstream industry for years has been Tullow Oil – the majority of the group's production now comes from the Jubilee and TEN fields.

During the second quarter of 2022, the Jubilee FPSO underwent a scheduled two-week shutdown for routine maintenance and upgrades. This work includes tie-ins with the Jubilee Southeast wells that are expected to increase production from mid-2023.

Production has remained strong since the FPSO restarted operations, at over 90,000 bpd gross. Long-lead items for the Jubilee Southeast development have been ordered and drilling is expected to begin in the fourth quarter – the new wells are expected to increase gross production from the field to around 100,000 bpd.

At TEN, the first of the two riser base wells (NT-10) has been drilled to initially define the extent of the Ntomme reservoir supporting the TEN Enhancement project. The results of these two wells will allow the Tullow team to optimise future drilling plans. The company expects to drill more wells in the coming year as part of its ongoing Ghana offshore work.

At the same time, like all other oil companies worldwide, it is working to reduce the environmental impact of its operations, including efforts to eliminate flaring on its Ghanaian assets.

Natural gas

Ghana's natural gas could likewise yield huge potential. It is now regarded as a cleaner-burning transition fuel away from oil and bridging the gap to renewables.

> **"Ghana remains as committed as ever to the promotion of its strategic upstream sector."**

Around 2 tn cu/ft of gas resources have been identified on the Jubilee and TEN fields alone, which could play a major role in national economic development.

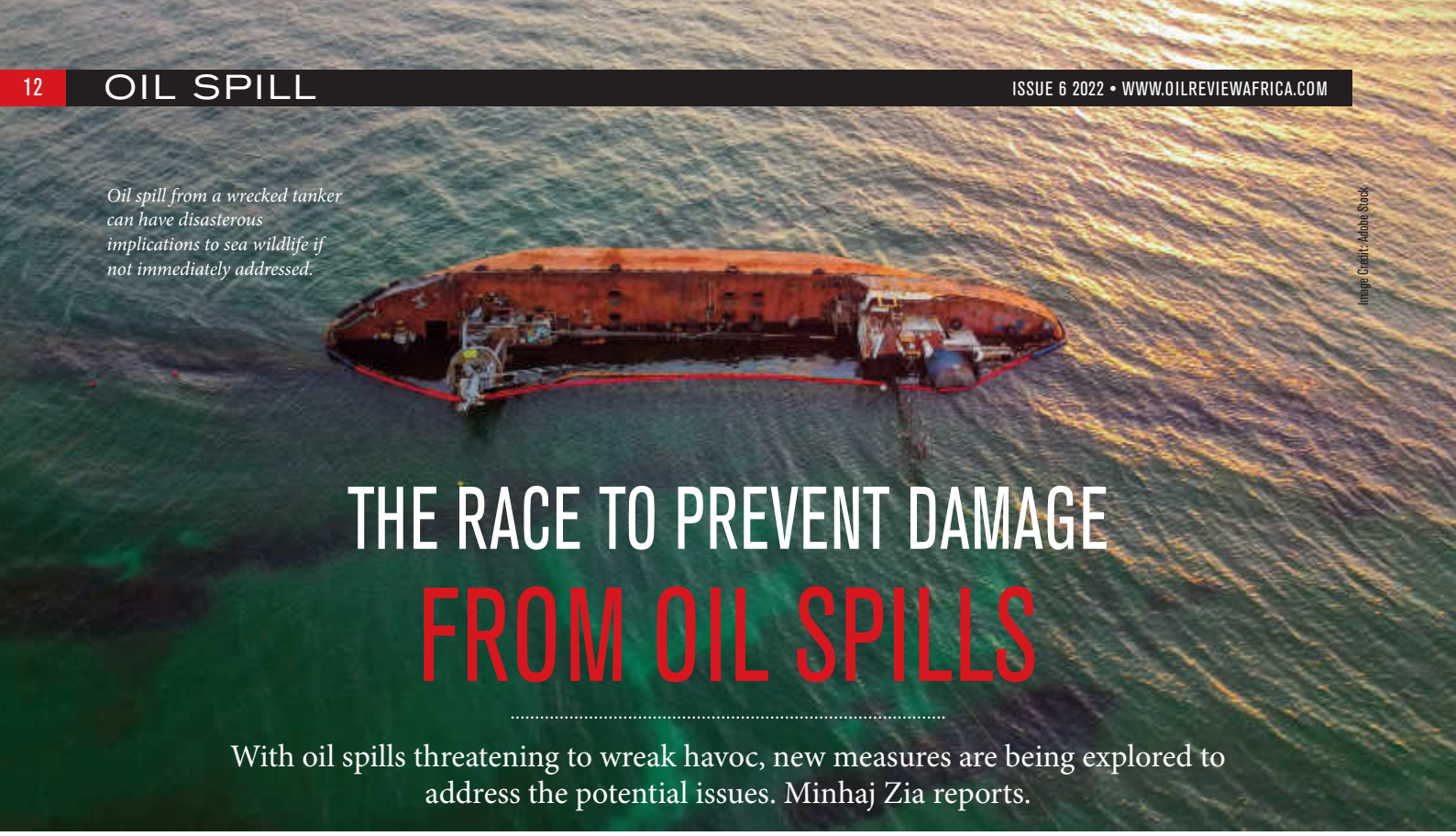
Tullow said in July that it is preparing an integrated plan for the rapid development of this material resource. "This indigenous resource has the potential to provide energy security for Ghana, while reducing dependence on the highly competitive global LNG market," it noted in an update.

Ghana is still looking to open an LNG import receiving terminal, although plans have been repeatedly delayed and a launch date is not expected until at least next year. GNPC is in talks with Shell for the supply of fuel to the project but in what has become a challenging trading climate.

As well as offsetting the need for gas imports, Ghana's offshore deposits might potentially open the door for exports too. One major project that Ghana is linked to is the proposed mega pipeline to transport natural gas from Nigeria, and elsewhere around the West African coast, up to Europe, via Morocco.

The ambitious 7,000 km project is believed to have added momentum with Europe phasing out vital Russian gas supplies this winter.

The transit corridor could redefine gas markets in West Africa, though its completion is not expected for many years and still faces countless formidable challenges, not least the prohibitive cost, estimated conservatively at over US$25bn.



Oil spill from a wrecked tanker can have disasterous implications to sea wildlife if not immediately addressed.

Image Credit: Adobe Stock

THE RACE TO PREVENT DAMAGE FROM OIL SPILLS

With oil spills threatening to wreak havoc, new measures are being explored to address the potential issues. Minhaj Zia reports.

WITH THE RECENT oil spill in California and the sinking of the X-Press Pearl off the coast of Sri Lanka, oil spills remain a global concern in the international effort to tackle environmental disasters. The effects it can have on both the environment and the maritime ecosystem can be felt for decades, as the complexity of the clean-up process varies depending on the magnitude and type of oil spill.

Oil spills can vary from minor, such as slight spillage from refuelling a ship, to more major incidents that can span across several miles and have impacts lasting years. Commonly, major oil spills occur when a pipeline breaks, a tanker sinks, runs get beached, or during a drilling operation blunder. The key element in most oil spills is human error.

With this in mind, the type of oil involved in the spillage also plays a factor. Indeed, some oils are actually more harmful and difficult to deal with than others. For example, gasoline is lighter and more toxic than crude oil, and therefore not only causes more damage to sea life, but can cover a larger distance than heavier oils as it is more affected by the wind and current. This means that it can reach sensitive shorelines or structures if not dealt with promptly. That is not to say that heavy oil is necessarily easy to handle, as the higher density means that it will sink to the bottom, causing sedimentation and damage to the seabed, while also making it difficult to monitor.

A somewhat recent case of spillage is the explosion of Trinity Spirit, a floating production storage and offloading vessel, near the delta of the River Niger. The vessel, owned by Shebah Exploration and Production Co (SEPCOL), had been working on the Ukpokiti field, and had 50,000 barrels of oil in storage during the time of the explosion, as reported by *Reuters*.

At the time of the event, Ikemefuna Okafor, SEPCOL CEO, told *Reuters*, "At this time there are no reported fatalities, but we can confirm that there were 10 crewmen on board the vessel prior to the incident and we are prioritising investigations with respect to their safety and security." It was later revealed that there were at least three fatalities as a result of the incident.

With the potential damage that ensues from oil spills, it raises the question of how oil spills are cleaned up. This is something which varies by a series of dependable factors, some of which range from the time taken for the clean-up crew to arrive, weather condition, the type of oil, and the type of coastline. If the clean-up crew can arrive to the site within a few hours of the initial spill, they can block off the zone to prevent the spill from spreading into a larger area, and then remove the oil at the surface using booms and skimmers.

> **"The key element in most oil spills, is human error."**

Booms are floating barriers which are deployed to block off and prevent oil from spreading further. They are used in conjunction with skimmers, which are boats that are modified to skim the oil off the top of the water. This is done with the aim of preventing the oil from spreading too far or reaching shorelines, as this would make the process significantly more difficult. Should this happen, the process would have to engage in manual clean-up campaigns rather than mechanical.

Marine wildlife would also have to be moved away from the area of concern by using balloons and floating dummies as a way of keeping them away from the spill. As the United Nations Environment Programme explains, "Oil destroys the insulating ability of fur on mammals and impacts the water repelling qualities of a bird's feathers, without the insulation or water repelling qualities mammals and birds can die from hypothermia. Dolphins and whales can inhale oil, which has an impact on their immune system and can impact reproduction. While fish and shellfish aren't immediately impacted, because oil floats on water, as the oil mixes and sinks, fish can experience impacted

growth, enlarged livers, fin erosion and a reduction in reproductive capabilities. In fish and shellfish, the impact can also be lethal. When it is not lethal, they are often no longer safe for human consumption." However, it is important to note that despite best efforts, only 40% of the oil from a spill can be cleaned up, with the rest being left to natural recovery.

