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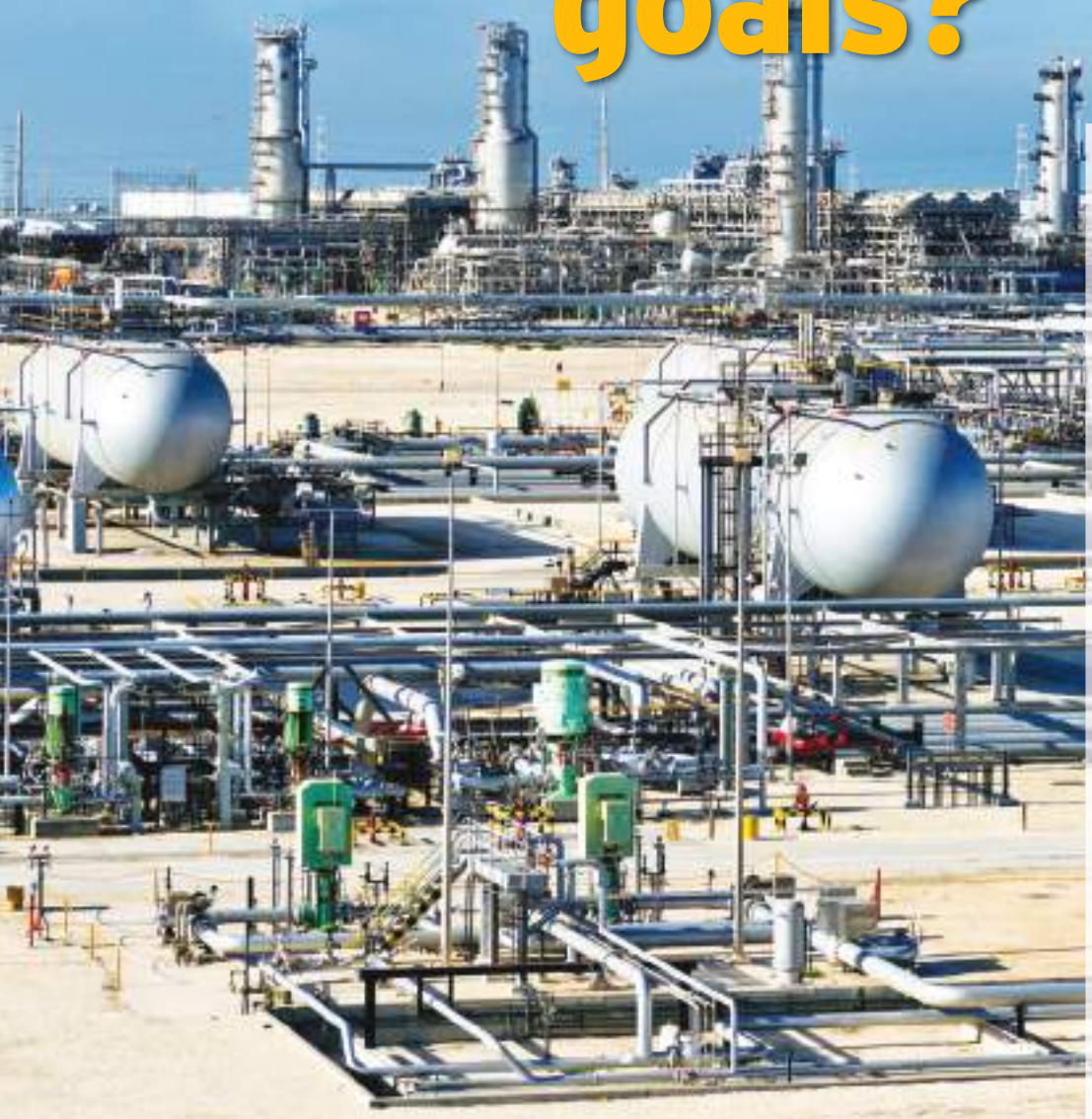
Can Saudi Arabia achieve its gas development goals?



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- The Middle East recruitment landscape
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Editor's note

SAUDI ARABIA'S GAS development plans are in focus in this issue. The Kingdom is looking to increase gas output by two-thirds and join the ranks of gas exporters within a decade, to capitalise on the growing global gas demand, underpin industrial diversification and promote energy efficiency in the utility sector (p14).

Kuwait, meanwhile, is moving ahead with plans to exploit oilfields along its border with Iraq, and ramping up its offshore exploration efforts (p18).

With the ever-increasing threat of cyber attacks on critical infrastructure, leading experts discuss what companies can do to protect themselves from cyber attacks (p36).

Our technology section covers the safety benefits of the Smart Digital Twin (p44), compressors for high temperature environments (p32) pipeline technology (p30), enhancing performance in well intervention (p42) and improved meter diagnostics (p34).

Contents

Calendar

4 Executives' calendar and event news
Event news and previews of ADIPEC and Kuwait Oil & Gas Show (KOGS)

News

10 Developments
A round-up of the latest news from around the region

Analysis

14 Can Saudi Arabia meet its gas development goals?
Saudi Arabia's ambitious gas development plans will see gas fuelling 70 per cent of the Kingdom's power generation by 2030.

Kuwait

18 Kuwait's oil and gas sector gathers momentum
With plans to exploit oilfields along its border with Iraq, and offshore exploration gaining traction, Kuwait appears in a decisive mood

Offshore Safety

24 Taking the world by STORM
The role of offshore work baskets

Recruitment

26 Positive outlook for the oil & gas recruitment market
As assessment of the Middle East recruitment landscape

Technology

30 The growth in non-metallic pipes
The use of non-metallic pipes is becoming more widespread to address the challenges of ageing assets and corrosion

32 Compressors for high temperature environments
The hot and harsh environments in which air compressors need to operate must be taken into account when specifying a system

34 Improved meter diagnostics
The development of a model that will help to facilitate condition-based meter caibration

36 Getting to grips with the cyber threat
The cyber threat landscape and how to mitigate the risks

40 New technologies, greater capabilities
Weatherford is bringing competitive new technologies to the energy industry

42 Enhancing performance in well intervention
Experts discuss well intervention challenges and solutions

44 Reaping the benefits of the Smart Digital Twin
How the Digital Twin can help strengthen safety programmes

Innovations

49 Latest product developments in oil and gas

Arabic

5 Analysis

Front cover image courtesy of Saudi Aramco

➔Executives' Calendar 2019

SEPTEMBER			
17-19	**Gastech**	TEXAS	www.gastechevent.com
OCTOBER			
7-8	**OWI MENA 2019**	ABU DHABI	https://interventionmena.offsnetevents.com
8-10	**Kuwait HSE Forum**	KUWAIT	www.hse-forum.com
13-16	**Kuwait Oil & Gas Show**	KUWAIT	www.kogs-expo.com
14-16	**MEPEC**	MANAMA	www.mepec.org
14-16	**WPC Downstream Conference**	MANAMA	www.wpcdownstream.org
15-17	**MOC**	ALEXANDRIA	www.moc-egypt.com
22-23	**Basra Megaprojects**	ISTANBUL	www.cwcbasraoilgas.com
NOVEMBER			
11-14	**ADIPEC**	ABU DHABI	www.adipec.com
24-25	**Dubai Health, Safety & Environment Forum**	DUBAI	www.hse-forum.com
DECEMBER			
3-5	**Iraq Oil & Gas**	BASRA	www.basraoilgas.com

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

ADIPEC 2019's Oil & Gas 4.0 to promote a new nexus between oil & gas and technology

ADIPEC 2019, WHICH takes place from 11-14 November at the Abu Dhabi National Exhibition Centre, is set to provide one of the most important global platforms for the oil and gas industry to do business and exchange information, attracting energy ministers, CEOs and leading decision makers across four days of business discussions and knowledge exchange.

The event is set to attract more than 2,200 exhibiting companies and 145,000 visitors from 135 countries, featuring 29 international country pavilions and 43 NOCs and IOCs.

World class industry experts will share their insights through more than 160 conference sessions, industry panel sessions, ministerial sessions and global business leaders sessions involving more than 1,000 speakers.

Digitalisation will be at the forefront of ADIPEC 2019. Oil & Gas 4.0, an agenda developed by ADNOC and ADIPEC, will address the most critical topics shaping the oil and gas industry as it prepares to navigate and embrace the opportunities enabled by the fourth industrial revolution. Enhanced digital technologies, agile business models and new partnership eco-systems will be a core part of the agenda.

From digital innovation and its transformative impact across the oil and gas value chain to how the industry attracts new millennials, implements management solutions and creates new strategic partnerships, ADIPEC 2019 Conferences and Oil & Gas 4.0 will provide the fundamental knowledge blocks for a new nexus between oil and gas and technology.

Speakers at the Oil & Gas 4.0 conference include HE Dr Sultan Ahmed Al Jaber, Minister of State, UAE and CEO of ADNOC Group, HE Dr Sultan Al Mazrouei, Minister of Energy & Industry, UAE; energy ministers from Egypt, Jordan and Oman; HE Mohammed Barkindo, secretary general of OPEC; Patrick Pouyanné, chairman and CEO Total; Bob Dudley group chief executive, BP; Condoleezza Rice, Secretary of State 2005-2009, USA; and Sebastian Thrun, CEO of the Kitty Hawk Corporation, chairman and co-founder of Udacity and formerly VP of Google; and Greg Cross, AI pioneer, Serial Entrepreneur co-founder and chief business officer, Soul Machines.

HE Dr Sultan Ahmed Al Jaber, Minister of State, UAE and CEO ADNOC Group, will address the conference.

ADIPEC 2019 sees the return of features such as the Offshore & Marine Exhibition and Conference; Heavy Industry Zone; Digitalisation in Energy Zone; Inclusion and Diversity in Energy Conference; C-Suite dialogues; Downstream Technical Conference; Young ADIPEC; and the Middle East Petroleum Club, an exclusive knowledge sharing platform for top decision makers and influencers.

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Delivering value in the new energy transition

The well-established SPE Kuwait Oil & Gas Show and Conference (KOGS) returns to Kuwait for the fourth time in October, further enhancing its position as a powerful global platform for professionals to discover and exchange advances and accomplishments in the oil and gas industry.

UNDER THE PATRONAGE of His Highness Sheikh Jaber Al-Mubarak Al-Hamad Al-Sabah, Prime Minister of the State of Kuwait, the conference will take place from 13–16 October, with the opening ceremony being held on 13 October, and the exhibition, from 14–16 October. This event is supported by the Organization of the Petroleum Exporting Countries (OPEC) and Kuwait Petroleum Corporation (KPC).

Organised by the Society of Petroleum Engineers (SPE) and Informa, this year's theme is 'New Energy Transition: Delivering Value Through Collaboration and Capability', extending the industry's potential by focusing on innovation and value by collaboration, and maximising capability.

"KOGS 2019 will provide a remarkable opportunity to enhance your technical expertise, expand your professional network, and learn about the major challenges, emerging technologies and key achievements in the energy sector," says Farida Ali Abdullah, rogramme chairperson and manager Reservoir Management, Kuwait Oil Company.

The event, combining a 14,000 sq m exhibition and a broad spectrum conference programme, is set to attract more than 6,000 qualified professionals from government representatives to key project owners, NOCs and IOCs, international service providers, EPC contractors, and consultants to address the evolving opportunities in the Kuwait and Middle East energy arena. Featuring more than 180 companies from more than 30 countries, the exhibition covers all areas of the industry including petroleum geosciences, exploration and production, and refining and petrochemicals.

The conference opening will include keynote speeches from His Excellency Dr. Khaled Al-Fadhel, Minister of Oil, Electricity and Water, State of Kuwait; Hashem Sayed Hashem, deputy chairman and CEO, Kuwait Petroleum Corporation; and Sami Alnuaim, 2019 SPE president, Saudi Aramco.

Image Credit : Informa

This year's event is expected to attract more than 6,000 visitors and 180 exhibiting companies.

> "Kuwait is one of the most compelling industry environments in the Middle East."

The executive plenary session will also include industry and government leaders such as H.E. Saad S. Al-Kaabi, Minister of State for Energy Affairs, State of Qatar and vice chairman, president, and CEO, Qatar Petroleum; H.E. Mohammad Sanusi Barkindo, secretary general, OPEC; Charles O. Holliday, chair of the board, Royal Dutch Shell; Musab Al Mahruqi, Group CEO, Oman Oil And Orpic Group; and Sheikh Nawaf S. Al-Sabah, CEO and president, KUFPEC and KPI, discussing 'The New Energy Transition: Policy and Sector Prescriptions'. This session will examine how policymakers and business leaders drive the industry's adoption of a lower carbon economy. What will the energy companies of today look like in 2040? What role will Gulf oil producers play at that time? How will producing countries develop their economies in the meantime?

Kuwait is one of the most compelling industry environments in the Middle East. An OPEC member, it houses the world's sixth largest oil reserves and is the fourth largest exporter of total oil products.

Production currently stands at approximately 2.77mn bpd. By 2020, Kuwait aims to reach a production capacity of four million bpd and maintain this level through 2030. Downstream, Kuwait also plans to grow domestic refinery capacity to 1.4 million bpd and boost international cooperation. ■

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Kuwait's oil and gas leaders to address Kuwait HSE Forum

LEADING LIGHTS FROM Kuwait's oil and gas industry will be among the eminent speakers at the Kuwait Health, Safety & Environment Forum 2019, to take place from 8-10 October at the JW Marriott Hotel Kuwait City.

Held under the patronage of Kuwait's Ministry of Health, the Forum will provide a platform for the sharing of insights, expertise and best practice on critical issues across the spectrum of health and prevention, safety and security, environment, risk management and technology.

Despite rapid advances in the health and safety sector, Kuwait faces a range of occupational health challenges such as reducing environmental hazards, improving the effectiveness of health policies, addressing communication issues and promoting healthy lifestyles and behaviours that will encourage a safer work environment and advance worker wellbeing. As Prof. Mohamed Kamel, Ministry of Health, Kuwait commented at last year's inaugural event, "You cannot be a safe worker if you are not a healthy worker."

There is also a big push on sustainable healthcare, tying in with the unified Gulf Health Strategy and the UN Sustainable Development Goals (SDGs), to raise standards of health and wellbeing throughout the country.

Image credit: Alain Charles Publishing

The event will bring together health and safety professionals, government regulators, policy makers and solutions providers to explore topical health, safety and environment issues.

This year's event will have a renewed focus on health and prevention, and will be preceded by a one-day workshop on Hospital Occupational Health and Safety Management on 8 October, prepared and presented by the Ministry of Health, which will enable those attending to obtain CME points.

The Forum itself will address subjects such as health promotion; sustainable healthcare to achieve the unified Gulf Health Strategy; improving competency and safety in high rise construction sites; protecting workers with 3D modelling; driving safety; leadership and safety culture; mitigating risks in hostile environments; IoT for monitoring potential workplace hazards; the effects of greenhouse gases on health and environment; and marine environmental contamination by hydrocarbons.

The line-up of eminent speakers includes Dr Ahmed Al-Shatti, director, Occupational Health Department, Ministry of Health, Kuwait; Nasser Al-Buhairi, chief security officer and head of Emergency Coordination Unit, Kuwait Oil Company; Dr Ghaida Mubarak Al-Shoraian, senior general practitioner, KNPC; Qusai Al Shatti, acting director-general, Central Agency for Information Technology (CAIT); Dr Muhammad Alamgir, HSE manager, Petrofac, Kuwait; Dr Ahmed Haji, senior doctor, Petrochemical Industries Company KSC; and Jason Woods, Middle East & India representative for the International Powered Access Federation (IPAF).

For further information see the website at www.hse-forum.com.

