

# Oil Review

Oil · Gas · Petrochemicals

## Middle East

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## New frontiers in drilling automation

- 
- A large offshore oil rig is shown in the background, extending from the top of the page down to the bottom. The rig is a complex structure of steel beams and platforms, with a prominent derrick in the center. It is situated in the middle of a blue ocean under a clear blue sky. The rig's deck is white with various pieces of equipment, including cranes and pipes. The legs of the rig are visible, supporting it on the water.
- Promoting pipeline security and integrity
  - Changing the energy landscape
  - The Eastern Mediterranean gas chase
  - Machine learning for operational excellence
  - Corrosion-resistant piping to unlock gas reserves

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## ➔ Editor's note

THERE HAS BEEN much discussion in the industry about digitalisation and automation, particularly in the drilling arena. But what has actually been achieved so far, and can the reality live up to the hype? Sriram Srinivasan, Halliburton's VP for Global Technology, shares his views (p30). Also on new technologies, we look at how digitalisation and machine learning can help companies achieve operational excellence (p26).

Our Pipeline Review looks at how companies can protect their pipelines against integrity and security threats, a hot topic in view of recent attacks on pipelines and installations in the Middle East (p23). We also look at the increase in demand for corrosion-resistant alloys with the growth of sour gas development in the region (p22).

Also in this issue, we look at the rise of the Eastern Mediterranean as one of the world's exploration hotspots. There are high hopes that exploration underway offshore Lebanon will yield results (p14).

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## → Executives' Calendar 2019

### SEPTEMBER

2-4	<b>World Heavy Oil Congress &amp; Exhibition</b>	MUSCAT	<a href="http://www.worldheavyoilcongress.com">www.worldheavyoilcongress.com</a>
3-4	<b>Kuwait Health, Safety &amp; Environment Forum</b>	KUWAIT	<a href="http://www.hse-forum.com">www.hse-forum.com</a>
3-6	<b>Offshore Europe</b>	ABERDEEN	<a href="http://www.offshore-europe.co.uk">www.offshore-europe.co.uk</a>
9-12	<b>24th World Energy Congress</b>	ABU DHABI	<a href="http://www.wec24.org">www.wec24.org</a>
17-19	<b>Gastech</b>	TEXAS	<a href="http://www.gastechevent.com">www.gastechevent.com</a>
24-25	<b>Oman Health, Safety &amp; Environment Forum</b>	MUSCAT	<a href="http://www.hse-forum.com">www.hse-forum.com</a>

### OCTOBER

7-8	<b>OWI MENA 2019</b>	ABU DHABI	<a href="https://interventionmena.offsnetevents.com">https://interventionmena.offsnetevents.com</a>
13-16	<b>Kuwait Oil &amp; Gas Show</b>	KUWAIT	<a href="http://www.kogs-expo.com">www.kogs-expo.com</a>
14-16	<b>MEPEC</b>	MANAMA	<a href="http://www.mepec.org">www.mepec.org</a>
15-17	<b>MOC</b>	ALEXANDRIA	<a href="http://www.moc-egypt.com">www.moc-egypt.com</a>
22-23	<b>Basra Megaprojects</b>	ISTANBUL	<a href="http://www.cwcbasraoilgas.com">www.cwcbasraoilgas.com</a>

### NOVEMBER

11-14	<b>ADIPEC</b>	ABU DHABI	<a href="http://www.adipec.com">www.adipec.com</a>
24-25	<b>Dubai Health, Safety &amp; Environment Forum</b>	DUBAI	<a href="http://www.hse-forum.com">www.hse-forum.com</a>

### DECEMBER

3-5	<b>Iraq Oil &amp; Gas</b>	BASRA	<a href="http://www.basraoilgas.com">www.basraoilgas.com</a>
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Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.

## Setting the scene for the future development of the heavy oil industry

THERE IS A growing interest in exploring and upgrading heavy oil to meet future energy needs. Reports suggest by 2030, the global crude oil demand is estimated to be about 89 mn bpd; and around 30 per cent of that production is expected to come from heavy oil.

Technological innovations, advancements in enhanced oil recovery methods, and infrastructural upgrades are increasingly making it possible to explore and upgrade heavy and extra-heavy oil; enabling the oil and gas producing countries to meet increasing consumption, growing demand, and production levels.

Providing a convening platform for the global heavy oil community, across the entire value chain, to convene, exchange knowledge, and do business the World Heavy Oil Congress & Exhibition (WHOC) offers companies and heavy oil professionals an opportunity to network, share project insights, generate new business, and meet global heavy oil players.

Taking place in Muscat, Sultanate of Oman from 2-4 September, WHOC hosts an all-encompassing three-day technical conference



*The exhibition tour at a previous edition of the event.*

featuring case studies and presentations; a two-day strategic conference featuring key insights from global business and thought leaders across the heavy oil value chain, and a three-day international exhibition where NOCs, IOCs, EPCs, OEMs, service and technology companies will showcase their projects,

products and services.

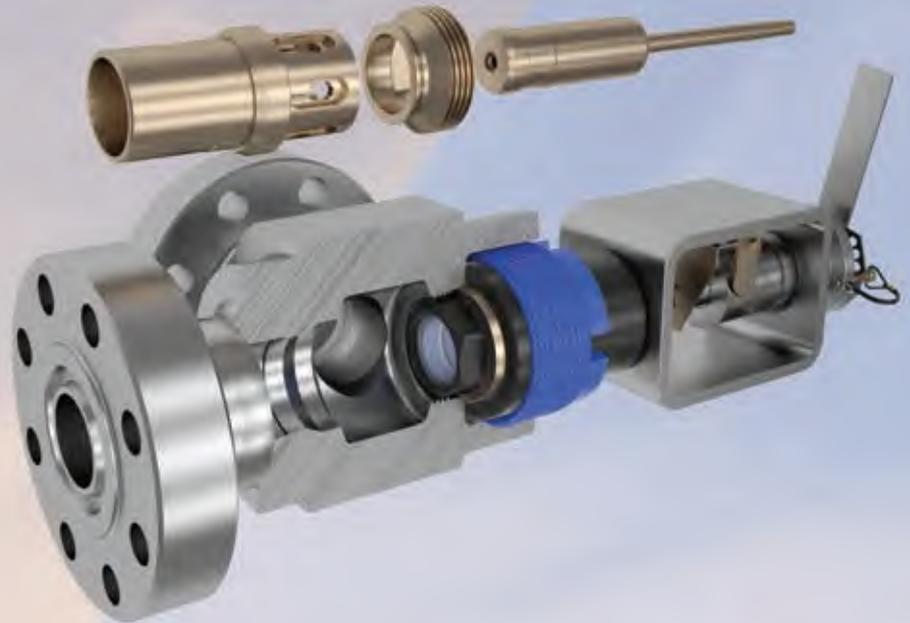
The event is hosted by Petroleum Development Oman (PDO) and is supported by the Ministry of Oil & Gas.

*For further information see the website at [www.worldheavyoilcongress.com](http://www.worldheavyoilcongress.com).*

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# Prevent, protect, prepare - Kuwait HSE Forum

The Kuwait Health, Safety & Environment Forum, to take place in Kuwait from 3-4 September, will once again provide a forum to explore topical health, safety and environment issues.

**T**HE GULF COUNTRIES have large industrial communities with a large workforce exposed to various hazardous agents in their occupations. Despite rapid advances in health, Kuwait faces a range of important occupational health challenges such as providing safer and healthier work environments and implementing sustainable workplace safety and health programmes, reducing environmental hazards, cutting the road accident rate, implementing effective health policies and promoting healthy lifestyles and behaviours.

Kuwait also faces security challenges. Deploying video surveillance under challenging conditions, such as influence of outside lighting and threat of vandalism, is one of the topmost priorities in the country.

Given the above scenario, The Kuwait Health, Safety and Environment Forum, to be held from 3-4 September at the J.W. Marriott Hotel, Kuwait City, will discuss best practices, process improvements, technological advancements and innovative applications to enhance HSE performance in Kuwait while promoting wellbeing at work. The latest in the highly successful event series, it will provide a neutral platform where a wide range of perspectives and concerns from a variety of stakeholders can be explored, thereby creating new avenues of business.

Key topics to be discussed are:

- SAFETY in construction sites – working at height
- SECURITY – securing against surprise attacks
- DEFENCE driving and road safety
- PROCESS SAFETY – new frontiers
- ENVIRONMENTAL contamination by industrial activities
- INDOOR air quality and outdoor air quality
- PROTECTING workers with the aid of 3D modelling
- ERGONOMICS – eliminating discomfort and optimising performance



Image Credit : Alain Charles Publishing

*Dr. Sajed al Abdali, medical director EQUATE Petroleum addressing last year's Kuwait HSE Forum.*

- HIA (Health impact assessment)
- WASTE minimising and management in Kuwait
- RISK management.

Confirmed speakers to date include Nasser Al-Buhairi, chief security officer and head of Emergency Coordination Unit, Kuwait Oil Company; Dr Ahmad Al-Shatti, director, Occupational Health Department, Ministry of Health, Kuwait; Dr. Ghaida Mubarak Al-Shoraian, senior general practitioner, Kuwait National Petroleum Company; Muhammad Alamgir, HSE manager Petrofac, Kuwait; and Musaed Al Najjer, retired brigadier, Kuwait Civil Defence (Police). ■

For further information see the website at [www.hse-forum.com](http://www.hse-forum.com).





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## Iraq's upstream development is set to become more expensive: WoodMac

IRAQ'S UPSTREAM DEVELOPMENT is set to become more expensive as production moves away from the easiest and largest fields, according to Ian Thom, director of the Middle East upstream at Wood Mackenzie.

According to Thom Iraq's energy investment needs are growing in cost and complexity, reflecting the underlying resources of the country and the market needs of a growing population.

The most successful energy financing source for Iraq over the past decade has been foreign direct investment (FDI) by oil and gas companies. In the past 10 years, the country has seen more than US\$70bn of investment, which spurred Iraq's tremendous oil production growth, he noted.

He further revealed that more fields are moving into secondary recovery with integrated power and infrastructure. In addition, secondary reservoirs and smaller fields are being developed, proving to be more expensive.

"As cost and complexity grow, the need for capable and experienced operators is clear," he remarked.

The current investment trend is unlikely to change, according to the research. Another source of financing is budget revenue, which presents competition as the government needs to prioritise domestic social spending over big business ventures. Therefore, the main source is likely to remain direct investment by oil and gas companies.



Image Credit : Markus Naujoks/Pixabay

*Iraq's energy investment needs are growing in both cost and complexity.*

## "Middle East to be second highest in global polypropylene capacity additions by 2023"

MIDDLE EAST WILL be the second highest region in terms of polypropylene capacity addition in the global polypropylene industry, growing at an average annual growth rate (AAGR) of 9.5 per cent from 9.22 mtpa in 2018 to 14.80 mtpa in 2023, according to GlobalData, a leading data and analytics company.

Most polypropylene capacity additions will be from Iran with a capacity of around 2.76 mtpa by 2023. Major capacity addition will be from the plant, Jam Polypropylene Company Assaluyeh Polypropylene Plant 2, with a capacity of 0.55 mtpa by 2023.

Global polypropylene capacity is poised to see a considerable growth of 48 per cent from 80.39 mtpa in 2018 to 118.66 mtpa in 2023, led by Asia and the Middle East.

The company's report, 'Global Polypropylene Industry Outlook to 2023 – Capacity and Capital Expenditure Forecasts with Details of All Active and Planned Plants' reveals that around 108 planned and announced plants are scheduled to come online, predominantly in Asia and the Middle East, over the next five years.

Polypropylene capacity in Asia is expected to increase at an AAGR of 7.8 per cent from 44.31 mtpa in 2018 to 65.33 mtpa in 2023. Among the countries in the region, China will add a capacity of around 11.63 mtpa by 2023. Major capacity addition will be from the plants, Zhejiang Petrochemical Daishan Polypropylene Plant 1 and Zhejiang Petrochemical Daishan Polypropylene Plant 2, each with the capacity of 0.90 mtpa by 2023.

Dayanand Kharade, oil and gas analyst at GlobalData, said, "Increasing polypropylene demand mainly from packaging, due to urbanisation and growing income levels, are contributing to large capacity additions in China and India."

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## ADNOC, Korean firms celebrate first oil production from Haliba field

AL DHAFRA PETROLEUM, a joint venture between Abu Dhabi National Oil Company (ADNOC), Korea National Oil Company (KNOC) and GS Energy, has started producing crude oil from Abu Dhabi's Haliba field.

Located along the southeast border of Abu Dhabi, the initial production from Haliba field would progressively increase to 40,000 bpd by the end of 2019 as Al Dhafra Petroleum further unlocks the substantial potential of the field.

Sultan Ahmed Al Jaber, UAE minister of state and ADNOC Group CEO, commented, "The start of production from Haliba field highlights the important role of energy cooperation in strengthening the close and deep-rooted strategic relationship between the UAE and South Korea."

"First oil from Haliba demonstrates our



Image credit: ADNOC

*Haliba field is set to serve as the main production hub in Al Dhafra Petroleum's concession area.*

ambition to unlock and maximise value from all of Abu Dhabi's oil and gas resources to create long-term and sustainable returns for the UAE and our partners," he noted.

## KOC awards Halliburton integrated offshore services contract

KUWAIT OIL COMPANY (KOC) and Halliburton have signed an integrated offshore drilling services contract for six high-pressure high-temperature (HPHT) exploration wells on two jack-up rigs in the Arabian Gulf.

Through Halliburton Project Management, the company is set to provide and manage drilling, fluids, wireline and perforating, well testing, coring, cementing, coiled tubing and all offshore logistical services.

Additionally, Halliburton will provide the offshore rigs and supply vessels for the project.

"As part of KOC's plan to increase production capacity by charting new territory in Kuwait's offshore reserves, our company is pleased to announce that we will be working on this ambitious project alongside one of our closest business partners, Halliburton, who will be assisting us through the provision of their many years of experience in the field of offshore exploration and production," said KOC CEO Emad Mahmoud Sultan.

The contract includes a three-year term with a six-month extension option. Work is scheduled to begin in mid-2020. The expected start date for the first rig is July 2020 and the second rig is January 2021.

## Saudi Aramco and Baker Hughes sign JV for non-metallic materials

SAUDI ARAMCO AND Baker Hughes, a GE company (BHGE), have signed a MoU to create a new joint venture facility in Saudi Arabia to manufacture non-metallic materials that will be used in a variety of areas across the energy industry.

Initially, the joint venture will focus on non-metallic reinforced thermoplastic pipes as a first and critical step towards developing such capabilities in Saudi Arabia.

Ahmad Al Sa'adi, senior vice-president for technical services at Saudi Aramco, said that the partnership with BHGE focuses on expanding the use of innovative non-metallic materials in Saudi Aramco's operations.

"Saudi Aramco has successfully deployed more than 5,000 km of non-metallic pipes, resulting in a significant increase in efficiency and reduction in maintenance and replacement



Image credit: Saudi Aramco

*The JV will focus on non-metallic reinforced thermoplastic pipes as a critical step towards developing such capabilities in Saudi Arabia.*

costs across the company's operations. Producing these materials in the kingdom would unlock opportunities for local manufacturers and facilitate knowledge transfer," he added.

Non-metallic applications are used in various industries including oil and gas, construction, automotive, packaging and renewable energy.

