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Oil Review Middle East

Oil · Gas · Petrochemicals

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- Global gas outlook
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Editor's note

Our Annual Pipeline Review assesses pipeline activity in the Middle East, which is forecast to remain a major market for onshore pipeline installation over the next five years, with major projects underway. We also look at some of the latest developments in pipeline technology (p26).

The Eastern Mediterranean is shaping up to be a very promising oil and gas province. Egypt's plans to become a regional energy hub are making headway, spearheaded by the ramping up of production at the giant Zohr offshore gas field (p9), while Lebanon has commenced its oil and gas exploration journey following promising seismic studies (p12); could it be the next big oil and gas opportunity?

We also look at the impact of digitalisation on the workforce (p17), while our technology section features case studies and articles on pumps, onsite power, Big Data, EOR and subsea cabling.

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➔Executives' Calendar 2018

SEPTEMBER			
3-5	**World Heavy Oil Congress**	MUSCAT	www.worldheavyoilcongress.com
3-4	**Abu Dhabi International Downstream Summit**	ABU DHABI	www.adid.wraconferences.com
5-8	**Iraq Oil & Gas - Baghdad**	BAGHDAD	www.baghdadoilgas.com
17-20	**Gastech**	BARCELONA	www.gastechevent.com
18-19	**SPE Data Management Workshop**	ABU DHABI	www.spe.org/events/en/2018
24-26	**SPE Annual Technical Conference & Exhibition**	DALLAS	www.atce.org
24-25	**Kuwait Health, Safety & Security Forum**	KUWAIT	www.hse-forum.com/kuwait
OCTOBER			
9-10	**RESCO Envirospill 2018**	ABU DHABI	www.rescoenvirospill.com
9-10	**OWI 2018 MENA**	ABU DHABI	interventionmena.offsnetevents.com
9-11	**Oil & Money**	LONDON	www.oilandmoney.com
15-17	**Middle East Electricity Saudi**	RIYADH	www.middleeastelectricitysaudi.com
23-25	**GDA Int'l Downstream Conference & Exhibition**	MANAMA	www.gdaconference.org
NOVEMBER			
12-15	**ADIPEC**	ABU DHABI	www.adipec.com
19-20	**4th Annual Health, Safety & Security Forum**	DUBAI	www.hse-forum.com

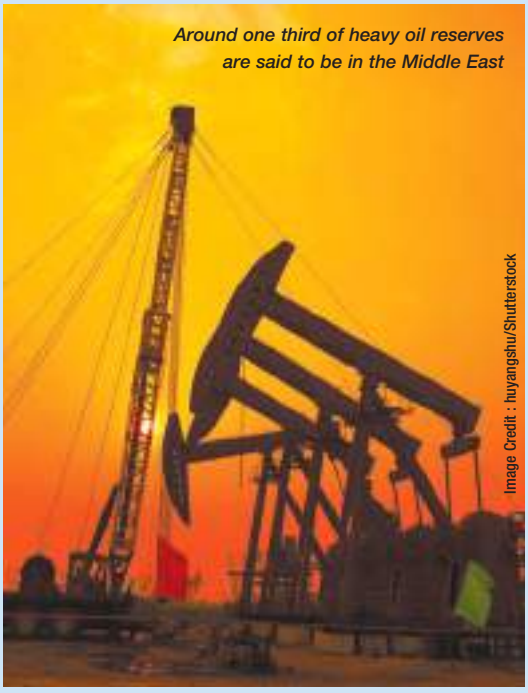
Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.

Transforming the heavy oil value chain

HELD UNDER THE auspices of the Ministry of Oil & Gas, Sultanate of Oman, the World Heavy Oil Congress & Exhibition (WHOC), which takes place from 3-5 September at the Oman Convention & Exhibition Centre in Muscat, will provide a global platform for the entire heavy oil value chain to convene, connect, exchange knowledge and do business.

Increasingly becoming an important part of the future oil mix due to rapid innovation and technological advancements, heavy and extra-heavy oil resources have been estimated at 40 per cent of the world's oil reserves, of which around one-third are said to be in the Middle East. Contributing to 15 per cent of Oman's overall oil production, heavy oil plays an extremely important role in the Sultanate's oil and gas industry. Petroleum Development Oman is spearheading innovation and continuing to identify novel EOR techniques to maximise production from the country's four active heavy oilfields, and it is anticipated that by 2025 more than 23 per cent of PDO's production will come from EOR projects.

Hosted under the theme 'Transforming the heavy oil value chain', WHOC provides an invaluable platform for the global heavy oil industry to gather and learn from each other.



Around one third of heavy oil reserves are said to be in the Middle East

Image Credit : huyangshu/Shutterstock

The two-day Strategic Conference is led by CEOs and industry leaders sharing insights into the business of heavy oil, covering cover topics on investments, creating agile business models, collaboration between heavy oil producing countries, and unlocking refining potential and value chain performance.

While the three-day technical conference will offer heavy oil professionals unparalleled opportunity for knowledge exchange on topics from upstream, midstream, and downstream heavy oil operations, and heavy oil research and technology.

Supporting the Technical & Strategic conferences is an international exhibition where regional and international NOCs, IOCs, service and technology providers will showcase the best of technologies, products and services for the heavy oil sector.

For further information see the website at www.worldheavyoilcongress.com.

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Gardner Denver

The leading oil and gas show of Iraq since 2010

Image credit: Expotim

Ministers and VIPs at the 2017 show

IRAQ OIL & GAS – Basra Show, the leading oil & gas show of Iraq, officially sponsored by Iraq Ministry of Oil, will be held for the eighth time this year between 5-7 December 2018 in Basra, Iraq.

Participation of Ministry of Oil, Basra Oil Company and South Gas Company is confirmed, and the event is promoted by Arab-German Chamber of Commerce and Industry.

In common with the past seven editions, the event will cover the entire spectrum of the industry, and is set to further contribute positively to the development of Iraq oil and gas sector. Iraq Oil & Gas - Basra Show has presented a wide variety of opportunities for international investors over its seven consecutive years of operation, with more than 1,300 companies exhibiting, 60 companies sponsoring, 120 papers being presented at the conference and more than 80,000 professionals visiting the show since 2010. The event offers customised matching activities for exhibitors and buyers, and access to thousands of decision makers and potential business partners. The 2017 show saw the participation of HE Jabbar Ali Hussain Allibi, Minister of Oil of the Republic of Iraq and HE Khalid bin Abdulaziz Al-Falih, Minister of Energy, Industry and Mineral Resources of the Kingdom of Saudi Arabia.

Iraq has immense oil and gas reserves and production potential. It is the third largest OPEC crude oil producer after Saudi Arabia and Iran, and holds the world's fifth largest proved crude oil reserves after Venezuela, Saudi Arabia, Canada, and Iran (nine per cent of total global reserves.) The oil and gas sector is expected to see an increasing number of foreign investment deals, while the Iraqi economy is forecast to grow up to 2020, with unemployment forecast to fall.

Event organisers Expotim & Ladin Group, which operates throughout the EMEA region (Europe, Middle East and Africa) has a successful track record of operating in the Iraqi market since 2009, organising 28 exhibitions in Iraq to date. It has organised Iraq Oil & Gas – Basra Show since 2010. There is no equivalent event in the region, according to the company.

For further details, please visit the website at www.basraoilgas.com.

Towards a competitive downstream through innovation, collaboration and technology

THE GDA INTERNATIONAL Downstream Conference and Exhibition, launched by the Gulf Downstream Association (GDA), is set to be held from 23-25 October at the Bahrain International Exhibition & Convention Centre in Manama.

Held under the patronage of Khalifa bin Salman Al Khalifa, prime minister of Bahrain, the theme of this three-day event is "Towards a Competitive Downstream through Innovation, Collaboration and Technology."

The GDA Conference is the leading Middle East strategic platform for downstream professionals to address business challenges, share best practices and unlock potential opportunities through collaboration and partnerships. It aims at engaging regional and international stakeholders across business, academia and technology providers to capitalise on investment, innovation and growth.

The conference expects to host 4,500 attendees and 150 exhibitors.

Panels at the conference include discussions on the role of innovation, collaboration and technology in the future of the downstream industry, focusing on the future of fuels, future of energy and future of margins. There will also be a roundtable on current challenges and best practices in acquiring and developing talent in downstream.

Eminent panellists include Jean-Jacques Mosconi, senior vice president refining and petrochemicals at TOTAL; Rebecca Liebert, president and CEO of Honeywell UOP; Suleman A Al-Bargan, vice-president for domestic refining and NGL Fractionation, Saudi Aramco; Dr Sun Xiansheng, secretary general at International Energy Forum (IEF); Charles J Reith Jr, CEO at Solomon Associates, Norm Gilsdorf, president for the Middle East, Turkey, Russia, Central Asia at Honeywell UOP; Othman Al-Ghamdi, CEO at S-Oil Corporation; Dr Riyad Yousuf Abdulaziz Hamzah, president at the University of Bahrain; Nooruddin Ahmed, co-founder at CERTERO Business Corporation; Suleyman M Ozmen, vice-president for downstream licensing (Retired) at Shell Global Solutions International.

For further information see the website at www.gdaconference.org

Driving the UAE's downstream growth

NOW IN ITS 19th year, the Abu Dhabi International Downstream Summit (ADID) is particularly timely given ADNOC's announcement that its is building the world's largest integrated refining and chemical site at Ruwais under a US$45bn investment programme, making the UAE one of the world's largest and most important markets for growth.

Image credit: Marco Verch/Flickr

A focus of discussion will be the impact of EVs on the downstream sector

The event, to be held from 3-4 September in Abu Dhabi, provides an unrivalled opportunity to meet relevant contacts from ADNOC Refining and Borouge, as well as other leading regional downstream giants. Keynote speakers include Sultan Al Bigishi, senior VP, Ruwais Refinery West, ADNOC Refining; Fuad Al-Ansari, VP Information Technology, ADNOC Refining; and Thorsten Loehl, VP Innovation, Borouge.

As a high-level strategic and technical event, ADID will present the latest technical strategy and thought leadership to support the UAE and the Gulf in creating new high value downstream revenue streams and value chains, and showcase the technologies and tools to drive the rapid expansion of the region's refining and petrochemical complexes of the future.

A focus of discussion will be the rise of electric vehicles (EVs) and the impact they will have on future fuel requirements, as well as the challenges and opportunities that they pose to refiners.

With refinery-petrochemical integration increasingly on the agenda, ADID will hear from regional leaders in integrated projects.

This year, there will be dedicated technical content on catalysts, new routes to olefins, digitalisation and operational excellence.

For the first time, the 2018 ADID Summit will be co-located with the inaugural MERTC: Ask the Experts, an event designed to give process and maintenance engineers the chance to ask their technical questions to panels of industry experts.

For further information see the website at https://adid.wraconferences.com.


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ADNOC to highlight UAE's energy transition vision during World Energy Congress

THE UAE ORGANISING committee of the 24th World Energy Congress has announced that the Abu Dhabi National Oil Company (ADNOC) will be one of the host sponsors for the 2019 congress.

The event will take place from 9-12 September 2019 at the Abu Dhabi National Exhibition Centre (ADNEC).

At the 2019 Abu Dhabi World Energy Congress, ADNOC will highlight how the company is adapting to an ever-changing energy landscape by optimising its resources and maximising value, while leveraging the latest technologies across the entire value chain, continuing the establishment of strategic and long-term partnerships and developing a highly skilled and performance-driven world-class workforce.

Image credit: ADNOC

Dr Matar Al Neyadi, undersecretary at the UAE Ministry of Energy and Industry and Omar Suwaina Al Suwaidi, executive office director at ADNOC.

Dr Matar Al Neyadi, undersecretary at the UAE Ministry of Energy and Industry and chairman of the UAE organising committee, said, "Our country is committed to developing a sustainable energy mix that maximises our natural resources, while transitioning to clean fossil fuels, nuclear and renewables."

Trinidad awarded contract for two rigs in Kuwait

ALBERTA-BASED TRINIDAD DRILLING Ltd has received a five-year contract to build two Trinidad Drilling International (TDI) joint venture rigs in Kuwait, which will begin operating by Q2 2019.

The contract has five-year, take-or-pay terms with an optional one-year extension, at the discretion of the customer. TDI will be reimbursed by the customer for the cost of relocating the two rigs from Mexico. The rigs will undergo capital upgrades of approximately US$22mn per rig (Trinidad's 60 per cent portion), largely related to new well control equipment and mud systems.

Trinidad expects to fund the additional upgrade capital from cash in the TDI joint venture, as well as reinvested proceeds from the previously disclosed sale of TDI's three Saudi Arabian rigs. On 31 March 2018, TDI had approximately US$50mn of cash on hand, of which Trinidad's 60 per cent share is US$30mn.

"Under the contract, we expect to deliver value for Trinidad's shareholders with improved international contract visibility, a strong return on capital and long-term, stable revenue," said Brent Conway, president and CEO of Trinidad.

Libya's Bahr Essalam Phase 2 offshore gas project starts production

MELLITAH OIL & GAS, a joint venture between Eni and Libya's National Oil Corporation (NOC), has started production from the first well of the offshore Bahr Essalam Phase 2 project.

This comes just three years after the final investment decision. Two further wells will begin production within a week. An additional seven wells will come on-stream by October 2018.

Libya aims to boost up the country's energy economy.

Image credit: Kristina Kasputienė/Pixabay

The Phase 2 of the project completes the development of the largest offshore producing gas field in Libya, increasing production potential by 400 mmscfd. Phase 2 will be completed between September and October, bringing total field production to 1,100 mmscfd.

Bahr Essalam, located about 120km northwest of Tripoli, contains more than 260 bcm of gas. This is delivered through the Sabratha platform to the Mellitah onshore treatment plant before principally being used to supply the national network.

Fayez Al-Saraj, chairman of the Presidential Council of Libya and prime minister of the government of the National Accord, commented, "The opening of Phase 2 of the Bahr Essalam offshore project will definitely add true value to the national economy. In the past, we missed huge investment opportunities due to the lack of budget. However, today we are committed more than at any time to encourage investment in the oil sector, and to grant promising opportunities to global giants on a commercial basis that serves the interest of this partnership, and creates growth that gives new hope to the Libyan youth."

DME Oman crude oil deliveries reach two billion bbl

DUBAI MERCANTILE EXCHANGE (DME), the premier international energy futures and commodities exchange in the Middle East, has announced the delivery of its second billion bbl of Oman crude oil since inception in June 2007, following the expiry of its August-delivery contract at the end of June 2018.

Ali A Al Riyami, director general of marketing, Ministry of Oil and Gas, Oman, said, "The Dubai Mercantile Exchange has proved a great success in enabling Oman, its equity partners and customers to transact Oman crude oil at a fair and transparent price. The two billion bbl of delivered Oman crude is a clear demonstration that transacting and pricing oil through a fully regulated exchange is a very positive step for both buyers and sellers."

Image credit: skeeze/Pixabay

DME aims to transact Oman crude oil at a fair and transparent price.

The two billion milestone underscores the position of DME Oman contract as the commodities contract with the largest physical delivery in the world. Deliveries via the exchange have grown sharply in recent years, culminating in 2017 in a monthly average of more than 29 million bbl.

Ahmad Sharaf, chairman of DME, commented, "Today's milestone is a great testament to the partnership between Oman, the CME Group and Dubai in creating the OQD contract. The DME Oman contract is now one of the leading price indicators for oil in the world and has proved to be a valuable asset for the Middle East and Asia when it comes to price discovery and valuing crude oil across the region."

In terms of oil shipments, two billion bbl is enough to fill 1,000 very large crude carriers (VLCCs), commonly referred to as supertankers, which are the primary vessels for shipping crude oil around the globe. At current values, two billion bbl of Oman crude oil would be worth approximately US$150bn.

ADNOC strengthens ties with China

HE DR SULTAN AHMED Al Jaber, the UAE Minister of State and group CEO of Abu Dhabi National Oil Company (ADNOC), has held a series of meetings with Chinese oil, gas, refining and petrochemical industry leaders, aiming to expand and deepen investment and partnership opportunities across ADNOC's upstream and downstream value chain.

The Minister's recent visit to Beijing was in line with ADNOC's effort to expand and deepen business and economic relations with one of the UAE's largest trading partners.

Dr Al Jaber said, "Energy cooperation is an important aspect of the UAE's relations with China, which is the number one oil importer globally and a major growth market for ADNOC's crude, refined products and petrochemicals."

Image credit: ADNOC

HE Dr Sultan Ahmed Al Jaber outlining ADNOC's downstream expansion plans

"ADNOC is also ready to work with its existing and potential new partners to meet the growing demand for energy and petrochemical products in China," he further added.

During the visit, he met with senior executives from the Wanhua Chemical Group, one of the world's largest producers of Methylene Diphenyl Diisocyanate (MDI), China National Petroleum Company (CNPC) and China National Offshore Oil Corporation (CNOOC). Dr Al Jaber also met with representatives from the China Development Bank and the vice-chairman of the National Development and Reform Commission (NDRC).

The meeting discussed ADNOC's plans to develop new upstream oil and gas resources and to expand ADNOC's downstream operations.

As announced earlier in 2018, ADNOC is making significant investments in new downstream projects, both domestically and internationally, to grow its refining capability and expand its petrochemical production three-fold to 14.4 mpta by 2025.

Egypt's energy hub plans make headway

EGYPT'S AMBITIONS TO become an energy hub are gathering increasing momentum, with the ramping up of production at Eni's giant Zohr gas field and a number of other discoveries and deals agreed recently.

In May, Eni announced the start-up of the third production unit (T-2) in the Zohr field, which will bring the total installed capacity to 1.2 bcf of gas per day. According to Eng. Tarek El Molla, Minister of Petroleum and Mineral Resources, the field will increase gas production to 1.7 bcf a day by August. The field is set to play a central role in enabling Egypt to achieve self-sufficiency in natural gas.

In May, Egypt issued what is likely to be its last LNG import tender, and could begin exports early in 2019, the Minister told Bloomberg.

New discoveries include Eni's second light oil discovery in its South West Meleiha license in the Western Desert in July, and SDX Energy's new gas discoveries in its South Disouq Concession in the Nile Delta.

Eng. El Molla announced in July that 83 new agreements have been signed with international companies since November 2013 which have "helped Egypt to strongly restore its position as a major player in the oil and gas industry", with 18 further agreements in the pipeline.

The Minister also announced the signing of three new agreements for oil and natural gas exploration in the Sinai Peninsula and Gulf of Suez. The first agreement at west Jabal el-Zeit, south Gulf of Suez concession area, with Ganoub El Wadi Petroleum Holding Company and the UK's GHP with minimum investment of around US$6mn, for drilling four new wells. The second agreement is with EGPC at Ras Fanar concession area in the Gulf of Suez, and the third agreement is with EGPC and the UK's Perenco at the offshore North Sinai concession area.