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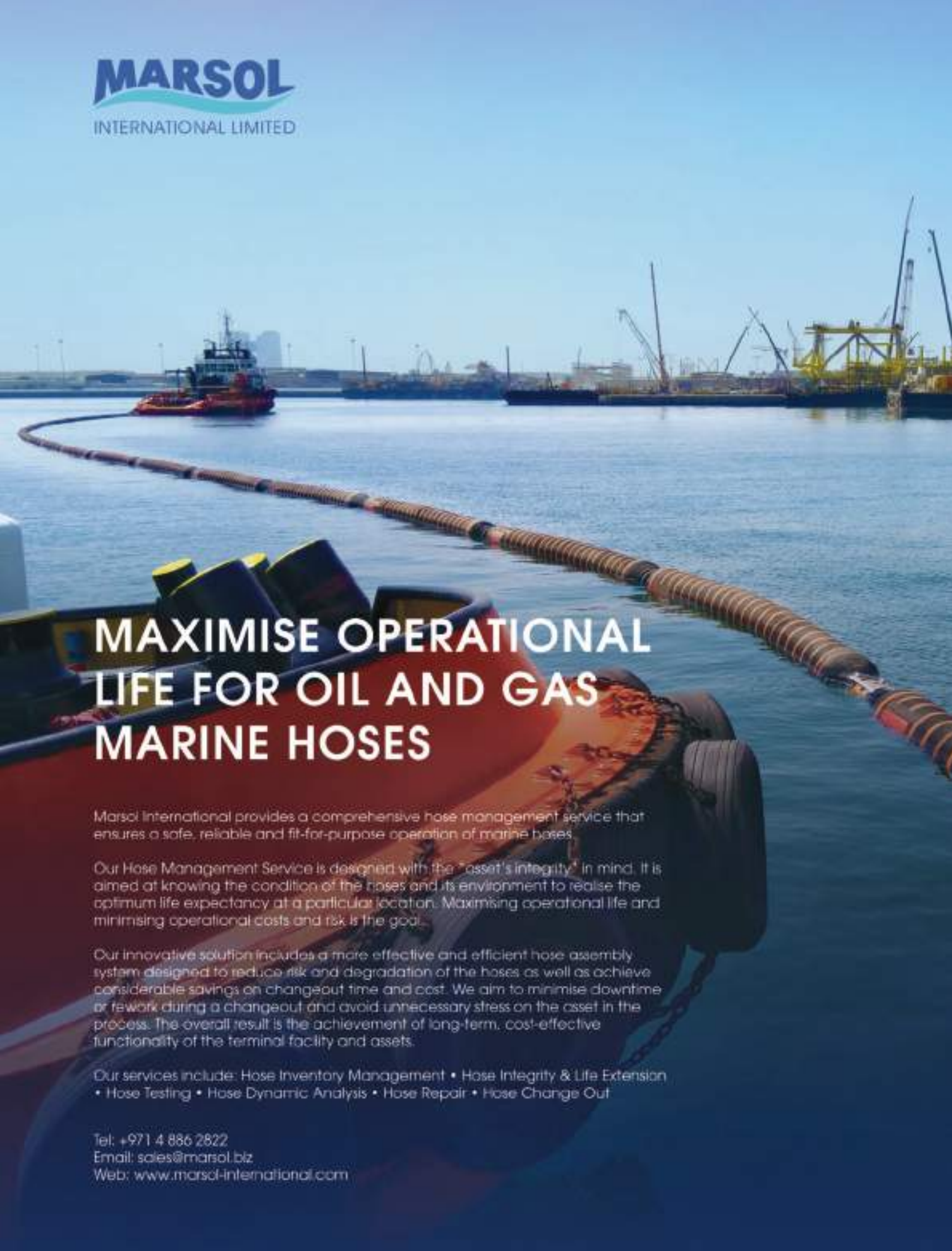

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Major oil and gas companies collaborate to boost Omanisation in maintenance work

PETROLEUM DEVELOPMENT OMAN (PDO), Oman Shell, Oman LNG and the Oman Oil-Orpic Group have joined forces to boost the level of Omanisation in critical maintenance work on their facilities.

The four companies have signed a Memorandum of Understanding (MoU) committing the operators to collaborate on developing a self-sustaining business model for the turnaround activities of oil and gas installations.

The total workforce for a 20-day turnaround can reach up to 800-900 people, with major shutdowns involving 1,200 or more depending on the size and complexity of a plant.

However, it is believed that aggregating the demand from the four oil and gas companies and providing consistent and continuous work will encourage the localisation of turnaround services and increase Omanisation levels.

PDO managing director Raoul Restucci said, "The Turnaround project is a great example of key operators, covering the full spectrum of up/mid and downstream operations in the Oman oil and gas industry, working collaboratively together to deliver In-Country Value.

"The project will deliver fundamental skills and services in Oman by Omanis. By integrating and synchronising our major facility shutdown and maintenance plans, we have secured the scale, scope and continuity of work that will enable us all to develop and deploy Omani talent in a cost-effective and sustainable manner within and beyond our industry."

A joint working group and a taskforce have been established to build alignment, develop its scope and set future actions. The ultimate goal is to increase Omanisation in the Turnaround Execution Workforce ("TEW"), with potential for future expansion in other activities based upon the success of the new initiative.

Grandweld completes delivery for KOC

GRANDWELD SHIPYARDS, THE UAE-based shipbuilding, ship repair, and engineering solutions specialists, has successfully completed the construction and delivery of six pilot boats and four crew transport boats for Kuwait Oil Company (KOC).

Image Credit : Grandweld Shipyards

The delivery comprised six pilot boats and four crew boats.

Jamal Abki, general manager of Grandweld Shipyards, explained, "Each of the delivered boats was designed to exceed the needs of KOC, and similarly built in accordance with Lloyd's Register latest technology for classification standards to provide the highest operational efficiency and safety. Our professional technical team did a proper handover for KOC crew to get trained about all needed operations. Both our team and KOC's team delivered an extensive model test during the engineering stage to ensure the vessels' compliance with the client's requirements. We look forward to potential future collaborations that will be of great benefit to both parties."

Sami Al-Sawagh, marine operations manager at KOC Group added, "This has effectively enabled KOC to strategically expand our fleet and it has also further reinforced our ability to execute maritime projects for Kuwait ports effectively."

Deeper cuts needed - GIQ survey

OPEC WILL NEED to make deeper supply cuts to keep oil prices above US$60 per bbl, according to 69 per cent of those surveyed in the Gulf Intelligence (GIQ) monthly Energy Market Survey in August.

Image Credit: Daan Franken/Flickr

Brent prices have struggled to hold steadily above the US$60/bbl mark.

At the start of July, OPEC, with Russia's backing, agreed to extend to March 2020, oil production cuts of 1.2 mmbbl per day, but Brent prices have struggled to hold steadily above the US$60 per bbl mark. US sanctions on Iran's oil exports and heightened geopolitical tensions in the Gulf have failed to boost prices further.

Brent crude averaged comfortably in the mid US$60s during the first half of the year. The average held at US$63.92 per bbl in July but dropped to US$58.93 per bbl in August. Weaker global economic growth forecasts and ongoing trade disputes between China and the US are dampening demand sentiment.

Around 45 per cent of those surveyed said that OPEC should change its current strategy of prioritising higher prices and instead fight for market share.

OPEC will next meet in Vienna on 5 December.

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Wearable tech to increase safety and productivity

OIL AND GAS companies are evaluating the possibilities of deploying wearable devices in day-to-day operations to improve safety and efficiency in oilfield operations, says GlobalData, a leading data and analytics company.

Initial research is focused on enabling real-time monitoring of field technicians to ensure their safety and in providing them with audiovisual assistance to perform asset maintenance, with the hopes of adopting lightweight, yet rugged wearable devices.

GlobalData's latest thematic report, 'Wearable Tech in Oil & Gas', states that wearable devices can augment natural human capabilities, such as enhanced vision or smell, thereby adding to productivity and safety in oil field operations. These features of wearable tech are encouraging oil and gas companies to adopt helmets, smart glasses, wristbands, and other devices that incorporate technologies such as wireless connectivity, artificial intelligence (AI) and augmented reality (AR).

Image credit: Honeywell

Wearable tech such as Honeywell's intelligent wearables could revolutionise workplace safety and productivity.

Ravindra Puranik, oil & gas analyst at GlobalData, comments, "Mobility is considered as the key driver and precursor to implement any wearable tech in the oil and gas industry. Ever since the evolution of digital technologies, companies in the oil and gas sector are using industry-grade smartphones to capture field-level data and exchange information with onshore experts. Instead of handheld smartphones, hands-free devices will increase work efficiency among the frontline workforce. Through different applications, wearable smart devices are expected to bring a paradigm shift in oil and gas field operations."

Wearable devices are also designed to provide safety to field staff by monitoring the wearer's health condition, alerting them to exposure to potential hazards and also providing access to live locations of workers to the onshore support team. This, in turn, provides a sense of security among the workers and increases productivity.

Puranik adds, "The increasing integration of wearable technologies with big data, AI, and cloud computing is enabling faster and deeper penetration of wearable devices. The oil and gas industry is integrating wearable tech with inspection and maintenance technologies to improve data collection and minimise risk to its workforce. Unlike the consumer sector, wearable devices in the oil and gas industry are made to withstand extreme temperature variations and resist oil, chemical spills, heavy rain, and dust among other things, making the working environment more secure."

Schlumberger and TGS announce reimaging project

SCHLUMBERGER AND TGS have announced a new 3D seismic reimaging project in the Egyptian Red Sea.

The project will comprise reimaging data from three overlapping seismic surveys totalling 3,600 sq km that were acquired between 1999 and 2008 – the only available 3D data in this part of the Red Sea. It includes the integration of all legacy seismic and nonseismic data and will apply advanced imaging technologies to better define complex subsalt structures.

Image credit:

The project will reimage 3,600 sq km of legacy seismic surveys of the Egyptian Red Sea.

The project, which is supported by industry prefunding, will be carried out by TGS and WesternGeco, the geophysical services product line of Schlumberger. Data will be available before the closing of Egypt's offshore Red Sea international bid round on September 15, 2019.

"Our comprehensive geological understanding, innovative seismic imaging techniques and full integration of nonseismic methods will define new exploration trends in this frontier basin," said Maurice Nessim, president, WesternGeco. "This collaborative approach will help our clients identify high-potential play segments, assess exploration risks and accelerate hydrocarbon discovery."

"Kristian Johansen, CEO, TGS said, "The underexplored offshore Egyptian Red Sea area is made up of large, untested structures that offer exceptional growth opportunities for oil companies."

Schlumberger and TGS have a long-term commitment with the Egypt Ministry of Petroleum and South Valley Egyptian Petroleum Holding Company (GANOPE) to acquire and process seismic data and promote the prospectivity of the Egyptian Red Sea.

New Saudi Aramco chairman

SAUDI ARAMCO HAS appointed Yasir Othman Al-Rumayyan, the governor of the Kingdom's Public Investment Fund (PIF), as its new chairman, in a move widely interpreted as further clearing the way for its initial public offering (IPO). Al-Rumayyan, who was appointed as a member of the board of directors of the company in 2016, replaces Khalid Al-Falih in the role.

Al-Rumayyan, a former banker with Saudi Fransi Capital, spearheaded the transformation of the PIF, the Kingdom's sovereign fund into one of the biggest investors in global technology start-ups. The PIF is set to receive the proceeds from the IPO to reinvest in the Kingdom to boost its diversification efforts.

Image credit: Wikimedia Commons

Yasir Othman Al-Rumayyan.

The kingdom's original plan, announced by Crown Prince Mohammed bin Sultan in 2016, was to sell around five per cent of Saudi Aramco on the Riyadh exchange and at least one international bourse. The listing, which could potentially be the world's biggest stock sale, was pushed back to 2020 or 2021 to allow Saudi Aramco to complete the US$69bn acquisition of Saudi Basic Industries Corp.

The oil giant is considering a two-stage IPO with a domestic debut and a subsequent international listing, possibly in Tokyo, the Wall Street Journal reported. The first phase could take place before the end of this year, according to reports.

The company has been increasing its financial openness and transparency in advance of the listing, disclosing its financial results for the first time in August 2019. In advance of its bond sale earlier this year, Saudi Aramco revealed that it is the most profitable company in the world, recording net profits of US$111.1bn in 2018.

Al-Falih has also been replaced as Minister of Energy by Prince Abdulaziz bin Salman, King Salman's son, a veteran oil official with long experience of negotiating with OPEC on production cuts.

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Can Saudi Arabia meet its gas development goals?

Moin Siddiqi, economist, assesses Saudi Arabia's ambitious gas development plans, which will see gas fuelling 70 per cent of the Kingdom's power generation by 2030.

DEMAND FOR NATURAL gas is currently the fastest growing area in the hydrocarbons industry, with much of that coming from the Asia-Pacific region. While oil consumption could level off over the next 15 years, as more countries shift to cleaner burning or renewable energy, gas demand is expected to surge by 50 per cent between today and 2040 (BP data). The kingdom of Saudi Arabia is eager to capitalise on this by increasing gas output by two-thirds and commencing exports within a decade.

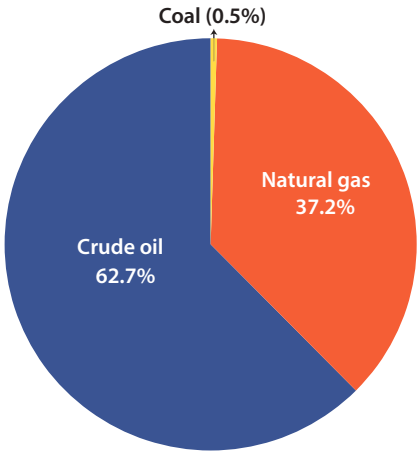
The monetisation of natural gas reserves, the sixth largest in the world, is a major national priority. It will underpin the Kingdom's ongoing industrial diversification and economic development under 'Vision 2030', while enabling better energy efficiency in the utility sector.

> "The monetisation of natural gas reserves is a major national priority."

"Our natural gas is a fundamental product used to meet growing domestic energy demand to power industries such as steel, aluminium, and water desalination. It provides an efficient, cleaner burning energy alternative for these activities, which helps lower emissions. Since our natural gas production yields large quantities of ethane, natural gas liquids (NGL) and condensate, we supply these as feedstocks for major petrochemical and building materials industries. We're committed to increasing production capacity to take advantage of opportunities resulting from increased use of gas – both as an energy source and as a feedstock for the chemicals industry," Saudi Aramco said in a statement.

An independent 2019 audit reported natural gas (natgas) reserves at 325.1 trillion cubic feet (Tcf) – an increase from the end-2016 estimate of 298.7 Tcf. Saudi gas production rose by almost half over the decade to 2018, from 76.4 to 112.1bn cubic metres (bcm) – making it the ninth largest global producer. The entire production is used domestically. In March 2019, large quantities of gas were discovered in the Red Sea. Natgas usage in the domestic economy rose nearly 35 per cent from 2010 to 2018, making it the world's seventh largest market (BP data). Saudi Arabia is self-sufficient in terms of gas supply and does not import.

Primary energy consumption by fuel, 2018 (Million tonnes of oil equivalent)



Source: BP Statistical Review of World Energy, 2019.

Saudi Arabia was the world´s 11th largest consumer of total primary energy in 2018 at 259.2mn tons of oil equivalent. Official projections show that primary energy needs will triple by 2030, rising from 267 Mtoe in 2016 to 800 Mtoe in 2030 (Government of Saudi Arabia 2016).

Unleashing 'full-scale' potentials

Saudi Arabia is trying to expand its economy beyond crude oil. It has began developing vast idle reservoirs of non-associated gas and those from shale fields for feeding power generation and water desalination, as well heavy industries. Until recently, Saudi gas strategy was to use the entire output either for electricity production or in the petrochemical industry. Amid high oil usage, the Kingdom wants to offset oil export decline by expanding gas production from 14bn cubic feet/day (cf/d) now to 23bn cf/d by 2030 – which will require US$150bn of investment. Around 70 per cent of the domestic electricity grid will be gas-powered, according to Saudi Aramco. Any surplus gas would be exported via pipelines and LNG; Saudi Arabia aims to export 3bn cf/d of gas by 2030.

The Kingdom also plans to increase the share of gas-fired power generation and shift away from using power generated by fuel oil. By 2030, 75 per cent of the utilities sector will be fuelled by natgas, and the remainder by renewable and nuclear power. Saudi Arabia is developing around 30 solar and wind projects – targeting 9.5 gigawatt (GW) of renewables in 2023, as well as building 17.6 GW of nuclear capacity by 2032. "There's a need to increase electricity generation, decrease oil-based power, and make use of the huge solar potential," said the International Energy Agency (IEA).

The Kingdom has ambitions to join the ranks of gas exporters; former Minister of Energy, Industry and Mineral Resources, Khalid Al-Falih, said, "Aramco will be one of the biggest five LNG producers in the world in 15 years, and we will start trading in gas before entering into ownership and production." It plans to create an integrated global gas business by investing an estimated US$175bn in the coming decade in the USA, Russia and elsewhere. Saudi Arabia is focusing more on gas investments, both at home and abroad. Amin Nasser, CEO Saudi Aramco, said, "There's an appetite to invest in natural gas and LNG."

Gas monetisation options

Given that half of Saudi Arabia's 34mn population are aged under 24, more domestic gas supply is needed to meet demographic pressures. Electricity demand will double by 2030 because of the economic overhaul, according to Jadwa Investment Bank. The 'Vision 2030' ambitions are fuelling higher gas demand, which calls for the construction of

> “The Kingdom has ambitions to join the league of gas exporters.”

economic cities around new industries, including its flagship project NEOM – a mega business zone and tourist destination costing an estimated US$500bn. As one observer put it, “Saudi Arabia foresees a natural gas empire that fuels futuristic new cities and helps develop local industries in manufacturing, mining and technology.”

Recently, Saudi Aramco has invested in exploration and development of non-associated gas because production is unaffected by fluctuations in oil output. Most of new supply due online between 2017 and 2020 will be from three complexes at Wasit, Fadhili and Midyan – with a combined non-associated gas processing capacity of more than 5bn cf/d. The Wasit Gas Plant currently produces 2.5bn cf/d of sour gas from the new Arabiyah and Hasbah fields and supplies 1.7bn cf/d of methane to the Master Gas System. The Fadhili facility is being developed at a cost of US$13.3bn to process 2bn cf/d from the Hasbah offshore field and 500m cf/d from the onshore Khursaniyah field. Output from the Midyan field near Tabuk is expected at a modest 75m cf/d and 4,500 bpd of condensates.

There is an urgent need to develop new gas supplies to replace crude used to generate electricity. Saudi Arabia burns as much as 900,000 bpd of oil to produce electricity to meet peak seasonal demand for air conditioning during the torrid desert summer. Burning this valuable commodity (rather than refining) threatens Saudi Arabia’s long-term viability as number one oil exporter. With production costs of US$5-10 per barrel, the country was losing between US$59-64/bbl in 2018 when the average price of Saudi crude was US$69/bbl.

Saudi Arabia's gas production and usage (bn cubic metres)

	Production						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
KSA	94.4	95.0	97.3	99.2	105.3	109.3	112.1
MENA total	694.1	708.4	721.7	735.3	765.2	801.8	848.0
KSA % of region's total	13.6	13.4	13.5	13.5	13.7	13.6	13.2
	Consumption						
KSA	94.4	95.0	97.3	99.2	105.3	109.3	112.1
MENA total	492.5	506.0	530.9	563.3	590.0	622.9	656.4
KSA % of region's total	19.2	18.8	18.3	17.6	17.8	17.5	17.1

Source: BP Statistical Review of World Energy, 2019.