## OPEC+ will continue production restraint: Wood Mackenzie



Image credit: Francais/Pixabay

*Tensions between the USA and Iran adds potential for oil price volatility.*

AS EXPECTED, OPEC+ has agreed to continue production restraint through the second half of 2019, rolling over the current agreement until March 2020.

The outlook for the market is mixed, Ann-Louise Hittle, vice-president, Macro Oils, at Wood Mackenzie said.

"Geopolitical risk means the supply outlook is tightening, offsetting the moderate weakening in oil demand growth thus far this year," she noted.

"We expect demand to increase one mnbbl per day in 2019, with a pick-up in the second half of the year after the weak growth in the first half.

"However, this is at risk if the USA increases tariffs on its imports from China or other nations and global GDP weakens further," she added.

However, worsening tensions between the USA and Iran add the potential for oil price volatility that could be tricky for OPEC members to manage.

"There is a downside risk for oil demand through the rest of the year if the ongoing trade war intensifies," she said.

"OPEC compliance is strong, except for Iraq and Nigeria. In May this year, Saudi Arabia had cut its production by more than 0.8 mnbbl per day from its October 2018 reference level. This is far more than required."

She stated that adherence to quotas is strong from the UAE and Kuwait, as well as Algeria and Congo. However, Libya, which is exempt from production restraint, saw a recovery in its output in May to around 1.1 mnbbl per day.

"The market faces the uncertainty of the escalation of threats between the USA and Iran. That would pose a supply risk in a 100 mnbbl per day global market, with just 3.8 mnbbl per day of spare productive capacity from OPEC. Around 1.8 mnbbl per day of that spare capacity could be made available within a month."

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## Building on record oil production and exports

IRAQ'S OIL MINISTER HE Thamir Ghadhban outlined Iraq's plans for oil and gas development at the CWC Iraq Petroleum conference held in London on 27 June.

Iraq has implemented the biggest development plan ever of its oil and gas reserves, he said. Production and export capacity are at unprecedented levels, with production capacity currently standing at around 5mn bpd, although the southern oil fields are yet to reach full capacity. Gas processing capacity is being increased to reduce flaring and provide urgently needed fuel for power generation and as feedstock for developing industries. The fourth bid round had led to large discoveries and an increase in reserves and production.

Current plans focus on two strands: firstly to expand export facilities in the south as part of the megaproject being finalised with Exxon Mobil, and secondly rehabilitate routes to the Mediterranean and add new routes to provide flexibility to manoeuvre from south to north. The construction of a new pipeline from Kirkuk to the Iraqi/Turkish border to replace the damaged ITP pipeline is underway.

Developing Iraq's gas resources is a priority. As oil has ramped up, associated gas has increased, with production in 2018 standing at more than 3bn scf a day, of which around one fifth was flared. Flaring has been reduced in the first half of 2019 and Iraq plans to eliminate flaring altogether by 2022, the Minister said. Iraq is exploiting its associated gas by increasing processing capacity, and developing transportation and compression facilities. Basra Gas Company has increased processing capacity, a new NGL plant is being built to process gas from Rumaila and Zubair and negotiations are underway to build another plant to process gas from West Qurna 2 and smaller fields.

Upstream, new activities planned include the development of border fields to provide a "leap forward in production capacity."

Iraq has been "less successful in building a viable refining sector", the Minister said. This is urgently needed to reduce dependence on



HE Thamir Ghadhban addressing the CWC Iraq Petroleum conference.

imported refined products; there is a "crucial and urgent need for new refined products," he stressed. The private sector is being offered opportunities to expand and upgrade existing refineries. A new investment model will be offered in the coming weeks, he announced.

The Minister commented on the unstable security situation in the region and the need to resolve differences through dialogue. Iraq is endeavouring to build relations with all its neighbours and play a constructive role, he said.

Fatih Birol, executive director of the IEA, commented that Iraq is and will remain a "major pillar of the global oil markets" in the face of growing demand, and is set to replace Canada as fourth largest global supplier after the USA, Saudi Arabia and Russia by around 2025.

Iraq's biggest challenges are political stability and reducing gas flaring, he said. While noting

increased investment in capturing gas and improvements made by Basra Gas Company, he said that an increased rate of gas capture is essential to satisfy the needs of the local economy, adding that Iraq imports significant amounts of gas at a high price. He noted the big gap between power demand and maximum capacity, saying that not only are new power plants needed, but efforts need to be made to make the most of existing capacity by upgrading and maintaining infrastructure, with around 40 per cent of power lost in transmission and distribution and the need for improvement of existing grids.

"A well functioning energy sector can be the bedrock of a more diversified economy," he concluded, highlighting the need for economic diversification, increased development of natural gas, a focus on solar energy and further industrial development.

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# Energy in 2018: an unsustainable path

BP's *Statistical Review of World Energy 2019* underlines the growing mismatch between societal demands for action on climate change and the actual pace of progress.

“THE HEADLINE NUMBERS are the rapid growth in energy demand and carbon emissions,” says Spencer Dale, BP's chief economist, in his introduction to the Review. “Global primary energy grew by 2.9 per cent in 2018 – the fastest growth seen since 2010. This occurred despite a backdrop of modest GDP growth and strengthening energy prices.

“At the same time, carbon emissions from energy use grew by 2.0 per cent, again the fastest expansion for many years, with emissions increasing by around 0.6 gigatonnes. That's roughly equivalent to the carbon emissions associated with increasing the number of passenger cars on the planet by a third.”

This growth was largely driven by China, USA and India which together accounted for around two thirds of the growth.

“To a very large extent, the growth in carbon emissions is simply a direct consequence of the increase in energy growth,” comments Dale.

“The power sector needs to play a central role in any transition to a low carbon energy system: it is the single largest source of carbon emissions within the energy system.

“Despite the rapid gains in renewable energy, the pace of growth in power demand has meant that overall carbon emissions from the power sector have increased substantially over the past three years. This highlights the importance of adopting a range of technologies and fuels, rather than just relying on renewables.”

The BP Statistical Review further highlights the growing divergence between demands for action on climate change and the actual pace of progress on reducing carbon emissions.

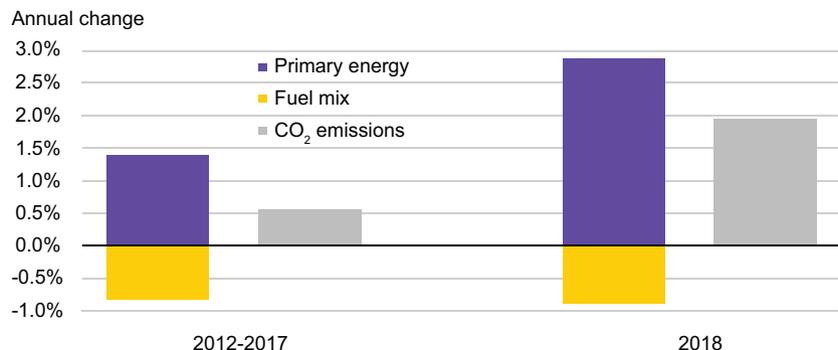
“The longer carbon emissions continue to rise, the harder and more costly will be the necessary eventual adjustment to net-zero carbon emissions,” says Bob Dudley, group chief executive.

“The underlying picture is one in which the actual pace of progress is falling well

## Energy demand and carbon emissions



Image credit: BP



short of the accelerated transition envisaged by the Paris climate goals,” adds Dale.

“Last year's developments sound yet another warning alarm that the world is on an unsustainable path.”

### Major findings

Major findings of the Review include:

- Natural gas consumption and production were up more than five per cent, one of the strongest rates of growth for both demand and output for over 30 years
- Renewables grew by 14.5 per cent, but still accounted for only around a third of the increase in total power generation
- Coal consumption (+1.4 per cent) and production (+4.3 per cent) increased for

the second year in a row in 2018, following three years of decline

- The USA recorded the largest-ever annual production increases for both oil and natural gas, the vast majority of increases coming from onshore shale plays.

### Middle East findings

- The Middle East accounted for one-third of global oil production, one-sixth of gas production, 48 per cent of proved oil reserves and 38 per cent of proved gas reserves
- Energy demand in the Middle East increased by 2.4 per cent in 2018, below the 10-year average of 3.8 per cent
- While oil consumption remained almost flat in 2018 (-0.1 per cent), gas increased by 4.9 per cent, and renewables by 34 per cent
- Oil production increased by 265,000 bpd (0.8 per cent) in 2018, with declines in Iran (-310,000 bpd) offset by increases in Saudi Arabia (+395,000 bpd) as well as UAE, Iraq and Kuwait.
- Gas production increased by 5.7 per cent, with Iran accounting for half of the increase. ■

“Last year's developments sound yet another warning alarm that the world is on an unsustainable path.”

# The Eastern Mediterranean gas chase

Recent discoveries have propelled the Eastern Mediterranean into one of the world's exploration hotspots, and now Lebanon is seeking time in the limelight, says Martin Clark.

**E**GYPT'S GAS RENAISSANCE of recent times continues, fuelling investment in other parts of the Eastern Mediterranean. Indeed, the region has become one of the world's exploration hotspots of late, with the discovery and development of Eni's giant Zohr gas field, as well as exciting finds offshore Cyprus and Israel.

More gas continues to be found. A spate of other discoveries in Egypt – including most recently Eni's giant Nour field, announced this March – has reignited Cairo's gas export ambitions, prompting a raft of new plans, projects and possibilities.

Officials talk eagerly about becoming a gas hub for the whole region, perhaps funnelling resources from both domestic and foreign fields for processing and onward sale to Europe and beyond. It is also breathing new life into Egypt's two liquefied natural gas (LNG) plants on the coast, banishing memories when the country was required to import gas as a matter of urgency for several years to fuel local energy demand.

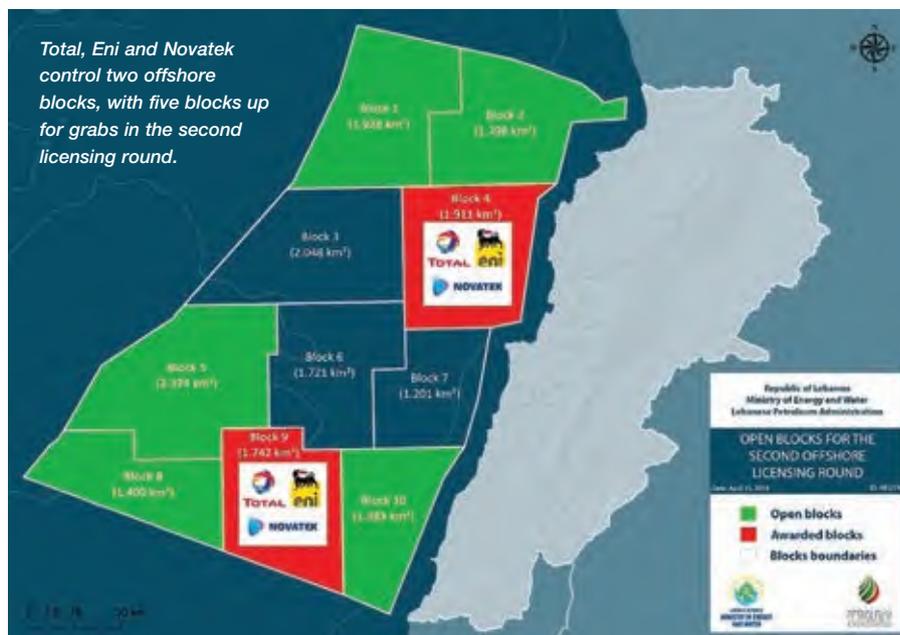
## Lebanese hopes

That picture now looks very different midway through 2019. Likewise, it has injected momentum into some of the region's other markets, those previously deemed less fashionable exploration prospects.

That includes Lebanon, which is looking to tap into the current positive sentiment and bring in more upstream investment in a country that has been largely overlooked by drillers in the past. This year sees Lebanon's Second Offshore Licensing Round 2019 that includes five blocks (Blocks 1, 2, 5, 8 and 10) up for grabs, stretching from its northern offshore areas to the country's southern tip along the border with Israel. The deadline for applications on the licensing round is January 31, 2020.

As a barometer for the region, it may reveal just how great investor appetite is now for this dynamic part of the world. Previous efforts to lure investment into Lebanon's exploration sector have been mostly underwhelming – although that could change this year.

*Total, Eni and Novatek control two offshore blocks, with five blocks up for grabs in the second licensing round.*



A consortium of Total, Eni and Novatek already control two offshore blocks (Blocks 4 and 9), awarded in the first bid round, with plans to spud a debut well this year. Seismic work has been done and final plans are underway with a well anticipated sometime later in 2019, to be followed by a second well in 2020.

“It marks a key moment for Lebanon’s nascent offshore sector.”

## Defining moment

It marks a key moment for Lebanon's nascent offshore sector, not only in testing its gas potential, but in standing firm in the face of pressure from Israel, which disputes some of the maritime border along the most southerly blocks (Blocks 8, 9 and 10).

Suhail Shatila, petroleum economist at

the Lebanese Petroleum Administration (LPA) said recently that Total will be drilling the first ever exploration well in Block 4 by December, with another well in the northern part of Block 9 by mid-2020.

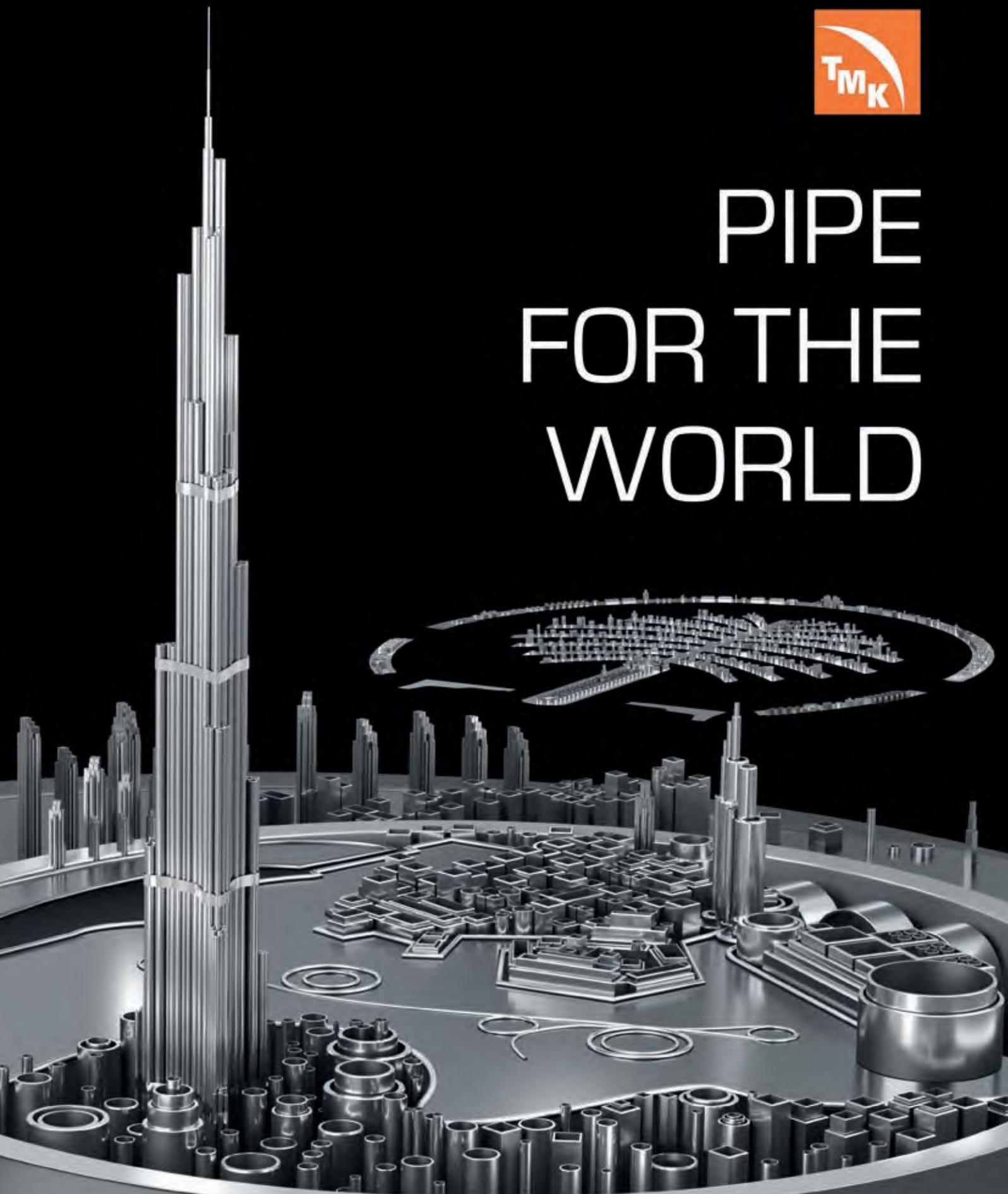
Though much of this block (Block 9) is uncontested, the southern tip lies in waters in an area that brushes up against Israeli waters. Earlier this year, Lebanon's Minister of Energy and Water, Cesar Abi Khalil, said efforts by Israel to put pressure on Total to halt Block 9 exploration, would “have no results” on current work and drilling plans. Israel's own big gas finds, including its Leviathan and Tamar fields, sit just across the border.