EGPC is also reported to have signed a US$9mn agreement with the USA's Apache Corporation on July 18 to drill seven oil wells in the East Bahariya concession in the Western Desert.

Speaking at a conference in London in February, Eng El Molla outlined Egypt's ambitions to become an energy hub – a regional centre specialising in oil and gas, from which energy can be exported, whether from Egypt's own resources or from neighbouring countries.

The Minister said that Egypt has taken bold steps to reform the gas market, issuing a new gas law which mandates the establishment of an independent gas regulator and opens the Egyptian market to private sector companies. He also highlighted the various infrastructure projects planned or underway in the Red Sea and Mediterranean, along with the construction of marine platforms and storage facilities. Egypt has huge existing refining capacity in addition to pipeline networks for transporting refined products and natural gas throughout the country, which are being upgraded and extended. It also has two LNG plants, maximising the flow of natural gas.

A gas pipeline from Cyprus' Aphrodite gas field to Egypt's LNG facilities is planned, with the Cypriot gas set to be used both for domestic consumption as well as export to the international marketplace.

Egypt's plans to become a regional energy hub are supported by the EU, which signed an MoU with Egypt in April for a strategic energy partnership.

Image credit: namning/Adobe Stock

Increased production and discoveries are set to transform Egypt from a gas importer to exporter

OPEC producers key to world supply through to 2040, says Wood Mackenzie

GLOBAL NATURAL RESOURCES consultancy Wood Mackenzie sees OPEC maintaining its role as a key oil supplier through to 2040, although output from non-OPEC producers will help ensure adequate supply in the years to 2030.

In its *Macro Oils Long-Term Outlook H1 2018*, Wood Mackenzie said it expects the US Lower 48 to enjoy continued growth through the medium-term, with its crude and condensate production reaching a plateau of over 11mn bpd in the mid to late-2020s. Once the USA plateaus, total non-OPEC liquids production will lose its growth momentum and begin to decline post-2030.

With demand continuing to grow through to its peak in the mid-2030s, the industry must find increasingly expensive oil to offset declines from a maturing asset base. To balance the market in the long-term, there is increasing reliance on OPEC continuing to exploit its available reserves.

The consultancy said that as reliance on OPEC ramps up, so does the importance of geopolitical risk as a key determinant for both supply and price. "As non-OPEC production growth slows and the importance of OPEC's output increases from 2023, OPEC's role in managing prices becomes more focused on ensuring upstream investment keeps up with replacing lost barrels from onstream declines, and the growth in oil demand over the next decade or so," it said.

A marked uptick in major project sanctions towards the end of last year suggests confidence is returning to the upstream sector, says the consultancy. A total of 32 project sanctions in 2017 resulted in close to 6bn bbl of liquids reserves reaching FID, double the reserves sanctioned in 2016. This recovery in conventional projects will continue, it forecasts; at least 30 major project FIDs are expected in 2018.

Sharjah announces 2018 onshore licensing round

THE SHARJAH PETROLEUM Council (SPC) is inviting petroleum exploration and production companies and investors to bid in an inaugural onshore acreage licensing round covering three concession areas.

SPC has appointed Sharjah National Oil Corporation (SNOC) to conduct the licensing round, offering companies 30-year contracts with a 10-year extension.

"Sharjah has always strongly supported private investment, providing the appropriate economic environment to encourage sustainable development, employment and business opportunities for the benefit of the people. New partnerships in petroleum exploration and development will enhance and strengthen these policies," stated HH Sheikh Ahmed Bin Sultan Al-Qasimi, Deputy Ruler of Sharjah and chairman of SPC.

Image Credit : SNOC

The concession areas are located in the producing Thrust Zone play trend, including an unappraised deeper gas discovery below the Sajaa gas condensate field (Area A). SNOC is currently preparing to drill a well in Area B as operator and is also offering participation in this near-term exploration opportunity.

Hatem Al Mosa, SNOC's CEO, said, "We are delighted to have made significant progress with our ongoing exploration programme and look forward to conducting a successful licence round in order to accelerate it together with suitable partners."

Early indications are emerging of potentially large, undrilled leads and prospects and untested plays.

The new licensing round is adopting a globally-competitive fiscal regime, which ensures that smaller fields are highly commercial and larger accumulations also generate very attractive returns.

Bidding instructions are available online at www.snoc.ae and the window for bids will close on 18 November 2018 with the winning bidder(s) announced shortly thereafter and contracts effective from 1 January 2019.

Aramco to build onshore rigs and equipment

SAUDI ARAMCO SIGNED a joint venture agreement with National Oilwell Varco Inc. (NOV) to establish an integrated world-class onshore rig and equipment manufacturing and aftermarket facility in Ras Al-Khair in Saudi Arabia. As per the shareholder agreement, Saudi Aramco will own 30 per cent of the JV's shares, while NOV will own the remaining 70 per cent.

"The kingdom leadership's efforts to accelerate economic diversification as part of Vision 2030 is having a significant impact in enabling the creation of new sub-sectors and also in attracting investments from our international partners to our nation's vital oil and gas industry," said Amin Nasser, Saudi Aramco's president and CEO.

The facility, near Jubail Industrial City on the kingdom's east coast, will serve as a major hub for high specification drilling rigs using cutting-edge technologies with a capacity to manufacture 10 onshore rigs per year. Additionally, the facility will offer repair services and recertification of a large portfolio of equipment. The facility will also have the capabilities to supply drilling packages for offshore jack-up rigs. It will localise expertise in multiple disciplines related to on-shore rig manufacturing, and is expected to create over one thousand direct and indirect jobs in the kingdom. Commissioning of the facility is expected by 2020 with the first rig to be delivered in 2021.

"The new manufacturing facility will further strengthen the integrated portfolio of oilfield services and equipment being developed by the Saudi Aramco Development Company, which also optimises Saudi Aramco's supply chain costs and improves its agility. This investment will also create employment and training opportunities for Saudi youth," added Ziad Al-Murshed, executive director of New Business Development at Saudi Aramco.

Meanwhile, Saudi Aramco also announced that it has a spare capacity of two million bpd and can meet additional oil demand in case of any interruption in supplies.

Aramco is currently producing 10mn bpd and has the ability to produce 12mn bpd, Nasser stated.

The JV will be supplying oil rigs to the Middle East countries

Image Credit : Kokhanchikov/Adobe Stock

Global natural gas prices rise for first time in two years

GLOBAL NATURAL GAS prices are increasing for the first time in two years with demand for the fuel advancing across the world.

Consumption of the 'cleanest' fossil fuel is projected to grow under virtually all major scenarios, "including the most aggressive low-carbon transition scenarios", according to a report published by Italian grid operator Snam SpA, the International Gas Union trade lobby and The Boston Consulting Group.

The expansion of global gas supply will be driven by unconventional gas in North America and Asia, as well as conventional gas in Russia and the Middle East.

Higher prices were driven by mainly by the rising cost of crude due to its influence on oil-linked supply contracts, as well as stronger-than-expected demand for liquefied natural gas. Across the major global gas hubs, the USA remained the cheapest, with prices 62 per cent less than those in Asia and half the levels in the European Union.

"The flexibility of gas and the ease with which it can be transported and stored make it an ideal partner for the growth of renewables," Marco Alvera, the CEO of Snam, said in an emailed statement. "And gas is well on the way to becoming a renewable-energy source itself, thanks to the development of green-gas technologies."

As gas prices rose, the trend toward global price convergence continued in Europe and Asia, according to the report. Spot prices, or those for immediate delivery, showed similar patterns across the major markets for LNG.

Gas price levels remain higher than those for coal because there's usually no "appropriate" price on carbon and other pollutants that would drive fuel switching, the report's authors said.

The way ahead for Lebanon's oil & gas development

As Lebanon begins oil and gas exploration with the award of two offshore blocks in its first licensing round, Wissam Chbat, head of geology and geophysics at the Lebanon Petroleum Administration, discusses plans and prospects for the oil and gas sector.

Lebanon has commenced offshore oil and gas exploration

Image Credit: Pichitstocker/Adobe Stock

What are your hopes for the exploration of Blocks 4 and 9 being conducted by the Total-led consortium, and what are the indications of the potential?

The first licensing round had two objectives that materialised fully with the award of two exclusive petroleum licenses over Blocks 4 and 9.

The first being the achievement of a commercial discovery and the second is preserving Lebanon's right over its Exclusive Economic Zone (EEZ) and more specifically at the EEZ borders.

Having said that, the companies believe, as we do, that Blocks 4 and 9 not only have high geologic prospectivity but also a variety of prospects types that are targets for exploration. Both blocks have sandstone (originating from turbidites) and carbonates formations. Both these rock types have proven to have a working petroleum system in the east Mediterranean.

> "The current opportunities in the oil and gas sector lie in the whole value chain"

Moreover, the 3D seismic coverage of offshore Lebanon (80 per cent) provided the companies with a unique opportunity to de-risk the prospects to be investigated and select the prospects with the best chances of success.

Do you have plans for a second licensing round, and are you able to give any indications of the timing for this? How do you hope to attract bidding interest?

Indeed we have. The government decided in May 2018 to launch the second licensing round before the end of the year and through 2019 (award expected before end of 2019 if we summarise the projected timeline).

The second round main milestones are:

- Prequalification round (three months from opening to closure): to open before end of the year 2018, the exact date to be communicated later this summer
- Bid submittal opened for pre-qualified companies for six months
- Assessment of the bids and report to the Minister of energy and water (one month)
- Review of the LPA report by the Minister and the Council of Ministers and award of the block(s) by the Council of Ministers (one month).

We are preparing a promotional and marketing campaign, and the bid conditions will have additional incentives and fewer barriers to bid. We will also present the additional geologic studies that are contributing to further de-risking the exploration and geology and hence improve attractiveness.

What opportunities do you see for international companies in Lebanon's oil and gas sector, and how do you hope to create a conducive environment for international investment?

The current opportunities in the oil and gas sector lie in the whole value chain (upstream, midstream and downstream) are as follows:

- Upstream: With the successful closure of the first offshore round and the award of the two blocks to large and major international companies, and the second round starting, Lebanon aims to attract major large companies technically capable to operate in deep water with the financial capacity to fast track and develop any commercial discovery. All that under strict environmental constraints to avoid any health, safety and environmental accidents
- Midstream and downstream: The Ministry of Energy and Water has launched an international tender closing in October to attract international bidders for two FSRUs (Floating Storage and Regasification Unit)

to provide and store LNG on two ships and build all the necessary piping and infrastructure to provide the gas-fired power plants with gas, thus reducing the energy bill cost on the state by almost US$1 billion a year. Most of the companies interested in the upstream have been pre-qualified and interested in this tender.

It should be noted that the Lebanese legal and institutional oil and gas framework provides clarity, stability and predictability with main focus on transparency and two-way communication with the International companies. For instance, we have published the bid assessment scenarios and detailed methodology, providing reassurance to the companies and eliminating subjectivity in the assessment (this is not the case in the majority of the licensing rounds world wide). This was highly praised by Extractive Industries Transparency Initiative (EITI), Natural Resource Governance Initiative (NRGI) and the companies alike.

What role can local companies play in Lebanon's oil and gas development?

According to a recent Lebanese market study, Lebanese companies will have an incremental role in the services industry mainly. The study showed that CAPEX related items will be imported initially by more than 95 per cent while the services needed and resulting in the OPEX are initially 80 per cent imported. The Lebanese companies can capture one to two per cent of the CAPEX market share yearly post development and achieve a total market share of 50 per cent after 20 years (further market share needs large investments and technology where the local market cannot compete with international established businesses). As for the OPEX items, the local companies can capture five per cent more yearly of the market share in oil and gas services and contribute to 80 per cent of the services industry after 12 years, starting today, (i.e. from exploration).

> “We have published the bid assessment scenarios and detailed methodology”

In the longer term, how do you hope to utilise Lebanon's oil and gas resources for the benefit of Lebanon and its people?

The first logical step before the revenue management is the resources assessment. The resources assessment is a continuous process, but we can have some indicative results after several years of exploration. After having a preliminary assessment of the resources in place, only then can a revenue management strategy be developed to achieve sustainability and economic growth.

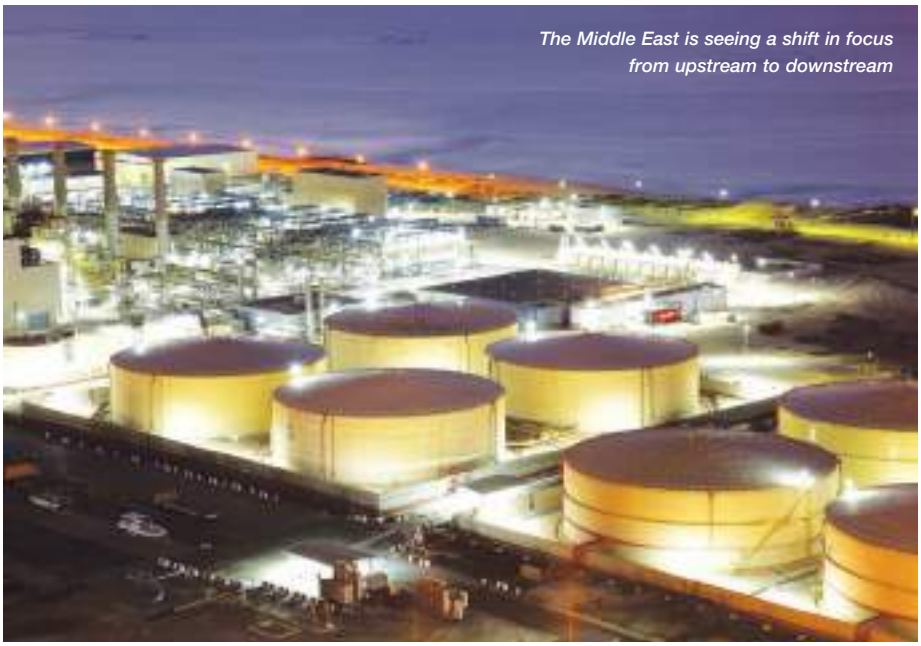
Currently (as per Law 132/2010) any revenues from the oil and gas should be deposited in a sovereign wealth fund. The parliament has started to study a draft law to establish the sovereign wealth fund. As I said earlier, only when we have a preliminary resources assessment will we be able to build an investment strategy for this fund. The main philosophy behind the structure of this SWF is to ensure that the non-renewable hydrocarbon assets below ground are transformed into sustainable financial assets above ground, and that not a single generation has the right to drain those assets. ■

The future of the Gulf's downstream industry

The Abu Dhabi International Downstream (ADID) Summit advisory meeting saw expert participants share their thoughts on the Gulf's downstream industry and the challenges that lie ahead.

THE EVENT, HELD in advance of the Abu Dhabi International Downtsream Summit to take place from 3-4 September in Abu Dhabi, was hosted by the World Refining Association (WRA) and chaired by Thomas Rings, partner at AT Kearney Middle East, with participants including senior business leaders from ADNOC Refining, Borouge, Saudi Aramco, CB& I, WR Grace, Schneider Electric, IBM, Wood Plc and CEPSA. The main points emerging were:

- The importance of predicting changes in global demand
- The on-going shift towards petrochemicals and integration, and the need for a'master plan' for large-scale integration projects
- How to minimise CapEx on new mega projects and maximise throughput of existing assets
- ADNOC's new ICV requirements and the significance of these for potential partners
- The threats and opportunities posed by Artificial Intelligence, Electric Vehicles (EVs) and other digital trends.



The Middle East is seeing a shift in focus from upstream to downstream

Image Credit : Philip Lange/Shutterstock

While Middle East economies are generally in a positive position relative to the rest of the world, the impact of a sustained period of low oil prices has had a lasting effect on governments and budgets. At the same time, China, India and Southeast Asia continue to boom, creating huge changes in demand. With China and India in particular pushing for energy self-sufficiency, there was agreement among the Board members that energy players in the UAE and the wider GCC should be looking to predict changing global demand, not just react to it.

It was agreed that the next 10 years will be pivotal for the region, which is in a position to make a success of the changes we are currently seeing.

> "The next ten years will be pivotal for the region"

Downstream trends

Energy majors across the region are undergoing a transformation from upstream to downstream, shifting their focus in response to market conditions. At the same time, the downstream industry itself is moving from a production-driven to a demand-driven world, in which customers play a much larger role in determining production strategies. The shift towards petrochemicals and integration seen elsewhere is very much a feature of the current GCC landscape, with the ultimate aim being to convert every molecule of crude into products that add value. This is a challenging transition, but in at least one respect, the region is in a strategically advantageous position in that it does not have to deal with ageing assets.

With the focus often on newer projects, technology providers in particular highlighted that refiners and producers could do much more to maximise their existing assets, and questioned what it would take to encourage this. At the same time, questions from refiners included several about the best plant configurations to meet future demand. This suggests a possible communication gap between refiners, producers and their solution providers on the technology needs associated with integration.

On the subject of integration, the Board highlighted the importance of a 'master plan', ensuring that projects are conceived with a long-term vision in mind. Expansions have historically been 'bolt-ons' to existing facilities, but it was agreed that advance decisions about where to place units are more effective. Duqm Refinery and KIPIC were cited as positive regional examples of complexes that have successfully implemented plans of this nature that ensure maximum value is designed for from the onset.

It was also suggested that the GCC could expand its capabilities to monetise trading ventures much more effectively, and that the region's

geographical position and strong assets mean that it lends itself well to trading. Aramco Trading has been undergoing expansion recently, including establishing its first global office in Singapore late last year, and other GCC players are keen not to miss an opportunity here.

Maximising profits

The driving factor behind all of these changes is profit. Given the many changes the downstream industry is currently witnessing, the focus for maximising profits often falls on minimising CapEx on new projects. There is a need for dialogue between refiners and producers and their EPC partners on how this can best be achieved, and it was suggested that refiners and producers in the region could do much more to maximise the through-put of their existing plants.

ADNOC is implementing a new in-country value (ICV) strategy, whereby the group's business partners may be required to employ a fixed quota of local Emirati staff members. Contractors are concerned about how this is going to impact their operations, and need further information from ADNOC.

> "Digitalisation can bring opportunities, efficiencies and emission reductions to refiners"

New threats and opportunities

It was agreed that a shift to EVs is coming, and that this shift will be driven by technologies, infrastructure and regulations. It was highlighted that the UAE provides an ideal environment for them.

