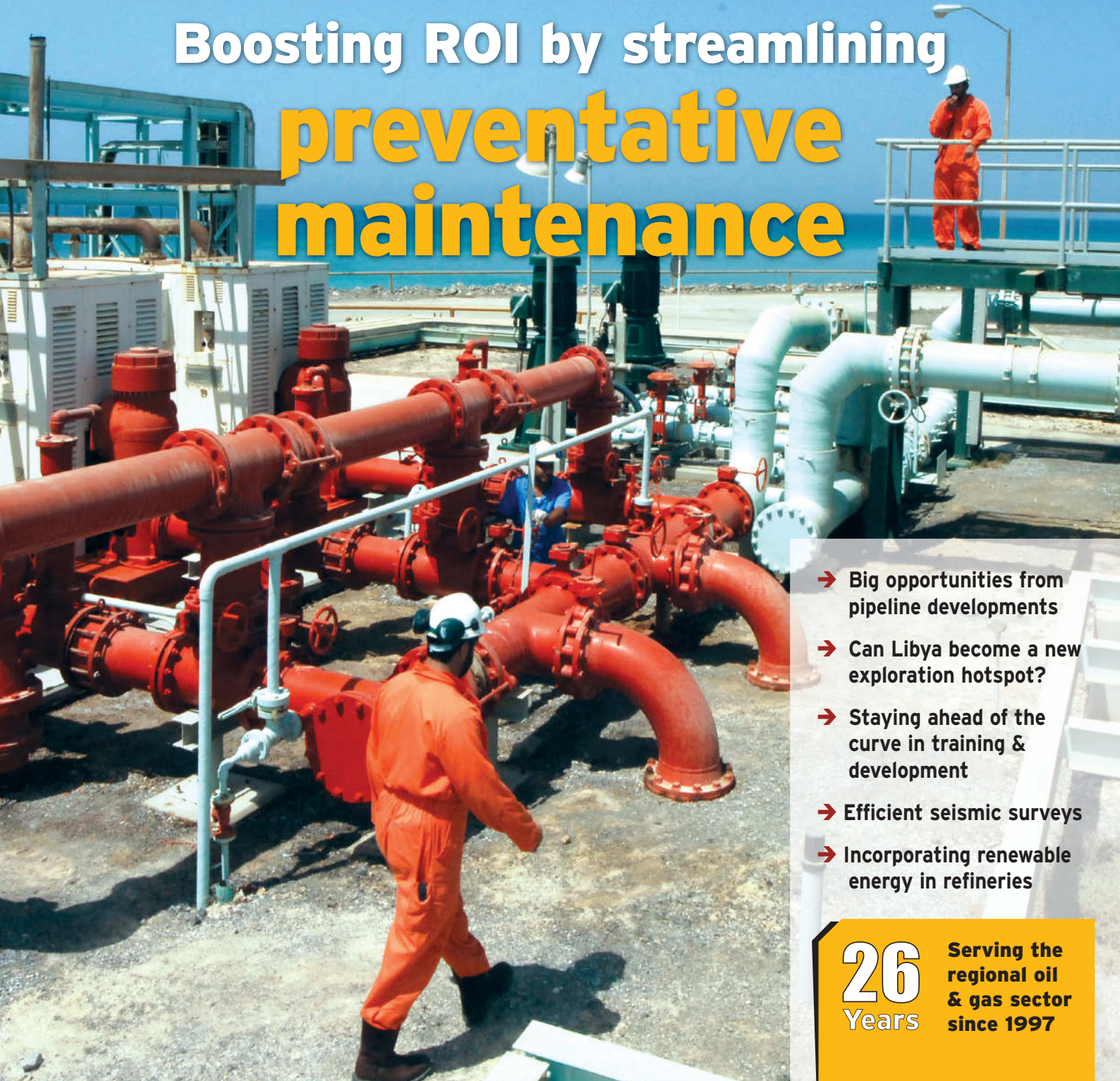


# Oil Review

## Middle East

VOLUME 26 | ISSUE 5 2023

### Boosting ROI by streamlining preventative maintenance



- ➔ Big opportunities from pipeline developments
- ➔ Can Libya become a new exploration hotspot?
- ➔ Staying ahead of the curve in training & development
- ➔ Efficient seismic surveys
- ➔ Incorporating renewable energy in refineries

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## → Editor's note

IN THIS ISSUE we take an in-depth look at Libya, one of the world's few under-explored provinces with great potential for more oil and gas discoveries. Could it become a new exploration hotspot for IOCs? While possessing many natural advantages, it also faces huge challenges, not least the political and security situation. Turn to p12 to find out more.

Pipeline activity in the Middle East is at a healthy level, thanks to the growing demand for gas, major expansion projects in the region and the potential demand for new fuels such as hydrogen, offering attractive prospects for manufacturers, contractors and suppliers. See our Pipeline Review on p18.

Also in this issue we look at how a new streamlined approach can optimise preventative maintenance, improving efficiency, reducing downtime and having a significant positive effect on ROI (p34); and how the downstream sector can embrace new energy sources and feedstocks to reduce emissions (p24).

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Back Cover Image: Adobe Stock

## → Executives' Calendar, 2023

SEPTEMBER			
5-8	<b>Gastech</b>	SINGAPORE	www.gastechevent.com
5-8	<b>Offshore Europe</b>	ABERDEEN	www.offshore-europe.com
OCTOBER			
2-5	<b>ADIPEC</b>	ABU DHABI	www.adipec.com
9-13	<b>Africa Oil Week</b>	CAPE TOWN	www.africa-oilweek.com
16-18	<b>Energy &amp; Sustainability Forum MENA</b>	RIYADH	www.europetro.com/esfmena
17-19	<b>Energy Intelligence Forum</b>	LONDON	www.energyintelligenceforum.com
NOVEMBER			
1-2	<b>MENA HSE Forum</b>	DUBAI	www.hse-forum.com/mena
27-28	<b>LEWAS Awards 2023</b>	AL KHOBAR	www.lewa-symposium.org

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

### Gastech – defining the future of energy

GLOBAL ENERGY EXPERTS convening in Singapore for Gastech 2023 will include CEOs, company presidents, and executive chairs of high-level international energy businesses and organisations, including Baker Hughes, Shell, ExxonMobil, and the International Energy Forum.

This year's edition of Gastech is supported by Enterprise Singapore and Singapore Tourism Board, and co-hosted by ExxonMobil, Chevron, Shell, and Venture Global LNG. It will take place at Singapore EXPO, on 5-8 September 2023.

The 2023 programme, which includes high-level ministerial sessions, leadership roundtables and technical and commercial conferences, will focus on the major themes of energy supply security, low-carbon energy for sustainable global growth, energy transition alliances, and the development of the energy industry workforce globally.

Taking place in the build-up to COP28, Gastech 2023 will elaborate on the ideas, solutions and innovations that will enable the energy industry to manage and deliver the transition to low-carbon energy, whilst continuing to supply the world with its energy needs. Through high-level panel discussions focused on the importance of low-carbon solutions and climate technologies industries, global business leaders will elaborate on the investment and regulation strategies required to ensure global energy security, affordability and sustainability.

The energy supplies needed in the years ahead, and the need for energy systems to be on track for net zero emissions by 2050, are already heightening the pressure on the investment community. During the Gastech 2023 Strategic Conference, global energy leaders will share insights on the investment landscape required to stimulate adequate funding on both new and existing energy production as well as next generation energy solutions and climate technologies. Shifts in financing strategies, a changing appetite for risk and a demand for greater flexibility are transforming partnership models. As the gas industry both expands and fragments, introducing greater liquidity and optionality, Gastech will examine how new opportunities for partnerships are being established in the global LNG market and demonstrate the resilience and agility of natural gas.

Speakers slated to attend Gastech 2023 include Joseph McMonigle, secretary general of the International Energy Forum (IEF); Lorenzo Simonelli, chairman and CEO of Baker Hughes; Meg O'Neill, CEO & managing director of Woodside Energy; Peter Clarke, senior vice president, Global LNG of ExxonMobil; Takayuki Ueda, president and CEO of INPEX; Russell Hardy, CEO of Vitol; Michael Lewis, CEO of Uniper; Akshay Kumar Singh, managing



The LNG market will be one of the focuses of Gastech.

Image Credit: Adobe Stock

director and CEO of Petronet LNG Ltd; Proscovia Nabbanja, CEO of Uganda National Oil Company (UNOC); Paul Everingham, CEO of Asia Natural Gas & Energy Association (ANGEA); Dan Brouillette, president of Sempra Infrastructure; Iqbal Z Ahmed, chairman of the Pakistan Gas Consortium; Paul Varello, founder and executive chairman of Commonwealth LNG; Freeman Shaheen, president of Chevron Global Gas; Federica Berra, senior vice president, BP; and Cederic Cremers, executive vice president – LNG, Shell.

Lorenzo Simonelli, chairman and CEO, Baker Hughes said, "We believe that transforming the global energy landscape necessitates highly collaborative business models and constructive partnerships across the energy industry value chain. We are committed to working together with our partners to drive impactful change and create a better energy future for all. Gastech will facilitate the cross-industry partnerships needed to make a real difference in the global energy sector and improve energy reliability, affordability and sustainability."

Peter Clarke, senior vice president – Global LNG, ExxonMobil, said, "The global LNG market is dynamic and resilient – unlocking its potential is key to meeting society's future energy demand. As co-host of Gastech 2023, ExxonMobil remains committed to driving innovation and providing customers around the world with reliable, lower-emission LNG solutions. Gastech is the premier global platform with the power to accelerate energy leaders' and other stakeholders' shared ambition: providing affordable and reliable energy to a growing population which is seeking a higher standard of living while lowering emissions."

For more information, please visit [www.gastechevent.com](http://www.gastechevent.com)





## High-performance fasteners, sealing and precision-engineered components for the world's energy markets

Founded in 2002, Triplefast Middle East supplies fasteners, sealing and gaskets to the Gulf, Middle East, Caspian, Indian subcontinent and surrounding areas. From its 15,000 square-foot strategically-placed UAE facility, Triplefast Middle East keeps stock of a diverse range of products to meet the demands of the Oil and Gas and Petrochemical markets including threaded bar, stud bolts, socket screws, hexagon products and heavy series nuts. Having built a reputation for the manufacture of precision bolting for the Power Generation industry, Triplefast Middle East has formed supply partnerships with some of the world's leading gas, steam turbine and associated plant manufacturers.



# Advancing the decarbonisation dialogue

ADIPEC, taking place in Abu Dhabi from 2-5 October 2023, is an international platform bringing together the ideas, ambition, technology and capital needed to decarbonise quicker and create tomorrow's energy system, faster.

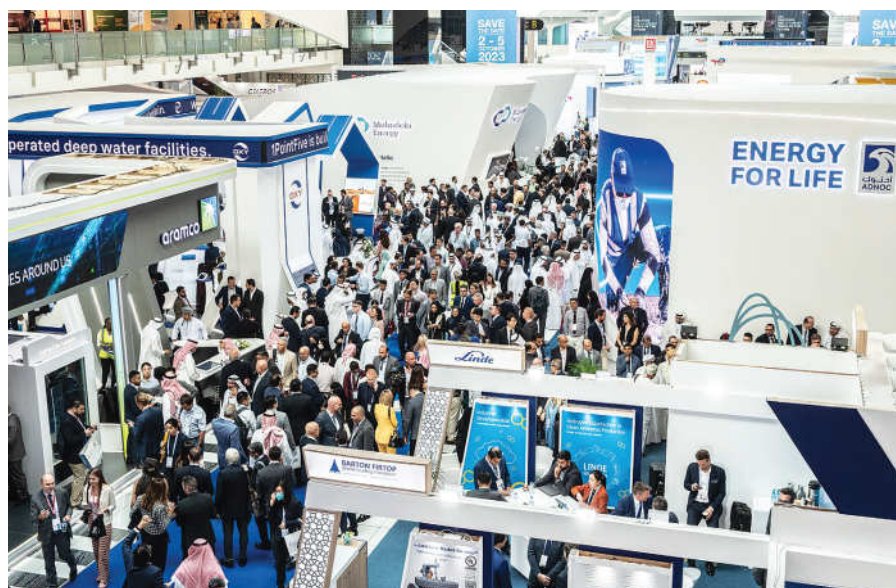
**H**OSTED BY ADNOC, ADIPEC builds on its nearly four-decade legacy as an inclusive platform convening the public sector, leaders in energy and technology, the financial community and private enterprise stakeholders from a wide spectrum of industries and sectors, as well as future talent.

Facilitating discussion across the entire energy ecosystem, ADIPEC fosters global partnerships and inspires credible solutions to critical challenges related to innovation, investment and securing the cleaner, more affordable and reliable energy that the world needs.

As the UAE prepares to welcome global leaders to COP28 in November 2023, ADIPEC will frame diverse conversations that complement the nation's goal of delivering a COP of collaborative action, while driving investment into the clean energies of the future.

Across 350 unique sessions, ADIPEC 2023 will welcome more than 1,500 speakers – including government ministers, CEOs, policymakers, energy experts and innovators – to rally industries, sectors and individuals around a common cause, encouraging collaboration and the action required to advance the world's decarbonisation goals.

The event encompasses both technical and strategic conferences – including a new, hydrogen-focused summit – that will address a range of themes such as energy security, mobilising finance and investment, and the development of a zero-carbon value chain. More than 2,200 companies will also come together at ADIPEC's four exhibition zones, facilitating cross-sector collaboration and



ADIPEC is expected to attract more than 160,000 energy professionals.

game-changing partnerships.

ADIPEC will serve as an open forum for dialogue on diversity, equity and inclusion, while highlighting the role of young talent and inspiring them to become the future leaders of a responsible energy industry.

Staged in parallel, the ADIPEC Awards 2023 will bring together and celebrate tomorrow's changemakers. They will feature eight categories, with criteria focused on supporting the industry pioneers developing the solutions that will unlock a sustainable energy future for all.

Tayba Al Hashemi, chair of ADIPEC 2023 and CEO of ADNOC Offshore, said, "By 2030, the world will be home to an additional half a billion people, demanding more energy every year. At the same time, the global challenge of climate change calls for urgent, game-changing solutions to eliminate emissions. Every government, industry, business and individual has a role to play in decarbonising quicker, and creating the future of energy, faster, while safeguarding energy security and

ensuring nobody is left behind.

"ADIPEC 2023 will be a progressive force for energy transformation and leadership. It will unite the expanding and increasingly diverse world of energy and help us work together to transform, decarbonise and future-proof our industry, by accelerating the innovation and tangible actions needed to enable a lower-carbon and higher-growth future for the world."

Christopher Hudson, president of dmg events, organisers of ADIPEC 2023, said, "ADIPEC 2023 will actively support the transformative global energy agenda. As climate challenges intensify, the energy sector's responsibility to lead the necessary progress on decarbonisation is greater today than ever before. ADIPEC 2023 will bring key industry decision-makers together to accelerate the innovation, collaboration, and investment necessary to drive us towards a lower-carbon future." ■

For more information visit: [bit.ly/3NTzGpQ](https://bit.ly/3NTzGpQ)

“ ADIPEC 2023 will be a progressive force for energy transformation and leadership.”



## Sparrows wins US\$13mn contract

SPARROWS GROUP, THE engineering and maintenance services specialist for the global energy and industrial sectors, has been awarded a major crane replacement contract for a client in the Middle East.

The project, which is worth US\$13mn, is expected to last 18 months. The scope of work will see Sparrows complete all aspects of the engineering required to

replace four BOS Liebherr cranes of four offshore platforms, which are beyond their expected operational life. Sparrows will handle all crane interfaces, installation, commissioning and testing, as well as engineered lift plans for the removal and installation of the cranes using a lift barge, which is to be supplied by the main contractor, along with the new cranes.

The project will be carried out in two phases, with phase one taking place onshore from the company's Abu Dhabi facility and workshop and phase two offshore.



Sparrows has announced a contract win in the Middle East.

## Aquaterra Energy secures UAE decommissioning contract

AQUATERRA ENERGY, A leader in global offshore engineering solutions, on 27 June, announced a multi-million-pound contract with a major Abu Dhabi based operator, working in partnership with TPMC, to provide offshore riser equipment and services for the decommissioning of eight wells, in 80m water depth offshore Abu Dhabi by 2028.

Aquaterra Energy secured the tender through its leading offshore engineering expertise, regional knowledge, and status as a fully independent riser connector OEM.

The offshore specialists will provide a completion and workover riser system complete with AQC-CW connectors, as well as an additional subsea riser system, tieback engineering and rig modifications. Throughout the contract, Aquaterra will deliver a complete end-to-end managed service, providing engineering services, expertise and personnel. The completion and workover riser system, complete with AQC-CW connectors, is certified to BS EN ISO 13628-7 2006 and can operate in water depths of up to 1,500m. The system has been designed to withstand repeat make and breaks, whilst offering a gas-tight metal-to-metal seal.

The company has identified the Middle East as a key geography to support its global growth plan. This contract marks another significant step forward in the region for the business, building on its regional footprint, having delivered intelligent engineering solutions to more than 35 projects in the Middle East to date.



James Larnder, managing director of Aquaterra Energy.

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## Aker and Aramco to explore CCUS partnership opportunities

AKER CARBON CAPTURE and Aramco have signed a Memorandum of Understanding (MoU) to explore partnership opportunities to deploy carbon capture, utilisation and storage (CCUS) and industrial modularisation in Saudi Arabia.

The MoU is expected to focus on carbon emissions reduction and removal through CCUS from industries and energy solutions by offering modular carbon capture plants and aftermarket services. The parties also aim to assess the potential for developing local supply chains and module fabrication. Aker Carbon Capture's Just Catch modular concept is a standardised product offering that enables prefabrication of carbon capture units.

"We are pleased to announce this opportunity with Aramco that aims to support Saudi Arabia's Vision 2030 and the Kingdom's Net Zero 2060 ambition. Together, we aspire to explore the establishment of a local modular CCUS industry, creating new jobs and helping Saudi Arabia's important journey towards net zero emissions. This MoU is a potential first step for Aker Carbon Capture into the Middle East," said Egil Fagerland, CEO at Aker Carbon Capture.



Image Credit: Aker Carbon Capture

The signing of the MoU.

## ADNOC awards Petrofac US\$700mn EPC project

PETROFAC, A LEADING international service provider to the energy industry, has been selected by the Abu Dhabi National Oil Company (ADNOC) subsidiary, ADNOC Gas Processing, to undertake a significant new engineering, procurement and construction (EPC) project at its Habshan Complex.

The contract, awarded to Petrofac Emirates, is valued at approximately US\$700mn and involves the engineering, procurement and construction of a new gas compressor plant. Comprising three gas compressor trains, associated utilities and power systems, the new plant will support ADNOC to substantially increase gas output from the Habshan Complex, west of Abu Dhabi.

"We are thrilled to have been selected by ADNOC, one of Petrofac's longest-standing customers, to undertake this significant new EPC project in our home market of the UAE. We very much look forward to working together with ADNOC to safely and sustainably develop this critical energy resource," said Petrofac's group chief executive, Tareq Kawash.

## Elcome and Miros sign GCC distribution agreement

LEADING MARITIME SYSTEMS and services provider Elcome International LLC has signed an exclusive sales and service agreement with Miros AS, the Norway-headquartered wave, current and oil spill monitoring specialist.

The partnership expands the distribution of Miros' comprehensive range of sea state sensor and measurement solutions to Gulf Cooperation Council (GCC) countries, namely UAE, Saudi Arabia, Oman, Kuwait, Bahrain, and Qatar.

Miros' portfolio of sea state measurement solutions provides accurate, real-time data for weather-sensitive operations at sea, as well as offering input to asset integrity systems and coastal monitoring. Its dry-mounted, radar-based sensors provide maritime and offshore operatives reliably with the sea state data they need to make informed decisions to improve fuel consumption, reduce carbon emissions, and mitigate any safety risks. As part of the agreement, Elcome will not only partner with Miros, but also provide distribution and installation services for its full product portfolio, which includes the company's industry leading oil spill detection (OSD) system. Elcome will be certified to commission and perform service and support on all Miros' products. The Miros OSD system has a unique ability to evaluate multiple indicators concurrently, only triggering alarms when the 'right' combination is identified. Following data processing, Miros OSD transmits the appropriate signal to the user interface, which can display up to 24 hours of oil spill history and trajectory.



Image Credit: Elcome International

Elcome and Miros sign agreement for sea state monitoring and oil spill detection solutions.

## McDermott secures major contract from Qatargas

MCDERMOTT WAS AWARDED a major contract from Qatargas Operating Company Limited to deliver engineering, procurement, construction, and installation (EPCI) for the North Field Production Sustainability (NFPS) Offshore Fuel Gas Pipeline and Subsea Cables Project, COMP1.

