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Oil Review

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UGANDA'S AMBITIOUS oil export plans



The role of Egypt's gas in the energy transition

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Safety clothing, project management prospects, women in energy, pumps



Unlocking sustainability benefits with advanced technology (p28)

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Uganda has big plans for its fledgling oil industry. (Image credit: Adobe Stock)

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EDITOR'S NOTE

IN THIS ISSUE we take a look at Uganda, which has ambitious plans for its fledgling oil industry. The US\$10bn Lake Albert project aims to exploit Uganda's oil reserves, of which 1.4bn bbl are deemed economically recoverable, and the EACOP pipeline, which will transport Uganda's oil to the port of Tanga in Tanzania for export, will be the world's longest heated oil pipeline. See our feature on p10.

Egypt and the eastern Mediterranean is another area to watch. Ahead of COP27, which takes place in Egypt in November, this region highlights the vital role gas can play in the energy transition (p12).

Elsewhere in this issue, our technology and operations section covers a wide range of subjects, from project finance prospects to safety clothing, equipment rental, data management and continuous pump monitoring.

Louise Waters

Acting Editor, Oil Review Africa

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Executives Calendar 2022

SEPTEMBER

- 1-2 MSGBC Oil, Gas & Power**
Dakar, Senegal
<https://energycapitalpower.com/event/msgbc-oil-gas-power-2022/>
- 13-14 South Sudan Oil & Power**
Juba, South Sudan
<https://energycapitalpower.com/event/ssop-2022/>
- 27-28 UIOGS**
Kampala, Uganda
<https://uiogs.com/en>

OCTOBER

- 3-7 Africa Oil Week**
Cape Town, South Africa
<https://africa-oilweek.com/Home>

- 4-5 Green Energy Africa Summit**
Cape Town, South Africa
<https://www.greenenergyafricasummit.com>

- 4-6 Energy Intelligence Forum**
London, UK
<https://www.energyintelligenceforum.com>

- 26-27 ReEnergy Africa Summit 2022**
Kigali, Rwanda
<https://www.reenergyafrica.com/>

- 31 Oct-3 Nov ADIPEC**
Abu Dhabi, the UAE
<https://www.adipec.com/>

NOVEMBER

- 15-17 EAOGS**
Nairobi, Kenya
<http://eaogs.com/en>

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

MSGBC Oil, Gas & Power to focus on the future of natural gas

THE MSGBC OIL, Gas & Power conference and exhibition, taking place under the theme 'The Future of Natural Gas: Growth using strategic investment and policy making', will be held from 1-2 September in Dakar, Senegal. It will gather leading experts, policymakers, engineers and industry leaders to discuss the unique role of gas in the energy transition and to offer critical solutions and strategies to fast-track gas development projects and secure gas monetisation.

This year's conference serves as the only event dedicated to energy development in Mauritania, Senegal, The Gambia, Guinea-Bissau, and Guinea-Conakry, demonstrating ECP's long-standing commitment towards attracting investment in one of Africa's most exciting regions. Built against a backdrop of sizeable oil and gas discoveries and associated large-scale multi-sector project developments, MSGBC Oil, Gas & Power 2022 will enhance investment in the basin while emphasising the region's success regarding cross-border cooperation and integration. During the 2022 edition, speakers and delegates will connect with

partners, gain knowledge, exchange ideas, develop strategies, and benefit from critical insight offered by industry peers on topical issues surrounding the energy sector. MSGBC Oil, Gas & Power 2022 appeals to a diverse audience and will be instrumental in the region's energy and economic future.

Delegates can expect a range of technical and strategic sessions, networking sessions, investor matchmaking functions, as well as live on stage interviews with energy professionals. Touching on topics ranging from financing in the energy world; regional cooperation in energy development and promoting cross-border synergies; young MSGBC; women in energy; and the latest developments in exploration and new licensing round opportunities, to name a few, the conference will focus on ensuring that natural resource development continues to translate into long-term economic and sustainable regional growth.

Rita Madeira, Africa program officer at the IEA, will address high-level delegates in a keynote sharing the Africa Energy Outlook report at the event. The report sets out a Sustainable Africa Scenario and explores

pathways for Africa's energy system to evolve towards achieving all African development goals, including universal access to modern and affordable energy services by 2030 and nationally determined contributions.

ECP's international conference director, Sandra Jeque, noted, "The 2022 Africa Energy Outlook and its Sustainable Africa Scenario in conjunction with the IEA's gas update will serve as invaluable guides and science-backed policymaking tools for the corporate and government leaders assembled at this year's MSGBC conference, including the Senegalese President and African Union Chair, H.E. Macky Sall himself – an unerring advocate for energy-backed African development. MSGBC's social and economic futures rely on a robust, fiscally secure, diversified power mix accompanied by leading distribution grids, integrated value chains and regional cooperation. The IEA represented by Madeira hold the roadmap to make that happen."

For more information about MSGBC Oil, Gas & Power 2022, see: <https://msgbc-oilgasandpower.com/>.

Azule Energy, Angola's new largest independent oil and gas producer, begins operations

BP AND ENI have announced that Azule Energy, the new 50/50 independent joint venture combining the two companies' Angolan businesses, has been officially established.

Azule Energy is now Angola's largest independent equity producer of oil and gas, holding 2 billion barrels equivalent of net resources and growing to about 250,000 barrels equivalent a day (boe/d) of equity oil and gas production over the next five years. Azule Energy boasts a strong pipeline of new projects that are scheduled to come on stream over the next few years, growing organically from exploration discoveries. These include the Agogo Full Field and PAJ oil projects in Blocks 15/06 and 31 respectively, and the New Gas Consortium (NGC), the first non-associated gas project in the country, which will strengthen its role as a global LNG

exporter. The JV also holds significant exploration acreage in excess of 30,000 sq. km in Angola's most prolific basins, allowing it to leverage proximity with existing infrastructure.

Eni and bp share common goals for Azule Energy in achieving environmental and sustainability ambitions. They believe that combining their efforts will create more efficient operations and offer the potential for increased investment, job creation and growth in Angola. They anticipate Azule Energy's new independent, integrated operating model will unlock significant cost savings, mainly from operational synergies in logistics and technology.

Bernard Looney, bp's chief executive, said, "Combining our Angolan businesses and drawing on both bp's and Eni's expertise, it will continue to safely and efficiently develop

Azule Energy has a strong pipeline of new projects that are scheduled over the next few years.



Angola's resilient hydrocarbon resources and pursue new opportunities in oil and gas and other energies."

Claudio Descalzi, CEO of Eni, added, "A new, strong entity is born, which combines our experience, skills and technologies with those of our partner bp, putting them at the service of the development of Angolan energy resources, with a priority commitment to environmental protection and the growth of local economy."

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Invictus Energy awarded three carbon offset projects in Zimbabwe

INVICTUS ENERGY HAS been awarded three carbon offset projects in Zimbabwe.

The company has entered a 30-year contract with the Forestry Commission of Zimbabwe (FCZ) for the development of the Ngamo-Gwayi-Sikumi (NGS) REDD+ project, which is renewable for a further 30 years, as part of the company's sustainable plan to manage emissions. The NGS REDD+ project will enable the company to fully offset all Scope 1 & 2 emissions generated across the entire lifecycle of the Cabora Bassa Project.

Invictus and FCZ will develop the NGS REDD+ project to protect the indigenous forests by implementing programmes to mitigate deforestation activities. Managing director Scott Macmillan commented,



Areas making up the Ngamo-Gwaii-Sikumi REDD+ Project.

“The award of these carbon offset projects marks a significant milestone for Invictus and will make Cabora Bassa one of the first carbon neutral oil and gas projects from the exploration phase to decommissioning, if our upcoming drilling campaign is a success.

“This project will not only offset our emissions, but help ensure preservation of Zimbabwe's rich biodiversity, aiding both forestry and wildlife conservation efforts, while also creating jobs and sustainable incomes for the entire region.”

JIP to develop the next generation of MIC detection and monitoring technology

DNV HAS JOINED ExxonMobil Upstream Research Company and Microbial Insights, Inc in a Joint Industry Project (JIP) to develop the next generation of microbiologically-influenced corrosion (MIC) detection,

monitoring and mitigation technology.

With global costs of corrosion estimated at US\$2.5 trillion, the project aims to significantly enhance detection and monitoring methods of

microbiologically-influenced corrosion (MIC), which is difficult to detect and monitor and poses a significant problem in numerous industries.

Assembling MIC experts from across the industry, the project plans to create up to 1,200 datapoints of corrosion-to-biomarker correlations, generated on simulated pipelines with actual field waters and participant-selected service conditions. The team aims to develop methods, tools and workflows (“biomarker technology”) to improve reliable detection of MIC in oil field operations, heavily leveraging advanced laboratory (bio)reactors and molecular analytical platforms that have been specifically developed for MIC biomarker discovery and KPI development.



MIC can cause costly pipeline failures.

Image Credit: Adobe Stock

Promising prospects for Africa exploration

AFRICA WILL SEE a return to high impact exploration in 2022, with key wells planned in South Africa, Mozambique and Zimbabwe, following the successes in Namibia earlier in the year, according to the latest research from Westwood Energy.

The energy consultancy firm forecasts that global high impact drilling activity will pick up in the second half of the year, with between 80 and 90 high impact wells expected to have been drilled by the end of 2022. This is the highest number since 2019, when 98 high impact wells completed.

South America will continue to be an exploration hotspot with more wells planned for the Suriname-Guyana basin and offshore Brazil. While activity levels in Asia-Pacific and northwestern Europe are relatively stable, 2022 sees a return to high impact exploration in the deepwater of the Eastern Mediterranean after 2021, when no wells were drilled.

Westwood has highlighted 13 wells planned as ‘key wells to watch’. These include a number of frontier play tests, such as Raia, offshore Mozambique.

Thirty-eight high-impact exploration wells were drilled in the first half of 2022, resulting in 13 potentially commercial discoveries at a 34% commercial success rate, delivering around 6bn boe of discovered resource. There were significant discoveries at Venus and Graff in the Orange Basin offshore Namibia. Venus is the largest discovery in 2022 so far, with multi-billion boe potential.

Al Ghais becomes secretary general of OPEC

HIS EXCELLENCY HAITHAM Al Ghais of Kuwait recently took office as secretary general of the Organisation of the Petroleum Exporting Countries (OPEC) in Vienna, Austria.

Al Ghais was appointed in January for a three-year term. He succeeded the late secretary general of OPEC, HE Mohammad Sanusi Barkindo.

“It is a great honour for me to be at the helm of an organisation that has been instrumental in supporting a stable and sustainable supply of oil to the world for more than 61 years. I look forward to working with all our member countries and partners around the world to ensure a sustainable and inclusive energy future which leaves no one behind,” Al Ghais said.

A respected oil technocrat and OPEC figure, Al Ghais brings a great wealth of experience from both his diplomatic background and association with the energy and oil sectors in OPEC founder member Kuwait and internationally.

The secretary general's career in the global oil industry spans 30 years. He advised six Kuwaiti oil ministers and is a veteran of the Kuwait Petroleum Corporation (KPC). He served as Kuwait's Governor for OPEC from 2017 to 2021 and was the first chairman of the Declaration of Cooperation's (DoC) Joint Technical Committee (JTC), following the inception of the historic framework in December 2016. He also played a key role in drafting and developing the Charter of Cooperation (CoC).

Eni and SONATRACH discover oil and gas in Algeria for the third time

ENI AND SONATRACH announced a further discovery in Sif Fatima II concession, located in the Berkine North Basin in the Algerian desert.

The Rhourde Oulad Djemaa Ouest-1 (RODW-1) exploration well, in the Sif Fatima II research perimeter, is the third well in the exploration drilling campaign. It led to a discovery of oil and associated gas in the Triassic sandstones of the Tagi reservoir. During the production test, the well produced 1,300 bpd of oil and around two mmscfd of associated gas.