For the LPA, which began marketing the second bid round in April, these are exciting times, supported by a firmer legal framework that was updated in November 2018.

With little drilling history to go on, however, it is hard to say what resources Lebanon might yield. Large swathes of seismic data have been collected over the past 20 years, which point to evidence of hydrocarbons, although the LPA is cautious about assigning



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resource numbers or estimates – as always in the oil and gas sector, it is the drill bit that will reveal all.

Shatila said that exploration is expected to yield mainly gas with potential for condensate, and possibly oil, while any discoveries will be fast tracked to feed the growing energy demand, mainly from the power sector, which is “thirsty for gas”.

### Egyptian exploration

Egypt too remains active in this congested corner of the Med; the mighty Zohr field sits close to the border with Cyprus and to the west of Israeli territory.

The rapid development of Eni’s giant 30 trillion cubic feet Zohr gas field soon after discovery has almost, on its own, transformed Egypt in the space of three years from a major gas importer to a net exporter. Eni’s recent Nour discovery, about 50 km North of the Sinai peninsula, reinforces the trend. The Nour-1 wildcat well was drilled in 295 metres of water to a total depth of 5,914 metres. It found 33 metres of gross sandstone pay with good petrophysical properties and an estimated gas column of 90 metres in the Tineh formation of Oligocene age.

The Italian group is now the country’s leading producer with equity above 340,000 barrels of oil equivalent per day (boepd) that will further grow in 2019 with the ramp up of the Zohr field to production plateau.

A host of other major projects are together quite literally transforming the gas sector. BP is especially active with its West Nile Delta project and last year launched its Atoll Phase One project in the North Damietta concession in the East Nile Delta. This is now producing 350 million cubic feet of gas a day (mmscfd) and 10,000 bpd of condensate. Gas production is directed to Egypt’s national grid.

Other major operators include the likes of Shell, SDX and Dana Gas.

“ This will lead to the creation of a new gas hub, which could boost development and contribute to the stability of the entire region.”

### Development options

Significantly, Egypt already has the infrastructure in place to take advantage of this opportunity, both for production, such as flow lines and treatment plants, and for export, such as LNG terminals and pipelines.

Eni chief executive Claudio Descalzi said at a Chatham House event in London this year that the idea of creating an export hub was a realistic possibility.

“If these countries are able to define common strategies and share these existing infrastructures, they will manage to lower the necessary investment levels, reduce costs and speed up the exploitation of available resources, helping them to grow faster,” he noted. “This will lead to the creation of a new gas hub, which could boost development and contribute to the stability of the entire region.”

Then there’s the politics. With tensions between Israel and Lebanon surfacing even before any drilling has taken place, that remains a potential hurdle. Yet the development of the now defunct Arab Gas Pipeline, carrying Egyptian gas to Israel, shows what is possible.

What’s more, the area’s swollen gas resources have prompted operators and governments to push for solutions.

In a landmark deal last year, Delek Drilling and partner Noble Energy agreed to export US\$15bn worth of gas from Israeli offshore fields to a customer in Egypt. The gas is expected to feed into a new pipeline, the EastMed pipeline, between Ashkelon in Israel and El-Arish in Egypt, to transport the gas supplies. Gas exports to Egypt are expected to commence by the end of the year.

Cyprus too is pondering its options and could, potentially, see an outlet in Egypt with its existing infrastructure. These are exciting times for the Eastern Mediterranean gas industry. ■



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# Changing the energy landscape

In advance of the 24th World Energy Congress to be held from 9-12 September in Abu Dhabi, Musabbeh Al Kabbi, the CEO of Mubadala P&P, shares his hopes for the event.

## What role does Mubadala play in the 24th World Energy Congress?

As a global investor, we are honoured to be among the primary hosts who will welcome heads of state, 70 ministers, 500 CEOs and 4,000 delegates to Abu Dhabi. Alongside the other major energy players here in the emirates, we look forward to familiarising them with the capabilities and expertise that exist within our organisation and the asset portfolio we manage that contribute to the leading position that the UAE and Abu Dhabi hold in the global energy sector.

The Congress will provide a gathering point for current and future energy leaders, and experts in a variety of sectors, alongside a showcase for cutting-edge technologies and opportunities in the future. This is great exposure from an investment perspective and will foster a space for collaboration and enthusiasm to create lasting change.

Our ambition is to ensure that the activity within the Congress will carry on well beyond the closing session to create a prosperous energy future for all.

## What are the most important strategic areas in Mubadala's portfolio at present? What does Mubadala want to highlight at the Congress?

At the Congress, we want to highlight Mubadala's role as a responsible global investor and our portfolio of companies operating across the energy sector, which together aim to bring safe, secure and reliable energy supplies to markets around the world.

We believe that all forms of energy, including fossil fuels and renewables, produced efficiently and responsibly, will be required to meet future energy demand. Key to that are both the activities of our wholly-owned clean energy champion, Masdar, and our portfolio of petroleum-focused businesses. Through these businesses, Mubadala is investing in:

- Highly competitive and innovative renewable energy solutions;
- Reliable and resilient sources of low-cost oil production;
- Increasing the proportion of gas in our portfolio by developing significant new gas fields such as those in Egypt and Malaysia;
- Building further our position in infrastructure vital to deliver energy supplies to market efficiently and safely; and
- Developing refining and petrochemical facilities required to meet growing demand for fuels and ever more complex lightweight materials key to new technology driven products.

“All forms of energy will be required to meet future energy demand.”

## What impact do you believe the 24th World Energy Congress will have on the energy sector, particularly in the UAE?

Under the Patronage of HH Sheikh Khalifa bin Zayed Al Nahyan, the 24th World Energy Congress will attract a broad range of senior



Image Credit : World Energy Congress

Musabbeh Al Kabbi, CEO of Mubadala P&P.

players representing the full spectrum of the energy and related industries. It will be the first time the Congress has been held in the Middle East in its 95-year history.

Mubadala is at the heart of Abu Dhabi's global investment strategy, active not just in the energy sector but in many other areas including, very importantly, technology. We look forward to participating in dialogue on the major developments that are impacting the energy landscape, from advances in our traditionally inventive and resourceful oil and gas businesses, to more broadly applicable innovation and disruption coming from digitalisation, AI and automation. The focus on innovation and knowledge has never been greater in the region, and hosting the Congress will place Abu Dhabi firmly at the centre of the global energy debate.

## What contribution will the Congress have in meeting global energy challenges?

Today, the world is facing significant challenges as we try to balance the issues of energy security, universal access to affordable energy

supplies and the environmental impacts of energy production and use. The 24th World Energy Congress will take place at a time when we look for new ways to innovate and manage this 'energy trilemma' and all the challenges but also the opportunities the world faces.

In line with the UAE's drive for innovation, the Congress will bring the latest trends and disruptive technologies, look at innovative ways of thinking and financing, business models and policies that can deliver real change and 'Energy for Prosperity' – the theme of the 2019 edition – for nations, businesses and individuals.

#### How is Mubadala looking to diversify its energy portfolio through its global investment strategy?

Mubadala manages a diverse global energy portfolio with interests spanning the petroleum value chain, from exploration and production, through refining and petrochemicals. Through the technology and operations experience of its asset companies, Mubadala is working alongside ADNOC to develop Abu Dhabi's downstream capabilities and position the Emirate as the leading hub serving the Middle East and the growing markets of Asia.

Mubadala is also increasing the proportion of natural gas in its portfolio, reflecting the healthy growth expected in the sector, especially in the Middle East and Asia as an important contributor to cleaner power generation.

“The Congress will bring the latest trends and disruptive technologies.”

Our company also has a distinguished track record of developing, commercialising and deploying renewable energy solutions and advanced technologies. The company, through Masdar, is behind some of the leading clean energy projects in the region and globally, including the region's largest concentrated solar power plant, the 100 MW Shams 1 in Abu Dhabi.

As the leading global investment company, we are excited to welcome the 24th World Energy Congress to Abu Dhabi, our home city, which will become the epicentre of the energy debate in September.

#### Which energy markets do Mubadala hope to network with at the Congress?

Mubadala is a global investor with interests stretching from the Americas, through Europe and the Middle East, to South East Asia and the Far East. Over the past decade we have been evolving and partnering with best-in-class businesses to deliver strong financial returns for Abu Dhabi and build the emirates' capabilities and experience across the energy spectrum.

The Congress will provide a unique opportunity to connect with high-level decision makers, regulators, investors, innovators and thought-leaders across all the markets and sectors in which we are active.

#### What is the strategic importance of a global event like the World Energy Congress coming to Abu Dhabi?

Held every three years, the World Energy Congress is the world's largest, longest-running and most influential energy gathering. It is the only place where the entire global energy ecosystem will come together – not just one energy source, not just one part of the world, and not just one audience.

Today, building on the expertise developed in our country over the past decades and our positioning as an energy hub, we are delivering some of the world's most ambitious, forward-looking and innovative energy projects in line with the UAE Energy Strategy 2050. Hosting the 24th Congress will cement the UAE and Abu Dhabi's position as a global force in international energy policy. ■

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# Standardising skills and competencies in MENA

Richard Roberts, vice president Middle East & Africa at OPITO, the global skills body for the energy industry, discusses the benefits of benchmarking competency to assure a skilled and competent workforce.

**T**HE MIDDLE EAST remains a significant player in the global oil and gas marketplace. According to MEED's Mena Oil & Gas Market 2019 report earlier this year, Iran, Saudi Arabia and the UAE have the biggest pipeline of projects on the horizon, together worth more than US\$200bn.

A key ingredient to the region remaining a strategically important player, is its ability to keep one eye on operations and another on making sure its people are skilled and

competent as projects around the region continue to ramp up.

An excellent example of this is the Abu Dhabi

Onshore Oil Production Capacity Increase Project (also known as 'The US\$1.8 Million Project') in the UAE. It is central to the Emirate's plan to raise sustainable production and with thousands of job opportunities expected, there are plans for a training centre to help develop local technical skills.

Saudi Arabia is also moving at pace and diversifying into the downstream sector. A number of large-scale expansion projects including Petro Rabigh Integrated Refinery & Petrochemical Complex, Jizan and the Al Fadhil Gas Plant are ongoing in the region, and a skilled, competent workforce is critical to ensuring successful delivery.

“Organisations want to develop a system that provides assurance and quality”

Competency is an integral part of everyday business, and a growing number of organisations are choosing to have their competence management system (CMS) evaluated on a regular basis by a recognised external body.

As the global energy industry skills organisation, OPITO, alongside various industry stakeholders, has developed best-practice criteria by which a business can have its existing CMS evaluated and approved. By conducting an objective third-party measurement against a range of critical processes, we can provide value and assistance to an organisation by approving a system that truly works for them.

The simple three-stage process involves a mix of workshops, onsite assessments and evidence based submissions, evaluated against our industry-approved criteria. There are now 29 companies across the globe, which have achieved OPITO CMS approval, including Cansco International

Corporation in the UAE.

And it is a trend that is growing steadily. The globally recognised accreditation sends out a very clear message. It demonstrates the commitment and importance businesses place on setting and maintaining standards in their working practices and ensuring personnel are working to the same high quality, across their operations.

Structuring the performance and development of staff within a measured system, gives organisations more control over risk and cost at every step of the competence management lifecycle – from selection, training and development to staff deployment and continual assessment.

An increasing number of organisations gearing up for OPITO CMS approval also decide to undergo an initial Systems Health Check Audit which can help to pre-empt any areas needing to be addressed. This OPITO baseline audit can be carried out on new, existing or developing systems and gives organisations the opportunity to proactively demonstrate how the competence of their workforce is managed.

As we see more companies in the region and internationally working to achieve the OPITO CMS accreditation, it tells us that organisations want to develop a system that provides assurance and quality – potentially opening the door to new business opportunities. For major operators, auditing the performance of their main contractors against the same CMS criteria also ensures a standardised approach.

It also supports the increasing focus from industry regulators and professional bodies on the need for formal processes around the competence of the workforce, as well as training frameworks.

Benchmarking employees' competency is a necessity as the assurance of a skilled and competent workforce is a vital tool in helping companies succeed. More importantly, it ensures that we continue to build a safe and sustainable industry in the Middle East and across the globe. ■



Image Credit: OPITO.

Richard Roberts, vice president Middle East & Africa, OPITO.

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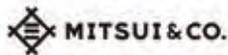


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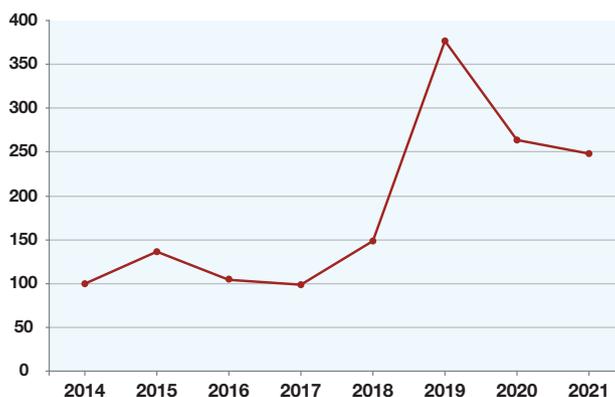
# Corrosion-resistant piping to unlock gas reserves

Matt Loffman, associate director, Rigs & Wells at Westwood Energy, discusses the growing demand in the Middle East for corrosion resistant alloys.

