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Oil Review Middle East

Oil · Gas · Petrochemicals

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Editor's note

THE OIL MARKET picture is looking slightly more positive this month as supply cuts start to take effect and lockdown measures are slowly being lifted. Oil prices remain volatile however, and yo-yo from day to day.

Meantime, we are having to get used to new ways of working, with remote working and working from home being the order of the day where possible. The role that digitalisation and automation technologies can play in facilitating this is a strong theme throughout this issue, and we see how enterprising companies are adapting their products and services for remote use.

This issue also looks at the impact of COVID-19 on the operations of Petroleum Development Oman (p12) and on the EPC market (p16); oil spill response strategies (P24); mitigating the risk of COVID-19 related cyberattacks (p26); and the critical role hydrogen can play in the energy transition (p30).

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Front Cover: Adobe Stock

➔Executives' Calendar, 2020

SEPTEMBER			
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1-4	**FPSO World Congress**	SINGAPORE	www.fpsonetwork.com/events
8-10	**Gastech**	SINGAPORE	www.gastechevent.com
11-14	**Iran Int'l Oil, Gas, Refining & Petrochems Show**	TEHRAN	www.iran-oilshow.ir/EN
14-15	**Kuwait HSE Forum**	KUWAIT	www.hse-forum.com
14-16	**Oman Petroleum & Energy Show**	MUSCAT	www.omanpetroleumandenergyshow.com
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OCTOBER			
6-8	**OPEX MENA**	MANAMA	www.europetro.com/week/opexmena2020
26-27	**Bahrain HSE Forum**	MANAMA	www.hse-forum.com
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9-12	**ADIPEC**	ABU DHABI	www.adipec.com
16-17	**Middle East Petroleum & Gas Conference**	MANAMA	www.mpgc.cc

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

Middle East Oil & Gas expands despite COVID-19

THE COVID-19 PANDEMIC has placed Middle East producers at the heart of the drive to prevent the health crisis becoming a global economic catastrophe, says data and analytics company GlobalData.

Accounting for around 52 per cent of global oil reserves and roughly 37 per cent of global production, Middle East hydrocarbons are critical to global energy supply, and to global economic stability.

Richard Thompson, editorial director at GlobalData, commented, "Maintaining its influential position is a strategic priority for the region's oil producers, and hundreds of billions of dollars are being invested in the exploration and development of new oil and gas reserves, and into the development of downstream oil refineries and petrochemicals plants."

Since 2011, more than US$300bn of oil and gas project contracts have been awarded in the Middle East and North Africa (MENA) region. These investments have strengthened Saudi Arabia's position as the world's most influential oil exporter, and pushed Qatar into the number one spot for both liquefied natural gas (LNG) and gas-to-liquids (GTL) production.

"Despite the fall in demand triggered by the COVID-19 outbreak, Middle East oil and gas has entered an expansive period as regional firms undertake major field development programmes, expedite unconventional hydrocarbons exploration and work to secure future market share in the industry," Thompson continued.

According to GlobalData's regional projects tracker, there are around US$58.4bn of upstream oil projects currently under execution in MENA countries. By mid-2025, this will lead to a significant expansion of the oil production capacities of operators. With many field discoveries expected to move into project development in late 2020, the region is expected to maintain a steady flow of capital expenditure towards upstream oil schemes.

Image Credit: Jerry & Pam Donahoe/Flickr

Middle East oil & gas has entered an expansion phase.

After a year of significant delays in the Middle East downstream sector in 2019, a range of large-scale projects is expected to come online in 2020, although some plans could be delayed by the low prices triggered by the pandemic.

"While downstream projects activity has diminished in many regions around the world, the Middle East remains on track to bring significant refining capacity online over the next 15 years," Thompson concluded.

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Global investment in oil & gas forecast to fall by almost one third in 2020

The COVID-19 pandemic has led to the largest drop in global energy investment in history.

Image credit: Edward Stojakovic/Flickr

GLOBAL INVESTMENT IN oil and gas is forecast to fall by almost one-third in 2020 as a result of the COVID-19 crisis, according to the International Energy Agency's (IEA) newly-released *World Energy Investment 2020* report.

The report notes that the shale industry was already under pressure, and investor confidence and access to capital has now dried up – investment in shale is anticipated to fall by 50 per cent in 2020. At the same time, many national oil companies are now desperately short of funding. For oil markets, if investment stays at 2020 levels then this would reduce the previously expected level of supply in 2025 by almost 9mn bpd, creating a clear risk of tighter markets if demand starts to move back towards its pre-crisis trajectory.

According to the report, the COVID-19 pandemic has set in motion the largest drop in global energy investment in history, with spending expected to plunge in every major sector this year – from fossil fuels to renewables and efficiency.

The unparalleled decline is staggering in both its scale and swiftness, with serious potential implications for energy security and clean energy transitions. At the start of 2020, global energy investment was on track for growth of around two per cent, which would have been the largest annual rise in spending in six years. But after the COVID crisis brought large swathes of the world economy to a standstill in a matter of months, global investment is now expected to plummet by 20 per cent, or almost US$400bn, compared with last year, according to the report.

"The historic plunge in global energy investment is deeply troubling for many reasons," said Dr Fatih Birol, the IEA's executive director. "It means lost jobs and economic opportunities today, as well as lost energy supply that we might well need tomorrow once the economy recovers. The slowdown in spending on key clean energy technologies also risks undermining the much-needed transition to more resilient and sustainable energy systems."

A combination of falling demand, lower prices and a rise in cases of non-payment of bills means that energy revenues going to governments and industry are set to fall by well over US$1 trillion in 2020, according to the report. Oil accounts for most of this decline as, for the first time, global consumer spending on oil is set to fall below the amount spent on electricity.

Companies with weakened balance sheets and more uncertain demand outlooks are cutting back on investment while projects are also being hampered by lockdowns and disrupted supply chains. In the longer-term, a post-crisis legacy of higher debt will present lasting risks to investment.

The overall share of global energy spending that goes to clean energy technologies – including renewables, efficiency, nuclear and carbon capture, utilisation and storage – has been stuck at around one-third in recent years. In 2020, it will jump towards 40 per cent, but only because fossil fuels are taking such a heavy hit. In absolute terms, it remains far below the levels that would be required to accelerate energy transitions.

"The crisis has brought lower emissions but for all the wrong reasons. If we are to achieve a lasting reduction in global emissions, then we will need to see a rapid increase in clean energy investment," said Dr Birol. "The response of policy makers – and the extent to which energy and sustainability concerns are integrated into their recovery strategies – will be critical."

Egypt plans 11 new petrochemicals projects

EGYPT'S PETROLEUM MINISTER Tarek El-Molla has announced that a new 2020-2035 strategy is being put in place to develop the petrochemicals industry, which is being reviewed before approval and implementation within the coming period.

In a statement, El-Molla said that 11 new projects to produce petrochemicals with a total investment cost of US$19bn are set to be implemented. They include a US$7.5bn refining and petrochemicals production complex in the Suez Canal zone with a capacity of 202mn tonnes annually, and a US$8.5bn petrochemicals complex at New Alamein City with a production of one million tonnes per year of petrochemicals and 850,000 tonnes of petroleum products. Other projects are under consideration.

The minister stated that the strategy aims to raise the added value of petrochemical activities in the country, meet the local demand for intermediate and final petrochemical products and improve the national trade balance.

Rystad Energy launches Emissions Solution

E&P COMPANIES, INVESTORS, governments and other stakeholders are increasingly becoming more focused on all elements of the energy transition, including emissions/carbon footprint within the oil and gas value chain.

Rystad Energy has developed a product line called Emissions Solution. This includes data, analytics and advisory services within the upstream, midstream and downstream segments.

The line's first product offering, the EmissionsCube, was launched on May 26. Users can benchmark countries, operators and perform detailed emission analysis of portfolios – incorporating data from the company's database.

"Today we are releasing a unique dataset that will enable stakeholders to compare and contrast a key element to measure upstream companies' readiness for the Energy Transition: CO2 emissions. With this tool, we enable our clients to effectively benchmark and drill into any upstream company's footprint of such emissions," Rystad Energy CEO Jarand Rystad said.

"We are proud to play our part in the energy transition process and look forward to helping the oil and gas industry take an informed step forward towards a more emissions-conscious future."

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SNOC awards EPIC contract to Lamprell

SHARJAH NATIONAL OIL Corporation (SNOC) has selected Lamprell to enter into a medium-sized engineering, procurement, installation and commissioning contract (EPIC) for the Mahani gas and condensate field in Sharjah.

The scope of Lamprell's work includes hook-up and installation at the well, upgrading the existing systems, associated tie-ins and building a 25 km export pipeline.

The work has been scheduled for completion in early 2021.

Lamprell's CEO Christopher McDonald said, "Mahani is a strategic gas discovery. We are looking forward to being associated with it, delivering this project safely and on time."

At the end of January 2020, SNOC and its partner Eni announced the discovery of the onshore Mahani field.

Image credit: Алексей Закиров/Adobe Stock

Mahani is a strategic gas discovery in Sharjah.

ARGAS targets global expansion

ARABIAN GEOPHYSICAL AND Surveying Company (ARGAS), a seismic acquisition company in MENA, is expanding its operations internationally.

Industrialization and Energy Services Company (TAQA) and Paris-based CGG have jointly announced the signing of an agreement. This will allow the company to expand its offering in integrated marine and land seismic solutions to oil and gas industry customers worldwide, giving ARGAS the ability to access potential multi-billion-dollar markets.

The agreement waives all previously-established territorial, technical, commercial exclusivities and other restrictions, as well as any other contractual restrictions on CGG or any of its current or previous affiliates.

Khalid Nouh, CEO of TAQA and chairman of the board of ARGAS, said, "The world around us is changing so fast that restriction and exclusivities are obsolete by the time they are executed."

"Our new agreement reflects a need for ARGAS to be more agile and to be able to react swiftly to market movements to address customers' needs better," Nouh added.

MENA countries score high in G20 low carbon project investment

G20 INVESTORS have shown a growing interest in the Middle East and North African (MENA) countries, especially for energy transition and decarbonisation technologies, contrary to their regional counterparts, according to a research report by Ashurst.

The report, entitled "*Powering Change: Energy in Transition*," compiles the views of more than 2,000 senior business leaders from G20 countries, on the changing global energy market.

Image credit: THATREE/Adobe Stock

Around 34 per cent respondents feel that Saudi Arabia's investment in traditional energy may flow into the energy transition next year.

Although the Middle East leads in the production of global oil and gas, it was identified as the second most popular region for low-carbon investment by G20 respondents. It comes second after North America, in terms of current and planned investment.

However, companies in the Middle East are less likely to invest in their indigenous market. Only 18 per cent of executives in the region said, they either invest, or have committed to investing, or consider investing in the energy transition, in the Middle East in the coming five years.

Around 34 per cent of respondents feel that Saudi Arabia's investment in traditional energy (coal, gas, oil) may flow into the energy transition the next year, which is a stark contrast to the global average of 62 per cent and the lowest of all countries surveyed.

Across the G20, 94 per cent of respondents expect their organisation's investment in the energy transition to increase over the next five years, with the average increase expected to be 43 per cent.

McDermott wins technology contract in Saudi Arabia

ENGINEERING COMPANY MCDERMOTT International has won a technology contract from Advanced Global Investment Company, a wholly-owned subsidiary of Advanced Petrochemical Co. (APC).

McDermott's Lummus Technology will provide the license and basic engineering package for a C3 CATOFIN unit at its new petrochemical complex in Jubail, Saudi Arabia.

The unit will have a propylene production capacity of 843,000 mt per annum.

Imge credit: ANUT PHIVTONG/Adobe Stock

The unit will have a propylene production capacity of 843,000 mt per annum.

Leon de Bruyn, senior vice-president, Lummus Technology, said, "The CATOFIN technology that Lummus licenses worldwide, alongside our partner Clariant, provides a highly reliable, lower-cost route to propylene, with a lower carbon footprint. APC's decision to proceed with CATOFIN technology for their second unit is a testament to the successful operation of their PDH unit and consistent performance as a top quartile PDH complex."

This is APC's second CATOFIN unit in their portfolio, having previously licensed the technology for their first unit in 2003 – also in Jubail, KSA.

The CATOFIN process operates at optimised reactor pressure and temperature to maximise propylene yield. This plant will utilise Clariant's latest generation CATOFIN catalyst system, including the company's patented metal-oxide Heat Generating Material (HGM), to deliver maximised selectivity at high conversion rates and long-run lengths.

McDermott's Lummus Technology is a leading licensor of proprietary petrochemicals, refining, gasification and gas processing technologies, and a supplier of proprietary catalysts and related engineering. With a heritage spanning more than 100 years, encompassing approximately 3,400 patents and patent applications, Lummus Technology provides one of the industry's most diversified technology portfolios to the hydrocarbon processing sector.

Increased demand for remote offshore inpsections

TESTING, INSPECTION AND certification company Bureau Veritas is reporting a rise in the demand for remote inspection of offshore assets and equipment since the COVID-19 outbreak.

Inspections and verification are vital for offshore companies to comply with legislation, and ensure efficiency and performance of their assets and equipment.

Bureau Veritas employees can carry out these services by staying onshore themselves, and limiting close contact with the site by using mobile cameras for inspection.

Image credit: J. Stephen Conn/Flickr

Remote inspection reduces the risks of exposure to COVID-19.

Paul Shrieve, vice president, offshore & services explained, "Previously, the remote inspection of assets and equipment received a limited reception, and was usually considered a good idea, something that the industry should get around to.

"But customers these days want to use remote inspection as an alternative way to meet the requirements of the Offshore Safety Directive (OSD). Since the start of this year, the demand has greatly increased."

A significant improvement in terms of health and safety, which remote inspection provides, is the reduced risk of exposure to the COVID-19 virus, for clients and Bureau Veritas staff.

It saves time and money, while reducing staffing levels, by eliminating travel to client premises, and helicopter travel to offshore installations, which cuts back on onsite inspections and accommodation costs. This results in improved green credentials and accessibility to a range of subject matter experts qualified to perform the tasks.

"COVID-19 has revealed that working practices can be conducted in a much more eco-friendly manner, and with the help of technology, businesses can deliver much more effectively, and achieve a quick turnaround," said Shrieve. "The world will never be the same again."

Rystad forecasts two per cent drop in gas demand

Gas remains competitive in the power sector.

Image credit: Ed Webster/Flickr

RYSTAD ENERGY ESTIMATES global natural gas demand to fall by almost two per cent this year as a result of lockdowns to limit the spread of the COVID-19 pandemic.

The energy consultancy expects global gas demand to total close to 3,878 billion cubic meters (Bcm) in 2020, down from 3,951 Bcm last year. In its pre-COVID-19 estimates, this year's natural gas demand was expected to grow to 4,038 Bcm.

Like oil demand, gas demand is also expected to suffer as a result of the slowdown. However, low prices are shielding gas demand to some extent as the fuel remains more competitive than other sources of energy, especially in the power sector where gas use remains relatively stable in most countries.

"2020 will be the first year since 2009 where there will be no growth in consumption. This will be a hard blow for an industry accustomed to yearly growth rates of more than three per cent," said Rystad Energy's head of Gas and Power Markets Carlos Torres-Diaz.

First ever OBN survey conducted offshore Egypt

NEPTUNE ENERGY HAS announced the successful completion of an ocean bottom nodes (OBN) multiclient survey in the North West El Amal block, offshore Egypt, delivering promising results for further analysis.

The project was carried out by WesternGeco, the seismic and geophysical data solutions division of Schlumberger, under a contract with the Egyptian General Petroleum Corporation (EGPC), sponsored by the Egyptian Ministry for Petroleum and Mineral Resources. WesternGeco acquired the survey using third-party vessels.

The survey employed innovative OBN technology to overcome the challenge of acquiring improved imaging in the complex salt geometries of the Gulf of Suez. It was the first ever OBN seismic survey to be conducted in Egypt and the most detailed survey of the block since the first acquisition in 1988, providing an in-depth data set for processing, image analysis, and planning for potential exploratory wells in the future.

The North West El Amal offshore concession covers 365 sq. km and is located in the central part of the Gulf of Suez, approximately 42 km south of Ras Gharib and 105 km north of Hurghada. Neptune was awarded the exploration licence in February last year, including the acquisition of 100 sq km of 3D seismic data.

Gamal Kassem, Egypt managing director, said, "Egypt is important for Neptune, and we are pleased to build on our strong relationships with the Ministry of Petroleum and Egyptian General Petroleum Corporation.

"The safe and successful completion of the seismic acquisition is an important achievement and is testament to the careful planning and professional execution by Neptune, EGPC and WesternGeco."

The project involved placing large numbers of autonomous sensors on the seabed to acquire seismic data, then retrieving them for analysis. The process acquires more detailed data than standard technologies and is less sensitive to weather conditions which can impact traditional seismic survey vessels.

Gro Haatvedt, Neptune's vice-president exploration and development, added, "It's very exciting to have been involved in the OBN seismic survey, the first time the technology has been deployed in Egyptian waters. Given the geographically-diverse nature of our global portfolio, Neptune is accustomed to working with innovative digital and subsurface technologies to tackle a variety of geological challenges.

"Obtaining subsalt imaging is particularly tough, and the OBN technology was well-suited for this purpose. The next step is to analyse the data which has greatly improved our understanding of the block and will support our future plans, including potential exploratory wells."

Petrofac wins BP maintenance and metering contracts

SERVICES CONTRACTOR PETROFAC is set to provide digital enhanced services for BP, following the award of a three-year extension to its existing maintenance contract and a new four-year metering contract. The metering services contract includes on and offshore consulting and support services. Under the agreement, Petrofac will continue to harness digital technology to drive improvements and increase efficiencies for BP.

Under the terms of the maintenance agreement, Petrofac will continue to provide campaign inspection and maintenance services on the operator's North Sea assets, many of which Petrofac has supported for the last decade.

Image credit: Petrofac

In 2019, Petrofac worked with BP to prove new execution techniques.

In 2019, Petrofac worked with BP to prove new execution techniques. Combining use of Digital Twin technology, Connected Worker and Petrofac's proprietary software, BuildME, Petrofac digitalised all forms of campaign maintenance and inspection activity – achieving significant productivity gains compared to industry standards – and continues to work with BP to extend the benefits of this approach to other applications.

Saudi Aramco records 25 per cent drop in Q1

SAUDI ARAMCO HAS reported a 25 per cent drop in Q1 earnings in the face of the collapse in oil prices and plunging demand arising from the COVID-19 pandemic. Announcing its first quarter results on 12 May, the oil giant reported net income of US$16.7bn in the first three months of this year, down from US$22.2bn in the same period a year ago, as lockdowns and travel restrictions to contain the virus hit global demand. The company also highlights declining refining and chemicals margins and inventory re-measurement losses.

Cash flow from operating activities stood at US$22.4bn in the first quarter, compared to US$24.5bn in the same period of 2019, while free cash flow was US$15.0bn, compared to US$17.4bn in the same period last year. Saudi Aramco said it will pay US$18.8bn in dividends for the first quarter.