The Board agreed that global demand for cars overall is growing, and that as things currently stand, it will not be possible for EVs alone to meet the demand. Furthermore, it will take many years for all the existing conventional vehicles to be phased out, and hydrocarbon-based fuels will still be required for bunker fuel, jet fuel and larger trucks. A further point made was the large quantity of refined products required to produce EVs in the first place.

Highlighting the fact that they are largely moving further downstream into chemicals anyway, refiners questioned whether EVs are actually as big a threat as envisaged, or even an opportunity.

On digitalisation, it was unanimously agreed that the oil and gas industry is not at the forefront.

Digital solution providers present at the meeting highlighted the fact that digitalisation can bring opportunities, efficiency and emission reductions to refiners, and that there is a tendency to overlook the economic impact of this in the GCC. The refiners acknowledged that digitalisation can generate profitability, connecting refineries with the outside world and bringing the knowledge and expertise of licensors, suppliers and other external partners 'virtually' inside the refinery.

It was also agreed that trends like Artificial Intelligence are here to stay, although their role continues to evolve. The Board members were particularly interested in the way AI will change human involvement in plant processes. The need for a substantial training phase, in which any AI-based offering must be trained in how to successfully carry out its tasks, was specifically mentioned as an area in which significant human expertise will be required.

However, digitalisation is very much seen as a double-edged sword, with the threat of cyber-attacks cited as a top concern. A 2017 cyber breach at Sadara has heightened awareness of this risk in the region, and there is an understandable desire to rein in some fast-paced digital changes until the threat has been more thoroughly assessed.

The changing role of process engineers was also discussed. With new tools and technologies having largely taken over the trouble-shooting function, the role of a process engineer has already shifted considerably. In this conservative industry, managing a change like this can present a challenge, especially when the sector as whole faces perception issues among younger generations. ■

The evolution of global natural gas markets

Strong demand growth from China, greater industrial demand and rising supplies from the USA will transform global natural gas markets over the next five years, according to the International Energy Agency's latest annual gas market report.

GLOBAL GAS DEMAND will grow at an average rate of 1.6 per cent a year, reaching just over 4,100bn cubic metres (bcm) in 2023, up from 3,740 bcm in 2017, according to the IEA report, *Gas 2018*.

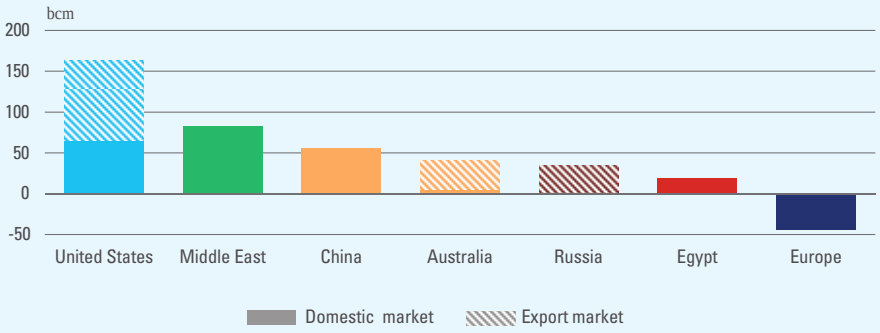
"In the next five years, global gas markets are being re-shaped by three major structural shifts," said Dr Fatih Birol, the IEA's executive director. "China is set to become the world's largest gas importer within two to three years, US production and exports will rise dramatically strongly and industry is replacing power generation as the leading growth sector. While gas has a bright future, the industry faces tough challenges. These include the need for gas prices to remain affordable relative to other fuels in emerging markets, and for industry to curb methane leaks along the value chain."

Chinese gas demand is forecast to grow by 60 per cent between 2017-2023, underpinned by policies aimed at reducing local air pollution by switching from coal to gas. China alone accounts for 37 per cent of the growth in global demand in the next five years and becomes the largest natural gas importer by 2019, overtaking Japan. The IEA also forecasts strong growth in gas use in other parts of Asia, including in South and Southeast Asia, driven by strong economic growth and efforts to improve air quality.

The Middle East will see continuous growth in consumption over the next five years, primarily led by increasing needs in industry, power generation and seawater desalination.

For end-use sectors, industry will become the largest contributor to the increase in global gas demand to 2023, taking the lead from power generation. The change is especially marked in Asia and other emerging markets, thanks to higher gas use in industrial processes and as feedstock for chemicals and fertilizers. Industrial gas demand also grew in major producing regions, such as North America and the Middle East, to support expansion of their petrochemicals sectors. Overall, industry accounts for more than 40 per cent of growth in global gas demand to 2023, according to the IEA, followed by 26 per cent for power generation.

Natural gas production growth in selected countries and regions, 2017-23



Source: IEA

Supply side changes

Major changes are also evident on the supply side, with the USA leading gas production growth worldwide to 2023, thanks to the on-going US shale revolution. Most new US supplies will be geared to export markets as LNG or through pipelines. The development of destination-free and gas-indexed US LNG exports will provide additional flexibility to the expanding global water-borne traded market.

The Middle East will see the second largest increase in production growth. Most of the increase in gas output from this and other major producing areas, including Egypt and China, is dedicated to domestic markets.

LNG is progressively taking a larger share in global gas trade, especially in Asia. LNG trade as a share of total gas trade is forecast to rise from a third in 2017 to almost 40 per cent in 2023. Emerging Asian markets will account for around half of global LNG imports by 2023. This continued rise in the LNG market will have significant impacts on trade flows, pricing structures and global gas security.

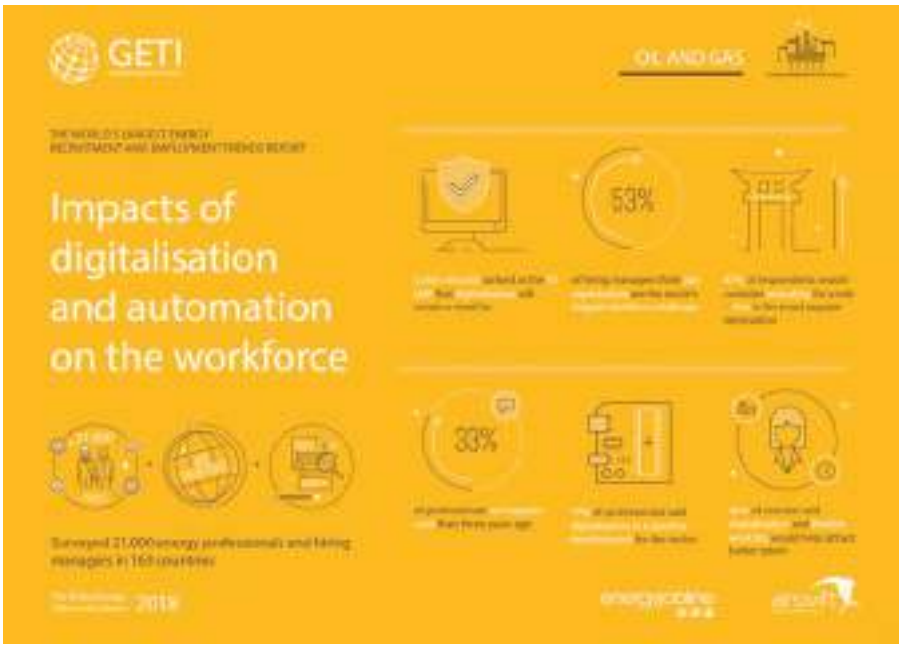
The current wave of LNG export projects will increase liquefaction capacity by 30 per cent by 2023. This will be led by an increase in output from the USA, which accounts for nearly three-quarters of the growth in total global LNG exports in the period, followed by Australia and Russia. However, a lack of new LNG projects after 2020 could lead to a tightening of LNG markets. Given the long-lead time of such projects, investment decisions will need to be taken in the next few years to ensure adequate LNG supply beyond 2023.

Price competitiveness will be crucial for gas to gain a firm foothold in emerging markets. This requires market evolutions and reforms, such as the development of trading hubs, opening up of the downstream to competition and fair access to infrastructure. Improving air pollution will be a key driver of gas demand, especially in emerging markets, and industry's ability to improve its environmental footprint, including by reducing methane emissions and expanding the deployment of carbon capture, utilisation and storage technology, will be critical for gas prospects. ■

Is digitalisation wowing the workforce?

On the heels of its 2018 Global Energy Talent Index (GETI), developed in partnership with Energy Jobline, Airswift brought together a panel of experts to discuss the ramifications of technology on how companies recruit, develop, utilise and ensure the satisfaction of their workforce.

Roundtable participants: Peter Searle – CEO, Airswift; Hannah Peet – managing director, Energy Jobline; Stephanie Rogers – managing director, Resources, Accenture; Tony Salemme – VP, Craft Labour Risk Assessment Group, Industrial Info Resources.



The 2018 GETI report found that the oil and gas sector is quite excited about the prospects of digitalisation. Do you think that employers should focus more on digitalisation than pay to attract fresh talent?

Hannah Peet: I think digitalisation can be a strong selling point for workers when the benefits are made clear. As the GETI report showed, greater opportunities for remote and flexible working are very much in demand, with four in ten respondents citing it as key to attracting fresh talent to the sector. Companies that offer flexible working are very much at an advantage in attracting talent.

Peter Searle: The last thing anyone wants is to be in a stagnant job. Digitalisation offers a lot of room for growth. For starters, data analytics and machine learning will transform humdrum processes into more agile and dynamic activities. People have the opportunity to be upskilled into new roles where they'll be intellectually stimulated and have more room for advancement.

> "People have the opportunity to be upskilled into new roles where they'll be intellectually stimulated"

Stephanie Rogers: People want to work for companies of the future. If an oil and gas company is investing in automation and continued modernisation, leveraging elements such as artificial intelligence (AI) and big data, they need to factor in the impact of these technologies into its future talent strategies.

This involves a couple of things. For starters, companies can seek out individuals that are especially keen to utilise new skills. It's also important that companies show workers how these technologies support various career paths and ultimately keep their skill sets relevant as roles shift. Finally, a clear understanding of how these technologies can achieve the desired business outcomes and company-wide impact will be essential.

HP: It's also worth pointing that, though new opportunities are important, remuneration is still one of the top selling points for workers. The benefits of digitalisation will complement the power of pay, but not replace it.

Tony Salemme: There's no doubt that companies rely heavily on bonuses, pay and per diems to attract talent. But as the pace of new projects ramp up, labour costs are going to get very expensive. I don't see digitalisation moving fast enough to change this. Companies are going to have to accept high costs as the new normal and be more realistic when planning the outlay for new projects.

SR: If oil and gas companies get their digitalisation positioning right, they'll have a better chance of attracting talent from a broader range of industries. It will open up bigger pools of candidates and help to bring more diverse thinking aboard.

Do you think it's realistic to expect more flexible working opportunities?

PS: I believe so. In fact, there's a strong business case for it. The push for economies of scale and onshore development for offshore projects ties in nicely with flexible and remote working.

We recently saw this in action with a major project in Papua New Guinea, where much of the early development was done by teams in Singapore and Houston. Instead of just working on the PNG project, these teams were able to serve multiple projects remotely. The company was then able to hold off on sending full teams to the PNG site until close to launch. This not only reduced the labour burden onsite but made for a more efficient use of those remote teams.

HP: Flexible and remote working can also cut costs in terms of reducing the need for office space. A lot of companies are trying to limit the cost of their physical footprint.

SR: This is a good strategy, considering that many of the job candidates for flexible and remote working are typically onshore and office-based. Examples of these roles include project management, data science and analytical support. That said, there will still be some limitations.

TS: Absolutely. Remote workers that are too far away from their respective sites aren't in the best position to serve those projects. Companies will still have to make sure they are making talent investments in the physical locations where they have assets.

HP: All this being said, there's no way the industry can afford to overlook flexible working. It's essential to closing the skills gap and, more importantly, the gender gap. The two go hand-in-hand – we're in a candidate driven market, talent shortages are growing and yet, as GETI shows, just 10 per cent of the oil and gas workforce is made up of women.

In offering flexible working, oil and gas companies are showing their commitment to providing a supportive environment for workers and their families, which appeals to individuals who might not have otherwise considered the sector.

Image Credit: Kanchiitdon/Adobe Stock

Digitalisation and flexible working can help to bring more women into the industry

How else do you think digitalisation can help increase worker satisfaction and improve retention rates?

SR: Workers are more eager to upskill into the new roles created through digitalisation than many realise. We have conducted research which shows that workers are very interested in developing new skills to have greater digital capabilities. Where companies aren't offering training opportunities, workers are taking the initiative to go out and find the education themselves.

HP: This point ties into what we saw in the GETI report, where training and development opportunities were cited as one of the biggest drivers of satisfaction. People are going to want to stay with the companies that are invested in their futures.

TS: Along these lines, apprenticeships and local development schemes are going to be essential. As powerful as multiskilling is, nothing beats having strong local talent.

SR: Another less obvious, but quite important example of how digitalisation can benefit workers is that it has the potential to keep people nearing retirement working longer. Technology helps to reduce the requirement for travel and having to be onsite, allowing them to instead focus on knowledge transfer and support for remote efforts.

PS: Going back to remuneration – not only are these new roles more engaging, they offer the potential for higher pay. When you couple that with the potential for analytics and artificial intelligence (AI) to help people work more creatively and efficiently, we can expect people to be more energised by their work.

> "Digitalisation isn't about job reduction, but job evolution"

Do you think it's easy for companies to train their existing workforce for these roles? Or should they be considering people with more digital skills?

SR: We have found that many of today's workers have skills and expertise that translate well into many of these new roles.

PS: Many of the emerging technologies like machine learning and AI will complement, not replace, existing skill sets. You need that industry experience to be able to make sense of performance data and use it to achieve agility in project lifecycles. With automation and digitalisation, project managers are going to have a lot more intelligence at their fingertips.

SR: Next-generation technology allows legacy knowledge to be recorded and shared with future generations of workers. You can capture skills and insight from the senior talent and use it to drive simulations or scenarios that will teach younger talent these invaluable perspectives. This is one useful tactic for helping to manage the skills gap.

HP: At the moment, there is a pressing need for people from pure technological backgrounds. Over the last year, we've seen a 249 per cent increase in available cybersecurity roles, something that a project engineer can't easily step into.

Is there any resistance to digitalisation among the oil and gas workforce? And what are the potential barriers to more widespread adoption?

TS: It's amazed me how, after 35 years of working with information and technology, that people still don't respect their power. There are still plenty of companies who make the minimal investments when it comes to big data and technology. It's really a cultural issue, rather than a budgetary one.

PS: For a long time, people saw technology as a threat, instead of seeing it as

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an enabler of efficiency, productivity and, ultimately, satisfaction.

SR: And of course, digitalisation isn't about job reduction, but job evolution.

TS: A lot of pushback from employees is that working with technology is just "another task that gets thrown on top of my workload." They see new applications as being outside of their job scope and try to pass it off. They can't see how it works for them.

Another issue is that firms aren't willing to assess where they are lacking skills. Especially the big companies – they think there is nothing new to learn. Honest self-assessment should be happening throughout the organisation.

PS: Management team mindsets will also have to change with regards to flexible working. A lot of managers aren't used to overseeing remote workers and, depending on how effective workers are, this could bring up questions of trust and work ethic. For flexible working and digitalisation to succeed, managers will have to make clear to workers what is expected of them.

HP: There's something to be said that the vast majority of advertisements for jobs that offer remote or flexible working opportunities fail to mention these perks. Why would a company not choose to take advantage of this? The same goes for the use of cutting-edge technologies – we're seeing exciting things happening across the sector and yet, none of this ends up in the job description. Most companies want to put out the same message because it's a safe message.

> "There are a lot of things happening in the Middle East as well"

Are there any companies or regions that are particularly excelling at incorporating digitalisation?

TS: There are two types of firms: the major multinationals that are fully invested in a digital future and smaller organisations that are moving into a new territory. Companies in the former are creating a digital-friendly culture, are keen on utilising big data to make more informed decisions and have teams dedicated to analysis.

Firms in the latter are conscious that they don't have the working knowledge to operate efficiently in the region and need outside support. These firms tend to be European or South American firms moving into North America.

PS: With all of the activity happening in the Permian Basin and in Canada, the USA is going to be a hotbed for projects and digitalisation. But there are a lot of exciting things happening in the Middle East as well. It's still a greenfield region compared to the USA, and there's a lot of opportunity for companies to invest heavily in digitalisation without the issue of dealing with existing infrastructures.

Is digitalisation changing the way companies attract or retain talent?

PS: Companies will have to get craftier about how they reach the younger, more tech-savvy audience they're going for. They will need to engage this audience where they're at – and offer them a culture that works for them. This brings us back to flexible and remote working opportunities that the big tech firms can offer and which GETI has shown us are clearly in huge demand in oil and gas.

HP: Absolutely agree with that. And it's worth remembering that, based on current methods, hiring managers have access to only about 30-40 per cent of the job market. Digitalisation will broaden this, especially as new tools are developed.

SR: We're seeing more companies use apps to interact with candidates well before they get to meet someone in person. The apps are useful for delivering information to the candidate in a more engaging manner while also gauging their interest.

HP: With the way that AI and machine learning are progressing, there's no reason that we couldn't have robots or avatars conducting interviews in the not-too-distant future. People can be screened based on facial expressions and other subtle non-verbal forms of communication, things that would be useful for, say, a customer service role.

But do you think technology has the potential to make recruiting more impersonal?

PS: Not at all. Companies know that this younger generation wants their voice heard and to feel like they can have a positive impact on what they're doing. They're taking steps to complement technology with engagement.

We're seeing more companies develop discussion groups involving a number of potential candidates as part of the recruitment process. This helps them glean valuable feedback while the candidates themselves feel more like their ideas are being taken into account.

TS: It's important that companies reach workers at all levels. Today's field worker can become tomorrow's project engineer. But the industry is really struggling to appeal to potential craftsmen. If the industry doesn't attract an ample number of field workers today, there is going to be a major lack of talented supervisors and managers in 20 years' time.

How do you think digitalisation will shape the workplace of the future?

PS: It boils down to one word: agility. With digitalisation, every aspect of how a project works is going to be more agile – from how teams are constructed down to the utilisation of capital equipment. People are going to be more agile, simultaneously working on projects across multiple geographies from a single location. This will accelerate the pace of projects, especially as they're split into modular chunks and built around shorter lifecycles.

TS: I think the success of technology will rely on how much companies are invested in it. Without the right content, data or intelligence, technology loses its power. And the pace of advancement is so fast today that you have to stay up-to-date, or any data you have will be increasingly obsolete.

Both workers and companies will have to be patient and remember that technology constantly evolves. No one is going to learn everything they need to overnight. Those that will succeed will be the ones that are pragmatic enough to know that there is always something more to be learned.

