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Oil Review Middle East

Oil · Gas · Petrochemicals

VOLUME 23 | ISSUE 6 2020

The critical role of LNG in the energy transition

- Kuwait weathers the storm
- The growth of non-metallic materials
- Increasing compressor energy efficiency
- Advancing the digital transformation of oil and gas
- The benefits of marine crew transfer

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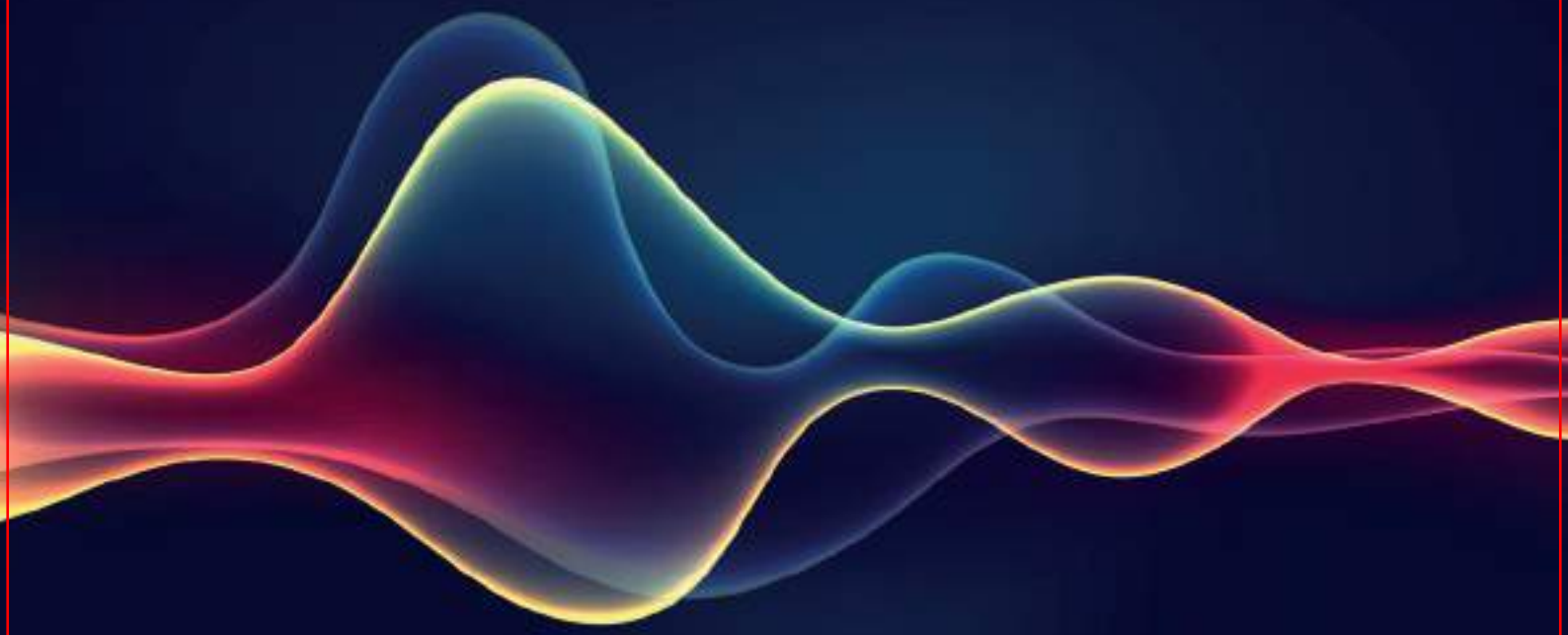

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Editor: Louise Waters - louise.waters@alaincharles.com

Editorial and Design team: Mariam Ahmad, Prashanth AP Fyna Ashwath, Miriam Brtkova, Praveen CP, Manojkumar K Nonalynka Nongrum, Unique Pattnaik, Abhishek Paul Rahul Puthenveedu, Samantha Payne Deblina Roy and Vinita Tiwari

Managing Editor: Georgia Lewis

Publisher: Nick Fordham

Sales Manager: Richard Rozelaar
richard.rozelaar@alaincharles.com

Magazine Sales Manager: Tanmay Mishra
+91 98800 75908
tanmay.mishra@alaincharles.com

International Representatives

Nigeria **Bola Olowo**
+234 8034349299
bola.olowo@alaincharles.com

USA **Michael Tomashefsky**
+1 203 226 2882 +1 203 226 7447
michael.tomashefsky@alaincharles.com

Head Office:
Alain Charles Publishing Ltd
University House, 11-13 Lower Grosvenor Place, London, SW1W 0EX, United Kingdom
+44 (0) 20 7834 7676 +44 (0) 20 7973 0076

Middle East Regional Office:
Alain Charles Middle East FZ-LLC
Office L2-112, Loft Office 2, Entrance B,
P.O. Box 502207, Dubai Media City, UAE
+971 4 448 9260, +971 4 448 9261

Production: Srinidhi Chikkars, Swati Gupta, Nelly Mendes and Arjun S
production@alaincharles.com

Subscriptions: circulation@alaincharles.com

Chairman: Derek Fordham

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www.oilreview.me
email: orme@alaincharles.com

Editor's note

GAS HAS A critical role to play in the energy transition, and is set to become the world's largest energy source from the mid-2020s. The Gastech Virtual Summit threw the spotlight on the importance of gas in the growing demand for energy globally, and highlighted the resilience of the industry in the face of price volatility, COVID-19 and changes to the environmental agenda (p20). Stepping up the use of LNG as a marine fuel could make a significant contribution to emissions reduction targets (p26).

We look at how KPC and its subsidiaries are weathering the challenges brought about by the pandemic. In common with other operators, KPC has put some major projects on hold, but there have been some positive developments on the refining side in particular (p14).

Our technology section covers the growth in the deployment of non-metallic materials, and their benefits (p36). We look at the main advantages and disadvantages of flowmeter technologies (p32) and offer some advice on increasing compressor installation efficiency (p28).

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Front cover: Adobe Stock

➔Executives' Calendar, 2020-2021

OCTOBER			
20-21	**Iraq Petroleum**	VIRTUAL	www.cwciraqpetroleum.com
27-29	**LEWAS Virtual Awards & Symposium**	VIRTUAL	www.lewa-symposium.org
NOVEMBER			
2-3	**MENA Energy Meet**	VIRTUAL	www.menaenergymeet.com
9-12	**ADIPEC 2020**	VIRTUAL	www.adipec.com
16-17	**Middle East Petroleum & Gas Conference**	VIRTUAL	www.mpgc.cc
TBC	**Dubai HSE Forum**	DUBAI	www.hse-forum.com
DECEMBER			
8-10	**BBTC MENA**	VIRTUAL	www.europetro.com/event/355
JANUARY 2021			
24-26	**Intersec**	DUBAI	https://intersecexpo.com
FEBRUARY 2021			
15-17	**ME-TECH 2021**	MANAMA	www.europetro.com/event/357

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

Promoting the advancement of women in STEM

LEWAS (LEADERSHIP EXCELLENCE for Women Awards & Symposium) 2020 takes place from 27-29 October as a virtual event, with the theme "Resilience Reimagined: Leading People through Change".

LEWAS seeks to empower, elevate and engage participants from across the globe through insightful keynotes and panel sessions, opening the discussion on the positives and negatives of resilience and celebrating women trailblazers in the energy sector. It is aimed at women, male champions and organisations in the energy sector and beyond who actively look to grow and nurture other women in energy. The three-day event includes workshops and mentoring sessions for students and early career women with career advice from STEM experts, as well as speed networking sessions.

Held under the patronage of H.E. Shaikh Mohamed bin Khalifa Al Khalifa, Minister of Oil, Kingdom of Bahrain, who will give the opening address, and supported by NOGA, LEWAS provides a strategic platform to showcase the accomplishments of women in energy, explore opportunities to advance women across the value chain, share best practices and unlock potential opportunities for collaboration and partnerships between organisations with the same objective and goal.

LEWAS champions women in Science, Technology, Engineering and Maths (STEM).

LEWAS champions women in STEM (Science, Technology, Engineering and Maths) at all levels, with the view that diversity and inclusion in organisations foster innovation and growth. Since its inception in 2013, it has recognised and honoured women who are not only making a mark but are also advocates for women empowerment in the Middle East. The platform celebrates women who have consistently pushed the boundaries, raised the bar for gender diversity, and found new avenues to address inclusion issues.

The Leadership Excellence for Women Awards recognise outstanding women in STEM in the energy industry who have excelled professionally and personally through their unmatched contribution in the areas of leadership, innovation, talent, research and outreach. Each of the seven awards cover categories ranging from academic excellence to technical categories, open to women of age 18 onwards.

LEWAS also has a special award to recognise male champions and corporations who acknowledge, empower and propel women to advance in the energy industry and actively promote inclusion in the organisation.

The virtual event is free to attend; register now at https://bit.ly/LEWAS20registration. Award applications are open until 30 September 2020. http://bit.ly/lewas20awards. For further information see the website at www.lewa-symposium.org.

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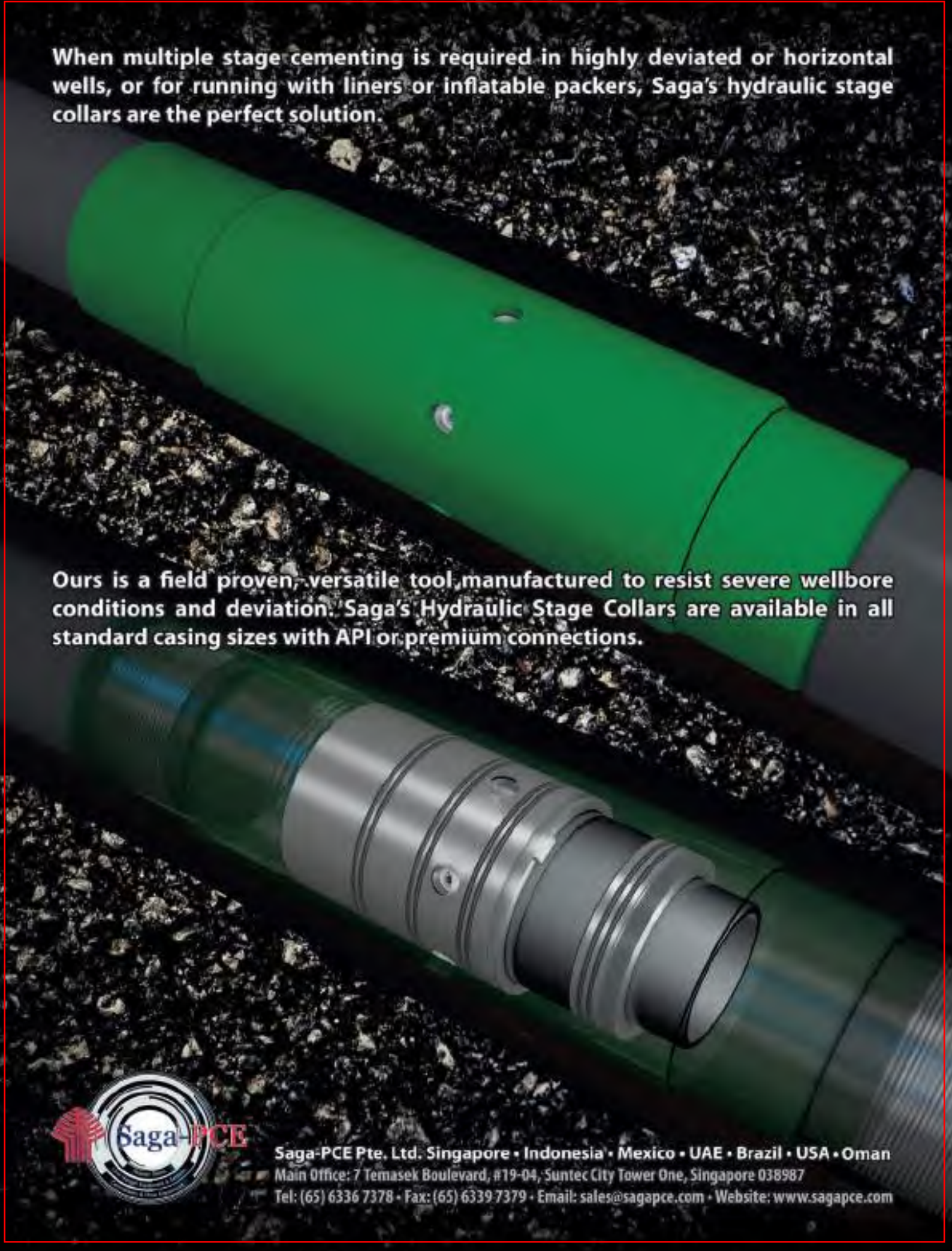

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Collaboration to advance oil & gas digitalisation

SCHLUMBERGER, IBM AND Red Hat have announced a major collaboration to accelerate digital transformation across the oil and gas industry. The joint initiative will provide global access to Schlumberger's leading exploration and production (E&P) cloud-based environment and cognitive applications by leveraging IBM's hybrid cloud technology, built on the Red Hat OpenShift container platform.

Collaborative development will initially focus on private, hybrid or multi-cloud deployment of Schlumberger's DELFI cognitive E&P environment enabled by Red Hat OpenShift to significantly expand access for customers; and delivering the first hybrid cloud implementation of the OSDU data platform (the open data platform for the industry).