Amin Nasser, Saudi Aramco's chief executive, said, "The COVID-19 crisis is unlike anything the world has experienced in recent history and we are adapting to a highly complex and rapidly changing business environment. Aramco has demonstrated resilience during economic cycles and has an unparalleled position due to a strong balance sheet and low-cost structure.

Penspen wins engineering contract with Target

PENSPEN, A PROVIDER of engineering and project management services to the energy industry, has been awarded a contract by Target Engineering Construction Co LLC for slug catcher replacement support on a project on Zirku Island in the UAE.

The Penspen contract is for work on the island's Satah slug catcher replacement project.

Image credit: C Morrison/Pixabay

Penspen will carry out detailed engineering services.

The project's objective is to replace the existing slug catchers at the Zirku Satah plant, which is operated by ADNOC Offshore, with new ones cladded with a corrosion-resistant nickel super alloy. It will also include modifications to associated pipelines, instrumentation and control systems, electrical, civil and structural works.

The scope of work for the company includes a review of processes, loss prevention/technical safety, mechanical, piping, instrumentation and control, civil and structural, electrical and corrosion/materials.

Neale Carter, Penspen's executive vice-president for the Middle East, Africa and Asia Pacific Regions, said, "This project continues our support for the Satah field and Zirku Island developments and will enhance our established position as a valued engineering services provider in the Middle East. We would also hope that it would lead to further support to ADNOC Offshore in the future."

Global LNG demand resilient in face of COVID-19

LNG DEMAND IS expected to show impressive resilience in the face of the COVID-19 pandemic, according to a forecast by IHS Markit. IHS Markit expects total LNG demand in 2020 to fall by 14.4 million tonnes, or 3.8 per cent from its 'pre-COVID outlook. Nevertheless, IHS Markit expects LNG demand to still register a slight annual increase with 2020 volumes projected to be up 4.4 million tonnes y-o-y.

It is pipeline gas more than LNG that feels the full brunt of reductions in gas demand, IHS stated, adding the price of pipeline gas is often less directly linked to oil price movements than LNG because of time lags and other formulas in long-term contracts.

Image credit: kees torn/Flickr

Europe sits at the intersection of a strong global LNG supply push.

IHS Markit projects that overall gas demand in the main LNG importing markets will decline four per cent relative to 2019. However, approximately two-thirds of the demand reduction is expected to come from reduced pipeline supplies (primarily in Europe). Another one third is expected to come from reductions in indigenous production.

Michael Stoppard, chief strategist, global gas, IHS Markit, said, "LNG is often the lower-priced option thanks to a strong supply push. Major pipeline suppliers, such as Russia to Europe, are choosing not to flood the market any further. It all adds up to LNG being relatively resilient in the face of gas demand declines."

Europe sits at the intersection of a strong global LNG supply push and a local gas demand collapse. Gas demand has been revised down from 550 to 497 bcm for 2020. However, IHS Markit continues to project rising and record levels of LNG imports in 2020.

Mainland China's gas demand for 2020 has been downgraded from 327 bcm to 312 bcm. Despite weak oil prices, gas pipeline contracts from Central Asia are expected to be the most expensive source once delivered to demand centres on the Chinese coast, and are expected to take the biggest hit.

ADC launches resilience audit

ABERDEEN DRILLING CONSULTANTS (ADC), a specialist rig inspection company, has launched a resilience audit to help the global oil and gas industry maintain safe operations by protecting against the spread of COVID-19 on offshore installations.

The audit provides a holistic review of life offshore, from best practices in serving food and social distancing during helicopter transfers to team communications and the safe management of toolbox talks.

The audit provides a holistic review of life offshore.

Austin Hay, ADC director, said, "Our COVID-19 Resilience Audit, which combines new policies, distancing measures, and recommendations, including advice from bodies such as Oil & Gas UK, the HSE, and governments, gives clients the assurance that operations can continue, maintenance can be managed and risks reduced. This will allow them to safely carry on delivering successful operations on time and on budget."

The audit covers policies and procedures; communication; operational planning and risk management; management of change; emergency response; competence; resourcing; maintenance and inspection.

"Naturally, the health and wellbeing of our own specialists are of paramount importance to us when they travel offshore, or to a shipyard to one of the projects we are part of. But our business focus has always been to ensure drilling operations can continue as smoothly as possible. Reduced staffing levels due to COVID-19 has both health and productivity implications for an asset. We can help companies avoid unnecessary risks and thereby maintain operations by ensuring they comply with the most up-to-date best practices," Hay added.

Oceaneering wins Dubai contract

ENGINEERING SERVICES COMPANY Oceaneering International has been awarded a significant asset integrity contract from a major operator based in Dubai, UAE. The three-year contract includes the provision of general and advanced non-destructive testing (NDT) and fabric maintenance inspection services across the operator's onshore and offshore facilities in the Middle East.

The contract includes integrity and inspection services for around 85 offshore platforms spread across five producing fields, as well as call-off onshore inspection management and NDT work for one of the operator's gas plants, gas control station, LNG jetty, and an onshore supply base.

The original scope included the up-man and mobilisation of 40 personnel, with the team currently sitting at around 100.

The company has made significant improvements to inspection enactment throughout the contract, including the introduction of more efficient and effective NDT methodologies. Additionally, the company has ensured all technicians are rope access trained at Oceaneering's accredited facility, which has helped to reduce scheduling and costs for the operator.

Sercel supports seismic survey in Saudi Arabia

SEISMIC EQUIPMENT MANUFACTURER Sercel has announced the successful large-scale deployment of its seismic data acquisition technology on a mega-crew survey being conducted by Sinopec Geophysical Co. (SGC).

The survey, which covers large areas of Saudi Arabia, started in late 2019.

A wide range of Sercel equipment is being used to meet this project's requirements, including more than 60,000 channels of Sercel's 508 XT land-based seismic acquisition system and a fleet of more than 45 Nomad 65 Neo all-terrain vibrator trucks and VE464 advanced vibrator electronics.

With more than 50 systems deployed worldwide, the Sercel 508 XT simplifies field operations and offers full monitoring capabilities. Its cross-technology architecture (X-Tech) optimises productivity and makes it the ideal choice for such mega-crew configurations.

When combined with Nomad 65 Neo vibrators and the VE464's unique Smart LF function, accurate high-resolution data can be generated and recorded at low frequencies (down to 1Hz). This allows for a more detailed broadband seismic image and attributes without the noise issues that would otherwise arise.

Sercel's Nomad vibrator trucks in operation.

Capitalising on Sercel's advanced technology, SGC engineers on the mega-crew survey have been able to maximise productivity while capturing and recording data of the highest quality.

Zhou Song, SGC president, said, "Sercel's contribution has been pivotal to this project's successful implementation. Furthermore, we were able to quickly ramp up our operations, reaching target VP figures within the first few days of commencing activities."

Emmanuelle Dubu, Sercel CEO, said, "This project showcases the high-resolution, high-productivity capabilities of our hardware as well as its unmatched scalability and adaptability. Its inherent robustness is designed to withstand the extreme temperatures and uncompromising working conditions encountered in the Saudi Arabian desert, thereby mitigating any downtime concerns.

"Given the success of this 508XT system in Saudi Arabia, Sinopec is already deploying a second 508XT system with 25,000 channels on another project in China."

PDO squares up to the COVID-19 challenge

Oman is navigating the headwinds of the pandemic by advancing in-country spending and pruning back costs. Martin Clark reports.

BUSINESS CONTINUITY IS the name of the game for pretty much all oil companies the world over right now. That includes Petroleum Development Oman (PDO), as it navigates the COVID-19 pandemic, which has brought with it a toxic mix of low oil pricing, weak demand and spluttering economies.

It has asked contractors to find savings of up to 30 per cent, with PDO managing director Raoul Restucci warning that cost reductions were essential to "mutual survival and sustainability".

Speaking in PDO's in-house journal in April, Restucci said the company and the country faced an unprecedented challenge.

"Along with the oil price collapse, faltering demand, funding constraints and employment challenges, we are facing a 'perfect storm' of circumstances which will test our resolve to the full."

And yet, amid the cost-cutting measures and market uncertainty, Oman's biggest producer – PDO last year accounted for around two-thirds of the nation's 900,000 bpd output – is sensing an opportunity.

Restucci suggested that current events could advance efforts in some key strategic areas, such as the Omanisation initiative, and the drive to source more supplies from local contractors. A significant proportion of PDO's supply chain comes from China and Italy, both badly affected by the COVID-19 crisis and suffering reduced manufacturing capacity and other restrictions. It means PDO is investigating the possibility of using Omani companies to produce materials normally provided by other countries, setting up a new task force to identify specific supply chain alternatives.

"Never waste the opportunities that a crisis presents," Restucci noted.

Boosting local content has long been a government priority for the energy sector. In February, PDO handed an engineering services contract to Oman Engineering Procurement & Construction (OmEPC), a partnership of four local SMEs (Value Engineering Centre, Hamad Engineering Services, Precision Engineering Consultancy and Rock International). Restucci said at the time it was a further example of the group's long-term commitment to its 'In-Country Value' strategy. The contract includes a range of technical services, including production systems optimisation, small project design, asset verification, process engineering flow scheme conversion works and front-end engineering design for smaller and less complex projects.

Image Credit: PDO

Boosting local content has long been a priority for Oman's energy sector.

And there is a significant emphasis on In-Country Value on PDO's Rahab Harweel Integrated Project (RHIP), the largest capital project in PDO's history, with 50 per cent of the procurement cost spent within Oman utilising local supply chains. Around 200 Omanis were trained as certified 6G welders (the highest international standard) through PDO's national objectives programme, specifically to work on the project.

> "Never waste the opportunities that a crisis presents."

Oil production

Nonetheless, the events of the past few months have also brought with them a host of challenges in the field, with widespread changes to working practices, including a shift to more remote working, mirroring an industry-wide trend. Tech specialists upgraded the company's IT infrastructure and capacity in a matter of days to bear the additional load of thousands of personnel working from home.

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While the myriad challenges posed by the pandemic have not gone away, PDO has moved swiftly to mitigate some of its effects. As Oman's flagship oil company, its success is inherently linked to the wellbeing of the nation's economy which, like other Gulf states, remains dependent on income from its energy sector. It has come at a time of general resurgence for the local oil sector, with production on the up and at sustained, higher levels following years of decline previously. As well as new projects, this has been built on squeezing efficiencies from mature fields.

At the start of 2020, PDO drilled its 1,000th well at the Marmul–Rahab–Thuleilat–Qaharir (RTQ) cluster located in South Oman. It is only the second time a PDO oil field has achieved this milestone, after Nimr in 2013. First discovered in 1956, the Marmul field cluster contributed around 81,600 bpd last year to Oman's overall production numbers.

And in mid-2019, the Rabab Harweel Integrated Project (RHIP), which will add 500mn boe of reserves, entered the start-up phase with gas production from the first sour wells. The facilities were built to handle the production of oil and gas from the Harweel oil reservoirs via miscible gas injection (MGI) – an oil recovery mechanism pioneered by PDO – and the production of gas from the Harweel and neighbouring Rabab reservoirs.

But total output is now being scaled back as a result of OPEC-enforced production cuts, down to around 682,000 bpd, with PDO absorbing the bulk of the reductions. Other independents, such as the USA's Occidental Petroleum, are also pruning back output.

While lower oil prices will no doubt have a dampening effect on the economy overall, it could also drive momentum in other areas for PDO, including its shift to a broader-based energy company. Plans to evolve into Energy Development Oman, with an enlarged mandate to cover investments in renewables and alternative energy resources, are reportedly gaining momentum. The concept, to transition from an an essentially fossil fuels-based producer to a fully fledged energy company, was first unveiled by PDO officials a few years ago.

The plunge in oil prices could be the trigger to accelerate the transition. It highlights a broader, longer-term shift for the industry, amid government plans to list up to a quarter of state-backed Oman Oil Company (OOC) to investors, although the timeline for this may now be pushed back given the general market volatility.

Gas sector

Fortunately, the gas sector has been somewhat more resilient than the oil industry. Oman is a major exporter of liquefied natural gas (LNG), supplying key demand centres in Asia and elsewhere. This may offset some of the disruption to oil production, with plans underway to increase gas exports over the next couple of years.

Oman LNG took steps in February to raise production further, signing a major debottlenecking contract with Baker Hughes that will add extra output from its three liquefaction trains and accommodate a potential increase in feed gas volumes. According to the US services group, the project will increase Oman LNG production capacity by around 10 per cent to 11.4 MMTPA. The project will be executed in three phases over two years, it noted, with the first train completion by the end of 2020, followed by the second LNG train in 2021, and the third train by 2022.

The gas export plant is 51 per cent owned by Oman, alongside Shell (30 per cent) and a clutch of other foreign partners.

This expansion of the gas industry provides some degree of diversification and income stability as a time of plummeting oil prices and, of course, highlights the need for diversification.

Another major initiative includes an LNG bunkering project at the port of Sohar, adjacent to the Strait of Hormuz, led by OOC with Total. A final investment decision on this development is anticipated by the end of 2020. The French oil giant was among international firms to boost its upstream gas position recently, acquiring an exploration licence on Block 12, with a first well planned this year.

The expansion of the gas sector comes against a backdrop of rising production. Total production and imports of natural gas hit 11.04 billion cubic metres at the end of March 2020, according to the National Centre for Statistics and Information, an increase of 1.7 per cent on the previous year.

Other major energy developments also remain on track, officials say, including the 230,000 bpd Duqm oil refinery, scheduled for opening in 2022.

While these may be uncertain times, the energy industry is accustomed to planning for the long haul – how PDO, and others managing Oman's prized oil and gas assets, transition through this period will be vital to the Sultanate's future well-being. ■

The Rabab Harweel Integrated Project (RHIP) will add 500mn boe in reserves.

Image Credit: PDO

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Saudi Aramco projects have offered rich pickings for EPC contractors.

Image Credit: Saudi Aramco

EPC contractors feeling the pinch

The Gulf was set to initiate some of the biggest energy projects worldwide…then COVID-19 happened. But how has it affected the region's EPC market? Martin Clark reports.

AGAINST A BACKDROP of production cuts, stifled demand from a planet wrestling with a global health pandemic, and gloomy economic forecasts ahead, energy planners in the Gulf are having to think fast on their feet.

This downbeat scenario has taken an inevitable toll on projects and timelines, which has had a knock-on effect on the big engineering, procurement and construction (EPC) contractors that have thrived in in the Middle East for decades.

The effects are tangible. Abu Dhabi National Oil Company (ADNOC) in April cancelled two contracts with Petrofac Emirates for its Dalma gas project. It is a massive blow: Petrofac Emirates' portion of the work – only awarded in February this year just before the outbreak engulfed the world – was worth US$1.5bn.

The contractor is now working with ADNOC to explore "alternative options" to deliver the project "within the current challenging environment," Petrofac noted in a 16 April statement.

The Dalma project is a part of the Ghasha ultra-sour gas concession which is central to ADNOC's strategy of enabling gas self-sufficiency for the UAE. It is designed to meet around 20 per cent of the nation's gas demand by the second half of the decade; more than 120,000 barrels per day of oil and high-value condensates are also expected to be produced when the project is on stream.

KBR was similarly awarded work in February by ADNOC for the Ghasha gas scheme, but has yet to announce any impact on its project management consultancy role.

Despite this, Petrofac remains active on a robust-looking Abu Dhabi project backlog worth US$7bn and is progressing with tendering for additional contracts. Nonetheless, it expects the Dalma cancellation to have some impact on the timing of other awards.

> "The downbeat scenario has taken an inevitable toll on projects and timelines."

Tendering activity down

ADNOC was especially busy at the start of 2020, with SNC-Lavalin also picking up work for the second phase of the Haliba field, located in the Al Dhafra Petroleum concession area. Al Dhafra Petroleum is an ADNOC joint venture with Korea National Oil Corporation and GS Energy.

But the proliferation of new greenfield oil and gas tenders may now be in short supply for the second half of the year. According to analysis by Rystad Energy, only US$60bn in EPC greenfield oil and gas tenders will be up for grabs worldwide this year, down from pre-coronavirus estimates of US$133bn, with new projects shelved or pushed back.

Tendering activity is expected to show only marginal recovery during 2021, reaching around US$74bn, the research suggests. In 2019, some US$170bn worth of tenders were doled out worldwide. It also highlights the LNG sector, with potential delays to the North Field expansion in Qatar.

On a practical, operational note, COVID-19 has likewise caused significant disruption to ongoing EPC projects due to stringent health protocols, supply chain disruption, travel restrictions and government-enforced lockdowns. This alone has resulted in material delays in construction activity, which will not be recovered in 2020, Petrofac added in notes at its annual meeting on 15 May.

Petrofac and other EPC firms, including Saipem and TechnipFMC, have all been busy exploring cost-cutting measures in order to navigate the crisis.

Weathering the storm

On a positive note, the lower production costs of the Middle East compared to other geographies give it a little more comfort, a point highlighted by TechnipFMC chairman and CEO, Doug Pferdehirt.

> "EPC firms have all been busy exploring cost-cutting measures."

For the group's surface technologies segment, he said "the longer-term trends remain favourable for several international markets, such as the Middle East…and we anticipate that international revenue in 2020 will be far less impacted than North America."

Moreover, the gas market has shown less volatility than oil, while the Gulf region's shift into petrochemicals might also provide some relief for EPC firms.

Not all projects have been frozen either, with McDermott International landing a series of new contracts in Saudi Arabia in the past couple of months. That includes building dozens of new storage tanks and a separate front-end engineering and design contract for offshore riser platform topsides.

It will also work on a new grassroots petrochemical complex in Jubail, to provide the licence and basic engineering package on a C3 CATOFIN unit with a propylene production capacity of 843,000 metric tons per annum.

McDermott also commenced construction on a new fabrication site within the King Salman International Complex for Maritime Industries and Services in Ras Al-Khair in February. The overall site, which is being developed by Saudi Aramco, is expected to be the largest maritime industries complex in the Middle East.

As always, Saudi Arabia is leading the region's largest projects, such as the Marjan and Berri offshore expansions, for which around US$18bn worth of EPC contracts were awarded in mid-2019 to companies including McDermott, Saipem and L&T Hydrocarbon Engineering.

There are other signs that EPC firms may be weathering the storm better than other oilfield services companies, with comparatively less impact in terms of reduced market capitalisation overall. The most affected stocks have been in offshore drilling, a segment that has nosedived by around 80 per cent since the beginning of this year, compared to a 27 per cent drop in the EPC segment, according to Rystad Energy.

"Our analysis indicates that companies with exposure to EPCI…have been less punished by investors," says Rystad Energy's Binny Bagga. Again, its research also indicates that international exposure is beneficial, especially to the Middle East, which is expected to be more resilient than North and South American markets. ■

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Integrated refinery operations to address the challenges

Colin Chapman, president, Euro Petroleum Consultants DMCC (EPC), discusses refining and petrochemicals integration opportunities for a sustainable downstream business in today's changing environment.