Recovery is important, but prevention is better. There are some steps which can be taken to prevent an oil spill from occurring in the first place.

> **"Recovery is important, but prevention is better."**

Firstly, it is extremely important to ensure that sea vessels are properly maintained. This means carrying out regular inspections of the through-hull fittings, checking for any damage to the vessel, and recycling used oil and filters. The fuel takes should also be ideally filled to 90% capacity to decrease the possibility of a minor spill.

Finally, it is useful to keep equipment specialised in spill control readily available to the crew, just in case. These are but minor solutions to what is a global issue, and it is clear that more innovative technology needs to be introduced when addressing oil spillage.

One such example, is the implementation of smart monitoring for pipelines. Through constant monitoring of pipelines, potential problems can be dealt with even before any problems arise.

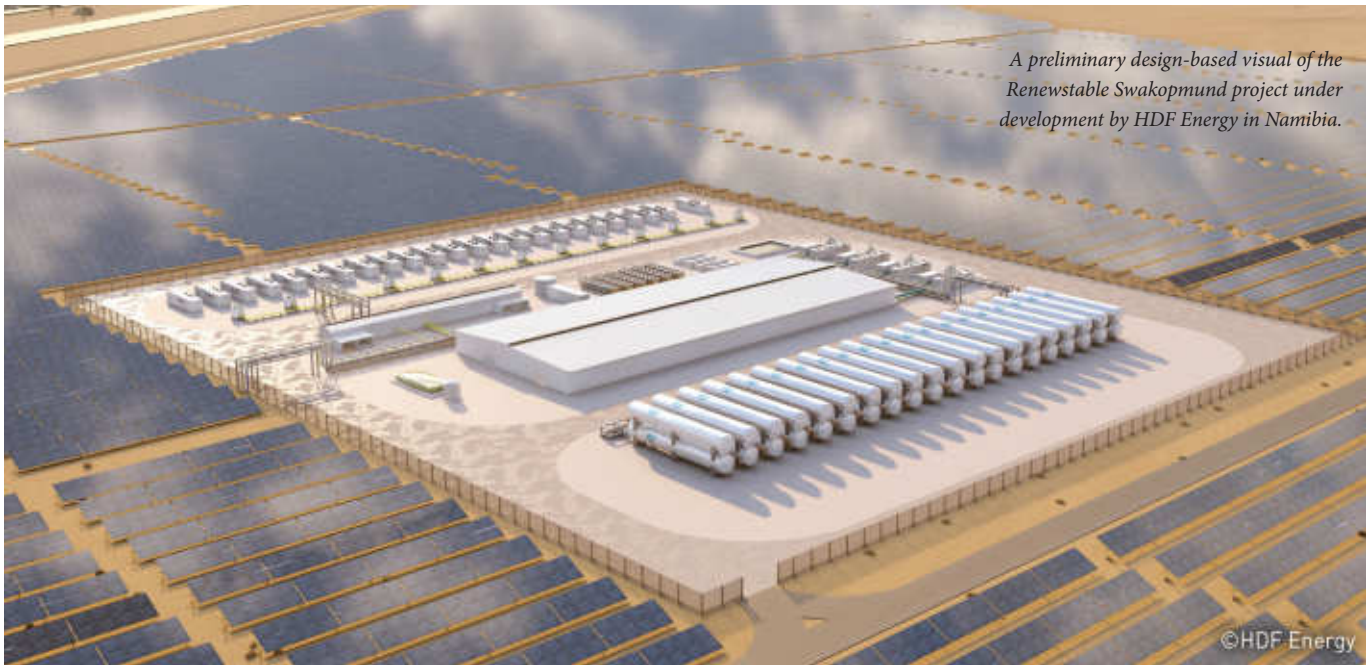
Image Credit: Adobe Stock

Volunteers manually clean the seashore from oil after a tanker wreck.

Fotech's LivePIPE II solution "processes vast quantities of data in real-time and extracts the actionable information needed" to provide pipeline security, according to Fotech Solutions. The system offers 24-hour protection and can warn against pipeline threats such as theft or damage, thus allowing for quick intervention. This is done with their "fully integrated and networked sensing solution based on the world's most advanced fibre optic Distributed Acoustic Sensor (DAS)," as Fotech describes.

NAMIBIA ACCELERATES GREEN HYDROGEN DEVELOPMENT

Namibia is planning a hydrogen future, with the country's first hydrogen power plant to produce electricity by 2024. Stephen Williams reports.



A preliminary design-based visual of the Renewstable Swakopmund project under development by HDF Energy in Namibia.

Image Credit: HDF Energy

THE FRENCH INDEPENDENT power producer HDF Energy expects its green hydrogen power plant in Namibia to be producing electricity by 2024, according to a senior company executive.

"Yearly we can produce 142 gigawatt hours, enough for 142,000 inhabitants and that is conservative," Nicolas Lecomte, HDF Energy director for southern Africa, says.

Once operational, the US$181.25mn Swakopmund project will supply clean electricity power, 24 hours a day all year round, boosting electricity supply in the southern African nation. Namibia currently imports more than a third of its power from neighbouring South Africa.

One of the world's sunniest and least densely populated countries, it wants to harness its vast potential for solar and wind energy to produce green hydrogen and position the country as a renewable energy hub in Africa.

In fact, while Namibia is a front-runner in developing a green hydrogen industry the country has joined other African countries in this endeavour. Six African countries formally launched the Africa Green Hydrogen Alliance and invited others to join in making their continent a global frontrunner.

Kenya, South Africa, Namibia, Egypt, Morocco and Mauritania intend to intensify collaboration to supercharge development of green hydrogen projects on the African continent.

Green hydrogen development in Africa promises access to affordable and clean energy, to create jobs, provide public health benefits such as cleaner air, promote new green industries and wealth creation, and open opportunities to new export revenues.

Hydrogen is categorised "green" when it is made with renewable power and is seen as key to help decarbonise industry, though the technology remains immature and relatively costly.

The intention is to foster collaboration on creating a sustainable enabling environment to supercharge green hydrogen development.

This includes development of public and regulatory policy, capacity building, financing and the certification needed to mobilise green hydrogen production for domestic use and export.

Academic backing

Green hydrogen has also received academic support. Mulako Mukelabi, and Dr Richard

Image Credit: Adobe Stock

By 2040, approximately 150mn tons of hydrogen will be required annually.

Blanchard of Loughborough University along with Professor Upul Wiayantha of Cranford University (both institutions UK Based) have outlined how Africa's renewable energy resources and minerals can be utilised to provide clean energy to millions of households and help meet global net zero targets.

They point out that despite Africa's carbon footprint accounting for only 3% of global greenhouse gases due to current low economic activity, it heavily depends on traditional biomass fuels such as wood and coal to meet daily energy needs.

Published in the *Renewables and Sustainable Energy Review Journal*, Mulako and his colleagues research specifically focuses on the role hydrogen can play in decarbonising Africa's predicted greenhouse gas emissions.

The report states, "Most of the current global hydrogen (80%) is produced through carbon intensive methods involving methane (grey hydrogen).

"However, hydrogen can be produced through electrolysis – the process of using electricity to split water into oxygen and hydrogen – and this can be powered by renewable electricity, i.e. green hydrogen."

Mulako and his team is the first to look at hydrogen potential at a country-level and assess communities' water and energy access needs, transportation systems, and costs.

The key criteria for an ideal fuel are inexhaustibility, cleanliness, convenience, and independence from foreign control. In large part, hydrogen possesses all these qualities and is being evaluated and promoted world-wide as an environmentally benign replacement for petrol, heating oil and natural gas.

However, hydrogen does represent some challenges. Hydrogen is about 14 times lighter that air and diffuses faster than any other gas. This means that its storage and distribution requires quite sophisticated technologies.

Despite the challenges, green hydrogen energy development has attracted attention around the world. Uses for hydrogen are expanding across multiple sectors, the World Bank reports, including power generation, manufacturing processes in industries such as steelmaking and cement production, fuel cells for electric vehicles, heavy transport such as shipping, green ammonia production for fertilisers, cleaning products, refrigeration, and electricity grid stabilisation.

A continent-wide solution

As well as Namibia, HDF Energy is also eyeing new hydrogen projects across Africa and other parts of the world. "Soon after southern Africa, you will see HDF developing projects in East Africa," Lecomte believes.

It is estimated that by 2040, approximately 150mn tons of hydrogen will be required annually.

Another company, Namibian-registered Hyphen Hydrogen Energy, is in talks with Namibia's government to secure an implementation agreement for its planned US$10bn green hydrogen project that will produce some 350,000 tonnes of green hydrogen a year before 2030 for global and regional markets.

Regrettably, the agreement was not reached in time to be announced at COP27 in Sharm El-Sheik, Egypt, but news of a breakthrough on the subject of the loss and damage caused to developing countries through climate change will give extra impetus to the continent's green energy ambitions.

As the Green Hydrogen Organisation chief executive, Jonas Moberg, says, "Green hydrogen is key to Africa's shift to green energy.

"It must provide energy for Africa's growing population and industrial needs. It will also offer a major export opportunity for the continent. Capacity to govern this key part of the energy transition is needed. We need to learn from each other and coordination is needed across government, industry and civil society."

And there was more positive news for Namibia at COP27 with the European Investment Bank (EIB) agreeing a loan of up to approximately US$509mn to Namibia. The aim of this debt is to support renewable energy, including green hydrogen.