Four fields - Ghawar, Safaniya, Berri and Zuluf - account for around 60 per cent of Saudi natgas output. Most gas fields are associated with petroleum deposits. One-third of gas reserves are located in the Ghawar region of Eastern Province. Associated gas at Ghawar oilfield (the world´s largest) accounts for nearly half of total production, according to Rystad Energy field-level production data. The country´s gas production has been rising at 4-5 per cent/year (BP data).

The Kingdom wisely wants to change the policy of using oil to produce power, thereby freeing oil for export. "We plan to eliminate most oil burning for electricity by 2030," said Saudi Aramco. According to estimates, oil export volumes could increase between 500,000 to 1mn bpd if Saudi Arabia uses both natgas and renewables in the national energy mix. In 2018, natgas generated three-fifths of electricity production, 375.6 terrawatt-hours (BP data) with oil providing two-fifths.

Soaring energy consumption is another key challenge; fossil fuels (so far) remain the only source of feedstock, and Saudi Arabia has among the highest levels of electricity usage. Its per capita power consumption is around 9.8 kilowatt hour (kwh) – almost twice as much as per capita consumption in Europe. In 2018, the kingdom produced 112.1 bcm of natgas – equivalent to per capita consumption of 3,000 cm – nearly four times as much as European countries. Consequently, Saudi Arabia has a relatively high per capita carbon footprint (CO2 emissions).

Future gas capabilities

Natgas production has struggled to keep pace with swelling demand for power from both residential and commercial users. If the non-oil economy really takes off during the medium term, as indicated in 'Vision 2030', demand for power and downstream feedstock will eat into additional gas supply. Peak electricity demand is projected by Jadwa Investment at 120 GW by 2030; it calculated that Saudi Arabia will need 135 GW of installed capacity in 2030 (nearly double 2015 capacity), with natgas expected to fuel most of that growth.

The Jadwa report indicated that for gas to fuel a higher proportion of power generated, more investments are required in non-associated gasfields. If gas is used for 70 per cent of generation, for example, the Kingdom must produce 32bn cf/d, significantly above the National Transformation Programme's target of 17.8bn cf/d in 2020. Also, annual gas output should rise 6.6 per cent on average in the decade to 2030 to meet the challenges of national development. Thus, Saudi Arabia will have to increase gas production volumes to maintain security of energy supply.

Saudi Aramco foresees natgas demand surging by 40 per cent by 2030, which could soon exceed the company's capacity. Its oil upstream and refining operations also demand higher gas volumes. Enhanced oil recovery (EOR) techniques are being implemented, partly based on 'gas re-injection' projects to stimulate pressures at matured oilfields and to stabilise or expand production. At the same time, more gas feedstock is needed to counter the current steep demand for crudes by power plants and refineries. Aramco plans a two-fold hike in refining capacity by 2025. Increasing refining capacity, while still aiming for higher oil exports, could keep the bulk of extra gas output inhouse. Some of the feedstock of Aramco-SABIC refineries can be supplied with natgas products and liquids.

Amid high global crude demand, Saudi Arabia can only boost oil exports by reducing the amount of fuel for electricity, other utilities and petrochemicals plants. Domestic oil usage totalled 3.72mn bpd in 2018 (BP data) – making Saudi Arabia the fifth largest oil consumer after the USA, China, India and Japan. Before the Kingdom can become a net exporter of natgas, greater production is needed (including shale gas). Without a drive to implement vast renewable energy schemes, no additional volumes of natgas could be diverted for export markets.

> "There is potential for Saudi Arabia to replicate the USA's shale boom."

In sum, Saudi Arabia aims to make optimal use of associated gas alongside oil recovery, as well as developing non-associated and shale gasfields. The Saudi Gas Initiative (SGI) seeks increased foreign investment in the gas sector through petrochemicals and power generation as well as diversifying the fuel mix. By 2040, natgas is expected to comprise half of the utilities mix, as the country uses cleaner fuel. Rapid reserve development is needed to power future industries and new cities.

While oil exports are the backbone of financial stability, gas is seen as key to diversifying the economy and boosting job opportunities for Saudi nationals. ■

Fuel and utility prices in Saudi Arabia since 2015

Product	2015	2018	% change 2015-18	Current benchmark (US$)	Saudi 2018 price as factor of international benchmark
Crude oil for power generation (US$/bbl)	4.23	5.87	39.0	71.31 (2018 Brent)	8.2
Natural gas (methane) (US$/mn btu)*	0.75	1.25	67.0	3.13 (US Henry Hub)	40.0
Water (residential) (US$/cubic metres)	0.03	0.04	33.3	0.61 2018(Tucson)	6.5
Electricity (residential, low usage (US$/kWh)**	0.01	0.05	400.0	0.13 (2017 EIA)	38.4

million British thermal units; **kilowatt-hour.
Sources: US Energy Information Administration, BP, Baker Institute of Public Policy.
Domestic gas prices are among the lowest in the world despite their increases in early 2016. Consuming sectors, such as utilities (water and power) and industries are given allocation quotas of natgas at prices controlled by the state. Cheap fuel prices underpin high levels of demand, especially by power producers and the petrochemicals sector.

Shale gas is pivotal in the further growth of Saudi Arabia's energy sector.

With the fifth largest global shale gas resources of 645 Tcf, as estimated by oilfield services firm Baker Hughes, there is potential for Saudi Arabia to replicate the USA's shale boom. To accelerate the effort, Saudi Aramco has invested US$10bn in an exploration and appraisal programme advised by Halliburton and Schlumberger. It targets the northwest Jalamid region; South Ghawar (the world's largest conventional oilfield); Jafurah basin; and condensate-rich shale gas in Rub al-Khali (the Empty Quarter).

In May 2018, Halliburton received a three-year contract to provide project management, hydraulic fracturing, coiled tubing, wire-line and perforating, completion tools and testing services in order to meet Aramco's production targets and improve the economics of its unconventional resources programme.

Saudi Arabia expects to produce shale gas by 2020, but it needs to address permeability, water scarcity and environmental concerns. Costs of the drilling and fracturing programme are expected to be substantial, especially in the Empty Quarter area, where deep drilling (depths of 12,000 feet) is required for wells to unlock shale deposits. Others challenges include the lack of water, though Saudi officials claim brackish aquifer supplies are plentiful. Saudi Aramco plans to produce 3bn cf/d of unconventional gas in the coming decade.

Another priority is to bolster petrochemicals capacities (presently 79mn tons/year) through shale gas. "We also have world-class unconventional gas resources that are rapidly supplementing our large conventional resources. Because a significant proportion of this unconventional gas is rich in both liquids and ethane, its production will play an important role in the further growth of the Kingdom's chemicals sector," Saudi Aramco's CEO Amin Nasser said.

Government investments will see new technologies and methods being deployed to overcome extraction difficulties, as well as the construction of new infrastructure (including gas-fired power plants) in shale-rich regions.

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Kuwait's oil and gas sector gathers momentum

With plans to exploit oilfields along its border with Iraq, and offshore exploration gaining traction, Kuwait appears in a decisive mood, says Martin Clark.

IT IS SAID that things happen slowly in Kuwait and, while that may well be true, there are certainly some ambitious new plans in the making.

That includes potential new developments along the shared – and once hotly contested – border region with neighbouring Iraq.

It has been a long time in the making, but the two countries are now moving ahead with plans to exploit joint oil and gas resources along their frontier. In August, a contract was awarded to a UK consultancy, ERC Equipoise (ERCE), to work on the project.

"ERCE will perform technical and economic development studies while preparing cross-border agreements on the Safwan-Al-Abdali and South Rumail / Al-Ratqa – Ratqa oil fields," the UK company reported in an 8 August statement. It described the venture between the Iraqi and Kuwaiti oil ministries as an "historic project".

It could potentially unlock a huge volume of reserves that have, for years, been a source of controversy between the two sides. There are a number of fields in the border area between Iraq and Kuwait, most prominently Ratqa, which is a southern extension of Iraq's giant Rumaila field.

There is still a long way to go until any development, but it is a start. The new study will essentially establish the technical and legal mechanisms to invest in the fields shared by the two countries. And it marks significant progress given that production from the area has long been a source of tension between the two former adversaries.

Iraqi officials called the signing of the new contract an "unprecedented and significant step", while the Kuwaiti side said it marked the result of years of efforts on both sides.

Offshore drilling activity

Kuwait has for years pledged to exploit more of its oil reserves in the north, but has been beset by delays and internal political wrangling, notably over the role of foreign investors in the prized upstream sector.

That includes the failed Project Kuwait, a plan drawn up in the 1990s in the aftermath of the Iraqi invasion, to tap into various northern fields, including Ratqa. The long-term goal was to increase production and compensate for declines at the mature Burgan field with the help of international oil companies.

Image Credit : nattapon7/Adobe Stock

KOC has been focusing much of its efforts in recent times on stimulating activity offshore.

While development of its onshore border fields with Iraq may still be some way off, it would provide a huge and welcome lift for the country's upstream industry. Kuwait Oil Company (KOC) has been focusing much of its efforts in recent times on stimulating activity offshore, where progress is – again, after a long wait – being seen. In July, it recruited US services giant Halliburton to drill six exploration wells in the Gulf, the first of their kind for many years.

> "The two countries are moving ahead with plans to exploit joint oil and gas resources along their frontier."

KOC's new chief executive, Emad Mahmoud Sultan, said the project formed "part of KOC's plan to increase production capacity by charting new territory in Kuwait's offshore reserves." The state entity has set its sights on the offshore area after a 3D seismic survey of the whole of Kuwait Bay indicated the potential for commercial quantities of hydrocarbons.

Sultan added after the contract signing that the area could contribute around 100,000 bpd to Kuwait's total production, without giving any further details.

Kuwait hopes to boost its oil production capacity to around four million bpd by 2020, up from around 3.2mn bpd currently – a feat most analysts deem highly unlikely given Kuwait's long track record in disappointment and delay.

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Honeywell UOP will revise the configuration and capacity of the Al-Zour refinery's gasoline production facilities.

Image Credit: Honeywell

The Halliburton contract, worth almost US$600mn, includes a three-year term with a six-month extension option, with work commencing in mid-2020. The US company will provide and manage drilling, fluids, wireline and perforating, well testing, coring, cementing, coiled tubing, and all offshore logistical services, in addition to the provision of offshore rigs and supply vessels for the project. The expected start date for the first rig is July 2020 and the second rig is January 2021. Halliburton said that it would be deploying two jack-up rigs for the six high-pressure high-temperature (HPHT) wells.

While other states have been more proactive in the Gulf, it will mark Kuwait's first offshore drilling since around the 1980s.

> "The fresh impetus follows a general restructuring of Kuwait's energy sector."

Downstream activity

There are other signs too, of a Kuwait in a more revitalised mood. Kuwaiti officials continue to talk with their Saudi counterparts to resume output from joint fields in the Partitioned Neutral Zone. A sovereignty dispute shut in around 250,000 bpd of Kuwaiti production from this area around five years ago.

Meanwhile, in the gas sector – another strategic priority for KPC and an economic necessity for the nation – Kuwait is looking to build new storage facilities to accommodate greater liquefied natural gas (LNG) imports.

Kuwait National Petroleum Company (KNPC) has issued tenders for the construction of the new facilities at its Al-Ahmadi oil refinery.

Again, in the refining segment, Kuwait Integrated Petroleum Industries Co., recently appointed US tech giant Honeywell to provide systems on its long-delayed Al-Zour refinery. Originally planned more than a decade ago, the refinery is finally expected to enter production in 2020, with an estimated capacity of 615,000 bpd. It will raise Kuwait's overall refining capacity to more than 1.5mn bpd.

The fresh impetus follows a general restructuring of Kuwait's energy sector, including reshuffling at the state conglomerate Kuwait Petroleum Corporation (KPC). One of its moves earlier this year was the appointment of new heads for main operating subsidiaries, including Emad Mahmoud Sultan at KOC and Walid Khalid al-Badr as the new chief executive for KNPC.

Kuwait's oil and gas sector appears on the move…albeit belatedly. ■

REVOLUTIONARY GOVERNMENT OF ZANZIBAR

TENDER ANNOUNCEMENT
TENDER NO. SMZ/N01/W/ICB/2019-20/30

TENDER FOR THE NON EXCLUSIVE MULTI-CLIENT 2D SEISMIC DATA ACQUISITION, PROCESSING, INTERPRETATION AND MARKETING (PROJECT) IN THE DEEP-OFFSHORE AREA - EASTERN ZANZIBAR

The Revolutionary Government of Zanzibar is announcing the tender for the upcoming non-exclusive multi-client 2D seismic survey to be conducted in the deep-offshore basin to the eastern area of Zanzibar during the last quarter of 2019 to first quarter of 2020.

The eastern deep-offshore basin is part of the East African margin comprising of approximately 36,065.48 sq.km. The area is in water depths between 500m and 3500m. The survey will involve acquisition of about 4,300 line kms of 2D seismic data of long-offset over 10x10km grids, bathymetry, gravity and magnetic data.

The survey is designed to provide high quality data for a regional evaluation with a view of identification of leads. The geophysical company and the Government will use the same data to promote open acreages to IOCs for exploration licenses. The Licensing round is expected to be held in Zanzibar by year 2020.

Interested geophysical companies are invited to tender for the planned project. Tender details are available in tender document that may be purchased through Zanzibar Petroleum Regulatory Authority (ZPRA) starting from 7th August 2019.

A complete set of Bidding Documents in the English language may be obtained from the Secretary of the ZPRA Tender Board, in the Pool Room, First Floor, Forodhani, P. O. Box 4746, Zanzibar or through email "ibrahim.rashid@smz.go.tz" upon confirmation of payment of non-refundable fee of US$50,000.00. Payment of non-refundable fee should be made through electronic transfer to ZPRA's bank account whose details are provided herein below:

Account Name:	Zanzibar Petroleum Regulatory Authority (ZPRA)
Account Number:	0400519001 - USD
Bank Name:	People's Bank of Zanzibar (PBZ)
Swift Code:	PBZATZTZ.

The Tender will be closed on **11th October 2019 at 12:00pm** local time.

Managing Director,
ZANZIBAR PETROLEUM REGULATORY AUTHORITY,
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Taking the world by STORM

Oil Review Middle East sat down with Alun Jones, development strategy manager at Reflex Marine to discuss offshore work baskets and Reflex Marine's latest product STORM-Work, a work basket with advanced design and engineering including self-righting and floating features. Traditional work baskets are used throughout many industries, both on and offshore. Their use stretches from general maintenance and offshore repairs to inspection and surveys.

Image Credit : Reflex Marine

Alun Jones, development strategy manager, Relfex Marine.

Oil Review Middle East (ORME): Reflex Marine developed and soft-launched a new generation work basket. What triggered the development of this product?

Alun Jones (AJ): We've been supplying crew transfer carriers to the offshore and marine industry for more than 27 years now. We have the most advanced, the safest and the most cost-effective product in our product group. Further to that, in the offshore crew transfer total product universe we are, by far, the option with the best safety track record: 10 years and over 15 million transfers without a lost time incident. That is quite impressive in anyone's book. During these 27 years, Reflex Marine built and kept updating an incident data base. This activity, enhanced with the feedback from the industry, started the process of identifying key design oversights in traditional work baskets.

Reflex Marine's Innovation and New Product Development Team collated common causes that led to injuries or fatalities. In most cases incidents occurred as a consequence of over-simplistic work basket design, lack of pre-use checks or lack of operational guidance.

ORME: You said that Reflex Marine created and kept updating the offshore transfers' incidents database. Was there a reason why you decided to do this in-house rather than just take data from a third party?

AJ: Operating globally, we did not really have that choice. There is no single legal entity or body that compiles, tracks and analyses this type of incident data. In our efforts to improve safety offshore and to keep transferring knowledge and expertise – often in an open-source form – we shared this database with many of our clients and partners, and it was one of our main contributions to the Marine Transfer Forum, an independent body we are a member of.

ORME: Working offshore is often perceived as a high-risk job and activity. Could you tell us more about the risks when work baskets are being used?

AJ: Working offshore is perceived as a high-risk activity because it is indeed a high-risk activity. The health and safety aspect of offshore operations keeps improving and we, at Reflex Marine, are both proud and grateful that we can contribute and that we are contributing in a very significant way. Both Norwegian and UK offshore safety standards, particularly those parts focused on crew transfer, changed and improved as a consequence of our products appearing on the market, but perhaps more so by our in-depth analysis of crew transfer operations, clear analysis of risks and simple yet effective way of mitigating them. Going back to work baskets, we've previously highlighted and articulated the main causes that lead to injuries or fatalities. These causes can be summarised as:

> "We are, by far, the option with the best track record."

Immersion – When people are working near to shore or offshore, in situations of crane failure, wire rope failure or crane operator's error – all these circumstances can lead to an immersion event.

Then we have **crushing and trapping injuries –** when people are working on the side of an installation where there is a high risk of the worker suffering a crush injury or being trapped inside the work basket.

The third main cause of incidents we identified is **snagging –** work basket designs do not traditionally have anti-snagging properties which enhances risks including falling, crushing and damage to the basket or installation.

Finally, we have **lateral impacts –** they are essentially high-velocity lateral impacts which can occur during lifting operations.

ORME: You explained earlier what inspired Reflex Marine to embark on a journey of designing and engineering a new product. Did you engage with any clients during this process, was there any external collaboration and how did all that work?