OVER THE LAST decade, the downstream sector has experienced a number of challenges, from volatile crude prices and the increased focus on climate change, to the continuing need for cleaner transportation fuels and the recent introduction of more stringent specifications for bunker fuels with the IMO Marpol VI regulation. The industry has had to adapt to all types of scenarios, and companies have had to adjust their strategic plans accordingly. Today has brought an additional factor – the wide-reaching impact of the COVID-19 pandemic, which has resulted in falling crude oil prices, major acquisition deals being restructured and falling company market values, not to mention the delay and cancellation of a number of projects.

Before the COVID-19 pandemic, among the risk factors for oil refining was the projected slowdown in the growth rate of fuel consumption against the backdrop of the increased use of electric vehicles. COVID-19 has accentuated this slowdown, and it will be very interesting to see the lasting impact on future transportation models post Covid-19.

We can safely say that there will be an 'after COVID-19' scenario, and we will see how the downstream companies will adjust their business model as a result.

How will our industry need to evolve to meet these challenges? What major changes will be required to make a success of this transition? It will be important to evaluate how crude oil can be converted into cleaner products and how to optimise integration with petrochemicals production. Diversification will be a major factor. This evolution will also encompass creating sustainable plastic solutions and lightweight materials for transport, notably shipping, aviation and electric vehicles (EVs).

Looking ahead, oil companies will need to accelerate efforts to meet their downstream ambitions for a sustainable and successful future. A focus on integration, digitalisation, talent and environment will be necessary.

Integrated refinery operations can help companies improve profit margins and adapt to the evolving landscape.

Image Credit: Adobe Stock

Greater emphasis on integration

We have seen that the downstream industry is putting greater emphasis on increased refining and petrochemical integration; from petrochemicals-oriented Fluid Catalytic Cracking (FCC) right through to the advent of ambitious crude-oil-to-chemical projects (COTC).

> "A focus on integration, digitalisation, talent and environment will be necessary."

If we look at the concept of the refinery and petrochemical plants of the future, there are a number of key questions that need to be asked. What will these plants look like? With the implementation of smart operation and connected plants, and investment in artificial intelligence, technology providers are introducing new solutions to help assets improve in terms of efficiency and flexibility.

Companies such as Honeywell have unveiled a new 'Refinery of the Future' concept, which demonstrates how carefully planned investments in refining operations, including integration with petrochemicals production, can help companies significantly improve profit margins and adapt to the evolving landscape.

In certain regions the demand for chemical and petrochemical products is expected to remain relatively high, driven by rising living standards in countries such as China and India. In this regard, solutions that enhance the integration between oil refining and petrochemicals are and will continue to be important.

Integration projects are wide ranging, offering many possibilities and configurations. We have seen a number of emerging trends – the reduction of heavy fuel oil production with a Residue FCC Unit for maximum propylene production; such options are offered by the major licensors of FCC technology such as KBR, Honeywell UOP and Axens. Specific catalyst formulations are available for such operations. Axens are licensing their High Severity RFCC technology – fruit of a collaboration between Saudi Aramco, JX Nippon Oil & Energy Corp.(JX), King Fahd University of Petroleum & Minerals, Technip Stone & Webster Process Technology and Axens Solutions. The first commercial application of this technology was successfully completed at the S-Oil refinery in Onsan, South Korea.

Image Credit: Euro Petroleum Consultants

Colin Chapman, president, Euro Petroleum Consultants.

Another means for capturing value via residue to chemicals projects is by using an Ebullating Bed Residue Hydrocracking technology unit (such as H-OIL and LC-Fining licensed by Axens and CLG respectively) integrated with a petrochemical complex by upgrading the heavy by-products of steam cracker units.

Optimisation of aromatics production is also a good opportunity to integrate refineries with petrochemical complexes by recycling pyrolysis gasoline from a steam cracker to the aromatics complex.

The Middle East is making real advances to develop a more diversified and greener economy. There are different green oil strategies to help companies improve their carbon footprint – these can include diversification into natural gas and renewable energy. Before the pandemic we were seeing increased activity in projects being developed or evaluated in other regions such as China, SE Asia, Russia and CIS countries – specifically for conversion of natural gas to methanol and then methanol to olefins using MTO and MTP technologies such as those licensed by Honeywell UOP and Air Liquide.

> “Integration projects are wide ranging, offering many possibilities and configurations.”

It will be important for the industry to continue to invest, despite the obstacles, in order to cope with changing regulations, invest in flexibility to adapt to regional and global markets, and invest in integration, as well as to build operational excellence, reliability and maintainability into all stages of capital projects and the asset lifecycle. Many of these capital intensive projects need large investments, hence it is essential to understand the impact of COVID-19 and the changing markets in each region before embarking on such projects.

The Middle East region has demonstrated the benefits of JVs and partnerships as a model to remaining competitive in today’s market by attracting foreign investment and expertise, and trading by oil and petrochemicals companies. This allows the creation of new revenue streams and the diversification of the downstream business. The JV experiences of companies such as Total, Dow and ExxonMobil with local oil companies have demonstrated the benefits of such partnerships in the region.

This trend was expected to continue and grow. However, that was before the global pandemic, and we have already seen certain deals being put on hold, or being renegotiated. It will be very interesting to see how the industry evolves post COVID-19. But one thing is for certain – refining & petrochemical integration will remain an important part of the picture. ■

EPC is a technical oil and gas consultancy with offices in Dubai, London, Moscow, Sofia and Kuala Lumpur. EPC also organises leading conferences worldwide. www.europetro.com

In the current remote and work-from-home scenarios, refiners are re-examining their digital capabilities.

Image Credit: Adobe Stock

Building agility, resilience & recovery in refining

Ron Beck, marketing strategy director, Aspen Technology, reflects on short-term and long-term digitalisation strategies refining companies can adopt to contend with the current economic uncertainties.

THE ENERGY SECTOR has been hit hard by the current global economic interruptions, with rapid drops in demand, changing mix of preferred products, plunging crude prices, difficulty staffing essential production sites and fragility of supply lines.

Refiners are faced with high volatility. Prices are extremely dynamic, and margins are very low. Demand for some products (such as diesel and naphtha) greatly exceed demand for other products (gas, jet). Refinery operators are running business scenarios and alternative refinery plans on almost a daily basis. And risk and uncertainty into the future is high. Many respected economic forecasters believe product demand will not fully recover for at least one to three years.

Industry watchers predict permanent changes in the roles of on-the-ground versus remote working. Organisations are seriously considering how more work can be done remotely and with fewer crews in dangerous settings, in and around assets. Autonomous production is no longer thought of as in the distant future. In the face of being forced to move most workforces into remote and work-from-home scenarios, energy companies are re-examining their digital capabilities and increasing their focus on digitalisation as an essential long-term strategy.

Some analysts think the energy transition will be accelerated; others forecast the opposite. Energy and chemical businesses are likely to rethink supply chains which are today highly globally interdependent and just-in-time in nature. The sustainability focus including decarbonisation, circular economy, and broader access to electricity and clean water globally, will resume with some new urgency and focus when things normalise, and this will drive regional refining and chemical markets. It will also impact the speed at which refineries integrate their operations to incorporate chemicals and shift away from transportation fuels.

In the short-term, companies are looking at a range of questions, which have varying importance depending on regional differences:

- Which are the right CAPEX cuts to make that keep the business agile and ready to take advantage of opportunity during the recovery?
- How can I maximise my team effectiveness today using digitalisation and enable continued remote working?
- What is my turndown limit, to keep plants running within safe limits and without damaging units and equipment?

> “Organisations are seriously considering how more work can be done remotely.”

- What is my optionality to shift as far as possible to diesel and minimise jet and gasoline?
- What do my margins look like under a dizzying range of crude and products pricing scenarios?
- In new operating scenarios, do I degrade my catalyst faster; in the face of supply chain disruptions, should I be ordering future catalyst sooner?
- How do I utilise my existing tools to optimise production in a drastically different operating regime?
- How can I shift my supply chain dependencies across geographies, and what are the business and economic tradeoffs?

Digital as a tactical tool today

How will companies most effectively contend with future business uncertainties?

In a recent discussion, a Middle Eastern energy customer referred to digitalisation as “a tactical lever in this environment.” Many organisations have realised during the current disruption that they need to develop capabilities to automate operations as much as possible and enable remote experts to address production plans, needs, and interruptions, and are not as far along in digitally enabling their assets as they should be. So, amidst the business uncertainty, several companies have small teams looking at how to digitally enable themselves more rapidly.

Seven ways you can use digital now to impact your business

In the short term there are a number of immediate digital technology actions energy companies can take and are currently taking to navigate the current period and prepare for future economic recovery. These in many cases are based largely on technology already in place within companies, but which has not been deployed in the most effective way to support remote and collaborative work that is so necessary for the agility and responsiveness to succeed in the coming challenging months. These include:

1. First, rebalancing capital spending (CAPEX) and operational expenses (OPEX) in an informed manner to match the current business climate. You have put 20 per cent, or maybe even 30 per cent of your capital budget on hold. Now you need to assess, for the next 12 months, which projects you should defer, and which are more strategic for your recovery and growth. Economic modelling and risk tools can rationalise your CAPEX portfolio into a series of scenarios, ranking them by impact on revenue, by impact on sustainability, and by financial risk and externalities. You can examine optionality of locations, timing, and contracting and their impact on agility, workforce, cost and enterprise value. Using advanced economic cost and risk modelling you should be able to make economic and risk tradeoffs transparent for making more informed decisions within 30 days.
2. Next, expand and accelerate scenario planning your production strategies. Production planning and scheduling tools are being creatively used to react to and solve challenges related to supply chain, demand and pricing disruption, by remote teams. Production planning can be rapidly moved to the cloud for remote and work-from-home; and to access high performance computing to run the large numbers of scenarios to establish the optimum choices as business conditions change dynamically. Several of the largest global refinery planning teams are running scenarios 12 hours a day, constantly adjusting the underlying model assumptions. Teams are using this approach to build future scenarios to plan for variable market and regional recoveries. Digital twin models of refining units can be used to inform the planning model of operating scenarios that have never been planned for before; to make sure the planning models are adjusted to be directionally correct; to identify safe operating turndown limits; to identify impacts of deferred maintenance on asset safety and integrity.
3. With the need to minimise numbers of workers in plant settings, remote worker access is crucial to enhance collaboration and sustain effectiveness. Visualisation and workflow digital tools are giving remote workers the ability to react to and collaboratively manage asset production. An Italian energy company is continuing urgent engineering work remotely with a front-end engineering collaboration tool that works as effectively from home as in the office. Asset health can be monitored remotely with prescriptive maintenance analytics to provide weeks of warning of equipment trouble. Adaptive process control can be managed and monitored remotely.
4. Adapting production to new operating conditions. When I drastically turn down units, or change column cuts, or operate under different process conditions, how do I optimise my operations for safety, yield and energy? Adaptive process control can be upgraded and deployed remotely. Self-tuning adaptive control can be adjusted quickly and remotely to these new operating strategies and continue optimising the key process units.

> “Production planning can be rapidly moved into the cloud for remote and work-from-home.”

5. With assets operated with the fewest possible on-site staff, routine inspection and maintenance has been deferred. Maintenance and asset health analytics and monitoring tools, such as troubleshooting operations via online column models and monitoring heat exchanger performance and fouling with online models, are evaluating how long equipment is able to run safely with deferred maintenance. Several global operators are using these online models to determine cost and risk of deferring maintenance. Predictive analytics are forecasting equipment failures and process upsets, providing one to eight weeks advance notice of failures, enabling asset owners to efficiently deploy small strike teams to avoid damage and downtime. This machine-learning based prescriptive maintenance has already saved one global refiner millions from avoiding conditions leading to equipment failure and improving plant uptime.
6. With assets running at lower rates, modelling tools are crucial to ensure that these operating scenarios can proceed without damaging the asset. Plant digital twin models can be run remotely to advise operators of the correct process changes for safely and reliably running units at low turndown rates. They can be run online to monitor the status of equipment and units with respect to process safety, process integrity, emissions, energy use, fouling and degradation, and yields.
7. With global energy companies continuing their focus on sustainability goals, even during this global economic volatility, digitalisation can be a crucial weapon to keep a corporate focus on sustainability, while operating leaders are fully occupied with maintaining operating safety and continuity. As an example, Bharat Petroleum (BPCL) very recently deployed an integrated digital twin to optimise sulfur recovery – encompassing software, such as AspenTech’s adaptive process control and connected simulation models to improve contaminant removal, as well as a key performance indicator (KPI) dashboard. In six months, the implementation resulted in 90 per cent reduction in sulfur emissions and economic (and circular economy) value from recovered sulfur. In a related project, BPCL implemented a digital emissions monitoring and prediction system, that allows the company in its Kochi Refinery to effectively address an increasingly rigorous and dynamic regulatory environment.

A progressive recovery

Agility and flexibility will be critical in the energy industry, as unpredictable oil and gas prices and patterns of demand will be in front of us. Digitalisation is not only a tactical tool, but more importantly a strategic lever for making a refinery more agile, and the business owners more flexible. Specific areas of digitalisation create very significant value quickly and enable companies to be extremely effective, whether using on-site or remote workers. Beyond the short term, as AspenTech ties planning and scheduling closely to optimisation and advanced control, advanced planning technology implementation is not only paying dividends today but will ensure safe operations and margin capture in the future. The plant digital twins that can be implemented easily on highest economic value units, such as crude units, conversion units and preheat trains, provide optimisation and advice, without placing workers in dangerous places in the asset.

AspenTech has been working with companies globally to support workers who have the critical need to access AspenTech software for remote access to perform their daily mission-critical work. Many companies are evaluating how much of this remote work they will make permanent.

Beyond the current unique economic environment, we will be helping our global customers to digitalise in the highest impact areas, as energy companies put increasing emphasis on these projects. These high value areas will include margin capture, safe operations, agility in the face of uncertainty and sustainability. ■

Oil properties and their impact on oil spills

At a webinar hosted by Oil Spill Response Ltd (OSRL), Edgar Gerasmia, senior trainer and spill response specialist, Oil Spill Response Ltd, discussed how the properties of oil will shape the response to an oil spill, and how these properties affect the weathering process.

GERASMIA BEGAN BY stressing the importance of knowing the properties of oil, to understand how the oil behaves when it is spilled into the marine environment, which will help to determine the most appropriate response strategy.

Five key properties of oil shaping the oil response

Gerasmia explained that there are five key properties of oil that are significant in relation to oil spills:

Specific gravity - how heavy the oil is, ie the density of the oil, which determines whether the oil will submerge or float in the water. Oil when submerged is difficult to monitor, and it can cause sedimentation and damage the seabed. Lighter oil floats, but can be affected by the wind and current, which can bring it to sensitive shorelines or sensitive structures.

> “There are five key properties of oil that are significant in relation to oil spills.”

Viscosity – how thick the oil is, or resistance to flow. Oil which is not viscous tends to spread wide and evaporate faster. Low viscosity oil can easily break, enhancing biodegradation and dissolution. High viscosity could increase the chances of the formation of sedimentation. The oil is almost stationery and hard to recover in a spill operation.

Pour point – the temperature below which the oil does not flow. It represents the lowest temperature at which the oil is capable of flowing under gravity. When the pour point of the oil goes above a certain temperature, it will stop flowing. Oil with high pour point spreads less on cold water as once it hits the cooler water it will solidify. In warm water, the oil continuously spreads, so in open water this oil could spread much faster. In cold water it solidifies, which prevents it from spreading. So the pour point of the oil is higher than the water temperature.

The Deepwater Horizon oil spill off the Gulf of Mexio was the largest accidental marine oil spill in history.

Image Credit : Green Fire Productions / Flickr

Volatility – the propensity to evaporate. Oil with high volatility evaporates very fast. Lighter oil tends to evaporate faster, and as it evaporates it reduces in volume, which reduces the amount of waste that needs to be dealt with. Very light oil does not need a physical response as it evaporates fast, although there are exceptions. The issue with oil with high volatility is that it becomes dangerous to responders because of the high evaporation of the oil. If it is dangerous to respond to the spill, the situation should be continuously monitored and evaluated. The disadvantage of this strategy is that from the point of view of the public or observers, it seems no action is being taken.

Asphaltene content – the propensity to emulsify. If the asphaltene content is higher than 0.5 per cent it could create a stable emulsion. If it is below that, it could still create an emulsion but it becomes unstable, there is still a chance we could separate the two. It changes the properties of the oil such as the viscosity and the density, as when it emulsifies it becomes very dense and very viscous. It also increases in volume, which means it increases the waste storage capacity required.

Gerasmia added that safety is paramount for response personnel, so it is also important to establish if the oil has an H2S content.

Optimum response strategy

The above properties are the main factors affecting the weathering, or fate, of the spilled oil. The optimum response strategy depends on these properties. So how do these properties shape our response?

Specific gravity – with heavy oil a possible strategy is containment and recovery with mechanical skimmers. For light to medium oil, monitor or evaluate, use dispersants, or in-situ burning and containment and recovery.

Viscosity – for high viscosity , use containment and recovery with mechanical skimmers and then manual recovery. For low

viscosity, use mechanical dispersion, dispersants, in situ burning, containment and recovery. For very low viscosity oil natural dispersion can be enhanced by using a mechanical means to create energy for the oil to naturally disperse.

Pour point – for high pour point, use containment and recovery, using mechanical skimmers or manual recovery. For low pour point, use dispersants, in-situ burning, containment and recovery.

Volatility – oil with high volatility is dangerous as when the oil is evaporating the surroundings become very volatile. So monitor and evaluate but be ready to act if the situation changes. For low volatility, use dispersants, use in situ burning, containment and recovery.

Asphaltene – oil with high content could create an emulsion, so use containment and recovery with mechanical skimmers. For low asphaltene, use dispersants, in situ burning, containment and recovery.

Gerasmia stressed that a proper assessment is needed before finalising the response strategy, with all relevant factors and considerations being taken into account.

The fate or weathering of spilled oil in the environment

The fate of oil spilled in the marine environment is influenced by other factors in addition to the properties of oil. These include the prevailing environmental conditions such as the wind, turbulence, current and the temperature of the water. It also depends whether it is a continuous or instantaneous release, and the quantity of oil that is spilled.

Spreading / fragmentation – low viscosity oil can spread fast and wide, and the rate of the spreading and fragmentation is dependent on the wind, turbulence and current. In an open sea it could spread very fast and very wide. When it spreads or is fragmented, it affects the complexity of the response, meaning more surveillance assets may be needed, and multiple response teams in different locations may be needed.

Evaporation – spreading and evaporation happen instantly and the rate of evaporation is influenced by the volatility of the oil. The higher the volality, the higher the rate of evaporation. This rate increases with higher ambient temperature or wind speed. So the same type of oil spilled into cold water will evaporate less quickly than in very warm water, such as the waters around the Middle East during summer. Spreading will also affect evaporation, because of the wide surface area, and the residues of the evaporation will have higher density and viscosity than the original product. So it will become very sticky.