**R**ECENT YEARS HAVE seen a strategic shift among major Middle Eastern national oil companies (NOCs) towards the development of natural gas reserves. As Saudi Arabia, the UAE, Kuwait and Oman develop their natural gas industries, the NOCs are increasingly requiring piping equipment capable of handling high pressure and sour gas, with hydrogen sulphide and carbon dioxide content frequently encountered and requiring engineering attention.

While corrosion resistant alloys (CRAs) have been used for many years in oil & gas production throughout the region, the current level of demand and project pipeline has never been seen before; in the GCC or anywhere else in the world. When Qatar’s Barzan project, currently under construction, required 90 kT of clad pipe material it required hasty capacity increases in the manufacturing facilities of the project winners. Now, with the design phase of ADNOC’s Hail & Ghasha sour field development progressing towards completion, with indications that another 50 kT of clad and other CRA pipe will be required for this project alone (volume unconfirmed at the time of writing), the impact of

Middle East & Africa CRA Pipe Tonnage Demand (indexed to 2014)



Source: Westwood, Fastmarkets

Weld Overlay Implied Pricing US\$ per Tonne (indexed to 2014)



Source: Westwood, Fastmarkets

under capacity is being felt by oil companies around the world. More tenders from Qatar and the UAE are expected. Demand for these products has increased smartly since 2014 and is anticipated to remain at an elevated level for the next five years.

With clad pipe capacity limitations more of a concern for project developers – and associated capacity for substrate

material – an increase in anticipated demand for both solid CRA and weld overlay CRA pipe is expected. While solid CRA is a high volume market across applications, the relatively high cost for large diameter pipelines limits this material selection. As a manufacturing method, weld overlay has historically contributed relatively low volumes within the industry, requiring far

higher lead times and with hints of concern around ease of repair and maintenance. This appears to be changing, with project developers increasingly comfortable using this method for lower tonnages of CRA pipe, in addition to the bespoke applications and processing equipment used alongside. Along with well-established demand for the solid CRA pipe, weld overlay methods are now widely accepted in the Middle East.

The impact of a broader demand/supply imbalance is already affecting pricing, material selection, project schedules and supplier relations. One of the primary manufacturing methods for CRA pipe still struggling to gain a foothold in the region is mechanically lined pipe. While these products will benefit from supply tightness internationally, the Middle Eastern markets appear set to remain with other methods for large tonnages in the current phases of gas developments.

CRA pipe manufacturing is a rare area of the oil & gas equipment market that is comfortably outperforming 2014 levels. For much of the supply chain in the Middle East, oil prices at the current level are more than adequate to support growth.

Westwood Global Energy, alongside Fastmarkets, include analysis of the clad, mechanically lined, solid CRA and weld overlay markets in the recently launched update to the Future of Corrosion Resistant Alloys Service, with a focus on CRA pipe. ■

mloffman@westwoodenergy.com.

“CRA pipe manufacturing is comfortably outperforming 2014 levels.”

# Protecting pipelines from security threats

Stuart Large, product director and business solutions at Fotech Solutions, discusses how to protect pipelines from integrity and security threats.

## To what extent are security threats a concern to Middle East pipeline operators, particularly in view of recent attacks on oil and gas installations?

By their nature, pipelines might be considered as soft targets. By planting a device close to the pipeline, or drilling into the side of it, it would be possible to cause substantial damage and disruption through an explosion, spillage or prevention of flow.

It is difficult to provide full protection for a pipeline using traditional techniques such as patrols or cameras, because the pipelines are so long and often travel through challenging and remote terrain. Those wishing to do harm to a pipeline can pick a section that is out of sight and can wait for line-walkers to pass before going about their work.

If the intent is to steal product from the pipeline, thought needs to be given to how the product will be transported and taken to market. But if the intention is simply to cause destruction, then that opens more opportunities to criminals and greater chances of success.

## What are the main threats to pipeline security and integrity you are seeing in the region?

Pipelines are potentially exposed to the threats of terrorism, theft by hot-tapping, accidental damage from things like excavators, or geotechnical activity such as landslides.

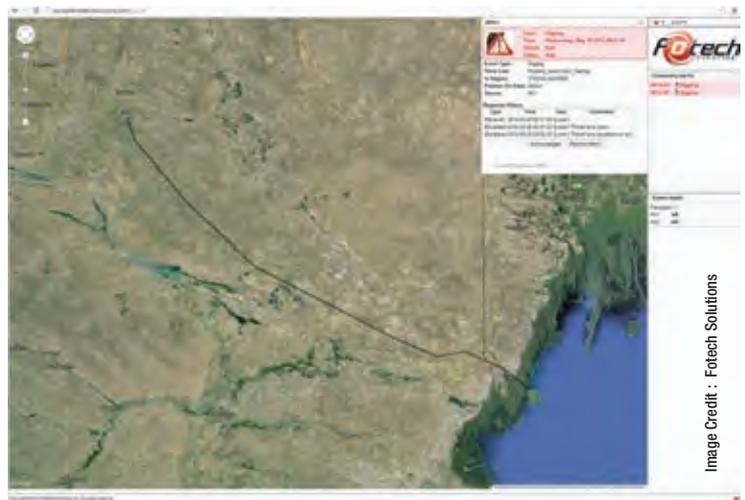
There has been news recently of drone attacks on critical Saudi pipeline infrastructure, with pipelines actually being shut down. Such attacks create wider issues for the global oil industry and cause a spike in global oil prices. This incident shows that other pipeline assets within the region are at risk from similar attacks. The extremely remote locations of pipelines in the Middle East makes them an easier target for attacks.

“ In the current climate, we’re seeing many Middle Eastern operators look at DAS solutions.”

## What measures can pipeline operators take to protect their pipelines against such threats?

Operators need to apply technology such as DAS (Distributed Acoustic Sensing) which can monitor pipelines covertly. Disturbances from criminals walking, digging or operating vehicles near the pipeline will be detected and located by an unseen fibre optic sensor. The activity will be categorised and raised as an alarm with a precise time and set of coordinates, so the security team can rapidly decide on the best course of action and seek to prevent damage to the pipeline.

Using a fibre optic cable laid alongside the pipeline, DAS technology



Using DAS technology, disturbances are detected and an alarm raised.

will detect threats to the pipeline and raise alarms. It can be integrated with other aspects of the security system, which might include cameras, personnel response, or drones. They can be directed immediately to a very precise location, accurate to within 10m, to give the best chance of identifying the perpetrators.

In the current climate, we’re seeing many Middle Eastern operators look at DAS solutions such as Fotech’s to better protect their valuable pipeline assets.

## Are there any projects you would like to highlight?

Fotech Helios DAS sensors are protecting many assets in the region and elsewhere around the world. For example, with recent installations included, more than 5,000km of pipelines are protected using our technology in India. In one example on a 72km pipeline, 26 hot tap attempts were detected and prevented in only six months. The success lies in the ability to detect disturbances at the earliest possible stage, raising an alarm and being able to provide actionable information for operators immediately before incidents become full-blown disasters.

One particular case involved a tunnel being dug into from a nearby building with an attempt to rupture a buried pipeline. A combination of two monitoring technologies, Fotech’s LivePIPE and a mass balance system were able to detect this activity. This is because they worked in conjunction to identify both a loss of product within the pipes while identifying the tunnelers digging. Through cross referencing the data, operators were able to identify the rupture attempt to a region of 10m, and the security team could act accordingly. ■

To find out more about Fotech’s pipeline monitoring DAS technology, visit: <https://www.fotech.com>.

## Middle East pipelines poised for growth

THE TRUNK OIL and gas pipelines in the Middle East are poised for considerable growth over the next four years, increasing from 89,397 km in 2019 to 104,297 km in 2023, a total growth of around 17 per cent, according to GlobalData. Iran and Iraq dominate the new-build pipelines additions in the region, accounting for around 74 per cent of the total length growth by 2023. Iran is expected to contribute around 50 per cent (~7,500 km), and Iraq around 24 per cent (~3,475 km) of the total pipeline length additions by 2023, the 1,700 km Basra-Aqaba oil pipeline being among the major projects. Among companies, Iranian state-owned companies – the National Iranian Gas Co (~2,400 km) and the National Iranian Oil Co (~2,000 km) – lead new-build pipeline length additions in the region.



Middle East pipelines are set to grow by 17 per cent in the next four years.

Image credit: Adobe Stock

## ADNOC closes pipeline infrastructure investment

THE ABU DHABI National Oil Company (ADNOC) has closed its pipeline infrastructure investment agreement with BlackRock and KKR. The transaction was announced in February when KKR and BlackRock signed an initial investment agreement to invest US\$4bn into the midstream pipeline assets. The Abu Dhabi Retirement Pensions and Benefits Fund (ADRPBF) agreed to invest a further US\$300mn. The KKR and BlackRock investment, which was successfully funded through their global infrastructure funds and financed by a syndicate of international banks, was oversubscribed during its syndication.

The innovative leasing investment structure marks the first time that leading, global and domestic institutional investors have deployed long-term equity capital into key midstream infrastructure assets of a national oil company in the UAE. This agreement will see BlackRock and KKR acquire a combined 40 per cent stake in a newly formed entity, ADNOC Oil Pipelines, with ADRPBF acquiring three per cent and ADNOC holding the remaining 57 per cent. ADNOC Oil Pipelines leases ADNOC's interest in 18 pipelines, transporting stabilised crude oil and condensate across ADNOC's offshore and onshore upstream concessions, for a 23-year period. The entity receives a tariff payable by ADNOC, for its share of volume of crude and condensate that flows through the pipelines. Sovereignty over the pipelines and management of pipeline operations remain with ADNOC.

The collection of 18 pipelines being leased by ADNOC Oil Pipelines has a total length of more than 750km, and a total aggregate capacity of approximately 13,000mn bpd. These assets allow for the vast majority of Abu Dhabi's crude oil production to be transported from ADNOC's onshore and offshore upstream assets, to Abu Dhabi's outlets and terminals.

## New NDT software released

CREAFORM, A GLOBAL leader in portable 3D measurement solutions and engineering services, has launched Pipecheck 5.1, a major upgrade to its non-destructive testing (NDT) software for pipeline integrity inspections in the oil and gas industry.

Pipecheck 5.1 is compatible with the recently released HandySCAN BLACK, the latest generation of Creaform's HandySCAN 3D portable 3D scanners. When used in conjunction with the HandySCAN BLACK, Pipecheck 5.1 offers high measurement speeds, thanks to 11 blue laser crosses that decrease the time between surface acquisition and workable files; high accuracy regardless of the conditions in which data is captured, even in sun, dust or rain; and ease of use. With high-performance optics and blue laser technology, Pipecheck provides unmatched resolution to capture even the minutest external pipe defects (corrosion, dents and mechanical damage). Users can perform assessments on any type of surface, including complex and shiny components, as well as in any harsh indoor or outdoor environment.

"Pipecheck 5.1 allows for highly reliable surface damage diagnostics on both the inner and outer linings of pipes for the entire pipeline lifecycle," explained Daniel Brown, Creaform's director of Product Management. "Pipeline integrity and safety is definitely top-of-mind across all stakeholders, including manufacturers, pipeline operators, researchers, communities and special-interest groups. Pipecheck 5.1 and HandySCAN BLACK are powerful technology solutions to mitigate the risk of pipeline damage and ensuring regulatory compliance."



Pipecheck 5.1 is compatible with the company's recently launched HandySCAN BLACK 3D scanner.

## New solution for safe and efficient pipeline management

WITH INCREASING OPERATIONAL, security, environmental and legislative requirements for pipeline operators, KROHNE has developed new solutions for pipeline management.

PipePatrol is a comprehensive suite of software modules for long or short distance single and multiproduct pipelines for oil, gas, water, chemical or refined products, and offers monitoring and protection of pipelines in all operating conditions.

PipePatrol can be supplied in various configurations: eight modules cover leak detection, theft detection, stress monitoring, line break detection, tightness monitoring, batch tracking, pump monitoring and predictive modeling. To match the application, the modules can be used stand-alone or individually combined, and optionally complemented by a wide range of instrumentation, cybersecurity and field data acquisition systems. KROHNE also offers engineering, operation and maintenance services for pipeline management such as support during certification or post theft analysis. This modularity offers the pipeline operator to achieve best results and meet safety and legal requirements in line with the application and the available budget.

The leak detection module provides the unique PipePatrol E-RTTM (Extended Real Time Transient Model) based leak detection and localisation for liquids and gases which is applied on more than 350 pipelines worldwide. It is complemented by the theft detection module that specialises in fast and reliable identification and localisation of unauthorised or illegal product discharges, and the tightness monitoring module to detect small or gradual leaks. To efficiently detect pipeline ruptures instantly the line break detection module can be applied. It uses a pipeline rupture pattern recognition for automatic emergency shutdown in case of a line break. The batch tracking module for batch and interface tracking in multiproduct pipelines, and the stress monitoring module for evaluation and documentation of lifetime stress and remaining pipeline service life complement the operational modules. The predictive modelling module forecasts pipeline operation (for example next 24 hours) and identifies possible threats such as shortage in supply or pressure violations. Its offline simulation then can be used to find corrective measures as well as for planning of optimised operation in the future. In addition, the pump monitoring module enables predictive maintenance and higher system availability by monitoring essential mechanical, electrical, and hydrodynamic measurement values.

## FloFuse

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FloFuse is a biased open valve which enables water injection at normal distributed rates but chokes once a trigger rate is exceeded.



Image Credit : Rawrfo/Adobe Stock

Machine learning can help to identify events, such as when the pressure within a pipe increases while the temperature remains the same.

# Reaping the rewards of digital asset management

The deployment of machine learning, alongside engineering models linked to the Industrial Internet of Things (IIOT), can help oil and gas companies achieve operational excellence, says Richard Irwin, senior product marketer, Bentley Systems.

**T**HE INDUSTRIAL WORLD is awash with data and new information from sensors, applications, equipment, and people. However, the data is worthless if untouched or not used to its full potential to gain insights and make improved decisions.

To make the most of big data, oil and gas leaders should implement machine learning alongside accurate engineering models linked to the Industrial Internet of Things (IIoT). This practice will leverage the digital DNA of the asset to take advantage of the increased performance and reliability insights that engineering information can bring to the operation. Using reality modelling technologies to capture existing asset conditions, applied together with IIoT and machine learning, companies can reap the rewards of cost savings and improved uptime.

## Demystifying machine learning

We have all experienced some form of machine learning, from streaming movie recommendations, to detecting fraudulent activity by monitoring spending patterns. Now, the industrial arena is moving quickly toward using this type of artificial intelligence to leverage IIoT.

As a greater variety of data becomes available to monitor just about anything, machine learning is managing increasingly large and fast-moving datasets. Previously,

organisations with predictive analytics could use big data (current and historic) to predict the future – with reasonable results. Machine learning brings a more accurate prediction, using algorithmic models to deliver more insight.

“Machine learning can handle large and complex information to discover hidden patterns.”

Machine learning can handle large and complex information from sensors, mobile devices, and computer networks to discover hidden patterns or trends in the data. It can then learn these patterns and apply it to new, real-time data to detect similar patterns in the future. For example, through modelling the performance of a piece of equipment, in relation to the temperature of its surroundings, machine learning can be taught to see what normal and abnormal behaviour looks like. Then, by applying the model to current data, it can identify events, such as when the pressure within a pipe increases while the temperature remains the same. The system can predict, from existing knowledge, that something is not right and prescribe actions.