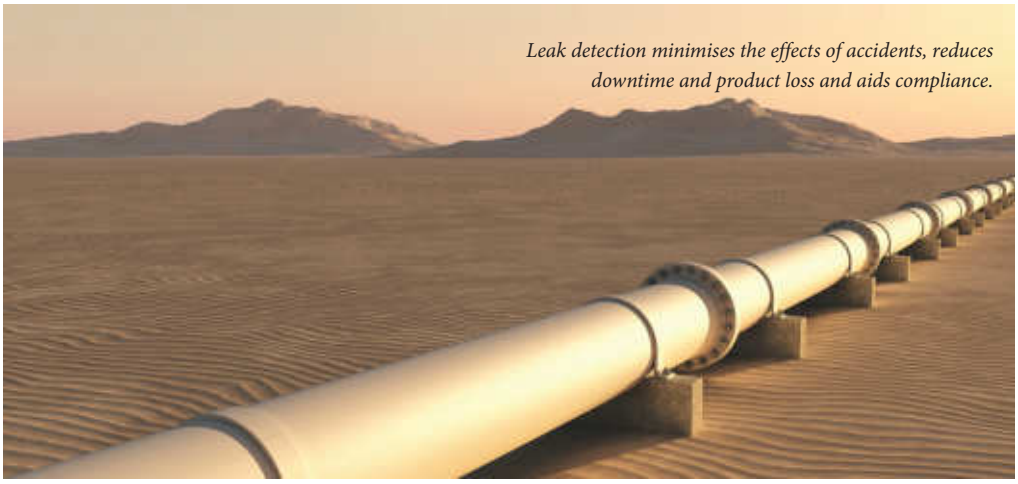
The EU and Namibia have agreed to develop an operational roadmap for 2023-24, the statement, with concrete joint actions within six months of the MoU signing.

"Now is the time where we have to really decide whether we want to be locked in in fossil fuels or whether we want to leap forward into clean energy. This is not only wind, this is not only solar, but it is also green hydrogen," European Commission president Ursula von der Leyen stated.

> **"Now is the time where we have to really decide whether we want to be locked in in fossil fuels or whether we want to leap forward into clean energy."**
>
> Ursula von der Leyen, president of the european commission

RELIABLE LEAK MONITORING FOR PIPELINES

Jay Gadhavi, KROHNE Middle East and Africa solutions director, discusses the benefits of Extended Real Time Transient Modelling (E-RTTM) leak detection systems as a central component of pipeline safety design.



Leak detection minimises the effects of accidents, reduces downtime and product loss and aids compliance.

Image Credit: Adobe Stock

THE TRANSPORTATION OF FLUIDS in pipelines is increasing all over the world, and with good reason: pipelines are among the safest and most economical transportation systems over long routes. Special leak detection systems are often used to limit the risks. In general, leak detection in pipelines refers to the recognition and quick localisation of product leaks.

Reasons to employ leak detection include:

- To minimise the effects of accidents
- To minimise downtime
- To minimise product loss
- Regulatory compliance.

Leak detection in pipelines can be performed in various ways, from simple visual controls during inspections, to computer-supported systems that monitor conditions, even for underground and undersea pipelines.

Getting started

Selecting a suitable leak detection system is not an easy task for pipeline operators. API RP (Recommended Practice) 1130 is even more specific with regard to leak detection systems. Among other items, it includes a collection of general recommendations for operating leak detection systems, such as clear presentation of the results for the operator and for maintenance. It also includes performance criteria for selecting a leak detection system: these criteria are very detailed and explain how leak detection systems work. The criteria are outlined below, and it is easy to see that they are linked and interdependent.

- Sensitivity: the leak detection system should detect even small leaks within a short period.
- Precision: the leak detection system should locate leaks precisely. The leakage rate, the quantity of escaped product (leakage rate multiplied by time) and the product that is escaping should all be indicated.
- Robustness: the leak detection system should continue active monitoring despite unsteady or non-ideal conditions. It also includes unsteady operating conditions, also known as transient operation, for example due to effects triggered by pumps or valves.
- Reliability: the leak detection system should not generate false alarms, even though it is highly sensitive.

> **“Leak detection in pipelines can be performed in various ways.”**

Canadian standards

Association CSA Z662 Annex E represents recommended practice for liquid hydrocarbon pipeline system leak detection in Canada. Hereby, the CSA Z662 Annex E is the only recommended practice to include precise uncertainties for leak detection systems. When the operator has clarified relevant requirements of the appropriate regulatory for their application, other characteristics that affect the choice of leak detection system can be considered.

Combining principles has several advantages. In 2012, the U.S. Department of Transportation Pipelines and Hazardous Materials Safety Administration published a Leak Detection Study, DTPH56-11-D-000001, which states, “The leak detection system itself should always be redundant, by using multiple techniques that differ from each other and therefore compensate for any inherent weaknesses they do not share.” It also describes the benefits of combined leak detection methods, “There is no reason why several different internal

leak detection methods should not be implemented at the same time. As an example, the Extended-RTTM system trademarked by KROHNE uses an RTTM in conjunction with several other API 1130 techniques". (E-RTTM stands for Extended RTTM, which combines the RTTM principle with leak signature analysis using leak pattern detection).

Image Credit: KROHNE

An E-RTTM leak detection system creates a virtual image of a pipeline based on real measured data.

Benefits of E-RTTM systems

An E-RTTM leak detection system creates a virtual image of a pipeline based on real measured data. If the model detects a flow discrepancy, the leak signature analysis module then determines whether it was caused by an instrument error, a gradual leak or a sudden leak.

The increased capacities of modern computers allow leak signature analysis to apply powerful statistical hypothesis testing. Based on modern statistical tests, the signature analysis decides whether the pipeline is affected by a leak or not. It provides a high degree of sensitivity and quick leak detection with real-time comparison of existing measuring results against leak signatures, which are stored in a database.

E-RTTM-based leak detection systems are able to handle changing or transient operating conditions that are not recognised by less sophisticated internal leak detection systems. An E-RTTM-based leak detection system works with dynamic values, which also affects robustness: the system can adapt automatically and very quickly to changes in the operating conditions such as sensor failure, communications failure, a valve closing or a product change in the pipeline.

The precision of the E-RTTM is based on three different methods of leak localisation: gradient intersection method, wave propagation method and extended wave propagation method. The leak detection system calculates the most probable leak location(s) by comparing the results of these methods. The gradient intersection method is based on the pressure profile of a pipeline: the occurrence of a leak changes the pressure gradient along the pipeline in characteristic manner. Without a leak, the drop in pressure in a liquid pipeline is linear. The leak position can be determined by calculating the intersection point.

The second option for leak localisation is the wave propagation method, which analyes the pressure waves that result from a leak. If a sufficiently large enough leak occurs suddenly, for example if the pipeline is damaged by an excavator, a negative pressure wave spreads at the speed of sound in both directions along the pipeline. The leak position can be calculated by comparing the arrival time of the pressure wave at the pipeline inlet and outlet pressure sensors.

The extended wave propagation method is based on the same physical principle as the wave propagation method. This enables more precise localisation of the leak by reducing errors due to delayed sensor reaction or slow signal transfer.

The E-RTTM introduced here is the basis of the PipePatrol leak detection system by KROHNE. The user interface can run on a separate workstation, or be integrated into an existing control system. The user interface features intuitive operation: only the information that the current user needs for his scope of work is displayed.

In principle, PipePatrol can be integrated into any new or existing infrastructure. Operators can learn to use the system in just a few hours. In addition to the visualisation of the pipeline operating conditions, PipePatrol can indicate leak positions on a map, which simplifies and speeds up a service technician's work.

Leak detection in practice

An example application in Canada demonstrates how quickly and precisely leak detection functions in practice. Following thorough consultation, the company opted for the PipePatrol leak detection system. PipePatrol used the measurement values provided by the process control system and was integrated into the pipeline monitoring system at the customer's request. The leak tests performed for the site acceptance tests were conducted using valves in the pipeline to simulate leaks by real fluid withdrawal into a vacuum truck. The detection threshold for leaks is set to 1.1 m^3/h / 4.84 gal (US)/min. After starting the leak test with a leak rate of 5 m^3/h / 22.01 gal (US)/min, the system recognised the signature of the leak within 55 seconds and went to "Leak Signature Detected" state.

> **"E-RTTM-based leak detection systems guarantee reliable leak monitoring for various types and lengths of pipelines."**

The gradient intersection method calculated a leak position of 24,689 m / 15.34 mi, while the wave propagation method calculated a leak position of 24,677 m / 15.33 mi, both less than 0.1% of pipeline length away from the real leak position.

The second pipeline is a sales oil pipeline with a length of 59,700 m / 37.1 mi. The detection threshold for leaks is set to 3 m^3/h / 13.21 gal (US)/min. After starting the leak test with a leak rate of 3.5 m^3/h / 15.41 gal (US)/min, the system recognised the signature of the leak within 50 seconds and went to "Leak Signature Detected" state. The gradient intersection method calculated a leak position of 0 m / 0 mi, less than 0.1% of pipeline length away from the actual leak position. The wave propagation method was disabled for this test because time stamping was temporarily not available for the measurements, but has been activated in the meantime.

Modern leak detection systems are based on various mathematical and physical models. E-RTTM-based leak detection systems guarantee reliable leak monitoring for various types and lengths of pipelines, even under transient operating conditions. KROHNE supplies the PipePatrol E-RTTM-based leak detection system either installed on separate hardware or for integration into an existing control system and measurement installation, always to international standards trusted by the industry.