Natural dispersion – here oil on the sea surface is broken down into small droplets by wind and turbulence. Gerasmia gave an example of an oil spill which occurred in Manila Bay in the Philippines, where people were collecting the oil floating in the water and selling it for recycling. After a week of the spill, a storm came, which created a lot of energy. When the wind subsided the beaches and waters in Manila bay were very clear, as if nothing had happened. This was natural dispersion because of the energy created by the storm. This promotes biodegradation, dissolution and sedimentation. But if it had been a heavy crude oil spilled in the bay, it would have been another matter. It would not easily have dispersed naturally, and could have been sticking to structures around the area. In the absence of strong waves and turbulence, natural dispersion can be enhanced by using natural agitation to enhance the oil flow and encourage natural dispersion.

> “The fate of oil spilled in the marine environment is influenced by other factors in addition to the oil properties.”

Emulsification – this is the mixing of oil in the water. Once this happens, the volume is drastically increased, by a factor of four or five, depending on the asphaltene content. The key factors driving the rate of emulsification are the asphaltene content and the sea state. Asphaltene above 0.5 per cent will create a stable emulsion; below 0.5 per cent it could still create an emulsion, but there is a possibility the oil gets separated in the water. The sea state of Beaufort Level 3 or above accelerates the process. The higher the energy, the higher the chances of the oil becoming emulsified, and we will often see the colour change to orange or brown.

Stranding and sedimentation – during the incident, if the oil cannot be removed from the water, the chances are it will get stranded, and some of the oil could sink into the seabed and create a sediment. This increases the impact on the environment and people. If the oil is still in the water and in rough seas it may become submerged for some time, however when the conditions improve and the water energy disappears, it could resurface. It can also promote the formation of tar balls which settle on the seabed, possibly washing up on shorelines weeks or months later. In the case of the Macondo spill, tar balls would appear on shorelines that had been cleaned the previous day, indicating there was submerged oil still on the seabed, and the change in tide had carried it on to the shoreline.

Biodegradation – This would ideally be the ultimate fate of the oil. Oil-eating microbes and bacteria grow in number with the more oil available. Oil is actually a food for bacteria; when there is food they thrive, increase in numbers and consume more, metabolising the oil suspended in the water column. But the time taken ranges from days to years, depending on the type of oil, the temperature, the nutrient content, the area, and the oxygen level of the water. If this happens in stagnant water, the biodegradation could take a long time, but if it happens in open water and there is a lot of water exchange, it could happen very fast. Spilt oil is broken back down into water-soluble compounds and eventually becomes water and carbon dioxide.

How does the weathering process affect the response?

Spreading and fragmentation – spreading covers a large area and with fragmentation oil could split into patches. This means more resources would be needed to monitor the area. For offshore operations, greater aerial support may be required to guide responders to the location of the oil.

Evaporation – when oil evaporates it decreases the volume and the surroundings become very volatile. Fewer resources are required, and there is less waste to manage. The big impact is on the responders, who are exposed to a more explosive environment, and this becomes a significant safety consideration when deciding what strategy to use to deal with the oil spill.

Natural dispersion – the oil naturally breaks down into a water column. With the right amount of wave energy it may require little or no response action, depending on the type of oil, but if there is not enough wave energy, mechanical dispersion may need to be used. Sometimes, because of the natural dispersion or the oil which is evaporating, responders are not allowed to go in for safety reasons. In this case they can be perceived by the public or media to be doing nothing when an incident happens.

Gerasmia concluded by stressing that a thorough assessment of the whole situation and all relevant factors should guide us in deciding a response strategy. ■

Oil Spill Response Limited (OSRL) is an international industry-funded cooperative which responds to oil spills by providing preparedness, response and intervention services. For further information see the website at www.oilspillresponse.com.

Mitigating the risk of COVID-19 cyberattacks

Security professionals across the Middle East must educate employees about the rise in coronavirus-related cybercrime and how to avoid placing their organisation at risk, says Werno Gevers, cyber security specialist at Mimecast.

Cyber criminals are feeding on people's fears and anxieties during the COVID-19 pandemic.

Image Credit: Adobe Stock

ORGANISATIONS ARE ALREADY facing business challenges in the wake of the coronavirus pandemic, and a rapid rise in COVID-19 related cyberattacks is causing additional stress.

A new report from the Mimecast Threat Intelligence Centre, entitled *100 Days of Coronavirus*, tracks cybercrime activity since the start of the outbreak. It found that between January and March 2020, global monthly volumes of spam and opportunistic cybercrime detections increased by 26.3 per cent, impersonation fraud detections increased by 30.3 per cent, malware detections increased by 35.16 per cent and the blocking of URL clicks increased by 55.8 per cent. In addition, more than 115,000 COVID-19 related spoof domains, designed to steal personal information, were detected over the three-month period.

Focusing on the Middle East and North Africa (MENA), the Threat Intelligence team saw notable increases in malware (22 per cent) and spam (36 per cent) during February and March, when the virus started spreading in the region. Shockingly, there was a 751 per cent increase in unsafe clicks during the first three months of year – likely as a result of a rise in human error caused by stress, unusual working environments and our desire to stay informed.

Cybercriminals feed on people's fears

Phishing scams often tap into whatever is currently making headlines. Thankfully employees' awareness of cybersecurity continues to grow, but criminals are making the most of the current situation by feeding on people's fears and anxiety. In short, people just aren't thinking straight.

We are also getting used to receiving emails from employers, authorities and just about every brand we've ever interacted with, about their response to COVID-19. Bad actors know this and are impersonating these organisations with the aim of getting concerned citizens to click on malicious links.

> "There was a 751 per cent increase in unsafe clicks during the first three months of the year."

Between March 9th and 20th alone, we saw a 234 per cent increase in daily registrations of new coronavirus-related web domains and sub-domains, at more than 6,100 a day. While some of these 60,000+ sites were legitimate, the majority weren't. Links were used to capture credentials, allowing bad actors to access networks, or to directly infect them with malware.

Evolving threats

As the pandemic and the response to it has evolved, so have cybercriminals' strategies and attacks. The scams change to match what people are talking about.

Many of the first phishing attacks impersonated specialists from Wuhan, China. Criminals then masqueraded as regional authorities and later businesses communicating with their employees.

In the Middle East, many businesses and

authorities have had to warn customers and residents of fake emails being sent out in their name. Some regional airlines shared warnings about malicious emails offering them refunds on cancelled flights.

On our own grid, our Threat Intelligence team discovered a phishing scam offering an immediate air ticket refund in exchange for credit card details.

The Central Bank of UAE released an announcement at the end of March, saying, "Fraudsters always look for opportunities to target consumers, and as the public is engaged with COVID-19 pandemic news, they are using different tactics to increase fraudulent activities on banking customers."

The most popular COVID-19 phishing scam themes seen by the Mimecast Threat Intelligence team include:

- **COVID-19 policy updates –** emails designed to look as if they are from HR departments directing employees to 'login' and read updated business policies regarding the pandemic and working from home.
- **Coronavirus testing –** Offering DIY kits, which take victims to fake sites where they capture their credit card data.

> "Employees need to be continuously educated about the risks and should be trained remotely."

- **Virus updates from healthcare authorities –** with fake links to the Centers for Disease Control and Prevention (CDC) and World Health Organisation (WHO).

Build a cyber secure workforce

With significant disruptions likely for many months, security professionals in the Middle East need to review their cybersecurity strategies and arm employees with knowledge needed to protect themselves, and the business, against these attacks.

Security and IT teams should encourage employees to:

- Update home Wi-Fi with a strong password
- Never click on COVID-19 related attachments received outside your trusted perimeter
- Double-check links – if suspicious, do not click!
- Ensure links go to the correct domain
- Update usernames and passwords on trusted sites only
- Do not use personal devices at home to access business networks, data or emails.

Most importantly, there is an urgent need to refresh employee awareness training, as highlighted by the rise in unsafe clicks seen in our report. The report also showed that employees from organisations that did not have regular awareness training were five times more likely to click on unsafe links. Now more than ever, employees need to be continuously educated about risks and should be trained remotely.

By instilling a culture of cybersecurity, organisations place themselves in a far better position to defend against growing coronavirus-related attacks. ■

Mimecast has launched a website focusing on helping security leaders to secure and protect employees while enabling a mobile workforce. Updated regularly, it provides insights into new threats to help organisations through this challenging time. https://www.mimecast.com/coronavirus/

Increase in cyberattacks targeting the cloud

MCAFEE HAS RELEASED a new research study titled *Cloud Adoption & Risk Report – Work-from-Home Edition* that shows a significant increase in cyberattacks targeting cloud services as companies are largely working from home due to the COVID-19 pandemic.

Based on data from more than 30 million McAfee MVISION Cloud users worldwide between January and April, the report reveals significant trends that include the rise of cloud-native threats, access from unmanaged devices, and an increase in the use of cloud services. It finds that:

- External attacks on cloud accounts grew seven times
- Overall enterprise use of cloud services increased by 50 per cent, including from industries such as manufacturing and financial services that typically rely on legacy on-premises applications
- Anomalous login attempts tripled from the start of the year
- Cisco WebEx, Zoom, Microsoft Teams and Slack saw an increase of up to 600 per cent in usage, led by the education sector

These trends emphasise the need for new security delivery models in the distributed work-from-home environment of today – and likely the future.

Tips to maintain strong security posture include:

- Think cloud-first: A cloud-centric security mindset can support the increase in cloud use and combat cloud-native threats. Enterprises need to shift their focus to data in the cloud and to cloud-native security services so they can maintain full visibility and control with a remote, distributed workforce.
- Consider your network: Remote work reduces the ability for hub and spoke networking to work effectively with scale. Network controls should be cloud-delivered and should connect remote users directly to the cloud services they need.
- Consolidate and reduce complexity: Cloud-delivered network security and cloud-native data security should smoothly interoperate, ideally be consolidated to reduce complexity and total cost of ownership and increase security effectiveness and responsiveness.

Mitigating default risk

George Booth and Chelsey Ross discuss measures companies can take to mitigate the risk of counterparty default in the uncertain COVID-19 environment.

Image Credit : Pinsent Masons

George Booth, senior international energy partner, Pinsent Masons; and Chelsey Ross, solicitor specialising in energy.

THE RISK OF a co-venturer's failure to meet its financial obligations under a Joint Operating Agreement (JOA) has always been a "known known" amongst parties to a JOA. There is often an assumption that the adverse reputational impact of forfeiture of a defaulting party's interest is a sufficient deterrent to avoid the failure of one party to pay its share of a cash-call under the JOA. In a low oil price environment, that assumption is certainly challenged, and parties to JOAs are now much more likely to experience financial problems with fellow co-venturers during the life of the JOA.

But now we also have a "known unknown" in the mix – COVID-19. Navigating joint ventures within these uncharted waters may test the long-standing principles of "mutual trust" which cement the JOA relationship.

Given the unprecedented times the global oil and gas industry currently faces, it is prudent that parties to a JOA test this assumption, particularly if there is already evidence that a co-venturer is financially constrained or has a history of default.

The current economic environment contains all the elements for potential default under JOAs, in particular, one party's inability to meet its cash-call commitment. It is therefore crucial that any party to upstream international oil and gas operations evaluates its increasing exposure to the risk of counterparty default and the mitigation steps available to it. The approach will depend on a number of factors which will vary in importance and relevance from asset to asset. These will include the terms of the underlying agreements (e.g. the E&P contract issued by the host government, the joint operating agreement), the remaining term under the host government contract, the nature of any outstanding work commitments, the attitude of the host government in relation to the asset and its ambition for it, the regulatory environment, the capability and appetite for the asset of the non-defaulting co-venturers, the nature of the relevant breach and the suitability of the applicable dispute resolution process.

In the Middle East region, three of the most common forms of Petroleum Contract are used – the Concession, the Production Sharing Contract and the Technical Services Contract. Under the Petroleum Contract the government contracting party will ultimately have the right to terminate should the IOC contractor client fail to perform. In particular, events which may be the result of a financially constrained counterparty are covered in each of these contract types – insolvency, administration and similar, failure to meet an expenditure requirement and failure to perform a work obligation. Most have remedy periods – some will entitle the Government to terminate the Production Contract as a whole even if only one member of the contracting party has suffered the relevant termination event.

> “Parties to JOAs are now much more likely to experience financial problems with fellow co-venturers.”

Particularly in the Gulf region, it is in our view unlikely for a situation to develop which would result in a termination for fault scenario. These are often huge upstream projects with well-established major international oil companies, often with significant geo-political support and highly experienced government counterparties. In more recent oil and gas plays in the region outside of the Gulf, the prospect of a contractor suffering financial distress is perhaps more real; indeed there are examples of this in the public domain.

Nevertheless there are very few scenarios currently where termination is likely to be in the host government's interest. What is more likely,

as we have seen in previous oil price slumps, is that work commitments and capital commitments may be delayed or reduced, cost share provisions adjusted in favour of the contractor, production periods extended or target production levels renegotiated. However, this does not obviate the necessity for both parties to undertake the review and scenario planning described below. This exercise must be carried out in contemplation also of relevant joint venture and JOA arrangements and financial and operational consequences downstream and in the supply chain.

The contractor's rights in relation to the upstream asset and its counterparties are principally covered in the Petroleum Contract and the JOA or joint venture agreement between the co-venturers (for the purpose of this article both called the OA). The position of the defaulting co-venturer under the JOA is dealt with similarly whether an unincorporated or incorporated joint venture is in place, both of which are common in the Middle East region.

Typically a party in default (i.e. the 'Defaulting Party'): (i) loses the right to attend Operating Committee meetings or to vote on any matter before the Operating Committee; (ii) loses the right to its participating share of any hydrocarbons; (iii) gives the non-defaulting co-venturers the right to "step-in" to remedy the Defaulting Party's default and (iv) if the Defaulting Party does not remedy its default after a period of time, it can be compelled to withdraw from the JOA. A well-drafted JOA is set up to allow a Defaulting Party to be excluded swiftly and its interest to ultimately be acquired by the continuing co-venturers, which allows the joint venture to continue operations in such a way as to ensure that the underlying obligations of the joint venture to third parties, for example under the Petroleum Contract, will be performed. The risk to the non-Defaulting Parties is that any failure of the remedies mechanism to work can result in losses and liabilities for all parties under the JOA.

> "We ask our clients to undertake risk scenario planning in relation to default risk, particularly important in the current climate."

Steps to mitigate the risk

We assist our clients, whether government or co-venturers, to undertake and maintain risk scenario planning in relation to default risk, particularly important in the current climate of uncertainty around COVID-19 and the oil price. This is the case not just in the Middle East but for our clients globally. What does this involve?

- Understand your rights under your Petroleum Contract, JOA and related contracts in relation to counterparty breach. What is 'Force Majeure' and what is not? Understand the contractual Domino effect – what are your rights, remedies, responsibilities and liabilities under related contracts (for example the Production Contract) if there is a defaulting co-venturer under the JOA? Ideally, related contracts will approach a particular default event consistently – but this is not always the case, particularly where relevant documents are historic, where there have been many iterations of relevant contracts or model form contracts were adopted without regard to the particular project specifics.
- Define the most likely default scenarios and work through how the contract suite will apply.
- Note time limits and forms of document which may be required to enable rights to be exercised and claims to be lodged. Ensure pre-default procedures are properly followed and documented – for example cash call procedures.
- Don't unwittingly waive your rights – often in these situations a two-pronged approach is followed – negotiations to seek a pragmatic commercial resolution to the default – but ensuring that meanwhile all legal rights are reserved through a "standstill" agreement.
- Understand whether the contractual dispute process will help or hinder – is it clear? Does it work? Will it be neutral? Can its determination or judgment be enforced? Therefore is it a process upon which you would wish to rely?
- Particularly for a large international oil company or government hosting and investing in a wide range of projects domestically and overseas, make sure you are communicating effectively internally. Do you have business relationships with the defaulting party elsewhere? How will they be affected? Will your public reputation be adversely affected by the actions you take? Within your organisation, who has the understanding and authority to make sometimes necessarily swift decisions on sometimes conflicting interests within your organisation?

We are seeing in the oil and gas industry a huge focus on discretionary spend and how this can be reduced. The resource needed to fulfil this exercise should be considered a necessary response to the environment we are in. Legal technology can be used to lessen the burden of this task and to integrate it within your organisation – this technology is available in the region, and Pinsent Masons has been at the forefront of developing and applying it. ■

George Booth is a senior international energy partner at Pinsent Masons, based in Dubai and London, and Chelsey Ross is an Aberdeen and Glasgow-based solicitor specialising in energy.

The endless possibilities of hydrogen

Pierre-Étienne Franc, VP of Air Liquide and Hydrogen Council Secretary, and Olivier Randet, VP of Middle East and India, Air Liquide discuss the critical role hydrogen can play in the energy transition, and how Air Liquide is helping to scale up the deployment of this clean and versatile fuel.

THE TIME IS ripe to exploit the full potential of hydrogen and enable it to play a key role in the transition to a clean energy system, says Pierre-Étienne Franc, explaining that a number of factors are converging to create favourable conditions for its development.

"First, the climate change debate has significantly moved on, with public opinion appreciating the urgency of reducing emissions, which is increasing the focus on the issues and solutions.

"Secondly, now that renewable energy is developing fast, and is reaching competitive costs, it is unleashing the ability to move on to other topics and decarbonise what we call the 'hard to abate' sectors, mainly transportation industries and district heating. Those topics are reviving the efficacy of hydrogen as a vector in the energy transition.

"In order to decarbonise these hard to abate sectors such as transportation and heavy industry, or fossil fuel consumers such as steel, cement and petrochemicals, they will have to shift from their intensive use of fossil fuels to decarbonised fuels. There are limited ways of doing this. Either you can electrify your process, or alternatively use either hydrogen or synthetic fuels as a fuel. So, hydrogen is needed, whichever way we look at it, for decarbonising hard to abate sectors.

"In the case of decarbonising and electrifying transportation – such as cars, buses, trucks and maritime applications – the best vector for electrification using the same type of autonomy as a traditional car, with the same refuelling time as a traditional car, is by using hydrogen in the fuel cell," he continues.

> "The pressure on the fossil fuel-based countries to decarbonise is making them look at alternative ways of valuing their fossil fuels."

Image Credit: Air Liquide

Pierre-Étienne Franc (left) and Olivier Randet (right), Air Liquide

Another important use for hydrogen is as a vector to transport energy from one place to another in a clean way, which is particularly relevant for the Middle East countries, which have the potential to become strong surplus producers of renewable energy.

"At the same time, the pressure on the fossil-fuel based countries to decarbonise is making them look at alternative ways of valuing their fossil fuels. One of the best ways to solve this is carbon capture and storage (CCS), exporting only the hydrogen part," adds Franc. Hydrogen can be produced from hydrocarbons with low emissions profiles when coupled with CCS.