SR: We're seeing the beginnings of human-machine collaboration, a conjoined effort to extract the potential that lies within data to enhance the way people work. This collaboration centres on developing the digital capabilities and awareness of the workforce. It helps to make upskilling and multiskilling a reality. You don't have to be a coding or algorithmic expert to succeed in a digitalised world, but you do need to be able to understand the data in front of you to make better decisions and lead your teams in a more informed way.

HP: Touching upon what was said earlier, digitalisation will help create a more diverse working environment. There simply aren't enough people available in the oil and gas sector for companies to continue only hiring from within. Digitalisation introduces a skills fluidity, where it becomes easier for someone from a sector like mining or aerospace to move into oil and gas.

Companies are going to have to be more open-minded about who they hire. And this goes well beyond people from other sectors or industries. Women and minorities must make up more of the workforce for the industry to remain viable in the long-run.

This broad mix of backgrounds will introduce new ways of thinking and, along with the technology itself, help spur innovation. Together, digitalisation and diversity will propel the industry forward. ■

GETI is the world's largest energy recruitment and employment trends report, featuring insights from more than 20,000 energy professionals and hiring managers in 163 countries. To download this year's report, please visit: https://www.getireport.com/download-report/.

Market outlook for Middle East onshore pipelines

Key projects will support sustained pipeline installation activity and expenditure from 2018-2022, says Katy Smith, Westwood Global Energy.

THE MIDDLE EAST accounted for 12 per cent of global capital expenditure on pipelines over 2013-2017, and following a significant increase in 2017, Westwood expects to see sustained levels of installation activity and expenditure over 2018-2022. Expenditure within the region over the next four years will be supported by a number of large projects, including the 1,700km Iraq-Jordan pipeline, as well as pipeline packages for Phase 2 of the Master Gas System Expansion in Saudi Arabia. As the number of ageing pipelines within the region increases, Westwood expects operational expenditure within the region to rise by 13 per cent through to 2022, with the Middle East forecast to account for 15 per cent of global Opex over 2018-2022.

Following a considerable decline in activity over 2014-2016, capital expenditure for onshore pipeline projects in the Middle East rose by 43 per cent in 2017, from US$2.6bn to US$3.7bn. This rise in spending was driven by a significant increase in installation activity, with the number of additional kilometres installed rising by 36 per cent. Key projects contributing to this growth in activity include 838km of pipeline for Phase 2 of the Master Gas System Expansion in Saudi Arabia, as well as the segment of the Trans-Anatolian (TANAP) natural gas pipeline located in Turkey. Iran also commenced construction work in 2017 on the 154km Miandoab-Tabriz pipeline to transport ethylene for use in petrochemical production.

Sustained installation activity

As detailed in the *World Onshore Pipelines Market Forecast Report 2018-2022*, Westwood expects to see sustained levels of installation activity over the 2018-2022 period, with the number of additional kilometres installed forecast to rise at a 0.8 per cent CAGR through to 2022. Notable projects expected to support installation activity over the forecast include the 1,770km Iraq-Jordan crude oil pipeline, as well as the 400km Yanbu-North Jeddah gasoline and jet fuel pipelines in Saudi Arabia.

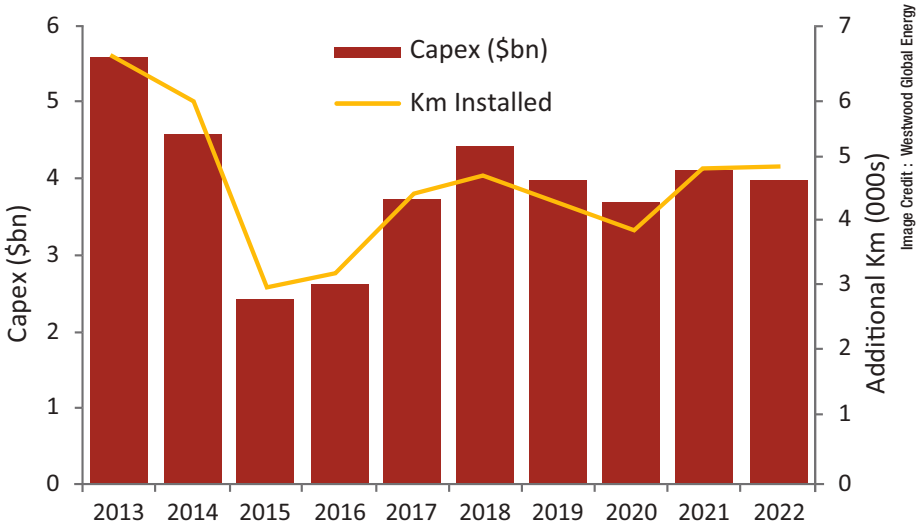

Figure 1: Middle East capital expenditure and additional km, 2013-2022

There are several large pipeline projects also planned in Iran, including the 1,200km IGAT XI natural gas pipeline from Ahvaz to Bazargan, making the country a large contributor to forecast installation activity within the region. However, the decision by the USA in May 2018 to abandon the Joint Comprehensive Plan of Action (JCPOA) agreement and reimpose sanctions on Iran represents a significant downside risk for future activity, in terms of Iran's ability to secure investment, which could potentially result in delays to projects. Political insecurity within the region also remains a barrier to installation, with the Iraq-Jordan pipeline having been re-routed to avoid territory controlled by ISIS.

> "Capital expenditure for onshore pipeline projects in the Middle East rose by 43 per cent in 2017"

Despite the trend in forecast installation activity within the region, capital expenditure is forecast to decline at a CAGR of three per cent over 2018-2022, reaching just over US$4.0bn in 2022. This is due to the majority of additional kilometres installed over the forecast period being allocated to less Capex-intensive, smaller diameter pipelines. Notably, whilst installation activity for medium (24-41 inch) and large (42+ inch) diameter pipelines is expected to decline over the forecast, the number of additional kilometres installed for small-diameter pipelines (0-23 inch) is forecast to increase by 68 per cent over 2018-2022.This growth will be driven by installation activity for projects such as the Yanbu-North Jeddah gasoline pipeline in Saudi Arabia. Despite this trend, however, medium diameter pipelines (24-41 inch) will still account for the largest proportion of installation activity over 2018-2022, representing 52 per cent of forecast additional kilometres installed. Key projects falling within this diameter banding include the Iraq-Jordan oil pipeline.

Operational expenditure expected to continue to rise

The Middle East accounted for 15 per cent of the global installed base of onshore pipelines in 2017. Regional operational expenditure increased at a CAGR of two per cent over 2013-2017, and is expected to continue rising by 13 per cent over the 2018-2022 period. Liquids pipelines accounted for the majority of operational expenditure within the region in 2013-2017, representing 60 per cent of total spending. This trend is expected to continue over 2018-2022, with important projects such as the 450km Al-Zour refinery oil pipelines and the 165km Lower Fars heavy oil development pipeline in Kuwait expected to contribute to operational expenditure on liquids pipelines over the forecast. Notably, Italy's Saipem was awarded an engineering, procurement, construction, and commissioning contract for the Al-Zour refinery pipelines in August 2017.

> "Regional operational expenditure is expected to continue rising by 13 per cent over the 2018-2022 period"

Small-diameter pipelines (0-23 inch) accounted for 85 per cent of regional operational expenditure over 2013-2017, and will continue to represent the largest share of the market over the forecast. Key small-diameter pipelines due to come online over the 2018-2022 period include the 300km natural gas liquids (NGL) pipeline for the Liwa Plastics petrochemicals project in Oman, as well as the Yanbu-North Jeddah gasoline pipeline in Saudi Arabia. Despite this overall trend, operational expenditure for large diameter pipelines (42+ inch) is expected to see the strongest growth over the forecast, rising by 40 per cent to reach 4,314m in 2022. This growth will be driven by the completion of a number of projects, including the pipeline packages for Phase 2 of the Master Gas System Expansion, as well as a 200km onshore section of the TurkishStream pipeline.

Operations expenditure, consisting of routine activities associated with the day-to-day operation of the pipeline facility (including routine monitoring and chemical cleaning of the pipeline, as well as any routine pigging), accounted for the majority of operational expenditure over 2013-2017, representing 59 per cent of the market, and Westwood expects this trend to continue over 2018-2022. Expenditure associated with the operation and maintenance (O&M) of pipeline stations (barring replacement costs) is also expected to account for a significant proportion of operational expenditure in the Middle East over the forecast, representing 19 per cent of the market.

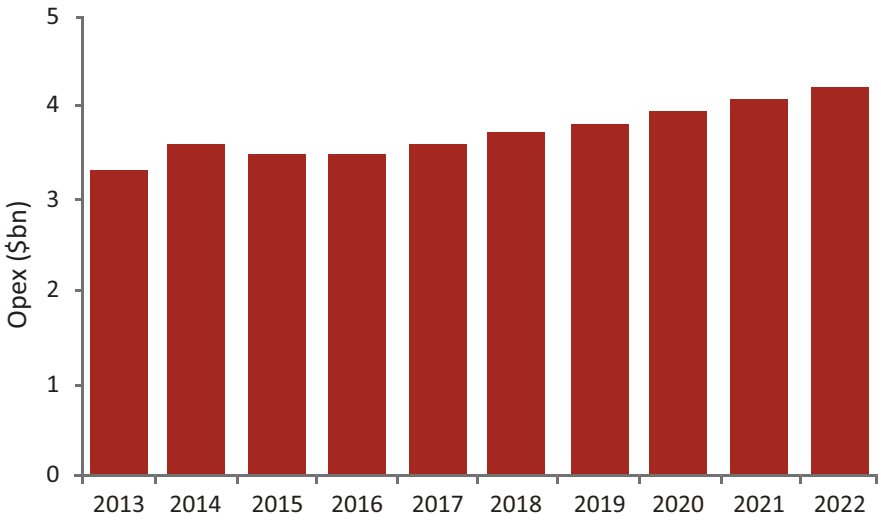

Image Credit : Westwood Global Energy

Figure 2: Middle East operational expenditure 2013-2022

The Middle East is expected to remain a vital market for onshore pipeline installation, with expenditure over 2018-2022 expected to be driven by the installation and completion of a number of large projects. Geopolitical tensions will continue to act as an obstacle to future installation activity within the region. Notably, the decision by the USA to abandon the JCPOA and reimpose sanctions on Iran represents a significant downside risk in terms of the country's ability to secure investment, which could potentially result in delays to planned onshore pipeline projects. ■

Katy Smith joined Westwood Global Energy in June 2014, and since then has worked on three successive editions of the 'World Onshore Pipelines Market Forecast' report as well as several other Westwood Energy reports. www.westwoodenergy.com

Pipeline construction – a virtual process

THE FUTURE OF managing pipeline construction projects over many miles can be viewed in a virtual environment, so that the wastes and value opportunities, such as increased resource utilisation, are readily identified. This 'digital twinning' approach significantly improves productivity, feeding the virtual equivalent with operational data to help optimise production, realise efficiencies and improve visibility.

A white paper from Lloyds Register describes how virtual lean pipeline construction using geographic information systems, (GIS), webviewers, dashboards, and mobile applications can help you reduce waste and enhance visibility, accuracy, regulatory compliance and project efficiency.

https://www.lr.org/en/insights/articles/pipeline-construction-a-virtual-process/

Saipem awarded major Middle East pipeline contract

SAIPEM HAS BEEN awarded a pipeline project offshore Middle East worth approximately US$1.3bn.

The contract involves engineering, procurement, construction and installation (EPCI) activities associated to two 32-inch export pipelines, two 24-inch corrosion-resistant alloy (CRA) intrafield pipelines, risers, spool pieces and subsea structures, also entailing a short onshore section and offshore brownfield topsides modifications.

The award includes the novation of substantial CRA line pipe and long lead items contracts.

The company comments that the contract will further cement its presence in the Middle East and marks the recognition of its leading position in the engineering of long underwater pipelines. It also underlines the company's commitment to innovation and technological development; the pipeline will be engineered using Saipem's patented internal plasma welding technology, which the company says represents a significant advance in the welding of clad pipelines and makes an important contribution to the safety and quality of offshore operations.

KUWAIT HEALTH, SAFETY & SECURITY Forum 2018

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Prevent | Protect | Prepare

INTRODUCTION

The top five themes in the Vision 2035 plan of Kuwait mainly focuse on achieving a caring and cohesive society where citizens will benefit from high quality healthcare, infrastructure and habitat. Central to the plan is the ambition to transform Kuwait into a world class financial and commercial centre. This, in turn, promotes production efficiency, protects values, safeguards social identity and creates an inspiring business environment.

Health Safety & Security Review is honoured to present "Health Safety & Security Forum Kuwait 2018 " on 24-25 September 2018, Kuwait City, Kuwait. The event will attract visionary HSE experts from diverse industry segments in an effort to promote occupational health, adequate and safe work environment and enhance productivity. Alongside the conference, there will be exhibitors to showcase the latest technologies, products and services.

ABOUT THE SUMMIT

HEALTH, SAFETY & SECURITY FORUM KUWAIT 2018 is the premier forum highlighting the best practices, process improvements, technological advancements and innovative applications to enhance HSE performance in Kuwait. It provides a neutral forum where a wide range of perspectives and concerns from a variety of stakeholders can be explored.

This event will convene in Kuwait, a major hub for the oil, gas and construction industries, all at the forefront of sustainable development. This year's conference will focus on the need for collaboration. In light of the current global climate, it is essential to maximise HSE programmes to help meet the needs of shareholders and stakeholders alike. This year's edition will gather industry experts to network and share the case studies and presentations, illustrate challenges, successes and new implementations and innovations which drive businesses today. The HSS Forum will focus on the major challenges in the sector and usher best practices to drive innovation and growth.

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Addressing leak detection challenges

Atmos International discusses the leak detection challenges on produced water and crude gathering networks, and the benefits of the Statistical Corrected Volume Balance system.

It is prudent to consider cost-effective options for leak detection on produced water pipelines

Image Credit : Atmos

OIL PRODUCERS LAID hundreds of miles of gathering pipelines from 2009 to 2017 to keep pace with the shale boom across North America. Produced water production has increased exponentially with oil and gas production. US oil and gas wells alone now produce over one trillion gallons per year of produced water, which must be contained and transported to disposal or reclamation sites. The everyday use of trucks to carry this dirty water creates its challenges such as cost, safety and traffic congestion. A Barclays report stated, "Reducing transportation costs will inevitably drive investment in pipeline infrastructure for both produced water and freshwater. Although building pipeline infrastructure carries a high upfront capital expenditure, it reduces operating expenses down the line."

Produced water, like crude oil, is considered hazardous to the environment. It is prudent to consider cost-effective options for leak detection on these pipelines as well as on the crude gathering networks.

The produced water pipeline infrastructure gathers produced water from temporary storage available at production sites and typically uses automatic pumping to transport the produced water to temporary storage, to a disposal site, or a reclamation facility. The crude gathering network collects crude from the wells and carries it to temporary storage or delivers it directly into a transportation pipeline. Crude gathering networks and the produced water networks typically share some unique challenges for leak detection:

- Product composition is variable depending on the specific well, the production field, and the region, and there are usually no density measurements available to the SCADA from each well
- Gathering networks can have many injections and deliveries
- Implementation speed; well-pads can be added weekly as new production come online

> "Crude gathering networks and the produced water networks share unique challenges for leak detection"

- Dynamic nature of injecting from numerous wells at different flow rates
- Limited access to the right-of-ways to add instrumentation at the branch connections, so typically there is only flow and pressure data available from the LACT units at the wells and at the outlet
- Constrained communications bandwidth limits the SCADA update rate to minutes at best
- Draining can cause slack in the network pipelines filling as injection pumps operate intermittently.

Such challenges explain why many leak detection methods that work on transmission pipelines may be unsuitable for a gathering system or produced water system. Factors that influence the performance of leak detection technology for these upstream systems include the number and quality of sensors on the pipeline; availability and quality of the telecommunications system; and pipeline operating scenarios, such as transient events from continuous start and stop of injections and deliveries and slack flow conditions.

Pumps on the wells at inlets of a gathering system frequently start and stop and flow rates change frequently; there is seldom a steady state as normal operating conditions tend to always be transient. Some technologies are hard-pressed to cope with transient behaviour and must desensitise to avoid frequent false leak alarms.

The only two systems with the ability to successfully detect leaks during transient conditions are the Statistical Corrected Volume Balance system and, to a lesser extent, the Real-time Transient Model (RTTM) system. The Statistical Corrected Volume Balance system can detect leaks under all operating scenarios; shut-in, running, and transient operation. The RTTM system, on the other hand, must raise the minimum detectable leak size threshold during transient operations (virtually all the time in gathering lines) to reduce false leak alarms, and may require additional costly instrumentation.

Real-time transient model (RTTM) based leak detection

A well-maintained RTTM that accurately models the real-life behaviour of a pipeline can provide good leak detection on transportation pipelines. However, as explained above, the nature of produced water and crude oil gathering networks make them impossible to model with reasonable certainty. The RTTMs cannot accurately model the transient behaviours caused by pumps frequently stopping and starting across the network and must degrade leak detection at such times to avoid frequent false leak alarms.

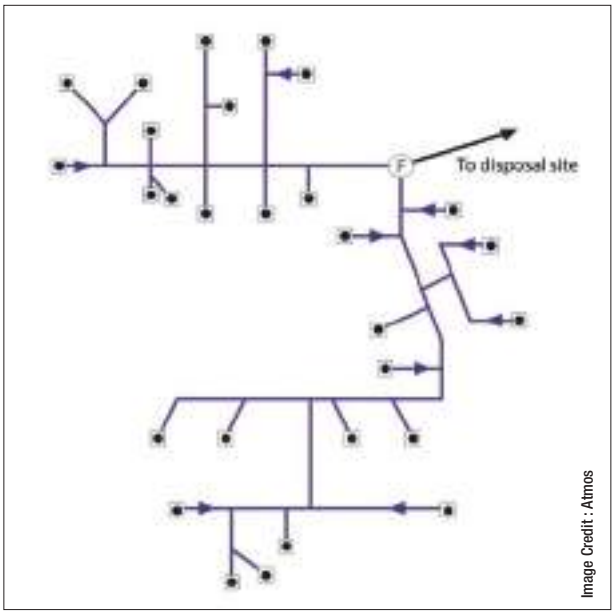

Figure 1: Part of a produced water gathering system

An RTTM cannot accurately model the continually shifting composition and viscosity of the crude or the produced water rising from the well-pads. The product compositions frequently change in each well-pad, change from well-pad to well-pad, and from oilfield to oilfield. The time taken to model additional pipeline sections as new wells come online makes it difficult to have an effective RTTM-based leak detection system. Furthermore, an RTTM requires accurate product temperature and density readings from the field, and these are seldom available.