SIMPLIFYING OFFSHORE EXPLORATION

A floating production storage and offloading (FPSO) vessel, combined with technological prowess, can help extract maximum efficiency.

AS OIL PRODUCERS are seeking to strike a balance between business and environment, they are choosing offshore over onshore exploration to emit less carbon per barrel. Given their massive scale, offshore projects help reduce flaring and recycle heat. And so long as offshore prevails, floating production storage and offloading (FPSO) will remain an integral part of the oil and gas industry.

FPSOs collect hydrocarbons from a subsea reservoir through risers, which then refines the resources by separating crude oil and natural gas from water and impurities within the topsides production facilities onboard. The revived crude oil is transferred onto shuttle tankers from the storage tanks of the FPSO, which then goes to market for further refining onshore.

FPSOs generally resemble a ship, which can stand moored to the seabed for operations as long as 20 years or even more, now that they have become digitised. The system of mooring depends on the environment as well as the depth of water. The advance of technology has helped companies speculate the service span of a vessel based on the impact of a particular project on it. There is data available on everything from hulls and mooring systems to processing equipment. These can help extract maximum efficiency while designing a vessel .

> **“FPSOs can stand moored to the seabed for operations as long as 20 years and beyond, now that they have become digitised.”**

Image Credit: Adobe Stock

High-production purpose-built FPSO can be a cheaper alternative to traditional platforms.

Earlier this year, Trelleborg Marine and Infrastructure installed SafePilot Offshore, a remote system of navigation and piloting for an FPSO project offshore Angola. It helps gauge the best position for tankers and minutely monitors vessel movements during offloading operations.

While offshore is more expensive than onshore, deploying high-production purpose-built FPSO instead of traditional platforms can cut down on costs to certain extent. An FPSO for a large field offshore of Africa is priced at around US$800mn. The average price for a traditional offshore oil-drilling rig, however, is approximately US$650mn. That is minus the well completion costs, ongoing facility production maintenance costs, and platform decommissioning costs. FPSOs, on the other hand, can be used in lease, thus allowing flexibility to manage fixed production assets.

A floating, storage and offloading (FSO) vessel is even cheaper than FPSOs, but it comes without the feature of processing. Last month, VAALCO Energy installed an FSO at Etame, replacing the Petroleo Nautipa FPSO.

"The new FSO provides us with additional flexibility and has an effective capacity for storage that is 50% larger than our relinquished FPSO. It also reduces our expected storage and offloading costs by 50% which should lead to an extension of the economic field life, resulting in a corresponding increase in recovery and reserves at Etame," said George Maxwell, VAALCO's CEO. That way the company expects to lower total operating costs at Etame by approximately 17% to 20% through 2030.

Before the advent of FPSO, offshore exploration was not easy. Pipelines were used, and they ended up becoming a liability once the oil field was exhausted. Also, pipes could not reach beyond the depth of a few metres. FPSOs, however, not only have the capability to go more than a thousand metres, but it can be moved to different locations for fresh use. Currently, about 225 FPSOs are operating worldwide.

As long as the oil and gas industry continues to shape world markets, demand for FPSO will stay strong.

BUILDING CYBER RESILIENCE THROUGH INDUSTRY COLLABORATION

As the digital transformation continues, the energy sector must be aware of increasingly common, creative and complex industrial cyber security threats, says Jalal Bouhdada, global segment director for Cyber Security at DNV and founder of Applied Risk.

SUCH IS THE concern among Middle Eastern and African energy professionals over cyber security threats in the sector that 69% believe that an attack is likely to cause loss of life.

This, compared with a global average of 57%, was just one of the findings of The Cyber Priority, a research report by DNV which was based on a survey of more than 940 energy professionals around the world and in-depth interviews with industry executives.

Exploring the state of cyber security in the energy sector, the report found that energy executives anticipate life, property, and environment-compromising cyber attacks on the sector within the next two years. Indeed, these could include attacks on energy supplies in power grids, ship navigational systems, windfarms and systems in pipelines. Attackers could be foreign powers, competitors or criminal gangs.

A recent example of a cyber attack on the energy sector came in October 2022 when Tata Power said that their IT infrastructure and systems had been hacked. Another, in 2020, saw hackers attempt to hack into the industrial control systems of five Israeli Water Authority facilities and try raise the level of chlorine in the nation's water supply.

> **"Never has it been more important for companies and authorities to come together to share knowledge, create best practice and develop new standards."**

Image Credit: DNV

Jalal Bouhdada, global segment director for Cyber Security at DNV and founder of Applied Risk.

With OT becoming more networked and connected to IT systems, cyber criminals can more easily access control systems operating critical infrastructure. Safety is therefore a key risk with industrial fail-safe mechanisms designed for an offline world possibly having unknown vulnerabilities that could see them undermined if they are not protected against a cyber attack.

The Cyber Priority report revealed that while some energy organisations are making real progress toward cyber resilience, preventative action is lagging the growing threat. There is still a strong signal that the energy industry and other industrial sectors need to make urgent investments to ensure that cyber security incidents do not become the cause of future safety incidents.

One of the challenges with managing industrial cyber security risks is that there is not enough best practice available – particularly within older energy infrastructure that doesn't have cyber security built into it by design – to guide operators, suppliers, manufacturers, and regulatory authorities in building an effective force of defence.

However, it is hoped that it does not take a tragic incident for the industry to prioritise and institutionalise safety protocols, standards, and regulation. This would draw parallels to trends in the industry's physical safety practices when it took incidents such as the 1988 Piper Alpha oil platform explosion in the North Sea and the 2010 Deepwater Horizon oil spill in the Gulf of Mexico for there to be material change.

Where the energy industry has worked together to solve its safety challenges over the past 50 years, it has made extraordinary progress. Within a relatively short period of time, it implemented global standards, improved its ways of working and use of technology, and embedded a safety-first mindset across the entire workforce. There is no reason why a similar transformation is not only achievable in the field of cyber security – and before a tragedy happens.

While industry players are already beginning to come together to develop more best practice – such as the IEC 62443 standards for cyber security in operational technology in automation and control systems, and DNV's Recommended Practice for its application in the oil and gas industry – we need to go further in taking collective action as industrial cyber security risks increasingly become seen as business risks.

Never has it been more important for companies and authorities to come together to share knowledge, create best practice and develop new standards in the fight against industrial cyber crime.

Download a copy of The Cyber Priority from: www.dnv.com/cyberpriority

CALIBRATING FLOWMETERS FOR REAL-WORLD PROCESS EFFECTS

The oil and gas industry is favouring 'newer' and more 'advanced' flow measurement technologies, says Chris Mills, senior consultant engineer, TÜV SÜD National Engineering Laboratory.

THOUGH THE ADOPTION of Coriolis flow meters is a logical move, the effect of elevated conditions on their measurement uncertainty is generally not well understood by end users.

Several factors affect the performance of Coriolis devices, including temperature, pressure, fluid viscosity and the Reynolds number. However, meter manufacturers incorporate corrections in an attempt to compensate for these effects. Whilst calibrating 'in-situ' at service conditions can eliminate these effects, the industry appears to be moving away from proving meters onsite. The more favoured design appears to consist of Coriolis master and duty flow meters.

The Coriolis duty meter remains in-situ and the master meter is periodically sent to an accredited laboratory for a flow calibration to minimise oil and gas production downtime. The performance of the duty meter is then compared with the calibrated master meter. However, the temperature, pressure and fluid properties of produced oil and gas from a reservoir can differ considerably from conditions at the calibration laboratory.

Our research has explored the performance of Coriolis flow meters that have been calibrated in our elevated pressure and temperature (EPAT) oil flow facility and the UK National Standards oil flow facility in Glasgow.

Image Credit: TÜV SÜD

TÜV SÜD's flow meter test facilities.

We analysed the calibration results in terms of fluid viscosity, Reynolds number, temperature, pressure and flow rate to identify trends and to ascertain whether manufacturers' performance claims were valid.

> **"Temperature, pressure, and the Reynolds number are the factors that effect Coriolis flow meters."**

The experimental results used were from a combination of BEIS funded research, joint industry projects, internal TÜV SÜD National Engineering Laboratory research and commercial calibrations.

Overall, the research results reinforce the concept that Coriolis flow meters cannot simply be utilised at service conditions without suitable consideration, characterisation and calibration. It is vital that end users remember that pressure corrections published by manufacturers are not fully traceable at present.

Temperature – It is a significant effect for Coriolis flow meters. However, they have an onboard resistance temperature detectors (RTD) and incorporate algorithms to correct for temperature effects on the flow tube material. This means that the temperature effect is automatically corrected.

The temperature compensation coefficient cannot be easily modified by the end user. Instead, a more practical approach would be to calibrate

the device as close to the service temperature as possible. This would allow to ascertain whether temperature effects are significant, and a correction allowed for via an adjustment to the Coriolis mass factor.

Pressure – As the pressure effect has shown to be linear, it can be corrected either via an adjustment to the meter mass factor, a static fixed pressure correction or a dynamic 'live' correction via a pressure transmitter. If the process conditions are stable, then a static fixed pressure correction could potentially be applied.

This involves the device being adjusted for the effects of pressure via an adjustment to the device mass factor or to the flow computer. However, it should be noted that if the pressure effect is significant (e.g. –0.020% per bar) then even a 5 bar variance could produce a meter offset of –0.10% using a static fixed correction.

This means that a traceable dynamic 'live' pressure correction via a pressure transmitter should be used where possible.

Viscosity / Reynolds Number – If operating in high viscosity conditions, a Coriolis flow meter should be characterised against Reynolds number with a suitable fluid to ascertain the effects.