"So, because of the dynamic of public opinion on climate change, because of the progress of renewables, enabling hydrogen to be produced at a more competitive cost, and the need now to focus on the hard to abate sectors, hydrogen is back on the agenda."

Added to this is the huge progress made in the technology over the last 20 years and the deployments seen today globally, which have changed the dynamic.

"Today we have 15,000 cars up and running, 30,000 forklifts, more than 100 projects to capture renewable energy and manufacture hydrogen using electrolysis at scale, huge infrastructure initiatives to enable the transport industry to progress, and huge carbon capture storage projects in the northern parts of Europe and elsewhere which will turn a fossil fuel economy into a hydrogen economy," says Franc. "The technology is reliable and safe. It needs new investments to scale up and become more competitive compared to traditional technologies, but it's the way forward and about to become a reality."

Tackling the challenges

So, what are the main challenges in doing this?

"The first, as with all energy operations, is to ensure that all stages of hydrogen production are safe, and that the safe use of hydrogen is maintained throughout its deployment," stresses Franc.

The second, he says, is to make the generation of hydrogen from low-carbon energy cost competitive compared with the traditional way of generating hydrogen (which involves breaking natural gas into hydrogen and carbon) to enable hydrogen to play an effective role in the energy transition.

"That's why we need to scale projects in many cases, and policy support is needed to make sure the cost premium is shared between public, industry, and consumer. This is what we are doing at Air Liquide in Canada, by building the largest PEM (Proton-Exchange Membrane) electrolyzer in the world with a 20 megawatts (MW) capacity for the production of carbon-free hydrogen.

"The third challenge is to bring that competitiveness not only to the clean production of hydrogen, but to the whole value chain, reducing distribution and infrastructure costs so it can become profitable. We have a couple of ongoing initiatives:

"First, a captive fleet model, as a way to load your infrastructure faster, e.g. taxis, commercial vehicles, trucks. We are supporting a large taxi fleet initiative in Paris, with more than 100 hydrogen vehicles which we are planning to grow to 600 by 2021. That model provides a way to simultaneously grow the fleet and the station with concerted load and ramp up use to make it profitable.

"The second way is to develop joint ventures or consortia between industrial players who can share the risks of the early stage infrastructure investment. In Germany we're part of a consortium of six players, with Shell, Total, Linde, Daimler and OMV, where there are already almost 90 stations. We are doing the same in Japan and Korea, and are part of a similar initiative in California, where we are co-investors in a start-up, First Element Fuel, which is developing a network. This is where most of the development has taken place in the last couple of years.

"The third approach is to move one step further by fostering the development of infrastructure funds and having the policy makers bring together financial tools to enable the risk sharing of the infrastructure business. One of the first examples of this is the advisory agreement the Hydrogen Council and the European Investment Bank have signed to address climate change, in December 2019.

"If we manage to multiply and promote such initiatives, we will be able to make the vision of deploying hydrogen at scale a reality."

> "The key motto is scale, scale, scale."

Looking ahead

Franc notes that a recent Hydrogen Council report sets out what needs to be done in the next 10 years to ensure hydrogen solutions can deliver cost competitiveness compared to other clean tech alternatives within a decade in more than 20 key applications. *'Path to Hydrogen Competitiveness: A Cost Perspective'* shows that the cost of hydrogen solutions is projected to fall more significantly and rapidly than previously expected.

"The key motto is scale, scale, scale," Franc stresses. "Now that the technology is ready, what we need is the scale to reduce the cost. This is fundamental for the Middle East, because if the region wants to change the way it contributes to world energy, it needs to shift from carbon supplier to hydrogen supplier. It needs to be able to make that work, and for the importing countries to have built up the necessary hydrogen demand so the Middle East can export energy in the form of hydrogen. That's the shift we're going to see in the next 10 years – and that's also where Air Liquide has a role to play in the Middle East."

How does Franc envisage the technology developing in the future?

"First, electrolysis technology needs to make progress to capture all the potential of cheap renewable energy and ensure hydrogen is produced in a low-carbon way.

"Second, we expect fuel cell technology, which is used for transportation, to rapidly deliver cost expectations with volume, so we expect more improvement in the manufacturing than in the technology itself.

"We might also see some new developments related to the petrochemicals circular economy concept, when we combine carbon and hydrogen into synthetic fuels, which are critical to the petrochemicals industry, in a competitive and energy-efficient way. That's a topic that's going to exercise many minds in the coming decade." ■

All about hydrogen

- The most abundant chemical element in the universe
- Can be produced by various technical processes and from a wide range of primary energy sources, including renewables ('green hydrogen'), nuclear and fossil fuels
- Can be produced from low-carbon electricity by using electrolysers, which split water into hydrogen and oxygen using electrical energy
- Can be produced with low emissions profiles from hydrocarbons when coupled with carbon capture and storage ('blue hydrogen')
- Mainly produced today from natural gas using steam reforming
- Light, storable and energy-dense
- Can be transported as a gas or in liquid form
- Generates no emissions of pollutants or greenhouse gases at point of use
- Can store the variable output from renewables to mitigate fluctuations in demand and can transport energy from renewables over long distances
- Can be transformed into electricity and methane to power homes and feed industry, and into fuels for cars, trucks, shipping, aviation, the iron and steel and chemical industries
- Currently mainly used in the oil refining and chemicals sectors
- Can help decarbonise a range of sectors including transport, aviation, heating and industrial processes such as steel and cement making
- Could meet 18 per cent of the world's final energy demand, prevent 6 Gt of CO_2 emissions and create a US$2.5 trillion market for hydrogen and fuel equipment by 2050 (Hydrogen Council)

Hydrogen technology is developing fast.

Image Credit: Adobe Stock

Air Liquide in Saudi Arabia

AIR LIQUIDE PLAYS a key role In Saudi Arabia and the Middle East. It is the market leader in hydrogen in Saudi Arabia through Air Liquide Arabia (ALAR), a joint venture with Saudi Arabia's TAQA. It operates a large hydrogen production unit using natural gas and other feedstock, supplying hydrogen to refineries and other industries.

Satisfying localisation requirements is very important to the company, stresses Olivier Randet, saying that the company has a Saudisation rate of 62 per cent and all its site managers are Saudis. ALAR plays a key role in local content initiatives, driving the growth of new industries and helping to promote the local supply chain in line with the Kingdom's Vision 2030.

"We've invested more than US$100mn and also invested in two hydrogen grids, one in Yanbu, where we have the bulk of our hydrogen production, and another in Jubail. With those grids you can connect users and consumers, which is a perfect way to optimise and reduce carbon emissions to the minimum," says Randet. The hydrogen infrastructure significantly contributes to Saudi Arabia's downstream investments and localisation drive.

"Saudi Arabia, with its huge oil and gas footprint, is a huge consumer of hydrogen today, mainly because of its strong refinery base and the important role which hydrogen plays in the refining process; refineries use it to refine fuels such as gasoline and GSL and remove contaminants such as sulphur," Randet explains, adding that the demand for hydrogen is set to increase as a result of the IMO 2020 regulation which came into force on 1 January, reducing the level of sulphur permitted in maritime fuel.

"This is driving further hydrogen treatment for what refineries call 'bottom of the barrel' and will trigger additional investment in hydrogen production. There is demand from other industries too.

> "Saudi Arabia is a huge consumer of hydrogen, mainly because of its strong refinery base."

"This requirement for hydrogen creates a production base which can be a key element of the hydrogen energy cycle," he continues. "The petrochemicals industry generates offgases from processes which are rich in hydrogen. You can easily capture hydrogen from the offgases and recirculate them in the global energy cycle, and we have the technology for that."

Randet highlights the potential opportunities arising from the futuristic NEOM mega-city project in north-western Saudi Arabia, which will be fully powered by renewable energy and where hydrogen will be one of the key energy vectors. He notes that the Kingdom is also very proactive regarding the circular carbon/hydrogen economy.

"We have a set-up which is a strong enabler regarding climate change. We see a lot of opportunities arising, ways to innovate, ways to bring more digital-managed operations, and ways to align with the circular economy which the Kingdom is pushing, and we are a key element of this.

"So, there is no question about the huge potential for the development of hydrogen in the Kingdom of Saudi Arabia," Randet concludes.

Image Credit: Air Liquide

The ALAR hydrogen production site at Yanbu.

Increased refinery activity can be a catalyst for growth in the metering market.

Image Credit : Adobe Stock

Flow rate measurement goes digital

Modern operators need to maximise recovery while continuing to lower operational costs – and reliable digital technology has become more important than ever to meet these goals. Flow rate measurements are vital for reservoir management and maximising recovery.

MULTIPHASE AND WET gas flow metering technologies, plus leveraging the Industrial Internet of Things (IIoT) are critical to meet modern demands. And it is indeed a growing market with the global flow meter market size projected to be worth US$12.3bn by 2027, a CAGR of 5.8 per cent over the next seven years.

While these technologies have been commercially available for a couple of decades, the changing operational environments and evolving digital paradigms have become more important than ever for operators. In 2019, the magnetic segment accounted for the largest share of the global flow meters market.

The penetration of IIoT has helped the evolution of smart flow rate measurement solutions, leading to an increased demand for intelligent flow meters.

Traditional separators provide dual functionality of gravitational phase separation and then measurement of separated single-phase flow. Multiphase flow measurement devices cut phase separation, expanding the options available to the operator to optimise OPEX while maximising recovery via high-frequency measurements. Multiphase and wet gas meters, as well as virtual meters, have been used for reservoir and process management, regulatory reporting, allocation, and custody transfer. These devices are compact, convenient to deploy, provide real-time measurement, and are relatively low maintenance. Smart meters provide real-time measurement that meshes well with surface and downhole streams of pressure, temperature, vibrations.

> “Factors such as increased industrialisation and buoyant refinery activity could help boost the meter market in the Middle East.”

Coriolis meters, meanwhile, enhance the reliability, accuracy, and efficiency of liquid flow rate measurement. Furthermore, the integration of IoT in flow rate measurement solutions has helped transform Coriolis meters into intelligent flow meters. The adoption of these meters is expected to grow significantly in the coming years. Extensive adoption of Coriolis flow meters by the oil and gas, chemical, and refinery sectors is projected to drive the growth of the overall product segment until 2027.

While India and the Asia-Pacific regions are expected to show the highest growth in the smart meter markets in the years ahead, factors which also apply to parts of the Middle East, such as increased industrialisation and buoyant refinery activity, could help boost this important market across the continent as well. ■

Benefits of automating gas lift optimisation

Adopting a machine learning approach to automating your gas lift production will save you time and money, says Venkat Putcha, P.E. PhD, senior data scientist at OspreyData.

MOST OPERATORS CAN agree that optimising gas lift is important for determining the best setpoints, maximising production and minimising costs.

The objective of gas lift optimisation is maximising the current output from a well by addressing the relationship between oil production rate and gas injection rate. The key parameter describing this relationship is the marginal increment in oil production rate per unit change in the gas lift injection rate.

Automating gas lift optimisation has many benefits. When considering machine learning approaches, there are too many wells and too few engineers to constantly monitor, analyse, update and evaluate the gas injection rate to establish optimal lift performance. A typical simulation model development followed by parametric analysis to decide a gas injection rate may potentially require close to half a day of work for a qualified engineer. This is due to the efforts in collection of sensor data, completion and lift design data, reservoir, and fluid properties, decision making to select the range, distribution and granularity of modelling parameters, history matching or validation, and deciding the gas injection set-point value.

In the case of unconventional wells, the static bottom hole pressure (SBHP) and productivity index are transitioning and difficult to measure. Hence, extreme discretion is required to perform deterministic nodal analysis. We contend that a probabilistic approach which learns from the history of the well using inverse modelling offers a more reliable solution.

Updating the operating gas lift set-point is required several times over the life of the well. This can be due to natural effects such as decline, or due to intervention such as restimulation or workover. Accounting for these factors, the work hours invested can be around 7-10 days per engineer per well annually for human-driven simulation analysis. For a 100-well field, this translates to approximately two to three engineering years. With the high volume of wells, it becomes unlikely for production engineers and well managers to undergo this intensive process on a proactive and regular basis.

Adopting a machine learning approach to automating gas lift production can bring many benefits.

Image Credit: Adobe Stock

This leads to a state where the optimisation process is performed infrequently, losing out on production, or injection gas, or both. Rules of thumb based on the experience of personnel can often dominate the decision making. Such an approach can be subjective to the level of diligence of the individuals managing the wells, who need to astutely evaluate if the conditions under which the rules of thumb were formulated continue to hold. In order to provide a solution which scales up to the challenges of such a problem, automation is necessary.

> “Operators can proactively reallocate excess gas to starving wells.”

Adopting a machine learning approach to automate your gas lift production will save you both time and money.

Proactive and consistent recommendations

The first benefit is that automation will provide proactive and scientifically consistent recommendations. This ensures that the well produces at its maximum economic potential, possibly minimising lease operating expenses, at least from the gas lift injection rate perspective. Operators can proactively reallocate excess gas to starving wells, catching changes in the well as they happen and before they become glaringly obvious problems. Engineers, operators and managers can avoid surprises, like those that occur when step rate test results and monthly added production rates do not align. Since the application is ensuring that the well is being evaluated in its longest normal state, the likelihood the model’s evaluation of a set point change translates into cumulative numbers is high.

Automate nodal analysis field-wide

The next benefit is that nodal analysis is automated. Inputs are automatically ingested and unknowns are learned from history matching. Ultimately, it eliminates the guesswork that operators and engineers used to have to do. The three biggest challenges for the engineer are the changes in wells, the uncertainty of down-hole parameters and the time required to develop and analyse simulations. To rigorously go through data input, nodal analysis, parametric analysis, history matching, to provide a set point recommendation is an activity which may be taking a lot of time and decision making for the engineer. Automated simulation saves time for the engineer, inverse modelling helps provide a better understanding of the down-hole conditions and modelling inputs which may be tough to measure or estimate.

Optimise hands free

Thirdly, automating gas lift optimisation can be done while using a hands-free, scalable, self-updating application. Many production engineers have dreamed of something like this. If engineers are asked to perform data input, which includes nodal analysis and manual gas injection recommendations on 300+ wells with say a team of five engineers and 20 operators, most engineers would tend to go for an approximate solution rather than spend several weeks on rigorously performing nodal analysis.

Engineers and operators have a lot of other decisions to make and operations to perform such as planning and executing frac jobs on new wells, re-stimulation, work-overs and maintenance jobs on old wells, and deciding when to switch the lift type of the well. Knowing that the job of set point recommendation has been taken care of across the field provides the time for activities which may arguably be higher on their priority list. Knowing that the machine learning model self-updates itself gives the engineer confidence that the model is going to adapt to the changes in the well. Most importantly, knowing that gas injection optimisation has been taken care of and down-hole parameters have been estimated, better data is available for planning successful re-stimulation jobs which can multiply the production rate of a well. ■

Automation can free up time for engineers and operators to spend on other tasks.

Image Credit: Adobe Stock

OspreyData is a leader in helping oil & gas upstream firms improve operations and raise profitability by leveraging the digital oilfield. Its Production Intelligence Solutions empower both operators and engineers with a unified monitoring tool and advanced analytics to optimise wells and find operational issues faster. For further information about the benefits of Gas Lift Optimisation with the company's Production Intelligence solutions, see https://www.ospreydata.com.

Remote work technology sees growth as a result of COVID-19

RYSTAD ENERGY ANALYSIS of service companies' earnings calls reveals a clear growth in cost-saving remote work technologies.

Given the limited options of low-hanging cost savings in the current downturn, operators and suppliers are looking towards digital technologies to realise cost efficiencies, Rystad says. For operators whose cash balances are not under short-term strain, the low oil-price environment is an ideal testing ground for new technologies, as the opportunity costs of implementing these are lower.

"Despite being positive news for suppliers offering digital technologies, spending by operators may have been accelerated as a result of COVID-19 instead of actual business needs. Growth seems to have mostly centred around remote work, while technologies focusing on optimisation of drilling and production seem to have hit some speed bumps," said Daniel Holmedal, energy service analyst at Rystad Energy.

Despite recent market events that have forced operators and suppliers to turn their focus towards cash conservation, development on this digital revolution still seems to be relatively robust, Rystad notes. Both Schlumberger and Halliburton noted in their earnings calls for the first quarter of 2020 that the current downturn could accelerate the adoption of digital technologies. This is especially true for technologies that enable remote operations, which remains an area where great cost efficiencies could be realised.

COVID-19 has already accelerated remote operations due to the movement restrictions imposed in many countries to limit the outbreak. Schlumberger recently deployed its DELFI platform for Woodside so that the operators' asset team and geoscientists could have full access to their data while working from home.

Schlumberger, in its first quarter earnings call, underlined intentions of doubling down its digital strategy in the years ahead, with more than 60 per cent of the oilfield services company's drilling operations in March being conducted remotely. At a more general level, COVID-19 has also paved the path for key decision makers to get more first-hand experience with digital tools. This could eventually increase their willingness to fully buy in on the digital revolution in other parts of their companies.

Halliburton, similarly, noted during its first-quarter earnings call that demand for cloud infrastructure services saw an uptick in April 2020. In late February, Halliburton helped Pertamina deploy a large portion of its processes and applications to the iEnergy cloud, which has allowed for well data to be structured and analysed to improve drilling performance, increase production and allow for better data-driven decisions along the well life-cycle.

National Oilwell Varco (NOV), one of the largest suppliers within the drilling tools and services segment, also reported updates on its digital technologies in the latest earnings call. Using its TrackerVision augmented reality technology, which streams real-time audio and video, NOV is able to provide instructions on rig repairs remotely.

Intelligent process automation for oil & gas

Burley Kawasaki, chief product officer at K2, discusses how intelligent process automation can address operational efficiencies in oil and gas.

IN MANY COMPANIES, a large chunk of time is wasted on manual, repetitive work. This is not only soul-crushing for employees, but also incredibly counter-productive. On average, the hours devoted to routine, data-intensive tasks represents a loss of up to 19 working days annually per employee. Beyond that lost time, which could be redirected to more worthwhile work, this outdated approach also impacts finances. Operational inefficiencies end up costing companies 20 to 30 per cent of their revenue every year.

Furthermore, it is difficult for many of these manual processes to operate efficiently in a virtual workplace – as many businesses are discovering, their existing processes are under new strains due to the impact of the global COVID-19 pandemic, which requires a whole new way to approach completing work with customers and partners.

Fortunately, with so many digital technologies within reach today, it is possible for enterprises to drive improvements and become more productive – and at the same time work virtually. By using market-ready digital solutions to automate manual processes and modernise operations, these companies can give time back to skilled employees, and add value to their bottom line.

> “Existing processes are under new strains due to the impact of the COVID-19 pandemic.”

A new lens on oil & gas digital transformation

There are a number of ways for businesses to accelerate digital transformation and eliminate costly, error-prone processes. A modern approach is intelligent process automation.