> “This cost-effective system detects and locates leaks during transient operations”

Statistical corrected volume balance (SCVB)

The statistical corrected volume balance leak detection system has been successfully deployed on numerous crude gathering systems and produced water pipelines, and is the prevalent method used in the new shale boom pipelines because it has demonstrated significant advantages over the other methods in real-life applications and rigorous testing in the field. For example, the RTTM and volume balance methods rely on accuracy, whereas, the statistical corrected volume balance leak detection system relies more on the repeatability of the measurements, making statistical corrected volume balance the better choice regarding instrumentation requirement and scan rate.

The statistical corrected volume balance system can achieve good reliability and sensitivity even with existing instrumentation of limited accuracy if the meters are repeatable, avoiding the high capital investment to upgrade instrumentation accurate enough to support an RTTM.

Based on the instrumentation requirements, infrastructure needed to support the CPM scan rate, transient functionality, and high tolerance of composition change, the Statistical Corrected Volume Balance (SCVB) technology is the most suitable for gathering systems.

The statistical volume balance system proved itself when installed on a produced water network with multiple injections in Canadian winter conditions. It detected a leak at a well-pad in the first quarter of 2018 and located the leak with sufficient accuracy to allow the producer to quickly minimise the damage.

Another successful example is the statistically corrected volume balance leak detection system installed on a large produced water gathering system in Texas (see Figure 1). This gathering system has multiple sectionalising flow meters to segment the network into separate hydraulic sections. The separation allows the client to optimise the performance of the leak detection system in each segment and maintain sensitivity as the produced water network expands unceasingly.

The leak detection system can detect a minimum leak one per cent of the nominal flow in 60 minutes in some sections, and can detect a minimum leak of two per cent of the nominal flow in 60 minutes in the remaining sections. These thresholds are set to assure high reliability to minimise disruption to operations from false leak alarms.

Conclusions

With a rising demand for nimble, efficient and cost-effective pipeline leak detection, the statistical corrected volume balance technology has proven to be the most suitable and reliable leak detection technology for gathering systems. Field deployments show the SCVB LDS functions well with minimum instrumentation and slow data scan rates. Independent, third-party trials have proven that this cost-effective system detects and locates leaks during transient operations, and easily tolerates changes in product composition. This system continues to prove itself in the production fields, detecting real leaks quickly. ■

This is an edited version of an article by Atmos International, www.atmosi.com.

New leak detection and prevention technology

CANADA-BASED INGU SOLUTIONS has been selected to demonstrate its leak detection and prevention technology for oil and gas pipelines in the US state of North Dakota. Ingu will deploy its Pipers technology in operational pipelines during 2018. Ingu Solutions was chosen by iPIPE (intelligent Pipeline Integrity Program), a US$4 million research and development programme focused on advancing new technologies to prevent and detect pipeline leaks.

Image credit: Nes Jerry/Adobe Stock

The solution will be deployed on pipelines in North Dakota

Ingu's Pipers solution uses miniaturised inline sensors to detect leaks, geometric defects and deposits that threaten pipeline performance and safety. Pipers eliminate the need for human intervention, reducing inspection costs, strengthening preventive maintenance, and lowering repair and replacement expenditures. Pipers are small enough to reach areas that are currently too difficult or expensive to inspect.

"We are changing the economics of pipeline inspection," said Ingu CEO John van Pol. "North Dakota offers us the opportunity to demonstrate how simple and efficient inline inspections can be using state-of-the-art technology small enough to fit in the palm of your hand."

White paper on ultrasonic inline inspection

NDT GLOBAL HAS published a white paper on *'The Evolution of Ultrasonic Inline Inspection'*, which can be downloaded at https://www.ndt-global.com.

Guaranteeing the safe operational conditions of pipelines is paramount to any integrity management programme. Intelligent inline inspection (ILI) tools are widely used throughout the industry for the early detection of potentially hazardous pipeline anomalies (e.g., metal loss) as well as their precise sizing, thus providing reliable input data for integrity assessment. Ultrasonic technology (UT) is the most accurate and reliable iteration of ILI technology available today. These inspection tools record data while travelling through the entire pipeline from launcher to receiver. For the inspection of liquid pipelines, ultrasonic tools offer specific advantages with regard to resolution as well as to measurement accuracy, and have been considerably improved by taking advantage of the progress in electronics, data processing technology, and data storage capabilities made available from other application areas. For example, the current achieved measuring resolution allows for the reliable detection of tiny pinholes at higher inspection speeds than previously available.

Corrosion protection solution

CORTEC HAS INTRODOUCED its CorroLogic VpCI technology, a specialised product range for preventing corrosion of pipelines and extending a pipeline's structural life. Corrologic CorrCaps powered by Nano VpCI are heavy wall black polyethylene pipe caps containing proprietary Vapour phase Corrosion Inhibitors (VpCI). By providing multi-metal corrosion protection, CorrCaps protect pipe threads, pipe ends and other tubular objects from corrosion, mechanical damage, and contamination during transit, handling, and storage. CorrCaps are available in a variety of sizes to fit any standard pipe diameter.

Image credit: Cortec

The product range prevents pipeline corrosion and extends the pipeline's structural life

Corrologic Tube Strips powered by Nano VpCI are also designed for protection of tubes, pipes, or conduits in storage or during shipping. Using VpCI technology, Corrologic Tube Strips make it possible to protect the interior of a tube or pipe against corrosion without expensive internal coatings. The flexible strip has a 8.5 mm diameter. It is extruded from low density polyethylene containing a proprietary VpCI compound designed for protection of ferrous and non-ferrous metals and alloys. Tube Strips are especially effective on more expensive stainless steel and aluminum pipes. Tube Strip is placed inside the tube or pipe, which is then capped or sealed. Within hours, the vapours from the pipe strip saturate the enclosed air space. Even in the presence of water vapour (high humidity conditions), the VpCI vapours passivate the metal surface, thus halting the process of corrosion.

AUV with robot arm for subsea pipeline inspection

JAPAN'S KAWASAKI HEAVY Industries has signed a basic agreement with The Underwater Centre (TUC), a marine testing and training facility in Fort William, Scotland, UK, on conducting a verification test of a prototype AUV equipped with a robot arm for subsea pipeline inspection. The test, scheduled for October 2018, will be the first such test in the world, according to the company.

With a focus on the growing demand for pipeline maintenance in offshore oil and gas fields, Kawasaki has been developing leading-edge component technologies for AUVs, based on sophisticated submarine technologies fostered in-house over many years. Aiming at commercialisation in FY 2020, Kawasaki is currently developing an AUV capable of underwater charging and transferring of inspection data to the mother ship features that allow for longer deployment time —while autonomously locating and tracking pipelines at close range, including those buried under seabed sediment.

Image credit: The Underwater Centre

The AUV during testing

In November 2017, Kawasaki successfully completed a verification test at TUC for automated underwater docking of a prototype AUV to its charging station, involving contactless charging and large-capacity optical communication.

For the upcoming test, Kawasaki plans to use a prototype AUV equipped with a robot arm with an attached inspection tool unit (currently under development), to achieve autonomous locating and tracking of subsea pipelines. The test will focus on verifying the robot arm's capability to absorb the movement of the AUV due to tidal currents, and on verifying that the inspection tool unit can continuously track a pipeline under those conditions.

Extending the life of subsea cables

Viper Innovations outlines a proven technology for improving subsea cable insulation without costly intervention.

SUBSEA ELECTRICAL SYSTEMS face a number of risks to their integrity. The cost of a failure of such a system can run into millions in terms of lost production and repairs. The return on investment of a system that can maximise system availability and integrity can, therefore, be rapid. Modern technology offers solutions that can reduce the cost of repairs or, in the case of Viper V-LIFE technology, actually heal subsea cables without the need for costly intervention.

The technology is particularly appropriate for warmer waters where there is more marine life and therefore greater insulation degradation

Image Credit : markhall70/Adobe Stock)

Subsea failure modes

There are a number of failure modes from which subsea electrical systems are at risk, which may result in system degradation or breakdown. Failures may occur due to flaws in system design, installation problems, the harsh operating environment, or component manufacture/assembly faults. Every electrical jumper, connector or penetrator is a potential source of failure. Indeed, most of the commonly used insulation materials experience develop 'water trees' (a phenomenon created by the combination of high voltage electrical stress and the presence of water which eventually leads to water ingress) or experience other water ingress simply due to being submerged in saltwater over periods of time.

With so many potential problem areas, high penalties for system failure, and evidence that faults will occur despite best testing efforts, it makes sense for operators to install continuous electrical integrity monitoring systems. These Line Insulation Monitoring (LIM) devices generally measure the Insulation Resistance (IR) of each of the power circuits in the system, typically by impressing a signal voltage between the AC power supply conductors and 'ground' and measuring the resulting leakage current. Resulting measurements can then be trended to predict when failures are likely to occur. To provide accurate and stable readings, LIM devices need to work well at the lower levels of IR experienced with degraded systems, and particularly with long cable lengths.

Getting more detailed diagnostics

Installing LIM units at the topside power supply only provides a limited picture of what is happening below the water surface. Measurements from a single point do not provide information about where any fault is in the network so that a suitable intervention can be planned. Separate monitoring of each distribution leg within the system overcomes this limitation.

> "Operators now have an alternative to passive monitoring"

Preventative measures

The problem is that LIM units only provide the operator with information about when a failure is likely to occur. While devices that are designed to provide more detailed information about when and where a failure is likely give the operator the opportunity to minimise the impact of such a failure, such systems do not prevent or delay the breakdown in system integrity.

Operators now have an alternative to passive monitoring with technology which actively heals low IR and minimises or even mitigates the impact of water ingress into subsea insulation for AC power and signal communication lines. Viper V-LIFE technology uses electro-kinetic and electrochemical processes to not only measure but also increase IR in subsea cables. With the system already in active use with major oil operators, it has been proven to offer significant benefits and extend the life of failing umbilicals without subsea intervention.

With the high cost of subsea failures, every operator is ultimately aiming for higher system availability. This can be maximised with consideration of design, manufacture and test of the system to increase fault tolerance and reduce risk of performance degradation. However, it has been shown that systems beneath the sea still degrade, and current levels of testing do not expose the system to the rigours it experiences once installed.

Modern monitoring solutions can provide a clearer picture about limits of IR, fault isolation and time to failure to give operators the opportunity to minimise the impact of failure modes and maximise system availability. Where suitable for the application, the use of active healing technology has also been shown to increase the life of umbilicals and mitigate previously unavoidable degradation to the point of failure. ■

Designing a suitable pumping system

Jörg Eitler, global head of business field oil & gas upstream, NETZSCH Pumpen & Systeme GmbH, describes how the company designed a progressing cavity pump (PCP) system with submersible drive to transport a multiphase mixture from an underground deposit.

"AROUND 30 YEARS ago, 5P Energy had started to use an underground deposit for gas storage," explains Eitler. "After a few years, however, it became evident during pumping of the medium that the geological horizon in which it was stored had emitted substantial oil quantities into the gas." This prompted a detailed production and profitability analysis which showed that a conversion from gas to oil production for this bed was economically viable.

A suitable pump system had to be acquired to reliably transport the crude oil to the surface from a depth of more than 1,200m. As the medium was a multi-phase mixture with a very high gas content, the usual centrifugal pumps with submersible drive were not an option due to the high risk of failure from gas lock, while the progressing cavity pumps with above-ground drive – as commonly used in Central Europe – posed the risk of a blowout on the surface, in case of extreme pressure on the dynamic seal.

"Due to the special displacement principle, which ensures a high level of robustness towards the composition of the medium, we only considered a solution based on the progressing cavity pump technology from the outset," Eitler recalls. Conventional pumping systems soon reach their limits if consistencies vary, which results in interruptions, loss of pressure and material damage. For progressing cavity pumps, on the other hand, consistency and viscosity of the medium are not relevant to the flow. Multi-phase pumps from NETZSCH can therefore also handle mixtures of oil and water with sand or gas, reaching flow rates of 300 to 400 m³/day.

NETZSCH designed a PCP system with underground drive, PMM and special control to address the issue

> "We only considered a solution based on progressing cavity pump technology from the outset"

To exclude the possibility of overloading the dynamic seal on the surface, and therefore a blowout, NETZSCH suggested the use of a progressing cavity pump which is driven underground – the NETZSCH ESPCP. "The special feature of this pump is that the rotor is not driven via a very long shaft or linkage from a drive head on the surface, but rather the rotor-stator combination and the motor are sunk into the well," Eitler explains. In addition, the dynamic seal is also located in the 1,200m deep well. This moved all critical components of the pumping solution below ground, precluding environmental impact from leaks above ground.

The motor for the system is a permanent magnet model (PMM) with special SPMM control which can ensure flexible flow rates. "In old wells, the flow rates fluctuate in a very limited range. For this project, however, we do not yet have any current inflow data – that means no productivity index – so that extreme fluctuations of up to 500 per cent are possible," Eitler says. "On an installed pump, this type of variance can only be covered with a very large speed range of 1:5. This factor cannot be achieved with systems with above-ground drive – that was another reason to move the complete system into the well."

For the NETZSCH ESPCP, a special 10-pole PMM has been used, as this can provide the slow speed required for the PCP, in contrast to the usual submersible motors without submersible gearbox. "The submersible motors normally used for centrifugal submersible pumps have a speed of 3,000 or 1,500 rpm at 50 Hz – that is much too high for use with progressing cavity pumps," Eitler states. "A realistic speed is in the range between 100 and 400 rpm."

Thanks to the PMM motor and the precisely adapted SPSS control, the solution designed by NETZSCH reliably achieves speeds from 100 to 500 rpm. That can ensure the desired flow rate of 1:5 and therefore achieve maximum flexibility for changing inflow conditions.

The system has been successfully in use since May 2017. ■

Smart power solutions for efficiency and affordability

CATERPILLAR, WHICH HAS been helping customers with their oil and gas power solutions for more than 80 years, expects continued strong demand for both diesel and gas engines and generator sets in the production space for the oil and gas sector, with a wide range of power needs across applications. The company has been spearheading innovation in delivering power to rigs, continuously developing solutions to support the market for on-site power solutions for the oil and gas industry.

There are a number of technologies being developed to improve efficiency, affordability, and environmental performance for the oil and gas industry. For example, the Cat Smart Engine Management System (SEMS), which optimises engine operation, reduces costs, and increases rig productivity and profitability.

SEMS is a fully automated system that is programmable to driller specifications. Once running, the system starts and stops the engines used on high performance and demand. Touch screen displays give drillers remote control of the engines so they can make changes as needed. The system can be located anywhere on the rig's control network, including the Variable Frequency Drive/Selective Catalytic Reduction house and the driller's cabin. The continuous monitoring and engine performance reports allow drillers to identify inefficiencies, maintenance issues or engine warnings.

SEMS eliminates the debate about how many engines are needed online at a given time because the system will automate the process. This allows for optimisation of performance and operating costs based on programmable targets. Having fewer engines running at higher loads is more efficient and reduces fuel costs. One study demonstrated that a rig running with the SEMS reduced its fuel costs by 10 per cent over 5,000 hours of drilling.

Image Credit : Caterpillar

The EMCP 4.4 Generator Set controller, which can be used with SEMS

In addition to efficiency and reductions in fuel costs, the Smart Engine Management System also reduces engine maintenance and repair costs. The study demonstrated that drilling engines using the Smart Engine Management System accumulated 19 per cent fewer hours per day and extended regular maintenance intervals by the same amount.

From an environmental standpoint, better engine management results in reduced carbon footprint from lower engine operating hours and less greenhouse gas emissions from improved fuel consumption.

COELMO Generating Sets for an oilfield in southern Iraq

COELMO DESIGNS AND manufactures industrial and marine generating sets from 3 to 4,000 kVA since 1946. Coelmo Generating Sets for Oil & Gas applications guarantee high reliability and maximum security, and can be customised to withstand the harshest of conditions.

One of Coelmo's new projects is the Halfaya Project Surface Facility Phase Three CPF3 and CF2 Power Plant Expansion, OHTL and Switchyards (Iraq), for the development of the Halfaya oilfield.

Located in the southern region of Iraq, the Halfaya oilfield is a NW-SE trending anticline structure around 30 km long and 10 km wide. The project scope consists of design, supply, installation and site service of emergency diesel Generating Sets. In particular, one generating set of 1,800 kVA, one generating set of 700 kVA, one generating set of 350 kVA and three generating sets of 55 kVA, at site conditions.

Image Credit : Coelmo

Coelmo manufactures Generating Sets for applications ranging from Oil & Gas to Telecommunications

Operating at 400V three phase voltage and 50Hz frequency, each Generating Set is installed inside an outdoor shelter as a black start emergency diesel Generating Set in the oilfield for substation and security defence. Each is complete with IP23 alternator, class F protection, PMG excited, generator control panel, synchronisation panel, 10 hours integrated daily fuel tank and 48 hours external fuel tank, mechanical radiator cooling system, NFPA fuel system, oil system, residential muffler 85dBA, extended insulated exhaust system, ANSI standards protection relays, air circuit breaker removal type and batteries.

The Generating Sets are installed in an IP53 rated sound proof containerised version 85 dBA with special paint coating designed to withstand the environmental conditions.

They are designed for unattended operation and automatic start on mains failure, mains failure start signal or failure of the mains supply. Each Generating Set works in emergency and in parallel to the mains.

Image Credit : NEL

Meter calibration in TUV SUD NEL's UK flow measurement facility

Reducing operating costs with Big Data

Alick MacGillivray, senior consultant at NEL, discusses how Big Data and machine learning can promote cost-effective flow management.

IN THE MODERN digital world, a company's primary asset now is very often its operational and financial data. With the relentless advance of data storage capability and processor power, companies can handle large volumes of data for both improving efficiencies and strategic planning. However, what if the organisation is very large, or if there are several companies sharing information and the volume of data is huge?

This is where we get into the realm of what has become known as "Big Data". The volumes of data involved here are far too large to be stored on a single hard drive or a private company network. It has to be uploaded into "The Cloud", which is a platform in cyberspace which allows the storage and analysis of massive amounts of data. A series of specially designed analysis tools are then used to identify trends in the data that could be of benefit to the companies involved. Big Data is currently being used in a diverse range of applications such as healthcare, education, transportation, financial services and even in crime detection.

The amount of this data being stored and analysed is doubling every 18 months and is starting to touch many aspects of our lives, while at the same time changing the business landscape.

So how does the Big Data revolution apply to the oil and gas industry? Since the reduction of the oil price in 2014, oil and gas operating companies have focused on increasing the amount of oil and gas recovered from fields rather than by undertaking large amounts of capital investment. Boosting recovery factors in mature fields using existing assets (known as Enhanced Oil Recovery – EOR) makes much more economic sense than developing new fields using expensive new equipment.