However, correcting for the adverse effects of viscosity /Reynolds number can be challenging. It should also be noted that installation has a significant effect on the Reynolds number at which the laminar-turbulent transition occurs. Hence, the robustness of any Reynolds number correction might require further investigation at alternative entry lengths.

Image Credit: Adobe Stock

Coriolis meters must be ISO 10790 updated.

It is also important for the end user to remember that the performance of Coriolis meters from one manufacturer are not necessarily similar to meters from other manufacturers as there are many variables such as meter design, flow tube dimensions, patented corrections and the quantity and quality of any internal R&D. It is also hoped that ISO 10790, which provides guidance on the selection, installation and use of Coriolis meters, will be updated in the near future with the latest available traceable data.

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PATHWAY TO ENDING ENERGY POVERTY IN AFRICA

AOW 2022 offered four days of pioneering insights to drive investment in the African upstream for the continent's benefit, reports Nancy A Onyango.

Image Credit: AOW

The event brought together close to 2,000 representatives from 80 countries.

THE 27TH EDITION of the Africa Oil Week (AOW) returned to Cape Town from 3-7 October after a one-year hiatus as a result of the Covid-19 pandemic. Themed 'Sustainable growth in a low carbon world', AOW 2022 offered four days of pioneering insights from ministerial panels to strategic outlooks designed to drive investment in the African upstream for the continent's benefit. The event brought together close to 2,000 representatives from 80 countries representing governments, national and international companies, independent investors, service providers, analysts and the media. The second edition of the sister event, the Green Energy Africa summit was also hosted along the sidelines of AOW.

> **"The biggest buzz was around the need to end energy poverty while supporting the upliftment of Africa's people."**

Key dignitaries who attended the event included, Amani Abou Zeid, commissioner for infrastructure and energy at the African Union; Ruth Nankabirwa, minister of energy and mineral development in Uganda; Omar Farouk Ibrahim, secretary general of APPO; Henri Max Ndong Nzue, SVP Africa division at Total Energies; Mathew Opoku Prempeh, Minister of Energy Republic of Ghana, and Rashid Ali Abdallah, executive director of the Africa Energy Commission. "AOW is the place to be if you want to connect with industry and government leaders across Africa," said Brad Crabtree, USA Assistant Secretary General of Energy during the event.

Energy poverty

Just like their global counterparts, African countries have been faced with tough economic times marked by a slow recovery from Covid-19 and the Russian-Ukrainian war. Energy is key to the growth and prosperity of any modern economy. With food and energy accounting for half of the household

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consumption in Africa, living costs across the region have spiralled. It is estimated that nearly one billion Africans lack access to clean, sustainable energy.

The biggest buzz during the AOW conference was around the need to end energy poverty while supporting Africa's social development and the upliftment of its people. If this energy-poverty gap is to be bridged by renewable energy in line with carbon-neutral targets, PwC estimates that Africa would need to deploy an additional 2,354GW of renewable generation by 2050 to bring Africa up to the world average for electricity access and meet decarbonisation commitments. This increase of nearly 40 times the current installed renewables capacity of 59GW is estimated to cost Africa approximately US$2.6tn (roughly the current size of Africa's GDP). Adding to this seemingly insurmountable task is the rapidly changing global landscape including climate change policy pressure, geo-political tensions such as the Ukraine conflict, and the aftershocks of Covid-19.

"Energy poverty in Africa cannot be separated from the need for clean energy," said Gwede Mantashe, South Africa energy minister during the opening ceremony of AOW. "We need an energy mix that will sustain our development."

Image Credit: AOW/Green Energy Africa

A Power List of 50 female leaders working in the energy sector across the African continent was unveiled at the event.

The Africa Union (AU) estimates that more than 600 mn Africans live without electricity, while 900 mn lack access to clean cooking facilities. The African Common Position on Energy Access and Just Transition encourages striking a balance between ensuring access to electricity for socio-economic growth and a smooth transition to an energy system based on renewable energy resources. Natural gas, green and low carbon hydrogen and nuclear energy will therefore be expected to play a crucial role in expanding modern energy access in the short to medium term, while enhancing the uptake of renewables in the long term for low carbon and climate-resilient trajectory.

> **"A key takeaway by most delegates was the need to enact policies that are inclusive."**

During the conference, political leaders, keynote speakers, analysts and business leaders reiterated the hardships of energy poverty are as dangerous as the risk of climate change. "We must remember that more than half of our continent's people do not have access to modern energy – specifically, electricity," said Abou Zeid. "Africa's low level of access to modern energy means that Africa will have to utilise all forms of its abundant energy resources to meet its energy needs."

Image Credit: AOW/Green Energy Africa

Panelists addressed the problem of energy poverty in Africa.

Female energy executives

The World Petroleum Council notes that women comprise less than 25% of the global workforce in the oil and gas sector. Diversity, equity and inclusion (DEI) are essential pillars for the energy transition and the broader climate debate. There is a great potential for the energy sector to play a prominent role in the fight

for gender balance because the industry is heavily tied to enabling food security, clean water, and sustainable agriculture productivity, areas where women play a prominent role – Lame Verre, co-founder of Lean In Equity, commented.

During the conference, a Power List of 50 female leaders working in the energy sector across the African continent was unveiled in partnership with Lean in Equity and Sustainability. The list included Africa's most inspirational female energy executives who act as visible role models in the industry to encourage the next generation of African girls and female executives. Canby Jones, director of exploration and production at Gambia National Petroleum Corporation, who was featured on the list, commented, "It is a myth that leadership is new to women or that we are not naturally suited for technical or challenging roles."

Image Credit: AOW/Green Energy Africa

Speakers reiterated that the hardships of energy poverty are as dangerous as the risk of climate change.

Major announcements

Following a merger, Maersk Drilling has now become part of Noble Corporation to form the new Noble Drilling. The Democratic Republic of Congo announced the 2022 Licencing Round. The DRC also launched the first phase of tenders for 30 blocks, located in the Coastal Basin, Cuvette Centrale, Tanganyika Graben, Albertine Graben and Lake Kivu. Also along the sidelines of the AOW, the 33rd edition of OPEC announced the cut in production by around 2%.

As the curtains came down on AOW 2022, a key takeaway from the conference by most delegates attending was the need to enact policies to achieve climate resilience and a just energy transition that are inclusive, leaving no one behind.

Image Credit: AOW/Green Energy Africa

Abdirizak Omar Mohamed, Minister of Petroleum and Mineral Resources, Somalia, at the ministerial forum.

> **"Africa's abundant mineral resources are new market opportunities for green energy transition."**

Moves toward low-carbon sources of energy to reduce global greenhouse gas (GHG) emissions are of paramount importance, but they need to be compatible with achieving the continent's development aspirations.

Mantashe said there was unanimity on the need to move towards lower carbon emissions. "That debate is settled," he said. "The real issue is in the details of that transition. The African energy transition must be systemic, it must be people-centric, and it must be community focused."

Other speakers also highlighted the pressure by developed nations expecting Africa to pause its oil and gas development when those nations' success was often founded on the very same development. According to the AFDB 2022 Climate Change and Just Energy resilience report, "At 46% in 2020, the share of fossil-based energy sources in Africa's energy mix is relatively modest compared with the share in other global regions. The continent has also increased its renewable energy technologies, which along with natural gas – which could serve as the transition fuel in countries that have access to it – will allow them to gradually reduce coal in their energy mix."

Lastly, Africa has an abundance of mineral resources, such as copper, lithium, cobalt and graphite – all of which are new market opportunities for the green energy transition. These untapped opportunities could help the continent build a climate-resilient and integrated sustainable energy sector. However, much is still required to enable greater investment through market reform, strong regulatory frameworks and incentive mechanisms. Don't forget to mark your calendars for next year's AOW 9-13 October in Cape Town.

Executives speak

Rashid Ali Abdallah, executive director of the African Energy Commission, African Union, said, "If you look at Africa today, we have 600 mn people without access to electricity, 900 mn without access to clean cooking facilities and almost 50% of the energy balance dominated by biofuel, mainly charcoal and firewood. How do we meet the demand of these people, not only today, but for years to come?

"Africa has the most younger and dynamic population which will increase from 1.4 mn today to 2.5 mn by 2050. So, the African Union is pushing to establish the domestic African oil and gas market that facilitate refined African crude oil in Africa, and trading between African countries to add value to production.

"We need really to look out for our local market; we have a huge suppressed demand that we need to meet. We need to build our own refinery. We need to build our own cross-border trading between our members. We need to move the regulations that control this regional market to make it attractive and competitive. And I think if we do that we can really achieve some result."

Obo Idornigie, VP Africa Research, Welligence, said, "Obviously, sustainability is a big concern for the industry now. It is all about reducing the emission profile of assets. And it's not just a concern for big operators like Shell or bp, but also the small operators who are pushing forward brownfield projects and picking up mature assets.

"Another big topic has been the transition towards gas. Access to energy is still a big concern in Africa. Africa is flooded with gas, and is scoped to repurpose flared gas. So there have been interesting conversations with the likes of Halliburton, Baker Hughes and Aggreko, talking about how they can support operators in reducing emissions from their projects and also delivering gas to the communities in Africa.

"Independent/small companies have a big role to play in the long term. Focus has always been on the big players with capital projects like deepwater and LNG. But the smaller players, who are acquiring mature assets, are the ones that we believe would be more active on the gas-to-power front – Perenco and BW Energy, for example. Fossil fuels will still be important in Africa, but it is how you deliver low carbon barrels in a short time frame – that is going to be of importance to the industry.