This comes after the significant discovery of HDLE-1 in Zemlet el Arbi, announced in March, and the successful appraisal well HDLS-1 in the adjacent Sif Fatima II.

The development of these



Image Credit: Adhbe Stock

The discovery is part of the exploration of five wells in the Berkine North Basin.

discoveries will be fast-tracked, thanks to their proximity to existing BRN/ROD facilities.

The Zemlet el Arbi and Sif Fatima II concessions are operated by a joint venture between Eni (49%), and SONATRACH (51%). The discovery is part of the new

exploration campaign which will include the drilling of five wells in the Berkine North Basin.

Eni has been present in Algeria since 1981. With an equity production of 100,000 barrels of oil equivalent per day, Eni is the main international company in the country.

TotalEnergies announces several multi-energy initiatives in Angola

AS PART OF the rollout of its multi-energy strategy in Angola, TotalEnergies announced the launch of the Begonia oil field, and Quiluma and Maboqueiro gas field developments, as well as its first photovoltaic project in the

country, with a capacity of 35 MWp and the possibility of adding 45 MWp in a second phase.

The final investment decision for Begonia, the first development of block 17/06, located 150 km off the Angolan

coast, was announced in agreement with concession holder Agência Nacional de Petróleo, Gás e Biocombustíveis (ANPG) and its partners on Block 17/06.

It consists of five wells tied back to the Pazflor FPSO (floating production, storage and offloading unit), already in operation on Block 17.

After CLOV Phase 3, Begonia is the second TotalEnergies-operated project in Angola to use a standardised subsea production system, saving up to 20% on costs and shortening lead times for equipment delivery.

The project represents an investment of US\$850mn and 1.3mn man-hours of work, 70% of which will be carried out in Angola.



Image Credit: Adhbe Stock

Projects include the Begonia oil field, Quiluma and Maboqueiro gas field development and a PV venture.

Petrofac consortium wins contract for the Tinrhert Project in Algeria

PETROFAC, LEADING A consortium with Genie Civil et Batiment (GCB), has received notification of a provisional award for an engineering, procurement and construction contract with Sonatrach for the Tinrhert EPC2 Development Project in Algeria. The contract is valued at approximately US\$300mn, with Petrofac's share around US\$200mn.

Located in Alrar, around 1,500 km southeast of Algiers, EPC2 will provide a new central processing facility (CPF) with inlet separation and decarbonisation units. The scope of work also includes tie ins to the existing Alrar Separation and Boosting Facilities, which Petrofac originally helped deliver in 2018.

When completed, the



The contract is valued at approximately US\$300mn.

development will boost natural gas production and remove CO₂ from the field's gas reserves, within specifications for the global market, enabling further economic growth in-country.

"The Petrofac and GCB consortium is testament to our focus on local delivery, through

investment in local supply chains and work forces," said Elie Lahoud, chief operating officer for Petrofac's engineering and construction division.

In July, the Tinrhert project enabled safe introduction of the first hydrocarbons for the start-up of production.

United to unearth oil and hydrocarbons from AJ-14 well

UNITED OIL & GAS announced an update on the drilling of the Al Jahraa-14 development well (AJ-14) in the Abu Sennan licence, onshore Egypt. It was primarily drilled to intersect the Abu Roash C (ARC) reservoir,

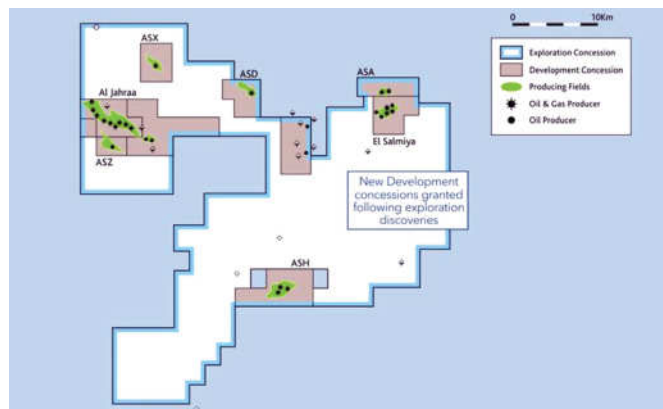
targeting reserves from an undrained area of the Al Jahraa Field. The well safely reached total depth of 3619 metres ahead of schedule and under budget.

A full logging suite was acquired through the ARC and

seven metres of good quality net oil pay has been interpreted in the reservoir, in line with the higher end of the pre-drill estimates.

Due to technical difficulties while running the logging tools, a full logging suite was not acquired over the Abu Roash G (ARG) interval in the AJ-14 well. There was, however, sufficient encouragement from the logging-while-drilling tools to indicate a potentially hydrocarbon-bearing reservoir, and to include the ARG in the testing programme.

Both the primary and secondary targets of the well will be tested and completed. If successful, it will be immediately brought onstream through the existing facilities, adding additional production and revenue for United.



AJ-14 was primarily drilled to intersect the ARC reservoir.

NNPC approves COPDC's OML 65 work

SIRIUS, AN AFRICAN-focused oil & gas production and development company, announced that its JV partner, COPDC, has received approvals from the Nigerian National Petroleum Corporation (NNPC) that enables the company to proceed with the drawdown of financing in order to commence Phase 1 of the approved work programme (AWP) in respect of OML 65 in Nigeria.

Phase 1 will focus initially on further development of the Abura field, involving the drilling and completion of nine development wells, intended to produce the remaining 2P reserves of 16.2 MMbbl1.

The Abura field is currently averaging production of circa 10,000 bopd and Phase 1 of the drilling programme is estimated to boost production by up to an additional 11,000 bopd.

Sirius has a master services agreement (MSA) in place with Baker Hughes relating to the development of OML 65, providing a comprehensive range of drilling and related integrated well services under a mutually agreed pricing structure.

Earlier this year, Sirius agreed a facility of up to US\$200m with Trafigura PTE Ltd, which will be deployed towards the execution of the AWP. The initial tranche of this facility will be combined with US\$15m of subordinated funding, which has been secured from a range of international institutions, including Odey Asset Management as a cornerstone investor.

Sirius is a 30% shareholder in the joint venture company, COPDC Petroleum Development Company Limited.



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UGANDA STEPS UP OIL EXPORT AMBITIONS

Landlocked Uganda has big plans for its fledgling oil industry. With support from international oil companies (IOCs), it is looking to become an exporter of crude oil and products via a record-breaking pipeline. Moin Siddiqi, economist, reports.

THE US\$10BN LAKE

Albert project (one of the largest in East Africa) situated at the 160-km natural border between Uganda and Congo (DRC) and led by French major TotalEnergies and China National Offshore Oil Corp (CNOOC), aims to exploit Uganda's probable 6.5bn barrels of 'oil-in-place', of which 1.4bn barrels are deemed economically recoverable. It entails both upstream development over a 25-30-year period and midstream investment (building a regional oil pipeline). Output is expected to commence in 2025, nearly 20 years after Tullow Oil Plc made the first commercial discovery near Lake Albert.

The East African Crude Oil Pipeline (EACOP) will be the world's longest [underground] heated oil pipeline at a length of 1,445 km, transporting highly viscous Ugandan oil from Hoima in western Uganda to the Indian Ocean seaport of Tanga in Tanzania. Oil will come from the Kingfisher and Tilenga oilfields (capable of producing 261,000 bpd) for export. Despite several hold ups, Uganda hopes the EACOP will be operational by 2025.

TotalEnergies owns a 62% stake in EACOP, while Uganda National Oil Co. (UNOC) and Tanzania Petroleum Development Corp (TPDC) each own 15% and CNOOC 8%. The



Image Credit: Adobe Stock

Uganda has big ambitions to become a major oil exporter.

pipeline is expected to cost US\$4.2bn, with 60% and 40%, respectively as debt and equity. Standard Bank (South Africa) and the Japanese Sumitomo Mitsui Banking Corp are financial advisers and lead debt arrangers.

“EACOP will be the world's longest heated oil pipeline at a length of 1,445 km.”

Environmental issues

Uganda's oil development was long hindered by environmental issues. Drilling is located in several natural reserves, one of which extends to Murchison Falls, Uganda's largest national park. The EACOP could produce as much as 34mn tons of CO₂/year, according to the Africa Institute for Energy Governance. Presently, Uganda's carbon emissions are negligible (0.01% of the global output). But this figure will increase as the petroleum industry develops. TotalEnergies, however, has pledged upstream projects

(Tilenga and Kingfisher) will have lower emissions per barrel produced (13kg/barrel) than the average of Total's global production portfolio (20kg/barrel).

The Ugandan Government has also reassured environmentalists of its commitment to pursuing carbon-cutting initiatives. For example, Uganda has pledged not to flare or burn natural gas during exploration stages, instead, using the gas for power generation or producing liquefied petroleum gas, as well as plans to use solar power in the oilfields. Uganda

and TotalEnergies have agreed on the development of 1 GW of renewable energy by 2030, according to Pauline Irene Batebe, the permanent secretary at the Energy Ministry.

Potential windfalls

A developed oil industry offers several benefits in terms of significant job creation; infrastructure development; and boosting government revenues. Oil exploration and production (E&P) could alleviate Uganda's energy supply deficiency (66% of the total population 43.73mn lacks electricity). Government and IOCs are committed to promoting national content development. Nearly one-third of the US\$15bn planned expenditure will be ring-fenced for Ugandan entities undertaking different works and services during the construction and development stages.

Around 14,000 people will be directly employed by oil companies, while some 45,000 people will be indirectly employed by the contractors. An additional 105,000 people will benefit from induced employment based on the utilisation of other services by the oil sector. These include transportation, security, hospitality, office supplies, land surveying, crane hire, locally available construction materials, civil works, environmental studies, information and communication technologies

“The energy sector could eventually attract US\$10-15bn into different hydrocarbons projects over the medium term.”



A fully operational refinery will boost domestic and regional refining capacity.

Image Credit: Adobe Stock

(ICT) and waste management.

The energy sector could eventually attract US\$10-15bn into different hydrocarbons projects over the medium-term. “This is huge investment for this country,” said Peter Muliisa, UNOC spokesman. The Tilenga and Kingfisher oilfields could yield up to US\$8bn in fiscal revenues (taxes and royalties) to the treasury over their life-span.

Mega-projects

TotalEnergies and partners' final investment decision (FID) last February has de-risked critical supportive projects, which will guarantee feedstock supply for a planned refinery (see below) and provide evacuation options for future oil/gas discoveries in the new exploration areas. The landmark investment unlocked into Uganda's economy includes the implementation of the Tilenga Project in Buliisa/Nwoya districts (approximately US\$4bn) and the Kingfisher Project in Hoima/Kikuube Districts (around US\$1.5bn). The Tilenga fields consist of more than 400 wells with an estimated production capacity of 190,000 bpd.

The Government is also investing in required support infrastructure, including Hoima International Airport (more than US\$500mn) and 700 km of oil transport roads (approx. US\$900mn). By the end of the construction phase, Uganda's economy will be significantly

boosted through sectoral linkages by a whopping US\$9bn – equivalent to one-fifth of its US\$41bn GDP.

Downstream investment

Uganda intends to export the bulk of oil to global markets and refine some at home by building a greenfield 60,000 bpd refinery in mid-west region Kabaale. The US\$4bn project – producing diesel, petrol, jet fuel, kerosene, liquefied petroleum gas (LPG) and heavy fuel oil (HFO) may come onstream late 2027, providing funding is agreed and technical studies are concluded, according to official sources.

An early FID for the refinery would attract new private investors. But “the problem is that the refinery doesn't have an engineering, procurement and construction (EPC) structure yet,” said Richard Byarugaba, managing director of the National Social Security Fund. Ugandan Government agencies are looking for around US\$500mn for a 40% national stake in refinery project.