The scope of the contract includes the installation of 118 miles of 32 in diameter subsea pipelines, 11 miles of subsea composite cables, 116 miles of fibre optic cables, and six miles of onshore pipelines. The project will be managed and engineered entirely from the McDermott Doha office with fabrication taking place at QFAB.

The contract award follows the North Field Expansion Project (NFXP) contract awarded to McDermott in 2022, which is currently under execution and remains one of the largest contracts McDermott has been awarded in its company history.



Image Credit: McDermott

The project will be managed and engineered entirely from the McDermott Doha office.

"The COMP1 award reflects the confidence key customers have in our ability to deliver strategically significant energy infrastructure projects in the Middle East," said Mike Sutherland, McDermott senior vice president, Offshore Middle East. "As we continue to progress the NFXP offshore contract awarded to us last year, we are helping the State of Qatar expand LNG production from 77 to 126 MTPA through the new LNG trains under construction. We are delighted to deliver this key pipeline and cable infrastructure and support the extension of the production plateau for the existing LNG trains."

"Our continued commitment to Qatar, building end-to-end execution capability in-country and significantly enhancing the local fabrication platform through QFAB, the McDermott-Nakilat joint venture fabrication yard in Qatar, will support continued energy development in the region," said Qatar Country manager and vice president of Operations, Neil Gunnion.





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## Sercel secures mega crew equipment deals for Middle East

SERCEL HAS BEEN awarded multiple major equipment contracts by BGP Inc., a worldwide leading geophysical services provider.

The contracts include the delivery of 54 Nomad 65 Neo vibrator trucks and 29,000 GPR300 seabed nodes. The equipment will be used this year on several major onshore and OBN seismic surveys conducted in the Middle East.

Meng Qingbing, president of BGP International, said, "Throughout BGP's long-term cooperation with Sercel, we have been impressed by their agility in anticipating our needs and meeting our tight deadlines. We are confident that we will continue this relationship with renewed success."

Emmanuelle Dubu, Sercel CEO, stated, "These major equipment sales strengthen Sercel's already long-established presence in the Middle East. We are particularly pleased to see our GPR300 nodal system continuing to gain ground as a preferred OBN solution. Featuring Sercel's field-proven QuietSeis broadband digital sensor technology, the GPR records the highest-quality data for the most accurate imaging in all seabed environments, including shallow water, as for this award in the Middle East. BGP's long-term loyalty reflects their complete satisfaction with our advanced technology and expertise."



*The contracts awarded to Sercel include the delivery of 29,000 GPR300 seabed nodes and 54 Nomad 65 Neo vibrator trucks.*

## AIQ and NVIDIA partner for advanced AI solutions

AIQ, A TECHNOLOGY pioneer focused on driving artificial intelligence (AI)-powered transformation for the energy industry, has joined the NVIDIA Inception programme, which provides technical guidance and support for cutting-edge enterprises.

By joining Inception, AIQ will gain access to the latest AI technology and expertise from NVIDIA and will receive technical training through the NVIDIA Deep Learning Institute. AIQ will also use the latest NVIDIA hardware and software as part of its strategy to develop cutting-edge applications and maintain a competitive edge in the dynamic AI market.

Omar Al Marzooqi, CEO of AIQ, said, "Joining NVIDIA Inception will allow us to further optimise our innovative AI solutions with best-in-class infrastructure. With access to NVIDIA's unparalleled frameworks, comprehensive training, and deep technical expertise, we will expand our reach to international markets and new horizons in innovation as we continue to provide our customers with advanced solutions to transform the energy sector and other hard-to-abate industries."

## Saipem awarded lucrative offshore drilling contracts

SAIPEM HAS RECEIVED two new offshore drilling contracts worth around US\$550mn. These contracts include one in the Middle East and another in the Mediterranean Sea.

In the Middle East, Saipem has successfully secured a 10-year extension to its existing contract, ensuring the continued operation of the Perro Negro 7 jack-up drilling unit from the second half of the year. The Perro Negro 7 is a highly advanced jack-up rig that can operate in water depths of up to 375 feet, meeting the strictest regulations and environmental standards.

"The 10-year extension is a record duration in the area, which in the past had only been granted to an international contractor on limited occasions, and further strengthens Saipem's strategic positioning in the drilling segment," according to Saipem.

Furthermore, in the Mediterranean Sea, Saipem has been awarded a contract for the utilisation of the semisubmersible unit, Scarabeo 9, for an estimated period of around six months plus an optional extended period. The unit is a sixth-generation semisubmersible drilling rig equipped with a dual ram rig and is capable of operating in ultra-deep water such as depths of up to 12,000 feet.

The acquisition of this contract confirms Saipem's solid positioning in the Mediterranean drilling market, an area which has been characterised over the years by appreciable stability and is expected to be able to contribute to keeping fleet utilisation rates high.



*These contracts include one in the Middle East and another in the Mediterranean Sea.*

## SNOC and Sumitomo sign MOU for CCS Collaboration

SHARJAH NATIONAL OIL Corporation has signed a memorandum of understanding with Sumitomo Corporation, through its wholly owned subsidiary, Sumitomo Corporation Middle East FZE, to conduct a joint feasibility study related to the potential for carbon capture and storage in Sharjah and beyond.

The feasibility study will cover the entire CCS value-chain including the techno-economic analysis of CO<sub>2</sub> capture, transport, storage, business models and assessment of regulatory aspects in order to assess the viability of a small to large-scale CCS project. If a CCS hub can be developed in Sharjah, this will contribute significantly to the decarbonisation of the Northern Emirates.



*SNOC gas field: Ideal carbon sink.*

The mature gas field owned and operated by SNOC is potentially a competitive carbon sink for sequestration due to its large storage capacity and ideal location which is not far from multiple large-scale CO<sub>2</sub> sources such as power plants and other industrial emitters.

Climate change is an existential challenge that requires urgent action from businesses, governments, and individuals. Innovation and collaboration are essential drivers in addressing climate issues and such CCS collaborations will play a pivotal role in this endeavor. Sumitomo Corporation has been looking for partnerships in order to develop CCS projects globally whilst SNOC has been working on re-purposing its mature gas reservoirs in Sharjah.

Hatem Al Mosa, CEO of SNOC, commented, "We are pleased to sign the MOU with Sumitomo and look forward to the next steps. As part of the joint feasibility study, we will collaborate with industry leaders, environmental organisations and regulators with the aim of developing a viable project which adheres to the highest standards. SNOC has committed to reach net zero on its own operations by 2032 and CCS has the potential to support this goal and beyond. The time to start is now."



## IEA urges producer/consumer gas dialogue

THE GLOBAL ENERGY crisis sparked by Russia's invasion of Ukraine has transformed the structure of natural gas markets, requiring closer dialogue between producers and consumers looking to ensure both short- and longer-term security of supply and reduce emissions.

Tensions in gas markets have eased significantly since the beginning of 2023, according to the latest edition of the IEA's annual Global Gas Security Review. Yet the new analysis notes that deeper coordination among market participants remains essential, given momentous shifts in how gas markets function.

The new IEA report also includes a special focus on integrating low-emissions gases into energy systems. Scaling up the use of these gases will play a critical role in reducing greenhouse gas emissions from the sector.

"A new global gas market is taking shape after last year's crisis. Given this, responsible producers and consumers must reconsider their approaches to supply security and flexibility, cooperating even more closely," said Keisuke Sadamori, the IEA's director of Energy Markets and Security. "Meaningful efforts are also needed to reduce the carbon footprint of gas supply chains, including through greater use of low-emissions gases."

The IEA's latest assessment of market dynamics shows gas markets have moved towards a gradual rebalancing since the start of the year. EU storage sites could be filled close to 100% by mid-September. However, full storage sites are no guarantee against market volatility during the winter. A cold winter, together with a full halt in Russia

*Tensions in gas markets have eased significantly since the beginning of 2023.*



Image Credit: Adobe Stock

pipled gas supplies to Europe early in the heating season, could easily renew market tensions. Fierce competition for gas supplies could also emerge if Northeast Asia experiences colder-than-usual weather and economic growth is stronger than expected in China.

LNG has become a baseload source of supply for Europe, with its share in total EU demand rising from an average of 12% over the 2010s to close to 35% in 2022 – similar to the contribution from Russia's piped gas before the invasion of Ukraine. Meanwhile, China's balancing role in global gas markets is set to increase. Additionally, the flexibility of gas supply needs to be reassessed in light of the phase-out of Russian piped gas exports to the European Union.

As producers and consumers engage in closer dialogue to address these dynamics, the new IEA report recommends that they should explore the development of innovative commercial offerings, new procurement mechanisms and cooperative frameworks favouring a more flexible supply of LNG.



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# Can Libya achieve its oil & gas potential?

Moin Siddiqi, economist, examines whether Libya can regain its status as a prominent oil producer and exporter.

**L**IBYA, A COUNTRY the size of Mexico, is among the world's few 'under-explored' provinces with excellent potential for more oil and gas discoveries. To date, only one quarter of its vast territory has been explored for hydrocarbons. The International Energy Agency (IEA) reckons a 'fully explored' Libya could yield a further 100bn barrels of oil equivalent – hence it could be a magnet for foreign energy majors given a stable political/security environment.

Libya's proved oil and natural gas reserves at 48.4bn barrels and 53 trillion cubic feet (Tcf) respectively as of end-2020 are based on outdated analysis by Libyan National Oil Corp (NOC), various consultancies and international oil companies (IOCs), notably Eni, Royal Dutch Shell, and the US 'Oasis Group' – ConocoPhillips, Hess, and Marathon. Thus, significant future reserves upgrade is a realistic probability. NOC estimates 'ultimate recoverable reserves' at 144bn barrels and 100 Tcf, respectively, on massive exploration and development, aided by IOCs' sophisticated technologies. UK-based Bayphase energy consultants put Libya's proved plus probable potential remaining reserves at 67bn barrels and 89 Tcf.

## Geology

There are six sedimentary basins in Libya, four of which have proven petroleum systems. These are (in order of importance), Sirte, Murzuq, Ghadames, Pelagian, Cyrenaica, and Kufra. The prolific Sirte basin is well explored compared to others with three geological trends: western Fairway; north-centre region;



Image Credit : Adobe Stock

*Libya is relatively unexplored, with the potential for further oil and gas discoveries.*

and the eastern trend housing the giant Sarir field with 8bn barrels of recoverable reserves. The Murzuq basin in the Sahara Desert boasts probable reserves of 25bn barrels. More than 90% of recoverable reserves are in the onshore Sirte and Murzuq basins – they also account for the bulk of oil production capacity.

The partially developed Ghadames basin (an extension of Algeria's Berkine basin) boasts exploration potential in Devonian, Silurian, and Triassic reservoirs. The mainly unexplored Kufra basin near Chad and Sudanese borders may contain 4bn barrels of oil. The frontier offshore Cyrenaica and Pelagian basins along the western and eastern coasts also possess considerable potential. The northern part of the Gulf of Gabes holds possibilities of 3.7bn barrels and 12 Tcf of natural gas in the area. According to IEA, the 'oil-belt' regions of Libya could possess 220bn barrels of original oil in place.

## Upstream attractions

Libya can become the 'hot spot' for IOCs' search for new fossil fuel supplies thanks to:

- Superior reserves of light (high API gravity) and low-sulphur (sweet) crude requiring little refinement (unlike sour crude) and cheap cost of oil recovery
- Production capabilities resemble those of mid-east Gulf rather than African producers. The bulk of oil reserves are deposited in 21 giant fields, chiefly Sarir, Sharara and Deffa-Waha
- Closer proximity to important European refining centres on the Mediterranean means lower transportation costs compared to Persian Gulf and sub-Saharan African producers
- Main export blends (Es Sider and Sharara) fetch higher premiums on global markets for gasoline and middle distillate yields
- The desert area has yet to be explored using sophisticated technologies of IOCs.

“Libya can become the 'hot spot' for IOCs' search for new fossil fuel supplies.”



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What is undeniable is Libya's 'natural prospectivity' to dramatically expand oil and gas production over the next decade, thus making it Europe's vital energy supplier. Libya in 1970 was producing 3.3mn bpd from just a dozen oilfields.

### A plethora of challenges

Libya, despite its natural advantages, has been plagued since 2011 by chronic problems that prevented a large-scale exploration programme, foreign direct investment (FDI) and sustainable output increases, as well as nation building. These include infrastructure bottlenecks, years of reservoir mismanagement, severe under-investment, NOC's budget constraints, political dissension (civil strife), shortages of skilled manpower, rigs/equipment, and labyrinthine bureaucracy (red tape), as well as militia blockades of several western fields and ports that pushed oil output below 0.5mn bpd a few years ago.

The annual 'natural' decline rate is estimated at 10% or higher – with reserve replacement also slipping over three decades. Therefore, the main challenges are to re-develop ageing fields such as block NC-174 in the Murzuq basin and finding/developing new oil-gas fields including in the Ain Jarbi block, while maintain rising production trajectory.

### Harnessing gas resources

Gas exploitation is in its infancy, although proved reserves (53 Tcf) rank as the world's 16th highest, with output averaging only 13bn cubic metres (cu m) per annum over 2012-21 (BP data). Offshore gas is known to exist in large quantities, but associated gas has been flared off for decades. There is potential to monetise gas reserves as feedstock for electricity, and expand existing piped and liquefied natural gas (LNG) exports. Last year, Libya exported a modest 3.2bn (cu m) of natural gas to Italy (Sicily) via the 32-inch, 595-km underwater pipeline GreenStream. Libya aims to maintain gas output at least 1.5bn cubic feet/day (bcf/d).

Last February, Eni became the first major to announce a new project in Libya in over two decades. It signed an US\$8bn agreement with the NOC to produce about 850mn cf/d by tapping estimated reserves of six Tcf from two offshore gasfields. NOC commented the Eni deal is "just the first step in a long way for more and more investment." NOC has pledged to boost gas output by reducing flaring and developing new non-associated fields.

“Total output still lags the pre-conflict era.”

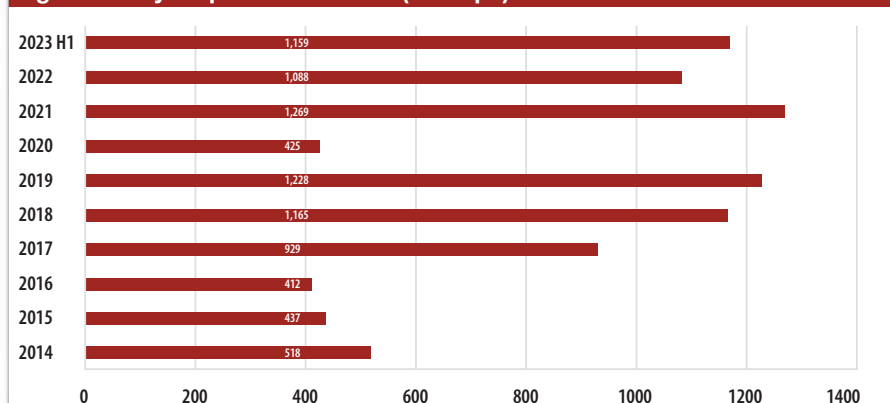
**Table 1: The correlation of Libya's hydrocarbons growth with GDP growth**

	2020	2021	2022	2023*	2024*
Real GDP growth (%)	-29.5	28.3	-11.4	18.8	8.2
Hydrocarbons growth (%)	-35.5	45.0	-17.0	20.0	8.3
Oil & gas exports (US\$b)	7.5	25.7	29.1	25.5	26.2

\*Projections

Source: International Monetary Fund (IMF)

**Figure 1: 10-year production trend ('000 bpd)**



Sources: Energy Institute 2023 Statistical Review of World Energy and OPEC Monthly Oil Market Report July 2023.

The exploration and development of offshore acreage for discovering prospective gasfields in the Mediterranean Sea is expected to provide a significant growth opportunity for IOCs.

### Signs of recovery

The country's gross domestic product (GDP) closely tracks the petroleum sector. The under-utilised oil and gas industry is the engine of future growth.

Exceptional swings in Libyan oil output and exports are evident (see above).

The end-2023 production goal is 1.6mn bpd, according to Oil & Gas Minister, Mohamed Aoun. But total output still lags the pre-conflict era (1.82mn bpd in 2008).

Libya is prioritising a key US\$3bn offshore expansion project led by Eni and NOC to help reach near-term goals, while shifting some oil capabilities from the onshore to the offshore arena. That, in turn, can increase oil reserves and counter faction-backing militias with power to disturb production.

The giant Waha oil concession in the Sirte basin – a joint venture between TotalEnergies, ConocoPhillips, and the NOC – boasts capacity to produce 350,000 bpd altogether. Eni and BP plan offshore drilling in the Ghadames and Sirte basins next year.

The Tripoli-based Government of National Accord (GNA) intends to comply with global benchmarks in order to enhance the export potential and attract greater FDI. Last February, NOC unveiled a new plan 'Strategic Programs Office' (SPO), in collaboration with U.S. firm KBR to help "improve fiscal transparency and keep pace with

developments in the oil sector worldwide." The strategy aims to raise sustainable productive capacity to 2mn bpd in three to five years, from around 1.2mn bpd presently – contingent on increased exploration and development to ensure the longevity of the sector.

Under the plan, new oil/gas blocks will be offered for exploration for the first time since 2006. Last May, Eni, TotalEnergies, and ADNOC began negotiations on the potential exploration and development of oil/gas fields in NC7 block in the Ghadames Basin (where new finds are reported). Iliasse Sdiqi, associate director at Whispering Bell, a risk management firm covering North Africa, explained, "The idea is that to draw foreign investment you need to be more transparent, and you need to enable IOCs to take a look at your books." Sdiqi added, "This strategic programme office is (set up) both to enable IOCs to be comfortable with channelling money into the east, and also to satisfy the local communities in the region."

### Regaining its former status

Several changes are crucial to develop Libya's energy industry to its full potential.

Prospects for sustained gains in oil recovery and production depend on several variables. These include huge FDI bringing it up to scratch with Gulf producers; enhanced oil recovery (EOR) and improved oil recovery (IOR) techniques; rehabilitation of damaged fields; horizontal and deep drillings; production/pressure maintenance technology and stream injecting; bolstering power supplies to oilfields; efficient reservoir





*Libya's oil & gas sector would benefit from modern technologies.*

Image Credit: Adobe Stock

management; new favourable contract terms for IOCs; pipeline expansion for exports; and improved training and safety procedures for workers in oil operations, as well as upgrading institutional capacity within the NOC.

NOC hopes to mitigate ongoing depletion of matured oilfields, notably Deffa and Sarir through EOR techniques that could hike capacity by 775,000 bpd and unlock probable reserves, especially in the frontier basins of Cyrenaica and Kufra.

There is a realistic possibility of Libya achieving much higher production, assuming adequate investments and national security.

Bayphase consultants estimated that at least US\$46-81bn is needed over the longer term to fix Libya's decrepit infrastructures and upgrade the capacities of upstream

“ Libya's revival would help improve Europe's energy security, with an impact on global oil supply.”

(production facilities); midstream (pipelines, terminals); and downstream (refineries, gas processing plants) sectors.