The use of data in this way is a component of the digital oil field – a concept combining data acquisition and processing, integration and analysis of that data. To this end, some of the major producers have instigated collaborative projects with data analytics providers in an effort to make the most of their data. The objective of these projects is the following

- Gather together all of the disparate data acquired by an exploration and production operation
- Manage and integrate both structured and unstructured data into a unified set
- Store the data in the cloud
- Apply the predictive algorithms and data analytic techniques to the data
- Identify trends and make predictions that can have a beneficial effect on different parts of the business.

What data are required?

A typical exploration and production operation acquires, stores and processes a vast quantity of data. This encompasses seismic and geological data often acquired during the exploration phase, through to performance data from a large number of sensors used to monitor performance of operational assets. The upstream sector uses sensors measuring quantities such as temperature, pressure, density and flow rate. The capability and speed of these devices has recently increased dramatically as electronics and processing speed has advanced. Other data collected includes GPS coordinates, weather information and seismic data. All of this data is being collected every few seconds and so the volume of stored data will increase very quickly.

> "Some of the major producers have instigated collaborative projects with data analytics providers"

This type of numerical data is classed as "structured". That is, it can be read by specific software applications or is in a recognised digital format such as OPC. However, typically a significant proportion is classed as "unstructured". This comprises items such as emails, spreadsheets, word processing documents and multimedia. This makes them difficult to store and therefore analyse as part of a larger data set. This can be achieved by using tools that can integrate these diverse data into a unified data set. It is then possible to derive insight into relationships that will be identified when all of the data are processed as a whole.

Where will it help?

The analysis of a vast volume of historical meter calibrations and future live data streams could significantly increase knowledge in key areas, improving flow assurance, while

minimising costs by reducing the need for time-based calibrations. One such area is predictive maintenance. as predicting the time until a device fails can be of help during production operations. This can be achieved by combining data about pressure, temperature and flow rates with information data and data on the past history of equipment failure.

Production is another area where big data analysis could deliver significant operational and cost benefits. Being able to predict future production levels using past performance data can be used to target assets at areas of highest production. It is also possible to increase field recovery factors by integrating and then analysing seismic, drilling and production data. Big Data can help in this way to optimise Enhanced Oil Recovery.

> “Together, these improvements could save industry a substantial amount of money”

The big future

The influence of Big Data is being felt across all sectors of industry, and in the oil and gas industry, its use is still at an early stage. However, some of the larger operating companies have begun collaborating with IT providers to introduce big data analysis to improve their performance. For example, as the custodian of the UK flow measurement standard, we produce large amounts of data during the testing and calibration of instrumentation. We have therefore employed contractors with knowledge of data analytics to identify trends and characterise behaviour in the data acquired from flow meters. This will assist in the evaluation of the degree of drift of meters between calibrations, and deliver more detailed information about how this varies between different technologies and different manufacturers of the similar technologies.

The overall aim of our use of Big Data in this context is to assist industry to optimise the process of selecting the most suitable and cost-effective flow measurement technologies and to support a risk based approach to calibration – that is calibration when required, and not based on a fixed period as is done now. Together, these improvements could save

Alick MacGillivray, senior consultant, NEL

industry a substantial amount of money, and it is therefore anticipated that the application of big data to the oil and gas sector will increase quickly, playing a significant role in driving efficiencies in the near future. ■

NEL is a world-class provider of technical consultancy, research, testing and programme management services. Part of the TÜV SÜD Group, NEL is also a global centre of excellence for flow measurement and fluid flow systems and is the UK’s National Measurement Institute for Flow Measurement.

Emerson launches new exploration and production software

EMERSON HAS ANNOUNCED the release of the Paradigm™ 18 integrated software solution suite, running on a unifying platform for generating high-resolution images and models of the subsurface.

This release includes advanced technologies that use reservoir intelligence to help customers improve performance, enhance operational certainty and support effective asset management.

Designed to optimise result accuracy while allowing users to work faster and more productively, Paradigm 18 aims to provide

- Artificial intelligence (AI) capabilities that enable quick and reliable identification of geologic facies from seismic data and wellbore data
- Seamless unification of the user interface and data management, from seismic processing to interpretation and modelling, enabling faster results with less effort
- Support for cloud hosting, making it easier than ever for remote teams to work together
- High-resolution processing, imaging, interpretation and modelling geoscience software, delivering more accurate subsurface models

New features include capabilities that improve user productivity in high-resolution seismic processing and imaging and interpretation, more options for quantitative seismic interpretation and reservoir characterisation, new enhancements to geomechanics, wellbore stability and production logging, and an extension of the petrophysical uncertainty functionality in Geolog®.

“Oil and gas companies today are under great pressure to optimise their drilling results,” said Somesh Singh, chief product officer for E&P software business at Emerson Automation Solutions.

“The new enhancements in Paradigm 18 will enable our users to connect their subsurface technology to operational activities, helping them make the right decisions regarding their drilling strategies.”

Honeywell launches new gas metering system

HONEYWELL HAS LAUNCHED a new gas metering solution to provide health monitoring of midstream metering systems for operations, maintenance and leadership teams.

Honeywell Connected Plant Measurement IQ for gas aims to enhance the metering operation’s reliability and safety while cutting costs by reducing the need for site visits.

“With advanced diagnostics, at-a-glance dashboards and intelligence analytics, Measurement IQ enables operators to increase metering reliability in the face of skills shortages, dispersed operations and a complex hydrocarbon mix. Users can detect and correct costly mismeasurement, anticipate equipment failure, reduce gas losses and eliminate unnecessary maintenance,” said the company.

“Traditionally, it’s been difficult to get metering diagnostics and meaningful analytics from the metering stations to others in the organisation, and no one had visibility of the whole operation,” said Eric Bras, product marketing manager at Honeywell Process Solutions (HPS).

“Users can access real-time diagnostics and collaborate to find the best solutions, wherever they are. Engineers can diagnose faults before they go to the metering station, operators get real-time alerts when key parameters exceed limits, and leadership can connect people and draw on expertise across the enterprise,” added Bras.

Measurement IQ connects assets across all enterprise metering stations and captures the data in Honeywell’s secure data centre. Users can connect on a device with a web browser and receive customisable alerts on their mobile phone with Honeywell’s Experion® App.

The Connected Plant solution monitors for significant changes in the flow meter, process and environment in which it operates. It anticipates problems and enables users to move from time-based or risk-based recalibration of meters to condition-based monitoring with calibrations only when required. Historical diagnostic data can be used as a basis to extend calibration intervals specified by regulatory authorities.

EOR - retrieving every last drop

Moin Siddiqui, economist, discusses the various forms of enhanced oil recovery (EOR) and their application in the Middle East.

Image Credit : Sergiy Serdyuk/Adobe Stock

The Middle East is home to a rising number of ageing wells

AS THE WORLD continues to consume more energy and proven hydrocarbons resources are gradually depleting, innovative tools for extracting oil and gas from identified reservoirs are being developed. Enhanced oil recovery (EOR) technologies have gained significance in the industry by allowing for almost complete oilfield extraction, thus maximising the value of hydrocarbons reseves.

The term 'EOR' refers to various techniques or methods where physical and chemical properties of the reservoir rock are changed to improve hydrocarbons recovery. The properties of the reservoir fluid system affected by EOR process are chemical, biochemical, density, miscibility, interfacial tension/surface tension, viscosity and thermal. It is a more capital-intensive process to increase 'cumulative oil produced' (mainly from matured-ageing wells), when conventional techniques are obsolete. The term 'quaternary recovery' is also applied when referring to more advanced, speculative EOR techniques for extracting crude oil from 'probable or possible' reserves [1].

Crude production is divided into three phases: 'primary' recovery relying on naturally occurring pressure within the reservoir to push oil to the surface or those utilising artificial lift devices, such as pump jacks; 'secondary' recovery deploying water-flooding or by pumping [compressed gasses] into the reservoir, displacing the oil and driving it to the surface); and 'tertiary' (or EOR) – used in fields containing heavy oils and poor permeability – by applying steam to change the physical properties of hydrocarbons – hence restoring formation pressure and raising oil displacement in the reservoir. According to the US Department of Energy, the first two phases could leave three quarters of the oil unrecovered. The global average recovery factor for a typical oilfield is around 30-40 per cent.

> "The global average recovery factor for a typical oilfield is around 30-40 per cent"

Oil extracted via primary recovery accounts for five to 15 per cent of total reservoir, while secondary methods could extract around 20 to 60 per cent of 'Oil-in-Place' (i.e. estimated amount of oil in a reservoir). By using tertiary extraction procedures, the ultimate recovery rate could reach 60-90 per cent from the reservoir, which is remaining after standard production methods. Hence, EOR technologies allow oil extractors to make optimal use of existing infrastructure.

Tertiary techniques

There are 'three' basic EOR techniques: gas injection; thermal injection; and chemical injection – each of which has varying implications on cost, efficiency and safety. The first method injects natural gas, nitrogen or carbon dioxide (CO_2) into the oil formation. The gases can either expand and push additional oil to a production wellbore, or dissolve in the oil to decrease its viscosity, thus increasing the flow rate. Water-Alternating-Gas (WAG) is another technique, where water and CO_2 are injected into reservoirs for larger recovery, as they contain low miscibility with oil. Using both water and CO_2 can reduce the mobility of carbon dioxide, making the gas more effective at displacing the oil in the well.

Miscible gas injection (MGI) is also used to inject gases that mix fully (or become miscible) with the reservoir oil – thereby eliminating or significantly reducing the interfacial tension between oil and water. The fluid most widely used for miscible displacement is CO_2, which as a solvent is less expensive than other similar miscible fluids such as liquefied petroleum gas, propane and butane. CO_2 is particularly effective to reduce the oil viscosity in reservoirs deeper than 2,000 feet where CO_2 will be in a 'supercritical' state [2].

Thermal recovery uses various heating methods: cyclic steam injection, stream flooding and combustion [3] to lower the viscosity, or thinning the heavier viscous oil so it flows more easily through the reservoir. The steam, hot water, combustion gas plus a bank of distilled solvent help drive the oil from fire side towards injected/production wells. Hence, oil viscosity and mobility ratio [4] drops, while the permeability rises in the process.

Chemical injection uses polymers, caustic solutions, and special molecules to help free

'trapped oil' within the reservoir. The use of surfactants [5] in conjunction with polymers lowers surface tension between the oil and water (preventing oil droplets from moving through a reservoir). The injected polymer improves lateral and vertical sweep of oil by water, thus helps recovering more oil.

Recent innovations

Depleting oil wells in the Middle East & North Africa (MENA) region, containing heavy crudes, are increasingly adopting thermal techniques – mostly cyclic steam stimulation [6] and steam assisted gravity drainage [7]. Solar-powered thermal EOR has also gained popularity – using solar arrays to concentrate the sun's energy to heat water/generate steam. Petroleum Development Oman and GlassPoint Solar are building a one gigawatt (GW) thermal solar field (world's largest) on the Amal oilfield. The project (named Miraah) will, upon full completion, generate 6,000 tonnes of steam per day for heavy oil production.

New technologies such as ultrasonic stimulation [8], plasma pulse technology [9], Carbon Capture and Storage [10] and microbial injection [11] have improved the efficiency of EOR methods. Microbial EOR system has a wider use in MENA considering the region's water scarcity.

> "EOR is a powerful tool to ensure the security of future oil supply"

Future oil supply

The EOR market size is projected at US$89.2bn by 2025, according to US-based Grand View Research, compared to US$29.7bn in 2016. MENA oil producers are major users of EOR techniques, especially UAE, Oman, Kuwait, Algeria and Egypt. The increasing number of ageing wells (with depleting production rates) coupled with rising global oil demand, forecast by OPEC to reach 104.3mn bpd by 2025, up from 95.4mn bpd in 2016, and some newly-explored wells, are key factors for market growth in the coming years.

Higher oil prices make extraction of expensive crude in different reservoirs, including deep waters, economically more viable. The global oil produced from EOR methods is expected to reach 1.37bn bbl by 2025, at a compound annual growth rate (CAGR) of 4.5 per cent from 2017 to 2025. The Society of Petroleum Engineers estimates that as much as 475bn barrels of oil could be technically recovered and produced in the MENA region using EOR. Tertiary recovery is costly, estimated at US$17 per bbl of extracted oil.

The EOR industry is characterised by the presence of giant, multinational players, the likes of Chevron Phillips Chemical Co; ExxonMobil Corp; Petroleo Brasileiro S.A., China Petroleum & Chemical Corp; Cenovus Energy Inc., BP; Royal Dutch Shell; Lukoil; BASF; Sasol; Halliburton; and Dow Chemical Co. In tandem with the EOR market, affiliated businesses such as patented technologies, maintenance and consulting services have also expanded.

The Miraah solar EOR project in Amal, Oman

Image Credit : Glasspoint Solar/wikimedia commons

In sum,'easy oil' extractable in inhabited areas is now diminishing. Energy majors are searching for oil in the world's remote locations (mostly offshore), including ultra-deep waters acreage where the temperature is below zero and development costs are high compared to conventional onshore fields. Technical innovations and high oil prices (if sustained) give optimism that substantial portions of otherwise neglected oil can be tapped. EOR is a powerful tool to ensure the security of future oil supply – pivotal for the stability and growth of the global economy. ■

Footnotes

1] Probable reserves have a probability of 50 per cent and possible reserves an intended probability of five to 10 per cent. Whereas proved reserves of MENA (878bn barrels), equivalent to one half of the globe's total 1,706.7bn barrels (BP data) – generally have 90-95 per cent certainty of containing the amount specified.

2] Supercritical carbon dioxide (CO_2) is separated from other flue gases, compressed to the supercritical state and injected into mature oilfields to improve yields. The amount of fossil CO_2 in the atmosphere can be reduced by using biomass to generate power and sequestering the CO_2 produced and/or by 'clean coal technology' combining EOR methods with carbon sequestration.

3] There are three methods of combustion: Dry forward (using an igniter to set fire to the oil); reverse (where air injection and the ignition occur from opposite directions); wet combustion (water is injected just near the oil and turned into steam by the hot rock).

4] Oil-mobility ratio is a key parameter to determine the efficiency of the water-oil displacement process, with recovery efficiency increasing as OMR ratio falls.

5] Injecting dilute solutions of surfactants such as petroleum sulfonates or biosurfactants (i.e. rhamnolipids) could lessen capillary pressure that often hinders oil flow through the reservoir. This reduces the residual oil saturation and improves the macroscopic efficiency of the process.

6] Cyclic steam stimulation means hot steam is injected into a vertical well for several weeks or months in order to liquefy the petroleum. Oil is then pumped for as long as possible before the procedure is repeated again. It is used to extract heavy oil reservoirs or oilsands deposits, through a common well bore.

7] Steam-assisted gravity drainage is an advanced form of steam flooding that involves drilling two horizontal wells into heavy oil reservoirs, one a few metres above the other. It is widely used in Canada for recovery of tar sand resources.

8] Ultrasonic-based EOR comprises the hardware parts consisting of power supply, rectifier, power amplifier, inverter, control circuitry and piezoelectric transducer. This technique is suitable for reservoirs with high water saturation or depleted reservoirs, as well as having heavy oil lying behind water.

9] Plasma-Pulse technology (orignated in Russia) uses low energy emissions to create the same effect that many other technologies can produce except without negative ecological impact. The volume of water pulled with the oil is actually reduced from pre-EOR treatment instead of increased.

10] Carbon capture and storage is the process of capturing waste CO_2 from large point sources, such as fossil fuel power plants, or injected oil wells, transporting it to a storage site, and depositing it where it will not enter the atmosphere, normally an underground geological formation.

11] Microbial injection is part of EOR that functions either by partially digesting long hydrocarbon molecules, by generating biosurfactants, or by emitting CO_2.

Collaboration between Halliburton and WEPCO increases oil production

A SUCCESSFUL COLLABORATION between Halliburton and WEPCO in Egypt's western desert increased daily oil production rate in a mature field by 150 per cent. By using production logging and pulsed-neutron technologies, WEPCO and Halliburton were able to identify several bypassed oil and watered-out zones, which were candidates for chemical and mechanical water shutoff.

WEPCO, on behalf of EGPC, mainly operates the Bed-1 field, which is considered one of the major mature fields in the Western Desert. Several years ago, the Bed-1 field faced an oil production decline and an increase in water production. WEPCO's main challenges were to identify the source of water production, allocate bypassed oil zones, select the optimum methodology for water shutoff, and increase oil production at a lower cost per barrel with no rig intervention.

Halliburton proposed reviewing the openhole logs, production history, and previous surveillance work completed, which helped pinpoint the right solution. Halliburton recommended a production logging tool (PLT) and Reservoir Monitor Tool (RMT) campaign to identify the current zonal contribution, oil/water saturation, and water flow logs (WFL). The work would conclude with optimum perforating and water shutoff techniques to increase field oil production, using the Halliburton Perforation Tool Kit (HPTK) to select the ideal charge to maximise production.

The field is in Egypt's Western Desert

Image Credit : Darla Hueske/Flickr

The solution unlocked the economic potential of this mature field through extended production and improved recovery. More than 20 wells using RMT and PLT surveillance work have been analysed. This work successfully identified the presence of bypassed pay zones and enabled the shutoff of water-producing zones. The total added-value along the bypassed zones was found to add 150 per cent to the original produced BOPD. The optimum commercial and operational technique has been properly designed and carefully implemented by using a rigless wireline intervention solution.

3M launches Gas & Flame Detection product portfolio

3M GAS & Flame Detection, a new product portfolio under 3M's Personal Safety Division, has debuted its gas and flame solutions, product breadth and innovative technologies as a unified front. The new group is formed from 3M's 2017 acquisition of Scott Safety and its Detcon, Oldham, Simtronics and GMI brands.

"By unifying our expanded portfolio of brands into 3M Gas & Flame Detection, we're providing the POG, industrial, hazmat and commercial communities with a single source for a broad line of safety equipment, including an enhanced offering of gas and flame detection system solutions," said Mel Gerst of 3M Gas & Flame Detection.

The products from 3M Gas & Flame Detection are well recognised for being designed for harsh environments and tough applications and appreciated for their user-friendly portables and large fixed selection. They help keep personnel and plants safe from hazards thanks to a wide range of sensing technology, including electro chemical, catalytic bead, metal oxide sensor, infrared and other optic solutions for gas and flame detection.

When customers require a customised approach, 3M Gas & Flame Detection's application engineering groups help customers build the right plan for their unique hazards. A complete product line and industry-leading solutions offer excellent perspective and quality products trusted for the most critical situations.