Image credit: Schlumberger

The collaboration will accelerate digital transformation in the oil and gas industry.

Using Red Hat's container platform will enable the deployment of applications in the DELFI environment across any infrastructure, from traditional data centres to multiple clouds. The DELFI cognitive E&P environment incorporates cutting-edge data analytics and artificial intelligence, drawing upon multiple data sources, automating workflows, and facilitating seamless collaboration for domain teams. Many more oil and gas operators, suppliers and partners, from all regions of the world will be enabled to work from the DELFI environment – built on a standard, open platform.

"By expanding market access to the DELFI environment we take a major step forward on the journey to establishing the open and flexible digital environment our industry needs," commented Olivier Le Peuch, chief executive officer, Schlumberger. "Our collaboration with IBM and Red Hat complements our established digital partnerships to produce an industry-first solution to overcome our customers' challenges. Together, we are enabling seamless access to a hybrid cloud platform in all countries across the globe for deployment in any basin, for any operator."

The organisations intend to further their collaboration with the creation of a differentiated data management and operations solution for the OSDU data platform, enabling oil and gas operators to build, deploy and transition digital solutions with hybrid-cloud data infrastructures. This will foster wider collaboration and greater efficiency across many professionals in the E&P value chain.

Prior to this announcement, Schlumberger, IBM and Red Hat successfully piloted the new hybrid cloud deployment of the DELFI environment on Red Hat OpenShift, the leading Kubernetes platform, working with Red Hat and IBM Services. The two organisations focused on demonstrating the flexibility and portability for compute, storage and data-intensive exploration and field development applications.

Slowdown continues into Q2 2020

THE GLOBAL OIL and gas industry has witnessed a continual slowdown in the number of oil and gas contracts, as companies are finding it difficult to proceed further due to stressed capital, crude oil prices decline and operational challenges due to the COVID-19 outbreak, says GlobalData, a leading data and analytics company.

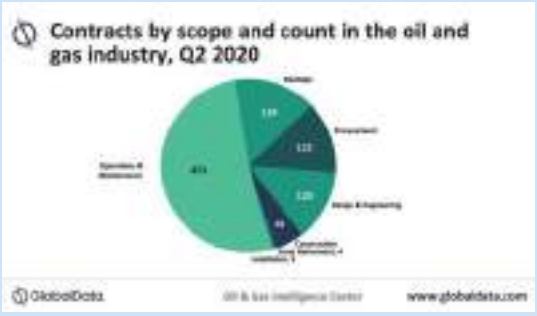

Image credit: GlobalData

The oil and gas industry recorded contract value of US$31.96bn in Q2 2020, as compared to US$18.01bn reported in the previous quarter, with the number of contracts witnessing a decline from 1,267 in Q1 2020 to 907 in Q2 2020.

GlobalData's latest report, *Q2 2020 Global Oil & Gas Industry Contracts Review*, states that the upstream sector reported 658 contracts in Q2 2020, followed by midstream and downstream/petrochemical sector with 171 and 114 contracts, respectively, during the quarter.

Major contracts signed included Qatar Petroleum's US$19.21bn agreement with DSME, Hyundai and Daewoo for the construction of more than 100 LNG carriers, as well as its US$2.85bn contract with Hudong-Zhonghua Shipbuilding for the construction of 16 LNG carriers.

Europe recorded the majority of the contracts, with 412 contracts in Q2 2020, followed by North America, with only 184 contracts. Operation and Maintenance (O&M) represented 52% of the total contracts in Q2 2020, followed by contracts with multiple scopes, such as construction, design and engineering, installation, O&M, and procurement, which accounted for 15%.

ADNOC awards EPC contracts

ADNOC ONSHORE, A subsidiary of the Abu Dhabi National Oil Company (ADNOC), has announced the award of two Engineering, Procurement, and Construction (EPC) contracts to upgrade two Main Oil Lines (MOLs) and crude receiving facilities at the Jebel Dhanna Terminal in the Emirate of Abu Dhabi, with a combined value of around US$245mn.

One is an EPC contract awarded to China Petroleum Pipeline Engineering Company Limited – Abu Dhabi, valued at around US$135mn, to replace the two MOLs which transport ADNOC's premium grade Murban crude oil from its oilfields at Bab (BAB), Bu Hasa (BUH), North East Bab (NEB), and South East (SE) to Jebel Dhanna terminal, increasing the capacity of the pipelines by more than 30%.

Image credit: ADNOC

The contracts have a combined value of around US$245mn.

The other is an EPC contract awarded to Target Engineering Construction Co.L.L.C. valued at approximately US$110mn, for upgrading the crude receiving facilities at the Jebel Dhanna Terminal, enabling ADNOC to utilise parts of the terminal's existing facilities to import Upper Zakum (UZ) crude oil from offshore and Non-System (NS) crude, for delivery to the new Ruwais Refinery West (RRW) project.

Yaser Saeed Almazrouei, executive director of ADNOC's Upstream Directorate, said, "The awards follow a very competitive tender process and highlight how ADNOC is making smart investments to optimise performance and unlock greater value from our assets. Crucially, a significant portion of the awards will flow back into the UAE's economy under ADNOC's ICV programme, reinforcing our commitment to maximise value for the nation as we create a more profitable upstream business and deliver our 2030 strategy."

The successful bids prioritised UAE sources for materials, local suppliers and workforce.

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Weir wins strategic contract in the UAE

Image credit: Weir Oil & Gas

This strategic agreement will position Weir as a major provider for the client, says the company.

WEIR OIL & Gas Dubai has signed a three-year agreement for servicing and repairing pumps and motors with a national oil company in the UAE.

The contract secures the provision of Weir Oil & Gas rotating equipment services, machine shop services, emergency manufacturing and site works. Deciding factors in the deal were positive past and existing contract performance with the client, Weir Oil & Gas' capabilities in UAE, local content, in-house engineering, API and OEM certifications and a comprehensive international facility near the customer's sites, according to the company. This contractual agreement further consolidates Weir's rig-to-grid capabilities in the Middle East.

"Weir takes great pride in our ability to deliver services, repairs, and upgrades to our clients, while supporting them with engineer-driven change management protocols and production facility turnarounds," said Ronan Le Gloahec, Eastern Hemisphere president for Weir Oil & Gas. "With this additional contract we will support our client's operations for several years, thanks to our state-of-the-art facility and in-country engineering know-how."

Iran launches three major projects

IRAN'S PRESIDENT HASSAN Rouhani has inaugurated three major oil, gas and petrochemical projects worth around US$5.5bn, through video conference.

As reported in the Tehran Times, the projects are the Phase 1 of Bushehr Petrochemical Plant, national gas network lines and the West Karoun Oil Cluster power plant. According to the report, the Phase 1 of Bushehr Petrochemical Plant, which is being developed over 70 ha, aims to produce four million tons of petrochemical products per year. Additionally, this phase is set to receive 9.6 million cubic metres (mcm) of sour gas from South Pars Complex fourth refinery. The 1,850km long national gas network lines project, from southern Iran's Assaluyeh to northwest Miandoab, aims to accelerate gas transfer capacity by 110 million cubic metres daily. The goal is to enable National Iranian Gas Company to ensure smooth supply of stable gas for exports to the western and northwestern regions.

The 492MW West Karun power plant focuses on providing electricity for the joint fields and the region's oil facilities. The plant, situated 45km southwest of Ahvaz, southwestern region of the country, is being constructed under a build-own-operate (BOO) model.

AVEVA acquires OSIsoft

Image credit: AVEVA

Craig Hayman, CEO of AVEVA.

AVEVA, A GLOBAL leader in industrial software, is to acquire OSIsoft, a global leader in real-time industrial data software and services, for US$5bn. AVEVA and OSIsoft will combine their complementary product offerings, bringing together industrial software and data management to help customers in industrial and essential organisations accelerate their digital transformational strategies as efficiency, flexibility, sustainability and resilience become increasingly urgent requirements for customers.

OSIsoft's data management software will complement AVEVA's comprehensive end-to-end engineering, operations, and performance offerings. Integrating OSIsoft's PI System into AVEVA's comprehensive software portfolio will create an integrated data foundation that can drive big data, Cloud and AI-driven insights to create meaningful business outcomes for customers. Together, AVEVA and OSIsoft can provide full-stack solutions that span edge, plant, and enterprise deployment models.

Craig Hayman, CEO of AVEVA, said, "This will not only help us serve existing customers better but also open the gates to new opportunities which will accelerate the delivery of our digitisation vision. Data has been enabling organisations to more effectively determine the cause of problems by allowing them to visualise what is happening in different locations, departments and systems. This agreement will enable our customers to improve business processes as well as eliminate inefficiencies."

New investments in SPARK

THE PACE OF investment in Saudi Arabia's King Salman Energy Park (SPARK) is accelerating, with National Petroleum Services Company (NAPESCO) signing an agreement with SPARK in August to invest US$100mn in a new facility.

The facility will serve the oil and gas upstream sector in Saudi Arabia, SPARK has announced, and manufacture downhole tools, gyroscopes and other oilfield equipment, adding to the energy value integration vision of Saudi Arabia and SPARK.

Image credit: SPARK

The signing of the agreement with NAPESCO.

Also announced in August were plans for Al Khobar-based Target United Energy (TUE) to invest in new facilities dedicated to downhole tools and whipstock, which will serve as a platform for TUE in the region.

They join the likes of Schlumberger, Halliburton, Yokogawa, Baker Hughes, Al-Rushaid Group and Sawafi-Borets, who will develop industrial facilities, factories and services centres to serve the energy sector in the Kingdom and the region.

It is forecast that foreign direct investment in Spark will exceed US$2bn over the next two years, one of the largest projects being the US$450mn investment in the construction of an SME hub by Oilfields Supply Company Saudi (OSC Saudi).

Based in Al Khobar, Eastern Province, and operated by Saudi Aramco, SPARK is a fully integrated global energy and industrial hub designed to fuel the growth of the energy sector as well as drive the diversification and localisation agenda. Sixty per cent of its first phase is now complete, consisting of infrastructure, roads, utilities, and real estate assets established across 14 sq km, in addition to a dedicated three sq km logistics zone and dry port.

SPARK is set to be completed in 2021, and is hoped to create thousands of new highly skilled job opportunities.

IEA report highlights challenges

A MAJOR EFFORT to develop and deploy clean energy technologies worldwide is urgently needed to meet international energy and climate goals, according to a new IEA report, *Energy Technology Perspectives 2020.*

It finds that transitioning just the power sector to clean energy would get the world only one-third of the way to net-zero emissions. Completing the journey will require devoting far more attention to the transport, industry and buildings sectors, which today account for around 55% of CO_2 emissions from the energy system. Much greater use of electricity in these sectors – for powering electric vehicles, recycling metals, heating buildings and many other tasks – can make the single largest contribution to reaching net-zero emissions, according to the report, although many more technologies will be needed.

"Solar is leading renewables to new heights in markets across the globe, ultralow interest rates can help finance a growing number of clean energy projects, more governments and companies are throwing their weight behind these critical technologies, and all-important energy innovation may be about to take off," said Dr Fatih Birol, the IEA's executive director. "However, we need even more countries and businesses to get on board, we need to redouble efforts to bring energy access to all those who currently lack it, and we need to tackle emissions from the vast amounts of existing energy infrastructure in use worldwide that threaten to put our shared goals out of reach."

Governments need to play an outsized role in accelerating clean energy transitions, according to the report.

Energy tech venture launches

Image Credit : AFKAR Ventures

The AFKAR Ventures team.

AFKAR VENTURES, A MENA-based first mover in energy tech, has been established, bringing together a team of the region's leaders in energy, engineering, fintech, and management. It aims to help shape a sustainable and independent future for the MENA region's energy tech sector.

"AFKAR Ventures' three main pillars are to seed and scale start-ups, accelerate the expansion of established companies, and grow the returns of institutions via fit-for-purpose solutions. AFKAR is not a conventional energy services or product manufacturing company, nor is it just an investment powerhouse. It will establish some unique business models combining both," said Adnan Ghabris, chairman of AFKAR.

AFKAR is taking novel approaches to age-old problems in energy and technology, with the aim of converting the region from a technology importer to a technology creator, enabling unique applications of technologies and innovations, as well as new manufacturing opportunities.

Sipchem partners with IBM

SAHARA INTERNATIONAL PETROCHEMICAL Company (Sipchem) has collaborated with IBM Services to virtualise its IT infrastructure, ensuring business continuity amid COVID-19.

For Sipchem, COVID-19 related government restrictions in Saudi Arabia required employees to access the company's IT systems remotely to complete their tasks and meet critical deadlines.

Image credit: Sipchem

Sipchem's entire workforce in Saudi Arabia has the ability to achieve maximum efficiency to conduct business securely and in a remote capacity.

In line with the urgent need to ensure health and safety of the employees, Sipchem is working closely with IBM Services to improve remote access capabilities to the company's IT systems, applications and resources.

Saleh Bahamdan, CEO, Sipchem, said, "In such a fast-evolving situation, we also knew that we needed to figure out new ways to continue serving our customers and partners and persevere through the pandemic. As usual, IBM was up for the challenge and met our immediate needs, and as a result, we were able to achieve a smooth transition to remote working."

APICORP posts strong H1 2020 performance

THE ARAB PETROLEUM Investments Corporation (APICORP) reported a strong performance in the six months up to 30 June 2020, with gross operating income standing at US$144.7mn while net profit reached US$54.8mn, despite the challenging market conditions.