The project is structured on a debt-to-equity ratio of around 70:30, with lead developer Albertine Graben Refinery Consortium (AGRC) responsible for raising the US\$2.8bn debt finance whilst contributing 60% of the US\$1.2bn in equity, according to Petroleum Authority of Uganda (PAU) – which is currently reviewing the refinery front-end

engineering design (FEED) before making its final comments.

A fully operational refinery will boost domestic and regional refining capacity – thereby ensuring the security of supply of petroleum products especially for landlocked Rwanda and Burundi. The Bureau of Statistics data indicated that Uganda's petroleum consumption is growing at 7%, with daily consumption of 37,000 barrels.

Current recoverable oil resources may last for 30 years, although the Albertine Graben area – some 23,000 sq km along Uganda's border with DR Congo – boasts potential for more discoveries.

Given that exploration has only covered a third of total area, geologists reckon Uganda's extractable deposits should exceed 2bn barrels. Giovanni Pedaci, general manager for Oil of DR Congo, estimates that DR Congo's side of Lake Albert could possess 2bn barrels. Presently, DR Congo produces around 25,000 bpd from a smaller number of onshore and offshore blocks along its Atlantic coast.

In sum, Uganda is finally taking steps to monetise its stranded oil assets. The country where oil seepages were first spotted over a century ago is slated to produce 230,000 bpd by 2025 – on par with sub-Saharan Africa's mid-tier producers: Gabon, Republic of Congo and Ghana. ♦

LOCAL ENERGY HEROES MAP

LANDSCAPE OF CHANGE

Ahead of COP27, Egypt and the eastern Mediterranean region highlight the vital role gas can play during the global energy transition, writes Ahmed Mousbah, vice president oilfield equipment, MENAT, with energy technology company Baker Hughes.



COP27 takes place at Sharm El-Sheikh, Egypt, in November 2022.

Image Credit: Adobe Stock

THE WORLD OF oil and gas has changed dramatically since last year's COP26 conference in Glasgow, reflecting the urgency of the climate crisis, the acceptance of the need for change, and the proactive role that industry can play in meeting the challenges ahead.

This new landscape will be further defined at COP27, which takes place in Egypt in November. The conference will give operators, suppliers and customers the opportunity to show how far they have come – by necessity – in a very short period of time.

The reality is that we have a generation-defining challenge, that oil and gas was too slow to buy into the narrative, but that everyone involved – mature markets, emerging sectors, new developments – are now pulling in the same direction.

That COP27 in Egypt is particularly fitting; the eastern Mediterranean is uniquely positioned to showcase a future in which oil and gas helps to drive the ongoing energy transition through a mix of new thinking, innovative solutions and unprecedented collaboration.

International energy technology company Baker Hughes is among those committed to

“ Everyone involved – mature markets, emerging sectors, new developments – are now pulling in the same direction.”

this new landscape, simultaneously meeting growing demand for energy, the critical requirement of security of supply, and our collective obligation to the world around us.

Enabling change

Gas is particularly important during the current phase of the energy transition. While the roll-out of renewables will continue to accelerate, there is nevertheless an urgent need to reduce emissions associated with the most carbon-intensive traditional sectors.

When gas replaces oil or diesel, the carbon saving is around 35-40%. When it replaces coal, the emissions footprint is cut in half.

Because demand continues to grow in areas previously reliant on high levels of imported energy, with development in regions such as the eastern Mediterranean ramping up

at an unprecedented pace – the total market is estimated to be in excess of 200Tcf of gas and associated condensates.

Investment in gas, which in Egypt alone will total more than US\$8bn, will make an immediate impact. It will also dovetail with development of the hydrogen economy, and combines well with carbon capture and storage initiatives. Research and development spending across the region already reflects that potential.

Gas, essentially, offers the ability to achieve change at pace; there is an increasing focus on speed of development – to create supply and address demands in the short term, to drive capex savings and to facilitate the agility that provides operators a platform for delivery in uncertain markets.

Working together

The eastern Mediterranean is, further, playing host to a collaborative spirit that promises to maximise production, reduce capital expenditure, increase efficiencies and lower carbon emissions.

Cooperation at scale is encouraging a holistic approach to development that combines the best of operators, products, suppliers and governments. Best practice is defined not by single projects or fields, but rather by working across multiple boundaries with common solutions.

This produces a focused team approach with a clear plan that delivers on identified goals, and builds on a range of regional initiatives across the environment, legislation and intra-state agreements.

The East Mediterranean Gas Forum is already an exemplar of what can be achieved, while the planned Mediterranean Hub – which Baker Hughes is proud to be leading – will serve as a focal point that leverages local industrial heritage, expertise and supply chains.

This will act as a catalyst for development, from concept through design, fabrication, construction, operation and decommissioning. It will facilitate the holistic, safe and system-wide approach required to meet regional demand at the lowest cost with the minimum carbon impacts.

Best practice

Change will, by necessity, often involve a new way of thinking. For example, the North East Amreya project for Abu Qir Petroleum faced a range of barriers to economic development.

Technical requirements included: minimal rig time and drilling cost; minimal opex and production deferment; simplified tieback and



Image Credit: Adobe Stock

“ There is a range of other innovations that will help to facilitate development while reducing carbon footprint.”

installation; and schedule optimisation.

Plans were based on four subsea trees, three production manifolds, an EHC umbilical, flexible flowlines and a control system, along with a topside modification on a nearby platform.

A FEED delivery team including Baker Hughes opted to move away from platform development in favour of subsea tieback. This resulted in a 37% cost saving on total project expenditure, as well as a six-month time saving.

The accelerated timeline was, of course, an end in itself, but less time on site further equals a less carbon-intensive development, while shifting from topside to subsea reduced lifecycle emissions across manufacturing, transport and installation.

Multiple choice

There is a range of other innovations that will also help to facilitate development at the pace required while reducing carbon footprint and maintaining a commitment to safety and economy.

Non-metals in pipelines, but also elsewhere, will not only cut the direct emissions related to fabrication but through the advent of mobile facilities will save across transport, with reduced weights leading to similar savings in installation.

Electrification is key. The shift away from hydraulic systems is making subsea components more efficient and less carbon-

intensive, while moving to electrics for compression and water treatment will allow for offshoring of traditionally onshore installations.

Collaboration will feed into all of the above. For the eastern Mediterranean, the whole can be much greater than the sum of its parts: early engagement on a regional level, standardisation across supply chains, holistic systems approach from development through decommissioning, partnerships and commercial solutions fuelled by fit-for-purpose technology.

Leading by example

The energy transition was never going to be binary; the journey from fossil fuels to net zero will be achieved in stages by delivering sustainability through a range of technologies while also meeting growing global demand and protecting security of supply.

Gas has a significant and ongoing role to play, and the eastern Mediterranean offers valuable lessons in technology, approach and localisation that can be applied to meet challenges in markets around the world.

The industry has come a long way since COP26 in Glasgow. The imperative to act has been embraced, the scale of the challenge acknowledged, and the actions to meet our obligations are taking shape at pace.

COP27 in Sharm El-Sheikh coincides with a commitment to delivery – with a laser focus on emission reductions, cost savings and maximum efficiencies. The achievements will be built on clarity of concept, the region's heritage of more than 50 years, innovations in hardware and electrification, and collaboration. Companies including Baker Hughes – committed to net-zero goals by 2050 – will drive forward this new way of working. ♦

PROJECT FINANCE PROSPECTS ON THE RISE

Prospects for attracting more financing to some of Africa's big oil and gas projects have increased in the wake of the war in Ukraine. Martin Clark reports.

The role of DFIs working alongside commercial lenders is critical for a large number of projects.

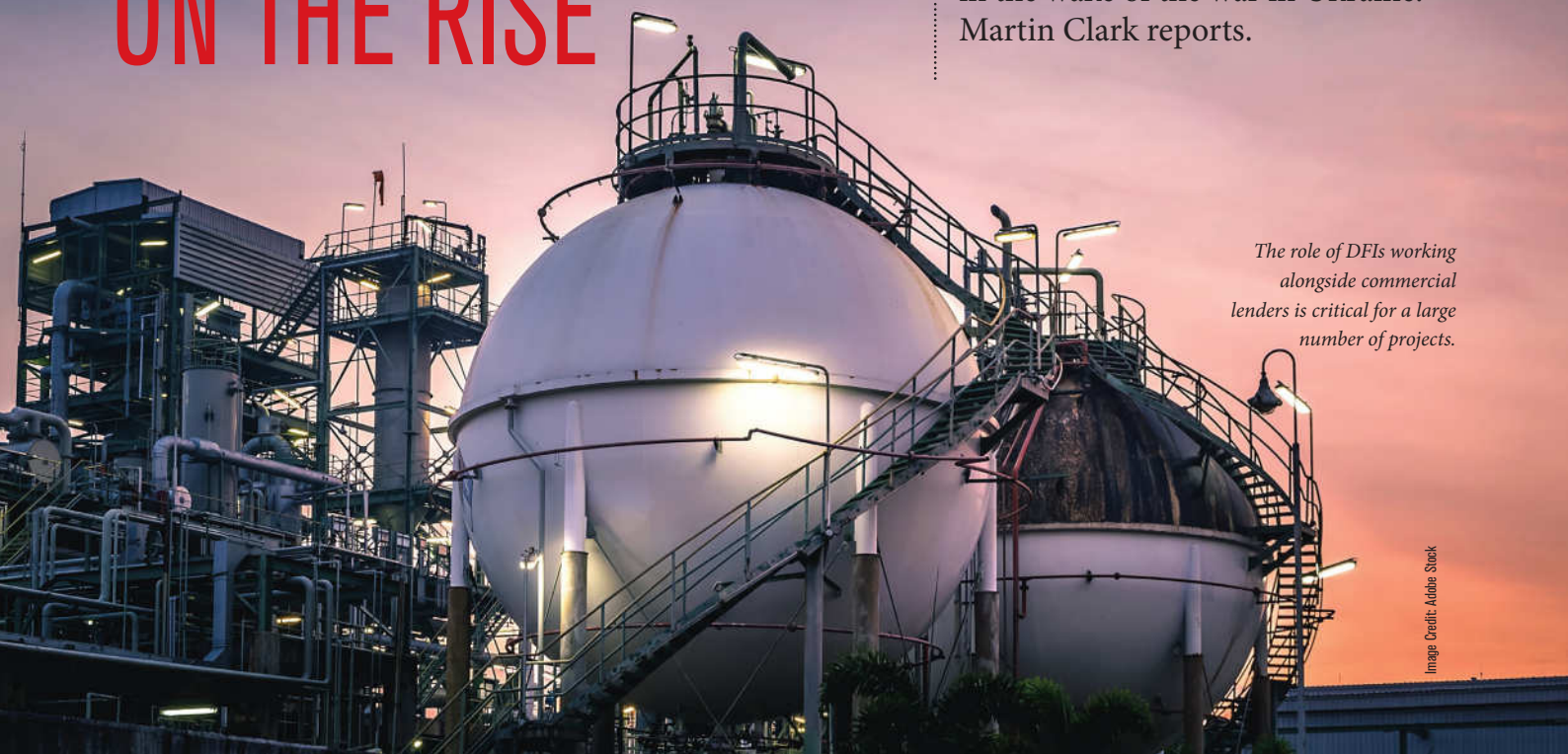


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THERE IS NOW huge interest in schemes that could eventually help to offset Russian supplies to Europe, despite previous concerns about supporting new hydrocarbon projects amid climate change fears.

Germany's chancellor, Olaf Scholz, on a visit to Senegal this year, was reported to have said that securing gas from the region was now worth pursuing "intensely" – his country is one of the most exposed to shortages from Russia.