AJ: Reflex Marine has always been an innovative company, and we've managed to preserve that side of a "start-up" mindset during the past quarter of a century.

Collaboration and openness to new ideas and methods are an integral part of the innovation process. We've always worked with clients and industry bodies because we were very much aware that our business rationale is to resolve issues that companies working offshore are encountering daily.

One of our most popular products – especially in deep-water operations – is our high capacity crew transfer carriers, which was a direct result of a very close collaboration between us and Seacor Marine, global leader in marine and support transportation services to offshore oil and natural gas exploration, development and production facilities.

Another great and very productive collaboration we had was with Seaway Heavy Lifting (SHL) (now Seaway 7), a company that manages and performs transportation and heavy lifting of offshore structures. Seaway 7 are involved in project management, engineering, fabrication, heavy lifting, cable installation and decommissioning services. During their operational planning process they identified a need for a more durable and sustainable work basket for their heavy lift operations worldwide. They required a work basket with the ability to mitigate the risks I described earlier in the interview and, in particular, they required a work basket with the ability to self-right and float. The Reflex Marine team worked closely with Seaway 7 on development, engineering and testing of STORM-work and they are now using it in their global operations.

ORME: You spent 25 years designing and engineering exclusively crew transfer carriers. While the work basket is in a similar category, it is not quite the same. You explained this step beyond crew transfer baskets from your supporting clients and their operations perspective. Were there other reasons?

AJ: Yes, there were other reasons, and very much to do with the changes in the market. I also appreciate it is always interesting for managers and professionals to learn about other companies' perspectives, decision-making processes and the rationale behind it. After the last major global oil price crisis back in 2015, Reflex Marine made a conscious strategic decision to expand its product portfolio but also to expand its market coverage. We looked at the wider offshore universe, trying to understand the other major industries beside oil and gas offshore. We did extensive in-house research and analysis to see how best we could contribute to these other industries and the companies operating in them.

> "Collaboration and openness to new ideas and methods are an integral part of the innovation process."

The STORM-Work new generation work basket.

Image Credit : Reflex Marine

ORME: What are the benefits of STORM-Work over other work baskets?

AJ: The main benefits I would highlight here are the self-righting and floating capabilities in the event of immersion, while also creating a safe space for personnel to await rescue. STORM-Work's flotation (buoyancy) panels double as side (lateral) impact protection. The outer panels and floatation minimise anti-snagging risks, this is achieved through contoured buoyancy panels, top and bottom, stepped side panels, folded top edges and protected shackle and lifting points. The lifting configuration is made of four anchor points which stabilise the carrier and reduce the risk of falling. Integrity of equipment is also a vital aspect in the design of STORM-WORK, easy-to-access and visible critical components, allowing for ease of inspection and maintenance. This design, combined with the weld-free structure, limits the components required in the critical path.

Personnel protection from when they are carrying out their duties within the carrier has also been taken into consideration. The offset space between the panels and the personnel is known as the "safe working zone", designed to mitigate crushing and trapping injuries. Overhead protection has also been incorporated and thoroughly tested to ensure competency.

Finally, our products have always been ahead of the market in terms of environmental sustainability, and STORM-Work is no different. We are continuously looking into which materials to use when engineering our products.

ORME: How did you test and verify all the features of STORM-Work?

AJ: STORM-Work has been designed with the client in mind. Through the design process we created a highly engineered product which ensures worker's safety. STORM-Work is really the only work-basket in the world to go through the most rigorous testing and verification programme. Anti-snagging, crane speeds, lateral impact and the impact on the human body were among the criteria assessed. Immersion testing was carried out to ensure the carrier would float and self-right in all load conditions.

During the development of our FROG and FROG-XT range Reflex Marine adopted methodologies similar to those used to evaluate the safety performance of motor vehicles. We used those same methodologies to test STORM-Work, and this rigorous testing and verification programme confirmed that the objectives had been met.

Together with the in-house testing I've just mentioned, we also conducted offshore trials with Seaway Heavy Lifting. Their feedback allowed us to formulate operational procedures and safety guidelines. ■

Positive outlook for the oil & gas recruitment market

Andy Greenwood, regional director for the Middle East at Airswift, the global workforce solutions company for the energy, process and infrastructure sectors, discusses the Middle East recruitment landscape.

Image Credit : diter / Adobe Stock

The Middle East recruitment market is looking positive.

THE MIDDLE EAST, as a major player in the global energy sector, accounts for a big part of Airswift's global business – and is expected to account for an even bigger part in the next couple of years, says Greenwood. The region currently accounts for around 20 per cent of the company's overall contractor headcount, and the outlook is positive, both internally and externally.

"Last year we grew by a very substantial percentage, and we're on track to exceed last year's growth by 40 per cent, so it's an incredibly positive picture internally," comments Greenwood.

"Externally, looking at the market more generally, there's a much more positive perception now of the Middle East market. In the short term we're seeing a real upturn in activity, particularly in areas such as FEED, which is normally the catalyst leading on to fabrication, construction, commissioning and later to operations and maintenance. Although, with some exceptions, the majority of the FEED work we're seeing is brownfield focused, ie modifications to existing plants, rather than big greenfield newbuild projects."

LNG is a growth area for the Middle East reflecting the global trend.

"We are seeing a bigger push on production and the work around that across the whole of the Middle East. Obviously there are various benefits to using LNG from an environmental point of view, as well as cost benefits in areas such reducing field costs and transportation.

"A number of major engineering projects are moving forwards across the region," he continues. "One of the interesting things we're seeing now is that while these are often focused on the production of oil and gas, the accompanying civil infrastructure developments are bringing benefits to other industries.

> "When there is an upturn in the market, you have to change your mindset when it comes to hiring the right talent."

"Long term, everything we're hearing and seeing in terms of activity indicates that the outlook is very positive. It's fair to say that this region has probably seen more of an upturn than Europe, and here we are more focused on the energy sector than our Europe operations as oil and gas plays such a big role in Middle East economies.

"One of the things we're trying to get over to our clients is when there is an upturn in the market, you have to change your mindset when it comes to hiring the right talent, to attract, engage and retain people. In a client-driven or job-driven market there is more choice when it comes to selecting talent as there are more candidates available. We're definitely seeing a change in that at the moment, particularly when it comes to people with the FEED and LNG skill sets.

"A different approach is required; it's not just about financial rewards, it's also about building a good team environment and culture. There has to be a focus on developing people and offering opportunities. In the last five years we've been in a market where clients could be incredibly selective about the people they choose to bring into their businesses, but that's changing now."

Cost saving initiatives have been a big focus for all clients over the past five years, he points out, with many businesses seeking to make cost savings through workforce economies.

"What we've been trying to do over the last 18 months to two years is put across the message that you have to do this in the right way, or it can be a false economy. Ultimately the impact of hiring the wrong people or selecting a manpower company to support you purely based on price and cost, can lead to costly errors, such as projects being delayed and ultimately coming in over budget.

"It's good to be cost conscious, but why

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not look at cost savings in terms of what you're getting from the people you have; by managing people more effectively and developing them further, businesses can have an incredibly positive impact on productivity."

He adds that over the past five years the manpower industry has become very commoditised.

"Our solution has been trying to offer something more innovative, rather than a purely transactional service. It's more about trying to understand the objectives and challenges our clients face, and genuinely trying to add value. That's driven one of our key strategies, which is to walk away from certain business and focus on clients who can see the value of what we offer as a company."

"So there is positivity in the market, but it comes with its own challenges and is at an early stage; we need to be conscious of that."

Focus on localisation

Localisation is a big focus for Airswift, in line with the push for nationalisation throughout the region, and stringent rules and regulations in several countries stipulating the level of national content. The company established a team at its Dubai office in 2018 to support, encourage and promote Emiratisation, within Abu Dhabi and Dubai particularly, with a focus on the private sector.

"In 2018 alone, there was a 200 per cent growth in Emiratisation across the public and private sectors, and the target is to double that by end of this year," explains Greenwood. "It's an impressive increase, but in 2018 less than two per cent of Emiratis were actually working in the private sector; the rest are in government organisations.

> "In 2018, less than two per cent of Emiratis were working in the private sector."

"The private sector offers opportunities for training and development in a completely different environment. If we look at the long term impact of getting more people into the private sector, experiencing a multinational environment and different ways of thinking, that's really important.

"Every day the team is going out and meeting with local businesses, discussing Emiratisation, what approaches business are taking, and how they can attract more Emiratis.

"So nationalisation is a really big part of working across the Middle East."

Another trend is the growth in demand for digital skills.

"At the beginning of last year, we employed two individuals with background in IT, more specifically cybersecurity, AI and certain other areas. It's something we're seeing a growing demand for, and which as a business we are very focused on. Everything will be driven by tech ultimately. The requirement to automate, become more efficient in internal processes, and how we work with our clients and vice versa is really important. It's something we're seeing a big change in, and it's very clear how forward thinking and progressive the UAE government is; look at what they've managed to achieve in a relatively short space of time.

"They are constantly challenging the status quo and are incredibly forward thinking, that's the mindset here, so there is a real focus across the UAE for technology advancement." ■

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The growth in non-metallic pipes

The use of non-metallic pipes is becoming more widespread throughout the Middle East to address the challenges of ageing assets and corrosion, a problem exacerbated by the prevalence of H_2S and the use of highly corrosive fluids for enhanced oil recovery (EOR).

A LEADING PROPONENT of non-metallic materials is Saudi Aramco, which commenced a non-metallic road map twenty years ago with the goal of reducing the annual cost of corrosion by 10 per cent.

"Some of our flow line network – mainly built from carbon steel – has been susceptible to corrosion damage because of exposure to common oilfield fluids, H_2S, CO_2, and even bacteria," said the company's senior vice president of Technical Services, Ahmad Al Al-Sa'adi, speaking at a seminar in November 2018. "But we have found that Reinforced Thermoplastic Pipe (RTP) used in flow line applications is quite successful in controlling corrosion."

Saudi Aramco has successfully deployed more than 5,000 km of non-metallic pipes, resulting in a significant increase in efficiency and reduction in maintenance and replacement costs across the company's operations.

While the early uses of RTP technology were constrained by the application limitations of the manufactured pipes, which was reflected in maximum sizes, fluid pressures, and temperatures of the process designs, these application limitations have been progressively eased by advances in materials and manufacturing technology, the company stated.

Saudi Aramco is looking to play a leading role in accelerating the deployment of non-metallic materials globally, and is partnering with local and international suppliers, as well as research institutes, to accelerate their deployment and development in Saudi Aramco facilities.

An example is the MoU signed with BHGE in July for a new joint venture facility to manufacture non-metallic materials, focusing initially on non-metallic reinforced thermoplastic pipes.

Al-Sa'adi said, "Producing these materials in the Kingdom would also unlock opportunities for local manufacturers and facilitate knowledge transfer."

Netherlands-based SoluForce has been at the forefront of RTP developments and innovations in the Middle East since 2000, when its flexible composite pipes (FCP) were first installed in the region. These are still operational to this today, without any issues, the company says, with more and more oil and gas companies now using non-metallic solutions.

Image Credit: SoluForce

SoluForce FCP systems are flexible, meaning they can go up hills, down slopes, round corners and underwater with ease.

> "Producing these materials in the Kingdom would also unlock opportunities for local manufacturers."

Advantages are the lack of maintenance required as the FCP systems are corrosion and scaling free, as well as flexibility, meaning they can go up hills, down slopes, round corners and underwater with ease. There is no need for supporting infrastructure such as sleeper supports, which are generally required for steel pipelines. They can be directly installed on the surface or buried in a trench.

The company has pioneered innovations such as gas-tight and high temperature FCP solutions.

"With a number of innovations to come, we are continuing to evolve our FCP markets and products, which will enable us to continue to develop and cement our business in the region," said SoluForce. New products, solutions and applications are being developed combining new materials and advanced technologies, it added. ■

Growing demand for local manufacture of piping and tubing

THE SUBSTANTIAL UPSTREAM growth plans of Middle East NOCs are providing fertile opportunities for suppliers of piping and tubing products – and demand for local manufacture of these products is growing, in line with in-country value strategies.

In August, ADNOC awarded US3.5bn worth of contracts to Luxembourg-based Tenaris SA, France's Vallourec and Japan's Marubeni for casing and tubing to support ADNOC's onshore and offshore E&P projects. It includes more than US100mn in foreign direct investment over the next five years, to establish a state-of-the-art oil country tubular goods (OCTG) threading plant and repair centre, and a training academy in Abu Dhabi.

For Tenaris, it includes the supply of a full array of steel grades and connections, including its Dopeless technology. The company will also strengthen its footprint in Abu Dhabi through installing a premium threading facility and upgrading its Rig Direct service centre.

Tenaris is also expanding its industrial presence in Saudi Arabia, with the acquisition of a controlling stake in SSP, a local welded pipe producer with manufacturing facilities located in the Eastern Province. This will enable Tenaris to expand the range of products it supplies to Saudi Aramco, the company says, as SSP's range complements its existing offering in Saudi Arabia.

Looking to become one of the leading manufacturers of premium tubular solutions in the region is Spain's TUBACEX, manufacturer of stainless steel and high-alloyed seamless tubular products.

The company sees the region as a key growth market and opened its first stock centre in the region in 2017. It has entered into a strategic alliance with SENAAT, one of the largest investment holdings in the UAE, to support the development of energy projects focusing on the development of local manufacturing capabilities. It is considering building production facilities to manufacture OCTG in Abu Dhabi.

As part of the alliance the two companies have acquired the NTS Group, which specialises in the manufacture, repair and maintenance of machined stainless steel components for the oil and gas industries. This will enable TUBACEX to expand its production capacity and range of services to provide a complete tubular solution, TUBACEX says.

OCTG are a focus area for SENAAT, which sees its partnership with TUBACEX as tying in with its strategy of seeking to partner with global organisations to grow the UAE's manufacturing base.

H.E. Eng. Jamal Salem Al Dhaheri, CEO of SENAAT, explained, "We are keen to expand our oil and gas product portfolio to take advantage of the massive sector development programmes recently outlined by ADNOC and other NOCs in the region.

"These programmes offer significant opportunities to the UAE manufacturers, especially in OCTG, where the ability for oil companies to have ready and reliable access to such products is so vital to the programmes' successful implementation."

Al Gharbia Pipe Company, SENAAT's joint venture with Japan's JFE Steel Corporation and Marubeni-Itochu Steel Inc (MISI), owns and manages the UAE's first sour service capable, welded steel pipe plant based at Kizad, with expected capacity of 240,000 tons annually.

Compressors for high temperature environments

As the Middle East is one of the world's most water-scarce and dry regions, the hot and harsh environments in which air compressors need to operate must be taken into account when specifying a system, says David Fenwick, Middle East sales director at Gardner Denver.

OVERHEATING, WHICH IS often the result of internal factors, external conditions, or sometimes a combination of both, is one of the most common causes of air compressor failure. The process of compressing air generates a lot of heat, with as much as 95 per cent of the electrical energy used by an industrial air compressor converted into thermal energy and lost through radiation, usually into the room housing the system.

The Middle East is particularly vulnerable to climate change, meaning that temperatures of up to 55°C are not uncommon. In fact, conditions that were ideal for industrial air compressors in the region just two decades ago could now require significant adjustments. Some existing machines using traditional air compressor technology are prone to overheating due to high ambient temperatures and have become inadequate, or obsolete.

Gardner Denver designs and delivers compressor packages that are built to withstand such extreme temperatures and work in the most challenging environments. Engineers create and manufacture solutions, both in oil-free and lubricated configurations that fit a range of customer specifications. Air-cooled oil-free rotary screw compressors incorporate innovative refrigeration technology and are capable of operating in temperatures up to 55°C.

Alberto Castaño, project group director EMEAI, says, "Climate change offers unprecedented challenges for our customers in the Middle East, which has motivated Gardner Denver to invest in innovation across different technologies of compressed air and vacuum. We now lead the way in the design, development and manufacture of air-cooled oil-free screw compressors that can operate in extreme temperatures.

"Our air-cooled oil-free rotary screw compressors incorporate innovative refrigeration technology and are capable of working under strenuous conditions either outdoors or indoors, in refineries, deserts and other sandy environments."

How are Gardner Denver air compressors able to deliver technology that can operate in temperatures of up to 55°C?

Firstly, there is no oil in the compressor or, indeed, the compressed air itself. Gardner Denver's oil-free compressors incorporate innovative air cooled cooling technology such as stainless steel pre-aftercooler and 50 per cent x2 sets of cooling fan configuration, ensuring exceptional reliability and low maintenance costs in high-temperature environments. Capable of working under strenuous conditions either outdoors or indoors, they are suitable for refineries, deserts (high inlet temperatures) and sandy environments.

Secondly, we should pay attention to the stainless steel air-end for the second stage of the compressed air process, and the open clearance between male and female rotors. The cooling fan's configuration is also important, optimised to deliver the best possible results. Our compressors are also optimised to withstand aftercooler inlet temperatures of up to 265°C.

There is a very low CTD for the aftercooler. In addition, no external cooling is required. All the components of the controller are designed for temperatures of 80°C without any cooling devices. ■

To find out more about air-cooled compressor technology for high-temperature environments, please download the new free guide: http://bit.ly/2EDwzix

Gardner Denver unveils new oil-lubricated 90 to 132 kW CompAir compressors

GARDNER DENVER HAS unveiled its newest oil-lubricated compressors for its leading CompAir L-Series range, offering best-in-class efficiency.

Available in 90 kW, 110 kW and 132 kW units, the new compressors deliver efficiency improvements of up to six per cent when compared with previous models, plus a seven per cent higher flow rate. The new compressors are available in both fixed and regulated speeds – which can help reduce a system's total cost of ownership significantly – as well as air-cooled and water-cooled options.