"New projects that companies had pushed for are delivering attractive returns. The breakevens are in the region of less than US$50 per barrel, NPV 10. Previously, breakevens were a lot higher. Companies have worked hard to reduce the breakeven, so it is very important for them to push these projects forward, as they think about their portfolios in a low carbon future.

"Although the breakevens are looking interesting, cost is a big concern. Since the supply chain is getting tight, their ability to deliver these projects in the next five years or so will be critical. We are watching the cost space closely – what suppliers, especially in shipyards and drilling, are doing. How would the cost profile evolve? This will play a critical role in operators being able to deliver these low cost projects in the next decade or so.

"Human capacity from a local content standpoint in Africa is key to pushing projects forward. But governments need to be pragmatic, especially thinking about local content from a supply chains perspective. That is always a bottleneck, resulting in delays in projects. The ability to be pragmatic and get the balance right between having local content and the infrastructure to deliver new developments on time is especially important in a low carbon future."

Akash Latchman, senior vice president for gas sourcing and operations, Sasol, said, "From a central perspective, Sasol wants to be well advanced in GHG emission reduction activities by 2030, which underpins our 2050 net zero ambition. We are pursuing energy efficiency levers, such as energy integration to produce more steam and the implementation of renewables at scale. We will also transform our operations by shifting our feedstock away from coal towards gas as a transitionary feedstock and green hydrogen and sustainable carbon over the longer term). Our future strategy is to look at the green hydrogen economy, which we think would be a game changer for businesses.

"What may be very relevant in the Africa Oil Week is fostering partnerships with governments as well as the private sector to make sure that we have the window of opportunity to monetise resources within Africa, especially in southern Africa, and particularly, gas in Mozambique. We are currently on a programme to extend and explore in Mozambique for more gas at a reasonable price that downstream customers can afford.

"In terms of flexibility, discussion is on to bring in LNG at both Richards Bay and Matola. However, the Ukraine-Russia war has caused quite a stir in the market in terms of supply-demand balance, and therefore LNG prices have gone up quite considerably. We are looking for a long-term view on LNG but also some level of flexibility, and that is extremely challenging. 'Africa's resources for Africa' is critical for us, and we see a reasonable way forward with both governments monetising gas molecules for the southern African region.

> **"Transition towards gas has been another big topic"**

"Recently we've had a financial close on a billion dollar project in Mozambique. We've drilled gas molecules from a near-field exploration, which is affordable to the customer base downstream. The naval power supply to Mozambicans – roughly 450 MW – will be at the cheapest of cost. Gas is a viable solution for communities, and it makes an economic case to get those gas molecules so that business wins as well.

"To elaborate my views on the African story, I think we're pretty well-endowed with fossil fuels, and Africa can really monetise that to grow the economy. On the same token, they are very well endowed with wind, solar and hydro facilities. I think those projects are critical in serving the African nation in terms of momentum, and the African communities can actually benefit from it. But over and above, we also have the ability to export renewable energy either in the form of hydrogen, or green products like ammonia. So the opportunities on the African continent are quite significant. However, it takes a huge amount of effort, not only by the private sector, but also by government. Typically, investors look for stability.

"We believe that Sassol's new technology gives us a competitive advantage. The sustainable carbon source in the future would be an ideal combination to use that technology for the production of chemicals as well as fuels. We are exploring how to deploy that technology not only locally, but also to sell and license it to entities in Europe, northern America and like, where they could monetise low carbon sources with green hydrogen, and then produce the fuels that are required to serve the markets.

PLUGGING THE GAP FOR SKILLED PERSONNEL

Matching the right people to the right job, that's the role of manpower and outsourcing specialists serving Africa's dynamic oil and gas industry, says Martin Clark.

THE DEMAND FOR good, skilled personnel to work in Africa's oil and gas industry is immense. It has spawned a small industry in firms specialising in the supply of additional manpower to operators, contractors and services companies working in the field.

They include the likes of Lagos-based Brade Africa, which works across sectors from O&G through to chemicals and manufacturing, now with operations in both eastern and western Africa. It has enjoyed great success in supporting aspiring Nigerian independents in its home market, such as Seplat Energy and Belema Oil Producing Limited.

With Seplat, it has provided various packages of support through the years with technical manpower and skilled expertise for drilling and workover rig management, among other services. Seplat produced almost 50,000 BOE during the first six months of 2022, with an exemplary safety record extending to 28.4 mn man hours with no lost time incidents on its operated assets. This kind of expert consultancy and outsourcing has helped to plug a gap for skilled personnel in key areas such as well engineering in the growth of small indigenous independents, providing a platform for further growth.

As well as underpinning the development of Nigeria's own indigenous oil industry, companies like Brade Africa are also tracking opportunities in new and emerging territories such as Uganda, where development work is now underway on the Tilenga project. Another fast-emerging energy economy is Mozambique, where global logistics experts, Bollore, is providing freight forwarding, logistics and warehousing services to O&G projects. It turned to Altea Energy to provide specialised personnel for an onshore drilling campaign in Temane, Inhambane province.

> **"Companies are tracking opportunities in new and emerging territories, where development works on oil and gas projects are underway."**

Image Credit: Adobe Stock

Demand for workers in Africa's O&G sector has spawned a small industry in firms specialising in the supply of manpower.

Altea – which describes itself as a 'technical assistance company' – is helping other firms right across the continent, and even has a live jobs feed for matching people to projects. That includes a crop of current opportunities for drilling expertise, as well as data engineers and project managers, across North Africa.

Altea also operates in the renewables and nuclear industries. This is becoming an important trend: according to the Global Energy Talent Index, the energy sector is now an industry undergoing 'unprecedented upheaval', where cross-sector convergence around green energy has created a transient workforce with transferrable skills. Whatever the future brings in terms of the energy transition, for the Africa region to make the most of its potential, sourcing the required workforce and skills is essential.

The advantages of outsourcing the provision of personnel means energy companies can largely be free of negotiations with recruitment consultants, as well as the employment process and any related paperwork, freeing up time for other essential work. These benefits will continue to appeal to operators, whether Africa drills for more oil and gas or rolls out more solar farms across its vast landscape.

DRILLERS SHARPEN UP FOR 2023

There is plenty of work to be found across Africa, though drilling teams must now contend with additional challenges, from the rise of data and digitalisation, to mounting environmental concerns, writes Martin Clark.

THE OUTLOOK FOR drilling services companies in Africa looks promising for the year ahead, with plenty of ongoing upstream activity right across the continent.

The latest to spin the drill bit is Eco (Atlantic) Oil & Gas, which has kicked off a well on Block 2B offshore South Africa, using Island Drilling's Island Innovator semi-submersible rig. The Gazania-1 exploration well is being drilled to a depth of approximately 2,800 m through a multi-zone pay section, targeting a reserve pool of more than 300 mn barrels of light oil. The area sits up dip of the AJ-1 discovery on the block, which proved approximately 50 mn barrels of contingent resources.

Pending discovery in the vertical section of Gazania-1, there is an option to directionally drill a second sidetrack well from the main well bore. Both the vertical well and the sidetrack option will be logged and then plugged back to surface; the well will be sealed, plugged and the casing cut off below surface with no equipment to remain on the sea floor – a measure of the current environmental priorities for all drillers.

> **"South Africa looks set to be one of the continent's newest and most exciting exploration hotspots. Uganda could be another."**

Africa is witnessing plenty of ongoing upstream activity.

Image Credit: Adobe Stock

Heading into 2023, South Africa looks set to be one of the continent's newest and most exciting exploration hotspots. Uganda could be another. Here, drilling services giant Schlumberger is about to commence work on the long-awaited onshore Tilenga development. It was awarded an extensive contract for drilling, completions and production services by TotalEnergies for the work back in March, with drilling activities starting in Q4 2022. The work includes the provision of directional drilling services, upper completions, lower completions, artificial lift solutions, and wellheads.

The Tilenga development comprises six fields with up to 426 wells, which will be developed across 31 wellpads. It's a high profile assignment and one with strategic significance for landlocked Uganda, where oil companies have battled for years to commence development work following a succession of discoveries a decade earlier.

Schlumberger has committed to a comprehensive national content development plan, supporting TotalEnergies with environmental, social, and governance (ESG) initiatives and in-country value creation, reflecting current industry trends. It says this will be achieved through local capacity building, localisation of supply chain, education development, HSE stewardship and digital enablement. But there is much work going on elsewhere too, including in some of Africa's more traditional oil-producing territories.

In Nigeria, another well-known multinational, Baker Hughes, is working on behalf of Sirius Petroleum on the development of OML 65, a large onshore block in the western Niger Delta. Baker Hughes is currently undertaking Phase 1 of the block's approved work programme, providing a range of drilling and integrated well services.

Phase 1 focuses initially on the redevelopment of the Abura field, involving the drilling and completion of up to nine development wells, intended to produce the remaining 2P reserves of 16.2 MMbbl.

Baker Hughes' integrated well services solutions harness new digitalisation capabilities that will help deliver cost effective and efficient operations for the development of the asset. Most recently, the industry services giant announced that it had secured a role on Mozambique's mighty Coral Sul FLNG project — the first deep-water floating liquefied natural gas (LNG) facility — for maintenance and monitoring of turbomachinery equipment operations. It's another highly sophisticated role, with Baker Hughes providing remote monitoring and diagnostics, as well as a suite of other digital services, which include health and maintenance monitoring, data services and cyber-asset management.

‘MAXIMUM ENERGY, MINIMUM EMISSIONS’
THE MANTRA AT ADIPEC 2022

ADIPEC 2022, the leading global energy conference and exhibition, witnessed record attendance of 160,549 energy professionals from more than 160 countries who gathered in Abu Dhabi to participate in one of the most important events in the energy calendar.