Senegal's own Greater Tortue Ahmeyim (GTA) offshore LNG project, located on the border with Mauritania, is now nearing completion with work around 75% complete.

The BP-led scheme will initially produce 2.5mn tonnes per annum (mtpa) of LNG for export, commencing next year, rising to 10mtpa in later phases.

The country's flagship oil project, the 100,000 bpd

Sangomar field, is also on track for first oil by 2023.

Perhaps the most ambitious idea of all is Nigeria's 4,000 km gas pipeline to Europe. Despite being on the drawing board in various guises for decades, officials have confirmed that financing discussions are underway with partners.

In April, Worley was awarded a front-end engineering and design study for the proposed Nigeria-Morocco Gas Pipeline (NMGP) project – previous route options had typically traversed Algeria, although security risks there are now deemed too great.

The role of development finance institutions (DFIs) working alongside commercial lenders remains critical for a large number of projects, especially risky or higher-cost ventures.

Angola recently stepped up its involvement with the Africa Finance Corporation (AFC),

which has served as a catalyst for private sector-led infrastructure investment across the continent.

The West African state is seeking to add more value to its commodity exports, including hydrocarbons. Angola's Finance Minister Vera Daves said AFC membership can support its transition from a "state-led and oil-funded economic model to a private sector-led growth model."

AFC recently approved US\$100mn in financing for the construction of the Cabinda Refinery, a priority project to boost local value addition to oil exports and create thousands of jobs. The multilateral is also working with the Angolan Government on a pipeline of further potential projects totalling almost US\$1bn. In 2020, it also made a US\$45mn investment in Sonangol, the country's state-owned oil company, as part of a syndicate.

Drawing in commercial

investment is a perennial challenge for the DFIs and multilaterals, although the mitigation of risk can provide a great degree of comfort for other lenders on even the largest of schemes.

In 2020, Total signed a US\$14.9bn senior debt financing agreement for its Mozambique LNG project, which includes the development of the Golfinho and Atum gas fields and the construction of a 13mtpa two-train liquefaction plant.

The French company said the project financing marked the biggest ever in Africa, and includes direct and covered loans from eight export credit agencies (ECAs), 19 commercial bank facilities, plus a loan from the African Development Bank.

If the NMGP project can gain traction and attract the financing it needs – the project has been estimated to cost as much as US\$25bn – then anything is possible. ♦

LIQUID STORAGE LOGISTICS

The need for oil storage and distribution is now greater than ever with Africa's growing demand. Martin Clark reports.

OIL AND GAS storage is likely to take on greater significance in Africa as the continent's economy grows over the coming years.

McKinsey modelling estimates that African energy demand in 2040 could be around 30% higher than it is today as the continent's needs expand – compared with a 10% increase in global energy demand. This will require a significant rise in investment in a whole host of energy infrastructure facilities, including storage and distribution.

For refined petroleum products, McKinsey analysis suggests that African demand will grow from 4.1mn barrels per day (bpd) today to approximately 5.3mn bpd by 2040. Based on existing and planned refining capacity, nearly half of that will need to be imported – unless substantial new investment is pumped into upstream and downstream facilities.

This could even be tied into driving more climate-friendly policies, such as reducing demand for carbon-intensive cooking with firewood, charcoal, and kerosene – which together generate roughly 14% of Nigeria's baseline emissions.

Expanding access to LPG in Nigeria by investing in distribution infrastructure could stimulate the uptake of cleaner cooking fuels for the more than 100mn Nigerians who rely on these fuels, while also being a



Refiners and distribution firms have long called for more petroleum products storage and distribution in Africa.

Image Credit: Adobe Stock

potential source of carbon credits, McKinsey noted in a July 2022 report.

That is a scenario that could be replicated elsewhere across the continent – but equally it is one that hinges on critical investment and expansion.

New facilities

Refiners and distribution firms have long called for more petroleum products storage and distribution in Africa.

With the advent of new state-of-the-art refineries – such as Nigeria's Dangote oil refinery and Angola's Cabinda refinery – that could be about to happen.

Other facilities, including ports such as Nigeria's deepwater Lekki deepwater port, and new pipelines infrastructure in support of offshore oil and gas

fields, could further boost Africa's overall storage capabilities.

In larger economies, there are signs of increased appetite for storage investment. This includes Oiltanking MOGS Saldanha (OTMS), a large-scale crude oil storage and blending facility located in Saldanha Bay in South Africa's Western Cape, which was commissioned in 2020.

The vast, cavernous and flexible facility consists of 12 1.1 mn bbl in-ground crude oil storage tanks and is used by international firms to store, blend and transship crude oil for bulk building and balancing production and offtake as well as blending for the market.

One of the names behind the project, Oiltanking GmbH, divested its Matola Terminal de Armazenamento de Petróleos

S.A. in Mozambique last year.

The 59,600 cbm petroleum products terminal in the port of Matola was sold to a consortium of Energi Asia DMCC and Al Braik Investments LLC, both based in the United Arab Emirates.

Meanwhile, in Egypt, the petroleum ministry has announced that there are plans to set up a new area for crude oil storage in El-Tebbin, south of Cairo.

The US\$100mn project will receive crude oil from the Ain Sokhna terminal on the Red Sea.

Egypt is mooting expanding its current storage capacity for a range of products, from diesel to jet fuel, as well as crude oil.

Bit by bit, Africa is building up its storage infrastructure to meet the projected rise in demand. ♦

RENTALS HELPING TO MANAGE COST FLOW ON OFFSHORE PROJECTS

Leasing and rental is nothing new in Africa, and in the oil and gas industry, it offers an important way to manage overall costs as well as provide access to the latest equipment, writes Martin Clark.

EQUIPMENT RENTAL HAS long played a meaningful role in Africa's business economy, from the construction sector to mining, as well as oil and gas.

For lots of energy projects, large and small, it makes good sense to lease items that can be returned later, or kept on for any duration of time required.

Industry specialists have evolved to service this niche, supplying everything from temporary power stations to trucks and cranes during project execution, and anything in between. Sometimes the temporary power plant is the most pivotal asset of all, providing on-site electricity to drive other processes in remote areas where no alternative energy source exists.

Major players in this field include the likes of Aggreko, Caterpillar and Cummins, among many others, which have long supported the energy industry and other sectors in Africa with remote, essential power applications. But leasing and equipment rental extends into most other areas too.

Aquaterra Energy is a leader in global offshore energy engineering solutions and boasts a long track record of products and tools for the energy industry. Its portfolio of work includes flagship projects in Africa.

The UK-based company believes this 'on-demand' model, working on a lease or rental basis,



Leasing and rental can provide a cost-effective solution in a number of areas throughout the oil and gas industry.

Image Credit: Adobe Stock

can help to lower overall capital expenditure for operators and developers by reducing the need for permanent purchases. Its solutions are also backed by maintenance and service experts so customers get all the quality and performance they need, alongside a flexible business model.

Tools and equipment included in the Aquaterra Express services portfolio are vast – from subsea camera systems, connectors and cleaning tools, to heavy lifting equipment, tension systems and riser monitoring systems.

Active across most of the world's major oil-producing regions, it secured a multi-million dollar master engineering and design service agreement last year to deliver multiple Sea Swift platforms destined for off the

coast of Angola's Cabinda Province.

The Sea Swift solution was chosen for its flexible design, which supports minimised installation times, and for its ability to be fabricated in-country. Aquaterra describes it as a minimum-facility offshore platform for rapid returns in the shallow waters.

Work began on the first platform, to be engineered for a 20-year production life in approximately 75m of water, soon after the contract was announced. The three-year contract period – signed with an undisclosed supermajor – was won through a competitive tender process.

Aquaterra views West Africa as an important region for future growth. In 2020, it also unveiled a Sea Swift offshore platform

solution deal with Chevron, through its wholly owned Angolan subsidiary, Cabinda Gulf Oil Company Limited (CABGOC).

Destined for the Lifua-A field, the conductor supported platform (CSP) will be designed and installed in 60m of water. Using well conductors as the structural support for the topside, Sea Swift minimises build and implementation times, according to Aquaterra – it says the platforms offer a low-risk, low-cost route to reduce time to first oil and lower capital investment.

The company is managing the entire project scope via its in-house engineering and project management teams, employing both Angolan fabrication and installation support. ♦

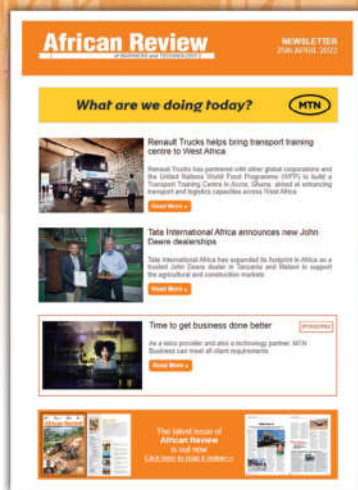
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KEEPING OIL AND GAS INDUSTRY WORKERS SAFE

Martin Clark discusses safety clothing and the essential role of personal protective equipment in Africa's oil and gas industry.

WORKER SAFETY
WHAS always been priority number one in an industry that is both challenging and inherently dangerous.

Operating with hydrocarbons and combustible or explosive materials represents a permanent hazard that calls for strict protocols and the best safety wear. In the African context, the varied climate and sometimes extreme environment can also exacerbate any industry-specific threats.

It means keeping workers safe yet comfortable, while they operate and perform efficiently, is a perennial test for suppliers of personal protective equipment (PPE), an area that spans protective clothing, footwear and headwear, as well as respiratory protection and other areas.

It is a market that is expected to see significant growth in the years ahead. Frost & Sullivan forecasts growth of 3.7% for PPE in the oil and gas space through to 2023. The global oil and gas PPE market generated revenues of US\$6.3bn in 2018 alone, it says.

While Africa represents a small portion of this total, it is nonetheless a market on the rise, serviced by a host of leading suppliers such as Sturrock and Robson, Anstell, among others. The latter supplies everything from industrial hand and arm protection for chemical and mechanical applications to body



Non-compliant PPE for healthcare workers as well as energy industry professionals can be a life and death issue.

Image Credit: Adobe Stock

protection for gas and vapour environments, liquid spray and splash, and even diving.

Public exposure

PPE is also an area which gained huge public exposure over the last two years with the Covid-19 outbreak – and not always for

“ PPE is also an area which gained huge public exposure over the last two years with the Covid-19 outbreak – and not always for good reasons.”

good reasons. The unprecedented demand witnessed a concerning influx of new and even existing PPE brands selling products that were not always up to scratch.

That is a massive problem in highly sensitive areas, including both healthcare and oil and gas. Anstell was among industry leaders to call out the problem urging safer, more sustainable PPE in an open letter this year to EU regulators.

“These often don't meet minimum protection levels or claim higher protection properties than they can provide – despite this, their prices make them attractive to buyers,” the company noted in a March statement.

Unfortunately, it notes, such practices are growing exponentially due to poor market

surveillance and the absence of severe penalties to combat fraud.

This increasing non-compliant PPE also creates an unfair competitive environment and could mislead customers, creating unsafe work environments and potential accidents.

For healthcare workers and energy industry professionals working on critical installations such as offshore platforms, refineries and gas plants, it is a life or death issue.

In an industry that values worker safety so highly, and where companies maintain their very reputation through a commitment to safety, it points to an era in which investing in quality, both in terms of equipment and brand, will be increasingly good for business. ♦

PROTECTING PUMPS, PRODUCTION AND PEOPLE

Durgesh Jha, Middle East & Africa sales leader – Reliability Solutions at Emerson Automation Solutions, discusses the benefits of continuous pump monitoring.

It is estimated that pumps account for 7% of the total maintenance costs of a refinery.