All models are offered with a completely new airend, featuring a larger-sized inlet and outlet to help improve air flow and reduce pressure drop. Delivering the highest quality compressed air at a low rotational speed, to help minimise the unit's energy consumption, the new airend has been designed and manufactured at the company's Centre of Excellence in Simmern, Germany. It is supported by the CompAir Assure warranty, which covers the airend for up to ten years or 44,000 hours.

Furthermore, the new airend comes with a newly patented oil

Image Credit : Gardner Denver

The new compressors deliver efficiency improvements of up to six per cent.

regulation valve, which balances oil and the discharge temperature according to environmental conditions. Not only does this remove the risk of condensate and – as a result – corrosion, it also ensures the oil in the system remains at suitably high standard at all times and can improve efficiency levels by up to five per cent. This has been cleverly integrated, along with the oil filter, into the airend's housing, helping to eliminate the risk of oil leaks while simplifying maintenance.

The airend features a robust shaft seal system, to stop oil leaking from the housing. Its unique design, which incorporates three different o-rings to protect against oil and dust, ensures the highest levels of reliability and minimises any opportunities for unexpected downtime.

The latest additions to the CompAir L-Series range include a new intake filter, further improving pressure drop, and an improved oil separator, specially designed for quick and easy servicing.

Using radial fans for low noise levels, the compressors' innovative cooling system ensures a consistently low operating temperature, optimising compressor efficiency and reducing energy consumption as a result. Further noise reductions are achieved via the compressor's noise-insulated enclosure and the fact that the compression element, separator/ receiver and drive motor assembly are all positioned on vibration-free mountings.

For more information on Gardner Denver, please visit www.gardnerdenver.com/industrials.

Image Credit : Gardner Denver

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Improved meter diagnostics

Gordon Lindsay, technical lead at TÜV SÜD National Engineering Laboratory, outlines the development of a model that will help to facilitate condition-based meter calibration.

Image Credit : TÜV SÜD National Engineering Laboratory

TÜV SÜD National Engineering Laboratory's elevated pressure and temperature (EPAT) single phase oil facility.

SIGNAL TRANSMISSION AND data acquisition in the field of flow measurement have advanced significantly over the past decade. The traditional analog signals are becoming less dominant. Flow meters and secondary instrumentation (e.g. pressure and temperature sensors) now come with the option of providing a digital fieldbus output, giving end-users more flexibility in communication infrastructures, as well as increasing the volume of data that can be obtained from a single device. For example, a Coriolis flow meter can output additional process values over a fieldbus, which can be used to infer meter performance, as well as providing the standard fluid flow and density readings for which the devices are known.

However, despite having access to this additional level of diagnostic data, many facilities still operate on a time-based calibration schedule (TBC). This means that high operating costs are incurred by removing a meter for calibration and shipping to an accredited calibration laboratory, bi-annually or annually, irrespective of whether the meter is in fact showing signs of deviating from its previous calibration curve. One reason for this relates to end-user confidence in correctly interpreting the diagnostic data, with some plant owners wanting to see more case studies of successful condition-based calibration (CBC) implementation before taking the leap themselves.

While most Coriolis meter manufacturers provide software that allow users to interact and log these digital values, detailed analysis of the parameters requires a level of familiarity with the specific characteristics of the facility and their effects on the digital parameters. In addition, the availability and relevance of certain digital parameters may vary between manufacturers of Coriolis meters. If one moves to a completely different flow metering technology such as ultrasonic, then analysis of differing digital parameters is required due to the fundamental principles of device operation.

To address this, we are undertaking experimentation in our flow laboratories, making use of emerging data science and mathematical techniques to establish correlations in the digital values available from Coriolis meters. The overall objective is to provide end-users with a standardised toolset that can automatically detect when a Coriolis meter is not performing to specification and crucially, the cause of the deviation in performance.

Such an undertaking requires a knowledge base to be constructed from experiments that investigate the individual and combinatory response of these digital values to specific process conditions. A bespoke data acquisition system was set up to log more than 100 modbus parameters from multiple Coriolis meters.

The following process conditions have been investigated to date: -

- Varying fluid temperature.
- Varying fluid pressure.
- Ambient air temperature.
- Cavitation.
- Fluid properties.
- Meter misalignment.
- Zero drift.
- Upstream and downstream flow obstructions.

A classification model, based on the extensive time-series data files logged during experimentation, has been developed by our Digital Services team. The model has already been shown to be capable of detecting correlations between the meter's digital fieldbus data and the process effects induced during experimentation. More experimentation is planned in the coming year, the aim of which is to increase the resolution of data, and in doing so continue to build upon the accuracy of the model. In some cases, it has also been shown that it is possible to automatically correct errors in meter output due to specific process conditions. Further work in this field is planned in the near future with cooperation from key vendors of Coriolis meters.

Successful field implementation of a model such as this would signify a significant step change with respect to end-user flexibility in condition-based calibration scenarios. Instead of a red, amber, green (RAG) output, which is available from multiple meter and software vendors, users would have access to diagnostic information that indicated a specific problem that requires investigating or intervention. Therefore, fault diagnosis times would be reduced, resulting in less facility downtime and maintenance staff effort, ultimately lowering overall operating costs for the facility owner.

TÜV SÜD National Engineering Laboratory is a provider of technical consultancy, research, testing and programme management services. It is part of the TÜV SÜD Group. ■

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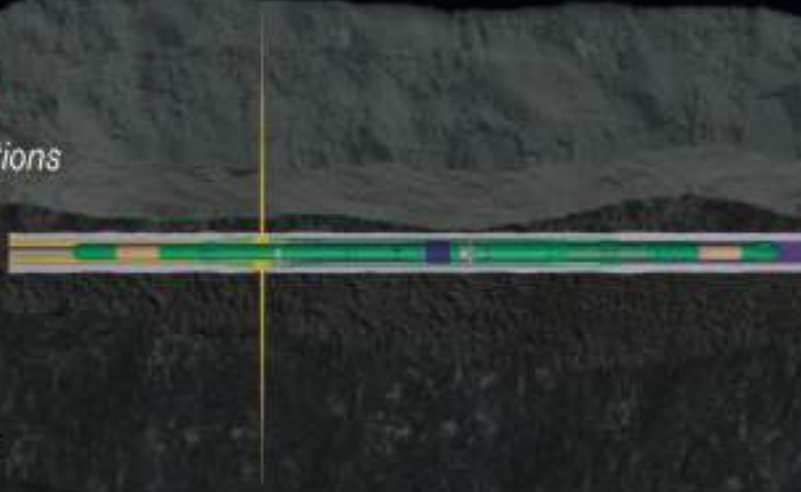

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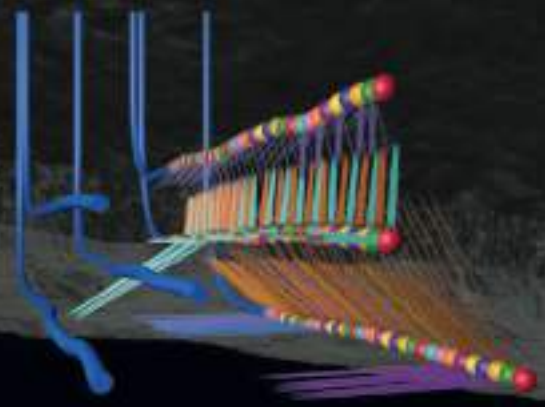

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Getting to grips with cyber threats

Leading cybersecurity experts discuss what can be done to mitigate cyber threats facing oil and gas companies.

Image Credit : beebright/Adobe Stock

Many organisations are ill-equipped to protect against cyber threats.

Participants:

Maher Jadallah (MJ), regional director – Middle East, Tenable
Jonathan Couch (JC), SVP, Strategy, ThreatQuotient
Doug Wylie (DW), SANS director, Industry Practice Area
Werno Gevers (WG), enterprise manager - Middle East & India, Mimecast

How do you view the cyber security threat landscape in the Middle East's oil and gas sector?

MJ: As with many industries, digital transformation programmes are being rolled out across the Middle East's oil and gas sector with the introduction of new technological tools to benefit the bottom line through enhanced efficiency and output. This has led to the convergence of both the data side of the business, traditionally the realm of IT, and the operational technology (OT) side, used to manage industrial control systems (ICS).

This issue is that OT environments remain plagued by the same basic cyber hygiene issues that have impacted IT infrastructure for years – the convergence of both is only compounding the issue. Furthermore, by connecting OT to the internet, organisations are exposing their once air-gapped systems to a wider range of threats, many of which they remain ill-equipped to protect against.

Unfortunately, the security tools and processes of yesterday aren't up to the job of solving today's problems. As a result, organisations struggle at every step – seeing their assets, detecting weaknesses, prioritising issues for remediation, measuring risk, and comparing to peers. The digital era requires a new approach.

> "The security tools of yesterday aren't up to the job of solving today's problems."

JC: With the current political climate in the Middle East, attention is turning toward cyber threats to shipping and the industrial control networks that manage and support extraction and refining. ICS networks are designed for utility, not security, so they can be easy targets at times. Attacks against the energy sector in the Ukraine in December 2015 are a good example of what can be done to disrupt operational networks. Countries such as Iran have shown intent to affect shipping through the Strait of Hormuz and also have a long record of cyberattacks (primarily utilising social media).

DW: The process control systems that drive today's oil and gas up, mid and downstream applications continue to rapidly evolve, becoming even more automated, connected and integrated with business operations. While this brings substantial benefits in terms of increased operational efficiencies and productivity, this same expanded access to today's complex cyber physical systems also opens them up to greater risks from accidental and even malicious actions.

Threats can come in all shapes and sizes, as do the resulting impacts. With today's highly interconnected and interdependent systems, what used to be an isolated event can now quickly cascade into widespread disruption. Companies today still need to draw distinctions between pure information-driven systems and cyber physical systems, but they also need to recognise in many cases that there is little to separate these systems. For high-risk industries especially, it is critical for companies to remain vigilant throughout the entire organisation against all types of threats that have the potential to disrupt operations, cause damage or even loss of life.

WG: State-sponsored, hacktivist-driven, and other adversary-driven attacks on industrial IoT systems are increasing in the utilities, energy, and manufacturing industries. Adversaries are taking advantage of the fact that the oil and gas industry is slowly moving to digitise its IoT systems.

The SHAMOON malware has also been executed in the region, with the first cyber-attacks targeting energy companies related to

Saudi Arabia in 2012. The malware evolved, leading to SHAMOON3, targeting a number of foreign oil and gas services and contracting companies in December 2018.

Attacks targeting employees via impersonation and phishing continue to grow. These can often lead not only to data loss but also downtime, which can bring operations to a standstill. Business continuity is essential in a time-critical and logistics-focused sector such as energy.

Image Credit : Mimecast

Werno Gevers, enterprise manager - Middle East & India, Mimecast

What strategies and measures should organisations take to protect themselves against cyber threats?

MJ: The majority of modern breaches are a direct consequence of ineffective vulnerability management. In fact, 34 per cent of organisations that have been breached state they were aware of the vulnerability that led to the attack before it happened. The problem is we have too much information and not enough intelligence.

In 2018, 16,500 new vulnerabilities were disclosed and CVSS categorised the majority as high or critical. With vulnerabilities on the rise, organisations need to be able to identify those that pose a real rather than theoretical risk to the business so they can zero in on remediating the vulnerabilities that matter most.

Staff responsible for OT security cannot afford to be blinkered and focused only on OT vulnerabilities. The convergence of IT and OT means both ICS and IT vulnerabilities can be exploited to attack critical infrastructure. Therefore, viewing both systems together through a single pane of glass is the only way to view risks holistically.

JC: There is no silver bullet technology in security, and even the smartest, most experienced person in the world can't prevent, detect, or remediate issues without the right information and technology.

I look at security as a combination of organisational maturity (people) and functional maturity (processes and technology). A good strategy for security, regardless of your size, is usually breadth and depth in combination with maturity. What I mean by that is breadth of coverage for your enterprise: what technologies do you have in place to make sure you're protecting all the "entrances" / perimeter to your network? Then depth of coverage: how are you monitoring endpoints and what is going on inside your network?

You should also focus on maturity: train your personnel in security and the business (make sure they understand what they are trying to protect); develop processes that are repeatable, sustainable, and scalable; and make sure you understand the threat (incorporate threat intelligence so you know what to prevent and how big a problem is when you find it on your network).

> “There is no silver bullet in security”

DW: There is no one-time investment in technology or training that we should ever expect to stand alone to sufficiently mitigate all risk. A combination of both technical and non-technical defence mechanisms that include building security-aware and skilled worker capabilities is necessary and beneficial. This approach should be built on employing relevant technologies and executing well-established and tested processes, each of which are designed to evolve over time and should therefore be kept up to date. Together, these approaches comprise an agile strategy to more successfully combat today’s dynamic threat landscape.

How important is regulation and the adoption of cybersecurity standards?

JC: The adoption of cybersecurity standards would help to provide security for oil and gas companies. Even just implementing leading practices and creating standards around security for ICS and SCADA would be a drastic improvement. Many operational networks aren't monitored today, and even fewer have controls available to prevent, detect, monitor, or remediate attacks. For example, it is standard practice to restrict or remove the use of remote desktop protocol (RDP) on servers and workstations in most industries. Most operational networks, however, rely on RDP for system maintenance and performance monitoring, so it is left open. Many modern attacks leverage RDP for initial access and to spread throughout operational networks.

Image Credit : SANS

Doug Wylie, SANS director, Industry Practice Area

DW: Cyber security standards and regulations that work for industry need to be designed to continuously evolve and improve. International and industry-specific standards can help to uniformly identify risks and provide methodologies to help mitigate known and emerging risks. Functional safety standards are a good example of the value that specific terminology, technology, device and system designs and management can bring to industry in order to successfully counteract risks that may otherwise affect operational integrity of highly-engineered systems. Likewise, cybersecurity standards, guidelines and best-practices can also help companies take a structured approach to identifying and mitigating a host of risks. When these variables are better controlled, companies are able to better protect, defend, and recover systems from harm. Laws and security-oriented regulations can also assist by providing strategic encouragement to push industry to adopt standards more quickly.

However, it’s important to recognise that whether a regulation or a standard practice, proactive provision for evolution over time is of paramount importance for both, otherwise they may do more harm than good. If they don’t change or improve, the end result to the community can be a series of standards and regulations that prove burdensome to industry while also being ineffective in meeting their intended objectives.

To what extent do you think oil and gas companies are aware of data security threats and of the need to implement measures to protection their information assets?

MJ: The threat to oil and gas companies is all too real, as borne out by a number of high-profile cyber attacks against the sector. In addition, governments around the world

caution that the threat to infrastructure will worsen rather than lessen, with the oil and gas sector particularly at risk of targeted attacks.

Finding a solution to any problem begins with acceptance. It is essential that IT and OT professionals understand the increased attack surface if their organisation is to moderate their business risk.

JC: For the most part, I believe they are aware. But it becomes a risk decision between operational efficiency and profit, vs security against threats they don't think will ever target them.

Image Credit : ThreatQuotient

Jonathan Couch, SVP, Strategy at ThreatQuotient

DW: Given the energy sector's status as a critical infrastructure, companies must readily acknowledge that cybersecurity risks are very real and threaten almost every organisation and its stakeholders in some way.

Unlike functional safety, where we often have the benefit of knowable data and mathematical calculations of probability, with cybersecurity risks we don't know with confidence how often an organisation is under a specific amount of risk of a ransomware attack, nor do we have a timeline for when and how often a malicious insider might choose to strike, or certain knowledge about how geopolitical change may affect our industry or a particular company. As such, oil and gas companies must work under the assumption that risks are ever-present.

To what extent is the lack of skilled professionals hampering efforts to boost information security? Are there any other challenges that are hampering such efforts?

JC: A shortage of skilled and experienced professionals is a problem throughout the cybersecurity industry – not just in oil and gas. The difficulty is retention: you can spend a lot of time and money training people up at which point they will receive multiple offers for more money from other companies. This can really hurt the efficiency of a security organisation.

But that is more around the day-to-day security operations centres and incident response teams. Most organisations can find seasoned leadership. The difficulty we face in cybersecurity is funding. The business has to buy in and understand that security is important to the success of the organisation. You can't grow revenue if someone is stealing your innovative technology of the future or consistently underbidding you, and you will lose market share if you lose control of your ability to extract or refine oil. Companies need to understand that in order to preserve future revenue, they need to invest in security now, and they need to invest at a level and enable their security groups in a way that creates impactful change.

DW: There are a number of facets to the personnel challenges companies are facing today across their information and operational technology domains. Arguably, not having access to enough people qualified to perform tasks to manage and maintain systems throughout their extended lifecycle is a problem that is only getting worse, with an ageing workforce that isn't being replenished fast enough. This situation can be addressed to a degree by accelerating a move to replace older systems with newer, more automated systems that don't require the same level of staff and are also designed to be more resilient. Another challenge stems from inadequate security awareness, education, know-how and skills among today's and tomorrow's workers, as the digital world around industrial control systems continues to change. Newer technologies can certainly help, and knowledge and know-how gaps can also be addressed with security awareness programmes and practical education.

How is your company helping to tackle cyber threats?