Dr. Ahmed Ali Attiga, CEO, APICORP, said, "Notwithstanding the triple crisis of COVID-19, oil price volatility and economic downturn, APICORP continued to go from strength to strength, further bolstering its financial position and diversifying its portfolio as it continues its drive to support the energy transition in the region. This includes a historic callable capital increase, a highly successful benchmark bond issuance, a US$500mn countercyclical support package, being assigned a second rating of 'AA' with a stable outlook from Fitch, as well as forging new partnerships with other leaders in key projects within the energy space. We are looking forward to a gradual recovery in our operating environment and the new opportunities it will bring. As the trusted financial partner to the MENA region's energy industry, we will continue to support our member countries and partners to alleviate the impact of COVID-19, with a focus on sustainable impact-driven energy projects and activities in the region."

Saudi Aramco launches new division

SAUDI ARAMCO HAS announced the establishment of an integrated Corporate Development organisation led by senior vice president Abdulaziz M. Al-Gudaimi, formerly head of downstream development.

"Corporate Development is mandated to create value, assess existing assets and secure greater access to growth markets and technologies through portfolio optimisation and strategic alignment," Saudi Aramco said in a press statement. It adds that the creation of the new organisation constitutes a refinement of Aramco's existing corporate development model and does not represent a fundamental organisational change.

Image credit: Saudi Aramco

Abdulaziz M. Al-Gudaimi, senior VP, Saudi Aramco is heading up the new division.

The organisation will support rapid and effective decision-making on the company's portfolio and corporate development activities, with the goal of strengthening the company's resilience, agility and ability to respond to changing market dynamics.

Commenting on the announcement, Aramco president & CEO Amin H. Nasser said, "We continue to leverage our capabilities in assessing our existing portfolio, identifying new opportunities and adapting to a rapidly evolving global landscape. The Corporate Development organisation will focus on growth opportunities as we further sharpen and strengthen our strategic focus to optimise our portfolio and, in doing so, maximise value for our shareholders. It will also enhance our abilities to harness robust processes to efficiently and effectively execute our business development strategy, as well as increase our agility and ability to adapt to changing market dynamics."

STATS Group sees strong Middle East growth

GROWTH IN ITS Middle East business helped pipeline technology specialist STATS Group to generate revenues of US$50.3mn and EBITDA earnings of US$7.2mn in 2019, and despite the impact of the COVID-19 pandemic and the fall in the price of oil, the company is confident revenues will hold firm in 2020.

Milestone achievements in 2019 included completing a key project in Saudi Arabia utilising the company's patented BISEP technology, establishing an operational facility in Muscat to support work with Petroleum Development Oman, and successfully delivering a technically challenging large-diameter isolation project in Qatar. STATS also completed subsea hot tapping workscopes in the UAE and in Egypt, and towards the end of 2019 the company's Abu Dhabi branch moved to new larger facilities.

Based in Kintore, near Aberdeen, UK, STATS' principal activity is the provision of pressurised pipeline isolation, hot tapping and plugging services to the global oil, gas and petrochemical industries.

Image credit: STATS Group

STATS Group continues to thrive in the Middle East.

STATS Group CEO, Leigh Howarth, said, "As COVID-19 evolved into a global pandemic in the early part of 2020, this had an impact on our trading performance. Not surprisingly, several significant contracts which had been a long time in planning were postponed by our clients until later this year or 2021, but on the positive side there is a healthy programme of work ahead of us.

"The response from our staff across all our global locations in dealing with the changed environment was outstanding. The introduction of new working practices has allowed us to continue delivering our services and, encouragingly, secure new work. As a result, and notwithstanding the impact of COVID-19 and the resulting lower demand for oil and the subsequent drop in price, we are optimistic that activity levels in 2020 will be broadly consistent with those of 2019."

Coronavirus and oil price drop hit GCC asset managers

THE PROFITABILITY OF asset managers in most Gulf Cooperation Council (GCC) countries will face moderate to high pressure over the next 12-18 months, reflecting the coronavirus crisis and an accompanying drop in oil prices, Moody's Investors Service said in a newly-released report.

"The sector's relatively low geographic and product diversification and regional geopolitical tensions will add further pressure," said Vanessa Robert, VP – senior credit officer at Moody's. "Still, an improving regulatory environment and growing interest from foreign investors will provide some counterbalancing uplift."

Weak oil prices will hold back economic growth and public spending, with negative consequences for asset managers. However, GCC governments' plans to privatise some state-owned assets should provide some offsetting stimulus. A recent increase in tension between the USA and Iran may harm investor confidence, delaying large scale infrastructure projects, weakening regional growth, and weighing on the asset management industry.

Most GCC countries have made regulatory changes to attract foreign investors since 2014, when falling oil prices made economic diversification more urgent. The inclusion of Saudi stocks in the MSCI emerging stock market index in May 2019 has encouraged foreign investment. As GCC markets open, local asset managers will likely capitalise on their expertise in the region to attract foreign clients.

See the website at website moodys.com/coronavirus for recent reports on credit developments from coronavirus and the implications for markets.

Resource upgrade announced

CHARIOT OIL & GAS has announced that it has completed the reprocessing of 3D seismic data across the Lixus Offshore Licence, Morocco, resulting in significant improvements in both image quality and in depth control. This has had a positive impact on the understanding of the distribution and extent of the Anchois gas sands, and has led to the upgrade of audited total remaining recoverable resource to in excess of one Tcf for Anchois, representing a 148% increase (comprising 361 Bcf 2C contingent resources and 690 Bcf 2U prospective resources).

Image Credit: J. Stephen Conn / Flickr

The remaining recoverable resource for Anchois is estimated at more than one Tcf.

Adonis Pouroulis, acting CEO, commented, "The recent work on the Lixus Licence confirms the materiality of the Anchois Gas Field Development project. We continue to hold the view that this asset has the capacity to be a value accretive and long-term project of national significance to Morocco. The Anchois development has the potential to supply material gas volumes into existing markets in the near-term, and the exploration prospectivity of the Lixus licence is of a scale sufficient to provide the Moroccan power sector with a clean, reliable, low cost and sustainable supply of gas for decades to come."

Shining a light on the energy transition

DNV GL's *Energy Transition Outlook 2020* forecasts a decarbonising world in which energy demand plateaus, renewables grow significantly, natural gas becomes the world's largest energy source, and oil demand never again reaches the levels of 2019.

BY 2050, FOSSIL fuels will account for 54% of primary energy supply, compared to around 80% today, while non-fossil fuels will make up 46% of the mix, the report predicts. Coal and oil will follow downward trajectories and natural gas will see its share of primary energy supply growing modestly from 26% in 2018 to 29% by 2050, to become the world's largest energy source from the mid-2020s.

The report predicts several interrelated energy transitions playing out globally, including transition from fossil fuels to renewables, from coal and oil to natural gas, and from fossil fuels to decarbonised gas.

"Oil is set never to fully recover from the COVID-19-induced market shock in 2020," the report predicts, adding however that continuing investment in oil and gas will be needed to maintain production at levels required to meet global demand.

The Middle East and North Africa, North East Eurasia and North America are set to dominate oil production over the next three decades, according to the report. Their dominance will be caused by a shift from producing 'more oil' to 'cheapest oil', putting increasing pressure on unconventional onshore and offshore oil production to 2050.

The Middle East and North Africa will account for 85% of conventional onshore oil production by mid-century, the report predicts. Oil production in the region will remain relatively stable to 2050, buoyed by significant capacity additions from the mid-2030s. Almost all the world's conventional onshore capacity additions will come from the Middle East and North Africa from 2035 onwards. In contrast, both North America and North East Eurasia will see declining production from the mid-2030s.

Natural gas will play a prominent role in the energy transition, becoming the world's largest energy source from the mid-2020s. China and the Indian subcontinent will account for more than 75% of gas imports from 2030, with significant increases in interregional trade predicted, much of this in the form of LNG, with LNG exports more than doubling over the forecast period to 2050. The Middle East will be the second largest supplier after the USA and, along with North East Eurasia, is set to dominate conventional onshore gas production, while offshore gas production will be more distributed.

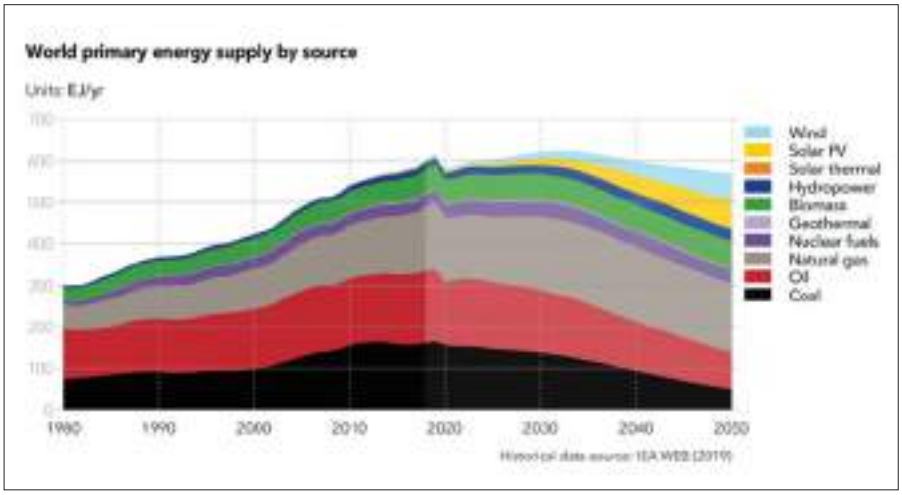


Image Credit: DNV GL

Natural gas and oil will dominate the Middle East and North Africa's energy mix through to 2050, according to the Outlook. Whereas oil use will see a slight decrease after 2040, natural gas's contribution will stay fairly constant at 2018 levels, with around 40% of the gas going to the power sector. Solar PV and wind will increase, but the uptake before 2030 is very limited. However a 178-fold increase is predicted for solar PV between 2018 and 2050, to reach 35% of the generation mix by 2050.

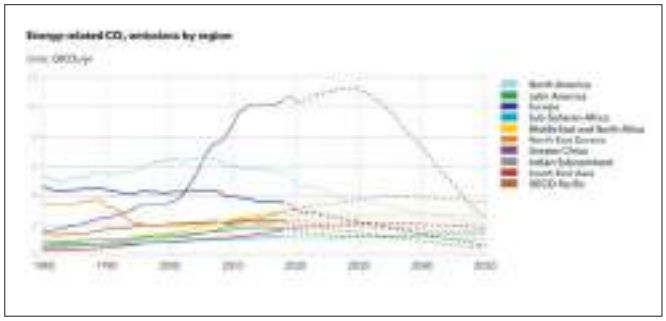
> "The Middle East and North Africa will account for 85% of conventional onshore oil production by mid-century."

The high share of fossil fuels in the region's energy mix will counteract further carbon-intensity reductions.

"The Middle East and North Africa's forecast emissions of 3.4 tCO2/person in 2050 are two-thirds of the present level, and among the highest of all regions. This fossil-rich region has a relatively slow transition, with emissions reducing less than in other regions with the same standards of living," the report comments.

The need to step up decarbonisation

The report highlights the urgency of stepping up decarbonisation efforts in the oil and gas industry, with carbon emissions forecast to remain stubbornly high until the mid-2030s. The oil and gas industry will account for more than 80% of world energy-related carbon emissions in 2050. Growing awareness of the urgency and magnitude of the climate change challenge is increasing pressure on the oil and gas industry to decarbonise, with several oil and gas majors transforming themselves into broad-portfolio energy companies. "The longer-term success of the sector may hinge on its ability to proactively drive the necessary



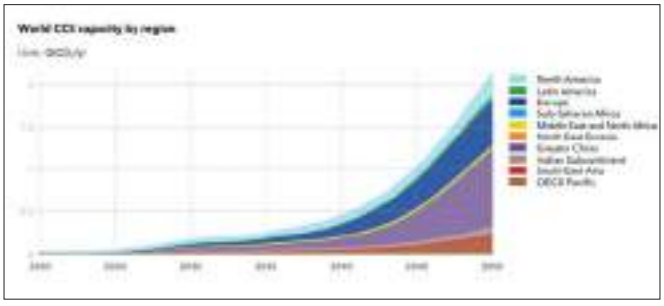


Image Credit: DNV GL

transition rather than passively react to societal pressure," the report says.

Emissions reduction dominates the industry's decarbonisation agenda in the shorter term, with key solutions including electrifying offshore platforms and oil and gas assets, reducing flaring and venting, increased efforts to detect and stem methane leaks, and efficiency gains through digitalisation of the oil and gas value chain. However, hydrogen and carbon capture and storage (CCS) have the potential to decarbonise fossil fuels more deeply, the report notes.

"The transition to renewables and efforts to cut carbon intensity will significantly reduce emissions, but they will not deeply decarbonise natural gas," said Liv Hovem, CEO, DNV-GL Oil & Gas. "It is only by removing the carbon from natural gas, before or after combusion, that the oil and gas industry can deeply decarbonise, reaching hard-to-abate sectors throughout the value chain."

Contributors to the fall in carbon in carbon emissions from the middle of the next decade will include the scaling of decarbonisation of natural gas, and enhanced use of green gas produced using renewable sources. The report projects that 13% of gas will be decarbonised by 2050, following rapid growth in production of hydrogen from natural gas, and of natural gas with CCS in power and industry.