Image Credit: Adobe Stock

PUMPS ARE ESSENTIAL in the daily operations of industrial oil production processes. The challenge most operators face is that these pumps begin to degrade as soon as they are running, with a roster of potential risks that producers must keep an eye out for. Fluid loss is one of those risks which can effectively be reduced through dual seals, but for a compromised reservoir tank on an

“ Statistically, pumps will fail or suffer degraded operations every 12 months.”

unmonitored pump, this can mean serious complications that can lead to the depletion of seal fluid levels from lack of lubrication and eventually, seal damage. Mechanical pump switches also have a tendency to stick, which can be detrimental to the entire unit.

All these point to lack of monitoring on the pumps, which results in reduced productivity, operational shutdown, expensive repairs, and lack of compliance to regulations. Along with fluid loss, it is also important to note the safety risk brought by dangerous fumes and threat of combustion within the facility.

In addition, with the global shift towards sustainability, stringent laws and regulations are being built around greenhouse gas emissions reduction where it is becoming

imperative for producers to reduce their fugitive emissions through the improvement of their overall operations. Measures can include improving leak detection and repair, installing vibration and temperature sensors and applying state-of-the-art seals, which can all be enabled with predictive maintenance.

Offshore platforms often operate in harsh conditions far from land, which calls for high reliability assets, especially pumps. These pumps are usually maintained and inspected manually with a technical crew flying to the locations at regular intervals. It is estimated that pumps account for 7% of the total maintenance costs of a refinery, and pump failures are responsible for 0.2% of lost production.

What if you had a cost effective, easy to apply solution for monitoring these pumps 24/7?

Pumps are, without question, significant players for maintaining production schedules. In process plants, as many as 90% of process pumps are monitored manually, or not monitored at all. Statistically, pumps will fail or suffer degraded operations every 12 months. This cycle provides a great opportunity for producers to deploy cutting edge technologies for pump monitoring that can predict failures and make it simple to take proactive measures in safety, regulations, and shutdowns.

Each operation is different, which is why it is highly important to carefully evaluate the factors at play in selecting and deploying solutions. These factors can be the current pump installation, maintenance and operational challenges faced by the team, current and future KPIs, budget, and return on investment.

A simple solution can start with an offline route-based condition monitoring, to an advanced solution involving online wireless or online continuous monitoring technology to collect key parameters like vibration, fluid leak, temperature, and feed to analysis software. The software will compare actual sensor readings to the pump's predictive, ideal values. It then provides exception-based notifications of developing problems to operators, along with the pump's diagnosis and prioritisation.

Wireless monitoring of key parameters of a pump using pervasive sensors has helped the industry make the leap from reactive to predictive maintenance. Emerson's wireless



Image Credit: Emerson Automation Solutions

Small, easy-to-install sensors like this vibration monitor can warn if an asset needs attention well before a turnaround.



Image Credit: Emerson Automation Solutions

The AMS Asset Monitor is an edge analytics device that delivers the benefits of continuous monitoring to more plant assets at far less installation expense.

“ Digital solutions are becoming more accessible with the recent technological advancements in machine learning and analytics.”

vibration and temperature monitoring is one of the pioneering technologies that leveraged wireless solutions to improve data collection in pumps. It is now deployed across global major oil and gas end users due to its easy deployment in both onshore and offshore locations, enabling operators to start small scale with a low budget and minimal risks,

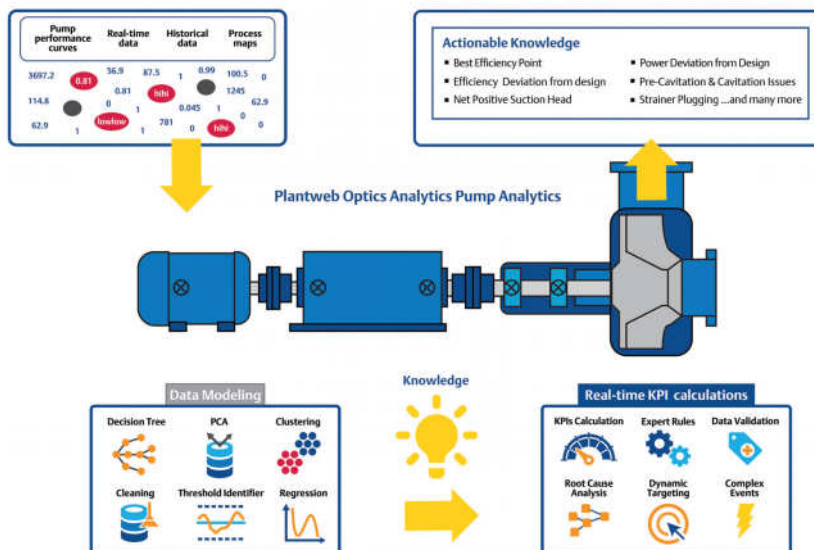
realise quicker ROI and expand further at their own pace.

Now, digital solutions are becoming more accessible with the recent technological advancements in machine learning and analytics, which can help address key pump issues. These include Emerson's Plantweb Optics Analytics Pump Template, a ready-to-use platform agnostic software component that allows users to monitor, manage, analyse and create visibility on the performance of pumps. Similarly, Emerson's PeakVue technology cuts through the complexity of pump analysis to provide a simple, reliable indication of equipment health through a single trend.

Edge Analytics lends another avenue for the industry to monitor their assets. Emerson's Edge Analytics device, AMS Asset Monitor, can be installed near to the pump to collect vibrations and other process parameters and deliver embedded prescriptive analytics to determine pump condition while broadcasting the results of the analysis in an easy-to-understand format. When connected to Plantweb Optics, users can receive updates in their office or on their mobile device with embedded prescriptive analytics that deliver easy-to-understand results for operators with limited to no prior knowledge and experience around pump maintenance.

These solutions enable operators to be proactive in the way they maintain their operations, offering a wide range of opportunities to improve their KPIs, make relevant decisions based on analytics, learn more about their operations with predictive models, and scale up to enterprise-wide pump monitoring. By deploying such solutions and software, they can prevent the challenges in pump performance and condition and unplanned shutdowns, and start building towards better asset assessments, best practices, and expert knowledge sharing. ♦

Image Credit: Emerson Automation Solutions



Analytics Dashboard: Pump Template is a ready-to-use software component that allows users to monitor, manage, analyse, and create visibility on the performance of pumps.

BRIGHT PROSPECTS FOR AFRICA'S PIPELINES

Strong oil and gas prices, growing demand and the drive to increase regional trade and boost international energy exports are catalysing pipeline developments in Africa.

BUOYANT OIL AND gas prices have strengthened the business case for many pipeline projects globally, according to energy consultancy Westwood Energy.

“In Africa, both the 1,443 km East Africa Crude Oil Pipeline (EACOP) and the 823 km pipeline for the Lokichar project are moving forward after multiple delays,” comments the energy consultancy.

The construction of these two pipelines will be a significant boost to Africa's annual pipeline installations, which have historically fluctuated, it adds. The pipeline for the Tullow Oil Lokichar project in Kenya will connect Lokichar to Lamu port on the Indian ocean, while the EACOP pipeline currently under construction, which will be the longest electrically heated pipeline in the world, will transport Uganda's crude oil to Tanga port in Tanzania for onward export.

Another project which appears to be moving forward is the US\$25bn Nigeria-Morocco Gas Pipeline Project, currently at the design stage, which is set to bring Nigerian gas to 13 countries in West and North Africa, with possible extension to Spain for the European market. Upon completion, the 6,000 km pipeline will be the longest offshore pipeline in the world and the second longest pipeline ever. OPEC is reported to be



Africa pipeline projects are moving forward.

Image Credit: Adobe Stock

funding the second phase of the FEED study, which has been awarded to Worley. Project management consultancy services for this have been awarded to a joint venture of ILF Consulting Engineers and DORIS Engineering, involving onshore and offshore pipeline and compressor station planning, technical surveying, environmental and social impact assessment, land acquisition studies and project implementation framework.

Also exploiting Nigeria's gas resources is the 614 km Ajaokuta-Kaduba-Kano (AKK) gas pipeline project running from southern Nigeria to Kano in the north. The long-term aim of this is to supply gas to Europe through the Trans-Saharan Gas Pipeline (TSGP) project, for which it is the first phase. The EU, which currently imports 14% of its LNG supplies from Nigeria,

is reported to be seeking additional gas supplies from the West African country in the face of potential Russian supply cuts.

Westwood points out that despite positive developments, the pipeline market remains precarious. Commodity price fluctuations remain a threat, and supply chain issues such as the removal of Russian steel from many international markets, are potentially limiting the annual pipe supply, with subsequent delays to pipeline construction and increasing costs.

Environmental issues are increasingly influencing developments. For example in the case of the Lokichar pipeline, the length of the pipeline was increased by 9% as a result of being diverted away from areas where it could have adverse environmental implications on wildlife, while the NMGC project investigates the potential to use

renewable energy sources to operate the pipeline and reduce its CO₂ footprint.

The EACOP pipeline, which will be buried to minimise the impact on the environment, has been subject to pressure from activists, who argue that the construction of the pipeline will displace thousands of families, destroy farmland, devastate ecosystems across the region and threaten water resources – not to mention generating significant CO₂ emissions. As a result, some bankers and insurers have been reluctant to back it.

Theft and vandalism also pose a challenge, particularly in Nigeria, which has been plagued for years by rampant oil theft from pipelines. The Trans-Niger Pipeline, which is capable of transporting around 180,000 barrels of crude per day, has been dry since mid-June this year due to theft. ♦

HARNESSING FLOW METER DATA

Behzad Nobakht, data scientist at TÜV SÜD National Engineering Laboratory, discusses how the predictive power of condition-based monitoring (CBM) systems can be enhanced, improving the efficiency and safety of operations throughout the flow measurement process.

WHILE THE OIL and gas sector enhances process control and safety, it also generates a deluge of complex data structures that engineers cannot manage and interpret quickly enough to avoid an unplanned event such as flow meter downtime. Production downtime has an adverse impact on productivity, leading to an overall reduction in business profits due to the reduction in units being produced and sold. To minimise loss of assets, petroleum enterprises need to reduce downtime, optimise operations and enhance maintenance strategies.

To interpret the vast amounts of data, data-driven models can utilise this information and deliver analytics solutions to allow businesses to reduce unplanned events. Data-driven solutions explore the impact of varying parameters in equipment such as temperature, pressure or even more device-specific digital diagnostic values on specific industrial conditions. These conditions may be indicative of a known fault or an unknown event. The models will extract this information to predict the future state of a system based on live and historical data. This process is known as condition-based monitoring (CBM).

TÜV SÜD National Engineering Laboratory has



TÜV SÜD's flow meter test facilities.

proven that the efficiency and safety of operations throughout the entire flow measurement process can be improved using data-driven solutions. This includes process values verification, prediction and uncertainty quantification using live data. Through extensive R&D, the Digital Metrology team successfully developed an intelligent software-based solution that can process data streams in real-time, detect any likely deviations from normal behaviours, and alert the operators of causes of failure.

CBM systems have been developed to extract temporal and spatial information in data through deep neural networks

(DNNs). The learned patterns (i.e. encoded information) were then related to historical system conditions to probabilistically predict the state of the system under uncertainty. The time associated with failure diagnosis during scheduled maintenance is also minimised, as a CBM system allows for remote examination. Consequently, CBM enables old meters and infrastructure to be operational for a longer period which, in turn, leads to the extension of Remaining Useful Life (RUL).

Many data-driven approaches exist to estimate the state of a meter or other equipment from sensor data for health monitoring applications such as anomaly

detection, fault detection and RUL. However, many of these methods may lose accuracy when dealing with noisy sensor readings, due to the presence of high voltage machinery. Other challenges in exploiting sensor data include 'partial unavailability' of sensor data because of network communication loss and complex dependencies between sensors. Different conditions may have similar characteristics, making it challenging to build unique connections between raw sensor outputs and conditions. Given the complexities in inter-sensor relationships, time-dependent patterns and spatial correlations, it is hard to distinguish

discrepancies between these relationships.