MJ: Tenable's Cyber Exposure platform is the industry's first solution to holistically assess, manage and measure cyber risk across the entire modern attack surface. Our platform uniquely provides the breadth of visibility into cyber risk across IT, Cloud, IoT and OT environments and the depth of analytics to measure and communicate cyber risk in business terms to make better strategic decisions. We enable customers to not only automatically detect every asset across their computing environments, but also assess them for vulnerabilities and misconfigurations. Our ground-breaking Predictive Prioritization innovation analyzes Tenable vulnerability data combined with third-party vulnerability data, threat intelligence and vendor security advisories using data science to predict the likelihood a vulnerability will be exploited in the near future. The resulting Vulnerability Priority Rating (VPR) scores are dynamic and change with the threat landscape, arming security teams with actionable insight into their true level of business risk.

Image Credit : Tenable

Maher Jadallah, regional director – Middle East, Tenable

JC: ThreatQuotient helps with security coordination, collaboration, and action within the enterprise. The ThreatQ platform aggregates commercial and open source cyber threat, allows you as an organisation to prioritise what is most relevant and impactful to your environment, and then exchanges that information with all of your other security tools. The result is a coordinated level of protection and knowledge throughout your security operations to fight against the people that are targeting you and your people.

The best way to protect yourself as an oil and gas company is to understand how people are attacking oil and gas companies and implementing controls to ensure that doesn't happen to you. ThreatQ enables you to activate that defence model.

DW: SANS Institute prides itself on being part of the global industrials and infrastructure community, with a clear mission that focuses first on people, before technology. Our unique place in industry as a cybersecurity educator and informational resource gives us the capability to see from our students and fellow community members the positive results that security awareness and education can bring. Individuals who are entrusted to protect their companies and their respective operational systems are both our students and our teachers, and because of the window they provide us into industry, we in turn can reflect this knowledge in the education and training we deliver. We know with confidence that security-informed, aware and educated people build, manage and maintain companies that are the essential backbone to the world's critical infrastructure and industrial applications – precisely why SANS is proud to serve industry. ■

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New technologies, **greater capabilities**

At Weatherford's technology showcase in Abu Dhabi, *Oil Review Middle East* found out more about the competitive new technologies the company is bringing to the energy industry.

The ForeSite® production optimisation platform is the backbone of Weatherford Production 4.0 solutions.

THE ROADSHOW CLEARLY emphasises the use of technological innovations and digitalisation as driving forces for the future. The tour creates awareness around new Weatherford offerings and integrated technologies while it stops in various locations in the region.

Mark A McCollum, president and CEO explained, "The UAE and the Middle East in general are huge areas of focus for Weatherford. Our aim has always been to help customers maximise efficiency, keep costs at a minimum and save time." He continued, "The biggest advantage of technology and digitalisation is enhancing safety by taking people out of the red zone, which is prone to many dangerous situations. Automation and AI enable improved decision-making and reduce the risks of failures in areas such as production and drilling."

Frederico Justus, the president of the Eastern Hemisphere at Weatherford, elaborated on the various technologies developed by the company, which help to constantly improve customer operations. These encompass formation evaluation, drilling, completions, production, intervention and tubular running services.

> "Automation and AI enable improved decision-making and reduce the risks of failures."

"The Middle East is open to new technology, and the companies in the region embrace innovative solutions," he said.

Justus explained that the ForeSite® suite helps to monetise production quicker. In addition, the Magnus® rotary steerable system (RSS) provides enhancements over other options available in the market. The RSS delivers reliable, accurate control and is already proving itself in some countries across the GCC, including the UAE.

He added, "On the completion side, our TR1P™ system helps to install the upper and lower completions in a single run for great savings in both time and cost."

Weatherford combines radio-frequency identification technology (RFID) with numerous premium completion technologies into one system to achieve greater efficiency, flexibility and control. The unprecedented completion system simplifies completion operations and reduces installation time by up to 60 per cent.

The company believes that 38 per cent of all global wells are in need of some sort of intervention. Weatherford helps protect customers' investments with reliable life-of-well technologies and solutions, lower production costs and optimise the recovery of ageing wells.

Shedding light on the GCC operations of the company, Tony Azizi, vice president, Arabian Sea countries, noted that "We (Weatherford) make continuous efforts towards maximising efficiency with minimum environmental impact." ■

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Enhancing performance in well intervention

Emad Elfeki, well operations specialist at ADNOC Offshore and Siddharth Jain, field development team leader, Sharjah National Oil Company (SNOC), spoke to *Oil Review Middle East* in advance of OWI MENA, the region's leading well intervention conference.

RAPID PROGRESS IS being made in the area of well control, to enable operations to be carried out successfully and safely, said Elfeki.

He highlighted two particular challenges which ADNOC has successfully tackled.

One is removing the scale which builds up inside the tubing string of producing wells which have water cut.

"We had two main techniques we used before – the most recent one we're using now is a milling operation utilising the coiled tube.

"Milling operations with coiled tube involve many difficulties. You need a small clearance to clean the nipples and all the compilations, which relates to the size of the tubing. When you have a smaller tubing size and when you blind mill (this means no cleaning of cuttings out of the well), this is more difficult because you are more liable to get stuck, and then you have to go for a fishing operation, which is a real challenge in such small tubing strings.

"In the last campaign, we performed this operation successfully on a well which was more than 1,500 feet of scale in 2 7/8" completion with the ID. of 2.44". This operation was accomplished successfully with zero LTI and zero downtime."

Another challenge, which ADNOC tackled using an operation that had never been done rigless before, is replacing an old Christmas tree which is corroded from the inside.

"Where the well is pressurised, you have to do some plugging, then remove the old Christmas tree and replace it with a new one, unplug and finally resume production.

"We did this very successfully in our last campaign using well intervention with offshore barges, partially balancing the pressure inside the well before installing plugs as a well control standard procedure (minimum two barriers).

"We start by killing the well with calculated fluid weight so you have a minimum pressure at the wellhead tubing. After that, we put a minimum of two barriers with slickline plugs and / or tubing plugs. This is followed by a plugs integrity test to make sure there is no pressure gain.

Image Credit : Denis Starostin / Adobe Stock

Technology advances are helping to make well intervention safer and more efficient.

"The top plug must be below the downhole safety valve (DHSV) depth to make sure no influx comes through the surface-controlled subsurface safety valve's (SCSSV's) control line when we remove the old Christmas tree. A wellhead cavity test has to be conducted as a final step, then you can remove the Christmas tree.

"This Christmas tree changeout had never been done before as a well intervention operation. Now, with this operation it is safer, easier, and less costly."

Technology advances

Technology advances are enabling well control and intervention operations to be done more safely and efficiently, commented Elfeki.

"Well intervention is a very wide area, ranging from stimulation to logging. In the past, manual calculations were used and the software was very basic. Now the software is very sophisticated. You can input all the details about the well – the trajectory, deviation, pressure, production etc – into the software, which gives you a full picture of the depth you can reach to implement the operation you need, and all the information you need about tractoring. This gives you extra accessibility for the hole and helps you to reach your target to make the proper operation in stimulation, or logging operation to record the well data."

> "The Christmas tree changeout had never been done before as a well intervention operation."

This is of particular value today when we are dealing with ultra-deep wells and 20,000 feet open hole horizontal wells, compared to 5-7,000 feet wells in the past, he added.

Siddharth Jain highlighted challenges as multilateral well re-entry and lateral identification through tubing; brownfield low reservoir pressure well interventions; continuous low cost well performance monitoring solutions; well modelling and simulation challenges for complex completions and designs; and legacy well designs and components with limited support and spare parts globally.

Importance of service company / operator collaboration

Commenting on the importance of service company / operator collaboration for effective and efficient well intervention operations and for implementing new technology, Jain said, "In an "efficient" oil price environment, the

Image Credit : ADNOC Offshore

Emad Elfeki, ADNOC Offshore.

operators are focused on trying to produce hydrocarbons efficiently with the least possible cost. The service companies on the other hand are focused on providing the best solutions to their clients' problems.

"It is therefore imperative that both sides have strong communication channels to ensure knowledge sharing of not just the problems but the solutions and the risks associated with them at the conceptualisation phase. This would ensure the least amount of surprises, and planning of adequate contingencies for the application and success of new technologies."

He suggested the following measures:

- Data sharing from both sides and transparency to ensure all facts (big or small) are taken into consideration at the planning stage;
- Applicability of the technology and selection of the right solution for the problem (not just the cheapest but the most applicable and efficient) should be taken into consideration during the contracting phase;
- Risk sharing between operators and service companies would promote implementation and first time use of the downhole technology. A "low base cost with higher upside on successful implementation" contracting model would encourage operators to look at trying new technologies with a win-win situation for both operators and service providers. ■

Emad Elfeki and Siddharth Jain will be speaking at OWI MENA 2019, which takes place from 7-8 October in Abu Dhabi. It provides a platform to discuss the critical themes shaping the well intervention market, and to learn about the latest well intervention techniques and digital models that enhance production and campaign performance. https://interventionmena.offsnetevents.com

Image Credit:: Sharjah National Oil Company (SNOC)

Siddharth Jain, Sharjah National Oil Company.

Professionals can familiarise themselves with an existing facility through a Digital Virtual Twin.

Image Credit: JP Global Digital

Reaping the safety benefits of the Smart Digital Twin

JP Global Digital discusses how the Digital Twin can strengthen safety programmes.

INNOVATION IN TODAY'S world continues. One of the most rapidly growing is the ability to convert physical assets into digital assets. The benefits of this are multifold, including reducing the number of trips to the field and the number of people required at the job site, and the ability to impact training through virtual and augmented reality.

Oil and Gas operators are committed to mitigating the likelihood of accidents and hazards in their operations. One area of impact in which we can make improvement is to reduce the total number of trips made to the field. Although each individual trip in and of itself poses a small risk, the cumulative whole represents a much more significant one. In many respects, driving is the most dangerous thing we do.

Typically, in the field, workers are exposed to more hazards than the standard office environment. These can vary greatly from physical exertion, to equipment failures, to slips, trips, and falls. Ultimately, the fewer people involved in operations or required at the job site, the less the total risk exposure.

Those people who are ultimately required to go to the field should be as familiar as possible prior to arrival. Statistics show that individuals who are experienced in the environment that they are working in are less likely to have accidents.

Uses of the Smart Digital Twin for safety

"3D digital technology is beneficial for all levels of operations," said Brian Sidle, senior VP Sales and Marketing, JP Global Digital. "Modelling, operational reliability and forecasting can all be impacted, but safety is an area which can benefit tremendously," he continued.

By enabling companies to access a Smart Digital Twin of their existing plant facilities and assets, workers can visualise, inspect, measure, and make actionable decisions from their offices, reducing trips to the field and subsequently both driving and work-related exposures.

As an example, consider the number of people, man hours and trips it takes to erect scaffolding and take a circumferential measurement on a pipe that is ten or more feet off of the ground. With a Digital Twin, this same task can be accomplished in as little as ten minutes from your desk.

And with regards to familiarisation, JP Global Digital's technologies can bring value to a company by building the virtual worksite. Here, professionals can familiarise themselves within a Digital Virtual Twin which can replicate the existing facility or a modified one. In a VR environment, they can quickly learn where muster points and fire stations are, and even train on conducting emergency shutdown procedures and egress exercises. These programmes can be tailor-made to fit the nature of any operation.

This familiarisation improves efficiency, but more importantly promotes confidence and competence. The same capabilities can be embedded into an AR world for similar benefits.

JP Global Digital's commitment to safety echoes the industry's commitment to getting us all home safely every day. And the Digital Twin provides a strong enabler for making this happen. ■

JP Global Digital is a leading digital technology service company, providing a broad range of 3D solutions to help companies pave the way for digital transformation. By combining unmatched engineering experience and expertise with a profound understanding of customer needs, we create comprehensive solutions to help achieve mission-critical business outcomes, globally. As part of our commitment to excellence, we have obtained ISO certifications from the Bureau Veritas Agency to maintain the highest standards of security, quality, safety and environmental protection for our customers. www.jpglobaldigital.com

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Experts in specialty gas mixtures, high purity, medical and industrial gases

BRISTOL GASES, PART of Concorde - Corodex Group, was established in Dubai, United Arab Emirates in 2002 and has grown to be one of the leading producers in the industry of specialty and industrial gases. The company prides itself on the experience and know-how of its team in production, operations and marketing. It aims to build up long term relationships with its customers based on quality products, services and flexibility to meet customers' needs.

Bristol Gases is a member of the Middle East Gases Association (MEGA) and follows local, European, American and ISO standards as required. It also certifies produced gases accordingly.

Bristol Gases is a leader in specialty and industrial gases.

Image Credit: Bristol Gases

Specialty gas mixtures, high purity and medical gases: Bristol Gases is a leading gas company in Middle East for calibration gas mixtures and equipment for a variety of applications, including gas detection and safety, laboratory and analysis, environmental monitoring, process systems monitoring, gas quality monitoring and breath test analysis. The company manufactures a complete range of specialty gas mixtures, ISO 17025-certified mixtures, high purity and medical gases. Bristol Gases draws on its logistical expertise and global reach to provide well services to the oil and gas, safety, marine, food and healthcare sectors.

Industrial gases: From its base in the UAE, Bristol Gases serves a wide variety of customers across a diverse range of industries where it has established a leadership position, including oil and gas, food and beverage, petrochemicals, metal fabrication, shipyards, construction, glass, steel, electronics and hospitals. The company is a leading provider of gases such as nitrogen, oxygen, argon, argon mixtures, helium, carbon dioxide, hydrogen and acetylene. It puts safety at the core of its business, and its expertise in rapid deliveries and after sales services has resulted in retaining clients in the long term.

KELLER AG für Druckmesstechnik introduces state-of-the-art cloud solution

KELLER AG FÜR Druckmesstechnik now offers customers a state-of-the-art cloud solution without recurring costs. Tracking pressure measurements, such as fill levels, or monitoring limit values conveniently from a distance is now possible with Keller's KOLIBRI Cloud.

Setting up and maintaining software, databases and servers is time-consuming and requires specialised knowledge. You can either implement your own connections to your sensors, or use given systems, which are limited to computers with only one access. In this age of digitisation, users want to access their data anytime and from anywhere.

With personal login and SSL encryption, the KOLIBRI Cloud enables secure and convenient access to measured data. Available data is used without installation, maintenance and management of databases, FTP or e-mail servers are no longer a problem. Measurements can be graphically displayed in real time, and the export function allows you to download to Excel and CSV formats. The integrated alarm system ensures the effortless monitoring of all measuring points. If, for example, the water level is high or the battery level is low, a warning message will be sent by e-mail.

Image Credit: KELLER AG für Druckmesstechnik

KELLER's KOLIBRI Cloud enables customers to store their own measurement data centrally and access it worldwide.

All aspects of security are considered, with the state-of-the-art authentication and encryption based on best practices and standards.

The KOLIBRI Cloud API allows custom software to retrieve metrics via HTTPS in a standardised JSON format. In this way, the measurement data can be forwarded to the user's own systems, visualised or processed further on their own display software. Open source software and documentation also help the user to build their own cloud solutions – based on the mechanisms of the KOLIBRI cloud.

The cloud is compatible with all KELLER IoT devices, ie the GSM and ARC series, as well new remote data transmission units based on IoT protocols such as LoRa.

Find out more about the possibilities of the KOLIBRI Cloud with a free trial account at www.kolibricloud.com.

Positive outlook for industrial valves

Ravi Doshi, director, Oswal Industries Ltd, discusses the company's activities and the Middle East industrial valves market.

OSWAL INDUSTRIES LTD (OIL) is India's leading industrial valves manufacturing company, with a 100,000 sq m integrated manufacturing facility at Ahmedabad, Gujarat.

We have a global footprint, with around 70 per cent of our business generated from exports. Our key markets are the MENA & Asia-Pacific regions, and we are currently focusing on upping our presence in the US and European markets.

The Middle East industrial valves market is expected to reach US$4.7bn by 2024, according to media sources. The contribution of the oil and gas industry to the GCC economies is higher than that of other industries, and stable oil revenue is crucial for investments in other segments. Oil and gas refining activity has increased, and balanced the slowdown in the oil and gas upstream sector. The LNG and oil storage segments are beginning to show significant growth.

With the stabilisation of oil prices, government spending is expected to grow, and the industrial valve market is likely to regain momentum.

Oil and gas facilities seized the largest slice in the Middle East industrial valves market revenue pie on account of upcoming oil and gas capacity expansion projects in the Middle East and increasing demand for maintenance operations in these refineries.

Currently the major growth in the valves industry is from LNG, FPSO, gas pipelines, infrastructure, water industry, and power sectors. Demand for automatic valve types has been accelerating at a faster pace in recent years, including in oil and gas.

We have a strong presence in the Middle East countries, where we are well known to major end-users and EPCs. There is a consistent demand in the region for gate, globe, check and ball valves, with additional requirements for automation, exotic materials and special applications, such as cryogenic, fugitive emissions, oxygen services etc. We have developed products to satisfy such demands.

Our unique strength is our own captive steel foundry which is exclusively dedicated to manufacturing valve castings. Our metallurgy includes stainless steel, alloy steel, duplex stainless steel and super duplex stainless steel and exotic alloy grades such as Hastelloy, Inconel etc. Our foundry is Norsok M650, AD 2000-Merkblatt WO, ISO 9001:2008, CE (PED) approved.

Image Credit: Oswal Industries Ltd

Ravi Doshi, director, Oswal Industries Ltd.

Our product range includes gate, globe, check and ball valves, manual and actuated, in various sizes and pressure ratings ranging from 2" - 72"and #150 to #2500 respectively.

Over last two years we have invested US$7mn in enhancing production capacity by adding the latest advanced machinery and equipment.