However, in the context of the Paris Agreement "the transition to decarbonised and green gas, with related scaling of CCS and hydrogen will not be quick enough," the report says, forecasting that CCS and hydrogen will not begin to scale for another 15 years. "While the technology to scale decarbonised and green gas is available and viable, the policy framework to scale it is only just taking shape, and only in some regions," the report comments. "Policy support for hydrogen, CCS technology, and solutions for hard-to-abate sectors needs urgent acceleration if regions, and the world, are to meet emissions targets."

"Forming partnerships among government, industry and associations will be crucial in scaling innovation and new technologies for decarbonisation. Collaboration on frameworks for making hydrogen and CCS safe, effective and commercially viable will give the oil and gas industry the certainty it needs to manage new risks and accelerate its transformation towards a low-carbon future," commented Hovem.

Some energy transition policies will affect demand for existing oil and gas products and drive companies to reduce their carbon footprint; others may completely transform the oil and gas industry, the report notes. ■

Kuwait weathers the storm

Kuwait Petroleum Corporation (KPC) is navigating the strong global headwinds of a pandemic and its dire economic impacts with flexibility, innovation and grit.

Kuwait's oil and gas sector has been hard hit by the COVID-19 pandemic.

Image Credit : Adobe Stock

IN THE WAKE of a global pandemic – and an even more destructive lockdown that has shattered economies worldwide – Kuwait is looking to steady the ship and create a sustainable platform from which to move forward into 2021. That includes adjusting major elements of its prized energy sector. There is no denying it has been a tough time for oil economies the world over, but the country is doing its best to adapt in what remains a highly volatile climate.

At the helm is Kuwait Petroleum Corporation (KPC), which is managing a whole array of critical issues, from production cuts to budget cuts.

This year, that has meant overseeing shut-ins at some of its fields to comply with OPEC requirements, after the enforced lockdowns stifled global energy demand. For a country like Kuwait, which depends on its oil revenues – the energy sector accounts for roughly half of GDP and nearly all of its exports – that is a major problem.

> "The state-owned company has trimmed its budget for oil and gas production."

Oil production is expected to average 2.45 mn bpd in 2020, according to S&P Global Ratings, a fall of 9% compared to 2019. It is also miles short of KPC's longstanding goal to hike production capacity to four million bpd by 2020 – a target that was never close to being achieved.

Financial hit

There is a big knock-on effect on finances too. The state-owned company has trimmed its budget for oil and gas production from a little over US$12bn down to around US$10bn for the year, according to figures cited by local newspaper Alanba. But that is likely to be in addition to a review of longer-term capital

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spending for new projects. In 2018, KPC announced plans to spend some US$500bn on major projects through to 2040. That too now seems an unlikely target.

Kuwait has already abandoned plans for one big project, the Al-Dabdaba solar plant, cancelled as a direct result of the pandemic and deteriorating economic climate. It is also a blow to the government's plans to grow clean energy use – the country has plans to generate 15% of its energy via renewable sources by 2030.

The Al-Dabdaba decision would contribute to KPC "focusing on its priorities for the coming stage and maintaining its position in the global oil markets," a cabinet statement read in July. The solar plant was expected to start initial operations sometime next year.

Expatriate workers

Still, the whirlwind conditions of 2020 have injected a level of momentum rarely seen in Kuwait's slow-moving energy sector. This includes more restrictions on expatriate workers, which have historically played a huge role in building major upstream and downstream installations. Kuwait is reportedly preparing to force as many as 360,000 foreign workers out of the country, mostly poorly-skilled labourers or those above a certain age. Many have already left the country voluntarily given the collapse in oil prices and its ripple effects on jobs and the local economy.

There could be more ambitious plans afoot, though. Prime Minister Sheikh Sabah Khaled Al-Hamad Al-Sabah said earlier in the year that he wanted to see even more expatriates leave, potentially as many as 2.5 million people from across the country, a target that some analysts say could be unrealistic. Other Gulf states have seen a similar exodus with overseas workers heading back home in the wake of the poor jobs market and tough prevailing economic conditions.

Subsidiaries

KPC meanwhile is doing what it can to adjust to the challenging environment. That includes measures to combine subsidiaries, as well as other cost-cutting measures, and freezing certain projects. Major KPC subsidiaries include Kuwait Oil Company (KOC), Kuwait National Petroleum Company (KNPC), Petrochemicals Industry Company (PIC) and Kuwait Oil Tanker Company (KOTC). All divisions have been engaged in efforts to keep employees safe during the health crisis, with changes to working practices and measures such as the building of temporary field hospitals.

But the pandemic and ensuing economic devastation has clearly had a major impact. Equate, a PIC petrochemicals joint venture with the US' Dow Corporation, reported subdued results at the end of August – its second quarter 2020 earnings were 31% down from a year ago, declining from US$231mn to US$159mn.

There have been some positive developments in Kuwait's refining sector.

Image Credit : Adobe Stock

Careful financial management has also been critical to navigating the "global headwinds," noted Dr Ramesh Ramachandran, Equate's president and chief executive. In order to effectively manage its debt liability, it completed a US$1.6bn dual-tranche issuance and secured US$300mn with local banks to re-finance US$1.9bn in bank loans.

Production

While Kuwait is a long way off its previous four million bpd goal, it has pushed production up incrementally through recent years close to the three million bpd mark, although that is now some way down because of shut-ins and other issues.

Upstream, KOC has been making progress tapping into Kuwait's heavy oil potential. It started producing as much as 50,000 bpd of heavy crude from its northern fields earlier this year. This is significant as local drillers square up to more complex reservoirs in the north, instead of more accessible reserves elsewhere, which have historically provided the bulk of Kuwaiti output.

> "There have been some positives in the scaling up of the country's refining infrastructure."

According to press reports, KOC is making progress with the development of three new fields in the western region of Kuwait, namely Umm Rass, Kara'a Al Marw and Kabd. KOC has obtained approval to float a tender to build and operate two new Jurassic production units, which will enable Kuwait to reach free gas production capacity of 850 mn cubic feet per day, and the production of around 250,000 bpd of light crude.

One of Kuwait's perennial challenges has been the uncertain environment for foreign investment and the role of international oil companies in its upstream sector. Still, the country has nonetheless provided a rich stream of work for major industry contractors.

UK engineering group Petrofac has enjoyed success in the north, helping with the exploitation of the Lower Fars heavy oil project. The US$4bn first phase, conducted with Athens-based Consolidated Contractors Company (CCC), to deliver 60,000 bpd could provide a template for future heavy oil activity. Petrofac opened a new office in Kuwait City at the end of last year to underscore its strong local ambitions.

This year is also meant to see the restart of production in the Partitioned Neutral Zone (PNZ) between Kuwait and Saudi Arabia, after a hiatus of several years. Potentially, this could add around 250,000 bpd to KPC's total output.

Downstream

There have been some positives in the scaling up of the country's refining infrastructure too, as Kuwait seeks to develop cleaner, higher-value fuels for export and domestic use. This includes the completion of various new biofuels units in the upgrade of the Mina Al Ahmadi refinery in April. Upon completion, the site will have a capacity of 364,000 bpd from some 31 production units.There are also plans to complete a similar upgrade of the 270,000 bpd Mina Abdullah site in the early part of 2021.

There are hopes too for the commissioning of the long-awaited 615,000 bpd Al-Zour refinery complex later next year, part of an integrated development worth around US$27bn. KPC unit Kuwait Integrated Petroleum Industries Co. (KIPIC) said that the gas line that will feed the Al-Zour plant started operating in July, and that it is a key step on the road to the gradual start-up of operations at the refinery.

Despite the challenging prevailing conditions and high cost, the integrated complex is a vital part of Kuwait's overall energy strategy, including an LNG import terminal and a petrochemical complex. ■

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The benefits of marine crew transfer in the COVID-19 era

Marine crew transfer methods offer cost and safety benefits in the time of this pandemic, says Reflex Marine.

THE OPERATIONAL EXCELLENCE of industry leaders is reflected in their financial results. Large-scale cost-cutting can temporarily boost the balance sheet, but the industry today recognises that it is long-term strategies that pay off in the end.

Reductions in expenditure costs in recent years have resulted from a variety of measures, most notably improvements in strategic planning, maintenance management and the application of new technologies, according to a Rystad Energy study. This shows that care is being taken to identify more structural cost savings rather than focusing on short-term wins, as has been seen in previous downturns.

The reduction of downtime and efficient resource management are also crucial aspects to long-term cost-cutting strategies, which are perhaps more notable today than ever before. The ongoing COVID-19 pandemic is putting a strain on logistics and resource management in the industry, and is forcing operators to revise their approach to staff rotations and crew transfers. Extended helicopter boarding procedures due to increased cleaning and disinfection measures, and in some cases the lower number of passengers per transfer, are examples of unexpected changes this year. The increased cost per passenger may make helicopter transfer no longer a viable option for some projects.

Marine crew transfer methods are thus offering additional benefits with this unprecedented threat present. Significant cost savings with volume crew transfers and reduced downtime due to harsh weather are prominent advantages to moving crew with a boat, but the most crucial one is safety (with Reflex Marine's FROG transfer carrier having the best safety record on the market for offshore crew transfer).

The Kingdom of Saudi Arabia, where there are currently nearly 20 FROG carriers in use, was the first country to implement this method of personnel transfer in the region.

Image Credit : Houston Chronicle

Saudi Aramco's SeaBus crew transfer service using a fast crew supply vessel and 2 FROG-XT6 carriers (six-passenger units).

Saudi Aramco introduced the SeaBus crew transfer service four years ago. "An example of Saudi Aramco's commitment to our corporate safety values, the FROG offshore transfer system was introduced in April 2016 to improve safe transfer of passengers to and from the rigs," stated Saudi Aramco.

The safety aspect of crew transfers is coming to the fore today. The pandemic has left the industry little time to develop appropriate safety measures, but it is clear that in the long term the offering of marine crew transfer methods will allow for simpler introduction of preventative measures. Marine crew transfers allow for spacing out of passengers, more accessible isolating systems and potentially easier application of new PPE and hygiene systems. The standard helicopter leasing model on the other hand, means that user-specific measures may be difficult to implement, while the higher R&D and capital investment costs of aviation will delay the deployment of helicopter assets designed to deal with COVID-specific issues.

> "The safety aspect of crew transfers is coming to the fore today."

Resilience and adaptability are being put to the test in the offshore oil and gas industry this year, perhaps more than ever. However, the challenges we are facing will ultimately help the industry improve, opening it up to more sustainable, cost-efficient practices and a renewed focus on safety. ■

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The critical role of gas in the energy transition

The Gastech Virtual Summit, which took place digitally from 7-11 September, provided a timely opportunity for the gas, LNG and energy value chain to convene, converse and collaborate on a post-COVID-19 future.

The evolution of the LNG industry was an important theme of the event.

Image Credit : Adobe Stock

FEATURING MINISTERS, POLICY makers, global business leaders, disrupters and innovators, the Summit delivered insights into the latest commercial strategies and trends dominating the industry, providing delegates with information on how best to align business models for the post-pandemic landscape.

The Summit threw the spotlight on the importance of gas in the growing demand for energy globally and highlighted the resilience of the industry in the face of price volatility, COVID-19 and the changes to the environmental agenda. The underlying theme of the Summit was that the gas industry will be both resilient and critical in the journey to a net zero carbon position by mid-century. Gas companies are now energy companies, with the shared mandate to drive a low carbon energy future.

Issues impacting the future of the industry; energy security of supply; affordability and sustainability; the prospects for demand and investment recovery; and changes to supply in a post-COVID-19 world were top of the agenda. The topics covered included the role of natural gas in the energy transition; the criticality of IoT and data security in the future of the energy industry; the impact of deregulation on markets and investment; opportunities and challenges to the energy sector posed by Industry 4.0; hydrogen's ability to deliver on decarbonisation commitments; and what impact environmental activism will have on the emerging growth opportunities for the industry.

> “While the COVID-19 pandemic has affected global energy demand, I'm confident in the long-term fundamentals of the market.”

Chan Chun Sing, Minister of Trade & Industry for Singapore, opened the Summit on 7 September, on an upbeat note. “While the COVID-19 pandemic has affected global energy demand, I'm confident in the long-term fundamentals of the market,” he said. “Natural

gas demand is expected to progressively recover from 2021 due to the global economic recovery and competitive gas prices. This demand will be driven by the growth and development of the Asian markets."

He brought to the fore a theme that continued throughout the week, that gas, LNG and the energy industry will evolve and adapt to meet net zero carbon ambitions by mid-century. He said, "As the LNG hub of the region, our government and gas industry in Singapore have embarked on many initiatives across the value chain. These serve to promote innovation in the sector and the adoption of more environmentally sustainable energy strategies."

These include catalysing the development of LNG as a marine fuel. "Singapore has introduced the world's first LNG bunkering standard, PR-56, providing a safe, sustainable, and transparent technical framework for conducting LNG bunkering operations. We have also developed a standard for storage, land transportation, and handling of LNG, PR-94."

> "How important is hydrogen in the context of our climate aspirations? It is mission critical."

The Minister noted that Keppel Offshore & Marine delivered the world's first converted floating liquefaction vessel (FLNG) in 2017, and is currently undertaking its second FLNG conversion. This is in addition to the four converted FSRUs that it has delivered.