Libya's revival would also help improve Europe's energy security, with an impact on global oil supply. There is appetite among IOCs for 'untapped' upstream opportunities, but civil stability is pivotal for optimal development of Libya's energy sector. ■

## Libya's hydrocarbons endowments at glance

- Proved oil reserves (end-2020): 48.4bn barrels
- Proved natural gas reserves (end-2020): 1.4trn cu m
- Libya has the sixth largest oil reserves and ninth largest gas reserves in the Middle East & North Africa (MENA) region
- Libya ranks in the top 10 countries for global proven oil reserves
- The petroleum sector constitutes around 95% of exports and government revenues
- Libya produces highly-valued 'light density' and 'low-sulphur' crude oil
- Major oilfields: Sarir (the largest), Nasser, El Sharara, Mabrouk, Al Jurf, Deffa-Waha, Erwin, Bu Attifel, Brega, Amal, El Feel, Gialo 111, Block NC-98
- Main export blends: Amna, El Bouri, Bu Attifel, Brega, Sirtica, Sarir, Es Sider, El Sharara have API gravities ranging from 24-44
- Oil storage terminals: Es Sider, Marsa El-Brega, Hariga, Ras Lanuf, Zueitina, Tobruk
- Five refineries with a combined nameplate distillation capacity of 380,000 bpd, of which the largest is Zawiya
- Major gasfields: Bahr Essalam, Waha, Hateiba, Attahadi, Zelten, Sahl, Assumud
- Most of the associated gas is in the onshore Sirte basin

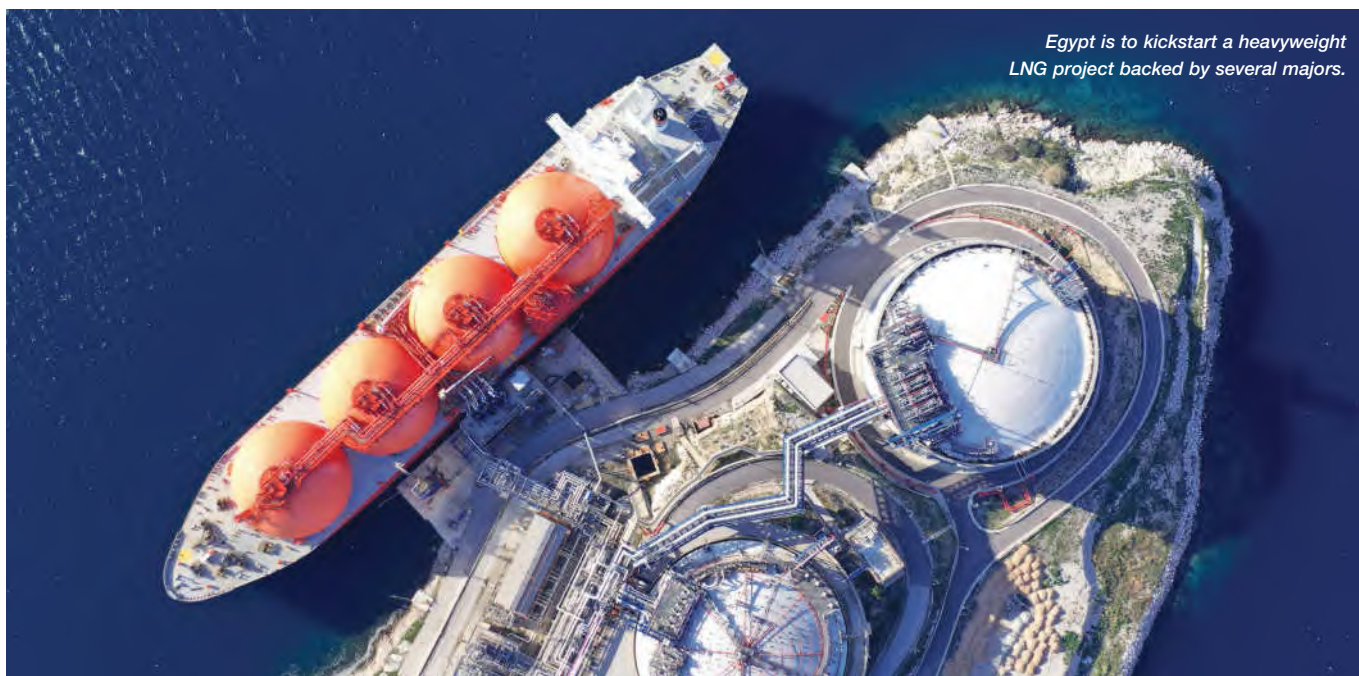


*Libya is prioritising a key US\$3bn offshore expansion project led by Eni and NOC.*

Image Credit: Adobe Stock

# Booming LNG market for home and abroad

Egypt is to kickstart drilling natural gas exploration wells in the Mediterranean Sea and Nile Delta under a US\$1.8bn deal. Madhurima Sengupta reports.



Egypt is to kickstart a heavyweight LNG project backed by several majors.

Image Credit : Adobe Stock

**N**O SOONER DID Europe declare sanctions on Russian gas than African nations felt they struck gold. The countries were as if on a race to tap the vast European gas market, with Egypt out in front. The North African country has been harnessing natural gas long before it gained popularity as a relatively sustainable fossil fuel. The 14,400 MW Egypt Megaproject by Siemens Energy, Elsewedy Electric and Orascom Construction deliver power to more than 40mn Egyptians. It includes three combined-cycle power plants in Beni Suef, Burullus, and New Capital that are considered some of the world's largest.

According to Bimbola Kolawole, vice president and head of business development for Africa, Rystad Energy, following the eastern Europe conflict, Europe's reliance on LNG imports has grown and African LNG producers, led by Nigeria, Egypt, and Algeria stand to benefit.

A report by the African Energy Chamber titled the *State of African Energy 2023 Q1*

*Report states that Algeria and Egypt likely will maintain their existing LNG infrastructure capacity of about 29mn tonnes per year and 12.7mn tonnes per year respectively.*

Egypt's latest addition to a flurry of LNG projects since last year is a US\$1.8bn gas deal. The country's Minister of Petroleum and Mineral Resources, Tarek El Molla, confirmed to media early this month that the programme will kickstart drilling natural gas exploration wells in the Mediterranean Sea and Nile Delta. It is a heavyweight project backed by the likes of Eni, Chevron, ExxonMobil, Shell and BP.

Sharing the project's plans, El Molla said

“African LNG producers, led by Nigeria, Egypt, and Algeria, stand to benefit from Europe's LNG needs.”

that around 35 exploration wells are slated to be drilled within two years; 21 in the current 2023-24 financial year and 14 in the following year.

Last month, in an instance of bilateral cooperation, Egypt entered into an agreement with Jordan to mutually share natural gas. Under the agreement, the Jordanian government will open the port of Al-Ahmad Al-Jaber Al-Sabah in Aqaba City to Egypt and let it utilise a floating storage regasification unit (FSRU) situated there. Egypt, on the other hand, can provide strong backing to the Jordanian National Electricity Company in terms of meeting sudden LNG requirements. It will help bring down operational costs of the port as well. The agreement will be valid until 2025.

As a part of the Middle East and North Africa (MENA) region, which accounts for around 60% of the world's oil reserves and 45% of its natural gas reserves, the strategic position of Egypt cannot be ignored. In June, Israel and Egypt signed a deal with the



European Union (EU) to supply Israeli gas via Egypt's LNG plants to the EU.

Egypt can be called the venous system that keeps alive the economy of the region. In May, partners in the Aphrodite natural gas field offshore Cyprus, revised their approach and decided to build a subsea pipeline that will connect the field to an existing processing and production facility in Egypt.

According to an estimate made by the operator Chevron, the updated development plan is expected to reduce the costs compared to the original plan, and bring forward commencement of production of the natural gas from the reservoir.

El Molla acknowledges the EU as one of the most prominent partners of the Egyptian energy sector, which has always had an important and active role in various oil and gas activities in Egypt. He pointed out that since the 2018 signing of a memorandum of understanding (MoU) for strategic cooperation in the field of energy between Egypt and the EU, both the sides enjoy a fruitful long-term relationship and the EU has become Egypt's largest trading partner.

"The geopolitical tensions and energy market fluctuations that the world is currently

witnessing are motivating countries to further diversify their energy sources in order to achieve energy security. Energy security and energy neutrality are complementary goals and Egypt's vision is to play a key role in the flow of global energy trade and promote a Better Business Link environment to ensure continued cooperation. Egypt has proved that it holds the keys to being a regional hub for gas and oil through its strategic location, a well-established energy industry and a strong infrastructure that helps to monetise all the potentials in the eastern Mediterranean region," El Molla said.

While targeting the European market on one hand, Egypt is also mindful enough to safeguard its domestic needs on the other. The only way the international oil companies and independents can become involved in Egypt's upstream sector is through a joint venture company with a state-owned entity such as the Egyptian General Petroleum Corporation (EGPC). While the contractual agreements take different forms — production sharing being the most common — the approach enables Cairo to keep close tabs on its resources (and ensure appropriate extraction) while granting its partners access to opportunity accompanied by reduced risk.



Image Credit : Adobe Stock

*Egypt likely will maintain its existing LNG infrastructure capacity of around 12.7mn tonnes per year.*

Today, no fewer than 50 IOCs and independents are joint venture participants, and they are having a huge impact on the country's economic well-being. According to the International Trade Association, hydrocarbon production is 'by far the largest single industrial activity in the country'. In fiscal year 2019-2020, with oil output fairly stable, it represented approximately 24% of total GDP.

Such well-structured practices to support the North African nation's vast resources no doubt open doors to lucrative investment prospects. ■



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# Good prospects for Middle East pipeline development

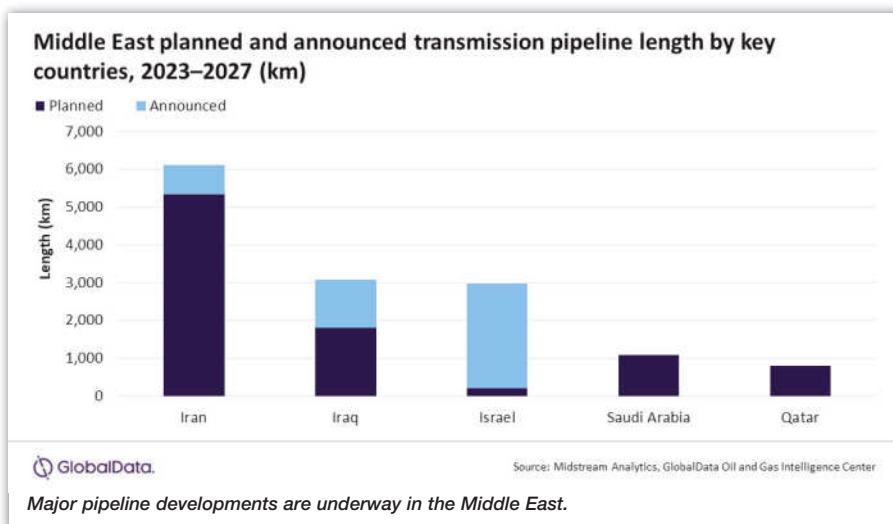
Growth in pipeline activity is forecast in the Middle East, with ambitious projects planned and underway.

**W**ITH GROWING DEMAND for gas, a continued appetite for liquids and the potential demand for new fuels, such as hydrogen, to support the energy transition, the Middle East is forecast to remain a key area for pipeline activity, with good prospects for manufacturers, contractors and suppliers. Major plans to develop domestic pipeline networks, as well as ambitious expansion projects to increase oil and gas production, both onshore and increasingly offshore, are driving pipeline demand.

Globally, gas pipeline demand was given a major boost by Russia's invasion of Ukraine which sent gas prices spiralling, especially in Europe. This surge in pricing, combined with long-term forecasted gas demand growth through to 2040, is expected to drive the need for new pipeline supply, according to energy consultancy Westwood Energy.

Westwood forecasts that gas pipelines will lead pipeline installations in the Middle East from 2022-2026, driven by domestic transmission lines in Iran and new lines to help monetise gas production in GCC countries. Despite this, new pipelines for liquids are expected to remain in high demand. New pipelines in the Middle East to help countries such as Iraq, Saudi Arabia and the UAE reach production capacity targets, will support liquid pipeline installations through to 2028, according to Westwood. Indeed, Africa and the Middle East are home to 49% of all oil transmission pipelines under construction globally at a cost of US\$25.3bn, according to new data from Global Energy Monitor.

This is not to say there are not challenges. Westwood points out that construction and material costs, which were already impacting the economic viability of many pipeline projects, have risen heavily, potentially impacting the economic viability of some



Major pipeline developments are underway in the Middle East.

projects. Political and security issues hamper developments in Iraq and in Iran, which remains under sanctions.

## Iran dominates Middle East trunk/transmission pipeline developments

According to GlobalData, the Middle East is forecast to add a planned trunk/transmission pipeline length of 10,537 km from 2023-2027 (from projects that received all necessary approvals), and announced pipeline length of 5,345 km during this period (projects that are yet to receive all necessary approvals). These figures cover major trunk/transmission crude oil, petroleum products, NGL and natural gas pipelines, but do not include gathering and distribution pipelines.

Iran is expected to dominate the Middle East's oil and gas trunk/transmission pipeline length additions from upcoming projects between 2023 and 2027, according to GlobalData, accounting for around 38% of the region's total planned and announced pipeline additions by then.

GlobalData's latest report, *Oil and Gas Pipelines Length and Capital Expenditure (CapEx) Outlook by Region, Countries and Companies including Details of New Build (Planned and Announced) Projects and*

*Forecast, 2023-2027*, reveals that Iran is likely to add a planned pipeline length of 5,340 km and an announced pipeline length of 770 km by 2027.

Bhargavi Gandham, oil & gas analyst at GlobalData, commented, "Natural gas pipelines account for more than half of the total transmission pipeline length additions in Iran by 2027. These additions will help the country to meet high domestic gas demand from its industrial, petrochemicals, and residential sectors."

Iranian Gas Trunk Line-IGAT XI pipeline is the largest upcoming transmission pipeline project by 2027 in the country, with a total length of 1,200 km. This onshore gas pipeline is presently in the construction stage and is likely to begin operations in 2023. To be owned and operated by National Iranian Gas Co, it helps to meet gas demand in provinces such as Bushehr, Fars, Yazd, and Isfahan.

With a total length of 1,000 km, Goureh-Jask oil pipeline ranks second among upcoming transmission pipelines in Iran. This onshore oil pipeline is presently in the commissioning stage and is scheduled to start operations in 2023. To be operated by Petroleum Engineering and Development Co, it will help to transport crude oil to its Jask oil terminal for storage and exports.

“Iran is likely to add a planned pipeline length of 5,340 km by 2027.”



GlobalData estimates Iraq to occupy second place in the Middle East in terms of transmission pipeline length additions, with 3,078 km by 2027. Oil pipelines account for almost entire pipeline length additions in the country. Basra-Aqaba Oil, and Iraq-Turkey II are the major upcoming oil pipelines with a length of 1,700 km and 1,000 km, respectively. Both pipelines are being planned for oil exports from the country.

According to recent press reports, the Iraqi cabinet has re-approved the construction of a third offshore oil export pipeline, known as Sealine 3 or SL-3, following amendments to the contract. The 48-inch subsea pipeline will have a capacity of 2mn bpd and will be built by Boskalis at a cost of US\$416.9mn. It would increase southern crude export capacity by half a million bpd in just over a year.

### Industry developments

In Saudi Arabia, the Jafurah unconventional gas development involves a network of around 1,500 km of main transfer pipelines, flow lines and gas gathering pipelines. Aramco's Master Gas System (MGS), an extensive network of pipelines that connects key gas production and processing sites with customers throughout the Kingdom, is currently undergoing an expansion. The system's current capacity is 9.6 bscfd of natural gas and supplies eastern central and western industrial complexes. The MGS Expansion Phase II will increase overall gas supply capacity to 12.5 bscfd to accommodate the increase in the Kingdom's natural gas demand, including expansion of the East-West MGS to ultimately deliver 5.2 bscfd to the central and western regions to support future utility and industrial developments.

While in the UAE, ADNOC Gas this July announced the award of US\$1.34bn in contracts to Petrofac Emirates LLC and the consortium between National Petroleum Construction Co. PJSC and C.A.T International Ltd. for the expansion of its natural gas pipeline network.

Under the sales gas pipeline network enhancement (ESTIDAMA) programme, the new pipeline will extend ADNOC Gas' existing pipeline network from approximately 3,200 km to more than 3,500km, enabling the transportation of higher volumes of natural gas to customers in the northern emirates of the UAE.

The ESTIDAMA programme comprises several packages, with the first one awarded in 2021 for early modification works on existing pipelines and successfully completed in 2023. The second and third packages, which are being awarded now, include the construction of new pipelines and a gas compression plant in Habshan that will help deliver essential feed gas to key customers across the Emirates.

In Qatar, the huge North Field Expansion project is providing plenty of scope for pipeline development. McDermott was recently awarded a major EPCI contract by Qatargas for the North Field Production Sustainability (NFPS) Offshore Fuel Gas Pipeline and Subsea Cables Project, COMP1, the scope of which includes the installation of 190 km of 32" diameter subsea pipelines, and 10 km of onshore pipelines. It follows an earlier EPCI contract awarded to McDermott in early 2022 by QatarEnergy for the North Field East (NFE) Topsides and the North Field East (NFE) Offshore Pipelines and Subsea Cables projects, involving more than 500 km of pipelines.

### Cross-regional developments

According to a report in *OilPrice*, a major new 2,000 km gas pipeline is being planned from the Middle East to India, running from Oman and the UAE through the Arabian Sea and into India.

It will allow gas to be brought in from Oman and the UAE, and from Iran, Saudi Arabia, Qatar and Turkmenistan. This could lead to the diversion of vital gas supplies from Europe, the report suggests. A related sub-project of the main Middle East to India pipeline is the re-energising of pipelines for the Iran-Oman gas and LNG pipeline project, the report adds.

The Russian invasion of Ukraine sparked a revival of interest in the EastMed gas pipeline project, a proposed 1,900 km natural gas pipeline project to connect the gas reserves of the eastern Mediterranean to Italy and central Europe through to Greece. The project has been held up by technical issues and environmental

“Aramco's Master Gas System is currently undergoing an expansion.”

concerns as well as inter-country tensions. However, it has the potential to be an alternative source of gas for southern Europe, reducing dependency on Russian gas imports, and could also potentially transport green hydrogen. Project developer Edison plans to take the final investment decision by the end of this year, according to a Reuters report, and the pipeline could be completed by 2027.

### Hydrogen pipelines move forward

As Rystad Energy points out, new hydrogen infrastructure is starting to materialise as the world starts to accelerate its path to net zero. Given its high gravimetric energy density and low volumetric energy density, hydrogen pipelines will be far better than vessels at moving hydrogen over short to medium range distances, the energy consultancy says. Today more than 4,300 km for hydrogen transportation already exists. According to GlobalData, a total of 23 planned and announced hydrogen pipelines are expected to come online during 2023-2027, 95% of which are at an early or conceptual stage. Europe leads, followed by North America and the Middle East. In terms of individual countries, Oman leads with the highest announced hydrogen pipeline length. A study commissioned by Asyad Group highlights potential for the development of a 1,000 km dedicated pipeline carrying hydrogen from the south of the country to the north. ■

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## Study highlights feasibility of hydrogen pipeline linking Gulf to Europe



The Gulf region and Europe could be linked with a pipeline to transport hydrogen.

Image credit: Adobe Stock

RINA, THE INSPECTION, certification and consulting engineering multinational, and AFRY, a European leader in engineering, design, and advisory services, have undertaken an initial study of how the Gulf region and Europe could be linked directly with a pipeline to transport low-carbon hydrogen, a key component in climate-friendly energy and industry systems of the future. The results indicate this could provide an opportunity to fully unlock the Gulf's immense potential as a cost-effective source of low-carbon hydrogen for Europe.

With abundant renewable energy sources and natural gas reserves, the Gulf region is set to become a leading global producer of green and blue hydrogen, ammonia and other synthesis products.

The concept of a hydrogen pipeline connecting Qatar, Saudi Arabia, Egypt, and traversing the Mediterranean Sea to Europe may seem ambitious, but initial assessment indicates its feasibility. The analysis shows that a suitable pipeline configuration could transport 100 TWh or approximately 2.5 million tonnes of hydrogen annually. Moreover, by constructing additional pipelines of the same nature, the transport capacity could be significantly scaled up.

The cost of transporting hydrogen through this pipeline is initially seen at approximately 1.2 EUR/kg H<sub>2</sub>. The Gulf countries, in turn, could supply green and blue hydrogen to the economic hub of Europe at Levelised Costs Of Delivered Hydrogen (LCODH) of around 2.7 EUR/kg starting from the 2030s, decreasing to around 2.3 EUR/kg in the longer term.

Recent geopolitical challenges have forced Europe to explore alternative avenues for energy security, including linking the Eastern Mediterranean and Europe by pipeline, which was investigated for the EastMed Natural Gas project. At the same time, the discussion around exporting hydrogen and its synthesis products from the Gulf to Europe is currently revolving around molecule transport by ship. These options receive EU subsidies and drive activity within the gas/hydrogen industry, but they may not be most efficient for bulk transport. A competitive pipeline project from the Gulf region in the near future could provide a viable and powerful complement.

Antonio Nodari, member of the Executive Management Team at AFRY Management Consulting said, "The collaboration between RINA and AFRY provides a unique and highly interesting view of a significant opportunity to take a step forward in the green energy transition for Europe and the MENA region. As well as understanding the opportunities, the expert team who have worked on this report have a realistic view of the obstacles that need to be overcome and have the solutions to address those challenges."

Andrea Bombardi, executive vice president at RINA said, "Through the combined expertise of AFRY and RINA, this first-of-its-kind study considers routing alternatives, technical parameters and feasibility, especially for the deep-sea pipeline section, geo-strategic framework conditions and top-level economic estimates of a direct hydrogen pipeline link between the Gulf and Europe as an element of an integrated green energy and industry system across Europe and MENA. The findings of the study represent a decisive contribution to boost the hydrogen economy. Together with AFRY, we have identified a potential stable corridor to bring supply and demand together. The scale-up of hydrogen adoption goes through projects like this."