We have an in-house laboratory and enhanced testing facilities, and are among the few companies recognised by Government of India for our in-house R&D centre, helping us to provide better and faster solutions to our customers. While there is still a long way to go for Indian manufacturing to transform itself through innovation, India as a destination for research and development (R&D) is well recognised. Due to the availability of low-cost, well-educated and highly skilled talent, in some sectors, the cost of R&D in India is one-third of that spent in developed countries in the west, making India an attractive destination.

> "The Middle East industrial valves market is expected to reach US$4.7bn by 2024."

Global vision, customer orientation, reliability, innovation and passion for excellence, backed by three decades of experience, have helped OIL to grow. A strict quality control and inspection system is in place which is approved by a number of organisations.

Every stage of the manufacturing process is controlled in detail, to ensure that products meet all customer requirements. The strength of a unique global sales network, with its sales headquarters in India, and high level of global support and technical service, ensure timely and customised responses to customers. We make continuous efforts at being cost competitive and globally responsive.

Factors critical to our success are first and foremost continuous learning and upgrading ourselves to meet global standards, and secondly being a fully integrated manufacturing facility and foundry, which enables us to score highly on quality, delivery and prices on the global front. ■

DUBAI HEALTH, SAFETY & ENVIRONMENT FORUM 2019

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Over the last three decades, the UAE has become a major business centre with a diversified economy and a plethora of profitable industries. Economic growth has driven the need for a robust labour force capable of carrying out high-risk jobs across multiple industries. Protecting the health and safety of this ever increasing workforce is a top priority. Although the Government has taken several initiatives to promote safety at work with the support of all stakeholders, incidents do happen at workplaces.
The Dubai Health, Safety & Environment Forum 2019 will present the latest innovations to help businesses deal with challenges related to occupational health and safety. Industry leaders will share solutions to enable companies and organisations to run successful operations while maintaining the highest HSE standards.

CONFIRMED SPEAKERS

Faasza Al Katheeri
Geoscience Manager
ADNOC - Al Dhafra Petroelum

Salman Dawood Abdulla
Executive Vice President - HSSEQ
Emirates Global Aluminium

Dr. Mohammed Aref
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New well control technology

TECHNOLOGY TO AUTOMATE well control, one of the biggest risks facing the oil and gas industry, has been developed by Safe Influx, a spinout company from Scotland's Robert Gordon University (RGU).

Image credit: Robert Gordon University

The system will take corrective action to minimise the impact of well influxes.

The system is designed to detect well influxes, kicks of gas or fluid from a formation into a wellbore, and take immediate corrective action to minimise the influx and prevent a well blowout. This will support the industry to improve safety, reduce cost and minimise any environmental impact.

"We have designed this product to save lives," said Phil Hassard, co-founder of Safe Influx and Drilling Simulation Manager at RGU's Energy Transition Institute.

"During development, we found that the industry has six blowouts for every 1,000 wells drilled. With more than one million wells still to be drilled in basins across the globe this is potentially 6,000 well blowouts, leading to 120 major oil spills and loss of life, so the potential impact of Safe Influx is significant.

"Further research showed that up to 70 per cent of well blowouts are down to human factors. Drillers have an ever-increasing workload and naturally this means concentration can lapse. To support drillers, our system acts as an automatic preventative safety tool they can use to make the well safe as quickly as possible when the situation arises."

"We have also tested it extensively on cyber rigs with real drillers and in simulations, and have consistently seen excellent results."

Aker Solutions launches Intelligent Subsea

AKER SOLUTIONS HAS launched its Intelligent Subsea offering designed to accelerate field development and maximise performance.

Image credit: Aker Solutions

Intelligent Subsea can help to accelerate field development.

With the Intelligent Subsea approach, the time it takes to generate optimal subsea field layouts can be reduced by 75 per cent and the cost of field development can be halved, according to the company.

Accelerated field development is achieved by combining the modular, optimised and configurable subsea equipment of Aker Solutions with an automated design that can reduce engineering hours by up to 70 per cent.

Intelligent Subsea will address the needs of subsea production by implementing an integrated field design approach where subsea and topside systems are optimised. It allows digitally enabled products to be configured to meet customer needs within accelerated timelines.

In addition, it optimises field life performance with enhanced recovery and extends field life through condition monitoring, predictive maintenance and simplified system enhancement.

HTL Group introduces oil-cooled torque pump

HTL GROUP, HEADQUARTERED in the UK, has announced a further addition to its OEM controlled bolting product range.

The oil-cooled torque pump eliminates well-known problems associated with continuous operation in harsh ambient temperatures for all industrial bolting sectors such as petrochemical, rail, construction, oil and gas etc.

Downtime caused by overheating can be expensive, so a solution to eliminate overheating was sought, with the design focused on keeping the hydraulic fluid temperature at an optimum range that will permit continuous use.

Image credit: HTL Group

The oil-colled hydraulic torque pump.

Designed and manufactured within the facility of HTL Group, the integral oil cooler uses lightweight, corrosion-resistant components to ensure that the overall unit remains extremely portable, while at the same time ensuring that important critical operating temperatures for seal degradation are not exceeded.

CEO Stephen Jones commented, "We supply to customers across the world operating our hydraulic torque wrenches in both hot and cold environments. Utilising our in-house engineering design team, we designed and manufactured the oil-cooled hydraulic torque pump. This product has been rigorously tested and is now readily available from our extensive stocks."

Well Conveyor receives new investment

WELL CONVEYOR AS, a Norwegian downhole technology company, has received equity investment from Chevron Technology Ventures (CTV), a division of Chevron USA Inc.

Combined with additional investments from existing investors ProVenture and Investinor, the company raised US$1.8mn. The money will support the qualification and commercialisation phases for the company's innovative slim battery-powered Conveyor, which will be the smallest diameter downhole tractor available on the market, offering access to the increasing number of slim, horizontal and highly deviated wells, which up to now have not been serviceable with wireline-type conveyance.

The Conveyor has been optimised for running on batteries, with an efficient electro-mechanical design, allowing for extended tractoring distances of more than 15,000 feet. Not being dependent on power and communication from the surface allows operators greater flexibility and lower-priced conveyance alternatives. It has been designed for simplified operations and reduced maintenance, enabling the service to be provided by the regular wireline/conveyance providers.

Oxford Flow launches IM gas regulator valve

OXFORD FLOW, THE pressure control equipment specialist for the oil and gas, water and industrial process industries, has launched its IM gas regulator valve to increase reliability and reduce costs for operators in the gas distribution, power generation, industrial gases and oil and gas sectors.

The launch follows a successful ongoing trial with SGN where the valve has regulated gas pressure smoothly with rapid changing demand profiles within an Accuracy Class of 1.5 per cent. This superior accuracy the valve offers in comparison to conventional technologies enables utilities and operators to achieve faster network stability on commissioning, even where flow rates vary significantly, the company says. In addition, the valve's compact construction reduces weight and the need for expensive lifting equipment during installation and maintenance.

Image credit: Oxford Flow

The IM gas regulator valve.

Oxford Flow's new design has eliminated the diaphragm, stem and external mechanical actuator. With only one moving part, the design minimises potential leaks and the risk of fugitive emissions – maximising efficiency and reducing maintenance costs.

Neil Poxon, CEO at Oxford Flow, commented,"This is not only a hugely exciting time for Oxford Flow, but a significant step forward for the valve industry. Our recent valve testing and developments in the UK, Germany and USA have enabled us to improve and perfect the regulator so that we can now roll the technology out to the wider industry with confidence."

Weatherford's Vero achieves 50th run

WEATHERFORD INTERNATIONAL PLC has announced that its Vero automated connection integrity system, which applies artificial intelligence to validate well integrity with absolute certainty and minimise safety risks, has completed 15,000 tubular connections in 50 operations worldwide since its market debut. Notable results include:

Image credit: Weatherford

The automated connection integrity system applies AI to validate well integrity with absolute certainty and minimise personnel safety risks.

Kazakhstan: Running multiple jobs per month for an operator with zero nonproductive time while consistently improving efficiency and removing personnel from the rig floor;
UAE: Offshore operation achieved a 30 per cent increase in running speeds and zero rejected joints on multiple jobs;
Norway: Improved previous mechanised operational performance by 15 per cent, resulting in the fastest liner-running operation on that rig in four years.

By applying artificial intelligence at every stage from pipe manufacturing to well installation, Vero improves connection make-up efficiency and eliminates the inevitable errors associated with human judgement during the connection process. In doing so, the solution can minimise the chance of catastrophic well failures associated with poorly made-up connections, significantly reduce the total cost of well ownership, minimise personnel safety risks, and protect corporate reputation.

"The future for Vero is very bright," said Dean Bell, president of Well Construction for Weatherford. "Vero is the most disruptive technology ever introduced in the tubular running space and operators are taking notice. Vero is now being engaged in most major offshore and onshore markets around the world, with its first-ever US operation scheduled to begin this fall in the Gulf of Mexico. Vero goes beyond tubular running to help our customers build wells that last a lifetime."

Halliburton launches Commander Full Bore Cement Head

HALLIBURTON HAS LAUNCHED the Commander Full Bore Cement Head, a product that enables rotation and reciprocation of 4 ½ - 6 inch production strings to help increase reliability and reduce risk during the well cementing process. Advanced wireless functionality and faster rig-up time help increase efficiency and improve safety for land-based cement jobs, particularly in unconventional formations.

Image Credit: WDN 24/Flickr

The new product helps increase efficiency and safety for land-based cement jobs.

The Commander Full Bore Cement Head can rotate pipe during a cement job to improve cement coverage, prevent channelling, reduce communication between frac stages and help maximise production. Wireless capability allows for less cost-prohibitive equipment on site, and helps eliminate the requirement for personnel to hoist, load, and manually deploy plugs on active rigs. The head prevents casing wiper plugs from being launched out of sequence and offers real-time verification that the plugs have launched successfully. This helps improve safety and efficiency while setting dependable cement barriers.

More than 100 jobs have been executed to date with the product, with average rig-up times as fast as 30 minutes and a reduction in time personnel spend in the red zone, the company says.

"We are building on our legacy of 100 years in the oilfield cementing business with exciting and innovative new products," said Jim Collins, vice president of Cementing. "We're bringing industry-leading products to cost-sensitive and challenging unconventional operations, while simultaneously reducing unwanted risk at the well site."

Probe unveils the ProMAC

PROBE HAS UNVEILED the ProMAC, a new series of multi-arm caliper tools. Designed to increase measurement accuracy, reliability and maintainability, ProMAC series tools offer the most advanced measurements in the industry to provide an accurate profile of the internal surface of tubing, casing and completion assemblies.

ProMAC series calipers deliver highly sensitive, accurate multi-arm caliper measurements over a wide range of casing and tubing diameters at an unmatched vertical resolution of 0.0001-inch, and excellent temperature stability.

Transmission of high-density data is made possible by Probe's digital (HD) telemetry, resulting in logs with excellent vertical resolution in keeping with the highest industry standards.

"With ProMAC calipers sampling at 50 times per second, the operator can acquire precise log data with high vertical resolution," said Federico Casavantes, CEO of Probe. "Engineering advances have reduced the time required to calibrate and characterise to just half a day, a very significant improvement. Minimising electronics and sensor exposure to elevated temperatures helps reduce premature failures, saving time and money."

Schlumberger introduces new drilling service

SCHLUMBERGER HAS INTRODUCED the TerraSphere high-definition dual-imaging-while-drilling service.

The new service provides the industry's first application of a logging-while-drilling dual-physics imager for oil-based mud for drilling oil and gas wells. It incorporates electromagnetic (EM) and ultrasonic measurements that enable multiple high-resolution borehole images in nonconductive mud. This reveals enhanced details for geological, petrophysical and geomechanical interpretation to uncover subtle variations in the subsurface caused by stratigraphic or structural properties that impact wellbore stability. The real-time transmission of images with these enhanced details enables drillers to make better-informed decisions during the near-wellbore stress interpretation process.

"Drillers have been unable to visualise, in real time, subsurface features when drilling with oil-based mud," said Tarek Rizk, president, Drilling & Measurements, Schlumberger. "The TerraSphere service delivers geological and geomechanical data that not only saves logging time and related rig costs, but also reduces the potential risk for lost circulation of drilling muds into formation fractures."

Image Credit : Schlumberger

The TerraSphere service overcomes geomechanics-related challenges and provides geological characterisation in real time.

More than 30 field trials were conducted with the TerraSphere service in the Gulf of Mexico, Middle East, North Africa, North Sea and US land. These trials included successful imaging for structural and stratigraphic analysis, revealing breakout fractures that enabled drillers to avoid mud loss. The new service acquired additional and higher definition data, reducing subsequent operational time and improving net-to-gross ratio in the payzone.

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS, KUWAIT

Project	City	Facility	Budget (US$)	Status
KGOC - Al Khafji Gas and Condensate Export Pi	Al-Khafji	Gas Pipeline	2,100,000,000	Construction
KIPIC - Al Zour LNG Import And Regasification	Al Zour	Liquefied Natural Gas (LNG)	3,330,000,000	Construction
KIPIC - Al Zour New Refinery - Overview	Al Zour	Petroleum Oil Refinery	19,000,000,000	Construction
KIPIC - Al Zour New Refinery - Package 1 (Main	Al Zour	Petroleum Oil Refinery	3,000,000,000	Construction
KIPIC - Al Zour New Refinery - Package 2 (Supp	Al Zour	Petroleum Oil Refinery	3,000,000,000	Construction
KIPIC - Al Zour New Refinery - Package 3 (Utilit	Al Zour	Petroleum Oil Refinery	2,100,000,000	Construction
KIPIC - Al Zour New Refinery - Package 4 (Tank	Al Zour	Petroleum Oil Refinery	1,600,000,000	Construction
KIPIC - Al Zour New Refinery - Package 5 (Mari	Al Zour	Petroleum Oil Refinery	850,000,000	Construction
KIPIC - Al Zour Petrochemical Complex	Al Zour	Petrochemical Plant	7,800,000,000	FEED
KNPC - Ahmadi Depot Expansion	Ahmadi	Oil Storage Tanks	214,000,000	Construction
KNPC - Clean Fuels Project - Mina Abdulla Refi	Mina Abdullah	Petroleum Oil Refinery	4,000,000,000	Construction
KNPC - Clean Fuels Project - Mina Abdulla Refi	Mina Abdullah	Petroleum Oil Refinery	4,000,000,000	Construction
KNPC - Clean Fuels Project - Mina Al Ahmadi R	Mina Al Ahmadi	Petroleum Oil Refinery	5,000,000,000	Construction
KNPC - Clean Fuels Project - Package 1 - Mina	Mina Abdullah	Petroleum Oil Refinery	550,000,000	Construction
KNPC - Kuwait Clean Fuels Project - Overview	Various	Petroleum Oil Refinery	13,000,000,000	Construction
KNPC - Mina Abdulla Debottlenecking of Coke	Mina Abdullah	Petroleum Oil Refinery	100,000,000	Construction
KNPC - Mina Al Ahmadi Refinery Fifth Gas Trai	Mina Al Ahmadi	Gas Processing	1,500,000,000	Construction
KNPC - New Local Marketing Depot At Matlaa	Northern Kuwait	Oil Storage Tanks	1,320,000,000	FEED
KOC - Al Zour New Refinery Crude Oil Pipeline	Ahmadi	Oil Pipeline	845,000,000	Construction
KOC - Installation Of New Desalter Train At GC	Various	Crude Oil Distillation Unit	250,000,000	Engineering & Procurement
KOC - Jurassic Production Facilities Off-Plot W	Northern Kuwait	Oil Field Development	300,000,000	Construction
KOC - Jurassic Production Facility (JPF) - JPF-4	Northern Kuwait	Oil & Gas Field	700,000,000	FEED
KOC - Kuwait Bay Exploration	Various	Offshore Oil Exploration	904,500,000	Engineering & Procurement
KOC - New 48'' Crude Transit Line From North	Northern Kuwait	Oil Pipeline	270,000,000	Construction
KOC - New Strategic Gas Export Pipeline From	Northern Kuwait	Gas Pipeline	480,000,000	Engineering & Procurement
KOC - North Kuwait Gathering Center (GC) 32	Northern Kuwait	Gas Gathering Centre	1,650,000,000	Construction
KOC - North Kuwait Manifold Gathering Syste	Northern Kuwait	Gas Gathering Centre	2,500,000,000	Construction
KOC - Ratqa Lower Fars Heavy Oil Developme	Northern Kuwait	Steam Injection	4,300,000,000	Construction
KOC - Small Boat Harbor Project	Ahmadi	Ship Yard	1,000,000,000	Construction
KOC - South East Kuwait BS-160 Upgrade	Southeast Kuwait	Gas Processing	270,000,000	FEED
KOC - Wara Pressure Maintenance Project - Tr	Southeast Kuwait	Oilfield Development	500,000,000	Construction
KOC - Water Management Project - Gathering	South Kuwait	Gas Gathering Centre	245,000,000	Construction
KOC - Water Management Project - Gathering	Southeast Kuwait	Gas Gathering Centre	240,000,000	Construction
KOC - Water Management Project - Gathering	East Kuwait	Gas Gathering Centre	196,000,000	Construction
KOC - Water Management Project - Overview	Various	Gas Gathering Centre		Construction
KOC - West Kuwait BS-171 Gas Sweetening Fac	West Kuwait	Gas Treatment Plant	300,000,000	FEED
MPW - Mishrif Pumping Station	Kuwait	Pumping Station	180,000,000	Construction

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Project Databank

Compiled by Data Media Systems

Project Focus

Compiled by Data Media Systems

Project Summary

Name of Client	KIPIC - Kuwait Integrated Petrochemical Industries Company
Estimated Budget (US$)	3,330,000,000
Facility Type	Liquefied Natural Gas (LNG)
Status	Construction
Location	Al Zour
Project Start	Q4-2013
End Date	Q3-2020
FEED and PMC	Wood Group
Main Contractor	Hyundai Engineering Company, KOGAS - Korea Gas Corporation and Hyundai Engineering & Construction
Subcontractors	Terrasol, SRG Limited, Sumitomo Mitsui Banking Corporation, WJ UK, Trevi, LT Sambo, ArcelorMittal, Hexagon PPM, Termomeccanica, PERI, Setec, Environment World Company, Raymond International Group, Van Oord, PROES, Sofregaz
Contract Value (US$)	2,900,000,000
Award Date	Q1-2016

Background

KNPC plans the LNG regasification terminal which will have a capacity of 1,500 billion British thermal units a day (btu/d) and will include two berths for the simultaneous unloading of large LNG carriers. The terminal will also include four full containment LNG tanks, each with a working capacity of 225,500 cubic meters. It is due to be constructed on reclaimed land formed by hydraulic filling. The LNG terminal will also provide training for plant operators along with testing so they can receive provisional acceptance.