"These vessel conversion solutions contribute to the circular economy...compared to building one from scratch, the conversion of an LNG carrier into an FLNG saves approximately one-third of greenhouse gas emissions."

Global business leaders discussed the current and future global LNG market, with Faisel Khan, chief financial officer of Sempra LNG saying, "We're quite optimistic on the growth and need of natural gas and LNG across the world for some time to come, especially in Asia. We see it eventually as competing with coal on a long-term basis both from a social cost perspective in terms of GHG emissions and even potentially on a price basis for a long time."

Anatol Feygin, chief commercial officer of Cheniere added, "We're very confident that LNG and US LNG in particular will have a seat at the table and will be part of a long-term multi-decade solution."

Moving to net zero

Honourable Seamus O'Regan, Minister for Natural Resources of Canada gave a keynote on the opening day, leading on the mandate for the energy transition, stating, "Just as our goal of net-zero emissions by 2050 needs our oil and gas industry, our oil and gas industry needs net zero." He added, "We must move now on our common mission, a net-zero economy by 2050, a global economy that continues to grow, and an energy transition that leaves no one behind."

The critical role of hydrogen in meeting climate goals was highlighted.

Image Credit : Adobe Stock

Joseph McMonigle, secretary general of the International Energy Forum, said in a keynote address, "The pandemic increases the stakes by pushing the demand gap out further over the next decade. This opens a new window of opportunity that enables the gas industry to play a larger role in achieving climate, clean air and energy access goals."

The conversation on the collective response needed for the energy transition, and the strategies and innovation that will shape the future of the industry continued throughout the Summit. Thomas Siebel, author, chairman & chief executive officer at C3.ai and Eugene Kaspersky, CEO, Kaspersky delivered Gastech Tech Talks on digital transformation, Internet Of Things and security and the criticality of technology for the energy future.

Pratima Rangarajan, CEO of OGCI Climate Investments addressed climate change, saying, "Energy is at the heartbeat of all this activity, but just decarbonising the energy system does not solve the climate problem. That is why it's imperative for us all, even within the energy industry, to take a system view of everything we do and work together on decarbonising our ecosystems."

Hydrogen's potential to play a key role in a clean, secure and affordable energy future was discussed, with De La Rey Venter, executive vice president, Integrated Gas Ventures of Shell saying, "How important is hydrogen really in the context of our climate aspirations? Bluntly put, it is mission critical."

Keisuke Sadamori, director, Energy Markets and Security, International Energy Agency said, 'There's a lot of opportunity now for hydrogen, probably more than ever before, so we must start now. What we do between now and 2030 is critical; the challenge is to turn the momentum into investment decisions."

A session on diversity and inclusion in energy underlined how vital it is that companies deploy initiatives to move towards meeting a balance. ExxonMobil hosted Powerplay Panels, connecting women from across the global energy business, highlighting excellence and supporting greater diversity and environments in which women can flourish.

Nick Ornstien, vice president Energy for event organisers dmg events said, "The Gastech Virtual Summit has delivered insights into the latest commercial strategies and trends dominating the gas, LNG and energy industry, providing delegates with fast track information on how best to align business models for the post-pandemic landscape." ■

The Gastech Virtual Summit 2020 was held in place of the Gastech exhibition and conference, scheduled to take place in Singapore. This will now take place from 13-16 September 2021. See the website at www.gastechevent.com

The role of technology in addressing the challenges

TECHNOLOGY AND THE talent to invent and implement it, is the answer to overcoming the dual challenge of meeting the demand for more energy with less emissions, said Lorenzo Simonelli, chairman, president & CEO, Baker Hughes in a keynote address at the Gastech Virtual Summit.

He zoned in on three key technology drivers which need accelerating, the first being technology to decarbonise oil and gas and more broadly, to decarbonise the energy sector.

"Decarbonising energy is a journey, and gas remains a key element. To decarbonise the sector, we must introduce more efficient and lower emissions technology and at the same time accelerate adoption of carbon capture, utilisation, and storage.

"Post-combustion capture, compression for transportation and sequestration, subsurface storage, and long-term integrity and monitoring are all key technologies needed for CCUS's success.

"Hydrogen can be a powerful enabler for the energy transition, with benefits both for the energy system and end-use applications like transportation and building heat. There are multiple routes to create hydrogen, some of which can be heavily decarbonised. If hydrogen can be produced from renewables such as solar and wind, it could provide zero-emission pathways."

He added that turbomachinery and compressor technologies can drive growth here, and advancements in gas infrastructure present a natural ramp towards faster adoption. Baker Hughes has reconfigured its Noval T gas turbine to run up to 100% hydrogen, and completed tests with Snam for the word's fast hybrid hydrogen turbine designed specifically for existing natural gas transportation infrastructure.

"Energy storage will play an increasingly large role to meet the dual challenge. We believe in the potential for liquid air storage and compressed air storage, which can bring significantly better benefits for operators as integrated solutions become more mature.

"There are many more opportunities available to decarbonise our industry. We can detect, monitor, and reduce methane emissions, reduce flaring, and improve flare combustion efficiency. Technology drives all of this. We have seen the industry leaders like Shell expand their commitments on deploying these solutions to scale. There's great potential and we can move even faster together."

The benefits of AI

The second technology driver Simonelli highlighted was artificial intelligence. "As connectivity improves, we see more possibilities for AI and more ways to reduce costs, increase productivity, and make operations cleaner and safer," he said. "The benefits have been said many times; better insights for remote operations, increased uptime, improved safety, and reduced energy consumption. Sometimes all at the same time.

Image Credit : Baker Hughes

Lorenzo Simonelli, chairman, president & CEO, Baker Hughes.

"Even this year with the pandemic changing the way we work, AI at scale is incredibly complex, and technology is the answer to make it simpler. Hardened AI technology platforms designed specifically for AI capabilities are easier and faster to deploy and easier to scale. We need to challenge ourselves to produce AI applications within eight to 16 weeks, not months or years."

The Baker Hughes joint venture with C3.ai released its first jointly developed application within 90 days, he said. "One of those applications, BHC3 Production Optimization, has been chosen by a Canadian oil company to help better optimise oil and gas production, increasing efficiencies at scale.

"Unlocking AI is not just about the technology platform. The hardware to capture and measure data is where many operators can start," he went on. "Condition monitoring technologies from brands like Bently Nevada already have a strong presence in upstream operations, as well as downstream mechanical sectors. Every one of Bently Nevada's over six million sensors are installed on mission-critical machinery, collecting data to be fed into an AI platform. When you couple that with additional sensors pulling in data to help the tech and reduce emissions, the benefits of AI become more tangible to solve the dual challenge."

Accelerating remote solutions

The third technology driver Simonelli mentioned was remote operations. "While we hope the current situation improves, the reality is that our world has been going remote for some time, and we must take advantage of this opportunity now," he said. "Remote solutions can be installed quickly and help lower carbon emissions over time, as well as bringing the obvious social distancing benefits, but longer term, the benefits can be greater.

"We can reduce routine maintenance for gas and LNG facilities, and required activities can be concentrated during planned visits only. When planned maintenance on equipment is needed, we can reduce the number of field engineers. Just two weeks ago we saw the relevance of remote operations for business continuity when hurricane Laura approached the Gulf Coast in the USA, requiring many to evacuate oil and gas utilities.

"It is now possible to assess equipment and operations from the safety of a remote location, instead of in-person activities. The technology to do this already exists and is becoming more commonplace everywhere.

"Since the pandemic began, an unprecedented rise in adoption has occurred in remote drilling and completions, as well as remote turbo machinery string tests. More than 70% of our drilling operations are now utilising remote capabilities in over 30 countries, up from 50% in 2019. As customers adopt more remote drilling, the ability to command the well site grows, helping to reduce site costs, minimise safety risks and improve decision making."

In the testing and validating of equipment, remote visual technology, such as smart helmets, shared data platforms and remote test sites are becoming a new normal, Simonelli commented. "During the pandemic, we've utilised digital and remote technology to run gas turbine and compression train tests, and we have the capability to extend its impact forever.

"This spring, only weeks after countries issued complete travel lockdowns due to COVID-19, we successfully completed the first-ever virtual string test on turbomachinery equipment Venture Global's Calcasieu Pass LNG project. The latest technology allowed us to virtually witness the test with a total completion time of less than eight hours, and it was witnessed by 21 people in five cities globally. With these new achievements, we have opened a new era of acceptance for virtual tests, something the industry struggled to scale before.

"If we work together on these technologies, decarbonising oil and gas, expanding the use of hydrogen, unlocking AI, embracing remote operations, we will progress with the energy transition rather than fall behind it, and we will solve the dual challenge faster," he concluded.

Advancing the digital transformation of oil and gas

Thomas Siebel, author, chairman and CEO at C3.ai, spoke at a GastechTech Talk on the digital transformation of the oil and gas industry and the importance of digital technologies in surviving the impact of COVID-19.

SIEBEL BEGAN BY saying we are undergoing a "mass extension event", with 52% of Fortune 500 companies having disappeared in the last 21 years, and predictions that 40% of the companies on the planet today will not survive the next decade. New companies with "new DNA," such as Amazon, Uber, Tesla and Google are filling the vacuums that are created by this "mass extinction event."

"When we think about what these companies are all about, when we get to this issue of corporate mass extinction and digital transformation, predictions are that 70% of the existing companies today will go digital and 21% will succeed. The rest will go out of business," he said. "This digital transformation process has clearly been accelerated in the post-COVID economy."

Digital transformation has now come to the top of the agenda for the CEO and board directors.

"What are the vectors driving the information technology industry in the 21st century? These would include elastic cloud computing, like AWS, and Azure, and Google Cloud. The concept of big data means we're able today to store and manipulate data sets that were previously unmanageable. This phenomenon of the Internet of Things – we are sensoring the value chains, travel, transportation, oil and gas, healthcare utilities, the power grid, so that all the devices in the value chain are becoming remotely machine addressable.....today we've probably sensored in an order of 50 billion devices around the world. Across all value chains, this is accelerating. The confluence of technology trends such as cloud computing, big data and the Internet of Things is enabling previously unsolvable problems to be solved using artificial intelligence."

"Unless we adopt these technologies, we will cease to exist. If we look at the new normal in oil and gas, I suspect we're dealing with oil prices less than US$100/bbl for some time in the future. You have the opportunity to either reinvent yourself or slowly go out of business," he said.

Image Credit : Adobe Stock

Digitalisation is a must for oil and gas companies.

Through its partnership with Baker Hughes, c3.ai is bringing together a set of AI applications that address the entire value chain in oil and gas.

"This is what the future is all about. In a typical deployment, we will be aggregating massive amounts of data from enterprise information systems, extraprise information systems, whether might that be the weather, terrain, social media, equity prices, commodity prices, and the aggregated data will also be coming from a very large constellation in a sensor network. We aggregate those data into a unified federated image. These data might be hundreds of petabytes of data. We process this data at the rate that they arrive and these data are arriving at, say, 60 or 90-hertz cycles, so processing millions of transactions per second, typically in the elastic cloud, but sometimes on-prem, and then we bring to market a family of AI applications that address network optimisation, inventory optimisation, yield optimisation, reliability, predictive maintenance, and then energy, water, and emissions management."

The company's largest use case is Royal Dutch Shell. "There we're doing everything from AI-based predictive maintenance to offshore oil rigs to a production optimisation in wells process optimisation, refining, AI-based predictive maintenance for 550,000 valves. In that application, we're managing, I think, two million machine learning models in real-time. We began with predictive maintenance, control valves, compressors, ESPs, low-pressure compressors and offshore oil rigs. Then we moved to optimisation. Next is what they call "well fail less". This is the roadmap that we're executing over the next five years.

"It is very large scale and we are partnered there with Baker Hughes and Azure to reinvent Shell in the 21st-century economy to produce lower-cost energy, safer energy, more renewable energy, and digitally transform the company," Siebel said. ■

Digital technology helps make remote operations safer and can help reduce staff costs.

Image Credit : Adobe Stock

Going digital for effective operations

As oil and gas operators across the world seek to reopen for business, there is a strong commitment among many companies to double down on investment in digital technology. Georgia Lewis reports.

INVESTING IN DIGITAL technology is a sound move for oil and gas companies looking to move ahead as industries attempt to emerge from lockdown as cost-effectively as possible. Choosing the right digital technology can help operators become more efficient, reduce staff costs and improve safety when tasks can be performed remotely rather than in hazardous locations.

In an edition of the ADIPEC Energy Dialogue series, Morag Watson, BP senior vice president of digital science and engineering, said the oil and gas industry has been slower than other industries to open up to the possibilities of leveraging digital technologies to compete and succeed in the ongoing energy transition process.

"For me it is not just about the technology," Ms Watson observed. "Many of the technologies have been on a reasonably fast trajectory for a while. The industry has to be open to thinking, how can we do things differently?"

> "Many of the technologies have been on a reasonably fast trajectory for a while. The industry has to be open to thinking, how can we do things differently?"

"It doesn't just happen by saying here are 10 robots that are going to do your work for you. It just doesn't work that way. You have to have the right business mindset to make it possible for the technology to radically change how you do things," she added.