## Project to investigate permeability of TCPs for hydrogen

THE UK'S NATIONAL Composites Centre (NCC) is launching a joint industry project that focuses on the permeability of thermoplastic composite pipes (TCPs) for hydrogen distribution, and optimal material selection for relevant applications.

It is projected that upstream distribution pipelines for hydrogen will grow significantly in the coming decades if plans for hydrogen production and end-use are realised. Spoolable TCPs offer a compelling alternative to steel pipes for connecting hydrogen production sites either directly with end users or into hydrogen transmission lines, as they are easier to deploy, offer lower potential total lifetime cost of expenditure (TOTEX), and avoid issues around embrittlement of steel. Hydrogen systems come with significant safety considerations that rely on detailed understanding of the performance of the system components.

There is a lack of comparative hydrogen permeability data currently available for TCPs, which creates uncertainty around the performance of different composite materials in hydrogen pipe systems. The joint industry project (JIP) will address the challenge of benchmarking permeability performance of pipe system designs for true comparison, through the manufacture of standardised pipe specimens and permeability measurements to build a liner and reinforcement material capability database. This can be used to make pipe system comparisons, and ultimately enable viable system specification and cost-effective pipe design.

Matt Hocking, head of Energy, National Composites Centre, said, "High performing transportation and storage of hydrogen is one of the technology barriers that needs to be overcome to guarantee containment and leak prevention. Measuring the permeability of hydrogen through thermoplastic composites is a key challenge that will be addressed in the project. We are interested in engaging with industry and the supply chain across energy, utilities and transportation sectors."

The NCC is creating a clear path to design, manufacture and digitally certify hydrogen-ready pipes and materials. It is also developing a state-of-the-art manufacturing and test facility for hydrogen transportation and storage, for pressure vessels and pipes. A Filament Winder and Thermoplastic Pipe Winder will be installed at the facility by the end of 2023.

Organisations interested in expressing an interest in joining the programme can email: [energy@nccuk.com](mailto:energy@nccuk.com)



# Time to accelerate decarbonisation

COP28 president-designate, Dr. Sultan Al Jaber, has urged the oil & gas industry to redouble efforts to decarbonise and reduce emissions.



*The UAE is looking to significantly expand hydrogen production.*

Image Credit : Adobe Stock

**D**ELIVERING A SPEECH to the eighth OPEC International Seminar in Vienna, Dr. Sultan Al Jaber said, "Dramatically reducing emissions, while maintaining robust sustainable growth, is the critical challenge of this century."

To meet that challenge, COP28 will need to "leverage the skills, the project management experience, the project finance expertise and the technological knowhow of all relevant industries, including and in particular the oil and gas industry."

While the oil & gas industry has long been viewed "as the problem" the sector should "take this opportunity to step up, flip the script and show the world once again how this industry is an important part of the solutions we need. We need to rapidly build a new clean energy system, while comprehensively decarbonising the system we rely on today," he said.

Dr. Al Jaber repeated his call for the oil & gas industry to "up its game, urgently decarbonise its operations and take collective action to eliminate operational emissions,"

**“ We need to rapidly build a new clean energy system, while comprehensively decarbonising the system we have today.”**

based on three imperatives. These include the entire industry aligning to achieve net zero by 2050, accelerating the industry-wide commitment to zero out methane emissions, and monitoring, measuring and validating progress every step of the way.

"Today, I would like to add a fourth imperative," Dr. Al Jaber told delegates. "And that is allocating capital at scale to clean energy solutions, because the energy system of the future will not build itself."

"Policies at the national level must set the

direction," Dr. Al Jaber said, calling on all nations to update their nationally determined contributions (NDCs) "to accelerate 2030 trajectories in line with net zero by 2050."

The UAE has recently submitted a third update to its second NDC that pushes emissions reductions to 40%, and has announced a US\$54bn local programme over the next seven years to triple renewable capacity and significantly expand hydrogen production, he noted.

"Government policies at the national and sub-national level need to stimulate adoption of clean energies, commercialise the hydrogen value chain, make carbon capture viable and affordable, and incentivise R&D in battery storage, energy efficiencies and other new technologies," Dr. Al Jaber said.

Applying new technologies at speed and scale will require significantly more capital to be invested, he noted, adding that capacity building and skills development to train young people for the jobs of the future will also be essential. ■

# Empowering the future with effective training & development

Shaun Dewar, senior vice president for operations, Middle East & Africa, Wood, explains how Wood stays ahead of the curve with its training and development programmes.

**T**HE OIL AND gas sectors in the Middle East have long been the driving force of the region's economy. However, in recent years, the landscape of these industries has been rapidly evolving, presenting new challenges and opportunities. As the global energy transition gains momentum, companies operating in the region face increasing pressure to adapt and innovate.

For Wood, investing in the training and development of young talent becomes crucial for the sustainable growth and success of the oil and gas industry. By nurturing a skilled and agile workforce, companies can not only navigate the complexities of the evolving market but also lead the way in embracing cleaner and more sustainable practices.

Shaun Dewar, senior vice president for operations, Middle East & Africa, Wood, speaks with *Oil Review Middle East* on how Wood is at the forefront of this revolution.

**As the oil and gas industry evolves in the Middle East, how does your company ensure that its training and development programmes stay ahead of the curve, preparing employees for emerging challenges and opportunities?**

The Middle East oil and gas industry has always been a dynamic landscape and in recent years has undergone a series of changes. Given the industry's complex and ever evolving nature, highly skilled employees are critical to ensuring operational efficiency, safety, and sustainable growth. Employee training and development programmes play a pivotal role in empowering personnel with the requisite knowledge, skills, and competencies to navigate the challenges and advancements.

“ Given the industry's complex and ever-evolving nature, highly skilled employees are critical.”



Image Credit: Wood

Shaun Dewar, senior vice president for operations, Middle East & Africa, Wood.

At Wood, we regularly assess the skills and knowledge within the business and identify areas where our employees need further development, which helps inform our training programmes. Across our Middle East operations, we have developed technical engineering programmes specifically tailored for existing employees and fresh graduates. This programme encompasses a range of discipline workshops, presentations, and hands on training, which have proven effective in equipping our people with a comprehensive understanding of their respective fields.

**With sustainability and renewable energy gaining traction globally, how does your company incorporate training for sustainable practices and technologies into the development plans for employees in the Middle East?**

We are committed to further strengthening our position as a responsible organisation, while striving to achieve ambitious sustainability goals. We have incorporated educational programmes to ensure our employees are equipped with the knowledge necessary to contribute to a greener future.

One of the programmes we provide globally is our Energy Transition Academy which offers technical learning around emerging energy transition solutions such as hydrogen and carbon capture and storage (CCS).

To further foster a culture of sustainability within the business, we consistently encourage knowledge-sharing and collaboration. Through internal forums, online platforms, and communities, our employees are encouraged to exchange ideas, share best practices, and learn from each other's experiences. This collaborative approach empowers our people to collectively pursue innovative and sustainable solutions.

**What role does on-the-job training play in enhancing the capabilities of your workforce in the Middle East, and how do you ensure that practical experiences are integrated into the learning process?**

Our training programmes are designed to cater to various learning preferences and styles, providing ample opportunities for growth and skill enhancement. We adopt the renowned 70/20/10 model, a blended approach to learning, where much of the development takes place on the job. According to this model, 10% of learning comprises formal training, 20% involves support from others and a significant 70% is gained through practical experience.

To align with this approach, we offer a range of training methods for our employees' development such as instructor-led sessions for trade-specific courses. We also use Computer Based Training (CBT) and e-learning to address secondary role requirements which allows our people to learn at their own pace and convenience. Additionally, we offer on-the-job training and coaching which play a vital role in the overall development process with direct supervision by line managers and supervisors to ensure effective application of learned skills and improved work quality.

By offering a diverse array of learning opportunities, we strive to nurture highly skilled and motivated employees capable of meeting both current and future challenges.



With these approaches in place, we are confident that our people will not only excel in their roles but also contribute significantly to the overall success of our business.

**Could you share some examples of successful cases where Wood's investment in training and development has resulted in skilled local experts who have made significant contributions to the company's projects in Iraq?**

In Iraq, we implemented a comprehensive training and development programme designed to transfer engineering knowledge and expertise for our Iraqi employees who work on client projects. Originally launched in 2017 for a two-year period, the development programme encompassed a diverse range of engineering training modules delivered in a classroom-style environment. These modules were complemented by practical assignments carried out on a portfolio of brownfield projects. Following active engagement with various external stakeholders and a subsequent evaluation of the existing programme, all participating companies unanimously decided to adopt a "fully integrated team" approach to learning and development.

Under the revamped development programme, our engineers who support Iraqi clients have relocated to our office in Basrah. This relocation facilitates collaboration among engineering teams, fostering the development of competencies in engineering. We also offer placement programmes that provide our employees in Iraq the opportunity to relocate to regional offices for a designated period. This experience allows them to enhance their skills, broaden their horizons, and gain valuable insights into different markets.

**What drove your company's decision to heavily invest in the growth and development of the national workforce, and what do you hope to achieve through these initiatives in the context of the region's oil and gas and energy sectors?**

At Wood, our commitment to developing local talent in the communities we operate in is at the core of our values. We take immense pride in our efforts to heavily invest in the next generation of workers, fostering their growth through a well-defined path of professional development. Central to this commitment are our valuable technical training programmes, which offer graduates the opportunity to

“ We are fostering a lasting impact that will ripple through generations of workers.”

engage with our industry from an early stage in their career.

Our focus on developing local talent not only strengthens the communities we operate in but also contributes to the sustainable growth and innovation of the local oil and gas industry. As these skilled individuals progress in their careers, they bring fresh perspectives, ideas, and expertise to tackle the evolving challenges within the sector. Furthermore, this investment bolsters the overall resilience of the industry, enabling it to adapt and thrive in a dynamic and ever-changing global landscape. By investing in the next generation and nurturing their growth, we are fostering a lasting impact that will ripple through generations of workers to come, ultimately creating a positive impact in the communities we operate in. ■



*The fostering of young talent creates a positive impact among local communities.*

Image Credit - Adobe Stock

# Incorporating renewable energy in downstream operations

Miro Cavkov, technical director – Downstream & Energy Advisory, Euro Petroleum Consultants (EPC) highlights the need for refinery operators to embrace new energy sources and feedstocks, alongside energy efficiencies, in the drive to reduce emissions.



*Refineries need to optimise production fuelled by conventional sources before introducing alternative energies in processing units.*

Image Credit : Adobe Stock

**D**OWNSTREAM PROCESSING FACILITIES play a vital role in the energy supply chain – they are secure suppliers of various critical commodities, including gaseous and liquid fuels, petroleum coke, chemical building blocks, and power, and they shape the world we live in today. However, until recently, many production designs overlooked the importance of energy consumption and emissions in downstream facilities. With the growing awareness of climate change and global sustainability goals, events like the annual COP conferences have shed light on the need for the energy industry, including refineries, to address these concerns and take meaningful steps to limit climate change.

Despite the predictions of a declining market, petroleum still remains a crucial source of energy. Nevertheless, operators face numerous challenges, including stringent environmental regulations and product specifications. As a result, processing

facilities, as well as their management and personnel, must adapt and embrace higher objectives, focusing on core efficiency and reducing harmful emissions in the form of CO, CO<sub>2</sub>, SO<sub>x</sub>, NO<sub>x</sub>, fine particles, and other environmentally unfriendly pollutants.

“ Processing facilities must adapt and embrace higher objectives.

The energy transition is still in its early stages, and although 100% renewable energy is not yet fully capable to meet current and near-future demands, there are existing solutions and approaches that can be implemented within downstream processing facilities to significantly reduce Scope 1 and Scope 2 emissions. While these solutions may

not be universally applicable, some regions and specific facilities may have certain advantages over others in their adoption and effectiveness.

## Optimising production

Before introducing alternative energies in processing units a refinery must first optimise production fuelled by conventional sources. Regardless of the fuel type (fuel oil or natural gas), energy efficiency must be prioritised by fine-tuning refinery heaters to avoid excessive fuel consumption. Key techniques to support this optimisation include applying high emissivity ceramic coatings on the heaters' refractories and inside process tubes. Furthermore, the proper installation and maintenance of industrial-grade insulation plays a vital role, even though they are often overlooked. These measures are essential to pave the way for successful integration of alternative energy sources.

If the refinery's fuel consumption remains higher than expected, even after optimisation,



it is imperative to identify and address energy losses in refinery pipeline, steam and heat exchanger systems. In certain cases, specific hot points are difficult to detect through conventional monitoring and metering systems – this is because sensors are typically placed at the start and end points of production cycles. However, these systems can provide general insight on which areas need further investigation. To pinpoint problematic areas accurately, advanced tools like infra-red thermal imaging cameras and ultra-sonic flaw detectors are indispensable. These tools enable refinery field engineers to conduct thorough examinations and identify energy loss areas precisely, paving the way for effective solutions to make further energy savings.

After optimising the heat and production units to their optimum settings, the operator can then explore the possibilities of integrating new energy sources, both for internal use within the refinery and also as a potential feedstock.

“ Integrating a higher proportion of renewables will become a crucial requirement.”

### Hydrogen utilisation

Refinery heaters, typically designed for fuel oil or natural gas, can be retrofitted to burn hydrogen, resulting in environmentally friendly emissions and manageable treatment for NO<sub>x</sub> emissions. Hydrogen boasts an impressive energy density, approximately 2.5 times that of methane, meaning that burning one kilogram of hydrogen produces 2.5 times more energy than burning an equivalent amount of natural gas. To ensure an environmentally sustainable approach, it is crucial that hydrogen is sourced from clean and/or renewable sources, such as green, blue or low-carbon hydrogen production methods.

### Electricity for process heat generation

Electrifying refinery furnaces presents a promising route to lower emissions, applicable to primary crude heaters, downstream petrochemical cracking furnaces, and steam generation units. To ensure the environmental benefits, it is essential to use a low-carbon electricity source, such as solar or nuclear power. By adhering to this principle, the refinery can make significant strides in reducing its overall carbon footprint while contributing to a more sustainable energy future.

### Steam is an asset

Steam is a critical asset in a number of refinery processes, from main crude distillation to steam-cracking and steam reforming. One



*Hydrogen needs to be sourced from clean or renewable sources.*

Image Credit: Adobe Stock

of the significant advantages in the Middle East region is the abundant and powerful renewable resource: sunlight. By harnessing and using solar energy, operators can concentrate and produce steam for refinery needs, resulting in reduced fuel consumption and improved emissions performance. Each kilowatt-hour (kWh) of solar-generated steam is equivalent to 100% of the heat produced by conventional fuels. For comparison, 1 kWh of solar steam saves emissions of approximately 216 grams of CO<sub>2</sub> compared to natural gas-fuelled heaters. Moreover, the use of solar steam has a direct positive environmental impact by reducing emissions of other pollutants such as SO<sub>x</sub>, NO<sub>x</sub>, and fine particles within the refinery ecosystem.

### Co-processing of bio-feedstocks

Implementing bio-feedstocks in refinery processes may present certain challenges for operators to overcome. However, they also offer undeniable benefits, especially when considering the life cycle analysis of the produced fuels, commonly known as “well-to-wheels” assessment. Conventional oil extraction demands a significant amount of energy, and in cases where production wells are located offshore, facilities often operate off-grid and rely on liquid fuels, primarily diesel-powered generators, for the required energy and electricity.

By incorporating bio-feedstocks, such as bio-crudes for processing and bio-alcohols for blending, the emissions impact originating from upstream production can be substantially reduced. This, in turn, significantly lowers the overall carbon footprint of the refinery and allows more environmentally-friendly and sustainable downstream products.

### Sustainable Aviation Fuel (SAF)

SAF, sometimes referred to as bio-jet is a renewable, environmentally-friendly alternative to conventional jet fuel, playing a crucial role in reducing Scope 3 emissions. As global regulations like the Carbon Border Adjustment Mechanism (CBAM) come into effect, the production of SAF becomes increasingly important for producers, especially when exporting to the EU.

Recent advancements in production technologies have enabled SAF to be sourced

from various renewable feedstocks. The three most promising pathways are Hydrotreated Esters and Fatty Acids (HEFA), Power-to-Liquids (PtL) and Bio-Ethanol-to-Jet technologies.

HEFA uses organic materials derived from plants and animals, including used cooking oils, vegetable oils, animal fats, palm oils and any other liquids that have a lipid composition. Through precise hydroprocessing, these bio-sourced materials are converted into drop-in fuels that meet ASTM standards, where the cold flow properties such as freezing point, viscosities and density at different temperatures and pressures are critical parameters for ensuring compatibility with the aircraft engines.

Biomass materials sourced from non-edible and waste products, such as municipality and forestry residues, can be transformed through enzymatic gas fermentation into renewable and low-carbon ethanol. This feedstock, as a hydrocarbon carrier, can be further converted into SAF, through Alcohol-to-Jet technologies.

PtL, on the other hand, leverages the Fischer-Tropsch process to produce synthetic hydrocarbons. The key to its success in decarbonisation lies in the use of green hydrogen and carbon molecules captured from waste gases of carbon-intensive industries. This combination allows for the production of methanol, which can be further processed into renewable jet fuel.

HEFA, PtL and Ethanol-to-Jet pathways present flexibility in feedstock utilisation, making SAF a versatile and sustainable solution for the aviation industry's energy and emissions goals.

Altering refinery configurations and adopting new feedstocks pose considerable challenges for operators. However, in the context of current and future energy scenarios, integrating a higher percentage of renewables for fuels and chemicals production will become a crucial requirement for those aiming to stay active and competitive in the downstream sector.

Embracing renewable energy sources not only aligns with the global shift towards sustainability and decarbonisation but also presents opportunities for operators to enhance their market positions, while allowing production of cleaner and more sustainable products. ■

# Optimising HSE for a safer, sustainable future

Momentum is building for the eighth edition of the MENA HSE Forum, which will bring together more than 150 key stakeholders from the HSE community in the UAE and across the region.

**S**ET TO TAKE place from 1-2 November at the Sheraton Grand Hotel in Dubai, UAE, this edition will provide a platform to exchange strategies and best practices, present HSE needs and access the latest developments to advance HSE in the Middle East. The emphasis will be on creating a sustainable future for the region's vital sectors, at a time when industries such as oil and gas and construction are experiencing unprecedented levels of activity. Digitalising HSE will have a strong focus, given its transformative potential in enhancing HSE management for effective safety monitoring, reporting and incident prevention, to highlight just some of the benefits.

Attendees can look forward to presentations from big names such as Emirates Airlines, ADNOC, Petrofac, Aura, DP World, Asyad Drydocks, DAMAC Properties, NEOM and Red Sea Global among many others. They will also be able to hear from regulatory bodies such as Dubai Municipality. In addition, the Exhibitors' Hall will showcase new technologies and services – all of which promise to assist delegates in their HSE objectives.

Confirmed speakers include Eng. Raed Al Marzooqui, manager of Studies & System Section, Dubai Municipality; Suzan Al Ghanem, section head, Organizational Resilience & Business Continuity, Environment Agency Abu Dhabi; Sultan Karrani, senior engineer - HSE, ADNOC; Md Ubaidul Haq, HSSE manager - head of department, Asyad Drydock; Saleh Al Balushi, HSE director, DP World - Drydocks World; Dr. Irshad Laghari, Petrofac group doctor, Petrofac; Michael James, director of health & safety, Red Sea Global; Ronald Otte, director of health & safety, Emirates Global Aluminium; Mona Adel Abdulaziz, workplace health & safety manager, Emirates Airlines; Paul Slater, executive director QHSE, Saudi Entertainment

*The event will provide a platform to exchange strategies and best practices, present HSE needs and access the latest developments to advance HSE in the Middle East.*



Image Credit : Alain Charles Events

Ventures; Daryl Wake, business development director, DEKRA Organisational & Process Safety, and others.

Sponsors are starting to come on board, the latest to sign up being DEKRA, globally recognised specialists in behavioural and process safety, whose promise is to ensure the safety of human interaction with technology and the environment.