TAKING PLACE FROM 31 October-3 November, the week before COP27, ADIPEC’s strategic conference sessions helped shape climate discussions, as the leading voices from the energy industry tackled issues at the heart of the sector, with a strong focus on the energy trilemma of sustainability, affordability, and security of supply.

In his opening keynote address, UAE Minister of Industry and Advanced Technology, managing director and Group CEO of ADNOC, Sultan Al Jaber, set the theme for the following four days of the conference and exhibition, stating, “the world needs maximum energy, minimum emissions.”

How the sector could achieve this was discussed across a range of high-level ministerial panels attended by the UAE’s Minister of Energy and Infrastructure, His Excellency Suhail Mohammed Al Mazrouei, Saudi Arabia’s Minister of Energy, Prince Abdulaziz bin Salman al-Saud, US senior advisor for Energy Security, Amos Hochstein, Egyptian Energy Minister, Tarek El Molla, and India’s Minister of Petroleum and Natural Gas, Hardeep Singh Puri.

ADIPEC 2022 featured over 28 country pavilions, facilitating international cooperation, including the signature of an historic new deal between the UAE and the USA. UAE Minister of Industry and Advanced Technology and Special Envoy for Climate Change, Sultan Al Jaber, and US Special Presidential Coordinator, Amos Hochstein, signed the Partnership for Accelerating Clean Energy (PACE), which will catalyse US$100bn of investment in renewable energies and clean technologies in the US, UAE, and emerging economies around the world by 2035.

Image Credit: dmg events

ADIPEC 2022 witnessed record attendance this year.

> **“It is important to acknowledge that the energy transition looks different in different markets.”**

Tayba Al Hashemi, chair of ADIPEC 2022 and CEO of ADNOC Sour Gas, said, “The best minds from across the energy sector convened in Abu Dhabi this week to focus their efforts on developing a new, bold, realistic, and pragmatic energy transition pathway that benefits humanity, the climate, and the economy. With the COP27 meeting in Sharm El-Sheikh next week, and as the UAE prepares to host COP28 next year, the ideas we have discussed, the solutions we have explored, and the commitments we have made at ADIPEC 2022 will help advance an energy future that is secure, affordable and sustainable.”

The technology and challenges around decarbonisation were at the heart of ADIPEC 2022. The new Decarbonisation Zone enabled energy leaders to explore the latest low-carbon technologies and to showcase the work that the industry is doing to accelerate the transition to low-carbon emissions.

Christopher Hudson, president of dmg events, organisers of ADIPEC 2022, said, “ADIPEC 2022 has shown the world that it is so much more than a hydrocarbon show. It is the leading strategic platform for energy and technology that provides the industry with a platform to demonstrate the fundamental role that it will play in the transition to Net Zero.

“It is important to acknowledge that the energy transition looks different in different markets. A successful energy transition cannot happen without key industry players from these markets having the opportunity to come together and agree a path forward that ensures populations across the world have access to safe, reliable, and sustainable sources of energy. ADIPEC is proud to enable this.

“At a time when energy is at the top of the global agenda, ADIPEC has laid the groundwork for the discussions that will be had, decisions that will be taken and partnerships that will be formed, and not just at COP27 next week, but for the next year of industry discussions.”

PGS unveils new Nigeria 3D reprocessing products

PGS HAS REVITALISED its Nigeria MultiClient data library with the addition of its first Nigeria MegaSurveyPlus.

The survey, which provides 11,230 sq km of three-dimensional data, offers an expanded and consistent regional geological perspective, encompassing a wide breadth of the nation's data.

Operators can utilise the survey's angle stacks for AVO analysis, offering greater insight into distribution of play fairways and migration pathways through the products' full-stack perspectives.

The survey is fuelled by modern techniques, including optimised denoising algorithms and full deghosting sequences, which laid the foundations for improved data bandwitch and signal-to-noise ratios.

MegaSurveyPlus was also subject to a multiple attenuation process, enhancing imaging integrity through the elimination of complex multiples.

The improved scale of the MegaSurveyPlus 3D project was surveyed to offer a more expanded and consistent regional geological perspective. The resulting full-stake PTSM data can be utilised for regional interpretation, guaranteeing a greater understanding of plays and migration pathways across open acreage.

Pre-stack PSTM products enable thorough AVO analyses.

The surface area of around 11,230 sq km covers two main structural provinces, both of which are directly linked to the gravity-driven motion of the Akata Shale Formation. The dataset's eastern section is in the transitional detachment fold zone, containing subtle faulting and low wavelength folding of Eocene to Quaternary stratigraphy. The survey's west sector, positioned in the outer fold and thrust belt, is largely dominated by closely spaced thrust faults.

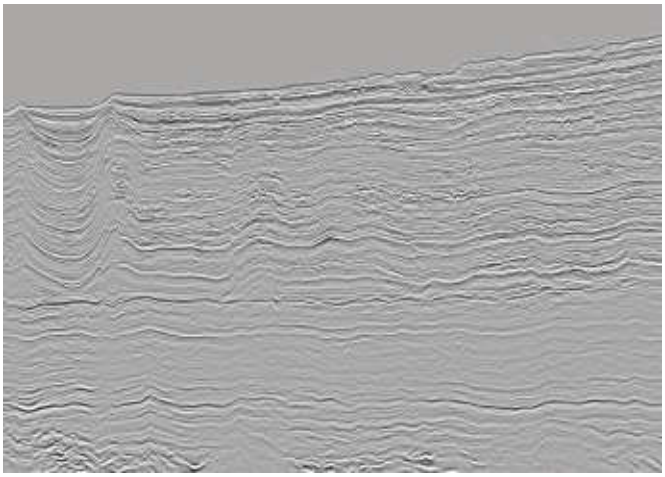

Image Credit: PGS

The schematic cross-section of the Niger Delta (pictured) demonstrates typical structural styles in the MegaSurveyPlus area.

"Reprocessing has enhanced imaging of targets with improved illumination of complex structures associated with the diapiric movement of the Akata Shale Formation," said Avril Burrell, principal geoscientist at PGS.

FEBUS Optics and LYTT partner for powerful well monitoring solution

FRENCH DEVELOPER OF distributing fiber optic sensing devices FEBUS Optics and LYTT, the UK-based sensor fusion analytics platform provider, have signed a collaboration agreement to offer a powerful well monitoring solution.

The distributed fiber optic sensing market is a rapidly growing one, expected to continue expansion over the coming years. FEBUS Optics' collaboration with LYTT aims to provide continuous and distributed asset monitoring that is more straightforward to implement than current methods, less expensive than traditional techniques, and encompassing acoustic, temperature, and strain information via one platform.

Etienne Almoric, FEBUS Optics CEO, elaborated, "With this agreement, we deliver to our customer a fully integrated solution for well monitoring by combining the best of FEBUS and LYTT. The objective is to make the life of our customers easier while extracting data that help to enhance the performance and the efficiency of well management."

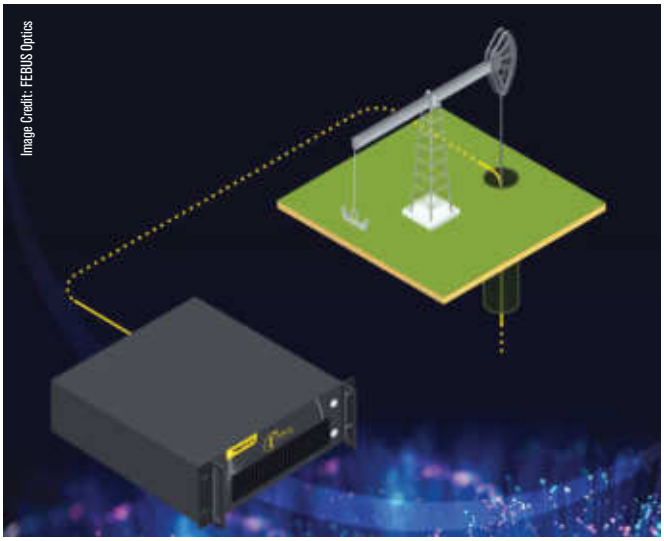

Image Credit: FEBUS Optics

The solution will utilise FEBUS hardware and LYTT software.

Set to be developed with FEBUS hardware operated through a LYTT software platform, the expected collaboration will see the two operators combine their expertise and offer a solution that visualises real-time insights. This will enable operators to make quick and informed decisions on-site and remotely.

Tim Morrish, sales director at LYTT, added "Energy companies are increasingly turning to innovative DFOS technologies that deliver well monitoring solutions addressing their unique operational needs. Our partnership with FEBUS Optics enables further flexibility in monitoring design architecture for the O&G market."

Intelligent Wellhead systems receives award

INTELLIGENT WELLHEAD SYSTEMS Inc. (IWS), a leading supplier of digital technologies that improve oil and gas well completion operations, announced that its inVision Digital Valve Control technology received a Special Meritorious Award for Engineering Innovation (MEA) in the Digitalisation category from Hart Energy, making them one of only 22 selected this year by Hart Energy for its special significance to the future of the upstream petroleum industry.

"I find it very inspiring that our inVision technology has been honoured as one of the industry's game-changing innovations of 2022," said William Standifird, CEO of IWS.

"From the beginning, the IWS team set its sights on optimising completions performance and wellsite safety by developing technologies that help to achieve these goals. To have our efforts recognised by Hart Energy is certainly a fitting way to demonstrate our commitment to improving HSE performance at the frac site, as well as enhancing efficiencies," he added.

According to Hart Energy, the technology helps mitigate the risk and improve the efficiency of hydraulic fracturing, wireline and pressure control operations. It integrates a wide variety of sensors, engineered safety controls and best practices to remotely operate accumulator valves using digitally enhanced standard operating procedures.