To address CBM in real-world scenarios, we ran different experiments in our facilities. In one recent study, two identical Coriolis flow meters were exposed to various fault conditions. After a baselining calibration exercise, both meters were systematically exposed to fault conditions by intentionally installing them with a misalignment, inducing cavitation and operating at flow rates beyond the meter's full specification.

During these experiments, uninterrupted time-series data sets were generated, which included both facility reference instrumentation and digital meter diagnostic variables. Different classification models

were then employed to learn facility and diagnostic variables to predict system conditions. The resulting models from this research performed considerably well in out-of-sample test predictions for real-world scenarios, and could offer tangible benefits to end-users.

The accuracy and versatility of the models can ultimately be improved by feeding it additional data that covers further scenarios likely to be encountered by flow meters in the field. The resulting data will be analysed and used to train the model to report meter performance issues in multiphase flow conditions. In addition, the facility will be used to recreate the conditions tested in previous experiments to observe and validate the model's transferability with respect to its reliability while

in use in a new facility.

In summary, using standard instrumentation and diagnostic measurements, available to all end-users, combined with the support of experienced flow practitioners and meter manufacturers, can enhance the predictive power of CBM models. The predictive model can be tuned to reliably predict and highlight undesirable operating conditions specific to a given installation in a manner that non-data science experts easily understand. This also includes anomaly detection or highlighting potential problems in the system before equipment is damaged.

With condition-based calibration and predictive maintenance, oil and gas firms will adopt a more proactive

approach to maintenance, meaning that facility downtime due to component failure will be reduced, and performance deterioration will be detected before the point of failure. Furthermore, a self-maintaining autonomous system will significantly reduce the ongoing costs of providing traceability to oil and gas business. ♦

TÜV SÜD National Engineering Laboratory is a world-class provider of technical consultancy, research, testing and programme management services. Part of the TÜV SÜD Group, the organisation is also a global centre of excellence for flow measurement and fluid flow systems and is the UK's Designated Institute for Flow Measurement.
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THE KEY TO UNLOCKING THE POWER OF DATA

Unlocking the power of data will be key to ensuring companies can maintain business continuity, drive operational resilience and benefit from emerging technologies, says Geir Engdahl, co-founder and chief technology officer, Cognite.

INSIDE NEARLY ANY type of business is a treasure trove of data. It is the companies that understand how to maximise the value of that data and use it to improve decision making, accelerate innovation, enhance the customer experience and drive operational efficiency that will have the competitive advantage. However, it is easier said than done, and companies may find extracting this data value to be challenging.

Siloed data, outdated tools and shadow IT are the most common hurdles faced by industrial businesses. These are the barriers that companies need to overcome if they aim to democratise data and analytics, streamline collaboration and accelerate time-to-insight. The global skills shortage represents another barrier, and it is clearly one that must be addressed if companies are to have access to the right talent pool to tap into that data. According to a DNV study, 91% of energy companies say digital skills training is needed in the oil and gas industry.

The energy industry is also facing an ageing workforce, with 43% of workers over age 50, according to the UK's Department for Business & Energy Strategy. That makes the optimisation and contextualisation of data essential to ensure maintenance and operations teams have access to



Image Credit: Adobe Stock

A number of barriers need to be overcome in order to reap the full benefits of data.

insights that might otherwise be lost as a critical part of the workforce enters retirement. This is yet another reason why driving business continuity and operational resilience through the

“ When looking at process-heavy industries, focusing on core operational technologies is key.”

power of industrial data is crucial.

Tackling proprietary data protocols

When looking at process-heavy industries, focusing on core operational technologies is key. Systems from multiple vendors, each paired with proprietary protocols, can lock down data, and these systems have an average lifespan of around 20 years. The impact of this mix of legacy kit, disparate control systems, non-compatible data models and communication interfaces can limit a company's ability to collect and contextualise its data.

Cognite experienced this challenge first hand when it supported an oil and gas company that had 30 oil platforms with more than 300 wells. The operator lacked a unified overview of maintenance activities within and between all assets – ultimately a costly and ineffective way of working. As the data team coming in to fix this challenge, the Cognite focus was on ensuring that this business did not have too many disparate control systems using proprietary data models and communication. By bringing these systems together into a shared platform,



Industrial data empowers everyone who engages with it.

Image Credit: Adobe Stock

this oil and gas operator could consequently optimise scheduling, improve communication across organisational silos and make data-driven decisions.

Concentrating on user needs

The secret recipe for many successful companies is to maintain a laser focus on their users and on improving their operational efficiency, along with their ability to make rapid and higher confidence decisions. Data plays a role here, and the work to structure an organisation's data can bring value to multiple users. The key is understanding how people interact with data across the operation and be aware of how the data needs to be presented to the various roles in the company. By maintaining a user-centric focus and having a solid foundation of scalable data, companies can accelerate time to value.

Across industrial operations there is also a major focus on data analytics to support optimised decision making and to enhance operational efficiencies. In the

future, this could lead to the adoption of AI and machine learning to intercede in the operation of industrial facilities in complex use cases, such as where Distributed Energy Resources (localised energy generation) is deployed.

Environmental impact is also something increasingly important for users. One example of this is from another Cognite customer, Aker BP. This oil and gas company used machine learning smart monitoring systems to visualise all data relevant for troubleshooting water contamination and identify factors related to high oil-in-water concentrations. This helped the company decrease its time spent on mitigating actions, a savings equivalent to an annual revenue potential of US\$6mn. So, concentrating on user needs not only helps to unlock the power of data, but also to drive operational resilience.

Using trusted data sources

Industrial data empowers everyone who engages with it,

but the analytics and applications that leverage this data will come from the end users, software providers and equipment manufacturers. When you have a trusted data source with common assets you have a very strong basis for using low code to develop in-house applications, as well as AI to enhance decision accuracy. Given the current industrial landscape, as well as greater market requirements, such as data-intensive carbon reporting and business model disruption from digital technology adoption, companies that do not focus on data as a key asset will face a significant

competitive disadvantage.

Fortunately, most companies realise that if they were starting operations today, given the tech we currently have available, their processes and teams would look very different relative to today's teams and processes built around legacy technology. The businesses that can adjust their people and processes will have a first-mover advantage in this new data-driven era. Those that remain wedded to past investments will eventually have to shoulder twice the technology debt.

At this point in the industrial space, there is a lot of focus on analysis to support optimised decision making and making operations more efficient. In the future, there may be adoption of AI and machine learning to operate industrial facilities for more complex use cases such as smart city concepts. Unlocking the power of data will be key to ensuring companies can maintain business continuity, drive operational resilience and reap all the benefits they can from emerging technologies. ♦

“ In the future, there may be adoption of AI and machine learning to operate industrial facilities for more complex use cases.”

Over the past 10 years, several African countries have announced gas discoveries.

A NECESSARY STEP ALONG THE PATH TO GREEN POWER

With the leap to clean energy a tall order to complete in one, natural gas is a strong candidate to act as the step between. *Oil Review Africa* reached out to Africa Energy Forum sponsors Aggreko to explore the potential of this fuel.

Oil Review Africa (ORA): How does gas fit into the African energy landscape?

Aggreko: Gas is an enabler for the transition to cleaner energy sources in Africa, because it has a lower carbon impact than traditional liquid fuels used for power generation in large parts of Africa. According to the US Energy Information Administration, natural gas emits almost half the carbon dioxide of coal, making it a viable way to transition to a lower carbon impact.

It is no longer a question of whether the transition is going to happen, but rather when. Globally, we are seeing increasing pressure to reduce carbon impact and the continent cannot afford to ignore those. Governments in Africa, therefore, need to prioritise finding ways to bridge the financial gap, to allow them to capitalise on more carbon-neutral fuels such as LNG to kickstart the process of transitioning to cleaner energy.

ORA: How important is this resource for the continued economic development of the continent?

Aggreko: Over the past 10 years, several African countries have announced gas discoveries, with the most recent discovery in Egypt, yet it is estimated that almost 40 countries on the continent currently do not have access to gas and have therefore not introduced gas into their energy mix.

There is an urgent need to expand in-country gas infrastructure and develop competitive gas markets on the African continent. While we are already seeing a slow increase in the use of gas for energy generation, this accounts for less than 40% of energy in Africa, so there is an opportunity to increase that dramatically to lower the continent's carbon impact.

Governments across the continent must look at creating environments that are conducive to investment in liquified natural gas (LNG) infrastructure and create the demand needed for private companies to invest. They also need to support the industry through the relevant policies to encourage and support them through this energy transition.

ORA: Aggreko has noted that natural gas has the potential to replace diesel generators typically favoured in remote areas through innovations such as virtual pipelines. Are such advances applicable to Africa and could they help power remote projects and locations on the continent?

Aggreko: Small-scale LNG technology still needs to be developed more so that the economics of building infrastructure can be improved. Many countries do not have LNG and the clusters of demand need to increase. We know energy is being consumed, but it is being generated by liquid fossil fuels that place a heavy burden on the environment. What is needed is an increase in demand for lower-carbon fuels and this will be driven by country-level policies.

If you look at countries outside of the United States, where gas exists as a commodity and where LNG has been easily accessible for several years already, there is still relatively limited LNG infrastructure.

Pipelines can be used, but these tend to only be economic where there are large populations and large users of gas such as cities or coastal areas. But when you get to things like electricity generation, which can be often miles inland, or when you get to mining, it is not economical to run pipelines. This requires virtual gas pipelines, which is when the gas is

transported by sea, road or rail, as well as the infrastructure to convert it from natural gas into a liquid and then regasification to restore it into its gaseous state.

ORA: How can countries and companies reduce flaring and what advantages does this have?

Aggreko: Not only does flare to power provide a cheaper and more stable energy source, but it also removes a future energy problem right off the table. For oil producers, flaring is going to start costing money in legislation and climate change regulation. However, they now can turn the problem on its head, to translate pollution into accessible power for governments, businesses, and citizens. And to shift reputational blame into a reputational advantage. This is further enhanced by the fact that they can charge for this service.

Currently, the gas situation on the continent is precarious and yet gas power is probably the most important part of the energy mix. It is significantly cleaner than coal and liquid fires, and it runs at a stable level.

Aggreko takes the gas that would normally be flared, puts it into a generator, and creates power. While the generators have their own emissions, they are lower and far less intrusive than flaring and therefore do not add to the pollution burden. If power companies embark on the flare-to-power journey, they can shift their balance sheet, change how they impact the environment, align the business with incoming climate regulation, and transform their reputation. It is an intelligent solution to a problem that has had a negative impact on the country and citizens, and it is one that any company can benefit from in a matter of weeks. ♦

EMPOWERING WOMEN IN THE ENERGY SECTOR

Anne Ezeh, communications director for GE Africa and chief diversity officer for GE Gas Power - Europe, Middle East & Africa region, describes the obstacles hindering women in the energy sector.

ORA: Why is there a disproportionate number of women working within the energy sector?

AE: The percentage of women working in the energy sector and quite frankly in most of the STEM related fields is still a lingering issue even as there has been progress in increasing female participation over the years. The U.S. Census Bureau reports that women represented 27% of STEM workers in 2019, up from 8% in 1970, so while there is improvement, it is definitely slow and requires more focus and attention.

Several factors contribute to these numbers and this rate of progression. First, there is a question of cultural bias. Sexism and role distinction are all products of cultural beliefs and practices that hinders the progress of women. Girls are mostly involved in housework or 'feminine' activities whereas boys are left to explore and discover. Women often have little influence over resources and norms, restricting what jobs are considered appropriate for women. While this perception and behaviour is also changing, such stereotyping and misrepresentation of women deprive them of opportunities to use and explore their intelligence and creativity.