## Six key themes

The latest edition of the acclaimed HSE event series will centre around six key themes:

- **Digitalising HSE: Driving Transformation** - Discover how integrating cutting-edge technology will enhance HSE management for effective safety monitoring, reporting and incident prevention. This also ensures cost saving and helps attain long-term sustainability
- **Consistent Responsibility: Training & Audit** - Evaluate the importance of effective communication, training, review, audit, and consultation. Learn about the need to integrate technology to optimise efficiencies and minimise non-productive time
- **Effective Management: Process Safety** - Prioritise process safety management by identifying hazards, and analysing risks. Develop safety plans for all stages of production, including hazardous material handling and disposal
- **Resilient Future of HSE: Sustainability through ESG Practices** - Achieve sustainability through net-zero solutions, such as utilising renewable energy, and implementing innovative resource conservation practices. This creates a safe workplace and improves overall HSE performance
- **Psychological Based Safety** - Promote a psychological wellbeing and workplace safety plan that addresses real-world risks with effective tools and training to achieve a best-in-class behavioural safety process
- **New Project Announcements** - Understand how HSE standards are being implemented in upcoming Saudi Arabian,

“Digitalising HSE will have a strong focus.”



UAE and Qatari mega projects. Look at the steps taken to tackle hazards of working at heights, the legislative updates for these regional projects and the importance of inspection and training to reduce risk.

Vinay T, head of events at Alain Charles Publishing, commented, "We are committed to providing attendees with an exceptional networking opportunity, and are thrilled to present the eighth edition of MENA HSE Forum, the longest-running HSE event dedicated to supporting the region's responsibility for a sustainable future."

**HSE needs and expectations**

At last year's Forum, ADNOC, Petrofac, Dubai Municipality, Saudi Aramco and Drydocks World met and committed to an advanced institutional safety best practice, which will

shape the HSE landscape for years to come.

You can access the report from this meeting here: <https://hse-forum.com/mena/report>

This gives insights into the HSE needs and expectations of those responsible for upcoming MEGA projects in the GCC, and will help you position yourself for evolving standards and improvement, prior to this year's meeting. ■

For further information about the MENA HSE Forum 2023, download the brochure at <https://www.hse-forum.com/mena/brochure>

Do you have an HSE case study, innovative technology, a new service or want to leverage premier networking opportunities? Contact Vinay T, head of events, Middle East. Email: [vinay.nair@alaincharles.com](mailto:vinay.nair@alaincharles.com). tel: +971 4 448 9260

“ We are committed to providing attendees with an exceptional networking opportunity.”

"The HSE Forum provided immense opportunities for networking and sharing knowledge as well as ideas." – **Dr Eng Hani Hossni, EHS director, Abu Dhabi Waste Management Centre – Tadweer**

"The MENA HSE Forum 2022 covered all aspects of the HSE spectrum, discussing critical issues and the latest trends." – **Naveen GV, global development officer & managing director, Benchmark Digital Partners LLC**

"We were fortunate to explore the impressive technological advances that are being made to protect worker-safety, and once again witness the underlying commitment that is shown towards HSE by leading companies in the Middle East." – **Associate, Projects & Construction, Clyde & Co**

"The HSE Forum targets decision-makers from industries across the region to share valuable content via the topics being discussed on this platform. I feel the event has been a success and such events should be held more frequently." – **Senior territory manager, Ansell**

"It is important that we bring industry leaders together and have open discussions about HSE challenges that will lead to an optimised function thereby setting a benchmark here in the Middle East" – **Sales director emerging markets, JLG Industries**

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 **ADIPEC**  
2-5 October 2023  
Abu Dhabi  
Hall 1, stand 1130



# Revolutionising health & safety through digitalisation

Daryl Wake, business development director, DEKRA Organisational & Process Safety, highlights the vital role technology plays in improving workplace safety.

IN TODAY'S RAPIDLY evolving technological landscape, digitalisation is transforming industries across the board. The realm of health and safety is no exception. With advancements in technology, organisations can enhance safety measures, improve efficiency, and foster a culture of proactive risk management. This article explores the growing trend of health and safety digitalisation, its potential benefits, and the readiness levels of organisations to embrace this transformative change.

According to a recent article on AP News, technology plays a vital role in improving workplace safety. From wearable devices and sensors to artificial intelligence and data analytics, innovative digital solutions offer organisations new ways to identify hazards, mitigate risks, and monitor safety performance in real time. By harnessing the power of digitalisation, companies can enhance their safety programmes, prevent incidents, and protect their most valuable assets – their employees.

The USA's National Safety Council (NSC) and DEKRA recently launched a collaborative effort to assess organisations' readiness levels for safety innovation. This initiative aims to provide resources and tools for companies to evaluate their current safety technology landscape. By conducting self-assessments and gap analyses, organisations can identify areas where digitalisation can bring significant improvements to their safety practices.

The NSC and DEKRA have also released a white paper outlining the benefits of safety technology adoption in the workplace. The paper emphasises that technology not only improves safety outcomes but also enhances employee engagement, quality standards, and job satisfaction. Research shows that organisations leveraging digital solutions experience lower injury rates, reduced downtime, and increased productivity. By embracing digitalisation, companies can create a safer and more productive work environment while fostering a culture of continuous improvement.

“Organisations leveraging digital solutions experience lower injury rates, reduced downtime and increased productivity.”

Digitalisation offers a wide range of applications in the field of health and safety. For example, wearable devices equipped with sensors can monitor vital signs and detect early signs of fatigue or stress, enabling timely intervention. Internet of Things (IoT) technology allows for real-time tracking of equipment performance, ensuring preventive maintenance



Image Credit: DEKRA

**Daryl Wake, business development director, DEKRA Organisational & Process Safety.**

and reducing the risk of accidents. Additionally, predictive analytics and machine learning algorithms can analyse vast amounts of safety data to identify patterns, anticipate hazards, and implement proactive control measures.

While the benefits of health and safety digitalisation are promising, organisations may encounter challenges during the implementation phase. These challenges may include budget constraints, data privacy concerns, and resistance to change. To overcome these hurdles, organisations need to foster a digital safety culture by investing in employee training and communication. Engaging employees in the digital transformation process and emphasising the positive impact on their well-being and job satisfaction can help overcome resistance and facilitate successful adoption.

As the world continues to embrace digital transformation, health and safety must not be left behind. The integration of innovative technologies holds tremendous potential for improving workplace safety, reducing incidents, and enhancing overall organisational performance. By assessing their readiness levels, exploring available resources, and embracing safety technology, organisations can pave the way towards a safer, more efficient, and digitally empowered future. ■

*Daryl Wake will be speaking at the MENA HSE Forum being held from 1-2 November in Dubai. [www.hse-forum.com/mena](http://www.hse-forum.com/mena)*



Digitalisation offers a wide range of applications in the field of health and safety.

Image Credit: Adobe Stock



# A multidimensional approach for perimeter security

Matrix Security Solutions outlines how a multidimensional approach is essential for protecting people, assets and information against security threats.

**P**ERIMETER SECURITY IS essential for protecting people, assets, and information against unauthorised intrusion, theft, and other security breaches. Historically, perimeter security was primarily used in military facilities to safeguard critical infrastructure. However, in today's world, businesses and organisations of all types and sizes require robust security solutions to protect their premises and ensure the safety of their employees and customers.

A perimeter security system is used to secure a property's boundaries, assets, and people. These systems typically incorporate a range of technologies and techniques to deter, detect, and respond to security threats. Perimeter security systems are based on the 5D principle, which includes delay, deny, detect, deter, and defend.

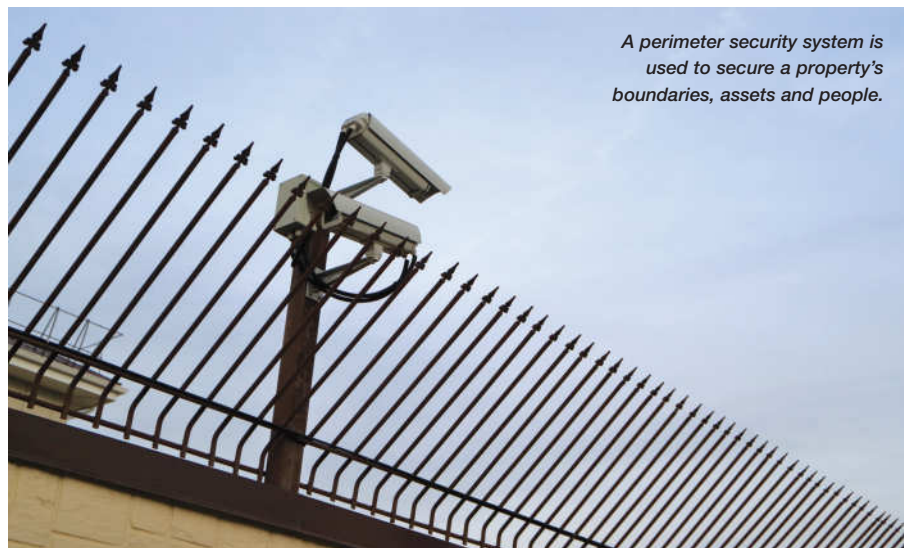
However, as security threats continue to evolve, a multidimensional approach to perimeter security is becoming increasingly important. A multidimensional perimeter security system is one that incorporates multiple layers of security, including advanced technologies, to provide a comprehensive and effective security solution.

Here are some of the key benefits of such a security system:

## Keeps a watchful eye over your property

The ability to monitor and surveil large areas is crucial for effective perimeter security. Multidimensional perimeter security systems leverage advanced technologies like IP cameras to provide clear and detailed imagery of every corner of the property, even in low-light or harsh weather conditions. This allows security personnel to detect potential threats and respond in real time.

To keep a premise secure, various types of IP surveillance cameras such as Bullet, Dome, and PTZ cameras are available. These cameras have unique features and benefits that can aid in monitoring and surveillance. Bullet cameras can capture high-quality images in low-light conditions, withstand harsh weather, and cover longer distances.



*A perimeter security system is used to secure a property's boundaries, assets and people.*

Image Credit : Adobe Stock

PTZ cameras can monitor large areas and provide clear images with 360° viewing by panning, tilting, and zooming.

The latest IP cameras can also be integrated with Video Management Software (VMS) to enhance their functionality, such as remote monitoring, intrusion detection, and tripwire. IP surveillance cameras can reduce the risk of crime and material loss from theft. Additionally, these cameras can capture useful evidence for crime detection and evidence gathering.

## Communicates with you to provision proactive security

A multidimensional perimeter security system can communicate with the property owner or security personnel to provide real-time alerts and notifications. This allows for proactive security measures to be taken, such as dispatching security personnel to the site or notifying law enforcement of a potential security threat.

## Sensing danger right at the perimeter

These systems can detect potential threats at the perimeter of the property, allowing security

personnel to respond quickly and effectively. This can include technologies such as motion detectors and alarms, which can detect unauthorised entry attempts and alert security personnel to the threat.

## Smelling trouble at the onset: smoke and fire alarms

A multidimensional perimeter security system can also incorporate smoke and fire alarms, which can detect potential fire hazards and alert security personnel to the danger. This can be especially important in large commercial or industrial properties, where fires can quickly spread and cause significant damage.

Such a security system is essential for protecting people, assets, and information against security threats. These systems incorporate advanced technologies such as IP cameras, motion detectors, and smoke and fire alarms to provide a comprehensive and effective security solution. By leveraging a multidimensional approach to perimeter security, businesses and organisations can ensure the safety of their employees and customers and protect their assets against potential threats. ■

The intervention rate is forecast to reach 17% in 2027, totalling around 260,000 wells globally.

Image Credit : Adobe Stock

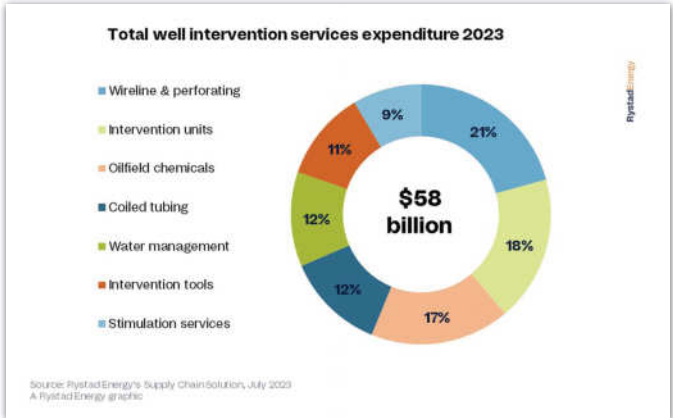
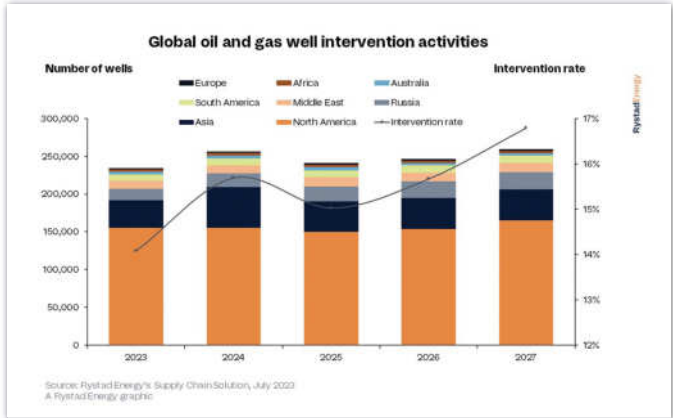
# Well intervention spending on the up

Spending on well interventions globally is projected to jump by almost 20% this year to US\$58bn, according to research from Rystad Energy, with Saudi Arabia set to be the top onshore market from 2023-2028.

AS OIL AND gas production companies look for efficient and cost-effective methods of increasing their output, the well intervention market is set to get a healthy boost. Spending on interventions – a way to extract additional resources from an existing well instead of drilling a new one – is projected to jump by almost 20% this year to US\$58bn. Rystad Energy’s modelling shows this is just the start of a surge in the coming years as the focus on efficiency intensifies.

The intervention rate – how many oil and gas wells go through the intervention process – is forecast to reach 17% in 2027. This would total around 260,000 wells globally.

More than US\$11bn of the total expenditure will be directed to the



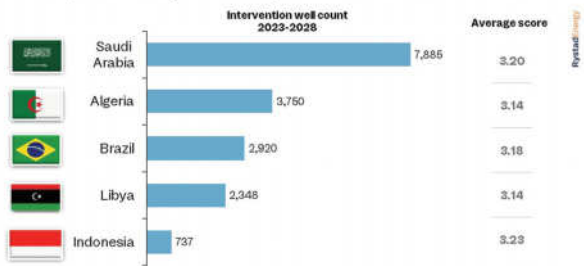
“ The well intervention market is set to get a healthy boost.”

wireline & perforating segment, while together, intervention units and oilfield chemicals sectors will represent 35%. In addition, the sum of the investments in coiled tubing, water management, and intervention tools is expected to exceed US\$420bn by the end of 2023.

To boost production rather than drill new wells, operators are more likely to undertake intervention into mature assets that have been

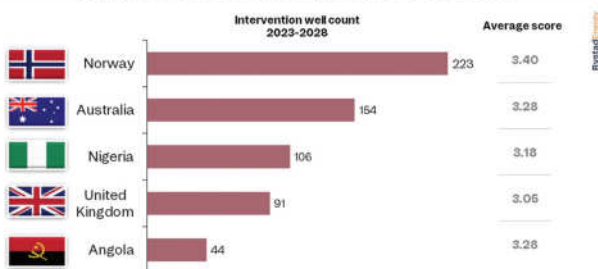


## Top countries by intervention potential – Onshore conventional\*



\*Conventional onshore wells only. Excludes Russia and North America.  
 \*Intervention potential score based on well age, production rate, asset remaining lifetime and breakeven oil price. Top countries ranked by forecasted intervention count.  
 Source: Rystad Energy's Supply Chain Solutions, July 2023.  
 A Rystad Energy graphic.

## Top countries with intervention potential assets-Offshore\*



\*Excludes Russia and North America.  
 \*Intervention potential score based on well age, production rate, asset remaining lifetime and breakeven oil price. Top countries ranked by forecasted intervention count.  
 Source: Rystad Energy's Supply Chain Solutions, July 2023.  
 A Rystad Energy graphic.

“Interventions are going to be a hot topic in the years to come.”

producing for more than five years, with relatively high production rates which are starting to show signs of decline.

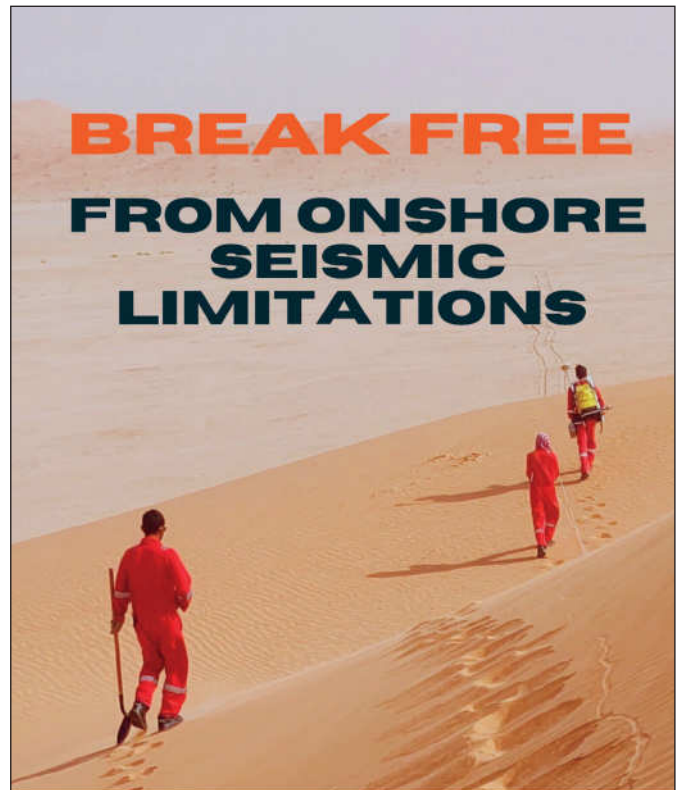
“As oil demand picks up in the second half of this year, operators will look to ramp up production from existing fields, and well interventions will be a vital piece of the puzzle. As a quick, efficient, and cost-effective method of maximising existing resources, interventions are going to be a hot topic in the years to come,” said Jenny Feng, supply chain analyst at Rystad Energy.

A distinct geographical focus is apparent when looking at high-intervention potential assets. Saudi Arabia is the top onshore market by far, adding more than 7,800 wells with exceptional intervention opportunities from 2023 until 2028, while Algeria is set to add more than 3,700. Brazil, a country traditionally attractive for offshore explorations, represents almost 17% of the total top five intervention count, followed by Libya and Indonesia.

In terms of offshore markets, 618 assets are highly attractive for intervention. Norway and Australia stand out with 36% and 25%, respectively, while the UK scores strongly because of the 91 wells likely to be involved in intervention activities.

Rystad Energy highlights four main factors which influence operators' decision-making process when considering whether to drill new wells or explore intervention opportunities. These are:

- Well age, as older wells require more maintenance to sustain a consistent production rate
- Average production rate
- Remaining lifetime of the asset
- Breakeven oil price. ■



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# STRYDE

# Adopting cable-less sensors for efficient seismic surveys

Chris Einchcomb, geophysical advisor, STRYDE, describes how cable-less nodal technology has revolutionised the seismic acquisition landscape.

**O**VER THE PAST decades, land seismic acquisition has faced numerous challenges which have hindered the ability to deliver affordable and high-quality subsurface imaging. These issues range from significantly high acquisition costs to greater HSE risk exposure, and high environmental footprint – associated with the use of heavy, complex, and expensive cabled geophone seismic recording devices – and complex data processing.

However, with the rapid advancements in seismic receiver technology whereby the cost, weight, and size have been dramatically reduced, these challenges are becoming less prevalent, enabling the acquisition of high-density seismic surveys and the use of advanced processing algorithms to deliver increased efficiency and affordability without any compromise to image quality.

In the quest for commercialising untapped resources, coupled with the steer towards more renewable energy, STRYDE, a global expert in onshore seismic acquisition technology and solutions, has experienced significant demands for its cable-less nodal technology and fast-track data processing services across the oil and gas, geothermal, mining, carbon capture, utilisation and storage (CCUS) and civil engineering industries due to the systems unique ability to reduce seismic data acquisition time and cost.

## Enabling agile, flexible, and efficient seismic operations

Traditional cable systems used for seismic surveys are costly to deploy and can be particularly inefficient in challenging Middle East terrains. They also require extensive line preparation and surveying ahead of equipment deployment which is costly and time-consuming.

By introducing the capability to conduct mobile surveying using Satellite-Based Augmentation Systems (SBAS) in the receiver and source point positioning, you can reduce or even remove the necessity to conduct pre-acquisition line surveying. The world of stakeless land seismic surveys is becoming the norm and has become ingrained in the



Node deployment in small, light vehicles.

Image Credit : STRYDE

way crews deploy cable-less receiver technology such as STRYDE's miniature nodes. This significantly reduces the personnel and vehicles required, and naturally directly reduces HSE risk exposure while delivering a reduced carbon and environmental footprint.