This is not a specific technology in itself, but rather a strategy that combines multiple technologies to improve performance and profitability. There’s the saying “If you’re a hammer, everything looks like a nail.” That’s the situation with digital, where every vendor claims to be the one size fits all solution. However, keep in mind each element of your digital strategy provides different benefits – don’t pick just one tool. You may need a hammer, but you may also need a saw or a drill or a crowbar – use all of the tools in the toolbox for their appropriate use and it will help you reach the outcome you are trying to achieve. Think holistically about your digital transformation roadmap and look at the range of technologies you need and the right approach to phasing in the digitisation of your processes.

Image Credit : Adobe Stock

Intelligent automation could help companies navigate the rapid change that will characterise the energy sector going forward.

When it is done well, intelligent process automation can unlock many new opportunities for process transformation. Below are some of the tools and techniques that are often included in the intelligent automation environment.

Process extraction and mining

Historically the challenge facing business process initiatives was defining or discovering the process; this often required lengthy consulting and business process documentation to produce an understanding of the current process. To more quickly understand the current process state and identify opportunities for optimisation, businesses could look to leverage process mining or process extraction tools, which can offer objective, fact-based insights derived from actual event logs.

Armed with this process intelligence, companies can audit, analyse and fine-tune existing business processes and look for opportunities to re-imagine using digital approaches. They could, for example, identify process steps that could be eliminated or optimised through automation, artificial intelligence (AI) and other solutions.

Phased digital process automation

With all the noise related to digital transformation, it can be daunting for business leaders to determine what is the right approach and technology to use for process automation. Sometimes the uncertainty and risks may lead to analysis

paralysis and hesitation on getting started at all. However, that is the wrong approach, as there are some compelling business benefits to realise from taking action; using digital can help companies respond more rapidly to change. But it's important for businesses to start with a clear understanding of what outcomes they are looking to achieve.

They need to build a phased roadmap, with an understanding of the right phases of technologies and how to align resources, people and process changes around those technologies. Digital transformation is ultimately achieved by first having a complete roadmap around what your organisation is looking to achieve, but taking agile, incremental steps to deliver against that vision.

Machine learning / Artificial Intelligence

Machine learning (ML) is a subset of artificial intelligence (AI) that involves software algorithms that can 'learn' from data to identify patterns and make predictions, without being explicitly programmed to reach these specific conclusions. You could, for example, use this intelligence to monitor operations and better detect risks or opportunities. Alternatively, you could leverage predictive analytics to test new exploration options and assess the potential environmental impacts of new projects before these are launched.

However it is not about completely removing people from a process, given the need for tapping into subject-matter expertise and being able to make very agile decisions in the face of uncertainty.

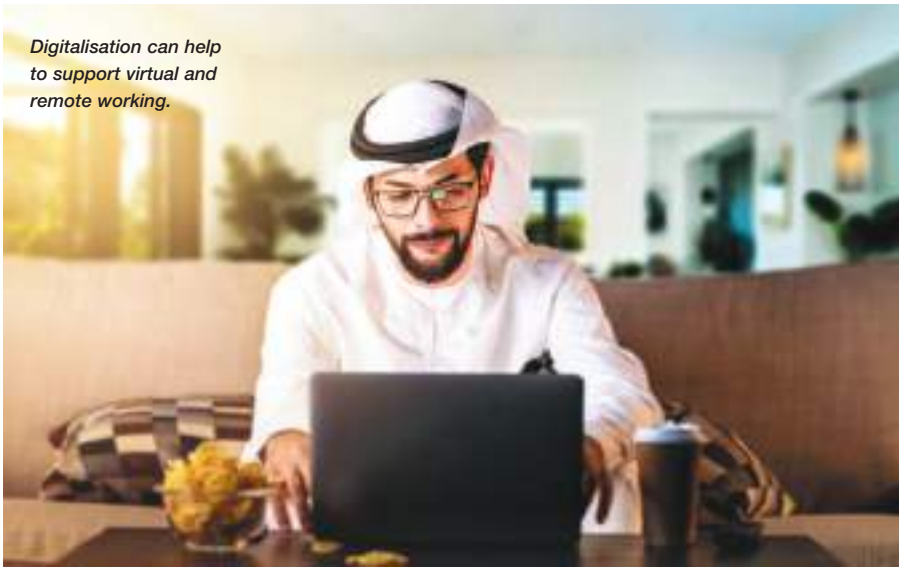
Instead, the right approach is usually using ML and AI to assist the process and free up humans from low-value and repetitive tasks so that they can focus on the high value and high-impact activities. An intelligent process automation strategy will use process models and cutting-edge ML to streamline the flow of work between humans, bots and systems to deliver revenue growth, enhance customer experience and lower operating costs.

When these types of technologies work cohesively, companies can digitise end-to-end processes on one platform or dashboard to provide multiple business benefits.

> "The pandemic has accelerated the need to be abe to have teams work virtually and support a remote workforce."

Prepare for audit and compliance checks

Running processes digitally has many advantages in tightly regulated industries, like Oil & Gas. When every action by technology or human user is logged in the technology framework, processes can be easily audited for inconsistencies. This helps to flag processes that are out of compliance. It can also provide evidence that processes have been executed in line with certain requirements, should this ever be required by internal or external auditors or regulatory authorities. If you need to prove that safety-related checks were completed, for instance, you have the evidence at hand.



Digitalisation can help to support virtual and remote working.

Image Credit: Adobe Stock

Virtual and remote working

The current global pandemic has accelerated the need to be able to have teams work virtually and support a remote workforce. This has been a trend for some time, but it is being accelerated given the current environment. We see digital transformation as a catalyst for enabling this change, allowing businesses to work virtually by replacing manual tasks or paper forms with newer digital processes; it can also enable employees to upskill and focus on more strategic, meaningful ways, as opposed to wading around in mundane, repetitive tasks that may require working in a traditional office environment.

Connecting across functional silos

Digital transformation hinges on tearing down data silos and creating a more complete view of what is happening enterprise-wide from which new intelligence can be used to drive more effective decision-making. If there isn't a way to connect the data in a meaningful way, businesses will find that their existing systems may not be able to meet customer's latest expectations around a modern digital experience.

Modern digital front-ends like mobile, modern websites or voice are powerful experiences but are simply the "tip of the iceberg"; what is below the waterline is often not seamless, and exposes the fact that the processes behind the digital front-end are still often manual, non-integrated and reflect sometimes batch processes. Studies estimate that 70-80 per cent of the processes that businesses rely on are still manual, with documents often being shared via email. It is important to continue to digitise the full business process, otherwise the customer front-end experience won't measure up.

Deliver a return on investment

Making technology investments to enhance processes and productivity can take time and money. However, with the right strategy and tools in place, the return on investment is clear.

With an intelligent process automation framework in place, businesses can access, visualise and act on data to accelerate digital business transformation enterprise-wide. In order to gain optimum ROI, users should continuously adapt their business processes to accelerate performance improvements and deliver better outcomes.

Importantly, large corporations aren't the only entities that can benefit from the technologies that work together to power intelligent automation. Recent innovations have made many of these solutions suitable for mid-size companies as well.

Despite the high frequency of operational inefficiencies at most large and mid-size enterprises, businesses now have a range of options to improve their systems and processes. Intelligent process automation, which combines a range of different technical capabilities, offers businesses the right solutions to help them drive needed enhancements in order to further productivity. ■

K2 is a leader in process automation. For further information about K2's process automation platform see https://www.k2.com/solutions/process-automation-oil-gas.

Upwing Energy wins award for Subsurface Compressor System

UPWING ENERGY, AN artificial lift technology company, has won the OTC Spotlight on New Technology Award for its Subsurface Compressor System.

Upwing's SCS is the only downhole turbomachinery that can maximise gas and condensate production, recoverable reserves, gas-in-place recovery efficiency and liquid unloading at the same time, according to the company. All of these benefits can be realised in any type of formation and wellbore geometry in both the onshore and offshore environments.

"We are honoured to be recognised by the Offshore Technology Conference for our Subsurface Compressor System," said Herman Artinian, president and CEO of Upwing Energy. "Existing gas assets are maturing at a rapid pace, and Upwing's SCS will play an important role in both the technical and commercial success of the artificial lift of those assets. We greatly appreciate the support received from the industry thus far in trialling and commercialising this innovative and enabling technology."

The SCS increases gas production and recoverable reserves by decreasing bottom hole flowing pressure and causing higher reservoir drawdown. It also carries liquids to the surface by creating higher gas velocities throughout the vertical and horizontal wellbores and prevents vapour condensation by increasing the temperature of the gas when exiting the compressor.

The subsurface compressor consists of two main components – a high-speed hermetically sealed permanent magnet motor with magnetic bearings and a hybrid wet gas compressor. These two components are coupled by a magnetic coupling that conveys torque from the hermetically sealed motor to the compressor with no mechanical shaft or seals, so there is no need for a motor protector to isolate the motor from downhole fluids. The topside variable frequency drive controls the motor at high speeds without any speed sensors. The SCS significantly reduces intervention costs when compared to alternatives for enhancing gas production.

Image credit: Upwing Energy

The Subsurface Compressor System.

Vaisala unveils high-end industrial Indigo transmitter

VAISALA, A GLOBAL leader in weather, environmental, and industrial measurements,has launched the Indigo 520 transmitter, designed for demanding industrial applications.

"The Indigo compatible products are the premium choice for providing high-quality data from a multitude of industrial processes. The new transmitter has what it takes to perform even in the harshest and most extreme industrial environments," said Vaisala's product manager Jarkko Ruonala.

"Industrial systems depend heavily on reliable sensors. The data must not only be accurate and reliable, it also needs to be easily accessible and clearly visualised. This way, users can base their decisions on the best possible data, which is where the new Indigo 520 excels," Ruonala said.

The Indigo 520 is a durable metal transmitter, compatible with Vaisala's comprehensive range of Indigo compatible smart probes for humidity, temperature, dew point, carbon dioxide, vapourised hydrogen peroxide, and moisture in oil measurements. It can accommodate up to two detachable measurement probes simultaneously, measuring the same, or different, parameters at the same time. The probes can be swapped quickly and easily whenever needed. The transmitter has an IP66- and NEMA 4-rated robust metal enclosure, and a touchscreen display made of hardened glass.

The Indigo 520 transmitter displays live measurements and transmits them to automation systems through analog signals and relays, or digitally using Modbus TCP/IP protocol over the Ethernet. The transmitter's Ethernet connection also provides a web interface and cybersecurity that meets modern standards.

UK patent for industry-first mechanical DPS

A UK PATENT has been granted for a new technology from Deep Casing Tools, which can almost half the cost for extended reach drilling (ERD) well liner installations, according to the company. Patents are also pending in Europe, the USA, Canada, UAE and Saudi Arabia.

Deep Casing Tool's (DCT) MechLOK Drill Pipe Swivel (DPS) helps overcome ERD challenges by allowing operators to deploy completions into longer and more complex well trajectories.

Image credit: Deep Casing Tools

The MechLok DPS.

As operators search for oil in new, complex areas, advanced technology is needed to combat several common difficulties associated with ERD, including high drag and torque.

The MechLOK DPS can be run on any string where potential problems exist in reaching Target Depth (TD) because of frictional issues, typically in long, horizontal extended reach drilling.

It enables the rotation of the drill pipe above the liner in an ERD well, reducing drag, redistributing friction and mitigating helical buckling of the work-string. It also increases the available weight to push completions and liners to TD in ERD wells.

The MechLOK DPS can be instantly locked using a mechanical manipulation of the drill-string. Once locked, the tool can be rotated to the right or left, in compression or in tension.

"DCT's business is providing unique technology for our global customers and this is another example of a simple innovation which will make their operations safer while saving time and money," said CEO David Stephenson.

"We have already demonstrated that compared to conventional technology the time taken to reach TD safely on the first attempt can be cut by half, which would typically mean a US$450,000 saving in running a completion or liner in."

The MechLOK Swivel reduces the need for heavyweight drill pipe collars and protects items from potentially harmful torque. The capability to immediately lock enables the mechanical release of setting tools, when required, and eliminates the need for drop ball and hydraulic concerns.

WFS bags two Spotlight on New Technology Awards from OTC

GLOBAL SUBSEA WIRELESS and digitalisation specialist WFS Technologies has received two Spotlight on New Technology Awards from the Offshore Technology Conference (OTC).

WFS won the Small Business Spotlight on New Technology Award for both its Seatooth SmartClamp and its Subsea Cloud Computing Network innovations.

Moray Melhuish, commercial director at WFS, said, "Wireless, digital technology is recognised more than ever as crucial to helping the offshore energy industry minimise the cost of ownership while improving safety, reducing the risk of environmental incidents and driving down its carbon footprint.

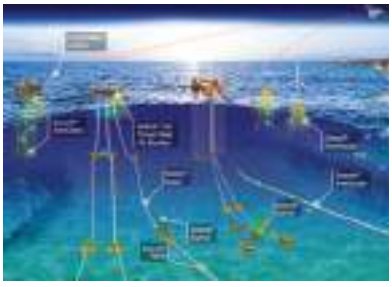


Image credit: WFS Technologies

WFS Technologies' award-winning Subsea Cloud Computing Network.

"The OTC awards are therefore a huge testament to the team at WFS who, through their vision and tireless efforts, have developed disruptive technology that is having a such a positive impact on the industry round the globe."

WFS' Seatooth SmartClamp is a smart, wireless Structural Monitoring System (SMS) for use on subsea structures. It incorporates the Seatooth wireless data processing and transmission platform offering short, medium and long-range hybrid communication options. As a result, the tool includes strain, vibration, pressure and temperature monitoring.

Seatooth technology enables the automation and digitalisation of subsea assets through its ability to communicate through steel, ground, sea water and the water-air boundary, and performs a major role in tackling the real-time monitoring of offshore assets and production both above and below surface.

The company's Subsea Cloud Computing Network (SCCN) is a system-of-systems which enable the most advanced data techniques to be used to optimise subsea operations. As a result, the SCCN reduces both operating and asset integrity management costs.

Sonardyne Fusion 2 software update for better offshore survey and construction

UNDERWATER POSITIONING SPECIALIST Sonardyne International has increased the capabilities of its Fusion 2 software package to enable surveyors and construction personnel to do even more, both on and offshore, with their existing hardware.

This latest release of Fusion 2 unlocks new benefits, including a simplified surface box-in app and the ability to perform wireless structure deflection monitoring, without having to deploy specialist hardware. Additionally, Fusion 2 now includes 'office' mode as standard, allowing project teams to plan and fine tune procedures before doing them for real offshore. Multi-user mode now comes as standard when using Sonardyne's Compatt 6+ transponder arrays, bringing the savings of simultaneous operations to all users.

Image credit: Sonardyne

Simplified surface box-in is one of the additional benefits Fusion 2 now provides to offshore surveyors.

With just a single cable connection from the vessel's USBL system to Fusion 2, operators will be able to run seamless real-time box-in operations.

Proteus offers new business operating models

XERGY HAS LAUNCHED a new digital platform Proteus after a successful Beta trial with a dozen companies. Proteus is a cloud-based operating system that can transform the way in which businesses source and use talent to resource and deliver projects.

By connecting companies with the talent they need, as and when they need it, and making remote working as effective as being in the office, Proteus removes utilisation waste, reduces overheads and increases productivity. The developers claim that Proteus can increase profits by as much as 30 per cent.

"With the vast majority of the world's workforce working from home in recent months, the COVID-19 crisis has demonstrated that remote working is possible. Proteus can now make permanent remote working highly profitable," explained Colin Manson, the energy entrepreneur behind the product. "The COVID-19 crisis has forced us into remote working and, as a result, there is going to be a fundamental shift in working culture moving forward."

To support businesses in the current climate, Proteus is being offered free to all users from now until the end of July.

OleumTech presents Smart Pressure Transmitters

OLEUMTECH, A PROVIDER of wireless industrial automation and IoT solutions, has announced the addition of HGPT Smart Gauge Pressure Transmitters to its fast-growing H Series line of hardwired process instrumentation. The new OleumTech H Series Smart Pressure Transmitters (PTs) can deliver better performance, reliability, and accuracy that is suitable for industrial markets including petrochemical, chemical, power, upstream oil & gas, and wastewater. The Smart PTs will be offered in both backlit-LCD and non-LCD display models with a variety of nominal pressure range options. Users will have the option to choose the output signal type: 4-20 mA, 4-20 mA/HART, or RS485 Modbus. All models carry the Explosion-Proof rating, while the 4-20 mA/HART model can be ordered with the optional Intrinsically Safe rating. Configuring the transmitter is effortless with a simple, easy to navigate and edit LCD menu system for quickly performing pressure calibrations and dialing in the desired parameters.

Image credit: OleumTech

The HGPT Smart Gauge Pressure Transmitters are available now with an LCD display.

"The HGPT Smart Pressure Transmitters are feature-rich in terms of ease-of-use, while delivering the high accuracy, stability, and reliability our customers demand," said Brent McAdams, OleumTech senior vice-president of Global Strategic Initiatives.

Compact pressure transmitter

KROHNE HAS INTRODUCED a new compact pressure transmitter for pressure and level applications with two-wire 4…20mA HART communication. The OPTIBAR PM 3050 is aimed at general applications in the food and beverage, water and wastewater, iron and steel, OEM/automation and other process industries. Typical applications include absolute and gauge pressure measurement of gases, vapours and liquids, hydrostatic level measurement in open tanks, pressure monitoring in pipelines, dry-run protection of pumps or compressor monitoring.

Image credit: KROHNE

The OPTIBAR PM 3050 pressure transmitter.

OPTIBAR PM 3050 can be used for process temperatures from -40...150°C / -40...302°F without additional diaphragm seal. For aggressive media and/or higher temperatures, it can be combined with OPTIBAR DSP series diaphragm seal assemblies, providing a wide range of special materials as well as a temperature decoupling up to 400°C/752°F. The measuring range reaches from 0.1…100 bar/1.45…1450 psi, with a smallest measuring range of 100mbar/1.45 psi and a measuring accuracy up to ±0.1 per cent of set span. Approvals include 3A, FDA, EHEDG, EG 1935/2004 and ATEX / IECEx Ex ia.

New in-line ultrasonic flow meter

FLOW TECHNOLOGY, INC. has introduced the QLF Series in-line ultrasonic flow meter for use in ultra-low-flow low viscosity liquid applications.

The QLF meter's high accuracy and repeatability is achieved through the unique measurement section within the meter body where flow is conditioned and Delta T measured along its axis. It measures the time difference of an ultrasonic wave travelling with and against the flowing medium. The time difference is directly proportional to the fluid's flow rate. Temperature is measured via an RTD embedded into the flow meter body.

The QLF in-line ultrasonic flow meter is a compact, rugged solution for measuring ultra-low flow in a number of industries, such as aerospace, agricultural, automotive, chemical, oil & gas, industrial, and pharmaceutical. The meter's construction makes it the meter of choice for many high purity and corrosive fluids. Typical measurement application examples include small engine fuel consumption; chemical injection systems; water treatment chemical skids and sample stations for cooling towers, boilers and membrane filtration systems; aircraft fuel flow stands; diesel exhaust fluid (DEF) consumption; liquid chromatography; and side stream filtration.