The more data that is analysed, the more accurate the predictive model.

## Machine learning techniques

Part of the implementation process is understanding how machine learning works and the number of techniques involved. The most common techniques are:

- Supervised machine learning: The programme is trained on a predefined set of test data, historical or similar to the real thing, to reach an accurate conclusion when given new data.
- Unsupervised machine learning: The programme is given a mix of data and must find patterns and relationships with no training whatsoever, without any specific target or outcome.

When implementing machine learning, there are many other considerations regarding the data, the insights, and how they can be applied within the business.

In the oil and gas industry, recognising equipment failure – and avoiding unplanned downtime, repair costs, and potential environmental damage – is critical to success across all areas of the business, from well reservoir identification and drilling strategy, to production and processing. It is even more relevant in today's turbulent times. With machine learning, there are numerous opportunities to improve the situation. Some forms of predictive analysis that machine



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learning can deliver to the oil and gas industry include predictive maintenance, reservoir modelling, video interpretation, and case-based reasoning.

**Predictive maintenance** – This failure inspection strategy uses data and models to predict when an asset or piece of equipment will fail, allowing teams to plan maintenance ahead of time to minimise disruption. It can cover failure prediction, failure diagnosis, and recommending mitigation or maintenance actions after failure. With the combination of machine learning and maintenance applications leveraging IIoT data, the range of positive outcomes and reductions in costs, downtime, and risk are worth the investment.

**Reservoir modelling** – Machine learning makes the process more reliable with decisions made more quickly by providing the reservoir with data that recognises patterns for history matching, answering the question of how reliable estimations are when calculating how a reservoir reacts to fracture treatments. The models will be robust enough to help improve the accuracy of the reservoir properties' predictions.

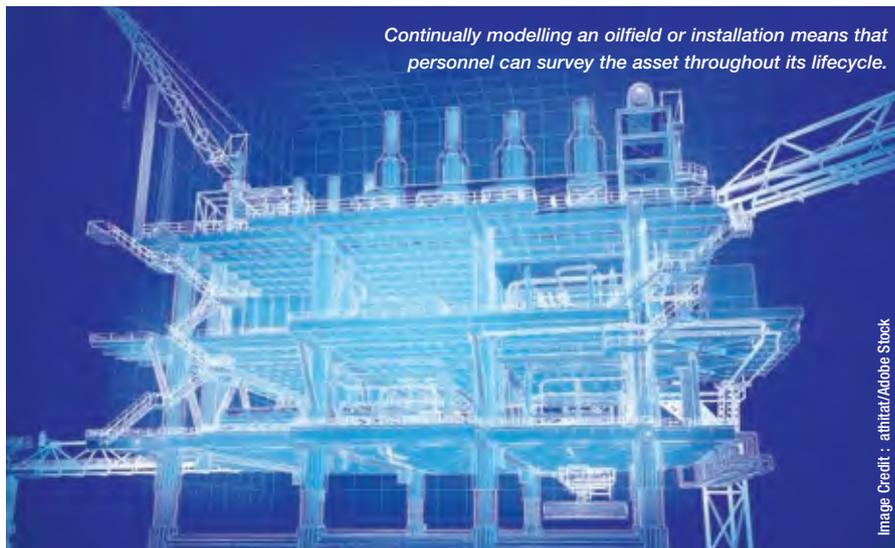
**Video interpretation** – Video technology used in the down-hole drilling environment can benefit from machine learning, as well as the many sensors that monitor a platform or plant. Machine learning can be applied to interpret video and image data through anomaly detection to provide accurate assessment wherever video technology is applied for sensing tasks, therefore improving safety, costs and efficiency.

**Case-based reasoning** – With case-based reasoning, a current problem or case is compared to historical cases to find similarities that could provide clues to help identify the actions or behaviors to take that could help overcome the current situation. Frequent operational and reliability problems are still common within the oil and gas process because of the number of complex parameters, with well blow-outs, leakages, and production issues being some of the serial offenders. This practice could include analysing data, such as weather conditions, depth, equipment used, costs, and more. Case-based reasoning is not a new approach in the oil and gas sector, but machine learning can significantly speed up the process.

### Visualisation bridging the gap between real assets and virtual assets

Machine learning capabilities will help organisations realise insights from the large amounts of data provided by sensors and IIoT. Bringing it all together is visualisation through engineering models for structures, such as offshore platforms and onshore processing plants.

IT/OT convergence has become an accepted practice, with operators gaining new insight from known information. But



misalignment in corporate strategy still results in silo building across many areas, especially within engineering technologies (ET), where engineering models often remain stranded, inhibiting the ability to leverage this information to optimise operations. They should be included within the existing IT/OT conversation, driven by IIoT and machine learning.

“ A machine learning strategy will give companies unprecedented insight into their operations.”

Designing and testing new products, systems, and even plants in a virtual environment makes a compelling case, particularly from a cost perspective. Virtual models can tie these domains together over the whole lifecycle of an asset, using its embedded digital DNA. From an asset management perspective, it is about predicting a problem before it occurs and enabling maintenance to be performed at optimum rates and costs. This will be accelerated with the application of machine learning to make the decision-making process smarter, faster and, more importantly, in context.

Continually modelling an oil field or installation means that personnel can survey the asset throughout its lifecycle, from initial design to current condition, applying the difference in data to maintain up-to-date information on the equipment's condition along the way. Reality modelling can link engineers in the field directly to the office, sharing information and data collaboratively. With the use of IIoT data provided by the images in the building of 3D models, machine learning algorithms provide a predictive capability and deliver more informed business

insights, resulting in faster and more reliable decision-making.

### Digitalisation and machine learning

While machine learning gives the impression that human involvement is minimal, it is not the case. It gives the user more intelligence, context, and insight to make the decision-making process easier and improve productivity. For those firms adding machine learning to their asset management journey, the next logical step is to go model-centric, by adding visualisation dashboards, cloud-based IIoT data, analytics, and reality models to machine learning. A machine learning strategy will give companies unprecedented insight into their operations and lead to significant benefits in efficiency, safety, and optimisation, as well as the speed in which decisions can be made.

With the arrival of IIoT, the amount of data is growing and becoming more accessible. With the ability to acquire more data, more advanced technologies are required to scrutinise and filter out the important information and the value held within. But, it can only be exploited by identifying what works well and what does not. Machine learning features complex algorithms to sort through large amounts of data, identifying patterns and trends within it, to make predictions.

The use of machine learning in oil and gas does not have to stop at just exploration and production, but can be applied across the whole operation, where algorithms are used to continually improve the overall performance across the whole facility and the equipment within it. By combining these machine learning practices with IIoT and visual operations, they will bring, as it matures, significant benefits. IIoT, engineering models and machine learning should no longer be considered just buzzwords. Instead, when combined, they can be an organisation's number one priority for achieving operational excellence. ■

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Attention has focused on automating the drilling rig.



Image Credit: Adobe Stock

# Moving ahead in drilling automation

The last few years have seen much discussion in the industry about digitalisation and automation, particularly in the drilling arena. What has been achieved so far, and can the reality live up to the hype? Sriram Srinivasan, Halliburton's VP for Global Technology, shares his views.

“**D**RILLING CAN BE broken into two parts,” says Sriram Srinivasan. “One is the pre-job planning, which encompasses all the planning efforts that go on to deliver the well design. The other is the execution of that plan and drilling the well.”

“The industry has made good progress on the drilling of the well,” he comments. Drilling a well involves a number of aspects; he points out, such as the surface equipment, the drilling rig and everything on the surface; as well as the downhole equipment, such as the drilling tools, sensors and so on.

“Over the last few years the industry has focused on automating the drilling rig – specifically on automating the top drive control, the drawworks control and the autodrillers. The rig companies are working on taking automation to the next level, in terms of automating pipe handling systems, robotic pipe handling and so on. The overall goal of this work is to reduce the time it takes to execute these operations.

“Turning to the drilling process itself, again you can break this into two parts,” he says. “One is on bottom drilling, where the drill bit is cutting the rock; and then off bottom, when you’re tripping in and tripping out to the bottom, maybe making a pipe connection or taking surveys. The focus has been on bottom drilling, although it accounts for only around 30 per cent of drilling time. The off bottom, i.e. flat time, is regarded as less ‘glamorous’ and has not drawn as much attention.

“The next frontier is bottom drilling which focuses on automated steering and directional

drilling,” he continues. “Although directional steering today is still done manually for the most part, technologies are becoming mature enough to autonomously make steering decisions in real time. These technologies are normally run in advisory mode, providing real-time insight and guidance to the driller on what to do – from optimising well placement to mitigating risks.”

Faster drilling, more accurate well placement and reliable performance are a priority in today’s market, Srinivasan continues.

“Technologies such as our iCruise intelligent rotary steerable system are integrated with real-time, automated advisory steering and vibration commands that deliver consistent and predictable drilling results. When combined with the LOGIX automated drilling director, this system applies machine learning to project complex drilling scenarios and geological uncertainty in real-time to optimise current drill plans accordingly.”

“Similarly, in the area of fluids and pressure

“Faster drilling, more accurate well placement and reliable performance are a priority in today’s market.”



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management, automated drilling mud measurement and predictive model-based decision making systems are another important aspect of improving drilling performance and reducing overall risk – and, they exist today, but haven't been widely adopted yet. Consider our portfolio of BaraLogix tools and services. This single piece of equipment autonomously measures fluid density and rheology in real-time, providing drilling engineers the predictive analytics required to quickly and accurately identify potential issues and make optimal recommendations to improve drilling performance."

## Opportunities in off bottom drilling

Off bottom drilling provides many more opportunities for automation, according to Srinivasan, in terms of optimising operations to minimise the time it takes to trip in and out, swab and surge control etc.

"The focus so far has generally been on reducing non-productive time, so I think there is still a lot of work to be done from the technology point of view before systems are robust enough to be used without significant human interactions. While we have advisory systems and control systems running, there are still people in the loop. It will be a few years before we can start doing total remote operations on a consistent basis."

## Automating the planning process

Another area that does not receive much focus is the upfront well design and planning process, Srinivasan continues. "It used to take six months to create the well plan. The workflow was a manual, non-seamless, process consisting of multiple, disjointed software systems that managed tasks individual, such as well planning, casing design, geomechanics and so on. Aside from the time it took to integrate this data for a more cohesive view, it was difficult to keep it up to date with critical changes. Today, the industry has reduced six months to 30 days, and when these plans are designed using a digital, integrated platform, they can be created in a day. Aside from the dramatic reduction in time, this digital approach to well construction provides operators with new and more powerful ways to connect to the reservoir, technology, operations and with each other.

Srinivasan explains further, "Well Construction 4.0 is our digital approach to automated well construction. It leverages a single, integrated platform that promotes increased collaboration and connectivity across drilling disciplines and activities, which reduces planning time, increases efficiency and improves decision-making. Platform applications include Holistic Field Development Planning, which is a live process where design elements are continuously updated for accurate economic analysis.



Image Credit: Halliburton

**Sriram Srinivasan, Halliburton's VP for Global Technology.**

Another component is the Digital Well Program, which enables real-time updates throughout the execution process, and our Edge solutions, which connect real-time advisory information and measurements at the rig site to create a live digital twin of the entire well construction process."

“ The need for consistency has been a prime motivator.”

## Progress in digital twins

Progress is being made in the digital models required for decision making, comments Srinivasan.

"All these control systems are model-based. The technical jargon today is digital twin, which is a digital model of whatever process you are trying to automate. We need to have good enough digital twins to base our automated decision making on, and digital twins today are getting better by the day. There are different schools of thought here – one is that digital twins should be first principle physics-based models, and there is another, which says that you should base the digital twins on historical data. So, for example if you have drilled 100 wells you should be able to create an empirical model involving no physics at all. I think the answer lies somewhere in the middle, using the right level of physics informed by the historical data you might have. That's what's going to survive in all the many digital twins we would need for the steering process, for the hydraulics and fluids and pressure management. The industry is making huge progress in this, but it hasn't yet all come together in a unified control system.

One reason why automation technology progress has not been as fast as it could be is that operators are not completely convinced

of the potential. "In order to get more traction, the service industries or any companies using these technologies have to bring the oil companies along," remarks Srinivasan. "It's happening, and there have been some early adopters, but some oil companies are more open to these ideas than others." North Sea companies tend to be at the forefront, followed closely by the Middle East and then the US land operators, he comments.

## Prime motivators

Consistency and safety have been the two prime motivators for automation technologies, he continues. "The motivation is largely the need for consistency in operations, rather than efficiencies due to reducing manpower. Typically, if we look at decision making on the day shift versus the night shift in any drilling operation, you'd be surprised at how inconsistent they are. The crew in the day shift can do things differently from the night shift in the same well. This has the potential for lost time so the need for consistency has been a prime motivator.

"Secondly, a priority, especially in the North Sea, is to move people off the offshore oilrigs for safety reasons. If you can operate remotely then you can monitor multiple jobs onshore from a remote centre and make decisions remotely, as opposed to on the rig. Speaking for Halliburton, consistency and remote operations are for sure the driving factors."

How does Halliburton itself evaluate the potential of these new technologies and take investment decisions?

"When it comes to drilling automation technologies, Halliburton has consciously decided to embrace the open architecture concept in the area of drilling, meaning that we're agnostic to what rigs we are going to work on, or what operating systems the rig runs from a data perspective. We're willing to plug into any architecture. We're a strong believer that in the area of automation and digital in particular, open architecture is essential for the industry. That guides our decision making when we look at where we need to invest and how much.

"We recognise that drilling automation is in its early years, but we are investing in the belief that this will drive substantial value for operators as the technology and capabilities grow. We are investing enough to get the technology building blocks ready, so when the time comes we can offer fully digitally-enabled services and will have automation capabilities. Some of the new rotary steerable platforms that we have are in the process of launching tools with that in mind. They have so much sensor and computing power that they are ready for the future when we can drill completely autonomously.

"So we're taking a long view for sure in that regard," Srinivasan concludes. "And we're guided by how we believe the industry will evolve, and how quickly." ■

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# SATORP - role model refinery

The SATORP (Saudi Aramco Total Refining & Petrochemical Company) refinery on the east coast of Saudi Arabia is the first refinery in the Kingdom to successfully implement data validation and reconciliation (DVR) software.

ONE OF THE most advanced and complex refineries in the world, with the longest conveyor, SATORP processes 400,000 bpd of mainly Arab heavy crude oil and produces LPG, benzene, paraxylene, gasoline, jet, diesel, propylene, coke and sulphur.

At the Belsim Users' Meeting held in Marseille in May, Amna A. Al Fagieh, (Performance Control Supervisor), and Kalpesh Dave (Mass Balance Engineer) from SATORP, presented on the implementation of Belsim VALI DVR software for daily mass balance. VALI's capability of integrating energy and mass balance had been one of the main factors in its selection, according to Mr Dave.

Mrs Fagieh highlighted the critical role of mass balance in monitoring refinery performance and for management decision making. All reports to management and shareholders start with the output of mass balance.

"One of the main benefits of our DVR software solution for mass balance is for financial accounting. Losses measurement is important for us to get a picture of how much we're losing and to what extent they are physical losses such as flaring, process, shipment loss; or accounting losses. The model helps us to look into reliability issues, material transfers and material losses and to identify faulty flow meters."