STRYDE Nodes™ were recently deployed for a client in a challenging desert environment. This type of environment would usually have created significant challenges for cable systems due to their hefty size and weight, but due to their small, lightweight properties, an impressive 10,000 nodes were deployed, retrieved, and rotated each day, utilising just 30 crew members and less than 10 lightweight vehicles.

By utilising a smaller, agile crew, operators can now be more flexible and efficient than ever before, allowing access to subsurface insights far quicker than ever experienced on previous surveys.

## Higher productivity and data quality, with less cost

Equipment damage, which is notorious with cabled systems where breaks in cables or theft occur frequently, can cause unplanned downtime and additional costs through laborious investigation and replacement in the

field to avoid data loss.

Despite cabled systems offering the benefit of real-time data quality control, the sheer mass of equipment and the burden placed on technology and crew members to prepare lines, deploy receivers, record, and review, real-time data is immense, which often results in source acquisition inefficiencies.

In cutting the equipment cost per channel by up to 50%, STRYDE Nodes™ have revolutionised the land seismic acquisition landscape by enabling operators to conduct high-density seismic surveys for less than the traditional 'sparse' surveys that were controlled by cable systems or bulky nodal devices. This method provides more data redundancy should data accessibility be compromised in the rare occasion of node loss, a better image of the subsurface by increasing the spatial sampling in the field, accessing complex terrains previously restricted by bulky systems, and significantly reduced acquisition and processing project cycle time.

Exploration for new resources and better mapping of production of existing resources will continue to require high-resolution seismic imaging and nodal technology is, without a doubt, the next evolution in making high-density subsurface exploration more accessible to de-risk decision-making. ■





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# Improving preventative maintenance to boost ROI

Chris Armitage, principal reliability engineer, ABS Group, discusses how to optimise operations by adopting a streamlined approach to preventative maintenance.

**C**ONFRONTED BY CHALLENGES, complexities, uncertainties and opportunities, it is easy to lose sight of a simple fact: companies that fully assess their operating risks are better able to manage them strategically and improve their financial position.

It all starts with how we measure plant performance: operations and maintenance. Operations is measured on how an asset is used, while maintenance is based on the availability of an asset. Are you seeing the dilemma?

Most organisations begin their reliability journey in a reactive state. For example, if a new plant is under construction, the priority is getting it up and running – not what could go wrong in the future. But just like a new car, after a few years, the equipment becomes worn and equipment routinely fails that would have failed regardless; however, you weren't looking for it ahead of time.

As equipment and infrastructure matures and operations change hands, enhancing plant reliability and safety is ever more demanding. Recent projects are now showing the benefits of incorporating preventative maintenance into asset strategies and programmes to reveal key learnings.

Across industry, risk and safety methodology has been enhancing asset strategies by focusing inspection and the associated costs on the most critical equipment. Past operating conditions and inspection data can be used to make strategic future predictions, capturing a 'risk snapshot' in time. The approach involves the determination of a probability of failure combined with the consequence of failure.

At some point in the future, when a risk tolerance is expected to be exceeded, an inspection is recommended to better quantify the state of the infrastructure or component. The inspection itself does not reduce the risk, but it mitigates the uncertainty associated with the current degradation condition. This enables operators to better quantify the current damage present in the infrastructure or component and helps engineers make more accurate projections on the asset's remaining life.



Image Credit : Adobe Stock

*Enhancing plant reliability and safety is ever more demanding.*

## The rise of asset strategies

This is where the establishment of asset strategies comes in. Asset strategies define activities such as preventative maintenance (PM), inspections and condition monitoring to find impending failures. We know that assets will ultimately fail, but through effective asset strategies, organisations can give themselves time to do adequate planning and scheduling, so the failure does not impact production or safety.

PM is an essential component of today's business. It helps to ensure that equipment and machinery are running at optimal levels, but to be truly effective, a PM programme must be aligned with the core goals of the business.

This means that before implementing any PM strategies, practitioners must first evaluate the business to identify any gaps in processes, people and knowledge. These gaps will dictate the approach that should be taken for PM, as they will identify which strategies will be most effective for addressing

the specific needs of the business. By aligning PM with core business goals, practitioners can ensure that their maintenance programme is tailored to the unique needs of their organisation, which helps to drive success deeper and further.

A company relying on their maintenance procedures for 10+ years, and operating them in the same way for an extended period, will have seen 95% of all the failures that will occur. Addressing the failures that we know will occur saves time instead of returning to the drawing board as though the plant is brand new. This strategy avoids unnecessary labour-intensive work that dreams up scenarios, rather than starting with optimising what an organisation has and making subtle changes to improve efficiencies.

## Back to basics: know what's important

Before looking at optimising PMs, the first step is asset criticality ranking (ACR). Asset



criticality is an objective process where all assets are ranked (i.e., pumps, motors, valves, fans, etc.). Although this process does not immediately address PM, ACR assessments provide a prioritised asset master list, and reveal the relative importance of every asset at a plant, as well as how that asset affects the bottom line of your operations.

With this information, an organisation can start at the top and work its way through improvement actions. ACR is a necessary step to get the most benefit out of doing PM optimisation. Typically, it is the top 25% of the list that is contributing to 80% of all the failures at a facility. If you get a good handle on the maintenance strategies, or PM, for that top 25%, you will likely take care of most of your problems. That does not mean that the other 75% of this list isn't important, but you know where to focus your attention and investment to gain the maximum value of your efforts.

### How to streamline PM

Streamlining your PM programme through innovative capabilities and knowledge transfer can have a significant positive return on investment (ROI), ensuring the longevity of equipment and changing the culture of an organisation.

Traditional PM tactics can be time-consuming and costly, leaving organisations looking for ways to streamline their PM programme. One way to overcome this is by incorporating innovative capabilities. Asset Performance Management (APM) – Powered by ITUS Digital offers a continuous improvement and sustainability approach to PM.

Their innovative solutions allow for real-time monitoring of equipment, identifying potential issues before they become major problems. This improves efficiency and reduces downtime to ensure the longevity of equipment. ABS Group works with organisations to transfer this knowledge and skills to their staff, so they can be self-sufficient in maintaining equipment and machinery.

### Focus on your failure risks

For any given PM task, define the failure modes. According to the American Society of Quality (ASQ), a failure mode is defined as the ways, or modes, in which something might fail (physical material condition). Failures are any errors or defects, especially ones that affect the customer, and can be potential or actual.

To ensure maintenance activities are mitigating actual business risk, we need to identify and define asset failure modes. This approach allows the maintenance manager to prioritise maintenance activities and corrective actions with the full context of actual failure risks to the organisation. The information captured in computerised maintenance management software (CMMS) can be generated automatically based on the

equipment's maintenance history (if available).

Through this approach, the maintenance team can identify and evaluate the most persistent and impactful failures and define PM plans with the specific purpose of mitigating those consequences. One example of this approach is the Asset Risk Analyzer, a free solution to analyse failure risk and benchmark asset performance highlighted in the ABS Group's latest White Paper "A streamlined approach to preventative maintenance: why you don't have to go back to the drawing board to optimize operations" ([https://www.abs-group.com/content/documents/gated-resources/Path\\_to\\_Optimized\\_Asset\\_Management.pdf](https://www.abs-group.com/content/documents/gated-resources/Path_to_Optimized_Asset_Management.pdf)).

Maintenance history is analysed using the Asset Risk Analyzer to quickly identify assets with the highest probability and consequence of failure.

### Integrate the process and change the mindset

Information about operational requirements and equipment condition comes largely from people and their experience. People (and their knowledge) are the 'bread and butter' of any organisation, and a continuous conversation between the operator and technicians needs to be in place to have an optimised PM programme. If you don't do this, you may find yourself with a team member that just sees their role as another task-orientated function!

Organisations are encouraged to include their operations and maintenance technicians when identifying the appropriate failure modes and then work together to tailor the PM programme to address those failure modes.

Involving maintenance technicians in the process, organisations can tap into their expertise and provide buy-in, leading to a more effective and sustainable PM programme. Also, by creating a culture of knowledge, organisations can empower their people to take ownership of their equipment and required operations, leading to improved performance, increased efficiency and ultimately, achieving business goals.

As an example, a plant's PM may involve going out and greasing the bearings on a motor to prevent it from failing in service. It is crucial to consider the failure mode and the applicability of the task in addressing this. Organisations can determine the appropriate task frequency and adjust as necessary by involving maintenance technicians in this process. This approach helps in identifying impending failures and reducing unscheduled downtime brought on by in-service failures.

Once you have established maintenance tasks which are targeted to address failure modes, it is important to ensure all stakeholders can easily access the asset strategy and understand the status. In one single shared view all aspects of engineering, operations and maintenance can collaborate

around the identified failure modes and PM tasks. More importantly the team can also see the current state of the plan which includes emerging failure risks and appropriate execution of PM activities.

### PM builds on OEM recommendations for equipment

PMs are not intended to be a diagnostic procedure but instead an inspection to ascertain the health of equipment compared to the last reading, which helps organisations project when an asset needs corrective maintenance over time. As easy as this sounds, when most companies institute PM, they usually base it on the OEM's recommendations, which mainly follow the construction phase, as equipment may be under warranty.

OEM recommendations sound like a straightforward solution to PM; however, in most construction, the typical two-year warranty has already expired by the time the equipment is up and running. Additionally, OEM recommendations result from testing at the manufacturer site to cover a wide variety of circumstances that a plant may not experience in installing that type of equipment. Unless you intend to use an OEM for a long-term service agreement or performance guarantees, building your reliability programme around warranty purposes should be avoided, as you are executing PMs which may not align to your business objectives or operating context.

### Why invest?

When the economics of a market are good, organisations may not have the time; and conversely when markets are in recession, the money to invest is not available. Although time and money are always an issue, investing in integrity and reliability is a competitive advantage for the future. What we 'prevent' by investing now will pay off in future operations. Shortcutting safety performance and asset strategies become apparent in the future when incidents and accidents cost more than the current investment for assurance.

Investing in a streamlined approach to PM, such as those offered by Itus Digital and ABS Group, can have a significant positive ROI. For example, spending US\$100,000 from the operations maintenance (O&M) budget but saving US\$300,000 in labour and downtime costs, typically results in a 3:1 ROI in the first year.

Unlike capital projects, the O&M budget is not new money. It is what you plan on spending if you do nothing in the coming year. With this approach, the 3:1 ROI is the savings in the O&M budget. It not only improves efficiency and reduces downtime, but it also allows for safer planned maintenance activities and helps to ensure the longevity of equipment. ■

Increasing offshore oil and gas exploration and development, such as major offshore projects in the Middle East, are driving the demand for subsea power grid systems.

Image Credit : Adobe Stock

# Subsea power grid systems market set for strong growth

The global subsea power grid systems market is estimated to be worth US\$1.6bn in 2023 rising to US\$5.2bn by 2033, recording a CAGR of 12.5% during the forecast period, according to a new report from Future Market Insights.

**A**CCORDING TO THE report, entitled *Subsea Power Grid Systems Market*, key factors contributing to the growth and development of the market include:

- Increasing offshore oil and gas exploration: Subsea power grid systems are widely used in offshore oil and gas exploration activities. As energy demand continues to rise, there is a growing need to explore and develop offshore oil and gas reserves. This drives the demand for subsea power grid systems, as they provide reliable power transmission and distribution solutions for offshore platforms.
- Growing offshore wind energy installations: Offshore wind farms are being established in various regions worldwide to harness the abundant wind energy resources available at sea. Subsea power grid systems are essential for transmitting electricity from offshore wind turbines to the onshore grid.
- Expansion of underwater cable networks: Subsea power grid systems are also used to install and maintain underwater cable networks, such as submarine power cables and interconnectors. These cable networks are essential for transmitting electricity between countries, connecting offshore wind farms to the grid, and enabling intercontinental power exchange.
- Technological advancements: Continuous advancements in subsea power grid system technologies have improved efficiency, reliability, and performance. These advancements include developing advanced insulation materials, underwater connectors, and high-voltage direct current (HVDC) transmission systems. Technological progress enhances the capabilities of subsea power grid systems and encourages their adoption in various applications.
- Government initiatives and environmental regulations: Many governments worldwide are promoting the development of renewable energy sources and adopting stricter environmental regulations. This encourages the deployment of offshore wind farms and other renewable energy projects, which, in turn, drives the demand for subsea power grid systems. Government incentives and policies supporting the growth of renewable energy further contribute to the market expansion.
- Need for reliable and efficient power transmission: Subsea power grid systems offer reliable and efficient solutions for offshore applications. They provide a stable power supply, reduce transmission losses, and enhance system performance. Adopting subsea power grid systems becomes crucial as the demand for reliable power transmission increases, particularly in remote offshore locations.

“Continuous advancements in subsea power grid system technologies have improved efficiency, reliability and performance.”

These driving factors collectively contribute to the growth of the global market, creating opportunities for technology providers, equipment manufacturers and service providers in the industry. ■



# Advancing sustainability in power systems

Rasso Bartenschlager, general manager, Al Masaood Power Division, discusses the company's sustainable power systems.

**M**AKING THE TRANSITION to net zero can seem overwhelming for organisations, but with an understanding of available energy sources and insight into achievable targets, the journey can be smooth. Discovering a roadmap that supports ambitious, yet realistic goals is key in tackling emissions reduction.

With more than five decades of experience, Al Masaood Power, an esteemed Emirati company, has established an impressive track record in the oil & gas, marine and industrial sectors. A commitment to enhancing systems reliability, advancing processes and reducing energy consumption to minimise its environmental impact remain fundamental to this success.

One particular industry focus lies in the conversion of onshore land rigs, offshore jack ups, island rigs, and self-propelled barge rigs into hybrid operations. Within the power sector, hybrid energy power plants, especially on offshore rigs, play an instrumental role in enhancing energy efficiency and sustainability while catering to the energy demands of the operation. These power plants combine multiple sources of energy, such as traditional fossil fuels and renewable energy sources, to optimise power generation. By integrating battery storage systems into the setup, these hybrid power plants can further improve their performance, providing numerous benefits for the rig and the environment. The primary objective of this transformation is to upgrade these rigs with Battery Storage Systems (BESS) to reduce the number of online generators required during operations.

## Understanding the role of battery storage systems

One of the main challenges with renewable energy sources such as wind and solar is their intermittent nature. The availability of wind and sunlight varies throughout the day and is often unpredictable. This intermittency can cause fluctuations in power generation, which may not always align with the rig's energy demands.

Battery storage systems are key components in addressing this challenge. They store excess energy generated during peak production periods and discharge it when renewable sources are not producing enough power. By acting as a buffer, battery storage systems stabilise the power supply, ensuring a constant and reliable energy output.

By meticulously evaluating key parameters of the rig's operations,

“Hybrid energy power plants, especially on offshore rigs, play an instrumental role in enhancing energy efficiency and sustainability.”



Rasso Bartenschlager, general manager, Al Masaood Power Division.

Image Credit : Al Masaood Power

Al Masaood Power is able to design and size the energy storage system optimally, delivering the most efficient and cost-effective benefits to the operator.

The concept revolves around peak shaving and load levelling, which enables the removal of a generator from the rig's operation. This results in fewer engines running, reduced operating hours, optimised fuel consumption for the remaining generators, and a significant cut in overall CO<sub>2</sub> emissions.

A critical aspect of achieving these results lies in the accurate sizing and engineering of the energy storage system. Al Masaood Power carefully considers factors such as the maximum power to be delivered, the duration of power discharge/charge to recover maximum energy, the number of discharge/charge cycles, the depth of discharge of the batteries, and the expected lifetime of the system.

The company's well-sized Battery Energy Storage System (BESS) operates continuously, maintaining a well-balanced charge and discharge rate, thereby enabling an optimum level of rig operation at all times.

Al Masaood Power takes pride in offering comprehensive recommendations to rig designers, facilitating seamless integration as part of a turnkey solution for clients, particularly when dealing with moving rigs.

In conclusion, Al Masaood Power stands at the forefront of sustainability efforts in the power industry. By leveraging the latest technologies and expertise, the company strives to enhance energy efficiency, reduce environmental impact, and provide innovative solutions that meet the evolving needs of its clients while contributing to a greener future. ■

# The future of sulphur in a world of transition

Following The Middle East Sulphur Conference (MEScon) 2023, leading experts from conference co-organisers CRU and UniverSUL, and conference host ADNOC, discuss some of the most important questions in the sulphur market today.

## Contributors:

**Peter Harrisson, principal analyst, Sulphur & Sulphuric Acid, CRU (PH)**

**Angie Slavens, managing director, UniverSUL Consulting (AS)**

**Fahad Al Wahedi, SVP, Projects & Technical Center, ADNOC Sour Gas (FAW)**

**The Middle East is the largest producer and exporter of sulphur, currently supplying nearly 30% of the world's sulphur. With its dominance only set to grow, what is it that makes the region so well placed for success?**

**PH:** High sulphur content oil and gas reserves in the Middle East is the primary reason for its production potential. When you couple this with the region's geographical proximity to some of the world's largest sulphur consumers i.e., China, India and Morocco, there is a logistics efficiency advantage for Middle East supply.

**AS:** Indeed, the Middle East is home to natural gas reservoirs containing large volumes of sour gas – a vital energy source for the region to meet industrial and domestic energy needs for a growing population. And the by-product of this sour gas? Sulphur. Middle Eastern companies such as ADNOC and Aramco treat sulphur as the valuable commodity that it is – a key component in many critical industries.

**FAW:** Indeed, resources and location alone are not automatic roads to success. Appreciation of sulphur's value and investment into world class extraction and processing technology sets the Middle East apart. As one example, in the last decade, at ADNOC we have implemented two sulphur granulation plants adjacent to two of our largest sour gas plants with the goal to eliminate transportation of liquid sulphur by truck, increasing supply and improving the sustainability of sulphur handling operations. Etihad Rail was subsequently established to transport up to 20,000 metric tonnes per day of granulated sulphur by rail from Habshan and Shah to the port at Ruwais. This substantial investment in transportation logistics is unrivalled anywhere else in the world.

“Middle Eastern companies such as ADNOC and Aramco treat sulphur as the valuable commodity that it is.”



Image Credit : Adobe Stock

*The Middle East is home to vast quantities of sour gas, of which sulphur is a by-product.*

**From the investment you have discussed in sulphur production in the Middle East, evidently there is a lot of value in it. Why do you think sulphur is sometimes misconstrued as a waste by-product only?**

**AS:** Historic long-term oversupply of sulphur, aside from a few brief periods, has resulted in a relatively low sulphur price. This, combined with a common perception that sulphur is simply a costly consequence of environmental compliance, often leads to the conclusion that sulphur is a problem or a low-value commodity.

**PH:** It's worth noting that this view is often in flux, with trends in demand and pricing causing producers to reassess where sulphur sits along this spectrum at any given time. The reality is, there are vital industries that are simply not possible without sulphur. From electric vehicle battery production to fertilisers and metals processing, the demand for sulphur production is often underestimated.

**AS:** Interestingly, the tide on this underestimation is starting to change. As sweet (rather than sulphur-heavy sour) shale oil and gas dominates the North American hydrocarbon landscape, this previously supply-leading region has been in decline. The supply/demand balance has become tighter and we are seeing more frequent periods of price volatility. The effect this is having on industries reliant on sulphur has caused many to take notice of its importance.

**FAW:** This shift in perception coincides with the emergence of the Middle East as the world's largest supplier of sulphur. Not only is it the largest producing region today, and ADNOC the largest single exporter of sulphur in the world, but it is also the source of around half of production increases expected this decade. As we deliver gas growth



at ADNOC, continuing to responsibly meet global energy and industrial feedstock needs with minimum emissions, we will also expand our supply of high-quality and competitive sulphur, produced with lower carbon intensity. This includes the expansion of the Shah Gas Plant and, in the second half of this decade, the delivery of the Ghasha concession, the largest offshore sour gas project in the world.

**Building on this, can you share learnings from MEScon 2023 regarding how demand for sulphur is changing in terms of volume and use? How are companies in the Middle East responding to this demand?**

**PH:** Sulphuric acid required for phosphate fertiliser production currently makes up more than 50% of global sulphur demand. This is expected to increase in parallel with global population growth. Remaining, and rising, demand is from a range of industries including metals mining, with the highest demand coming from lithium, cobalt and nickel for batteries, and copper and aluminium for the construction of electric vehicle (EV) batteries specifically.

**AS:** The energy transition presents the potential for a compounded impact on the sulphur industry. The demand growth Peter mentions is true, but this is coupled with potential decreases in global sulphur supply due to reduced hydrocarbon consumption. While the most pronounced impact is not expected to be realised until the late 2030s or 2040s, the sulphur industry should be putting plans in place for future voluntary production to meet demand.