Advances in Internet of Things (IoT) technology, for example, have been helping operators restart effectively but the oil and gas IoT sector has been growing since before the pandemic struck. The "*Digital Transformation Market in the Oil and Gas Industry Market*" research report by MarketWatch, which covers the sector between now and 2023 has

forecast a CAGR of almost 16% with a year-on-year growth rate 17.58% during that period.

The MarketWatch report focuses on the growing need for advanced technologies in exploration activities, as well as the importance of implementing mobility solutions in the oil and gas industry. The report forecasts a CAGR of almost 16 per cent between now and 2023 for the digital technology market in the exploration sector.

In regard to mobility solutions, the report says that these innovations can "help enterprises to reduce the time spent on routine activities and provides them with information to address issues and queries."

Adding value

Deloitte is similarly upbeat about the potential of digitalisation to transform the industry for the better. In the report "*The new frontier: Bringing the digital revolution to midstream oil and gas"*, the consultancy says that the IoT is projected to add US$15tn of value to the global economy by 2030. The report concluded that "Industries are embracing technology to reshape their operating landscape and reap the benefits of improved productivity, higher efficiency, and increased cost savings. The oil and gas industry is not a stranger to this and is progressing towards digital maturity."

"*Drilling for data 2020*", a report by PwC's Strategy& division offered a case study about a medium-sized energy operator "building a digital strategy from scratch."

Strategy& worked with the company and said mini digital pilots were used, with the adoption of a mindset of "willingness to explore and 'fail fast', quickly pursuing new initiatives, such as AI, while adhering to lessons learned."

An example of one of the successful strategies was to adopt the use of AI in reservoir modelling. This meant that geologists could spend less time collating the data and more time interpreting it.

Digital twinning is another area where the oil and gas industry has started making significant strides.

In April this year, DNV GL issued an international call to oil and gas operators and the associated players along the supply chain to pilot a methodology that will prove whether the data generated by digital twins can be trusted, and if the technology is delivering value.

DNV GL's *Technology Outlook 2030,* a research report identifying transformative technologies in major industries, highlights a digital value chain run by machines and algorithms as a trend for the oil and gas industry in the decade ahead.

"Solving the digital trust challenge will be key to the dramatic evolution that we expect to see in digital twin technology in the years to come. If more sophisticated digital twins are to be widely accepted and developed at scale by the oil and gas industry, they need to be supported by accurate, valuable and trusted technology," said Liv Hovem, CEO, DNV GL - Oil & Gas. "Technology decision-makers in our sector will increasingly offer support to the use of digital twins when they see the technology provide consistent, accurate information which brings tangible value against the investment needed. Our work with TechnipFMC and other partners through this new pilot aims to provide the industry benchmark to qualifying that a digital twin will perform as intended."

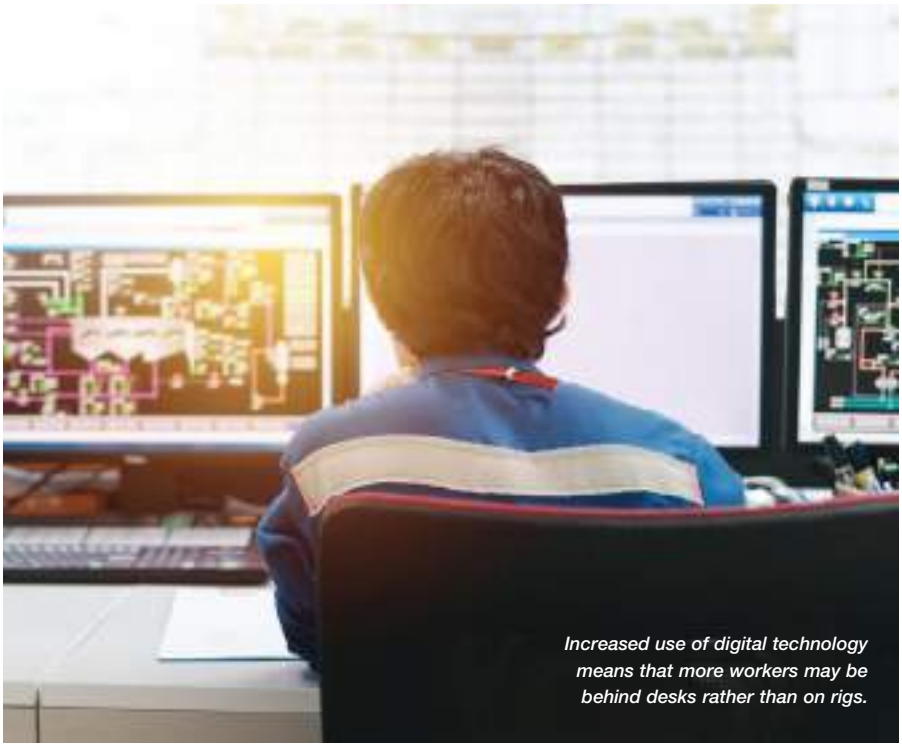


Image Credit : Adobe Stock

Increased use of digital technology means that more workers may be behind desks rather than on rigs.

> "Since drilling activity is down, operators are likely to turn their focus on improving completion and evaluation techniques."

Halliburton is an example of a company which is leveraging digital technology to cut costs.

"Halliburton executives continue to work towards a target of US$1bn in cost reductions with 75 per cent reached by end of Q2. The main linchpin in its strategy is offering operators cost savings through improved efficiencies offered by an investment in digital technologies. The company's announcement of a five-year agreement with Microsoft and Accenture continues to double down on digital technology," said Effuah Alleyne, senior oil and gas analyst, GlobalData. "Since drilling activity is down, operators are likely to turn their focus on improving completion and evaluation techniques. However, although Halliburton remains optimistic on its ability to adapt and rebound, the market remains uncertain. The company still has to contend with some very real factors, including the scalability and reproducibility of implementing digital solutions, adoption of solutions by clients and overall depressed opportunities in the market resulting from decreased global oil and gas demand. Halliburton may have mitigated haemorrhaging, but it is unclear whether that is enough in this 'new normal'."

Schlumberger has brought a new digital technology to the marketplace with Symphony* live downhole reservoir testing, a technology platform that enables operational control of the downhole testing toolstring to deliver real-time downhole measurements. Symphony testing unites Muzic* wireless telemetry with the downhole string, creating a digital solution that enables real-time control of the dynamic range of conditions during well testing operations. The digitally enabled toolstring is customised for the test objectives to position, isolate, connect, measure, control, sample, select and profile the reservoir with real-time verification.

"Symphony testing's digital enablement significantly increases operational control to acquire actionable data in real time, saving our customers operational time and achieving well test objectives more efficiently," said Aparna Raman, president, reservoir performance, Schlumberger. ■

Image Credit: Adobe Stock

Using LNG as a marine fuel could help shipowners comply with the IMO's vision.

The time is now for LNG retrofits

The shipping industry needs to accelerate its transition to the use of LNG as fuel to have any hope of meeting IMO emissions reduction targets, says Newport Shipping UK LLP.

IN APRIL 2018, the IMO's Marine Environment Protection Committee (MEPC 72) adopted resolution MEPC.304(72) on the reduction of greenhouse gas (GHG) emissions from ships. The IMO has called for the industry to reduce its average carbon intensity by up to 40% by 2030 and by 70% in 2050, compared to 2008.

The IMO's bold vision was rightly applauded by politicians, the press, climate change activists and many industry stakeholders, but unless the industry transitions to low carbon fuels, meeting these targets will be impossible. But because the IMO did not specify how these targets might be met, the resolution left owners with more questions than answers. What alternative fuels make sense? Is there adequate bunkering infrastructure? And more to the point, who pays?

For years, natural gas has been regarded as the marine "fuel of the future". After all, LNG is readily available, relatively affordable and because it has negligible NOx, Particulate Matter (PM) and zero SOx emissions, it will help owners comply with the IMO's vision. But the introduction of other alternative fuels solutions, such as hydrogen, ammonia, bio fuels and battery hybrid systems, caused many owners to hesitate. Why invest in LNG retrofits if natural gas will be replaced by other fuels that have lower GHG impacts?

> "The pathway to carbon neutral fuels starts with gas."

Slipping up

Others point to recent studies highlighting the impacts of methane slip, an issue specific to gas-fuelled engine systems. Methane slip can occur during the gas exchange phase of the cycle when unused fuel can get trapped in the combustion chamber and top piston area, allowing some unburned methane gas to escape at the exhaust into the atmosphere. Methane slip not only results in less efficiency (thus higher fuel costs), it may add to the GHG impacts, as methane is a major contributor to global warming.

In a February 2020 press conference in London, DNV GL's Maritime CEO Knut Ørbeck-Nilssen acknowledged that low carbon biodiesel, hydrogen, ammonia and synthetic fuels are promising, but said that they would take time to develop. "The pathway to carbon neutral fuels starts with gas," he stated. "It is important to act now and not to wait for the 'perfect' fuel."

As for emissions, Ørbeck-Nilssen pointed out that methane leakage had been drastically reduced in modern engines, and further improvements could be expected. Citing data provided from the engine manufacturer Wärtsilä, he noted that over the last decade, gas engines outperformed engines running marine gas oil (MGO) in terms of GHG emissions.

Engine technologies

Cato Esperø, Wärtsilä's head of Marine Sales (Norway) confirms that the company's engineers have continuously improved the emissions performance of its dual fuel engines (notably the 46DF, 50DF, 31DF), which allow ships to operate using a broad range of fuels, including heavy fuel oil, MGO, light fuel oil, bio fuel and LNG. The company has also introduced the 31SG, an engine optimised to

run on gas alone, and provides customers with the Wärtsilä Methane Number Calculator, a tool to help shipowners and operators calculate methane values in the fuel gas.

"Wärtsilä is a pioneer in the development of sustainable engine systems, including battery hybrid solutions, and is working with other key industry stakeholders to achieve zero-emissions shipping," he says. "Until we succeed, we believe LNG retrofits represent the best, most viable option."

Esperø acknowledges that LNG retrofits are expensive, but is quick to point out that owners willing to make the investment now will be in a better position to migrate to other alternative fuels as they become available. "It is important that owners secure fuel flexibility to fit their operational profile, in the short, mid and long term," he says. "For most owners, a dual fuel/LNG setup reduces business risk and provides flexibility with regards to availability of new fuels during the transition."

The cost of sustainability

Yet in a world still in the grip of the pandemic, one can forgive owners for being slow to book retrofits at their favourite yards. After all, LNG conversions are expensive, time consuming and in some shipping segments, LNG tanks can reduce valuable cargo space. Nevertheless, Lianghui Xia, managing director of Newport Shipping UK LLP, argues that further delays will all but ensure the industry will fail to meet IMO targets. "The time to act is now," he says. "Natural gas may not be perfect, but let us not make perfect the enemy of good."

Xia acknowledges that more promising fuels are on the horizon, but for the next five to 10 years, LNG as fuel represents the only credible and achievable mid-term solution in cutting emissions. Yet so far, only a small fraction of the world fleet runs on natural gas. "Newport Shipping recognises that the number one challenge for owners is cost, so in addition to providing turnkey solutions that includes equipment procurement, full-scope design work, on-site project execution, we offer a five to seven-year payment plan without fixed vessel mortgage collateral."

Collective action required

But that may not be enough. Indeed, Xia notes that if the world is serious about cutting maritime emissions, it will require more than efficient engines, skilled yards and short-term financing options. "Right now, many owners willing to make the change simply don't have the capital to invest in conversions," he says. "To reach IMO targets will take a collective effort."

Xia says that governments could offer tax incentive schemes to reward owners and charterers could help subsidise conversions to achieve lower emissions throughout the value chain. Ports could work with logistics providers to improve bunkering access, and energy companies, which would benefit from greater demand, could help by lowering the production and delivery costs of natural gas. "If climate change is a shared challenge, then so is the solution," he says. "Owners should not be forced to bear the costs alone."

To paraphrase a (likely apocryphal) quote from Sir Winston Churchill, "Shipowners can be counted on to do the right thing once they have exhausted every other option." With those options now almost exhausted, Xia says that the time to accelerate the industry's migration to LNG is now. "When it comes to climate change, we cannot afford to wait for a solution to appear – there is no vaccine for global warming," he says. "The question is not 'should we do this now?', it is 'why haven't we already started'? ■

Newport Shipping UK LLP is a global service provider for ship repair and retrofit.

LR gives Digital Twin Ready approval to HHI for gas containment tanks

LLOYD'S REGISTER (LR) has awarded Approval in Principle (AiP) to Hyundai Heavy Industries (HHI) for its Digital Health Management System for a Type B gas containment tank, following a joint development project between the two parties launched in November 2019.

The system, Hyundai Prismatic Independent IMO Type B Tank eXcellence (HiPIX), has been assessed by LR's digital experts against LR's ShipRight Procedure for Digital Compliance, resulting in HiPIX receiving Digital Twin Ready AiP.

This approval sets HHI on the path to become a Digital Health Management provider to the maritime industry, offering customers the possibility to operate and maintain their ships' Type B gas containment tanks in an optimal cost-effective way while complying with classification and statutory requirements.

HHI is aiming to develop a complete structural Digital Health Management system for its LNG Fuel Type B Tank fitted onboard the dual-fuelled ultra-large container ships that are currently under construction at Hyundai Samho Yard. This will assure structural integrity in operation and safety and enhance the ship's operational and compliance performance.