Heat exchangers for the MENA region and beyond

UAE-BASED DOLPHIN HEAT Transfer LLC (DHT), which recently celebrated its 30th anniversary of doing business in the MENA region, is experiencing a busy year as it works on several major project awards.

Dolphin Heat Transfer is a leading company engaged in the design and manufacture of shell and tube heat exchangers, air-cooled heat exchangers, pressure vessels, storage tanks and finned tubes. This equipment can be offered with ASME 'U' 'U2' & 'S' stamps for design and manufacture and with National Board 'R' stamp for repair & alteration. The company is also ISO 9001: 2008, ISO 14001: 2004 & ISO 18001: 2007 certified by TUV. Its ASME authorised inspection agency is Lloyds Verification Ltd. It has a state-of-the-art facility covering two manufacturing shops of 3,000m^2 each in the Ajman New Industrial Area.

DHT supplies clients in the oil and gas, petrochemical, chemical, refining, power plants and refrigeration industries, and exports its products throughout the Middle East, Africa, Asia and Australia. Its reputation for on time manufacture to the highest international standards has led to contract awards with blue chip clients in the oil and gas, petrochemical and power and desalination sectors. DHT has built up a strong reputation with clients over the years thanks to its experienced design team, and is proud of its continued relationship with prestigious companies including ADNOC, Dugas, ADGAS, PDO, Orpic, Kuwait Oil Company, KNPC and Siemens.

Current projects include design and manufacture of a 110-ton sulfur condensor unit for ADGAS in Abu Dhabi as well as shell and tube heat exchangers for the New Refinery Project for KNPC, Kuwait and air-cooled heat exchangers for a project in Australia.

DHT specialises in the following products:

Shell and tube heat exchangers: Thermal and mechanical design, detailed fabrication drawings and fabrication of shell and tube heat exchangers as per ASME Sec VIII Div.1, Div.2 and TEMA. Fabrication facilities include CNC drilling machines, orbital welding machine (for tube to tube sheet welding), microprocessor-based telescopic expansion machine (for tube to tube sheet expansion), CNC plasma cutting and column and boom SAW machine in addition to the regular machines such as plate bending, TIG / ARC welding, grinding and two 25-ton EOT overhead cranes.

Image Credit : Dolphin Heat Transfer LLC

DHT's equipment is used in various industries including oil, gas and petrochemicals

Air-cooled heat exchangers (fin fan coolers): Thermal and mechanical design and manufacturing. These coolers are supplied with various types of finned tubes manufactured on in-house finning machines. The coolers are supplied with forced draught / induced draught fans procured from leading worldwide manufacturers. This equipment is designed as per ASME Sec VIII Div.1 & API 661 and can be manufactured for sour service as well as lethal service applications. Heat exchangers can be manufactured in various materials such as carbon steel, stainless steel, nickel alloy, monel, inconel, hastelloy, titanium, duplex, brass and cupro nickel.

Finned Tubes: Finned tubes are manufactured on the latest state of the art McElroy Mark IV & V finning machines from the USA. Various types of fins such as 'L', 'G' & 'KL' can be manufactured with aluminum and copper fins. Base tube size ranges from 5/8" OD to 2" OD, and tube material can be selected as per application.

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Benefiting from learning management systems

Delivering education and training via a learning management system (LMS) can bring CSR benefits, says Kestell Duxbury.

SIMPLY PUT, AN LMS is a piece of software that can deliver an application, documentation, track, report and deliver learning or educational resources. An LMS, first and foremost, can give a company's workers, wherever they may be in world, information to help them improve themselves and their work. This can improve their productivity, their work/life balance and their efficiency, bringing obvious benefits to both the employee and the employer. Furthermore, it can help to improve the company's CSR message.

A LMS is a secure technology that is often integrated into a company's existing systems. Some LMSs can integrate a client's own content by enabling them to upload their own training material, as well as any other content, to the LMS. So they could include management training from their own library with some working examples to drive home key learning skills. This can help workers, whether at home or working remotely, learn about the company's message both at home and further afield. Greater communication channels, supported by the learning methods from an external learning provider, can improve worker engagement and the understanding of a company's CSR goals.

One issue that many have when it comes to training is harvesting the best from their employees through hard skill training. An example of this is if you need to train someone to adjust and monitor a smart valve to control oil flow. You can demonstrate to them what should happen, what shouldn't happen, and how to look for any unusual activity that suggests that they should take measures to rectify this. A soft skill that can work alongside this is the ability to gauge risk and hazards. A skill like this can be used to interrupt the workflow if they spot a potential risk in the future, improving safety and potentially dangerous situations. Not only is this applicable in monitoring smart valves, but is transferable to other tasks that they may need to complete in their everyday line of work. This is a basic example, but pairing hard and soft skill learning can be difficult.

Image Credit : billionphotos.com/Adobe Stock

Learning resources available in the cloud can be used anywhere at any time

Trainers often do not have time to teach soft skills as they are broader and take more time. By harvesting a learning platform via an LMS, any worker, remote or inbound, can continue their learning away from their trainers to reinforce transferable skills, which in the case of safety, can be a net saving for the company and also an investment in the worker. This can feed into an overall CSR project by promoting good working efforts for every colleague, increasing the company's safety record and making the worker feel appreciated through a crucial transferable investment.

> "The implementation of an LMS can also help to reduce costs"

The implementation of an LMS and learning platforms for the purpose of soft skill training that improves compliance and safety, can also help to reduce costs. It is a cost-effective way of providing learning resources, and can back up vital training. Furthermore, via an LMS, refreshers and quality assurances can be done remotely to ensure compliance at all levels, and can be completed at any time. This can bring huge cost savings as well as increasing engagement.

Learning resources that are kept in the cloud can not only serve anyone in the world at any time, but can also be tailored for different types of learners. In regions where language and communication skills can be limited between worker and manager, different learning formats can be used. For example, if a worker doesn't have particularly strong reading skills, they could learn from a video or an audio book. This can improve engagement for those who often feel alienated, and can also deliver a vital investment to many that are let down by local education systems. This will enhance your company's CSR aims and ambitions, improving your businesses image and worker satisfaction, driving efficiencies and boosting morale.

So the implementation of an LMS within your company can improve training resources, decrease on the ground training costs, improve efficiency, promote worker cohesion and spread a positive message throughout your business. ■

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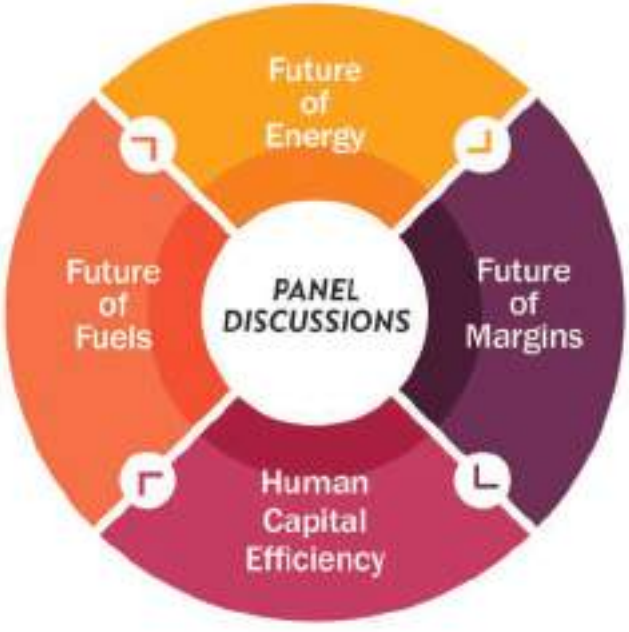

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The importance of calibration for **welding machines**

If you want to guarantee the quality of your welding equipment, you will need to calibrate it on a regular basis. For companies working with welding technology, it is essential that systems deliver consistent welding results without fail throughout their service life. Lee McCartney from Fronius Middle East FZE explains.

THE PROCESS OF calibrating welding systems involves them being connected up to a calibration station to have their voltage, amperage and wire feed speed measured. It is also an option to determine the gas flow rate of the welding current source. The calibration software analyses the values recorded for your welding systems and compares them against the standard specifications in order to identify the discrepancy between the two. This result must fall within the permissible tolerances as set out by the European (EN) 50504 standard – Validation of arc welding equipment.

If the results of the calibration process are not acceptable, the necessary measures will need to be taken. If a company does not take these required steps, they should not continue to use the welding machine for production – not least based on considerations surrounding quality assurance and product liability.

Benefits and requirements

As a general rule, MIG/MAG, manual metal arc welding, and TIG systems can be calibrated. Metal-processing companies certified to a standard are required to calibrate their welding equipment on a regular basis. The standards covered here include the ISO 9000 series as well as EN ISO 3834-2, which set out the principles for the quality assurance process for welded products. EN 1090 defines the production standards and CE markings for steel and aluminium supporting structures. A manufacturer who complies with the standards will find itself in a position to gain their customers' trust and to build up a reputation as a professional enterprise. Not to mention that being able to prove calibration has been performed can come in handy in the event of complaints.

Fronius Middle East FZE, located in Jebel Ali since 2015, recently opened a service centre in Dubai Investment Park. The company, bringing its 68 years of experience in welding, is performing calibration services for well-known companies in the oil and gas and pipeline construction industry in the Middle East. Service manager Lee McCartney suggests customers combine the safety inspections with calibration, in order to save time and money.

"Through personalised planning, consultation and implementation, as well as selected service packages, we find the perfect solution for your welding technology and welding system, and ensure that it continues to work just as well as it did on the first day. The Fronius service portfolio perfectly complements the life cycle of our innovative welding technology solutions. We offer the ideal services before, during and after your decision to make a purchase," McCartney says.

Since 1950, Fronius has been developing innovative complete solutions for arc welding and resistance spot welding.

Image Credit: Fronius

Fronius Middle East FZE is located in Jebel Ali since 2015 and has recently opened a service centre in Dubai Investment Park

These solutions include long-lasting welding systems that are highly cost-effective as well as high-quality, professional services. ■

Image Credit : Fronius

Metal-processing companies certified to a standard are required to calibrate their welding equipment on a regular basis

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Fotech launches new DAS product

AS OPERATORS INCREASINGLY turn to Big Data for new insights into their operations, Fotech has launched Helios Theta – its most advanced Distributed Acoustic Sensor (DAS) product, optimised for upstream operations.

Helios Theta provides fine-grained data on well performance during a range of operational scenarios such as Vertical Seismic Profiling (VSP). This new layer of intelligence will enable operators to extend the life of wells, realise new operational efficiencies and increase production.

Based on Fotech's True Phase technology, making use of cutting-edge photonics, edge computing, and advanced AI systems, Helios Theta delivers greater fidelity, enhanced sensitivity and superior flexibility in the field. This improved performance enables the detection of smaller microseismic events and lower levels of fluid and sand production – giving operators far more detailed insights into well performance.

Helios Theta also allows the acquisition of seismic data at greater well depths than ever before. Whereas typical upstream DAS solutions have a sensing range around 10km, Helios Theta offers detailed measurement and imaging to well depths of up to 40km from one sensor unit.

Three distinct detection modes give operators the ability to dynamically optimise Helios Theta for the specific conditions of each downhole operation. Two quantitative phase modes (Bandwidth and Fidelity) enable high quality imaging for low energy environment applications, ideal for VSP and microseismic measurements. A third 'intensity' mode provides unmatched performance and profiling for high energy environments, for example during hydraulic fracture operations.

Chris Shannon, CEO, Fotech Solutions, said, "The technological advancements of Helios Theta and its in-field versatility will provide another step change in operators' ability to understand the economics of their well, to help move the breakeven point, and ultimately to realise new efficiencies and new revenues."

SABIC adds new resins to foaming portfolio

SABIC IS ADDING to its portfolio of foaming technologies with two new dedicated LDPE grades for the cross-linked foaming process – SABIC® LDPE HP0722NDF and SABIC® LDPE HP2022 NDF, which will be available globally.

"SABIC's new resins are specifically designed and beneficial for cross-linked foaming processes. Together with our partners we have created innovative recipe designs of our new grades with additional value due to improved foam quality and increased process efficiency," said Douwe van der Meer, engineer, Market Development & Technical Support. "These new solutions can enable better surface quality and smaller cell-size, with potentially improved mechanical properties due to their improved reactivity," added Kai Chek Kuan, engineer, Market Development & Technical Support.

The improved reactivity of the new resins to cross-linking can result in more efficient processing, with shorter cycle times or faster line speeds, typically leading to a more competitive product and added value. SABIC's global foam portfolio is applicable in almost all industrial applications, from automotive and packaging to consumer and construction.

SPX Flow adds to high pressure pumps portfolio

WITH CLYDEUNION PUMPS, SPX FLOW Inc, global manufacturer of industrial equipment, aims to provide total pumping solutions in demanding markets such as oil exploration, refining and distribution, water treatment and distribution, desalination and other industrial processes.

Image credit: SPX Flow

The ClydeUnion Pumps BB5

According to the company, the ClydeUnion Pumps CUP-BB5 is the latest generation of high pressure, multi-stage, barrel case pump and part of an extensive portfolio of high pressure pumps designed to the latest API specifications and for compliance with the most stringent global oil industry requirements.

The pump can be used in applications including seawater injection, produced water reinjection, flow-line displacement, crude oil pipeline, NGL pipeline, refinery process charging, gas treatment, boiler feed and refined product pipeline distribution.

SPX said that the pump is available with opposed or inline impeller arrangements, volute or diffuser-based hydraulics, foot or centreline mounting and a choice of construction materials from carbon steels to super duplex.

"The BB5 is also available with ClydeUnion Pumps' unique shear ring design to reduce cartridge overhaul weight and times, whilst also eliminating the need for torqueing equipment," said the company.

Clariant extends catalyst portfolio

CLARIANT, A WORLD leader in specialty chemicals, today announced the expansion of its EnviCat series of catalysts to include a high-performance solution for selective catalytic reduction (SCR) to combat nitrogen oxides (NOx).

Clariant offers methodology to remove high levels of NOx via its EnviCat NOx SCR catalyst. The catalyst, an extruded honeycomb structured block made from a vanadium based composite, is designed to facilitate NOx reduction reactions in an oxidizing atmosphere. With high selectivity, EnviCat NOx significantly decreases NOx levels using ammonia as a reducing agent for the conversion of NOx pollutants into nitrogen and water. EnviCat NOx SCR has been demonstrated to effectively lower NOx emissions from gas fired exhaust streams and is well suited to a multitude of chemical and industrial applications.

Image credit: Clariant

The EnviCat NOx SCR catalyst

The largest output of NOx emissions from non-automotive, stationary sources emanate from coal fired boilers, especially those in power generation. Petrochemical processes also produce large amounts of NOx, originating from utility boilers, cogeneration units, process heaters, steam methane reformers, ethylene cracking furnaces and fluid catalytic cracking (FCC) regeneration units.

"Clariant is delighted to be able to offer this important addition to our catalyst emissions reduction portfolio," said Stefan Heuser, senior vice president and general manager, Catalysts. "Not only is the technology highly effective in mitigating the dangerous effects of NOx, it now enables us to provide our customers with cost-effective emissions solutions for both upstream and downstream businesses."

EnviCat NOx SCR is available in module designs of varying lengths and cell densities, is easily installed and can be configured to the plant's particular dimensions. The catalyst helps to achieve plant specific emission limit targets while effectively controlling NH3 slip under low to mid-temperature operation.

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS - EGYPT

Project	City	Facility	Budget ($ US)	Status
Petro Shorouk - Zohr Gas Field Development	Mediterranean Sea	Gas Field	7,000,000,000	Construction
ERC - Mostorod Refinery	Mostorod	Refinery	3,700,000,000	Construction
ECHEM - Formaldehyde and Derivatives Project	Kafr El Sheikh	Formaldehyde	40,000,000	Feasibility Study
MIDOR - Midor Refinery	Alexandria	Refinery	1,800,000,000	Engineering & Procurement
ASORC - Naphtha Complex	Asyut	Continuous Catalytic Cracker (CCR)	250,000,000	Engineering & Procurement
Burullus Gas Company - West Nile Delta Gas Field	West Nile Delta	Gas Field	12,000,000,000	Construction
EHC - Tahrir Petrochemicals Complex - Utilities and Offsite Facilities	Suez	Offsites & Utilities	2,000,000,000	Engineering & Procurement
EHC - Tahrir Petrochemicals Complex	Suez	Petrochemical Complex	7,000,000,000	Feasibility Study
EEHC - Dairut Power Plant	Luxor	Independent Power Plant (IPP)	2,500,000,000	Engineering & Procurement
ENI - Nooros Exploration Prospect (Abu Madi West)	Nile Delta	Gas Field	12,000,000,000	Construction
ASORC - Hydrocracking Diesel Complex	Asyut	Hydrocracker	1,800,000,000	Project Announced
AQFCIC - Nitric Acid Plant	Ain Soukhna	Ammonia	160,000,000	EPC ITB
Eni - South-West Melehia Block license	South-West Melehia	Exploration	40,000,000	Engineering & Procurement
Burullus Gas Company - West Nile Delta Gas Field - Giza, Fayoum, and Raven Gas Fields Offshore	West Nile Delta	Gas Field Development	800,000,000	Construction
AQFCIC - El-Wady Complex for Phosphate and Compound Fertilizers	Abu Tartor	Ammonium Phosphate	750,000,000	Feasibility Study
EPPC - Propane Dehydrogenation (PDH) and Polypropylene (PP) Complex - Phase 2	Port Said	Polypropylene	1,200,000,000	Engineering & Procurement
ASORC - Hydrocracker	Upper Egypt	Hydrocracker	1,500,000,000	Engineering & Procurement
Red Sea Ports Authority - Sonker Bunkering Company - SCA - Bulk Liquids Terminal	Sokhna Port Free Zone	Gas Storage Tanks	504,000,000	Construction
ANRPC - Continuous Catalyst Regeneration (CCR) Unit	Alexandria	Catalysts	294,000,000	Construction
Petro Shorouk - Zohr Gas Field Development - Grassroot Natural Gas Processing Plant (Phase 2)	Port Said	Gas Processing	200,000,000	Engineering & Procurement
El Nasr For Intermediate Chemicals - Phosphate and Fertilizer Complex	Ain Soukhna	Phosphoric Acid	600,000,000	Construction
PhPC - Atoll Gas Field	Damietta	Gas Field	300,000,000	Construction
SUMED - Ain Sukhna Product Hub (ASPH) Project - Tank Farm & Topside Facilities (LOT 2)	Ain Soukhna	Oil Storage Tanks	250,000,000	Construction
ECHEM - Alexandria Propylene Derivatives Project	Alexandria	Propylene	1,000,000,000	Feasibility Study
CEPC - Cairo West Supercritical Steam Power Plant - Pumps	Cairo		5,000,000	Engineering & Procurement
BP - West Nile Delta Gas Field - Gas Reception and Processing Facility	Various	Gas Processing	1,000,000,000	Construction
Eni - Block 9 (North Leil Offshore)	Mediterranean Sea	Exploration	300,000,000	Engineering & Procurement
Eni - British Petroleum (BP) - Block 8 (Karawan Offshore)	Mediterranean Sea	Exploration	140,000,000	Engineering & Procurement

Project Databank

Compiled by Data Media Systems

Project Focus

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Project Summary

Project Name	Petro Shorouk - Zohr Gas Field Development
Name of Client	Petro Shorouk
Estimated Budget (US$)	7,000,000,000
Facility Type	Offshore gas field
Status	Construction
Location	Mediterranean Sea
Project Start	Q3-2015
End Date	Q1-2019
FEED	EniProgetti
Main Contractor	ENPPI, Petrojet, OneSubsea, BHGE - Baker Hughes & GE company
Contract Value (US$)	1,300,000,000
Award Date	Q3-2015

Background

The field is located in Shorouk Block in the Mediterranean Sea (Egyptian sector), 190 km away from the Egyptian coast, and covers the area of 100 sq km, at a depth of 1,450 meters. The field's estimated capacity is 30 trillion cubic feet of natural gas. Eni was granted approval for the Zohr Development Lease by the EGAS Company in February 2016. Eni and Egyptian General Petroleum Corporation (EGPC) agreed to form a joint venture - Petro Shorouk - for the phase 1 field development. The deepwater gas field started production in late 2017 and is expected to reach full production capacity in 2019. The gas produced from the field is expected to be distributed within Egypt, while the excess will be exported to overseas markets. The full field development plan entails the drilling of 254 wells over the field's production life. The overall investment is estimated to be approximately US$12bn.