**FAW:** How we take proactive steps to bring together sulphur producers and consumers to tackle these changes was a key topic of discussion at MEScon 2023. With the Middle East taking a leading role in sulphur production, we need to be constantly exploring and innovating new uses and possible areas sulphur can add value in a decarbonising world with a growing population.

“ There are indeed new demand drivers for sulphur which upgrade its value in the energy transition.”

**It is clear that sulphur's role in the energy transition was a key topic at MEScon 2023. Do you think it truly has a role in a low-carbon economy? If so, how are companies in the Middle East adjusting and innovating to make this a reality?**

**PH:** While sulphur is a by-product of oil and gas production, it has much to contribute to the energy transition. Sulphur's conversion to sulphuric acid provides carbon-free power to many of the operations running sulphur-burners around the world. The subsequent acid which is generated will be critical in extracting the metals and producing the materials required to realise the electrification of economies around the world.

**AS:** The perception of sulphur is changing as the energy transition unfolds. The world is beginning to take notice of sulphur's true value, and some are coming to the realisation that at some point the industry will need to take steps to deliberately manage supply to meet demand. As the Claus process is the most efficient and economical means of producing huge volumes of elemental sulphur, it will likely still be the primary means of supplying sulphur to a decarbonised world. In addition, the Claus sulphur recovery unit is a net energy exporter, generating high pressure steam, a frequently overlooked benefit.

**FAW:** For me, the role of sulphur in the energy transition is two-fold. There are indeed new demand drivers for sulphur which upgrade its value in the energy transition. However, we need to also make sure that



Image Credit : Adobe Stock

**Sulphur is used in many vital industries from fertilisers to electric vehicle battery production.**

we are responsible and sustainable providers of sulphur. ADNOC has a dual advantage, as a result of decarbonisation and efficiency efforts, that have made its oil production lowest-possible cost and lowest-possible carbon intensity. For example, we already import 100% clean power from the grid and utilise the region's first railway to export our sulphur. We need to make sure we are extending this dual advantage to our sulphur production, utilising the latest technology to decarbonise our processing and handling operations, maintain reliability and drive down cost.

**What do you foresee as the greatest challenges that the sulphur industry will face, both globally and in the Middle East?**

**PH:** The perennial challenge the sulphur market faces is how to manage the constant oscillation of supply and demand from surplus to deficit that has been the defining feature of sulphur's past. However, the future will face a different, but related, challenge. With the energy landscape shifting from hydrocarbons to renewables, sulphur supply will decrease and the question may no longer be where to put oversupply, but instead where to find it when there is not enough. The decline in oil and gas supply is not an immediate trigger of lower sulphur availability but the more hydrocarbon processing falls, the more sulphur supply will come under pressure. The trend in gas processing in the Middle East is towards higher sulphur production for each unit of gas, which will be a useful contributor to meeting future sulphur supply needs.

**AS:** There will indeed need to be a mindset shift from sulphur as a plentiful, low value commodity to one that must be thoughtfully and strategically managed. While it will still be some years before that need fully arises, the world's largest producers of sulphur should be crafting strategies now so they are prepared to act when necessary. It is likely that meeting sulphur supply needs in a decarbonised world will still require the production of sour gas, most likely with hydrocarbon reinjection into the reservoir, which could create political challenges unless perception and expectations are properly managed.

**FAW:** There will be many challenges in the years and decades ahead, particularly as sulphur is increasingly recognised as a commodity with strategic value, and we navigate a changing energy landscape. However, with the leadership and collaboration provided by events like MEScon 2023, where we share successes and learnings, innovate and explore together, challenge each other and celebrate the specialist expertise, we will ensure we are resilient and agile to this changing sulphur landscape. ■

## AMETEK LMS introduces Magnetrol E4 Module level displacer level transmitter

AMETEK LEVEL MEASUREMENT Solutions (LMS) is excited to announce the launch of its Magnetrol brand, E4 Module level displacer level transmitter.

Electronic displacer level transmitter technology operates by detecting changes in buoyancy force caused by liquid level change. These forces act upon the spring supported displacer causing vertical motion of the core within a linear variable differential transformer.

Since 1932, the Magnetrol brand has provided best of breed products and technology and is the acknowledged industry leader for robust mechanical, buoyancy-based level measurement solutions in harsh operating environments. The Module level design continues this legacy by incorporating the trusted LVDT/Range Spring technology, which has been relied upon consistently in demanding industrial applications for decades.

The E4 Module level is a state-of-the-art 24 VDC, loop-powered, displacer liquid level transmitter. It offers the capability to output total level, interface level, or specific gravity. By utilising the LVDT/Range Spring

technology, this transmitter delivers superior measurement stability and performance compared to traditional torque tube displacer transmitters. This enhanced E4 transmitter aligns with the latest Magnetrol family of level transmitters, providing intuitive operation and exceptional ease-of-use through faster commissioning, maintenance, and troubleshooting. Highlights include:

- Equipped with a graphic LCD featuring an easy-to-navigate menu structure
- Includes a graphical DTM with increased diagnostics (compatible with PACTware)
- Offers NAMUR NE 107 diagnostic coverage
- Features HART® digital output (Version 7)
- Can be retrofitted onto existing displacer assemblies without interrupting the process
- Enables user calibration that can be performed in the instrument shop
- SIL 2 suitable with FMEDA available
- Provides a wider range of product configurations with various chamber/cage designs.

For more information see

<https://www.magnetrol.com/en/products/e4-module-level-liquid-level-transmitter>



The E4 Module level displacer level transmitter.

Image credit: AMETEK LMS

## Aarvi Encon Limited: outsourcing technical manpower

AARVI ENCON LIMITED is an ISO 9001, 45001 and CRISIL SME 1 certified company headquartered in Mumbai, with offices across the country. It has extended its footprint to the UAE, Oman, Qatar, Saudi Arabia, Indonesia and the United Kingdom.

With more than 35 years of experience, it is a leading provider of technical manpower staffing services to Oil & Gas, Refinery, Petrochemical, LNG, Power, Renewable, Infrastructure, among others. The company currently has more than 5,000 technical personnel on their payroll, with more than 50,000 deployed since the company's inception.

With a strong client referral base, Aarvi offers technical manpower deputation and operations and maintenance services.



Image Credit: Adobe Stock

Aarvi have deployed more than 300 personnel for both onshore and offshore international projects.

For both onshore and offshore international projects, they deployed more than 300 technical personnel to their Middle East clients with an expertise in the areas of design engineering, construction supervision, quality engineers/inspectors, pre-commissioning and commissioning personnel.

More than 500 technical personnel have been deployed by Aarvi in India for its renewable clients. Aarvi has also delivered projects for its global renewable clients

beyond India.

Owing to its excellence in the field, the company has won several awards for its ethics and practices, including the NOCIL Award from the Indian Institute of Chemical Engineers, the HSE Excellence Award from Cairn India Limited, the India Business Excellence Award from Worldview Business Review, and the Jamnalal Bajaj Award presented by late President Dr. A. P. J. Abdul Kalam, among others.



Aarvi has delivered projects for global renewable clients beyond India.



## Leading in offshore safety: Reflex Marine's award-winning work basket has completed 100 projects

REFLEX MARINE'S STORM-WORK suspended work basket was successfully employed in its 100th offshore project in October 2020.

The STORM-WORK was designed specifically for offshore industrial work activities and was very well received by offshore operators across industries – heavy-lift, decommissioning, oil & gas, and offshore wind. ConocoPhillips in Australia is using the customised enlarged version of STORMWORK while the standard units have been employed in multiple projects throughout Europe, among others, with Seaway7.

The design, safeguarding both the workers inside the basket and the assets worked on thanks to the soft-touch features and contoured shape, is praised by users worldwide. The small footprint and light weight allow for improved manoeuvring, while the highly durable, low-maintenance materials used ensure long unit lifespan.

"The unit is excellent for accessing areas with obstacles and tight landing spaces," comments a STORM-WORK user from Boskalis.

Reflex Marine's innovative work basket design has been recognised by industrial



Image Credit: Reflex Marine

*The Reflex Marine STORM-WORK suspended work basket has been recognised by the LEEA with a safety award.*

engineering body LEEA with an award in the Safety category confirming the outstanding crew protection features and safety benefits.

STORM-WORK is available for purchase and hire and can be customised to meet the required size and capacity.

## Oil giants successfully convert plastic waste from oil into circular polymers

ARAMCO, TOTALENERGIES, AND SABIC have for the first time in the Middle East and North Africa successfully converted oil derived from plastic waste into ISCC+ certified circular polymers.

The plastic pyrolysis oil, also called plastic waste derived oil (PDO), was processed at the SATORP refinery jointly owned by Aramco and TotalEnergies, in Jubail, Saudi Arabia. It was then used as a feedstock by PETROKEMYA, a SABIC affiliate, to produce certified circular polymers.

The project aims to pave the way for the creation of a domestic value chain for the advanced recycling of plastics to circular polymers in the Kingdom of Saudi Arabia. The process allows the use of non-sorted plastics, which can be difficult to recycle mechanically, and consequently contributes to solving the challenge of end-of-life plastics.

The project has obtained ISCC+ certification to assure transparency and traceability of the recycled origin of feedstock and products. Three industrial plants were involved in the process: SATORP refinery, Aramco's Ju'aymah NGL Fractionation Plant and PETROKEMYA. All successfully obtained the ISCC+ certification, enabling the production of circular materials.

Mohammed Y. Al Qahtani, president of Downstream at Aramco, said, "This achievement illustrates the importance of the petrochemical sector in creating more sustainable products and solutions. Our aim is to create circular solutions for plastic waste, while also making progress on our ambition to achieve net-zero Scope 1 and Scope 2 greenhouse gas emissions across our wholly-owned operated assets by 2050. By leveraging spare capacity of existing infrastructure, we aim to produce circular products that could be scaled up at low cost. Aramco is considering multiple ways of tapping into new technologies and leveraging existing assets to support the deployment of circular, more sustainable and lower-carbon products."

Adding to this, Bernard Pinatel, president, Refining & Chemicals,



Image Credit: Adobe Stock

*The project aims to pave the way for the creation of a domestic value chain for the advanced recycling of plastics to circular polymers.*

TotalEnergies, commented, "This advanced plastic recycling initiative reflects TotalEnergies' ambition to concretely contribute to addressing the challenge of end-of-life of plastics. Several other circular economy projects are being studied, leveraging the partners' technical expertise and experience to further contribute to plastics recycling. It is a major pathway towards TotalEnergies' target to produce 30% of circular polymers by 2030, and its strategy to build a multi-energy company with the ambition to get to net zero by 2050, together with society."

## Wanner Hydra-Cell features low-shear pumping technology

WANNER RECENTLY PUBLISHED findings of research showing that a Hydra-Cell seal-less, multi-diaphragm pump reduced the shear degradation in a polymer solution by more than 90% compared to a plunger pump. The independent testing was conducted by a professor specialising in enhanced oil-recovery and transport in porous media at the University of Wyoming. The testing investigated how to minimise shear effects during polymer flooding.

Surface facility pumps often cause large amounts of shear degradation in polymer slugs, which can lead to dramatic reduction in production. Overall, the Wanner Hydra-Cell T100K API 674 pump demonstrated a marked reduction in polymer solution viscosity degradation, achieved by its low shear pumping action; significant savings can therefore be realised through lower polymer utilisation and higher cumulative EOR production.

Many of Wanner's pumps have been reliably operating in the field for a quarter of a century plus; with the Hydra-Cell low-shear pump technology, these operators have extended their financial recovery of wells on polymer injection and seen an increased rate of return.

The Hydra-Cell true positive displacement pumping action and minimal internal losses achieve high efficiencies from pump shaft to hydraulic power; this, combined with the wide range of flow rate controllability, ensures optimum energy usage, freeing resources that can be invested into further improving efficiency and sustainability. Also, the pumps' components can be constructed from a variety of materials, including stainless steel, Hastelloy, PTFE and polypropylene, which coupled with the flexible design makes repurposing easy.

Paul Davis, Wanner International's managing director, commented, "Our priority is to help energy organisations run safe and cost-effective pumping processes; this research shows with our low shear pumping action technology, significant savings can be made in EOR polymer injection. This has a huge impact on the efficiency and profitability of oil fields around the world, which is especially significant given the energy crisis the world is facing."

Wanner designs and manufactures API 674 and API 675 process, transfer, injection and metering pumps for the energy industry; helping customers around the world improve their processes and reduce energy consumption and maintenance costs.



Testing investigated how to minimise shear effects during polymer flooding.

## Graco launches next-generation double diaphragm pump

GRACO, A MANUFACTURER of fluid handling equipment, has announced the release of the company's next-generation electric-operated double diaphragm pump, QUANTM. It features a revolutionary new electric motor design that is up to 8X more efficient than a standard pneumatic pump.

The innovative QUANTM pump is suitable for nearly any fluid transfer application and offers a wide range of materials of construction to support multiple industrial and hygienic applications, including chemical processing, water treatment, paint manufacturing, food and beverage, pharmaceutical and more.

"The QUANTM pump isn't a new twist on old technology. It's an entirely innovative design that changes how pumps perform in factories and other installations around the world," said Bart Clerx, product marketing manager EMEA. "We're excited to have created an advanced, extremely efficient design that is lightweight and provides significantly lower lifetime costs than other pump technologies. The pump modernises operations by greatly reducing energy costs. This empowers industrial manufacturers to protect and grow margins and measurably contribute to energy savings, compliance and environmental stewardship efforts."

The breakthrough electric QUANTM pump is designed to be a highly reliable drop-in replacement for current pneumatic pumps or greenfield construction.

To learn more about the QUANTM pump, visit [www.graco.com/quantm](http://www.graco.com/quantm).



QUANTM is suitable for nearly any fluid transfer application.

## Parker Hannifin offers elevated performance in power saving

PARKER HANNIFIN, A global leader in motion and control technologies, has announced the launch of the new medium-duty, fixed-displacement, bent-axis pump and motor series, F10. As an evolution of the F11 and F12 products manufactured by Parker's Pump & Motor Division Europe, the F10 series excels in power savings, reliability and durability. It is intended for mobile machinery applications in agriculture, construction, mining, marine and offshore, oil & gas and transportation.

The new F10 series is available in seven displacements, from 30 cc up to 125 cc, and is designed for both open- and closed-circuit transmissions. Thanks to the patented spherical piston concept, the F10 series offers excellent efficiency, which mean less power loss.

The F10 series offers excellent efficiency.



The F10 series has the same design concept as Parker's

F11 and F12 heavy-duty series with double-tapered bearings and ring gear synchronisation for the highest reliability and durability. The new series offers up to 13% smaller envelope size and 25% lower weight than the equivalent F12, resulting in very easy installation. The spherical piston design enables high volumetric efficiency of up to 96%.

"The new F10 is probably the most efficient medium-duty pump and motor on the market," stated Christian Bengtsson, product leader at Pump & Motor Division Europe. "With sustainability and low total cost of ownership as key considerations, long service life and high reliability have been the focus for us when designing the F10 series. We can significantly reduce operating costs by lowering power consumption and support OEMs' goals to reduce emissions and comply with future environmental regulations."

The F10 series comes in ISO, SAE and cartridge versions with flexible shaft options. Parker also offers a wide range of accompanying speed sensor and integrated valve options.



## ADNOC builds hydrogen refuelling station

ADNOC HAS BEGUN construction on the Middle East's first high-speed hydrogen refuelling station.

The station, which is being built in Masdar City by ADNOC, will create clean hydrogen from water, using an electrolyser powered by clean grid electricity.

Hydrogen can give vehicles a longer driving range and quicker refuelling times compared with battery electric vehicles.

ADNOC also announced a partnership with Toyota Motor Corporation and Al-Futtaim Motors to test the high-speed hydrogen refuelling station using a fleet of clean hydrogen-powered vehicles. The pilot programme will help ADNOC understand how hydrogen with high-speed refuelling can best be used in mobility projects to support the UAE's National Hydrogen Strategy, which aims to position the country among the largest producers of hydrogen by 2031.



Image credit: ADNOC

Clean hydrogen-powered vehicle.

His Excellency Dr. Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology and ADNOC managing director and group CEO, said, "The need to reduce carbon emissions to address climate change is clear and urgent. ADNOC is placing sustainability and decarbonisation at the heart of its strategy and, while we decarbonise our operations today, we are making robust investments to be a supplier of choice for the clean energies of tomorrow.

"Hydrogen will be a critical fuel for the energy transition, helping to decarbonise economies at scale, and it is a natural extension of our core business. Through this pilot programme, we will gather important data on how hydrogen transportation technology performs as we continue to develop the UAE's hydrogen infrastructure."

ADNOC has allocated US\$15bn (AED55bn) for new energies and decarbonisation technologies to reduce its carbon intensity by 25% by 2030 and enable its Net Zero by 2050 ambition.

## Clariant introduces demulsification solution

CLARIANT OIL SERVICES, a provider of specialty chemical solutions, has launched PHASETREAT WET to offer more efficient and sustainable solutions for the oil and gas industry's demulsification needs.

Designed to overcome challenges in traditional oil production processes – most notably, meeting stricter environmental requirements for oil and water separation – the novel solution will help operators reduce operational costs, simplify logistics and mitigate safety risks.

For offshore operators, PHASETREAT WET reduces chemical volume by up to 75%, resulting in reduction in freight, inventory and offshore movements. In onshore operations, the solution offers additional benefits, including decreased dosages for demulsifiers and deoilers, improved water treatment quality, more efficient oil treatment, and reduction of injection points.

"In an ever-changing world with increasing energy demands and a drive towards energy independence, the oil and gas sector plays a crucial role in supplying vital resources. More sustainable chemical solutions to support oil and gas production can help the overall production process become more sustainable and adhere to modern health, safety, and environmental regulations," said George Nunes, head of Clariant Oil Services.

Last year, Clariant Oil Services launched the D3 PROGRAM to introduce more sustainable solutions to the oil and gas industry with an emphasis on decarbonisation, densification, and detoxification. The initiative leverages advances in the oilfield and helps operators reduce carbon emissions and enhance safe operations, while avoiding disruptions to ongoing operations.

## IWS introduces inVision Mobile App

INTELLIGENT WELLHEAD SYSTEMS (IWS) has introduced the inVision Mobile App, which provides current users of the IWS inVision Technology Platform with instant access to key wellsite operational data. It is the latest addition to the company's portfolio of digital technologies for completion operations.

"Developing the inVision Mobile App represents the next step in our efforts to encourage operators to embrace a digital infrastructure," said Bill Henn, vice-president of business development for IWS. "By giving operators even greater, easier access to operational data at the wellsite, they can respond immediately to changing conditions, helping to reduce risk, lower costs, and improve uptime while on the go."

With inVision Mobile, users can now view a wide range of key data from a cellphone or tablet. They can inspect pad progress and current well activity, a live frac tree and live valve positions. When running frac and wireline data through IWS safety and efficiency controls, users can analyse frac and wireline plots remotely, as well as a pre-set frac and wireline plots with the most pertinent data. Users can also select and de-select additional channels on the plot through the plot data configuration option.

## New laser-based H2S gas detector launched

TELEDYNE GAS AND Flame Detection has launched its GD1 laser-based gas detector with full SIL2 3rd party approval.

The GD1 SIL2 is the market's first open-path gas detector for hydrogen sulphide (H2S) safety-related applications, according to the company.

The GD1 from Teledyne GFD first entered the market in 2011, with more than 1600 units since deployed at oil and gas

exploration and production companies throughout the Middle East and the rest of the world.

With its new certification, the GD1 is now suitable for use in systems with SIL2 requirements. The step from SIL1 to SIL2 requires built-in automatic self-testing of hardware components, meaning reduced maintenance intervals for sensors, and reduced downtime. GD1 complies to the latest standard for IEC 60079-0:2017 (IECEx).

Teledyne GFD's GD1 feature a unique customised tunable laser diode that eliminates environmental effects from sun, rain or fog. It can operate with up to 98% obscuration, boosting overall site safety, and can penetrate harsh environments that competitor solutions may find difficult.



The GD1 SIL2 gas detector.