The first official mass balance was published into SAPTM in Feb 2014 from DVR, and all official data to management are provided from DVR. The model provides global, unitwise and network mass balance. It provides a full integrated reconciled mass balance on a daily basis, the completion time being three to four hours. User-friendly application reports, such as production account or unit yield reports, are automatically generated from the VALI reconciled results. The software also provides alarms on degrading or under-performing sensors for corrective and condition-based maintenance, and the ability to adopt any changes in refinery configuration.

The refinery is divided into clearly defined



Amna A. Al Fagieh (front right) in discussions at the Belsim Users' Meeting.

areas for mass balance, which has been vital to the success of the model. "In each area we identified the critical flow meters that impact the balance of the refinery. Each area is given spreadsheet of meters that have to be calibrated and maintained to give us a good result to add to our mass balance," said Mrs Fagieh.

“One of the main benefits of our DVR solution is for financial accounting.”

The model has 30 units, 80 tanks, 1400 PI tags and 200 PFDs. Mr Dave commented that the main challenge in implementing this large and complex project was the fact that only design data was available at the start, as the refinery was not yet on the ground. "When we tested the model everything looked good, but with the real-time data, we had our ups and downs," he said. However, with the help of Belsim and its team of experienced engineers,

12 of whom were working on the project in the early stages, these issues were overcome. "We worked together with Belsim to fine-tune the model, which was a good sharing experience," said Mr Dave. "These guys are capable of developing whatever you want, as long as you have a clear vision, which we did. It was successful and we were very happy."

Mrs Fagieh said that SATORP launched the first of its annual mass balance workshops last year for relevant personnel, as well as shareholders Saudi Aramco and Total. This provided a forum to discuss any problems and issues and to explore how to further enhance the mass balance tool to improve the accuracy of the data provided to management

SATORP is also sharing its experience and best practice, as many refineries are still struggling with closing the mass balance. Following SATORP's success, other refineries in the Kingdom are implementing or looking to implement the DVR solution. SATORP is now looking forward to upgrade to the new solution tool provided by Belsim, VALI 5, to take advantage of its enhanced features, such as web reporting and more user-friendly user interface. ■

## Caterpillar O&G launches dual fuel engine

CATERPILLAR OIL AND Gas has released the new land well service 3512E Dynamic Gas Blending dual fuel engine. The 3512E DGB engine will be certified to U.S. EPA Tier 4 Final emissions standard while offering the highest natural gas substitution in its class.

Unlike previous versions offering dual fuel operation, the 3512E DGB will include factory solutions that emit approximately the same or less greenhouse gas (GHG) emissions as a comparable 3512E Tier 4 Final diesel engine. Additionally, the dual fuel performance of the new 3512E DGB has significantly increased compared to similar engines in its class with the ability to achieve 85 per cent diesel displacement, further allowing for lower operating costs.

With identical configurations as the 3512E diesel engine, the new 3512E DGB engine was designed for 2250 and 2500 bhp ratings. Separate circuit and air to air after cooling options are identical to the core diesel, including mounting dimensions for like trailer design. On-engine gas filtration is standard as well as the same options available for the



The 3512E Dynamic Gas Blending dual fuel engine.

core diesel, including the Engine Idle Reduction System (EIRS), which reduces the amount of fuel used on non-productive idle time. The engine's robust diesel design will allow for extended life and lower owning and operating costs.

"Caterpillar's 3512 platform has decades of experience operating in the oilfield. And the addition of the 3512E DGB will continue that legacy while helping customers burn natural gas," said Derek Kamp, Well Service Industry manager.

## Industrial gensets market

THE GLOBAL INDUSTRIAL generator sets market is set to exceed US\$13bn by 2025, according to the latest study by Global Market Insights. The 75-375 kVA gensets market is anticipated to expand by more than seven per cent by 2025, owing to infrastructure and construction growth with upcoming mega events, most notably the Qatar FIFA World Cup 2022 and Dubai World Expo 2020. The natural gas industrial generator sets market size is predicted to grow by more than eight per cent up to 2025. Increasingly stringent environmental requirements along with a growing focus on cleaner sources and energy efficiency will stimulate demand. Additionally, growing availability of natural gas as a result of an expanding LNG infrastructure coupled with the shale gas revolution will accelerate industry growth. The standby industrial generator sets market is set to witness growth on account of rising demand for consistent power supply along with elevated costs associated with power interruptions across industrial establishments.

## Saudi Steel Pipes (SSP) rebranded to TenarisSaudiSteelPipes

Image Credit : prachid/Adobe Stock



Tenaris is a leading global supplier of steel tubes and related services for the energy industry and other industrial applications.

TENARIS, A LEADING supplier of tubes and related services for the world's energy industry and other industrial applications, has announced that it will rebrand Saudi Steel Pipes (SSP), a welded pipe producer in the Kingdom of Saudi Arabia (KSA), to TenarisSaudiSteelPipes.

The decision follows the integration of SSP into the global commercial and industrial network of Tenaris, after the latter announced the closing of its acquisition of 47.79 per cent of the shares in SSP on January 21, 2019.

"The rebranding symbolises the official integration of Saudi Steel Pipe with Tenaris, marking an important step in our commitment to further expand our footprint and capabilities in the Kingdom of Saudi Arabia," commented Mariano Armengol, managing director and CEO of TenarisSaudiSteelPipes.

"The new brand builds on the strengths and good reputation that both companies have built over time in the Kingdom," he added.

With a complete portfolio, covering the full product range required by local customers, including pipes, accessories, coating and bending, TenarisSaudiSteelPipes' mission is to deliver value to its customers through product development, manufacturing excellence, and supply chain management, as well as minimising their risk and helping them reduce costs, increasing flexibility and improving time-to-market.

TenarisSaudiSteelPipes facilities are located in the Eastern Province of the Kingdom of Saudi Arabia and have a manufacturing capacity of 500,000 tons per year. The company is qualified to supply products with major national oil companies in the region, including Saudi Aramco.

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## Cleansorb well treatments increase production and water injectivity offshore Middle East

CLEANSORB, A LEADING provider of patented chemical well treatments that enhance hydrocarbon production for the international oil and gas industry, has announced that following a series of successful ORCA for OBM treatments on offshore oil production wells and a water injection well drilled with OBM, increased production and water injectivity have been achieved on behalf of a major operator in the Middle East.

This was as a result of treating the well with an ORCA for OBM breaker fluid, one of Cleansorb's range of field proven well treatment fluids. This formulated fluid removes drilling damage caused by oil-based drill-in fluids in open hole sections of production and injection wells. Water injection across the open hole section of the targeted well, newly drilled offshore, was expected to be impaired by residual drilling damage unless a remedial drilling damage removal treatment was applied. This was a particular concern, as "backflowing" the injection well in the production direction to remove drilling damage before starting water injection was not possible.

In order to treat the 5,000ft openhole section liquid, OBM was displaced to 1.09 s.g. NaCl brine



Image Credit : Cleansorb

*Cleansorb's environmentally-friendly ORCA for OBM well treatment fluid increased production and water injectivity in offshore wells in the Middle East.*

without fluid losses to the formation. To remove OBM drilling damage, ORCA for OBM breaker fluid was then displaced from the toe to the heel of the open hole section and left in place for approximately one week to solubilise hydrocarbon and water wet and dissolve carbonate mud solids. Meanwhile the upper completion was being run.

Following treatment, the water injection rate

was 10 per cent above the target rate without exceeding maximum injection pressure. This was despite the challenge of having to remove OBM-based drilling damage to attain the required water injection rate offshore without backflowing the well. The operator considered the well treatment a definitive success, as it was conclusive proof that ORCA for OBM can be used to remediate OBM drilling damage in water injection wells.

"Eliminating oil-based mud filter cake damage can be challenging. In this case, it was complicated by the fact that the well was located offshore, where operator concerns about the effect of hazardous chemicals on the environment are at an all-time high," said Ian McKay, director and co-founder of Cleansorb. "The good news is that we developed ORCA for OBM with these specific concerns in mind. Compared with conventional acids commonly used to clean up filter cake following drilling, ORCA's benign chemistry means that it is extremely low hazard for both the environment and those who use it. Not only does it leave the well free of OBM damage, it's simple to use and achieves results quickly, without affecting the environment."

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## Oceaneering International launches digital asset inspection system

OCEANEERING INTERNATIONAL HAS launched the Inform Inspect digital asset inspection system, which aims to streamline non-destructive testing (NDT) and inspection management.

The tablet-based technology equips technicians, supervisors and managers with the ability to deliver seamless, end-to-end inspection – from planning to review – with standardised data captured into a cloud-based system. Information is instantly available for analysis, enabling more effective planning and optimisation of personnel time onsite. Hardware is rated for onshore and offshore applications and is certified

for use in hazardous areas.

Field trials have demonstrated conservative productivity gains of up to 30 per cent in end-to-end inspection times, and the speed and scope of the technology provides major safety benefits, ultimately enabling personnel to spend less time onsite in hazardous environments. The software can also be integrated with a computerised maintenance management system (CMMS) and integrity management systems to increase efficiencies and provide a holistic approach to inspection and integrity management.

Bill Boyle, senior vice president for Asset

Integrity, Oceaneering said, “Our Inform Inspect technology is transforming the way we plan, enact and measure inspection efficiencies. Our customers can compile, execute and review work scopes in real-time, significantly reducing end-to-end inspection turnaround. The system also provides a platform to pre-plan work, so that all activities that can be completed offsite, actually happen offsite.

We already have an agreement in place with a global oil and gas operator, evidence that our customers recognise the value that this new system brings.”

## New thermal flow meters

### FLUID COMPONENTS

INTERNATIONAL (FCI) has released the ST75A and ST51A thermal flow meters for the measurement of natural gas for industry.

FCI's inline ST75A flow meter is ideal for the measurement of natural gas, other industrial specialty gases and air in line sizes from 0.25 to 2 inches. It features a solid-state thermal dispersion mass flow sensing element with platinum RTDs in equal mass thermowells. It can be calibrated to measure gases over a wide flow range from 0.04 to 559 SCFM (0.07 to 950 NCMH), depending on line size.

For variable plant demand cycles due to small batch or other continuous process production requirements, the ST75A flow meter is factory preset to 100:1 turndowns. It features highly dependable accuracy to  $\pm 1$  per cent of reading with  $\pm 0.5$  per cent repeatability. It features no moving parts for superior reliability, a full digital display and is also available with optional transmitter remote mounting capabilities for hazardous plant environments.

For larger natural gas line sizes of 2.5 to 24 inches, the insertion style ST51A flow meter is designed for accurate, repeatable flow measurement of natural gas, biogas, air, compressed air or nitrogen.



The new flow meters from FCI.

Image Credit : FCI

## Advancing carbon capture technology

The parties are working on technology to capture CO2 emissions from sources including industrial plants.



Image Credit : arhenrix/Shutterstock

EXXONMOBIL AND GLOBAL Thermostat have signed a joint development agreement to advance breakthrough technology that can capture and concentrate carbon dioxide emissions from industrial sources, including power plants, and the atmosphere.

The companies will evaluate the potential scalability of Global Thermostat's carbon capture technology for large industrial use. If technical readiness and scalability is established, pilot projects at ExxonMobil facilities could follow.

“Advancing technologies to capture and concentrate carbon dioxide for storage and potential industrial use is among a suite of ExxonMobil research programmes focused on developing lower-emissions solutions to mitigate the risks of climate change,” said Vijay Swarup, vice president of research and development for ExxonMobil Research and Engineering Company.

## Crowcon launches HMI for complete gas and hazard visibility solution

CROWCON DETECTION INSTRUMENTS has developed a Human-Machine Interface (HMI) solution that creates complete system visibility.

The solution can run alongside existing DCS/SCADA/PLC systems or mimic panels which are used to monitor wider system views, often incorporating other sensors including security, flow, smoke and fire.

William Allum, Crowcon's product manager, explained, “This solution enables our customers to view data from multiple panels from one central screen. Due to the system having the ability to store alarm and event logs, users can quickly understand the symptoms of a problem as they view the information and identify the exact location.”

“Vortex & Gasmaster HMI employs license activated software operated from a dedicated touchscreen panel. As the system is modular, users specify the required number of input converters to link the number of controllers in their system. It monitors up to six Vortex panels or racks, or up to 10 Gasmaster controllers operating on one system, so either Vortex or Gasmaster,” he added.

The display shows gas levels from all detectors from the chosen panel simultaneously and enables the user to easily adjust or test a system. It is now possible to see the details of each controller within a system, including alarm indications,

as well as the complete configuration and location of each gas detector.

Users can also see possible trends within the alerts. For example, an alarm in a specific location may be triggered on a regular basis. This is due to the development of one-hour ‘trend visibility by gas’ function.

Crowcon HMI can be configured in various different setups:

- Connection locally
- Connection via network
- Connected directly via HMI enclosure

The Crowcon HMI can connect with the controller via RS-485 MODBUS or ethernet cable which are capable of long-distance connectivity.

## BAUER KOMPRESSOREN launches compact nitrogen generator for jack up rigs

BAUER KOMPRESSOREN GCC FZE is proud to introduce its newly developed nitrogen generator which supports critical applications on the rig.

Blow out preventers (BOP), blanketing and inerting are typical areas where this nitrogen generator SNG 4S plays a vital role.

BAUER's SNG 4S is a solution to the high cost and high risk of ship-to-shore transport of high-pressure nitrogen cylinders. It is a dedicated, point-of-use nitrogen generation system that eliminates logistical issues, increases safety aboard the vessel and saves you money in the long-term, versus ship-to-shore transport of high-pressure nitrogen cylinders. The aluminum frame and corrosion-resistant

materials provide the utmost reliability in the harshest of offshore environments. The well-designed layout takes up minimal deck space and requires nominal utilities for use, and automatic operations maintain consistent nitrogen pressure at all times.

All which begs the question: Why buy nitrogen when you can make your own?



This unit takes instrument air available on the rig through air separation membranes and delivers high purity nitrogen (98 per cent) at high pressure (5000 psi).

- Up to five membranes
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For further information contact:  
BAUER KOMPRESSOREN GCC FZE  
Tel: +971 4886 0259, ext. 206  
Email: sales@bauer-kompressoren.ae.



The BAUER SNG 4S nitrogen generator.

Image Credit : BAUER KOMPRESSOREN

## CTS continues to flourish in Saudi Arabia

CTS, WHICH SPECIALISES in products used for the storage and transfer of fluids, is experiencing a strong demand for its products in Saudi Arabia.

A major part of the company's portfolio consists of aluminum geodesic domes, aluminum internal floating roofs, floating suction lines, tank seals (for both internal and external floating roof tanks), tank drain systems, and industrial supplies such as hose systems, dry break couplers, emergency release systems, vapour bladders etc.

CTS has received a world record-breaking dome order from both NWC & SWCC, Saudi Arabia, for the supply of 110 metre and 107 metre domes for the cities of Riyadh, Khobar, Makkah and Jeddah region. The order is also the largest ever dome contract in terms of square metres covered, representing a projected covered area in excess of 333,000 sq m.

The domes are scheduled to be installed in the course of 2019 and 2020. CTS will not only supply the materials but will also support the project by mobilising experienced supervisors and crew with all the specialised tools required.