Second, the saying 'seeing is believing' is also true in this instance. Younger girls and women do not get to consistently see female role models in STEM

fields and the success of women in the STEM world is rarely featured in mainstream media. On the rare occasion of these features, they are viewed as pioneers, outliers, 'doing the impossible' and this further perpetuates an unconscious disservice to the desire and need to normalise female participation in STEM by creating a perception that these jobs are difficult and women who successfully do them are anormal.

Third, the advent of new age millionaires and success stories in entertainment, sports, fashion and the ever-widening influence of the Internet have redefined success for the younger female generation. Today, careers in STEM are no longer viewed as fancy or on trend and hold little attraction for them.

ORA: How does Africa's energy sector compare to other regions in terms of gender diversity?

AE: Africa's energy sector has grown over the years in terms of diversity but there is still room for growth as the participation gap still exists. According to SEI, the participation of women and girls in STEM in Africa, remains at the global average and persistent gender disparity continues to exclude women and girls in science from achieving their potential.

According to another recent UNESCO report 'Cracking the code: Girls' and women's education in STEM', only 35% of STEM students in higher education globally are women, and



Anne Ezeh is the communications director for GE Africa.

Image Credit: GE Africa

differences are observed within STEM disciplines. I recently participated in a career outreach at a renowned technical university in West Africa and the ratio of females to males in engineering studies is 10 to 1. It is evident that the gender gap in Africa still persists, and concrete short-term actions as well as longer-term strategies are needed to address it.

ORA: What is being done to address this on the African continent?

AE: Across Africa, organisations are significantly more active and deliberate about diversity and inclusion. Women engineering professional associations are growing stronger and creating credible grooming, coaching and mentoring hubs for members.

For example, in 2021, GE created the Next Engineers programme to increase the diversity of young people in engineering and inspire the next generation of engineers. Next Engineers represents a

commitment of up to US\$100mn with a goal to reach more than 85,000 students. In Johannesburg, South Africa, the Next Engineers programme will provide more than 3,500 students between the ages 13 to 18 over five years with hands-on exposure to engineering concepts and careers, and ultimately award financial support to students pursuing engineering degrees.

In December 2021, GE also hosted a 'Girls in STEM' event in Ivory Coast to inspire careers and increase gender diversity in STEM. The aim of the Girls in STEM programme is to help shape the perception of STEM careers and shift the gender gap to enable and encourage the next generation of women engineers and innovators.

While these programmes will definitely help close the participation gap for women in STEM, other factors like family decisions, financial considerations, workplace cultures and gender discrimination also need to be addressed to ensure a holistic solution that will shape the future of female careers in STEM.

With the current positive trends around public policy and organisational engagement as it pertains to female participation, I'm optimistic that there is a better future. Evolving social and workplace cultures, affirmative public policy and increasing women empowerment programmes will help improve this. ♦

FACILITATING COMPLIANCE WITH ESG TARGETS

As net-zero becomes an unstoppable movement, industrial enterprises can leverage advanced technologies to unlock operational and sustainability benefits across every aspect of the energy value chain, explains Harpreet Gulati, senior vice president, Planning, Simulation & Optimization Business at AVEVA.

AROUND THE WORLD, industrial enterprises of all kinds are racing against the clock to keep planetary warming to 1.5°C, and to support net-zero carbon emissions by 2050. Public and private sector companies alike have committed to supporting the energy transition – but now comes the difficult task of making good on those promises.

Businesses in mature industries such as oil and gas, mining and metals, and power generation and chemicals will need to address new business imperatives if they are to build an alternative, sustainable energy landscape while maintaining current operations continuity.

The playing field has changed, and businesses must adapt to ensure they survive – and thrive. Regulatory alignment has begun to coalesce around stricter Environmental, Social, and Governance (ESG) regulations. Alongside, more than 80% of companies worldwide now report on sustainability, a figure that rises to 90% for the largest corporations, KPMG reports.

If they are to maintain their social licence to operate, companies must also comply with ESG pressures from their communities and from consumers who are looking for more sustainable solutions. Consumers are now embracing a more sustainable lifestyle, whether in terms of consumer goods or clean energy alternatives, and are questioning brands about their environmental credentials, increasingly making spending decisions in line with their convictions.

On the supply side, businesses must reconcile these imperatives with volatile prices, increasing labour shortages and continued supply chain disruptions as the pandemic continues to rewrite the operational playing field.



Image Credit: Adobe Stock

Businesses can harness digital tools to facilitate ESG imperatives.

With energy sector businesses forced to operate within these new constraints, digital technologies will be indispensable in supporting the transition to greener value chains at both the upstream and downstream ends. McKinsey estimates that up to 80% of the technologies needed to reach net zero are already deployed, some 15% are in prototype trial, and a further 5% are in the R&D process.

From AI-infused analytics to data-led platforms that enable industries to unify information streams for responsible decision making, the smart solutions that empower companies and help them identify ways to minimise environmental impact and costs are already available today.

Businesses can harness digital tools to facilitate ESG imperatives in three ways:

1. Achieve faster design and construction of carbon-efficient plants: Energy companies transitioning to cleaner businesses, such as the ones related to wind, solar and biofuel, require new greenfield assets or may need to modernise existing installations. A data-centric approach, combined with the latest technology can drive faster and more effective engineering cycles across the project's life with an eye on the sustainability footprint. Integrating artificial intelligence-infused simulation with the engineering database can rapidly enable speed and deliver the breath of insights needed to build the most carbon- and

energy-efficient plants at the very first attempt. There is no room for error given the short window of time available to achieve our net-zero ambitions, as well as the increased transparency around ESG reporting.

2. Reduce waste and improve efficiency with digitalised supply chain management:

As the pandemic has shown, market conditions can change overnight. By simplifying and standardising downstream supply chain management, businesses can quickly adapt to market changes and capitalise on emerging economic opportunities. Migrating to a unified enterprise platform with built-in data management and embedded business process workflows builds digital resilience while plugging value leaks, reducing waste, sustaining productivity and supporting quicker decision-making in service of a circular economy.

3. Foster hybrid and remote-working solutions for more efficient operations:

Digital transformation serves as a proven buffer against continuing uncertainty that impacts workforce productivity. When companies leverage AI and the cloud for edge-

to-enterprise visualisation and intelligent data management, staff gain clear and contextual access to data, wherever they are. Not only can they execute operational processes remotely, but they can also collaborate with colleagues and business partners anywhere around the world, thanks to virtual environments that replicate real-time operations connected to a reliable operational data management source. Greenhouse gas emissions can also be reduced along the way, through reduced travel and minimal use of materials such as plastic and paper.

Technological innovation can serve as one of the primary building blocks to realising a net-zero pathway when deployed alongside other solutions as part of a multi-layered approach, including lower-carbon energy sources and ramping up efforts to improve carbon capture, utilisation and storage.

As a recent AVEVA survey shows, the energy industry is committed to driving to net zero and tackling climate change. Nine out of 10 businesses see sustainability as a key focus area for their companies over the next three years. In fact, 89% of C-suite leaders are



Image Credit: AVEVA

Harpreet Gulati, senior vice president, Planning, Simulation & Optimization Business at AVEVA.

committed to helping tackle climate change.

As momentum builds around the energy transition, companies that act now to integrate technology in service of ESG goals will drive long-term value through to 2050 and beyond. ♦

Container World expands their product range to include offshore items

WITH GROWING DEMAND from long-term onshore customers, Container World has recently expanded their product range and is now able to offer a wide variety of offshore equipment for the oil and gas industry, such as baskets, skips, reefers and accommodation modules — all certified to DNV 2.7-1 and EN 12079.

Strategically located in Cape Town and with most units available Ex-Stock or Ex-Factory, they are well placed to serve demand from East, West and Central Africa with short lead times and at competitive prices.

Having more than 39 years of experience servicing the African market and with 12 strategically located branches, Container World is ideally positioned and experienced to handle any on or offshore container enquiry.

Their diverse range of products include offshore containers, which are reputed to meet international standards with recognition from certifying bodies like Det Norske Veritas (DNV) and Lloyd's Register (LD); oil rig supply ship containers such as mini containers and dry goods storage containers, which are quite popular in the oil and gas industry for transporting small items like equipment, tools, food and waste on supply ships to and from oil rig platforms; offshore accommodation containers that are designed particularly for offshore oil rigs; equipment and tooling containers, which come with special features like internal tie-down points, cargo net securing points and blocking mechanisms, and food storage containers that can resist rough conditions.



Container World offers a wide variety of offshore equipment for the oil and gas industry.

Image Credit: Container World

Container World has been providing specialised container conversions into the African and sub-Saharan African onshore market since 1983.

Visit the website for a full range of products.

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AFRICAN RIG COUNT

COUNTRY	June 2021	July 2021	June 2022	July 2022
ALGERIA	25	21	33	33
ANGOLA	4	4	6	6
CAMEROON	1	2	3	3
CHAD	3	3	3	4
CONGO	0	0	0	1
CÔTE D'IVOIRE	0	0	2	2
EQUATORIAL GUINEA	0	0	0	0
GHANA	2	2	1	1
KENYA	4	5	4	4
LIBYA	12	14	2	2
MAURITANIA	0	0	1	1
MOROCCO	0	0	0	0
MOZAMBIQUE	1	1	0	0
NIGERIA	5	7	11	11
TUNISIA	0	1	2	2

Source: Baker Hughes

CORTEC launches new Wellhead Plug Catcher

CORTEC, A LEADING manufacturer of high-quality API valves, has launched its new, compact, Wellhead Plug Catcher, which is installed directly between the wellhead and the production choke.

Fracking and plug parts returning to the surface is a common problem in shale wells. The user-friendly Wellhead Plug Catcher is installed upstream of a wellhead production choke and features an internal screen that is utilised to filter out large debris to prevent it from clogging or damaging a choke. This will improve choke life and performance, improving operators' revenues.

Stephen Corte, vice president, CORTEC, said, "Plug and other debris catching devices have been used in the industry for many years now, but CORTEC's compact Wellhead Plug Catcher is being utilised in a new application and specifically developed to improve choke service life and minimise down time for servicing. Operators fighting substantial well debris using this product will gain increased



The CORTEC Wellhead Plug Catcher.

choke trim life while experiencing less handling and downtime fighting debris. We have now installed hundreds of these units in the field and are very pleased with the positive response from our customer base."

The device has been evaluated and sized by the CORTEC engineering team to accommodate substantial plugging within the screen and still provide full capacity flow. The screen design has been field-proven and designed through consultation with field operators.

CORTEC is a manufacturer of high-quality valves and flow line equipment for production, drilling and service applications in the global oil and gas industry. CORTEC has two divisions, CORTEC Fluid Control (CFC) and CORTEC Manifold Systems (CMS). It engineers, manufactures, assembles and tests its products in Louisiana, USA, under API 6A, 6D and 16C licences and has a quality system registered to ISO 9001 and API Q1.

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Halliburton introduces PDC drill bits

HALLIBURTON HAS INTRODUCED the new Hedron platform of fixed cutter polycrystalline diamond compact (PDC) drill bits.

The drill bits combine the latest technology with an industry-leading customisation process to deliver high-performance, application-specific designs for customers.

The culmination of multiple technologies, Hedron drill bits are designed using Halliburton's Design at the Customer Interface (DatCISM) process, along with proprietary iBitS modelling and simulation software that enables the design teams to tailor each bit to unique customer challenges.

Hedron drill bits are the first PDC bits that incorporate Juggernaut cutters, Cerebro in-bit sensing insights, and Oculus advanced dull grading analytics. These technological advancements increase drilling performance



The PDC drill bits combine the latest technology with customisable performance.

through higher rates of penetration and extended run lengths in applications globally.

"Hedron drill bits are the next generation of fixed cutter bits; we've designed them to drill farther and faster than any previous bit generation," said David Loveless,

vice president of Halliburton Drill Bits and Services. "The combination of these transformative digital and hardware technologies enables Hedron drill bits to address today's most difficult drilling challenges and push the performance envelope."