The latest innovation to the platform was introduced in February 2022.

Additive manufacturing service to transform flow control MRO market

THE USE OF additive manufacturing has the potential to streamline in-field control valve maintenance, which cut millions of euros a year in maintenance, repair, and operation (MRO) costs for process and industrial plants.

The impact of high-velocity media within a valve trim is one of the leading causes of cavitation, erosion, and vibration; all of which can combine to cause poor process control, premature failure, and unplanned downtime for critical flow control applications.

Retrofit3D, pioneered by IMI Critical Engineering, focuses on the engineering of bespoke drop-in replacement internal components. These include disk stacks and valve trims (inclusive of seat and plugs), ensuring the body of the valve can remain in situ throughout the process.

Image Credit: Adobe Stock

Retrofit3D components integrate IMI Critical Engineering's DRAG technology.

Additive manufacturing technology represents a significant shift in valve replacement services, as it enables the design and production of parts which would not be possible using only traditional manufacturing processes. Each replacement part can be custom-made to the specific process conditions of the valve in question, in a fraction of the time, weight and cost.

Contrasting like-for-like legacy component replacements, Retrofit3D components integrate IMI Critical Engineering's DRAG technology, which divides the flow into a series of right-angled smaller passages.

N'GENIUS solution for oil and gas industry

THE N'GENIUS SERIES was developed to out-perform the majority of existing grades in the 300 Series, the corrosion resistant alloy (CRA) line pipe grades currently available for selection in the API Specification 5LC and the DNV-ST-F101 standard, plus the CRA Oil Country Tubular Goods (OCTG) in the API Specification 5CT for Casing and Tubing.

Dr C.V. Roscoe, CEO of N'GENIUS Materials Technology, explained, "The extensive range of alloy types, variants and grades in the N'GENIUS Series of High Strength Austenitic Stainless Steels have strength properties equivalent to duplex and super-duplex stainless steels, ductility and toughness levels normally associated with conventional austenitic stainless steels but with far superior corrosion resistance to suit all major oil and gas projects."

Image Credit: N'GENIUS

The N'GENIUS Series was developed to be the total system material solution.

In terms of oil and gas production system design, the N'GENIUS Series has been developed to be the total system material solution. A vast array of wrought and cast products and equipment can be manufactured and supplied in the N'GENIUS Series for onshore and offshore oil and gas production systems.

Subsea umbilicals, catenary risers and flowlines, manifolds, subsea bundles, well heads, fittings, flanges, compact flanges, hub connectors and engineered products such as pumps and valves are among these products.

‘ACQUIRING SEISMIC AND EM ALLOWS FOR A NEW EXPLORATION MODEL’

A marine EM company called EMGS is providing fieldwide insights on gas saturation levels. In this interview, they lay out their survey activities in West Africa, exclusive digital advances in imaging, sustainable approaches and more.

How does EMGS’ technology help companies in their search for offshore hydrocarbons?

Traditionally, electromagnetic (EM) has been used to de-risk specific prospects for drill or drop. However, with latest technology, we are now seeing a change in demand. Both seismic and oil companies are asking for 2D EM over 2D seismic to de-risk, and make 3D seismic campaigns more effective and, hence, attractive from a cost as well as prospectivity point of view.

On the other side of the exploration and production (E&P) workflow, a large part of our surveys in the previous years has been towards the appraisal of gas fields. There are, in general, two reasons – first being the technology’s capability of distinguishing low saturation gas from high saturation gas; the other being the ability to map the gas saturation level fieldwide and estimate net hydrocarbon map, thus identifying the sweet spots in a reservoir.

> “A large part of our surveys in the previous years has been towards the appraisal of gas fields.”

Image Credit: Adobe Stock

Companies are preferring 2D EM over 2D seismic to de-risk, and demanding more effective 3D seismic campaigns.

Tell us about EMGS’ presence in Africa.

EMGS has been working around Africa since the start of the company – a survey over Girassol in Angola in 2002 was our first pilot test of the method.

Currently we are working with several West African countries to re-process and understand the potential of legacy data, and with different IOC on potential surveys, both proprietary and multi-client over the next two years along the whole western African margin.

Does the company have any expansion plans for Africa? What potential does it see in the African market?

EMGS has not done much work in Africa in the last 10 years, but that looks to change now. We had two surveys in the pipeline in 2020 that was aborted due to the pandemic. But it looks like we will return with the vessel sometime next year, which allows for other interested parties to take advantage of reduced mobilisation costs.

Will the company be launching any new products? What exclusive features can customers expect from them?

Recently we just completed a pilot test in a research consortium named ATLAB. It was done with a new technology that we have developed over the years – a towed EM streamer for shallow surface imaging .

Furthermore, our EM vessel was used in the survey as a platform for a multi-physical acquisition. Working alongwith

PGS and Inapril, we acquired seismic and EM in the same survey, both towed seismic and nodal seismic.

In addition, together with Norce, we added various sensors to our EM source, collecting data from close to the seabed for environmental purposes and a multi-beam for seabed mapping. This technology provides for cost-effective acquisition of data for the marine minerals industry, and we foresee similar benefits for the offshore wind geo-technical services.

Furthermore, in oil and gas the ability to acquire seismic and EM allows for a new exploration model, enabling seismic and EM at the same time. And lastly, oil companies are interested in our newfound ability to deploy by drop nodes, both seismic and EM nodes, with potential cost-savings to velocity surveys and the benefit of adding EM into the velocity building process.

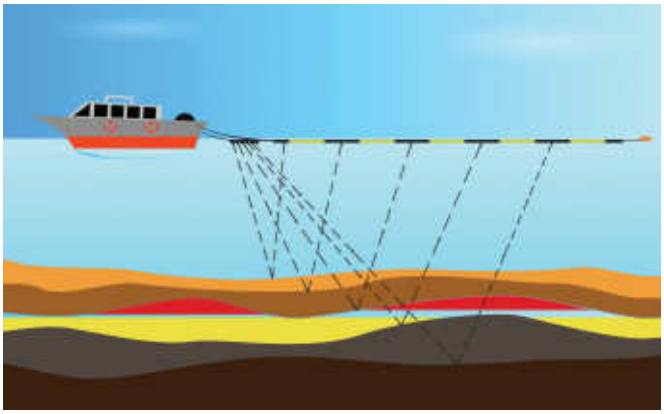

Image Credit: Adobe Stock

New markets are opening up for the exploration of marine minerals.

Does the company face any market challenges because of the current worldwide decarbonisation drive?

We faced serious challenges during the pandemic due to logistical issues related to acquiring surveys. The investment environment at US$20 oil was very low from the oil & gas companies. However, we got through and now that the market seems to have improved, we are doing reasonably well on the economic side.

We would rather have a positive look on the de-carbonisation end as EM allows for a much more cost effective approach and also low carbon intensity exploration through drilling fewer but better exploration wells.

On top of that, we are seeing new markets open for us in exploration of marine minerals and for site surveys for offshore wind. We have a role to play in the monitoring of CO-injected reservoirs, but that is currently a little longer into the future.

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SHOWCASING THE BEST IN WELL INTERVENTION

Celebrations rang through the night as the third annual OWI Awards 2022 brought industry giants together to highlight the very best in well intervention, reports Leah Kelly.

Image Credit: : Offshore Network

The ceremony highlighted the innovative technology and developments which have been brought into the industry.

THIS YEAR THE ceremony was hosted in Aberdeen on 25 November 2022, and showcased a host of innovative technologies and solutions over the span of eight categories. The judging panel consisted of top operators, including Mustafa Adel Amer from BAPETCO, Wisdom Patrick Enang from ExxonMobil, and Benjamin Ajaraogu from Shell, ready to find the best of the best in the industry.

Marine robotics company, Vaarst, kicked off the night by taking home the Digital Transformation Leader trophy for their excellent work on the trailblazing digital solution, SubSLAM X2. Energy services provider, Expro, were the big winners of the night, claiming victory in two award categories – Champion Integrated Well Service Company and Most Innovative Solution. The company's integrated subsea intervention package and Octopoda system were recognised by the judging panel for their ingenuity and impact on the outer industry.

The award for the Best Example of Collaboration went to AKOFS Offshore in this hotly contested category, for their exemplary work with Equinor, offering the AKOFS Seafarer for integrated services utilising the company's OneTeam model.

Tendeka took to the top spot for the Best Project Outcome award, shining a light on the company's remedial solution, Filtrex Conformable Sand Screen, which showed huge success restoring sand-free production across a three-well campaign in Indonesia.

As sustainability is an incredibly hot topic within the industry at the minute, the award for Environmental Sustainability Innovation presented a very strong roster, but ultimately well management specialist, Exceed, pipped everyone else to the post. The company is on a mission to be the global leader of intergraded well management for energy transition, and were subsequently rewarded for their work on carbon neutral well operation.

> **"The award for Environmental Sustainability Innovation presented a very strong roster."**

SLB were awarded for their Plug and Abandonment Excellence thanks to its industry-first wireline service, Epilogue Isolation, wherein operators are no longer required to remove the inner pipe to evaluate well integrity, revolutionising conventional operations.

To end the ceremony, the final award was that of Significant Contribution to the Industry; an award which showcases the impressive portfolios accumulated by the finalists over the span of their respective company life cycles. The winner of the prestigious award was Weatherford for their rig-less framework approach to decommissioning pre-abandoned phase 3 wells.

Overall, the ceremony was a cause for celebration for not only the winners, but for all the finalists; the hard work and dedication each operator has put into making the well intervention industry be the best it can be.

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