- ENi: 50 per cent
- Rosneft: 30 per cent
- BP: 10 per cent
- Mubadala: 10 per cent

Project Status

Date	Status
Jun 2018	The output capacity will reach 1.750 billion cubic feet per day (BCFD) by August 2018.
Jun 2018	The production of the line 4 in first phase will start in June 2018.
15 May 2018	The output capacity has reached 1.1 billion cubic feet per day (BCFD).
25 Dec 2017	Production of the first phase has started.
04 Jan 2017	The drilling work in seven wells has been completed.
12 Jan 2016	The drilling work has started.
Aug 2015	Italian energy and gas company Eni has discovered a supergiant natural gas field off the coast of Egypt.

Project Scope

The project scheme includes:

- 3D seismic data acquisition, processing and interpretation
- The drilling of exploration wells
- Appraisal drilling
- Geological and geophysical studies
- Associated works

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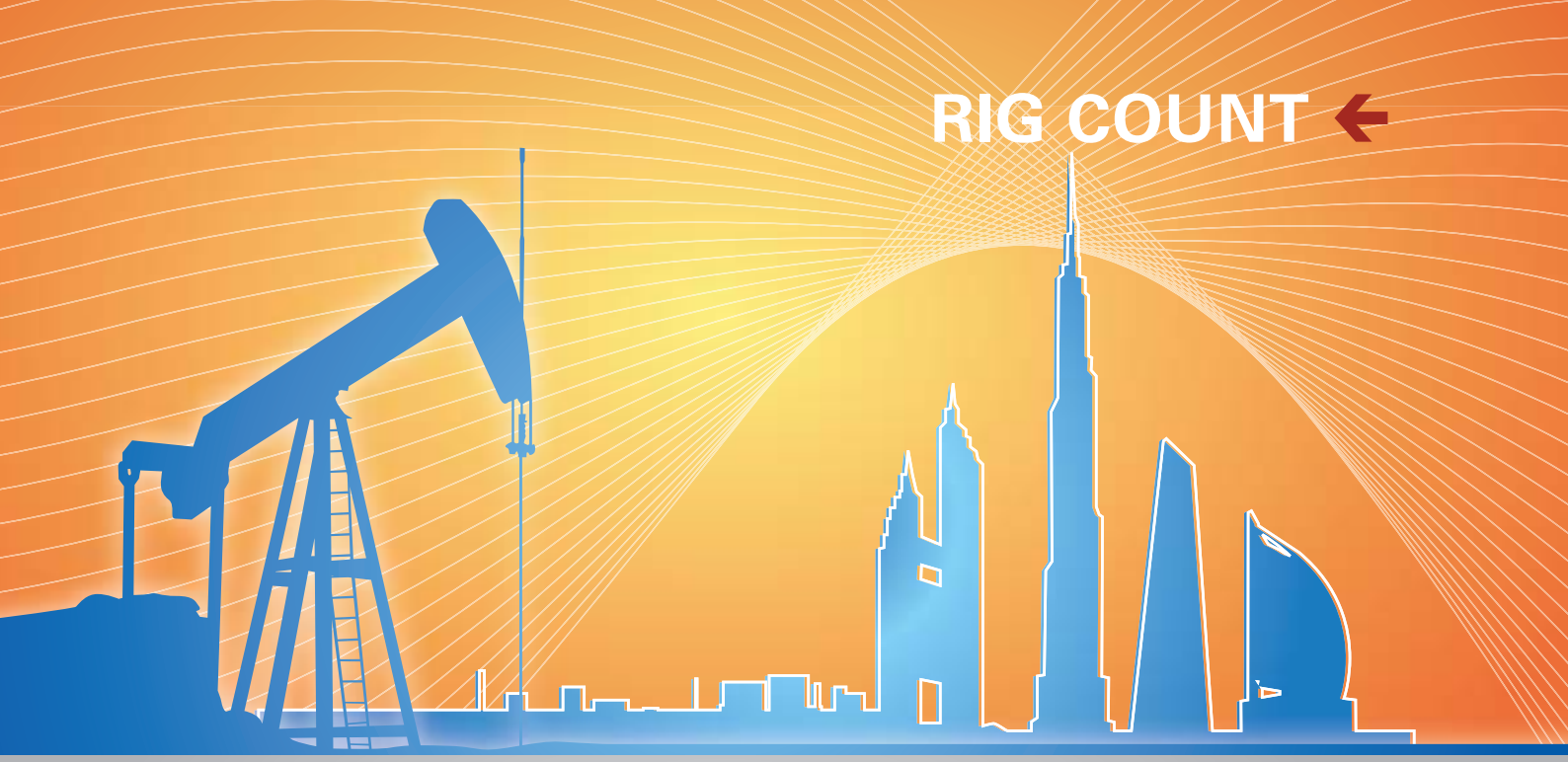

Middle East & North Africa

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			LAST YEAR		
Country	Land	OffShore	Total	From Last Month	Land	OffShore	Total	Land	OffShore	Total
Middle East										
ABU DHABI	39	13	52	-1	39	14	53	35	13	48
DUBAI	0	2	2	1	0	1	1	0	2	2
IRAQ	60	0	60	0	60	0	60	51	0	51
JORDAN	0	0	0	0	0	0	0	0	0	0
KUWAIT	54	0	54	0	54	0	54	55	0	55
OMAN	54	0	54	1	53	0	53	53	1	53
PAKISTAN	24	0	24	1	23	0	23	25	0	25
QATAR	3	8	11	0	3	8	11	5	5	10
SAUDI ARABIA	97	19	116	5	96	15	111	104	15	119
SUDAN	0	0	0	0	0	0	0	0	0	0
SYRIA	0	0	0	0	0	0	0	0	0	0
YEMEN	0	0	0	0	0	0	0	0	0	0
TOTAL	331	42	373	7	328	38	366	328	36	363
North Africa										
ALGERIA	50	0	50	-5	55	0	55	53	0	53
EGYPT	21	4	25	-5	26	4	30	19	4	23
LIBYA	0	1	1	0	0	1	1	0	1	1
TUNISIA	2	0	2	0	2	0	2	0	0	0
TOTAL	73	5	78	-10	81	5	88	72	5	77

Source: Baker Hughes

التطورات التقنية التي لا تشمل فقط البيانات الضخمة والتحليلات، وإنما تشمل أيضا أجهزة إنترنت الأشياء ذات المعايير المفتوحة، وسهولة الحركة والنقل، هذا إلى جانب الحوسبة الافتراضية والسحابية. والأمر الأكثر أهمية أنها توفر فرصا غير محدودة لتحسين وتحويل العمليات.

هذه المنشآت القائمة على الاتصالات توفر بعض الفرص الرئيسية لقطاع النفط والغاز، ومن بينها:

• قدرة شركات النفط والغاز على تمكين العُمال، وذلك عبر تزويدهم بمعلومات التشغيل الحرجة ومساعدتهم في تحسين أداء الأجهزة والمعدات من خلال جمع بيانات الأصول القيمة ووضعها في السياق الملائم لتحويلها إلى معلومات قابلة للتنفيذ.

• إمكانية استخدام بيانات الأجهزة والمعدات أيضا لاستكشاف الأخطاء وإصلاحها بشكل أسرع، ووضع إستراتيجيات صيانة تنبؤية، فضلا عن فهم سلوك العمال بشكل أفضل، ويساعد كل ذلك في تقليل الأوقات المهدرة.

• إمكانية الاستفادة من تقنية الوصول عن بُعد لمراقبة رؤوس الآبار ومحطات الضخ ومواقع التخزين عن بُعد، كل ذلك من موقع مركزي. ويمكن أن يساعد ذلك في تقليل مخاطر السلامة وخفض التكاليف المرتبطة بإرسال العمال لتسجيل الدخول يدويا على هذه الأنظمة.

يعكف العديد من منتجي النفط والغاز حاليا ـ بالفعل ـ على توضيح جدوى العمليات القائمة على الاتصالات والمعلومات في تحسين أداء العمل والتغلب على تحدياته.

المراقبة المستمرة لعمليات حقول النفط البحرية عن بُعد

من المتوقع إجراء العمليات على مدار الساعة حتى في أكثر البيئات النائية والمليئة بالتحديات. ينطبق ذلك بالتحديد على إحدى شركات النفط والغاز التي تمتلك منصات لإنتاج النفط في حقل نفط بحري موجود قبالة ساحل ألاسكا. هذه الشركة تستخدم منصات حفر لاستخراج النفط تستعين بالمضخات المغمورة حتى يستمر الإنتاج ٢٤ ساعة يوميا. وحتى تقلل الشركة مخاطر الأوقات المهدرة، قامت بإجراء عمليات ترقية للمضخات المغمورة الكهربائية لتتحول إلى أخرى أكثر فاعلية وكفاءة، واستعانت بخدمة الدعم الافتراضي لمراقبة ناقلات الحركة التي تزود المضخات بالطاقة عن بُعد.

تتولى الخدمة القائمة على الحوسبة السحابية جمع البيانات الرئيسية للأجهزة والمعدات، مثل السرعة والتيار الكهربائي والقدرة والجهد الكهربائي، وتحلل هذه البيانات في وقت حقيقي. وفي حالة الكشف عن أية مشكلات أو أعطال محتملة، يتم إبلاغ أحد مهندسي الدعم بشركة روكويل أوتوميشن على الفور. وقد غطت هذه الخدمة تكاليفها تقريبا خلال أول أسبوعين من تفعيلها. فقد ساعدت في الكشف عن أربعة حوادث خلال هذا الإطار الزمني بعد التطبيق، وأبلغت فريق العمل الرئيسي بها.

تحسين نماذج الأعمال في حقول النفط البرية

يشهد استخدام تقنيات الحوسبة السحابية تزايدا في حقول النفط البرية كأداة مراقبة عن بُعد، إلى جانب تخزين البيانات وتحليل المعلومات ووضعها في السياق الملائم. على سبيل المثال كانت م. ج. برايان، وهي إحدى شركات توريد الماكينات والمعدات الثقيلة البارزة في قطاع النفط والغاز، تتطلع لإيجاد طريقة تتيح مراقبة شاحنات التصديع الهيدروليكي، التي تبلغ قيمتها مليون دولار، والمحافظة على أدائها عن بُعد. فقد تتكبد من جراء توقف المركبات عن العمل تكلفة تتراوح بين ٣ آلاف إلى ٧ آلاف دولار يوميا، وذلك قبل احتساب الخسارة في إيرادات المنتجات.

لهذا لجأت الشركة إلى الاستثمار في نظام إدارة القوافل المعتمد على الحوسبة السحابية. وتمكنت م. ج. برايان من إدخال البيانات في مستعرضات الويب باستخدام تكنولوجيا الأجهزة النقالة والنقل السلس لمعلومات العمل من خلال الحوسبة السحابية. وفيما بعد، يصدر نظام إدارة البرامج التقارير ولوحات المعلومات بعرض حالة ناقل الحركة لكل مركبة، فضلا عن أداء التصديع الهيدروليكي. هذا النظام حقق الراحة من عناء التفكير في جداول الصيانة، ومن ثم يساعد في منع حدوث الأعطال غير المتوقعة.

بالإضافة إلى ذلك، أدت إمكانية الاطلاع المباشر على بيانات الأصول البعيدة إلى تحسين أوقات تشغيل الأصول وإنتاجيتها للمستخدمين النهائيين. كما أن ذلك أتاح للجهات المُصنعة للمعدات الأصلية تحويل نموذج الأعمال لديها من الاتفاقيات الشهرية إلى الدفع حسب الاستخدام، وهو ما يعطي الشركة ميزة تنافسية. وباستخدام الحوسبة السحابية، أصبحت م. ج. برايان لا تجري الصيانة للبنية التحتية، بل أصبح بمقدورها أيضا تعديل الحل من شاحنة واحدة إلى عدد يصل إلى ٤ آلاف شاحنة.

البيانات مستقبل شركات النفط والغاز

تتزايد احتمالات استخدام البيانات والتحليلات في قطاع النفط والغاز كل يوم مع توجه عدد أكبر من الشركات إلى تطبيقها. فالشركات على سبيل المثال تبدأ في استكشاف إمكانية استخدام تخصيص الإنتاج في الوقت الحقيقي. وتتعاون شركة روكويل أوتوميشن مع إحدى الشركات المنتجة للنفط لجمع التدفقات الحجمية خلال المراحل المتعددة في وقت حقيقي من جميع آبار الشركة القائمة. ومن شأن ذلك مساعدة المُشغلين في مراقبة البيانات وتخصيص الإنتاج للآبار الفردية، وعلى وجه الخصوص تحديد الأصول التي ينخفض إنتاجها وتحسين الإنتاجية بوجه عام.

إنها فقط البداية، فالإمكانات غير محدودة. إذ يتطلع عدد أكبر من شركات النفط والغاز المتطورة إلى دمج بيانات الحقول بأنظمة التخطيط للإنتاج والمحاسبة لتحقيق المواءمة الدقيقة والآنية لإنتاج حقل النفط.

ومع سعي المزيد من الشركات إلى ضخ رؤوس الأموال في منظومة البيانات وتطبيق نموذج المنشآت القائمة على الاتصالات، يكون للقرارات التي تتخذها دورٌ محوريٌ في تحقيق الفوائد على المدى البعيد للأعمال. فقد أصبحت هذه الشركات تدرك أن القدرة على الوصول إلى الأصول ومراقبتها خلال أعمال التنقيب والإنتاج والنقل وخطوط الأنابيب والصناعات التحويلية، علاوة على دمج بيانات حقول النفط المتفرقة في موجات من المعلومات القابلة للتنفيذ لها أهمية كبيرة لتبقى في خضم المنافسة. ولا يزال المجال يتسع مع ظهور التقنيات الجديدة والأجهزة الذكية. ويمكن بالتعاون مع طرف ثالث موفر لآليات الأتمتة والمعلومات، مثل روكويل أوتوميشن، مساعدة منتجي النفط والغاز في هذا المضمار.

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زاد استخدام قطاع الصناعات التحويلية للبيانات والتحليلات لتحسين عملياته

تعزيز قيمة الأعمال بالبيانات والتحليلات

قال جون جينوفيسي، نائب الرئيس والمدير العام لشؤون أعمال حلول المعلومات والعمليات بشركة روكويل أوتوميشن، إن صناعة النفط والغاز تشهد توجهاً آخذاً في التزايد نحو استخدام البيانات بهدف تحسين الإنتاج. وبطبيعة الحال ليس هناك أدنى شك في أن البيانات والتحليلات تكتسب زخما في صناعة النفط والغاز. ولا يتم ذلك فقط على مستوى التنقيب والإنتاج، إذ تُبدي شركات النقل وخطوط الأنابيب والصناعات التحويلية أيضا اهتماما بالطرق التي يمكن من خلالها توظيف البيانات والتحليلات للمساعدة في تحسين عملياتها، إن لم يكن ذلك قد دخل بالفعل حيز التنفيذ. إذن، ما هي العوامل التي تدفع نحو ذلك؟

ترى شركات النفط والغاز في هذا التوجه ـ بالتأكيد ـ فرصة كبيرة لتحسين عملياتها. فالحصول على فهم أفضل للعمليات من شأنه حل المشكلات وتحسين آلية اتخاذ القرار للمساعدة في دفع عجلة الإنتاج وتحسين العمليات، فضلا عن تقليل الأوقات المهدرة وتحقيق منفعة أكبر من الأصول. غير أن البيانات والتحليلات يمكن أن تساعد الشركات أيضا في مواجهة بعضٍ من أكبر التحديات، مثل زيادة مستوى التعقيد التشغيلي. وقد أصبحت الشركات المنتجة للنفط والغاز تحصل على الهيدروكربونات من مواقع جديدة وزاخرة بالتحديات، سواء كانت مكامن عميقة تحت سطح البحر أو تكوينات جيولوجية محدودة. وأصبح ذلك يتطلب أنظمة أكثر تطورا عن ذي قبل، بعضها يضم أكثر من ٢٠٠ ألف لوحة بيانات وإنذار.

التوجه نحو المنشآت القائمة على الاتصالات

طالما قيَّدت طبيعة عمليات النفط والغاز، غير المتصلة والموزعة على مناطق مختلفة، قدرة الشركات على جمع البيانات. غير أن ذلك الأمر في طريقه إلى التغير مع استخدام تقنيات الاتصال المدعومة بالمعلومات، إلى جانب استبدال الشبكات المتفرقة ببنية الشبكات الموحدة. تُعرف هذه البنية الأساسية العصرية بالمنشأة القائمة على الاتصالات، حيث يمكن إقامة الاتصالات بين الأفراد والعمليات والتقنيات بسلاسة تامة في أنحاء المنشأة التي تمتد عبر مئات أو حتى آلاف الأميال. وهي تستفيد من

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