HHI's HiPIX is a suite of software and service solutions designed to assure the structural safety of Type B tanks and enhance the performance of assets by obtaining survey credit through accurate insights on the condition of tank components, using digital twin technology and data as an alternative to a physical survey. This will provide shipowners with an advantage when securing charterer contracts by lowering the through-life costs of the containment tank while maintaining a high level of safety and reliability. The digital twin's ability to process real-time data and generate insights on the health condition of the gas containment tank improves maintenance effectiveness through the ability to make just-in-time, specific maintenance advisories. Furthermore, its ability to estimate and localise incipient fault conditions allows accurate tracking and progression of faults, prior to becoming costly failures.

Seung-Ho Jeon, executive vice president of HHI Initial Design Division said, "We are glad to receive Digital Twin Ready AiP from Lloyd's Register. Now ship operators can feel confident about operating HHI's dual-fuelled ultra-large container ships by using HHI's HiPIX solution to meet the rigorous requirements of classification as well as flag administration. We plan to further develop HiPIX to include the machinery digital twin for a gas supply system by working together with LR's Marine & Offshore Innovation team."

Image Credit : Lloyds Register

Luis Benito, LR's Marine & Offshore innovation and co-creation director (right) presents the Digital Twin Ready AiP to Seung-Ho Jeon, executive vice president of HHI Initial Design Division.

Luis Benito, LR's Marine & Offshore Innovation and Co-creation director, said, "A new paradigm in shipping has started, towards remote operations, when digital health management technology starts enabling remote servicing, maintenance and testing of critical equipment for the safety of ships, with digital technology that can be trusted by ship managers and ship operators."

LR awarded the world's first Digital Twin Ready AiP to GE at SMM 2018, the first ever approval of a digital twin health management system for marine applications.

Tips to increase compressor installation efficiency

Sanjeev Sharma, regional general manager at Atlas Copco Services Middle East, offers some advice on increasing compressor installation efficiency.

Image Credit: Atlas Copco

Finding innovative ways to increase compressed air efficiency can amount to big savings in the long run.

COMPRESSED AIR ACCOUNTS for a significant part of total energy costs for industrial manufacturers – typically around 12% and maybe as high as 40% in some facilities. This means that finding innovative ways (no matter how small) to increase compressed air efficiency can amount to big savings over the long run. Items like leak elimination, air audits, reduced pressure bands, and reducing unloaded running hours are some of the most popular ways to decrease energy usage – but there are many other actions that you can take to reduce your costs and make sure your compressor system is running as efficiently as possible.

1. Ensure your compressed air equipment is sized correctly

Choosing the wrong size air compressor for your facility can lead to production issues and increased costs due to wasted energy. When choosing the right type of compressor, consider these questions:

- What is the application?
- How much air flow does my facility/workshop use?
- What is the minimum pressure needed within the facility?
- Do I need clean, dry air?
- How many hours per year does my compressor operate?
- How many shifts do I run per day?
- Is there fluctuation in flow demand between shifts?
- Are there any plans for future expansion?

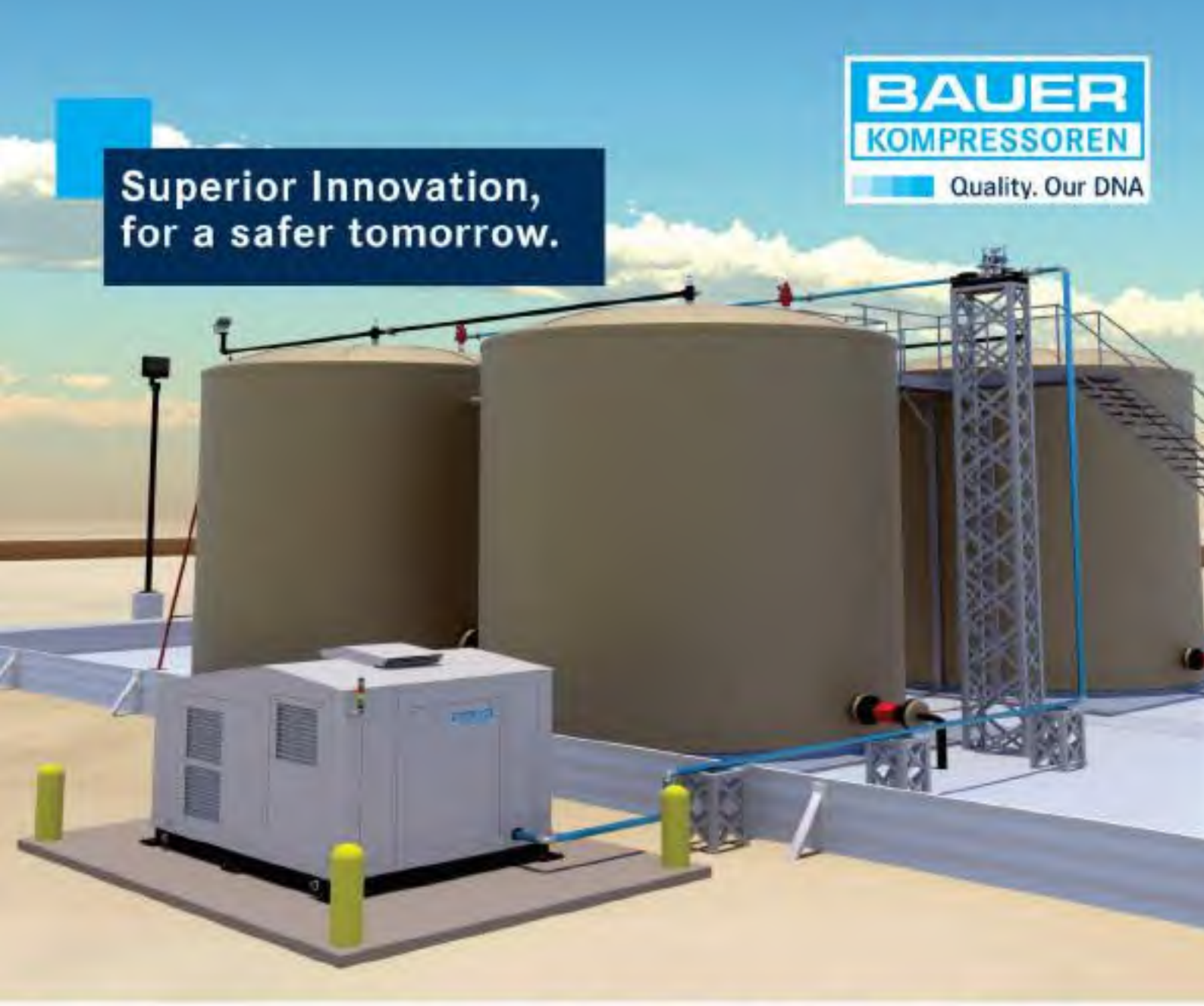
Once you have the answers to the above, make sure that you select your compressor based not only on initial cost, but on the lowest total lifecycle costs.

2. Consider new compressor technologies

Air compressors are long-term investments that will play a significant role in your business for years to come. The average factory changes air compressors every seven to 10 years, meaning that the initial capital expenditure is only a fraction of how much your compressor will cost you in total. 70% or more of your air compressor's lifecycle cost will come down to its energy usage.

Switching or updating your compressed air installation to the latest technology can reduce energy consumption by up to a quarter. If you have an old or inefficient compressor, the cost to replace it with a new compressor is often less than the current running costs. A modern air compressor with the latest controllers and energy efficient motors will contribute to your bottom line from day one.

You can also think about upgrading certain aspects of your compressor. Reach out to your compressed air provider to discuss the possibility of replacing major components of your compressor with new, more efficient



› FOR SUPERIOR SAFETY AND CORROSION RESISTANCE, CHOOSE BAUER TANKSAFE.

In the oil and gas industry, there is a multitude of volatile and corrosive compounds. A typical tank battery consists of several tanks filled with liquids and gases that may be contaminated with explosive and corrosive hydrocarbons. If the gas concentration is between the LEL and UEL, an explosion could occur causing millions of dollars in losses as well as expensive environmental fines and risk to human lives. In addition, corrosion in steel tanks can be a real problem which results in significantly increased operating costs.

Our safety solution is BAUER's Tanksafe™ Nitrogen Blanketing Systems. BAUER Tanksafe™ creates a nitrogen blanket layer inerting the headspace of tanks, to prevent the risk of explosion and significantly reduce tank corrosion. BAUER Tanksafe™ has been specifically designed using BAUER's rugged and time-proven on-demand NGM™ nitrogen generation system combined with BAUER's Tanksafe™ smart tank battery configuration. For over 70 years BAUER has created high-pressure solutions for various industrial applications.

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components. For example, upgrading your compressor with the latest type of electronic controller will allow you to take advantage of the most advanced compressor control management, reduced unloaded running and higher efficiency.

3. Make sure you have the right compressor type

Many applications in the food and beverage, electronics, oil & gas, automotive, textile, and pharmaceutical industries require oil-free air to guarantee product integrity and quality (often specified as Class 0). Oil-free compressed air technology will help to avoid expensive filter replacements, cut the cost of oil condensate treatment and reduce energy loss from pressure drop in filters.

If you have a very large-scale application, you can also consider a centrifugal compressor, given that these offer energy efficiency in process air or in bulk air applications presenting a flat load; they're also ideal for providing a baseline flow in mixed installations with VSD screw compressors.

> “Regular servicing, using OEM genuine parts, is more critical in the Middle East region.”

4. Consider VSD (Variable Speed Drive)

Most production processes require different levels of demand in different periods, which may mean that the compressor is running off-load or idle (not producing any compressed air) for long periods of time. Substantial savings can be made if a fixed speed compressor can be replaced by a variable speed drive unit as it only produces compressed air as and when required. This also minimises offload running of the compressor, which is known to waste energy. A VSD compressor saves an average 35% energy and a VSD+ unit can save as much as 50% compared to a fixed speed unit, even at full load.

5. Don’t forget the impact of regular maintenance

The best way to take care of your compressed air availability is by taking the best care of your compressed air equipment. This means investing in regular preventative maintenance, which will sustain the efficiency that you have gained by purchasing a new compressor or improve the performance of an older unit. Whether you prefer to purchase spare parts only and perform maintenance in-house, sign up to a planned maintenance programme at pre-determined intervals from the manufacturer or approved distributor, or choose a total responsibility package that covers breakdowns and leaves no room for surprises. The main thing to remember is that reduced compressor performance is inevitable as the machine gets older. Regular servicing, using OEM genuine parts, is more critical in the Middle East region where the climate is humid and dusty, and will improve your equipment uptime and energy efficiency; the opposite could lead to more downtime, increased energy consumption and potentially a costly breakdown.

6. Lastly, gather some data!

Data monitoring such as SMARTLINK data box gives you remote insight into your air system. It enables you to detect problems, identify potential improvements and even follow up on actual savings. ■

To learn more about the ways to save energy, download Atlas Copco’s guide: https://www.atlascopco.com/en-ae/compressors/offers/eleven-ways-to-make-your-compressor-installation-energy-efficient

Bauer Kompressoren introduces B-VirusFree breathing air protection

BAUER KOMPRESSOREN HAS developed B-VirusFree, a solution that eliminates viruses at the air intake stage. The system is designed to protect firefighters, divers, pressure chamber operators and medical personnel from these hazards whenever they require respiratory equipment for their daily operations.

The B-DETECTION PLUS online gas measurement system already provides accurate measurements of the commonest hazardous substances associated with breathing air, such as CO, CO_2, moisture and oil, and eliminates them using BAUER filter systems. However, a new threat now lurks in the form of viruses like SARS-CoV-2, as well as bacteria and moulds. These new dangers are particularly insidious because they are invisible and highly communicable – and cannot be measured by sensors. Inhaled in ambient air, they can pass through any commercially available standard air purification system. Even the high temperatures and pressure levels of the compression process have little effect on them because of their short exposure to the process.

The new B-VirusFree protective filter system reliably neutralises – depending on the charging rate of the compressor – up to 99.9% of the corona viruses, bacteria and special moulds, removing them from the intake air.

The chemical- and ozone-free technology of the patent-pending B-VirusFree System uses a special UV light source to destroy pathogens in the intake air flow before they can reach the compressor.

Image Credit: Bauer Kompressoren

The B-VirusFree protective filter system eliminates viruses at the air intake stage.

The 254-nm UV wavelength is absorbed by the pathogens’ DNA, where the photons destroy the bonds between the DNA strands of the viruses, bacteria and mould spores and effectively prevent them from reproducing.

B-VirusFree can be ordered alongside any new BAUER system and is also easy to retrofit. The filter system is designed for flexible mounting to a wall, and has a compact footprint for extra ease of handling and convenience.

The filter does not require replaceable filter cartridges. The UVC light source has an extremely long service life of around 2,000 hours and is simple to replace. The control unit reliably displays the filter functions and includes visual and acoustic warning signals for the event of a malfunction, e.g. in a power cut.

A standard 220/230V power outlet is all that is needed for operation. A version for regions with 110V power supply is also available.

Understanding complex flows to **optimise production**

Digital technology is transforming flow management, but an understanding of multiphase flows and fluid behaviour is essential for getting the most out of these innovations, writes Anna Pieper, multiphase flow leader, TUV SUD National Engineering Laboratory.

Image Credit: Adobe Stock

Operators should arm themselves with knowledge of multiphase flows to get the most out of oilfields.