Image credit: Teledyne

# Project Databank

Compiled by Data Media Systems

## OIL, GAS AND PETROCHEMICAL PROJECTS - EGYPT

Project Name	City	Sectors	Facility	Budget (US\$)	Status
RSNRPC - Ain Sokhna Petrochemical Complex and Refinery	Ain Soukhna	Petrochemicals, Plastics	Polyethylene, Polyester	7,500,000,000	FEED
Energiean - North El Amriya-North Idku Development - Subsea Tie-Back	Idku	Gas	Gas Field	235,000,000	Engineering & Procurement
AGIBA - Meleiha Gas Export Pipeline - Phase 2 - 130 Km Pipeline	Western Desert	Gas, Pipeline	Gas, Gas Pipeline	120,000,000	Engineering & Procurement
MIDOR - Midor Refinery Expansion	Alexandria	Refining	Petroleum Oil	2,300,000,000	Commissioning
GASCO - Western Desert Gas Complex - Train D	Western Desert	Gas	Gas Field	450,000,000	Construction
ANOPC - Hydrocracking Diesel Complex - Hydrocracker Complex	Asyut	Gas, Refining	Hydrocracker	2,800,000,000	Construction
EGAS - GASCO - Dahshour Gas Compression Expansion - Train 5, 6, 7, 10A	Dahshur	Gas	Gas Compression	1,000,000,000	Construction
Petro Shorouk - Zohr Gas Field Development	Mediterranean Sea	Offshore	Offshore Gas Field	15,600,000,000	Construction
ECHEM - SCZone Refinery & Petrochemicals Complex - Overview	Suez Canal Economic Zone (SCZone)	Petrochemicals, Refining	Petroleum Oil	7,500,000,000	FEED
ASORC - Assiut Atmospheric Distillation Unit	Asyut	Refining	Crude Oil Distillation Unit	3,820,000,000	Engineering & Procurement
RSNRPC - Polypropylene (PP) Plant	Suez Canal Economic Zone (SCZone)	Petrochemicals	Polypropylene	1,700,000,000	Feasibility Study
SOPC - Suez Refinery Expansion	Suez	Refining	Refinery	1,400,000,000	Construction
Apex International Energy - South East Meleiha - Concession Exploration	Western Desert	Exploration & Upstream Production	Development Drilling & Production	100,000,000	Construction
Ministry of Housing, Utilities & Urban Communities - Central Business District (CBD)	New Capital	Construction	Mixed-Use Development, Commercial Buildings	3,000,000,000	Construction
SMD - Formaldehyde and Derivatives Plant	Damietta	Petrochemicals, Chemicals	Melamine, Methanol, Sulphuric Acid, Formaldehyde, Urea	41,000,000	Construction
Kuwait Energy Egypt - Abu Sennan Concession - Infill Project	Western Desert	Exploration & Upstream Production	Development Drilling & Production	100,000,000	Construction
SDX Energy - West Garib Concession - Rabul Field	Gharib	Exploration & Upstream Production	Development Drilling & Production	58,000,000	Feasibility Study
SIDPEC - Propane Dehydration (PDH) Plant	Alexandria	Petrochemicals	Propylene	730,000,000	Feasibility Study
ECHEM - El Alamein Petrochemical and Refinery Complex	New Alamein City	Petrochemicals	Butadiene, Benzene	8,000,000,000	Feasibility Study
PETROBEL - Nooros Exploration Prospect (Abu Madi West)	Nile Delta	Offshore	Offshore Gas Field	12,000,000,000	Construction
NOSPCO - Offshore North Sinai Concession - Phase 3 - Kamose and Tao Field Development	North Sinai	Gas	Gas Field	95,000,000	Pre-FEED
ECHEM - SCZone Refinery & Petrochemicals Petroleum Refinery Project	Suez Canal Economic Zone (SCZone)	Refining	Petroleum Oil	3,000,000,000	FEED Complex -
ECHEM - SCZone Refinery & Petrochemicals Complex - Petrochemicals Complex	Suez Canal Economic Zone (SCZone)	Petrochemicals	Butadiene	3,200,000,000	Feasibility Study
Total - OLA Energy Egypt - Mex Petroleum Zone - Phase 1 - Alexandria Petroleum Products Terminal (APPT)	Alexandria	Gas, Refining	Gasoil	200,000,000	FEED
Eni - North El Hammad License - Bashrush Discovery	Nile Delta	Gas	Gas Field	200,000,000	Feasibility Study
Eni - Nour Gas Field Exploration	North Sinai	Gas	Gas Field	100,000,000	Feasibility Study
SUCO - Disouq Concession - Phase 2 - Field Development	Disouq	Exploration & Upstream Production	Development Drilling & Production	100,000,000	Construction
Agiba - Western Desert Gas Processing Plant	Western Desert	Gas	Gas Processing	700,000,000	Construction



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- North Africa
- South Africa
- East Africa
- West Africa
- Russia & CIS
- South East Asia
- India
- China
- Europe
- North America
- Latin America

## SECTORS COVERED



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# Project Databank

Compiled by Data Media Systems

## Project Focus

Compiled by Data Media Systems

### SOPC - Suez Refinery Expansion

<b>Name of Client</b>	Suez Oil Processing Company (SOPC)
<b>Estimated Budget (US\$)</b>	1,400,000,000
<b>Contract Value ( US\$)</b>	430,000,000
<b>Award Date</b>	2014-Q4
<b>Main Contractor</b>	ENPPI, Petrojet
<b>Facility Type</b>	Petroleum Oil, Refinery
<b>Status</b>	Construction
<b>Location</b>	Suez, Egypt
<b>Project Start</b>	2015-Q3
<b>End Date</b>	2023-Q4

### Background

Suez Oil Processing Company (SOPC) is constructing a large scale expansion project in order to revamp its existing facilities and improve its product quality and mix, operation efficiency and capacity output. The refinery includes two complexes: the coke complex and the lube oil complex.

### Project Status

Date	Status
Jul 2023	ACROW Integrated Construction Services (AICS) is the scaffolding subcontractor for the coker complex rehabilitation package.
Jan 2023	The Italian Termotecnica Industries and Egyptian Onspec Engineering & Contracting Consortium has been awarded a contract for the supply of two high-pressure boilers.
Nov 2022	he delayed coker package is worth US\$55mn and is expected to be completed by the end of 2023.
Feb 2022	The asphalt unit has begun production. The civil work of the new coker complex has been started.
Feb 2021	Bechtel will be responsible for the detailed engineering design and supply of all the needed raw materials to Petrojet, the engineering, procurement and construction (EPC) contractor of the project, to perform the shop fabrication of the coker furnace.
Mar 2018	The board of the European Bank for Reconstruction and Development has approved the US\$200mn loan that will fund and support the project. In November 2019 it confirmed an additional US\$50mn

### Project Scope

The project's scope of work includes:

- Installation of a new Vacuum Distillation Unit (VDU) A new 200,000 tpa Vapour Recovery Unit (VRU) Renovation of the old coker unit
- Asphalt unit plant
- Upgrading the existing straight-run unifying unit to produce kerosene (Jet A-1 specifications) instead of gas oil Delayed coker package
- Installing a new distillate hydrotreating unit



## Middle East & North Africa

The Baker Hughes Rig Count tracks industry-wide rigs engaged in drilling and related operations, which include drilling, logging, cementing, coring, well testing, waiting on weather, running casing and blowout preventer (BOP) testing.

Country	JUNE 2023			VARIANCE From Last Month	MAY 2023		
	Land	OffShore	Total		Land	OffShore	Total
<b>Middle East</b>							
ABU DHABI	40	15	55	-2	41	16	57
DUBAI	0	1	1	0	0	1	1
IRAQ	62	0	62	0	62	0	62
JORDAN	0	0	0	0	0	0	0
KUWAIT	24	0	24	-3	26	1	27
OMAN	47	0	47	-2	49	0	49
PAKISTAN	12	0	12	0	12	0	12
QATAR	4	7	11	0	2	9	11
SAUDI ARABIA	70	11	81	-3	68	16	84
SUDAN	0	0	0	0	0	0	0
SYRIA	0	0	0	0	0	0	0
YEMEN	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>259</b>	<b>34</b>	<b>293</b>	<b>-10</b>	<b>260</b>	<b>43</b>	<b>303</b>

### North Africa

ALGERIA	36	0	36	+4	32	0	32
EGYPT	31	3	34	0	29	5	34
LIBYA	15	1	16	+2	13	1	14
TUNISIA	2	0	2	0	2	0	2
<b>TOTAL</b>	<b>84</b>	<b>4</b>	<b>88</b>	<b>+6</b>	<b>76</b>	<b>6</b>	<b>82</b>

Source: Baker Hughes

مع الشركات متعددة الجنسيات الرائدة في مجال التكنولوجيا لتعزيز قدراتها في مختلف القطاعات، بما في ذلك النفط والغاز. ومن الأمثلة البارزة على هذا التعاون، الاتفاقية الموقعة بين شركتي أرامكو وأفيفا في أغسطس/آب من عام 2021. ويركز هذا التعاون على تسخير الذكاء الاصطناعي والتعلم الآلي وإدارة البيانات لتطوير وتنفيذ مرافق الهيدروجين الأزرق وإزالة الكربون في المملكة العربية السعودية.

بالإضافة إلى ذلك، يحدد التقرير ثلاثة اتجاهات مستقبلية رئيسية من شأنها أن تدفع تبني الذكاء الاصطناعي في صناعة النفط والغاز. أولاً، هناك تركيز متزايد على المراقبة والتنبؤ وتقليل البصمة الكربونية المرتبطة بعمليات النفط والغاز.

ويتماشى هذا مع التزام الصناعة بالاستدامة البيئية. ثانياً، يكتسب تحسين عمليات التقاط الكربون وتخزينه واستخدامه (CCSU) مكانة بارزة كوسيلة لتقليل انبعاثات غازات الاحتباس الحراري. أخيراً، تعمل الصناعة على تكثيف جهودها في إنتاج واستخدام الهيدروجين الأخضر، مما يؤدي إلى زيادة اعتماد تقنيات الذكاء الاصطناعي.

ومن خلال تبني هذه الاتجاهات والاستفادة من الشراكات التعاونية، يمكن لصناعة النفط والغاز الاستمرار في تعزيز اعتمادها للذكاء الاصطناعي، والتصدي بفعالية للتهديدات السيبرانية، وتعزيز التزامها بالاستدامة وإزالة الكربون. فالشرق الأوسط يحظى - بالتأكيد - بإمكانيات هائلة للتقدم التحويلي في استخدامه للذكاء الاصطناعي. ومع احتضان الصناعة لعملية التحويل الرقمي، توفر أنظمة الذكاء الاصطناعي الفرصة لإحداث ثورة في الممارسات التقليدية، وتحسين عمليات الإنتاج، وزيادة الإنتاج. كما شهد مجال التعلم الآلي، على وجه الخصوص، نمواً سريعاً، مما أتاح تحليل البيانات السيزمية وسجلات الآبار وبيانات الإنتاج لتحديد مكامن النفط والغاز وتحسين أداء الآبار.

في حقل خريص النفطي. علاوة على ذلك، من المتوقع أن تؤدي المشاريع الضخمة والجارية والمخطط لها في المملكة العربية السعودية إلى مزيد من تبني تقنية الذكاء الاصطناعي.

هذه المبادرات الطموح، مثل نيوم، والتي تهدف إلى ربط كل شيء بالذكاء الاصطناعي وإنترنت الأشياء (IoT)، تجسد التزام المملكة بالتحويل الرقمي. وبالنسبة للشركات التي تركز على الذكاء الاصطناعي، وخصوصاً مزودي البرمجيات، تقدم نيوم إمكانيات كبيرة غير مستغلة، وتوفر فرصاً تجارية مربحة. وبالإضافة إلى ذلك، تقدر قيمة البنية التحتية الذكية المخطط لها لمدينة «ذا لاين»، التي أعلن عنها ولي العهد الأمير محمد بن سلمان في عام 2021، بأكثر من 200 مليار دولار أمريكي. وهذا يؤكد كذلك على جهود الدولة لدمج الذكاء الاصطناعي في خططها التنموية.

## الذكاء الاصطناعي

### في الأمن السيبراني

مع استمرار صناعة النفط والغاز في التحويل الرقمي، فإن الاعتماد المتزايد على الأنظمة الرقمية يعرض الشركات لخطر متزايد من الهجمات الإلكترونية، غير أن هذا الخطر يمثل أيضاً فرصة لتعزيز اعتماد الذكاء الاصطناعي. فالحماية من التهديدات السيبرانية المعقدة تتطلب نهجاً مستهدفاً يشمل تدابير الأمن السيبراني وحلول التكنولوجيا المتقدمة والموظفين المهرة. كما يجب على شركات النفط والغاز، للتصدي بشكل استباقي لهذه التحديات، تحديد نقاط الضعف وتبني حلول الذكاء الاصطناعي والتعلم الآلي للتخفيف من المخاطر السيبرانية بشكل فعال.

علاوة على ذلك، يلعب التعاون الاستراتيجي والشراكات التجارية دوراً محورياً في دفع تبني تقنية الذكاء الاصطناعي وتعزيز الابتكار. وتشارك المملكة العربية السعودية، على وجه الخصوص، بنشاط

العامة في صناعة النفط والغاز لمواجهة التحديات ووضع نفسها لتحقيق النجاح على المدى الطويل. وتشير تقديرات منظمة التعاون الاقتصادي والتنمية (OECD) إلى أن تكامل الذكاء الاصطناعي يمكن أن يضيف ما يصل إلى 16 تريليون دولار أمريكي إلى الناتج المحلي الإجمالي العالمي بحلول عام 2030. ويمثل هذا الرقم المذهل أكثر من 10 في المائة من إجمالي الناتج العالمي.

أما في المملكة العربية السعودية، فمن المتوقع أن يكون اعتماد الذكاء الاصطناعي في صناعة النفط والغاز مدفوعاً بعدة عوامل رئيسية تتماشى مع الاتجاهات والأهداف العالمية. وأحد هذه الجوانب الحاسمة هو التزام الدولة بالتحول في مجال الطاقة وتحقيق الأهداف المناخية. كما تعد الحاجة الملحة لمواجهة تهديدات الأمن السيبراني في قطاع النفط والغاز باستخدام الذكاء الاصطناعي، حافزاً آخر لاعتماده وتبنيه على نطاق واسع.

بالإضافة إلى ذلك، يُنظر إلى تعزيز الشراكات وأوجه التعاون لتشجيع المزيد من اعتماد الذكاء الاصطناعي والابتكار على أنه استراتيجية لتحقيق النجاح. والمملكة العربية السعودية تهدف إلى تبني أفضل الممارسات من الصناعات الأخرى وتكرار الأمثلة الناجحة على المستوى المحلي والإقليمي والعالمي. ويسلط تقرير دراسة الحالة «الذكاء الاصطناعي في النفط والغاز والخدمات الحكومية والخدمات المالية» الصادر عن شركة ستراتيجيك جيرز، الضوء على التنفيذ الاستباقي للتكنولوجيا الذكية من جانب شركة أرامكو في المملكة العربية السعودية. فمن خلال دمج الأنظمة القائمة على الذكاء الاصطناعي، حققت شركة أرامكو تحسينات كبيرة في الكفاءة وخفض التكاليف. وتجدد الإشارة إلى أن الشركة نجحت في خفض إجمالي استهلاك الطاقة بنسبة 18 في المائة، وخفض نفقات الصيانة بنسبة 30 في المائة، وخفض أوقات التفتيش بنحو 40 في المائة

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الاستخدام الفعال للذكاء الاصطناعي يجعل الأعمال أكثر انسيابية وفاعلية

## صعود الذكاء الاصطناعي في قطاعي النفط والغاز

في هذا المقال، يقول منهاج ضياء إن الجهات الرئيسية الفاعلة في قطاعي النفط والغاز تحظى بالاستفادة من الذكاء الاصطناعي. فقد مهدت التطورات التكنولوجية الطريق لتكامل أنظمة الذكاء الاصطناعي (AI)، في المشهد الديناميكي لصناعات النفط والغاز في الشرق الأوسط، مما يبشر بعصر جديد من الكفاءة التشغيلية المعززة واتخاذ القرارات المستنيرة.

الرغم من أن الاضطراب الأول أثر على الطلب العالمي على الطاقة، فإن الأخير تسبب في اضطراب في سلاسل إمداد النفط والغاز في أعقاب العقوبات المفروضة على روسيا، أكبر مورد للطاقة في العالم.

وقال: «وقد استلزم ذلك زيادة الرقابة وتحسين الأداء في جميع الوظائف، بما في ذلك تصميم المشروع، والبناء، والخدمات اللوجستية، وإدارة المخزون، والصيانة. والأهم من ذلك، تريد الشركات أيضاً تحقيق رقابة أفضل على طلب السوق لمواءمة إنتاجها. والهدف هو إيجاد كل فرصة لخفض التكاليف للاستمرار على المدى الطويل.»

والتعلم الآلي يقدم مجموعة من الفوائد في هذا السيناريو من خلال عمليات التشغيل الآلي وتحسين العمليات والتنبؤ بالطلب. ويمكن أن يدعم تحديث ممارسات الصيانة، واكتشاف التسرب، وإدارة البيانات المبسطة والتوثيق، وكذلك تحسين سلاسل المخزون والتوريد. فمن خلال تطبيق التعلم الآلي، يمكن للشركات

معدلات الإنتاج وتقليل التكاليف عبر قطاع النفط والغاز، حسبما أكدت شركة جلوبال داتا. فـشركة جلوبال داتا تقدم، في تقريرها الموضوعي الشامل «التعلم الآلي في مجال النفط والغاز»، رؤى حول الأهمية المتزايدة لتكنولوجيا التعلم الآلي في عمليات الصناعة. كما يسلط التقرير الضوء - أيضاً - على الجهود الملحوظة التي تبذلها شركات النفط والغاز الكبرى؛ مثل بريتيش بتروليوم وإكسون موبيل وأرامكو السعودية وشيل وتوتال إنرجيز في تطوير وتنفيذ أدوات التعلم الآلي لمواجهة تحديات الأعمال ذات الصلة.

وقد سلط رافيندرا بورانيك، المحلل الاستراتيجي في مجال النفط والغاز في شركة جلوبال داتا، الضوء على الاضطرابات الأخيرة في الصناعة، بما في ذلك تأثير كوفيد 19- على الطلب العالمي على الطاقة، وعواقب حرب أوكرانيا، على سلاسل توريد النفط والغاز. حيث شهدت صناعة النفط والغاز اضطرابين هائلين في ثلاث سنوات فقط في شكل فيروس كوفيد 19- وحرب أوكرانيا. وعلى

فقد حظي الذكاء الاصطناعي، باعتباره مجالاً سريع النمو، باهتمام كبير لإمكاناته التحويلية عبر مختلف القطاعات، وصناعة النفط والغاز ليست استثناء من ذلك. إذ يدور عالم الابتكار هذا حول تسخير الخوارزميات الذكية وتحليلات البيانات لإحداث ثورة في الممارسات التقليدية، وتحسين عمليات الإنتاج، وزيادة الإنتاج في هذا القطاع الحيوي. وفي الواقع، يشهد مجال التعلم الآلي نمواً سريعاً في صناعة النفط والغاز، حيث يقدم تطبيقات قيمة في تحليل البيانات وتحسينها. فمن خلال الاستفادة من خوارزميات التعلم الآلي، يمكن فحص البيانات السيزمية، وسجلات الآبار، وغيرها من المعلومات الجيولوجية الأخرى لتحديد مكامن النفط والغاز المحتملة.

علاوة على ذلك، فإن هذه الخوارزميات بارعة في فحص بيانات الإنتاج، واكتشاف الأخطاء التي يمكن أن تعزز الأداء الجيد. وعليه، تقدم هذه التكنولوجيا التحويلية وعداً كبيراً من حيث تعزيز الكفاءة وزيادة

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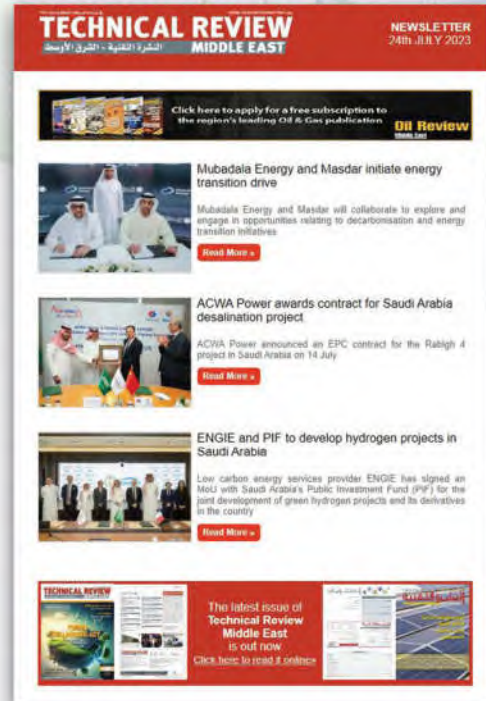
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تُعنى بالنفط والغاز والبتروكيماويات

# النشرة النفطية

المجلد 26 العدد الخامس 2023

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## اصقود الذكاء الاصطناعي في قطاعي النفط والغاز

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