Accurate level measurement in harsh processing conditions

MAGNETROL HAS LAUNCHED the Eclipse Model 700 Guided Wave Radar (GWR) transmitter. This new level measurement solution is designed to be virtually unaffected by changing media conditions, including turbulence, foaming, boiling and flashing.

"The Eclipse Model 700 continues our tradition of bringing innovative, high-ROI solutions to the market," said Bob Botwinski, senior global product manager at Magnetrol. "All Eclipse models are able to measure and control media in challenging applications with unprecedented accuracy while providing proactive diagnostics to the user."

Proactive diagnostics, like the Model 700's build-up detection feature, minimise maintenance costs by allowing engineers to proactively schedule shutdowns and maximise uptime.

Eclipse GWR solutions, including the new Model 700, are designed to handle any level of complexity and are equipped for overfill protection through the industry-leading probe design that allows for level measurement across the entire probe length with a smaller dead zone than any competitors.

The Model 700 also features true level measurement and boasts the market's highest signal-to-noise ratio. Together, these features enable the Model 700 to achieve direct measurement of material levels, including liquids, foams, and solids – even distinguishing between liquid and foam layers.

Benefits and features include minimum dielectric capability of 1.4, directly measured, without the need to infer levels via software techniques; reference accuracy: ± 0.1" or 0.1 per cent probe length, whichever is larger; temperature range: -320 to +400 °F (-196 to +200 °C); process pressure range: full vacuum to 6250 psi (430 bar); Safety Integrity Level (SIL) 2/3 Certified. The transmitter is approved by FM, CSA IEC and ATEX for general purpose, intrinsically safe (Class 1, Div. 1, Zone 0/Zone 1), and non-incendive (Cl 1, Div. 2, Zone 2) installations.

Continuous flow verification

FLUID COMPONENTS INTERNATIONAL (FCI) has introduced the advanced FLT93F FlexSwitch which offers continuous verification of flow and/or control of air, gas and liquids for demanding high-temperature high-pressure processes.

The insertion-style FlexSwitch for flow, level and temperature monitoring and control provides temperature compensation to ensure set point accuracy for process temperatures that vary up to ±100°F (37.7°C).

Image credit: FCI

The FLT93F FlexSwitch.

The SIL-2 rated FLT93F FlexSwitch is designed for fast response to perform an extensive list of critical air/gas flow application tasks that meet the needs of a wide range of process and manufacturing industries. Highly accurate, it is ideal for use in ventilation air flow, purge gas assurance, gas analysers and sampling systems, inert gas tank blanketing, hydrocarbon gas flows, high-pressure relief valve monitoring and much more.

Featuring FCI's advanced thermal sensing technology, the Model FLT93F combines a highly accurate, all-welded stainless steel sensing element with an advanced, user-friendly FlexSwitch control circuit. One standardised, field-configurable FlexSwitch control circuit satisfies virtually any combination of flow, level and temperature application requirements.

It is available for service from -100 to +500° F (-73 to +260°C) and pressures up to 3500 psig [240 bar(g)].

Air/gas service accuracy is: ± 0.5 per cent reading or ± 2 sfps (± 0.06 nmps), whichever is higher. In liquids, accuracy is ± 0.5 per cent reading or ± 0.04 fps (± 0.012 mps), whichever is higher. For temperature service, accuracy is ± 2°F (±1°C) with repeatability of ± 1°F (± 0.6°C).

The versatile FLT93F FlexSwitch operates over a wide setpoint range. It is available with either integral electronics or remote electronics for use in hazardous areas where the transmitter electronics must be separated from the instrument.

Adapting to the COVID-19 environment

AS THE OIL and gas industry contends with the restrictions on travel and social distancing measures along with health and safety considerations and the availablity of personnel as a result of the coronavirus pandemic, many companies are adapting their products accordingly to allow remote operations.

Acoustic Data, a wireless well technology provider, has developed a remote deployment model for its SonicGauge wireless monitoring system to overcome travel restrictions relating to COVID-19. The solution enables operators to self-install their real-time wireless downhole monitoring system without requiring specialist engineers onsite.

With much of the industry's workforce grounded, Acoustic Data is offering full operational support in real-time from its UK headquarters. In conjunction with online training videos, operators will now be able to install the pre-packaged and pre-programmed technology in standard well installations, from underground gas storage through to production and monitoring wells.

Matthew Norgate, chief operating officer of Acoustic Data, said, "We can anticipate extended restrictions on personnel deployment – particularly for offshore and remote locations – and a drive to minimise operational expenditure for the foreseeable future.

"In this environment, optimising asset performance utilising downhole well data is more critical than ever, so we have developed this deployment model for both the SonicGauge and Barracuda HEX-Hanger to give operators a cost-effective data solution in this period of limited mobility. This methodology is a testament to the portability and simplicity of the technology."

"Our customers are searching for ways to reduce the cost of installation, to minimise personnel at wellsite and to reduce operational risk – this solution achieves all of this while providing immediate OPEX savings," added Norgate.

Meanwhile, leading simulator developer and manufacturer Drilling Systems has launched a web-based version of its well control simulation software to train drillers remotely following successful trials with Louisiana State University (LSU), which was looking for a way to continue delivering high-quality academic instruction to its drilling and well control students during the coronavirus outbreak.

Drilling Systems adapted its well control training software into a cloud-hosted product to enable remote well control learning for the first time. Accessed through a web browser via tablet, laptop or desktop computer from anywhere in the world, this innovation allowed LSU to create virtual classrooms where students could develop and fine-tune well control skills remotely, overseen by an instructor.

Following LSU's successful trials, Drilling Systems has now launched its new cloud-based learning well control software online under the product name 'iDrillSIM'.

"LSU is currently working very hard to provide the best academic environment possible to our students during the current coronavirus pandemic, and we are very grateful to Drilling Systems for supporting us during this period. We can see this solution positively impacting well-control training even after the stay-at-home directives are relaxed," LSU Craft & Hawkins Department of Petroleum Engineering chair Karsten Thompson said.

Clive Battisby, director of simulator operations for 3T Energy Group, said, "Coronavirus is a fast-moving situation and the industry needs to act quickly to adapt to this changing and challenging environment. At a time when people are simply unable to go into training centres or attend universities and colleges, we wanted to develop a solution which can help support well control training and ensure the industry maintains its high safety standards.

"Our new cloud-hosted DrillSIM software is a game-changer for the oil and gas sector and will transform the way people learn well control and keep skills fresh. Now the drilling and well control community will be able to access this learning online so they can practise drilling and well control operations from the comfort of their own home at a time that suits them."

New white paper on alleviating foam headaches

FOAM IS A dynamic mixture of gas and liquid which can present difficulties with traditional level devices that are commonly employed for liquid level measurement.

Many liquid tanks in the chemical, refining, food & beverage, life sciences and other process industries can, at times, have foam present. Reasons include the product being manufactured, the use of agitators/mixing blades, or if there is air/gas introduced.

The dynamic nature of foam means there is no 'one-size-fits-all' measurement solution. In addition to knowing what type of measurement is required, it is also critical to consider the characteristics of the foam itself. The foam thickness, density, bubble size and effective dielectric constant (most of which continuously vary during a process) can impact the level measurement.

Depending on the level transmitter or switch technology, as well as the properties of the foam, the instrument may be able to detect the foam, it may ignore the foam and only measure the liquid level, or it may lose the signal altogether in the foam layer. Care must be taken in choosing level instrumentation to prevent unnecessary errors or loss of measurement.

When choosing a technology, it is important to consider what you are trying to measure: the liquid through the foam layer, the top of the foam or the foam thickness. By using the right solutions and applying best practices for measurement and detection, you can ensure optimal tank capacity utilisation and boost process optimisation and productivity.

Foam can be present in tanks for a number of reasons.

Image Credit: Dave Crosby/Flickr

Magnetrol has produced a white paper entitled *'Foam in the field - How proper level instrumentation can alleviate foam headaches'*. It reviews challenges presented by foam and how to realise operational improvements through proper level instrumentation.

The white paper is available for download at https://www.magnetrol.com/en/downloads/white-papers

DTEK Oil & Gas launches virtual workstations

DTEK OIL & GAS, the largest private investor in Ukraine's energy sector, has created a virtual server that significantly increases the efficiency and safety of the 3D field modelling process.

The virtual server was created for geology and field development specialists, who create 3D models of gas condensate fields in Petrel software package and work with more than 100 gigabytes of data.

The virtual server will significantly increase the level of interaction while modelling deposits. Specialists located in different offices of the company, as well as external experts, will now be able to successively work on one 3D project. Employees can instantly obtain access to data from any computer, at any time, from any office, and quickly exchange this information with colleagues. The new solution also provides centralised data backup, which increases the level of information security and minimises the risk of data loss. The third advantage is the increased speed of calculations, modelling of deposits and enhanced efficiency.

IT specialists of DTEK together with the DTEK Oil & Gas team implemented the project, using Hewlett Packard equipment and VDI VmWare Horizon technology.

Denis Garkavy, the head of DTEK's IT infrastructure department, noted that previously data was processed at users' workstations, but now it is done at the centralised virtual server. "VDI technology is of particular importance for ensuring business continuity, as it allows the user to securely access data and continue to work remotely. This technology is the future of remote work."

Ivan Gafich, DTEK Oil & Gas Exploration and Prospective Development director, emphasised, "Using a virtual server, we not only managed to fully realise the full cycle of remote work with data and the use of specialised software, but also achieved significant flexibility in the workflow, accelerated interaction between teams and increased productivity of work. As a result, even under lockdown conditions there are no restrictions for fulfilling the tasks of 3D modelling and analysis of results."

The virtual server allows the user to securely access data and work remotely.

Image Credit: Adobe Stock

The virtual server project will be expanded for other divisions of DTEK Oil & Gas as part of the MODUS Digital Transformation Programme and its Digital Field project.

"Today, digital transformation is a necessary step for the efficiency and competitiveness of an enterprise in the global digital economy. As part of the Digital Field, we plan to introduce the best technologies to improve the quality of the field development strategy, maintain an optimal well operation regime, and system reliability," said Dmitry Osyka, head of Information and Digital Technologies and MODUS's Digital Transformation Programme at DTEK.

Lancaster Flow Automation introduces new high-performance production choke

LANCASTER FLOW AUTOMATION, which has designed and manufactured high-performance production chokes for more than 20 years, has released a new product called the Vector Inline Choke, in line with its commitment to constant innovation.

Lancaster Flow Automation continually advances its engineering to accommodate the oil and gas industry's requirements to operate at increasing pressures while delivering outstanding efficiency and reliability. Engineered using 3D modelling and fluid dynamics, the Vector Inline Choke has been manufactured for optimal performance in challenging liquid and gas applications. The new choke significantly increases efficiency and sets new standards of durability. Perhaps the greatest advance in the product is its revolutionary flow system called the Guide Vane. This remarkable piece of engineering directs the flow of fluids directly into the opening of the trim, providing a lower erosion rate and thereby increasing the longevity of the choke. Additionally, Lancaster Flow's proprietary design of the trim disc openings allows for finer control and higher differential pressure drops.

To generate even further cost savings, the Vector Inline Choke has a Class V leakage rating, meaning the choke will stay in service for longer and require less maintenance. Furthermore, it has been designed so that maintenance may be carried out while the choke is still in service. As with the company's other products, the Vector Inline Choke requires extremely low operating torque; there is no need for large hand wheels or additional personnel. Designed and tested to API 6A PR2 standards, it may be operated manually or with a pneumatic or electric powered actuator and depending on the choke's specific application, wear sleeves are available in stainless steel, solid tungsten and stellite.

The Lancaster Flow Vector Inline Choke is available now and will be manufactured at the company's headquarters in Houston, Texas and Samarinda, Indonesia. Maintenance for the choke will be fully supported worldwide, including in the Gulf via its service facility in Abu Dhabi. The Lancaster Flow Vector Inline Choke has patent pending in the USA.

For further information please email info@lancasterflow.com or melvinsng@sagapce.com.

The Vector Inline Choke.

Image Credit: Lancaster FLow Automation

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS, OMAN

City	Sectors	Facility	Budget (US$)	Status
Al Dahirah	Gas	Gas Field Development	4,00,00,00,000	Commissioning
Al Dahirah	Gas	Gas Field Development	24,00,00,00,000	Construction
Duqm	Petrochemicals	Aromatics	9,00,00,00,000	FEED
Duqm	Oil, Refining	Petroleum Oil Refinery	2,78,00,00,000	Construction
Duqm	Oil, Refining	Petroleum Oil Refinery	2,08,00,00,000	Construction
Duqm	Oil, Refining	Petroleum Oil Refinery	6,00,00,00,000	Construction
Duqm	Oil, Refining	Petroleum Oil Refinery	90,00,00,000	Construction
Duqm	Oil	Oil Storage Terminal	60,00,00,000	Construction
Northern Oman	Oil	Exploration	4,00,00,000	Engineering & Procurement
Al Wusta	Oil	Exploration	16,00,00,000	Construction
Sohar	Gas	Liquefied Natural Gas (LNG)	9,00,00,000	EPC ITB
Masirah Basin	Oil	Exploration	25,00,00,000	Construction
Al Wusta	Oil	Exploration	5,00,00,000	Engineering & Procurement
Sohar	Gas, Pipeline	Gas	1,50,00,00,000	EPC ITB
Dhofar	Oil	Exploration	30,00,000	Engineering & Procurement
Dhofar	Oil	Exploration	8,00,00,000	EPC ITB
Various	Gas, Pipeline	Gas	8,00,00,000	EPC ITB
Al Wusta	Oil	Exploration	5,00,00,000	Engineering & Procurement
Qalhat	Gas	Liquefied Natural Gas (LNG)	10,00,00,000	Engineering & Procurement
Al Dahirah	Oil	Exploration	3,00,00,000	Engineering & Procurement
Central Oman	Oil	Oilfield Development	15,00,00,000	EPC ITB
Central Oman	Oil	Oil & Gas Field	1,10,00,00,000	Construction
Duqm	Infrastructure	Marine Terminal	5,00,00,000	Construction
Sohar	Gas	Natural Gas Liquefaction (NGL)	70,00,00,000	Construction
Sohar	Gas, Pipeline	Gas	30,30,00,000	Commissioning
Sohar	Petrochemicals	Polyethylene	6,50,00,00,000	Construction
Sohar	Petrochemicals	Polyethylene	89,50,00,000	Construction
Sohar	Petrochemicals	Ethylene	2,90,00,00,000	Commissioning
Duqm	Oil	Oil Storage Terminal	20,00,00,000	Project Announced
Duqm	Oil, Pipeline	Oil	30,00,00,000	FEED
Duqm	Oil	Oil Storage Terminal	40,00,00,000	Engineering & Procurement
Various	Gas	Gas Recycling	20,00,00,000	FEED
Saih Rawl	Gas	Gas Field Development	5,00,00,00,000	Engineering & Procurement
Marmul	Gas	Gas Compression	15,00,00,000	FEED
Marmul	Oil	Oil Storage Tanks	7,00,00,000	FEED
Marmul	Oil	Oilfield Development	27,00,00,000	Engineering & Procurement
Northern Oman	Oil	Oilfield Development	2,90,00,00,000	Construction
Yibal	Gas	Gas Production	50,00,00,000	Construction
Al Sharqiya	Petrochemicals	Chlor Alkali	1,50,00,00,000	FEED
Salalah	Gas	Liquefied Petroleum Gas (LPG)	65,00,00,000	Construction
Salalah Free Zone (SFZ)	Refining	Refinery	2,50,00,00,000	Project Announced
Duqm	Infrastructure	Marine Terminal	15,00,00,000	Project Announced
Sur	Refining	Refinery	10,00,00,00,000	Project Announced
Sohar	Infrastructure	Marine Terminal	60,00,00,000	FEED

Project Databank

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Project Focus

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Project Summary

Project name	DRPIC - Duqm Refinery & Petrochemical Complex - Duqm Refinery - Main Process Units
Name of Client	DRPIC - Duqm Refinery and Petrochemical Industries Company
Revised Budget (US$)	2,780,000,000
Facility Type	Petroleum Oil Refinery
Status	Construction
Project Start	Q3-2006
End Date	Q3-2022
FEED	Amec Foster Wheeler
PMC	Technip
Main Contractor	Daewoo Engineering & Construction, Tecnicas Reunidas
Contract Value (US$)	2,780,000,000
Award Date	Q3-2017
Subcontractors:	Credit Agricole, Allen & Overy LLP, KBC Advanced Technologies Inc., Marsh Oman, Wood Mackenzie, IHS, Brown Earth Trading & Contracting, Yokogawa, Nusail Engineering Consultancy, Swissboring, HMR Consultants, OHI-Douglas, WEG, Towell Engineering Company

Background

The 230,000 bpd capacity refinery is part of the government's plans to develop the Duqm area, in which a port and associated facilities are being built. 65 per cent of crude feedstock for the refinery will be from Kuwait, while the remaining 35 per cent will be supplied by the Sultanate. Natural gas for the utilities necessary to operate the plant will be supplied via a pipeline that Oman Gas Company (OGC) is laying from Saih Nihayda in central Oman to the Duqm SEZ. Central Utilities Company (CUC) will develop and operate Seawater Intake facilities associated to the refinery. Duqm Petroleum Terminal Company (DPTC) will build a Liquid Jetty to handle ships bringing in crude for processing, and carrying refined fuels and petrochemicals for export markets.

Project Status

Date	Status
14 Apr 2020	Works on the project are progressing in full swing following DRPIC's instructions to the contractors to keep the project moving on schedule. The procurement activities however have been facing major delays as a big percentage of the instrument and mechanical parts are imported from Italy, the centre of the COVID-19 pandemic in Europe.
07 Aug 2019	Construction for a temporary labour camp and facilities has started by Douglas OHI.
04 Jul 2019	WEG has been awarded 2 project frame agreements by the JV of TR and Daewoo, for low voltage equipment and medium voltage equipment.
22 Apr 2019	Douglas OHI is undertaking a contract worth US$90mn to deliver the building integration work, which includes the construction and coordination of 23 buildings. Douglas OHI has also been awarded a pair of sub-contracts totaling US$42mn for the civil and underground piping to support the installation of equipment, piperacks and specialist structures and networks.
01 Apr 2019	Towell Engineering Company has started works at the inter-connected pipe racks at Area 0. February 2021 is the scheduled completion date.
27 Mar 2019	Main construction work has started on the package.