Oliver Valves unveils slimline monoflanges for cold service applications

OLIVER VALVES LIMITED has unveiled a new range of slimline monoflanges for cold service applications.

Traditionally utilised within LNG (liquefied natural gas), cold service tools are able to operate between -29°C and -50°C. While valving for cold service does not require cryogenic bonnet extensions, they often require smaller extensions to allow for lagging application. Lagging types and thicknesses vary from project to project, and can be up to 50mm thick.

Valves used on cold service applications are required to be operatable at -50°C, so that they are capable of opening, closing and maintaining leak tightness

through the gland and across the seat at the valve design pressure.

Oliver Valves' Slimline



The unit was comprehensively tested against Shell specifications.

Monoflange block & bleed and double block & bleed assemblies utilise an outside screw and yoke needle valve primary isolate, and an inside screw and yoke type needle valves for a second isolate and bleed valve.

For cold service applications, the monoflanges can be supplied with extended bonnets.

Oliver Valves has utilised the rigorous testing requirements called for in the Shell specification 77/300, which covers the ability to perform at low temperatures and the gland and seat seals.

The units delivered zero seat leaks, well within leak rate BH, at ASME pressure classes 600 and 2500 and temperatures of -50°C.

All the testing was witnessed by a third party.

Enteq announces 45% revenue increase

ENTEQ TECHNOLOGIES, THE energy services technology and equipment supplier, has announced a 45% increase in revenue for 2022, with entry into new regions and energy transition fuelling the growth.

Building on the growth, Enteq's game-changing SABER tool, using a novel concept of internally directed pressure differentials to steer at the drill bit, has achieved its expected milestones to date.

Neil Bird, VP Advanced Drilling Systems at Enteq, commented, "The SABER Tool was developed and proven to work downhole by Shell before we took on the technology and refined the concept towards a commercial system. We have put a lot of time, money and effort into testing, while listening to the market to understand its wants and needs to further advance the tool.

"While the concept had already been proven, our engineering team has further de-risked the project and we have built a system that will be commercially viable."

The global drilling market is estimated to be worth at least US\$11bn, with Enteq's CEO adding, "We know that the drilling market, and in particular the RSS market, is strong. We're confident this is set to continue into the future, and we're excited by the potential to use our technology to support energy transition applications.

"With SABER, we're confident that we're able to do that and we're looking forward to providing a solution that customers can feel confident in investing in."

KROHNE Group launches rapid spares service

KROHNE GROUP HAS launched a rapid spares service that provides access to pre-defined spare parts for pipeline management solutions, supporting customers with fast replacements for failed items. It also includes spares that need to be pre-configured to match the failed item, for example, server components. Rapid spares are stored in KROHNE facilities for delivery to site on the next business day.

“KROHNE has spent the last 100 years delivering creative solutions to our industry partners and customers. Rapid spares is simply the latest iteration of this, coming at a time when we need



Image Credit: KROHNE Group

With access to large stocks of vital components, the company has realised its capability to provide a solution to ease customer fears.

to be managing resources and revenues closely in order to protect the three Ps of people, planet and profit,” said Frank Janssens, vice president, KROHNE Middle East and Africa.

AVEVA launches new version of operations control software

AVEVA, A GLOBAL leader in industrial software, has launched the 2023 release of its operations control software, the first major coordinated release of its HMI/SCADA software portfolio, available in both perpetual and subscription purchases.

The new release further supports the delivery of AVEVA Operations Control, a flexible, subscription-based solution of integrated capabilities that promotes greater efficiency and workforce collaboration at the scale that best suits the business.

AVEVA Operations Control simplifies day-to-day routines of teams by aligning workers

around common digital threads of information, delivering the data and insights they need to drive growth at every level through increased efficiency, agility and reliability.

With rich visualisation technologies, analytics and development tools deployed within a hybrid cloud and on-premises environment, customers can ensure performance consistency, remove opportunity for human error, and improve operator insight and reactions to process deviations. Critical information can be retrieved faster, and inbuilt flexibility provides greater scaling.

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THREE TRENDS SHAPING THE ENERGY TRANSFORMATION

Adnan Merhaba, partner, Energy & Utilities Practice lead and Carlo Stella, partner, Energy & Utilities Practice, Arthur D. Little Middle East discuss how decarbonisation, decentralisation and digitalisation are transforming the energy sector.

A **GAINST A GLOBAL** backdrop of environmental crisis and armed conflict, there is a growing need for meaningful change in the energy sector. While CO₂ emissions continue to exacerbate the climate emergency, the ongoing war in Ukraine is serving up a reminder of the fragility of energy supply in times of unrest. With energy and ecosystems facing a future of uncertainty, the call to action is clear: the sector and its partners must pull together to transform the way they work.

Fortunately, change has already begun. As Arthur D. Little unearths in its recent report, *Disruption Is Now* (<https://www.adlittle.com/en/insights/report/disruption-now>), three trends are shaping transformation efforts across the energy spectrum: decarbonisation, decentralisation, and digitalisation.

Decarbonisation

From soaring temperatures to changing landscapes, the climate emergency is unfolding before our eyes, and at COP26 commitment was secured to halt – possibly even reverse – the damage. Many of the world's biggest economies pledged to achieve net zero emissions by 2050 and double their efforts to curb the global temperature increase to 1.5°C.

It is not just a governmental affair; there is private sector resolve to support nations on their respective 'road to net zero' journeys. In fact, during COP26, the Global Financial Alliance for Net Zero announced that its participants had committed US\$130 trillion of private capital to effect meaningful change.

The significance of decarbonisation cannot be overstated. It will be nothing short of the most important overarching trend shaping the strategic thinking and investment decisions of companies – not just in the energy ecosystem, but in sectors across the board.

Decentralisation

The impact of the Ukraine conflict on global energy supply is indicative of a broader problem that has long been brewing. In a world of uncertainty, there is a pressing need for a more localised solution where service delivery is concerned, rather than a reliance on a much wider national or regional infrastructure.

The mission for energy stakeholders is to create future-proof infrastructures that can accommodate technologies such as intermittent and decentralised generation. Towards that goal, tried and tested solutions include siting wind farms close to urban areas or using micro-

generation such as photovoltaic (PV) rooftop panels on new housing developments and encouraging energy users to take greater responsibility for how they consume it. All these elements are feeding into new business models that are focused on much greater sustainability – a thread that runs increasingly through every component of society.

Digitisation

The digitalisation and automation of processes and practices in the energy sphere will be critical to the success of efforts to transform the sector. By digitising operations, energy players can reduce costs, increase revenue streams, and deliver superior service to customers. Importantly, digital solutions also enable companies to minimise waste and maximise operational efficiency, with clear sustainability gains and benefits for the environment.

Attesting to the importance of digitisation to the emerging energy paradigm, ADL's report reveals that, besides massive investments in the energy grid itself, the increasing digitisation of operations and flexibility dominate investments.

The power of hydrogen

Another area attracting both investment and global

attentions is hydrogen (H₂) – so much so, the global H₂ economy is expected to be worth US\$700bn by 2050. Green hydrogen in particular has been identified as a key technology to meet decarbonisation ambitions and support the transition toward a greener future in hard-to-decarbonise sectors.

Worldwide, collaborative R&D efforts are underway to maximise the potential of hydrogen within the global energy matrix. Recently, the UAE and the Netherlands joined forces to boost their H₂ efforts and advance the formulation of projects and initiatives to support the Paris Agreement on climate change. While Abu Dhabi National Oil Company (ADNOC), bp and Masdar have strengthened their strategic partnership to progress the development of clean hydrogen and technology hubs, driving energy innovation for both the UAE and the UK.

The path ahead

In a context of climate crisis and supply uncertainty, the need for energy transformation is resoundingly clear, and the way in which industry players position themselves today could determine the success or failure of global efforts, as well as their own competitive advantage, for decades to come. ♦

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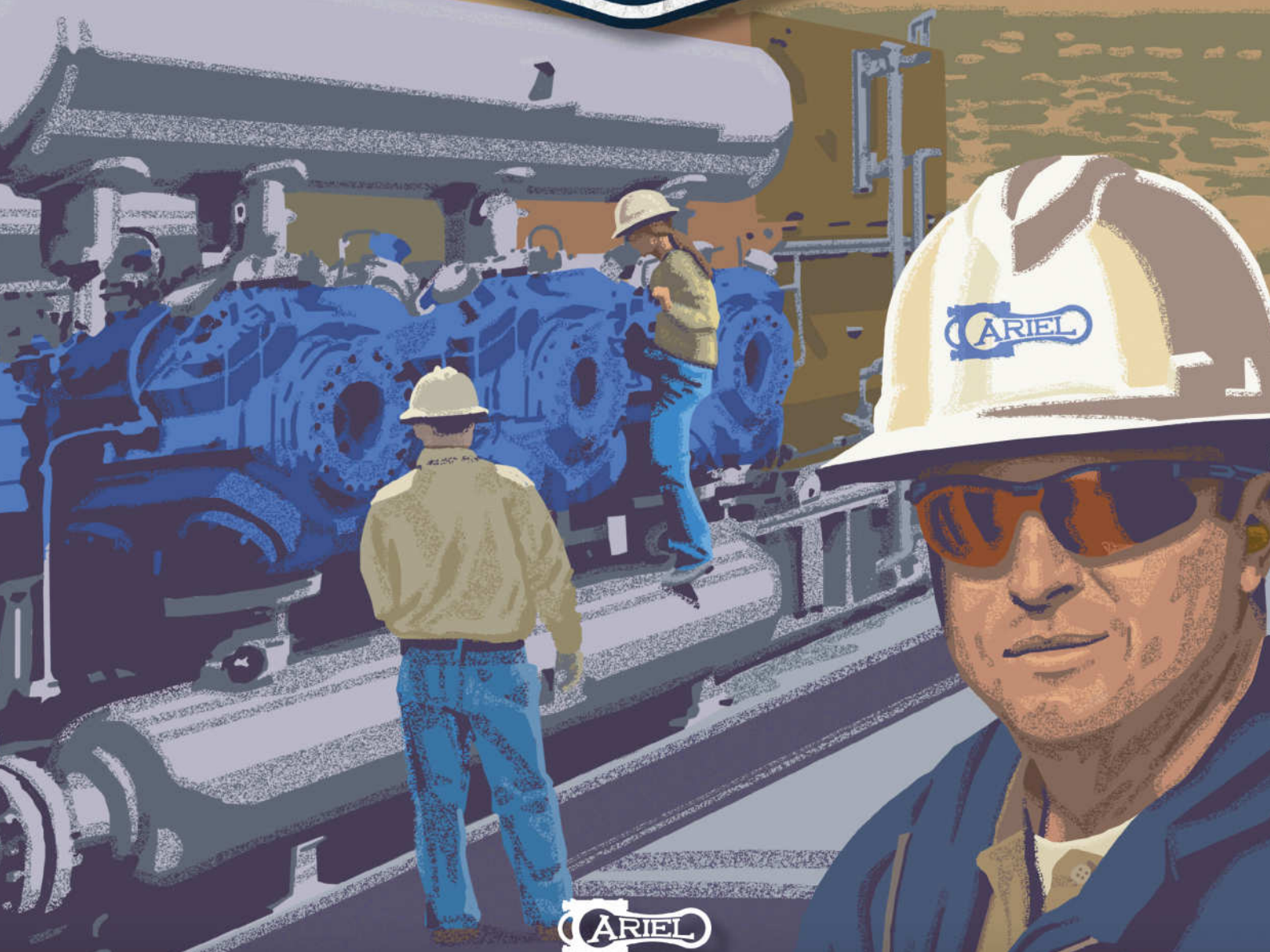
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