CTS has also been awarded a contract for supplying tank seals and Drain Master drain systems for 12 tanks at Aramco Yanbu South Terminal Rehabilitation Project. This involves supplying seals for 10 tanks with a diameter of 110.8m, and two tanks with a diameter of 15.24m.

Additionally, CTS has been awarded many projects by Saudi Aramco for different bulk plants. These have included the supply of primary and secondary seals for a 125.57m diameter tank at



Image Credit : CTS

Yanbu Crude Oil Terminal (YCOT) one of the largest tank terminals worldwide. The terminal has 11 floating roof storage tanks – each able to hold one million barrels – plus a 1.5mn bbl tank, the largest diameter tank in Saudi Arabia, which was added in the 1992 capacity upgrade. The total storage capacity of the crude oil tank farm is 12.5mn bbl. CTS was selected to supply and design the primary and secondary seal systems as well as maintenance spare parts with seal fabric for four of Aramco's bulk plants (Juaimah Terminal, Ras Tanura, Abha & Ain Dar).

CTS has been selected as vendor for the supply of three aluminum honey comb full contact internal floating roofs (IFR) for Ras Tanura Integrated Project (SOLUTION PE) for Sadara Chemical Company, a joint venture of Saudi Aramco and the Dow Chemical Company. The project involves the procurement and construction

of a polyethylene and specialty elastomers package in Al-Jubail Industrial City II, in the eastern province of Saudi Arabia, where Sadara is constructing a world-scale chemical complex.

For the last four years, CTS has been designated by Saudi Aramco as the supplier of choice for designing, manufacturing and installing gauge pole covers on Aramco tanks, in recognition of the company's ability to provide a tailor-made design and installation service. CTS also supplied Saudi Aramco with 23 covers for single pole and multiple gauge pole tanks at the Yanbu Refinery. As part of the contract, CTS has also provided support for Aramco in installing the system.

In recognition of CTS's continuous support, efforts and commitment to Saudi Aramco, CTS was given a plaque of appreciation for the second time, during Saudi Aramco Technology Day at Yanbu Refinery Area.



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## Eliminating corrosion risk in firesafe valves for oil and gas

SEVERN GLOCON GROUP has launched OCT SW innovation with an aim to avoid galvanic corrosion in saline applications, without compromising firesafe capability.

The innovation has been driven by market feedback from offshore oil and gas operators regarding seawater service valves used for fire safety. It aims to ensure that graphite parts – which may increase the susceptibility of adjacent metals to corrosion when exposed to seawater – do not contact line media.

Eliminating galvanic corrosion while maintaining firesafe credentials has been an enduring challenge for the industry. The new valve design is set to overcome this factor and has passed fire testing in accordance with the latest editions of API 6FA, API 607 and ISO 10497.

Granted a patent by the UK Intellectual Property Office in 2018, Severn's oblique cone technology (OCT) is central to this solution. The 'infinite circle' geometry of the design helped the R&D team to develop a hybrid seal technology that eradicates the need for graphite.



Image credit: Adobe Stock

*Eliminating galvanic corrosion while maintaining firesafe credentials has been an enduring challenge for the industry.*

## CGG announces collaboration with Microsoft

CGG HAS ANNOUNCED a collaboration with Microsoft to deliver its geoscience products, data and services on Microsoft Azure and accelerate exploration and development workflows for its oil and gas company clients.

Through Azure, oil and gas companies across the globe will have access to CGG's extensive library of geoscience data, and high-end interpretation, analysis and reservoir characterisation software technologies. Clients will also be able to take advantage of the optimised hosting of CGG's E&P data management solutions.

Sophie Zurquiyah, CEO, CGG, said, "Digitalisation is rapidly advancing in the oil and gas industry with more and more geoscience data and software converging onto a common cloud platform. This will enable deeper insight through global collaboration, increased efficiency, and the development of new E&P workflows. Integration with industry-leading platforms and environments is core to CGG's digitalisation strategy, and our collaboration with Microsoft will enable our Microsoft Azure clients to make faster and better decisions, by efficiently integrating our data, technology and services into their own digitalisation solutions."

## LR's new software for maintenance optimisation

LLOYD'S REGISTER (LR) has announced the release of LR AllAssets that is set to optimise asset and plant performance and reduce maintenance costs by up to 30 per cent.

This release adds new functionality to the AllAssets asset performance management (APM) platform with the addition of a maintenance optimisation module, which includes RCM, FMEA, FMECA and maintenance optimisation capabilities and libraries.

Jim Stuart, senior vice-president for Software, Lloyd's Register, stated, "Many assets operate with a maintenance strategy and plan which is a legacy of a past economic era and have typically remained constant over the asset life, irrespective of changing production and commercial realities. Original equipment manufacturer (OEM) recommendations can go unchallenged resulting in unnecessary maintenance burdens which place significant pressure on asset teams and operational budgets."

LR's approach to APM aims to bring together facility-specific asset data and engineering expertise, thus enabling customers to determine the most effective maintenance strategies.

The AllAssets platform uses advanced analytics to help customers mitigate business risk and optimise plant performance. Preconfigured risk and reliability models and a unique model builder tool enable customers to easily configure the templates for their own environment without the need for software coding – reducing costs and providing faster time to insight.



Image credit: Adobe Stock

*Many assets operate with a maintenance strategy and plan which is a legacy of a past economic era.*

## New subsea pumping solution

ENPRO SUBSEA AND DASS Can-K pumps have announced a Memorandum of Understanding (MoU) which will leverage each company's expertise to deliver multiphase pumping solutions for topside and subsea well boosting.

The announcement sees Can-K's patented Electro Submersible Twin-Screw Multiphase (ESTSP) pump technology being combined with Enpro's subsea systems expertise and patented Flow Access Modules (FAM) technology to create a retrievable subsea pumping solution targeted primarily at individual wells.



Image credit: Enpro Subsea

*The partnership will draw on Enpro's FAM technology.*

The agreement will allow both companies to collaborate to provide targeted solutions globally for subsea and topside applications offering a low cost, low risk method of integrating Can-K pumps within new and existing subsea infrastructure.

FAM essentially creates an enhanced production 'USB port' within the jumper and flowline envelope. This supports the use of standard subsea Xmas trees and manifolds, with the FAM providing life of field flexibility within the system design. Pumping is one of a range of production enhancing technologies that FAM enables. These include metering, sampling, digital data acquisition and hydraulic intervention.

Enpro Subsea CEO, Ian Donald said, "These innovative twin screw multiphase pumps are used successfully in downhole and topside applications and the technology lends itself to single or small cluster well applications. Combined with FAM, the system provides a differentiated boosting strategy for our clients by enabling a cost-effective simplified infrastructure and efficient redeployment from well to well to deliver maximum ultimate recovery from subsea assets."

The first units are expected to complete subsea testing in 2020.



# HEALTH, SAFETY & ENVIRONMENT FORUMS 2019

Researched & Developed by

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## KEY SECTORS



“ It was a pleasure meeting with like-minded people and those with very similar concerns and challenges and good to learn how other organisations and experts are meeting those challenges. ”  
- Salman Abdulla, Executive Vice-President, HSSEQ - EGA

“ There were some good informative sessions and allowing people to attend such conferences challenges our thinking and we should always be looking to evolve the safety profession. ”  
- Shaun Hannan, Head of Safety, International Airport Operations, DNATA, Emirates Group

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# Pulling together to raise standards of health and safety

The Bahrain Health, Safety & Environment Forum, which took place at the Wyndham Grand Manama, Bahrain from 17-18 June under the patronage of Bahrain's Ministry of Labour & Social Development, was a great success.

**T**HE EVENT, HELD in partnership with Bapco, brought together more than 130 HSE practitioners, government representatives, regulators and solutions providers from Bahrain and the wider region, and provided a forum to share ideas and expertise on critical issues across the spectrum of health and prevention, safety, risk management and environment.

A wide range of topics was explored over the two days, through a combination of thought-provoking presentations, case studies and interactive panel discussions, which generated lively questions and debate from the audience.

It is clear that Bahrain faces a number of health and safety challenges, such as unsafe practices on construction sites, failure of companies to report accidents and communication barriers when dealing with a multilingual workforce. However the overwhelming impression from the Forum was of the proactive approach of Bahrain's government, notably the Ministry of Labour & Social Development and bodies such as Bahrain Civil Defence, in raising health, safety and environment standards, and the strong collaboration between government, civil society and Bahrain's major companies to this end. The event was marked by a strong presence from the Ministry of Labour & Social Development, Bapco and Bahrain Civil Defence / Fire Brigade.

Nowhere was this spirit of co-operation more apparent than in the first of its kind mock evacuation drill, the highlight of the Forum, which brought together the worldclass capabilities of Bapco and Bahrain Civil Defence / Fire Brigade in a unique collaboration. It showcased Bapco's world-leading expertise in rescue from height and emergency medical treatment, along with the Fire Brigade's expertise at working in confined space and smoke-filled environments. Civil Defence/Fire Brigade oversaw the whole operation.

The Forum was inaugurated by Sabah Al Doseri, Under-Secretary at the Ministry, who



Jack Waldron, Bapco's safety at heights specialist, addressing the Forum.

“ Working from heights, if not controlled, is the biggest killer.”

underlined the Ministry's commitment to ensuring the highest standards of safety for Bahrain's workforce.

This message was echoed by Ali Mahdi, occupational engineer at the Ministry, who gave an overview of the legislation controlling occupational accidents and described the stringent measures taken by the Ministry to tackle health and safety violations. He pointed out that the construction sector accounted for the majority of accidents and that the Ministry had stepped up the number of site inspections. The amount charged in fines for violations has been increased, and

this is having an effect. The Ministry is also active in running safety awareness campaigns; the campaign to inform labourers of the hazards of working in direct sunlight has been particularly successful.

## Safety at height

Jack Waldron, safety at heights specialist at Bapco, stressed that working from heights, if not controlled, is the biggest killer in any industry. According to Ministry of Labour & Social Development statistics, 13 out of 20 deaths in the construction industry in 2017 were due to falls from height. All of these were preventable, he said.

“Even the most professional organisation in the world will suffer from emergencies; it is what they do about it that makes them professionals,” he said. There is a need for training to international standards, clear emergency procedures, use of the right PPE equipment and effective communication.

Bapco published its own Working from Height standard in 2017 and has developed world-class expertise in this area.

In a session on health and prevention, Dr Maha Al Shehab, Bahrain Health & Safety Society, underlined the importance of focusing not only on physical health in occupational health programmes, but also on aspects such as mental health and social wellbeing. “The end result is good for everyone.” While Dr Hussain Al Durazi, Healthzone Bahrain, discussed the implementation of health risk assessments in workplaces, and the benefits of occupational medicine in eliminating ill health and injury, improving productivity and enhancing the quality of life of the workforce.

### Taking ownership

Hesham Abdulla, Aluminium Bahrain (Alba), outlined how Alba has driven a culture of extreme ownership in safety from the top. Set to be the largest aluminium smelter in the world when the Line 6 expansion is complete, Alba has achieved a step change in its safety performance since a change of leadership, with the CEO leading safety, engaging continuously with employees at all levels and driving an employee to employee health and safety culture. Engagement is driven by initiatives such as safety campaigns and safety shares at the beginning of every meeting.

“When employees take extreme ownership, their problems are solved,” Abdulla concluded.

Martin Peters, behavioural specialist at Bapco, discussed the benefits of behaviour-based safety (BBS) in creating a culture of care, enhancing employee engagement and contributing to the overall success of the organisation, and what constitutes an effective BBS process.



The mock evacuation drill was the highlight of the Forum.

Image Credit : Alain Charles Publishing

On the second day of the Forum, Mohamed Ali Shukri, Y Access Training Solutions Bahrain, shared his ‘Walk, watch and win’ recipe for learning that lasts in an entertaining presentation, and how to turn workers into true and longterm learners, believers and implementers of the safety learning they receive.

This was followed by a panel session on the role of effective leadership in promoting a good safety culture, which covered areas ranging from professional development to the relationship of health and safety with the bottom line, and generated lively discussion.

In a session on risk management, Samah

Al-Hamadala, Bapco, discussed the company’s business resilience management programme, stressing the link between risk management and business continuity. She pointed out that the UAE has introduced legislation on business continuity obliging companies to evaluate risk and develop business continuity plans. “This is the way forward,” she said

Waleed Rehman Althawadi, Fire Chief at Hamad Town Fire station, Bahrain Civil Defence, discussed fire scene management challenges. “Being ready is the first step towards good fire scene management” was his key message. “Do what you can with what you have to save lives.”

Moving on to environment, Dr Fay Abdullah Al Khalifa, University of Bahrain, discussed the development of smart, sustainable cities. “One cannot be smart without being sustainable, and with today’s technological advancements, smart technologies are vital in any sustainability initiative,” she commented.

And turning to the future of OHS in a digital age, Marwa Aleskafi, Brinc Bahrain, discussed the transformational impact of IoT and fourth industrial revolution technologies on the health and safety landscape, in areas from wellness to industrial safety. For instance the use of wearable devices and sensors has had a significant impact on safety behaviour and safety monitoring. The use of AI, smart devices etc can only increase.

This led into further lively discussion to conclude the event. ■

For further coverage, see the website at <http://www.hse-forum.com/bahrain-health-safety-environment-forum-2019>.