Project Databank

Compiled by Data Media Systems

Project Focus

Compiled by Data Media Systems

Project Scope

The 230,000 bpd refinery will be capable of producing the following products:

- 800,000 tpa of styrene
- 300,000 bpd of crude oil
- 1,500,000 million tonnes per annum of polypropylene
- 2,800,000 million tonnes per annum of aromatics

The main process units will comprise:

- Crude distillation unit 230,000 b/sd
- Vacuum distillation: 114,000 b/sd
- Hydrocracking: 74,000 b/sd
- Delayed coking: 52,000 b/sd
- Kerosine treatment: 40,500 b/sd
- Diesel hydrodesulfurisation: 83,500 b/sd
- LPG treatment: two units, each 12,500 b/sd
- Hydrogen production: two units, each 126,500 normal cu m/day
- Saturated gas: 6,500 tonnes/day (tpd)
- Sour water stripping: two units, each 44 tpd
- Amine regeneration: two units, each 415 tpd
- Sulfur recovery: three units, each 355 tpd

Project finance

Duqm Refinery and Petrochemical Industries Company (DRPIC) is the client. DRPIC is a 50/50 joint venture of Oman Oil Company (OOC) and IPIC (Abu Dhabi). In April 2017 Oman Oil Company and Kuwait Petroleum International signed a 50/50 joint venture to develop the Duqm Refinery. The refinery will be 35 per cent financed by the two partners with the remainder, US$5bn, to be raised from local and international banks.

New paper reviews learnings from Deepwater Horizon oil spill

TEN YEARS AGO, a powerful explosion destroyed an oil rig in the Gulf of Mexico, killing 11 workers and injuring 17 others. Over a span of 87 days, the Deepwater Horizon well released an estimated 168 million gallons of oil and 45 million gallons of natural gas into the ocean, making it the largest accidental marine spill in history.

National Science Foundation-funded researchers at the Woods Hole Oceanographic Institution (WHOI) and other institutions quickly mobilised to study the unprecedented spill, investigating its effects on the seafloor and deep-sea corals, and tracking dispersants used to clean up the spill.

In a paper published in the journal Nature Reviews Earth & Environment, WHOI marine geochemists Elizabeth Kujawinski and Christopher Reddy review what they and their science colleagues around the world have learned from studying the spill over the past decade.

"So many lessons were learned during the Deepwater Horizon disaster that it seemed appropriate and timely to consider those lessons in a review," said Kujawinski. "We found that much good work had been done on oil weathering and oil degradation by microbes, with significant implications for future research and response activities."

Reddy added, "One of the big takeaways is that the oil doesn't just float and hang around. A huge amount of oil that didn't evaporate was pummelled by sunlight, changing its chemistry. That's something that wasn't seen before, so now we have insight into this process."

Chemical dispersants, released for the first time in a deep ocean oil spill, remain the subject of one of the most controversial debates in the aftermath of Deepwater Horizon. Studies offer conflicting conclusions about whether dispersants reduced the amount of oil that reached the ocean surface, and the results are ambiguous about whether dispersants helped microbes break down the oil at all.

"I think the biggest unknowns still centre on the impact of dispersants on oil distribution in seawater and their role in promoting – or inhibiting – microbial degradation of the spilled oil," said Kujawinski, whose lab was the first to identify the chemical signature of the dispersants, making it possible to track them in the marine environment. "Now we have a better sense of what we need to know. Understanding what these environments look like in their natural state is really critical to understanding the impact of oil spill conditions."

A simple solution to mitigate fire risk

Tim Martin, sales director, MIDEL EMEA, discusses how the use of ester transformer fluid can enhance fire safety.

AS WITH ANY industrial operation, a reliable source of electricity is critical to the competitiveness of oil and gas operations, and unscheduled downtime from asset failure can easily cost operators into the millions of dollars in lost opportunity.

Transformer failure poses a very real risk to oil and gas safety and uptime. Concerns over transformer failure are often exacerbated in the Middle East by harsh operating conditions. Last summer saw heatwave temperatures reportedly exceeding 60°C, coupled with dusty, humid or coastal conditions. What's more, plants are not always in the most accessible of locations, meaning any electrical equipment needs to be doubly reliable.

While newer transformer designs have been more closely tailored to cope in these conditions, the age and maintenance condition of electrical infrastructure across the Middle East's oil and gas sector is mixed. Further, while refineries are experts at managing the processing of hydrocarbons, managing transformer fire risk may not come so naturally. And, as ExxonMobil's Beaumont refinery found out, it only takes one small fire in a transformer to cause a sitewide outage that has an impact that lasts for days.

> "It only takes one small fire in a transformer to cause a sitewide outage"

Opting for an ester transformer fluid, rather than flammable mineral oil, can make all the difference in providing a reliable, safe power supply.

MIDEL's readily biodegradable transformer fluid not only significantly reduces fire risk, it can also substantially extend the transformer's useful life.

Ester fluids are highly moisture tolerant, unlike mineral oil, protecting the transformer's paper insulation and thereby extending its life. The fluids are easy to use as a retrofilling option, meaning that operators can enhance fire safety and uptime, while preventing deterioration without replacing transformers.

Image Credit: Adobe Stock

A fire in a refinery could have catastrophic consequences.

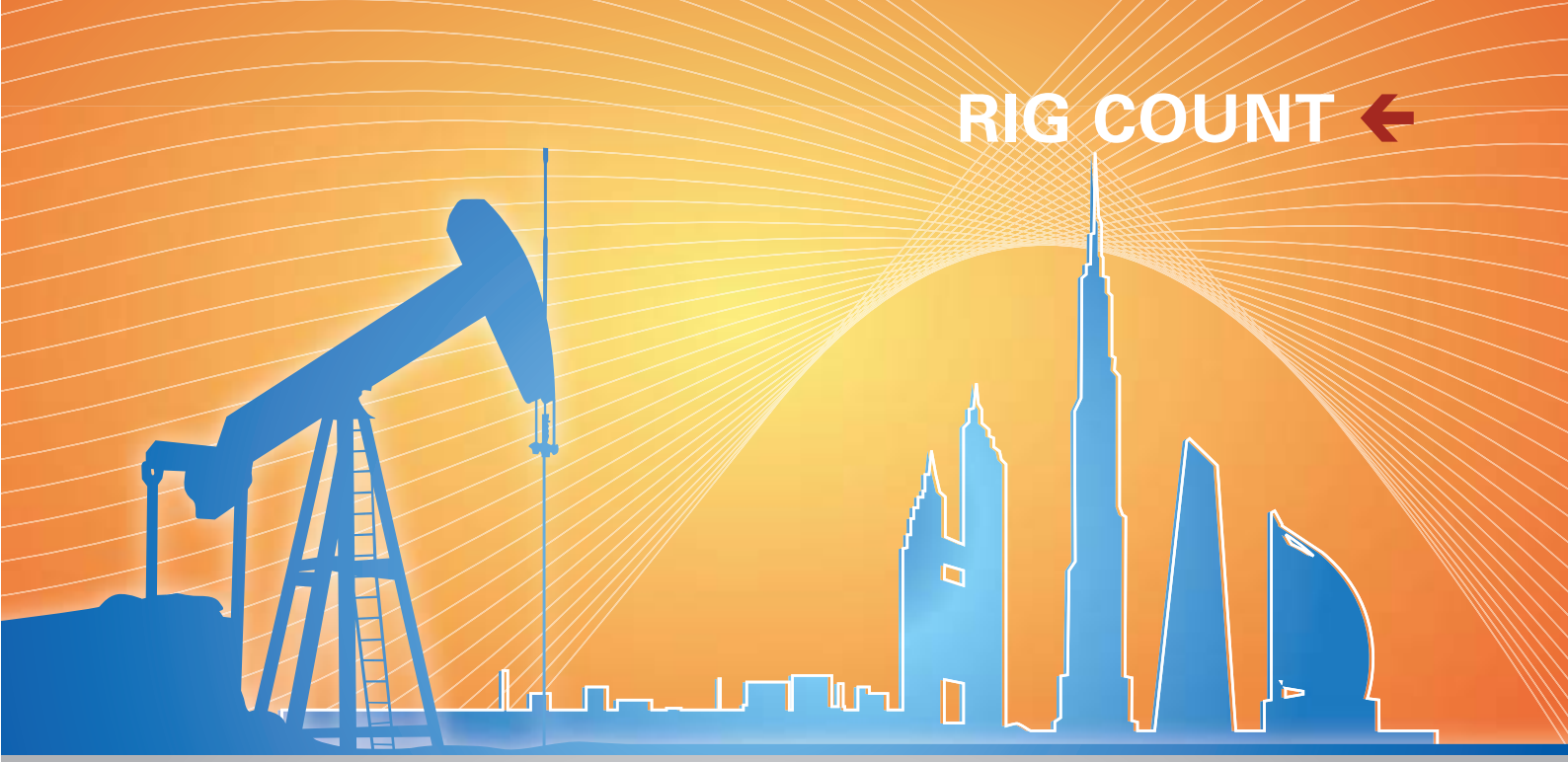
The 230,000 bpd Duqm Refinery in Oman is an example of how ester fluid can deliver world-class risk mitigation. The refinery is part of a US$15 billion investment earmarked to create Oman's next industrial centre – the Duqm Special Economic Zone. The zone's proximity to international shipping lanes in the Arabian Sea and Indian Ocean expedites the process of transporting goods in and out of the region and as such gives the refinery strategic advantage.

The site's vision is to "create a facility that will benefit many generations to come….to be sustainable far into the future", and with a refining capacity of around 230,000 barrels of crude oil per day, fire safety is also an operational imperative.

Adhering to the strictest of international standards, the engineering team at Duqm commissioned new transformer units, filling the transformers with MIDEL fluid. It benefited from enhanced transformer risk mitigation (K class fluids have fire points >300°C), improved environmental protection (MIDEL's esters fluids are readily biodegradable) and reduced total cost of ownership (less maintenance and civils costs).

With its enhanced fire safety profile, ester fluid filled transformers require substantially less bunding and fire suppression systems – a cost saving that typically runs into millions of dollars on complex industrial sites.

MIDEL is used by leading names across the Middle East including JEPCO (Jordan), MEW (Kuwait), ADNOC (Abu Dhabi) and Qatar Petroleum (Qatar). ■



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.

	APRIL 2020			VARIANCE	MARCH 2020		
Country	Land	OffShore	Total	From Last Month	Land	OffShore	Total
Middle East							
ABU DHABI	44	19	63	-3	44	22	66
DUBAI	0	2	2	0	0	2	2
IRAQ	70	0	70	-4	74	0	74
KUWAIT	54	0	54	-2	56	0	56
OMAN	53	0	53	-2	55	0	55
PAKISTAN	18	0	18	-1	19	0	19
QATAR	2	6	8	-5	4	9	13
SAUDI ARABIA	98	18	116	+2	96	18	114
SUDAN	3	0	3	-1	4	0	4
YEMEN	1	0	1	0	1	0	1
TOTAL	343	45	388	-16	353	51	404
North Africa							
ALGERIA	42	0	42	+8	34	0	34
EGYPT	23	8	31	+2	25	4	29
LIBYA	9	1	10	-1	9	2	11
TUNISIA	2	0	2	-1	2	1	3
TOTAL	76	9	85	+8	70	7	77

Source: Baker Hughes

أن خسائر الأرباح السنوية في الولايات المتحدة وحدها بسبب تآكل المصافي يمكن أن تكون في حدود 12 مليار دولار أمريكي، وبالتالي فإن مدى وتكلفة التآكل يمكن أن يكونا هائلين عبر جميع قطاعات النفط والغاز.

على مدى الثلاثين عاما الماضية، تغيرت ظروف التشغيل في صناعة النفط والغاز بشكل كبير وأصبحت أكثر تحديا ليس فقط من منظور الإنتاج والتعقيدات التي يجلبها، ولكن أيضا من حيث نقل وتكرير هذه الوسائط شديدة التآكل التي يتم استخراجها. وقد وجدت GPT أن صناعة النفط البحرية على وجه الخصوص تدفع باستمرار عمليات التنقيب عن النفط إلى أعماق أكبر من أي وقت مضى، مما يؤدي بدوره إلى ظروف ضغط أكبر وبيئات أكثر قسوة.

وكانت التكنولوجيات المتقدمة التي تطورت على مدى سنوات عديدة تعني أن عمليات الحفر لاستغلال الهيدروكربونات تصل الآن إلى أعماق أكبر، مما ينتج عنه معدل إنتاج أعلى من الخزانات المحلية. ومع ذلك، بينما يزيد الحفر العميق من عمر هذه الآبار والإنتاج، فإن ذلك يأتي بتكلفة حيث يمكن أن تحتوي الوسائط الحامضة على مستويات أعلى بكثير من كبريتيد الهيدروجين H2S عالي التآكل.

ويتمثل أحد الأسباب الرئيسية للتآكل، الذي يؤثر في المقام الأول على قطاع التنقيب والإنتاج وقطاع الصناعات التحويلية، في إنتاج ونقل وتكرير الخامات الحامضة. كذلك، فإن أحد المجالات التي يكون فيها التسرب مصدرا للقلق هو الوصلات المفصلية ذات الشفة التي يمكن أن يكون هناك العديد منها داخل أي مجمع. فالوصلات تتكون من شفتين متداخلتين بينهما شكل من أشكال مواد الحشو. ويمكن أن يكون التسرب في هذه الوصلات ناتجا عن نقل المنتج المسبب للتآكل عبر الخطوط التي تهاجم بعد ذلك الحواف الفولاذية من خلال التآكل والتعرية وبالتالي تقليل مادة الحافة الفعلية من أسطح منع التسرب إلى الحد الذي قد تتعرض فيه مادة الحشو وسطح مانع التسرب للخطر والسماح بحدوث تسرب.

ويتجلى ذلك أيضا في الحواف ذات الضغط العالي التي تستخدم وصلات من نوع الحلقة المعدنية (RTJ) حيث لا يتطابق القطر الداخلي لهذه الحشوات مع تجويف الحافة ويترك فجوة. فأثناء نقل الوسائط الحامضة جدا والتي تحتوي على رواسب شديدة التآكل، سوف تتآكل وتتدهور الحافة إلى الحد الذي يلزم استبدالها مع مرور الوقت.

وتكون المناطق التي تم الضغط عليها على الشفة، حيث يتم تطبيق عزم دوران كبير لإنشاء مانع للتسرب أكثر عرضة للتآكل. وستزداد المخاطر بشكل كبير مع تراكم الرواسب القوية من المواد الحامضية.

وشركة GPT تعد إحدى الشركات العالمية الرائدة في تصميم وتصنيع مجموعات عزل الحواف التي تقضي على خطر تراكم الرواسب المسببة للتآكل على حشوات الوصلات من نوع الحلقة المعدنية وواجهات الحافة المكشوفة.

كما تقوم شركة GPT بتصميم وتصنيع مجموعة EVOLUTION وPikotek VCFS من الحشيات المسطحة التي تتناسب مع تجويف الحواف بغض النظر عن قطر الأنابيب، وبالتالي تمنع تراكم الرواسب المسببة للتآكل والتوصيل. كما يمكن استخدام هذه الحشوات على حواف الوصلات من نوع الحلقة المعدنية والحواف المسطحة وذات الأوجه المرفوعة.

وقد أعتمدت GPT من قبل العديد من المستخدمين النهائيين الرئيسيين في جميع أنحاء العالم بما في ذلك أرامكو السعودية وشل، حيث تتمتع شركة GPT بخبرة واسعة في تصميم وتصنيع مجموعات عزل الحواف التي تساعد على مكافحة التآكل عن طريق التحكم في التدفق الحالي لأنظمة الحماية الكاثودية، ومنع التآكل الجلفاني على الرغم من عزل المعادن المختلفة.

تدفع هذه الوسائط شديدة الحامضية بالتحكم في التآكل والرصد، من الإنتاج إلى التكرير، إلى مستويات جديدة وتجبر المستخدمين النهائيين على تخصيص ميزانيات صيانة ضخمة لضمان الحفاظ على سلامة مرافقهم.

قد يكون الهبوط الأخير والكبير في أسعار النفط خبراً ساراً للمستهلكين في المضخات. ومع ذلك، مع انخفاض الإيرادات إلى هذا الحد، فإن الأرباح الإجمالية ستتضرر بشدة داخل العديد من المؤسسات عبر الصناعة، وهذا بدوره سيقلل التدفق النقدي للاستثمارات والمشاريع وقد يتسبب في تقليل برامج الصيانة. ومن شأن التأثيرات على برامج الصيانة في جميع أنحاء صناعة النفط والغاز أن تولي اهتماما كبيرا للصحة والسلامة التنفيذية. إذ أن آثار بعض المواد، بسبب الوسائط العدوانية والمسببة للتآكل، يمكن أن تكون شديدة للغاية، وبالتالي فإن أي تسرب نتيجة للتآكل يثير قلقاً بالغاً.

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تقدر التكلفة السنوية للتآكل في صناعة النفط والغاز بأكثر من 60 مليار دولار أمريكي

تكلفة التآكل في صناعة النفط والغاز

يمكن أن تكون تداعيات التآكل في صناعة النفط والغاز مروعة لأسباب عديدة، وذلك وفقا لروبرت كولتون، مدير منطقة أوروبا والشرق الأوسط وأفريقيا في شركة جارلوك لتقنيات خطوط الأنابيب (GPT). وهو يقول إن تكلفة التآكل السنوية في صناعة النفط والغاز، على مستوى العالم، قد تجاوزت الستين مليار دولار أمريكي.

لا يقتصر الأمر على زيادة التكلفة بشكل كبير في أسعار قطع الغيار والمكونات، بل يمكن أن يؤدي أيضا إلى خسائر فادحة بسبب فقدان الإنتاج. كما يمكن أن تشمل العواقب الأخرى التأثير على البيئة بسبب الانسكابات والتسربات من خطوط الأنابيب المتآكلة. وأربها كان الأهم بكثير من أي خسارة في الإيرادات أو التكلفة على الأعمال التجارية، هو زيادة المخاطر على حياة الإنسان.

فقد يمكن استبدال خطوط الأنابيب والمرافق والأصول الخاصة بالمالك في حالة حدوث انفجارات أو كوارث، ولكن الحياة البشرية للأسف لا يمكن استبدالها. يُعتقد أن التكلفة السنوية للتآكل في صناعة النفط والغاز على مستوى العالم تتجاوز 60 مليار دولار أمريكي، حيث تأتي الولايات المتحدة وحدها بما يقدر بنحو 27 مليار دولار أمريكي. وهذه الأرقام موزعة في قطاع التنقيب والإنتاج وقطاع النقل وخطوط الأنابيب وكذلك قطاع الصناعات التحويلية حيث يمكن أن يظهر التآكل بطرق مختلفة.

فمن منظور قطاع الصناعات التحويلية، يُقدر بأن التكاليف العالمية لتآكل المصافي تقدر بنحو 15 مليار دولار أمريكي سنويا. ويستثني هذا الرقم أي خسائر ناتجة عن توقف الإنتاج وخسائر الأرباح الناتجة عن ذلك. من الصعب في بعض الأحيان الحصول على معلومات أكثر دقة حول هذه الخسائر لأن بعض المصافي لا تجعل هذه الأرقام متاحة أو تنقل المدى الفعلي لمشكلات التآكل لأسباب واضحة.

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تكلفة التآكل في صناعة النفط والغاز

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