Project Scope

The project scope includes:

- Four full containment LNG tanks, each with a working capacity of 225,500 square meters.
- A regasification plant with a capacity of 1,500 billion British thermal units a day.
- Additional utilities and infrastructure needed for the operation of the plant.
- Pipeline connections between the import terminal and the existing pipeline system.
- Metering system.
- Pig launcher/receiver.
- Natural gas send-out pipelines.
- Tie-in with Kuwait Oil Company gas network.

Project Finance

Kuwait National Petroleum Company (KNPC) is the client of the project.
KNPC and the Petrochemicals Industries Company (PIC) have signed agreements to transfer contracts of the project to Kuwait Integrated Petrochemical Industries Company (KIPIC).

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.

	THIS MONTH			VARIANCE	LAST MONTH		
Country	Land	OffShore	Total	From Last Month	Land	OffShore	Total
Middle East							
ABU DHABI	40	21	61	2	40	19	59
DUBAI	0	2	2	0	0	2	2
IRAQ	77	0	77	2	75	0	75
JORDAN	0	0	0	0	0	0	0
KUWAIT	46	0	46	1	45	0	45
OMAN	53	0	53	-1	54	0	54
PAKISTAN	23	1	24	0	23	1	24
QATAR	3	9	12	-1	3	10	13
SAUDI ARABIA	106	19	125	11	97	17	114
TOTAL	348	52	400	14	337	49	386
North Africa							
ALGERIA	41	0	41	-4	45	0	45
EGYPT	18	4	22	-3	21	4	25
LIBYA	14	1	15	0	14	1	15
TUNISIA	2	0	2	0	2	0	2
TOTAL	75	5	80	-7	82	5	87

Source: Baker Hughes

لحظات حاسمة

هذا يمثل لحظات مهمة للقطاع البحري الناشئ في لبنان، ليس فقط في اختبار إمكان وجود الغاز، ولكن أيضا في موقف حازم في مواجهة ضغوط إسرائيل، التي تشكك في بعض الحدود البحرية على طول المناطق الجنوبية (المنطقة رقم 8 و9 و10).

قال سهيل شاتيلا، خبير النفط في هيئة إدارة قطاع البترول، مؤخرا إن شركة توتال ستقوم بحفر أول بئر للتنقيب في المنطقة رقم 4 بحلول شهر ديسمبر/كانون الأول، بالإضافة إلى بئر أخرى في الجزء الشمالي من المنطقة رقم 9 بحلول منتصف عام 2020. وعلى الرغم من أن هذه المنطقة (الكتلة 9) تخلو من الجدال فيها كثيرا، فإن الطرف الجنوبي يقع في المياه في المنطقة التي تتبع من المياه الإسرائيلية. وفي وقت سابق من هذا العام، صرح وزير الطاقة والمياه في لبنان، سيزار أبو خليل، بأن الجهود التي تبذلها إسرائيل للضغط على شركة توتال لإيقاف التنقيب في المنطقة رقم 9 لا «تسفر عن نتائج» بشأن خطط العمل والتنقيب الحالية. كما تقع اكتشافات إسرائيل الكبيرة للغاز، بما في ذلك حقلا ليفياثان وأفر، عبر الحدود مباشرة. وفيما يتعلق بهيئة إدارة قطاع البترول، التي بدأت تسويق جولة العطاءات الثانية في أبريل/نيسان، فهذه أوقات مثيرة يدعمها إطار قانوني أكثر التزاما تم تحديثه في نوفمبر/تشرين الثاني 2018. ومن الصعب تحديد الموارد التي قد ينتجها لبنان، وذلك نظرا لعدم وجود غير القليل من سجلات الحفر. وقد جرى جمع مساحات كبيرة من البيانات المتعلقة بالأعمال السيزمية على مدار العشرين عاما الماضية، مما يشير إلى أدلة على وجود الهيدروكربونات، على الرغم من أن هيئة إدارة قطاع البترول حذرت من تعيين أرقام الموارد أو التقديرات. كما هو الحال دائما في قطاع النفط والغاز، فإن مثقاب الحفر هو الذي سيكشف كل شيء.

وعلاوة على ذلك، أفاد شاتيلا بأنه من المتوقع أن يسفر التنقيب عن وجود الغاز بشكل أساسي مع إمكانية تكليفه، بل وربما النفط، في حين سيتم تتبع أي عمليات تنقيب سريعة لإمداد الطلب المتزايد على الطاقة بشكل رئيسي من قطاع الطاقة «المتعطش للحصول على الغاز».

التنقيب المصري

لا تزال مصر نشطة في هذه الزاوية المكتظة من البحر الأبيض المتوسط، إذ يقع حقل ظُهر العملاق بالقرب من الحدود مع قبرص ويمتد ناحية الغرب من الأراضي الإسرائيلية.

وقد أدى التطور السريع لحقل غاز ظُهر العملاق، الذي تبلغ طاقته 30 تريليون قدم مكعب، بعد فترة وجيزة من اكتشافه، إلى تحويل مصر في غضون ثلاث سنوات من مستورد رئيسي للغاز إلى مصدر خالص. كما أن اكتشاف شركة «إيني» لحقل نور الأخير، على بعد حوالي 50 كم شمال شبه جزيرة سيناء، سوف يعزز هذا الاتجاه. وقد تم حفر بئر نور - 1 الاستكشافي بمساحة 295 مترا من المياه على عمق إجمالي يبلغ 5914 مترا. تم تنقيب 33 مترا من الحجر الرملي الإجمالي، حيث يتمتع بخصائص بتروفيزيائية جيدة، علاوة على عمود الغاز المقدر بـ 90 مترا، في تكوين الجر، العلوي (نيئة) من العصر الأوليغوسيني.

وتعد المجموعة الإيطالية الآن أكبر منتج في البلاد، حيث تزيد أسهمها على 340000 برميل من المكافئ النفطي يوميا، والتي ستزيد بشكل أكبر في عام 2019 مع وصول إنتاج حقل ظُهر إلى ذروة الإنتاج. وتعمل مجموعة كبيرة من المشاريع الكبرى حرفيا على تغيير قطاع الغاز. حيث تزاول شركة بي بي نشاطها بشكل خاص في مشروع غرب الدلتا، وأطلقت العام الماضي مشروع جزيرة أنول الأول في امتياز شمال دمياط شرق الدلتا. وينتج هذا المشروع الآن 350 مليون قدم مكعب من الغاز يوميا و 10 آلاف برميل يوميا من المكثفات. ويتم توجيه إنتاج الغاز إلى شبكة مصر الوطنية. كما تشمل الجهات التشغيلية الرئيسية الأخرى شركة شل وشركة إم دي إكس وشركة دانة غاز.

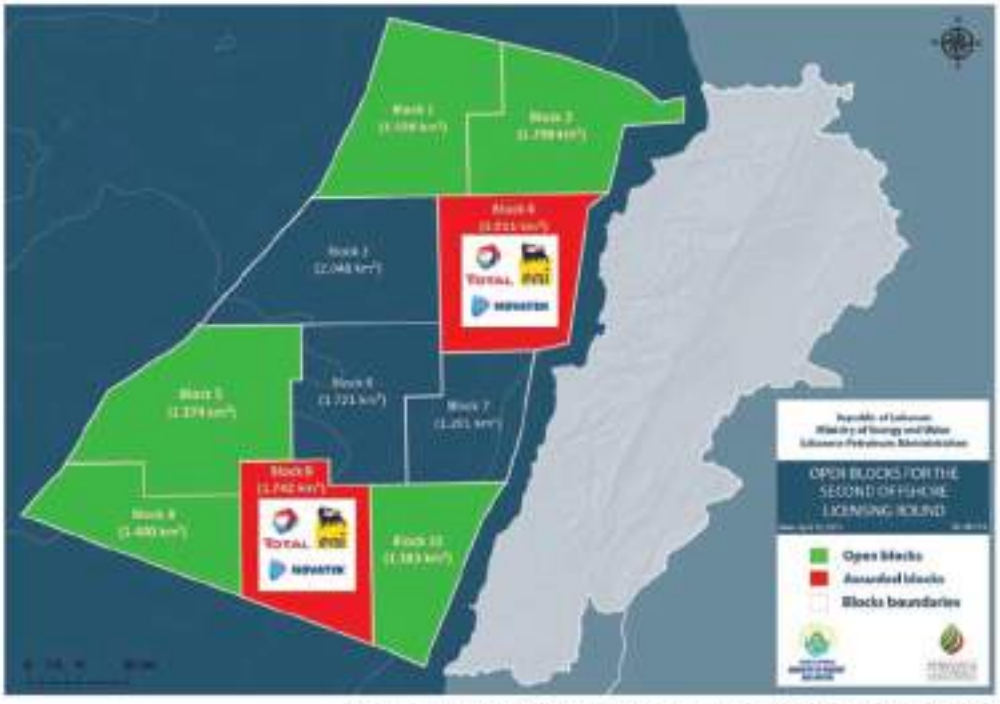
خيارات التنمية

تمتلك مصر بالفعل، إلى حد كبير، البنية التحتية الضرورية للاستفادة من هذه الفرصة، سواء بالنسبة للإنتاج، مثل خطوط التدفق ومحطات المعالجة والتصدير، أو محطات الغاز الطبيعي المسال وخطوط الأنابيب.

وقد ألقى كلاوديو ديسكالزي، الرئيس التنفيذي لشركة «إيني»، كلمة في إحدى فعاليات تشاتام هاوس (المعهد الملكي للشؤون الدولية) في لندن هذا العام، حيث أفاد بأن فكرة إنشاء مركز للتصدير كانت احتمالا واقعيا. وأردف قائلا: «إذا كانت هذه الدول قادرة على تحديد استراتيجيات مشتركة ومشاركة هذه البنى التحتية القائمة، فستتمكن من خفض مستويات الاستثمار الضرورية وتخفيض التكاليف والإسراع في استغلال الموارد المتاحة ومساعدتها على النمو بشكل أسرع. كما سيؤدي هذا إلى إنشاء مركز جديد للغاز يمكن أن يعزز التنمية ويساهم في استقرار المنطقة بأكملها».

بعد ذلك، تتطرق إلى دور السياسة. فمع ظهور توترات بين إسرائيل ولبنان حتى قبل إجراء أي حفر، تظل هذه عقبة محتملة. ومع ذلك، فإن تطوير خط الغاز العربي البالغ الآن، والذي ينقل الغاز المصري إلى إسرائيل، يوضح ما هو ممكن. والأكثر من ذلك، دفعت موارد الغاز المتضخمة بالمنطقة الجهات التشغيلية والحكومات إلى الضغط من أجل إيجاد حلول. وفي صفقة تاريخية العام الماضي، وافقت شركة دبليك للحفر وشريكتها نوبل إنرجي على تصدير غاز بقيمة 15 مليار دولار أمريكي من الحقول البحرية الإسرائيلية إلى عميل في مصر. ومن المتوقع أن يتم ضخ الغاز في خط أنابيب جديد، خط أنابيب شرق البحر المتوسط، بين عسقلان في إسرائيل والعريش في مصر، لنقل إمدادات الغاز. ومن المتوقع أن تبدأ صادرات الغاز إلى مصر بحلول نهاية العام.

كما تفكر قبرص في خياراتها. فقد ترى منفذا في مصر مع بنيتها التحتية القائمة. وبالتالي، فهذه أوقات ذات أهمية لصناعة الغاز في بلدان شرق المتوسط.



يسيطر اتحاد توتال وإيني ونوفاتك على كتلتين بحريتين مع بقاء خمس كتلات أخرى لجولة التراخيص التالية

التناحر على الغاز في شرق المتوسط

في هذا المقال، يقول مارتن كلارك إن الاكتشافات الحديثة وجهت أنظار بلدان شرق المتوسط نحو إحدى مناطق التنقيب الشهيرة في العالم. وحاليا تسعى لبنان جاهدة إلى تسليط الضوء عليها. وتواصل مصر نهضتها في قطاع الغاز في الآونة الأخيرة، مما يشجع الاستثمارات في مناطق أخرى من بلدان شرق المتوسط. وفي الواقع، أصبحت المنطقة إحدى مناطق التنقيب الشهيرة في العالم في الآونة الأخيرة مع اكتشاف وتطوير حقل غاز ظُهر العملاق التابع لشركة «إيني»، بالإضافة إلى اكتشافات مدهشة قبالة سواحل قبرص وإسرائيل، حيث البحث يجري حاليا عن حقول الغاز.

أدت سلسلة من التنقيبات الأخيرة في مصر - بما في ذلك حقل غاز نور العملاق التابع لشركة «إيني» والذي تم الإعلان عنه في مارس/آذار الماضي - إلى إشعال طموحات مصر لتصدير الغاز، مما استدعى مجموعة من الخطط والمشاريع والإمكانيات الجديدة. ويتحدث المسؤولون بشغف عن أن تصبح مصر مركزا للغاز في المنطقة بأكملها، بل وربما نقل الموارد من الحقول المحلية والأجنبية لمعالجتها وبيعها إلى دول أوروبا وخارجها. كما أنها تنبض بحياة جديدة في محطتي الغاز الطبيعي المسال في مصر على الساحل، مما ينفي الذكريات عندما كانت البلاد مطالبة باستيراد الغاز على سبيل الاستعجال لعدة سنوات لتغذية الطلب المحلي على الطاقة.

التوقعات اللبنانية

تبدو هذه الصورة مختلفة تماما حتى منتصف عام 2019. وبالمثل، فقد ضخت زخما في بعض الأسواق الأخرى في المنطقة. تلك الأسواق التي كانت تعتبر من قبل آفاق استكشاف أقل رواجا. يشمل ذلك لبنان، التي تتطلع إلى الاستفادة من الشعور الإيجابي الحالي وجلب المزيد من الاستثمارات في بلد تم تجاهله إلى حد كبير من جانب شركات التنقيب في الماضي. إذ يشهد هذا العام جولة التراخيص الخارجية اللبنانية الثانية 2019 التي تشمل خمس كتلات (الكتلة 1 و2 و5 و8 و10) متاحة للجميع، حيث تمتد من المناطق البحرية الشمالية إلى الطرف الجنوبي من البلاد على طول الحدود مع إسرائيل. سيكون الموعد النهائي لتقديم الطلبات في جولة التراخيص في 31 يناير/كانون الثاني 2020.

كمقياس للمنطقة، قد يكشف عن مدى روعة المستثمرين الآن بالنسبة لهذا الجزء الديناميكي من العالم. حيث كانت الجهود السابقة لجذب الاستثمار في قطاع التنقيب في لبنان مخيبة للآمال، على الرغم من أن ذلك قد يتغير هذا العام.

يسيطر اتحاد توتال وإيني ونوفاتك بالفعل على كتلتين بحريتين (الكتلة رقم 4 و9)، تم منحهما في جولة العطاءات الأولى، مع وجود خطط لبدء نشاطهما لأول مرة هذا العام. وقد تم إنجاز العمليات السيزمية ويجري تنفيذ الخطط النهائية مع توقع جيد في وقت لاحق من عام 2019، على أن يتبعها بئر ثانية في عام 2020.

المحتويات

القسم العربي

تحليلات

التناحر على الغاز في شرق المتوسط ٤

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استطلاعات: التوظيف والحفاظ على القوة العاملة.

تقنيات: المكثفات، الأمن السايبراني، تقنيات القياس.

فعاليات: معرض الكويت للنفط والغاز، منتدى الكويت للصحة والسلامة والبيئة.

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Company	Page	Company	Page
Alloy & Stainless Fasteners, Inc.	20	NPS Energy DMCC	5
Alloy Industry Co Ltd	15	Oswal Industries Limited	43
Bell Energy	8	Pipelife Nederland B.V.	31
Borets International FZE	27	Reflex Marine Ltd	22
DMG World Media Abu Dhabi Ltd (ADIPEC 2019)	39	Saga PCE Private Limited	7
Flir Systems ME FZE	49	Shree Steel Overseas FZCO	10
Gardner Denver FZE	29	Sullivan Palatek Inc.	19
IIR Exhibitions (MEE Saudi 2019)	41	Suraj Limited	51
Kaeser Kompressoren FZE	59	Takatuf Petrofac	13
Keller AG fur Druckmesstechnik	2	Trans Asia Pipeline Services FZC	33
Marsol International Limited	9	Weatherford International	17
Miag Fahrzeugbau GmbH	28	Wilhelm Layher GmbH & Co. KG	11
NCS Multistage LLC	35	Zanzibar Petroleum Regulatory Authority	21

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