Marwa Aleskafi, Brinc Bahrain discussed how companies can capitalise on the opportunities afforded by the Industrial Internet of Things (IIOT)

Image Credit : Alain Charles Publishing

# Project Databank

Compiled by Data Media Systems

## OIL, GAS AND PETROCHEMICAL PROJECTS, EGYPT

Project	City	Sector	Facility	Budget	Status
E-styrenics - Styrenics and Polystyrene Plant Phase II	Alexandria	Petrochemicals	Polystyrene	460,000,000	Shelved
Petro Shorouk - Zohr Gas Field Development	Mediterranean Sea	Offshore	Gas Field	7,000,000,000	Construction
ERC - Mostorod Refinery	Mostorod	Refining	Refinery	3,700,000,000	Construction
PhPC - Atoll Gas Field	Damietta	Gas, Offshore	Offshore Gas Field	300,000,000	Construction
Egyptian Chemical Company (KIMA) - Aswan Fertilizer Complex (KIMA 2)	Aswan	Petrochemicals	Ammonia	592,000,000	Construction
Burullus Gas Company - West Nile Delta Gas Field - Overview	West Nile Delta	Gas, Offshore	Offshore Gas Field	12,000,000,000	Construction
Burullus Gas Company - West Nile Delta Gas Field - Giza, Fayoum, and Raven Gas Fields Offshore	West Nile Delta	Gas, Offshore	Offshore Gas Field Development	800,000,000	Construction
MIDOR - Midor Refinery	Alexandria	Refining	Refinery	2,200,000,000	Engineering & Procurement
EPPC - Propane Dehydrogenation (PDH) and Polypropylene (PP) Complex - Phase 2	Port Said	Petrochemicals	Polypropylene	1,200,000,000	Engineering & Procurement
ECHEM - Bio-Ethanol from Rice Straw Project	Kafr El Sheikh	Petrochemicals	Bio-Ethanol	227,000,000	Shelved
ECHEM - Bio-Ethanol from Beet Molasses Project	Kafr El Sheikh	Petrochemicals	Bio-Ethanol	135,000,000	Shelved
ECHEM - Aromatics & Fertilizers Complex (SUPSC Project)	Suez	Petrochemicals	Aromatics	2,044,000,000	Feasibility Study
ECHEM - Formaldehyde and Derivatives Project	Kafr El Sheikh	Petrochemicals	Formaldehyde	40,000,000	EPC ITB
ECHEM - Alexandria Propylene Derivatives Project	Alexandria	Petrochemicals	Propylene	1,000,000,000	EPC ITB
AMOC - AMOC 2 - Lube Oil	Alexandria	Refining	Lube Oil	800,000,000	Feasibility Study
ENI - Nooros Exploration Prospect (Abu Madi West)	Nile Delta	Offshore	Offshore Gas Field	12,000,000,000	Construction
ASORC - Hydrocracking Diesel Complex (Overview)	Asyut	Refining	Hydrocracker	1,800,000,000	EPC ITB
ASORC - Hydrocracker	Asyut	Refining	Hydrocracker	1,500,000,000	EPC ITB
ASORC - Naphtha Complex	Asyut	Refining	Continuous Catalytic Cracker (CCR)	250,000,000	Engineering & Procurement
EHC - Tahrir Petrochemicals Complex - Utilities and Offsite Facilities	Suez	Petrochemicals	Offsites & Utilities	2,000,000,000	Engineering & Procurement
Petro Shorouk - Zohr Gas Field Development - Grassroot Natural Gas Processing Plant (Phase 2)	Port Said	Gas	Gas Processing	200,000,000	Construction
BP - West Nile Delta Gas Field - Gas Reception and Processing Facility	Various	Gas	Gas Processing	1,000,000,000	Construction
Eni - South-West Melehia Block license	South-West Melehia	Oil, Gas	Exploration	40,000,000	Engineering & Procurement
Eni - Block 9 (North Leil Offshore)	Mediterranean Sea	Oil, Gas, Offshore	Oil & Gas Offshore Exploration	300,000,000	Engineering & Procurement
Eni - British Petroleum (BP) - Block 8 (Karawan Offshore)	Mediterranean Sea	Oil, Gas, Offshore	Oil & Gas Offshore Exploration	140,000,000	Engineering & Procurement

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# Project Databank

Compiled by Data Media Systems

## Project Focus

Compiled by Data Media Systems

### Project Summary

<b>Project Name</b>	Egyptian Refining Company (ERC) - Mostorod Refinery
<b>Estimated Budget (US\$)</b>	3,700,000,000
<b>Facility Type</b>	Refinery
<b>Status</b>	Construction
<b>Location</b>	Mostorod
<b>Project Start</b>	Q2-2007
<b>End Date</b>	Q3-2019
<b>PMC</b>	WorleyParsons
<b>Main Contractor</b>	Mitsui & Co., GS Engineering & Construction
<b>Contract Value (US\$)</b>	1,800,000,000
<b>Award Date</b>	Q2-2009

### Background

Egyptian Refining Company (ERC) plans the redevelopment of a refinery at Mostorod, near Cairo, which first came onstream in 1973. The Mostorod refinery has a working capacity of 142,000bpd and a design capacity of only 115,000bpd. It produces a variety of products, including LPG, gasoline, naphtha, propane and fuel gas.

### Project Status

Date	Status
Jun 2019	99.6 per cent of project works have been completed.
May 2019	The trail operation work has been delayed to the third quarter of 2019.
Apr 2019	The project is currently in the commissioning phase. The commissioning work is going slowly and is expected to be completed by the end of 2019.
Dec 2018	Petromaint has been awarded a technical support contract for the trail operation work.
20 Jun 2018	The test operation work has been started.
17 May 2018	Petromaint and Sun Misr have signed a contract with ERC to provide the technical support and maintenance services.

### Contractors

**PMC:** WorleyParsons

**EPC:** Mitsui & Co; GE Engineering & Construction

**Sub-contractors:** ARESCO; Hassan Allam Construction; SIAC; ENPPI; Petrojet; OCI - Orascom Construction Industries; KBR; Soci t  G n rale Group; JICON; Zamil Steel Industries

### Project Scope

The hydrocracker will have a capacity of around five million tones a year of diesel when it is commissioned. It will be built alongside the existing Mostorod facility, operated by Cairo Oil Refining Company. The plant will process some 142,000 barrels a day of fuel oil residue from Egypt's existing refineries to make higher-value diesel and gasoline. The project includes the following new facilities:

- Diesel hydrotreating unit (23,600 bpd)
- Vacuum distillation unit (81,500 bpd)
- Hydrocracker (39,600 bpd)
- Catalyst reforming unit (13,000 bpd)
- Delayed coker (16,700 bpd)

### Project Finance

The project has been financed by US\$2.6bn debt package for ERC. The package includes US\$ 2.35bn of senior debt and US\$225mn of subordinated debt. With the Bank of Tokyo-Mitsubishi serving as the global coordinator, institutions participating in the senior debt package include the Japan Bank for International Cooperation (JBIC), Nippon Export and Investment Insurance (NEXI), the Export-Import Bank of Korea (KEXIM), the European Investment Bank (EIB) and the African Development Bank (AfDB). In 2018, an additional US\$300mn in senior debt was added bringing the total debt package to US\$2.9bn.



## Middle East & North Africa

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

Country	THIS MONTH			VARIANCE From Last Month	LAST MONTH		
	Land	OffShore	Total		Land	OffShore	Total
<b>Middle East</b>							
ABU DHABI	40	18	58	3	36	19	55
DUBAI	0	2	2	0	0	2	2
IRAQ	77	0	77	4	73	0	73
JORDAN	0	0	0	0	0	0	0
KUWAIT	45	0	45	2	43	0	43
OMAN	54	0	54	-1	55	0	55
PAKISTAN	23	1	24	0	23	1	24
QATAR	3	10	13	0	3	10	13
SAUDI ARABIA	92	19	111	-9	100	20	120
<b>TOTAL</b>	<b>334</b>	<b>50</b>	<b>384</b>	<b>-1</b>	<b>333</b>	<b>52</b>	<b>385</b>

### North Africa

ALGERIA	51	0	51	-1	52	0	52
EGYPT	21	3	24	-1	22	3	25
LIBYA	14	1	15	0	14	1	15
TUNISIA	2	0	2	0	2	0	2
<b>TOTAL</b>	<b>88</b>	<b>4</b>	<b>92</b>	<b>-2</b>	<b>90</b>	<b>4</b>	<b>94</b>

Source: Baker Hughes



لاتخاذ الإجراءات اللازمة بشأنها، مثل التأكد من معايرة أجهزة القياس بشكل صحيح». وأضافت أن «التحقق من صحة البيانات منذ البداية هو أكثر الطرق فعالية لتفادي وقوع انتكاسات وإعادة الهندسة والقرارات الخاطئة».

## إطار الإدارة المكون من تسع خطوات

كيف يمكن للشركات تمكين بياناتها لتصبح رصيذاً استراتيجياً في عالم أصبح يعتمد على البيانات ومعطلاً من الناحية التكنولوجية؟

يجب دمج تقنيات التمكين القوية مثل VALI مع تنظيم مناسب لإدارة البيانات. حددت السيدة هوف إطار إدارة مكوناً من تسع خطوات يتطلب الشراكة والتعاون بين جميع المجالات الوظيفية:

- تحديد الأولويات التنظيمية وتحديد النطاق - على سبيل المثال، البدء بعشرة أو خمسة عشر عنصراً من عناصر البيانات الرئيسية مثل درجة الحرارة والضغط وما إلى ذلك.
- الاستثمار في إدارة التغيير، وهو أمر بالغ الأهمية للاعتماد والاستدامة.
- إنشاء تنظيم لإدارة البيانات يظهر دعم القيادة الشامل.
- ربط الفرق ومواءمتها من خلال كتالوج بيانات يفي بالغرض ويجب أن يحترمه الجميع - تحديد ما تعنيه عناصر البيانات وأصحابها وتوافرها وإنشاء أنظمة تسجيل - تمكين «مصدر الحقيقة» الواحد.
- وضع سياسات لإدارة البيانات لدعم الأولويات والمشهد التنظيمي.
- تحديد نموذج التشغيل الجديد عن طريق تحويل السياسات إلى طرق عمل جديدة.
- تصميم التقنيات التمكينية لضمان التكامل السلس للبيانات عبر الأنظمة - يعد برنامج التحقق من صحة

الخاص بشركة Belsim. يقوم «VALI» بجمع البيانات من نقاط قياس متعددة ومطابقتها، ويوضح لك أين توجد أي استثناءات، ثم يمكنك اتخاذ قرارات مستنيرة بناء على ذلك. فالبيانات تروي القصص، وتُظهر النظم وتعطيك تصوراً عن الأماكن التي توجد فيها مشكلات. ولكن الأمر متروك للأفراد

- تنفيذ مراقبة مستمرة لجودة البيانات وتوافرها - المقاييس ومؤشرات الأداء الرئيسية لقياس الأداء.
- ضمان الاستدامة عبر عمليات تدقيق الفترة بناء على مؤشرات الأداء الرئيسية المحددة.

وقالت السيدة هوف إن إدارة التغيير التنظيمي غالباً ما تكون المجال الذي تكافح فيه شركات النفط والغاز أكثر من غيرها. «إن إدارة التغيير تتخلل جميع مراحل دورة حياة إطار إدارة البيانات. حيث لا يمكنني التأكيد بما فيه الكفاية على أهمية ذلك. ولكن لا يمكنك إدارة منظمة بالطريقة القديمة وتوقع نتائج جديدة! إنها تنطوي على تغيير كامل لطريقة التفكير والثقافة. إنه ليس سباقاً قصيراً أو حتى ماراتون، بل هو تغييرٌ كاملٌ في عُط الحياة».

وأوصت قائلة: «كن من دعاة التغيير. أخبر موظفك عن سبب أهمية معالجة البيانات بوصفها مصدر قوة استراتيجية مهمة للشركة ولهم شخصياً، وكيف يمكن أن تساعد في توفير الوقت. في مجال الطاقة على وجه الخصوص، هناك نقص كبيرٌ في فهم تدفق دورة حياة البيانات وجميع النقاط التي يمكن أن تتعرض البيانات فيها للخطر، من نقطة التقاط البيانات إلى الوقت الذي يتم فيه استخدامها بالفعل. قم بتثقيف أفراد منظمك حول دورة حياة البيانات».

كما أكدت على أن «الشركات التي تتصدر هذه العقبة المتمركزة حول البيانات، والتي تركز على البيانات بوصفها مصدر قوة استراتيجية، ستحقق ميزتها التنافسية في وقت مبكر. بينما الشركات التي لا تقوم بذلك لن تصمد في المنافسة».

وخلصت السيدة هوف إلى أن «البيانات هي نطف العصر الرقمي، ويجب تنقيح البيانات الأولية لقيمتها لتتألق بشكل مشرق. واختتمت كلمتها قائلة إن VALI هي أداة رائعة للتأكد من دقة بياناتك وتبسيط الضوء على التحديات التي تواجهها، ولكنها تحتاج إلى الإطار المناسب حولها».



سبتمبر/أيلول

- 4.2 المؤتمر الدولي للنفط الثقيل - [www.worldheavyoilcongress.com](http://www.worldheavyoilcongress.com) - عسقلط
- 4.3 منتدى الكويت للصحة والسلامة والأمن - [www.ksoc-forum.com](http://www.ksoc-forum.com) - الكويت
- 6.3 مؤتمر ومعرض حقول لفظ أوروبا البحرية - [www.offshoreeurope2019.org](http://www.offshoreeurope2019.org) - أبردين/اسكتلندا
- 9.12 المؤتمر الدولي للطاقة - [www.wec24.org](http://www.wec24.org) - أبوظبي
- 17.19 مؤتمر ومعرض غازتك - [www.gastechevent.com](http://www.gastechevent.com) - جوستون/تكساس

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النجاح حليف الشركات التي تبني العنقبة المتمركزة حول البيانات

## البيانات مصدر قوة استراتيجية

في هذا المقال تعرض إيلينا هوف، مدير أول الخدمات الاستشارية في إرنست ويونج، كيف يمكن تحرير المنظمات من خلال التحكم في بياناتها، وذلك في اجتماع مستخدمي Belsim الذي عُقد في مارسيليا خلال شهر أبريل/نيسان. وقد أشارت هوف، أثناء تقديم عرض رئيسي عن موضوع «البيانات بوصفها مصدر قوة استراتيجية»، إلى وجود كلمات رنانة حول التقنيات الجديدة مثل الذكاء الاصطناعي والتعلم الآلي، لكنها شددت على أن «كل شيء يبدأ ببيانات ذات نوعية جيدة»، مما يؤكد أهمية التحقق من صحة البيانات والتوفيق بينها.

الأولية في مشاريع مختلفة وأرشفات مستخدمين مختلفة. وهذا هو الحال بصفة خاصة في صناعة النفط والغاز، إذ يكون أصحاب بيانات الإنتاج في الحقل بعيدين كل البعد عن مستهلكي البيانات في المكتب. ويمكن للمستخدمين في مجال الأعمال قضاء وقت أطول في البحث عن البيانات وتنقيتها وتجميعها بدلا من استخدامها فعليا للتحليل. وذكرت هوف أنه «يمكن التخفيف من ذلك من خلال استخدام تقنيات تمكين قوية مثل «VALI»، في إشارة إلى برنامج التحقق من صحة البيانات والمطابقة بينها (DVR)

منصات الحفر، والمزيد من الآبار المنتجة وتحسين التدفق النقدي الحر». ومع ذلك، غالبا ما تكون البيانات غير موثوقة أو غير كاملة أو غير معروفة تماما. وتشير التقديرات إلى أنه في الولايات المتحدة الأمريكية وحدها خلال عام 2016، تم إهدار 3,1 تريليون دولار أمريكي بسبب سوء نوعية البيانات. (توماس ريتمان، مجلة هارفارد بزنس ريفيو، 22 سبتمبر/أيلول 2016). ولا تزال هناك مشاكل تتعلق بالبيانات والعمليات المنعزلة. فمثلا قد توجد إصدارات متعددة من مدخلات البيانات

قالت هوف: «لا يمكنك الاستفادة من هذه الحلول الجديدة المبتكرة بدون تلك الركيزة». وأكدت أن بيانات القياس أمر أساسي في صناعة النفط والغاز. وأضافت: «أن بيانات الإنتاج الموثوقة، التي تم تحويلها إلى إجراءات صارمة، ستحسن الأداء في مختلف العمليات في صناعة النفط والغاز. على سبيل المثال، يمكنك تحسين إنتاج الآبار، ومراقبة الآبار بشكل أفضل، ومعرفة ما يجب القيام به لتعزيز أداء البئر. كما يمكنك فهم خصائص الخزان بشكل أفضل وتحسين برنامج الحفر الخاص بك. كل هذا يؤدي إلى مزيد من

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# المحتويات

## القسم العربي

مقابلة

البيانات مصدر قوة استراتيجية

ملخص محتويات القسم الإنجليزي:

تقارير خاصة: شرق المتوسط، خطوط الأنابيب.

استطلاعات: التدريب والتطوير، الصحة والسلامة والبيئة.

تقنيات: الحفر، الطاقة في موقع العمل، أمن خطوط الأنابيب، البيانات الضخمة.

فعاليات: مؤتمر الطاقة الدولي، مؤتمر ومعرض حقول نفط أوروبا البحرية، المؤتمر الدولي للنفط الثقيل.

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