DIGITALISATION SHOULD DELIVER improved understanding of reservoir behaviour, but a good understanding of multiphase flows and fluid behaviours is necessary too. This is because environmental conditions can cause chemical reactions which reduce production and cause stoppages or the complete loss of the well. A focus on flow assurance is therefore necessary, using expertise and chemicals to mitigate or avoid such a phenomenon.

Production is often escalated by increasing the wells choke size, leading to a significantly larger drawdown at reservoir level. Over time, this may cause reservoir weakening near the well bore and the production of solids. The maximum critical flow before sand production will change over time, potentially producing solids which will cause erosion. While erosion modelling and associated standards indicate possible erosion rates, they can be optimistic. In reality, the instant the pipe is not strong enough, a burst can happen well before complete erosion of the pipe wall.

If sand erosion and line pressure are not considered together, Computational Fluid Dynamic (CFD) models will be overoptimistic. CFD modelling should therefore be combined with Finite Element Analysis in real-time. Neither should corrosion be excluded from the analysis, and should probably be a subject of study alone.

With time, a well will produce more water, and for oil with long carbon chain components an emulsion will be created at the inversion point. The viscosity of the mixture will be at least 10 times greater than the expected oil viscosity for the same temperature, and this will lead to more friction and a significant decrease in oil production.

Test separation procedures do not accurately reflect a well's behaviour under normal production conditions. An inline system that collects continuous data will help to optimise oil flowrate production and identify slugging, which can cause operational problems.

A more global or holistic review approach should therefore be used to account for all means of production optimisation. A one-stop solution provider should be considered, which can factor in all of the different impacts, cumulative effects and their contributions to the flow measurement, pipe integrity, chemical reaction and fluid behaviour. However, the most important factor is the confidence level in the validation of the technology used and the data produced. It is meaningless to deliver a confidence level number if there is not an associated uncertainty and some form of traceability that is aligned to the process and method that has been used to reference it. A more global or holistic review approach should therefore be used to account for all means of production optimisation. ■

www.tuv-sud.co.uk/nel

The big six flowmeter technologies

Flow measurement is one of the most important aspects of process control. Jerry Boisvert, Americas product manager, Electromagnetic Flow Technology at ABB Measurement & Analytics, discusses the big six flowmeter technologies, and where to use them.

THERE ARE A wide range of flow applications and a broad variety of flowing media to measure, including liquids, gases and steam. The process can be complicated by high pressures and temperatures, suspended solids within the fluid, and entrained air. No single flowmeter technology can accurately measure all types of media or meet all application needs, although some are uniquely qualified to meet the needs of certain applications.

Selecting the right flowmeter requires you to first take a look at what media you are measuring and the measurement purpose, the application process parameters, the level of accuracy required, and the budget available.

The following six flowmeter technologies are used in the majority of applications. Other technologies include thermal mass, positive displacement, and turbine technology.

Differential pressure

This consists of a flow element, sensors up and downstream from the element, and a differential-pressure transmitter. The primary elements could be orifice plates or venturis, wedges, pitot tubes, nozzles or other devices, depending on the application conditions. A common design uses a wedge-shaped flow element that creates a restriction within the pipe to create a pressure drop from one side to the other. As the medium flows from left to right, the higher pressure ahead of the constriction is compared to the lower downstream pressure, to derive the differential pressure. The higher the flow velocity, the larger the differential pressure.

> “No single flowmeter technology can accurately measure all types of media or meet all application needs.”

Flow measurement is used in a wide variety of industry sectors, including upstream, midstream and downstream oil and gas, and chemicals.

Image Credit : Adobe Stock

Advantages: Suitable for liquid, gas and steam, tolerates extreme process conditions, has no moving parts and is approved for custody transfer.

Limitations: Limited rangeability, inferior accuracy, maintenance intensive and affected by changes in density, pressure and viscosity.

Electromagnetic (Mag Flow)

This technology relies on a magnetic coil that may be integrated with a primary transmitter, or may have a secondary sensor assembly connected to a remotely mounted transmitter. The coils are typically mounted on the top and the bottom of the meter tube. A pair of electrodes is arranged opposite one another, positioned outside of a metal tube with an inert liner. Current from the transmitter is applied to the coil package, creating a magnetic field across the metering pipe. As liquid flows through the field, it forces the negatively and positively charged particles in solution to separate, causing an induced voltage between the two electrodes that is proportional to the flow velocity.

Advantages: Simplicity, accuracy measuring electrical conductivity fluids, no flow obstructions, does not require much upstream or downstream straight piping, works with entrained solids, wide diameter range and no pressure losses.

Limitations: Only conductive liquids can be measured, measurement is less accurate with weakly conductive fluids, and deposits inside the measuring tube or on electrodes can cause errors.

Coriolis mass

These meters measure direct mass of the medium using tubes inside a sensor. An exciter imposes a ‘twisting’ motion in the medium that creates a uniform oscillation as the medium flows through measuring tubes. The higher the flow velocity, the greater the deflection of these oscillating tubes. Sensors on the inlet and outlet of the element measure the time of the oscillation, which is the phase shift and is proportional to the mass-flow rate. This provides a direct measurement of the volume of the liquid or gas flowing in the pipe.

How the major flowmeter technologies meet the most common application requirements

Liquids	Differential Pressure	Electromagnetic (Mag Flow)	Coriolis mass	Vortex & Swirl	Ultrasonic	Variable Area
Clean	***	***	***	***	***	***
Dirty	**	***	***	**	***	**
Conductive	***	***	***	***	***	***
Viscous	**	**	***	*	***	**
Corrosive	**	***	**	**	***	**
Reverse flow	**	***	***	*	***	**
Pulsating flow	*	***	***	**	**	*

Gases	Differential Pressure	Electromagnetic (Mag Flow)	Coriolis Mass	Vortex & Swirl	Ultrasonic	Variable Area
Steam	***	*	**	***	*	***
Clean	***	*	***	***	***	***
Wet	**	*	**	*	**	**
Contaminated	**	*	**	**	**	*
Corrosive	**	*	**	**	**	**

****** Performs well, ** Can be used, * Performs poorly***

Source: ABB

Advantages: This technology can simultaneously provide density measurement, which can be useful when doing mass-flow calculations. It provides data that other technologies do not, such as temperature. Measurement is unaffected by density changes, making it a good choice in applications where physical properties of the medium are not well known or variable. Large pressure drops across the flowmeter can be measured at high flow rates and viscosities. It is suitable for liquid, gas and steam and provides the highest accuracy, as well as being highly reliable and low maintenance, with excellent verification and diagnostic capability, and is approved for liquid and gas custody transfer.

Limitations: The cost is typically much higher than other technologies, and it is limited and/or expensive for corrosive fluids.

Vortex and Swirl

Flowmeters based on this principle have an obstruction referred to as a bluff body inside a pipe, which disturbs the medium flow, causing recurring vortices on each side of that body. A mechanical sensing element measures the frequency of the oscillations between consecutive vortices, which corresponds directly to the flow velocity.

Advantages: Provides good accuracy, works with all media over wide measurement ranges and has no moving parts inside the meter. By adding pressure and temperature it can be used for mass flow measurement.

Limitations: The most significant drawback is that it does not perform very well with low and pulsating flow rates. It cannot be used for highly viscous fluids, requires long inlet and outlet runs, and is not ideal for dirty or abrasive fluids.

Swirl technology is similar in measurement principle. Swirl meters also measure pressure variation in flow when interrupted by an obstruction, but the bluff body is quite different. The swirl meter has a stationary turbine rotor at the inlet. It creates a small, thread-like rotating or spiral flow of the medium that enlarges and stabilise as it moves towards the outlet. Sensors at the outlet use the speed of the rotation to calculate the flow rate.

Advantages: Has the least requirement for upstream and downstream piping, which makes it ideal for tight spaces. It can provide mass flow measurement with pressure and temperature sensing and is virtually maintenance free, providing excellent accuracy for all mediums.

Limitations: The same limitations as vortex meters.

Ultrasonic

Early designs were based on Doppler measure, while the current technology relies on ultrasonic transit time. Ultrasonic signals are transmitted both upstream and downstream. Sensors measure the differences in the transit times between the two signals. That data, combined with pipe diameter, is used to calculate the flow rate.

Ultrasonic technology is best suited to measuring liquids, such as water, cryogenic liquids, and chemicals – but it can also measure gases and vapour.

Advantages: It can be used with corrosive fluids, there is no pressure loss and it can be used in a wide range of pipe sizes.

Limitations: Sludge deposits on the pipe walls can interfere with the ultrasonic signals, although more sensors can help overcome that issue. It provides medium to low accuracy, depending the acoustic transparency of the fluid, and measurement results depend on flow profile.

Variable area (VA)

Commonly used as a cost-effective local indication of small liquid or gas flows, this technology consists of a vertical, conical column narrow at the bottom and wider at the top, with a specialised float that moves freely up and down. Flowing fluid enters the bottom of the meter, passes upward through a metering tube, around the float and exits at the top. Flow rate is read by noting the position of the float against the calibrated scale etched on a sight glass. Remote measurements are also possible using sensors that measure the height of the float.

Advantages: Able to measure all mediums, it is low cost, able to handle high pressures, and provides easy, dependable on-site flow monitoring.

Limitations: It can only be used for relatively clean liquids and gases, with measuring accuracy depending on process conditions and fluid properties. It is not suitable for liquids containing solids and has no totalising function.

With a better understanding of the different flowmeter technologies and how each can be applied, you can go back to the three qualifying factors – media and application, level of accuracy, and cost (budget). Evaluate each of those factors with the new knowledge learned about the technology and where best to use that technology. You will then find the optimum technology for your needs.

It is advisable to engage vendors that provide such technologies to gain further insight into their specific product capabilities, measurement accuracies, pricing, etc. to ensure you have all the facts as you make your decisions. ■

This is an abbreviated version of an ABB white paper which can be obtained at https://request-center.com/299

A collaborative approach for oilfield automation

Integration of controllers from Schneider Electric with FOUNDATION Fieldbus (FF) gateway from Technology Partner Softing resulted in a secure and reliable solution for a Middle East operator.

The project aimed to achieve a major expansion of the operator's facilities.

Image Credit: Softing

AN INCREASING NUMBER of projects in process automation are now aiming to achieve best-in-class solutions, in which the most suitable components from a range of vendors are utilised. This is being driven by a reluctance on the part of facility operators to rely on one-stop solutions from a single provider that may not meet requirements in all applicable circumstances. If parts from multiple companies are deployed, however, facility operators must ensure they can be integrated and work together as a combined solution.

Several years ago, automation specialist Schneider Electric launched a Technology Partner programme with the aim of ensuring this kind of effective integration. This programme – which has created an "ecosystem" of providers whose products complement each other – counts Softing Industrial Automation among its members. The Softing and Schneider Electric partnership focuses on data communications, with a key emphasis on fieldbus technology. Together, the two companies won a major contract in the oil and gas sector in the Middle East.

Oilfield expansion with FOUNDATION Fieldbus expertise and optimised IT security

The customer was an operator of oilwells in the Middle East. The project aimed to achieve a major expansion of these facilities as well as the pumping capacity for the seawater used to force the oil to the surface. In a departure from strategies for existing wells, the operating company decided to bring another provider on board rather than simply procure the automation components according to a 'one-stop-shop' principle. Key criteria in this process included the interoperability of the existing systems with the new provider's solution, and effective remote management.

> "Key criteria included the interoperability of the existing systems with the new provider's solution."

The tender documents published by the oil company specified FOUNDATION Fieldbus (FF) as the automation technology to be used in the expansion project for this oilfield. Improving IT security was another key specification for the project. To date, the client had worked with Yokogawa, and the plan was to maintain deployment of the latter's SCADA system. To optimise the client's cybersecurity operations, however, best-in-class products were to be used from several manufacturers.

Schneider Electric successfully outbid several other process automation companies to win the contract. For the initial expansion phase, the company supplied 70 Foxboro SCD2200 controllers (RTUs), which were to

communicate with the existing master automation system, Yokogawa PRM. The success of this initial phase was also due to Schneider using its Partner programme to make Softing's gateway products part of the solution. The name Softing has a long association with FF solutions, especially since most of the FF field devices on the market have Softing FF stacks. While Schneider's reliable controllers are a trusted solution in the oil and gas sector in particular, the Softing gateways were essential for their deployment in this expansion project. This was because the Foxboro controllers offered by Schneider Electric since its acquisition of Invensys in 2014 communicate via Modbus/TCP and so do not 'speak' FF. With Softing's gateways, the OT systems were integrated via FOUNDATION Fieldbus inexpensively and with minimal effort.

The FG-110 FF gateway was deployed in the first project phase. This gateway connects the new facility components via an FF-H1 interface to ensure fault-free data exchange, while also supporting the FF-specific communication options used for device configuration, monitoring and diagnostics, for example. As a result, controllers utilising the Modbus protocol can also be used in an FF environment. In the second phase of the project, the successor model FG-200 was brought in. It offers up to four FF-H1 links in controllers with Modbus support, while also supporting device redundancy and deployment in explosion hazard areas. FG-200 also enables fast access to process data and exploits FF benefits such as reduced cabling effort, centralised field device parameterisation, comprehensive diagnostic options, or links with intrinsically safe devices.

> "The remote maintenance options offered for field devices is a particular benefit for maintenance technicians."

Communications between the Yokogawa SCADA, the Schneider controllers, and the Softing gateways has been working without a hitch. As a last step, the operator opted for MTL power conditioners.

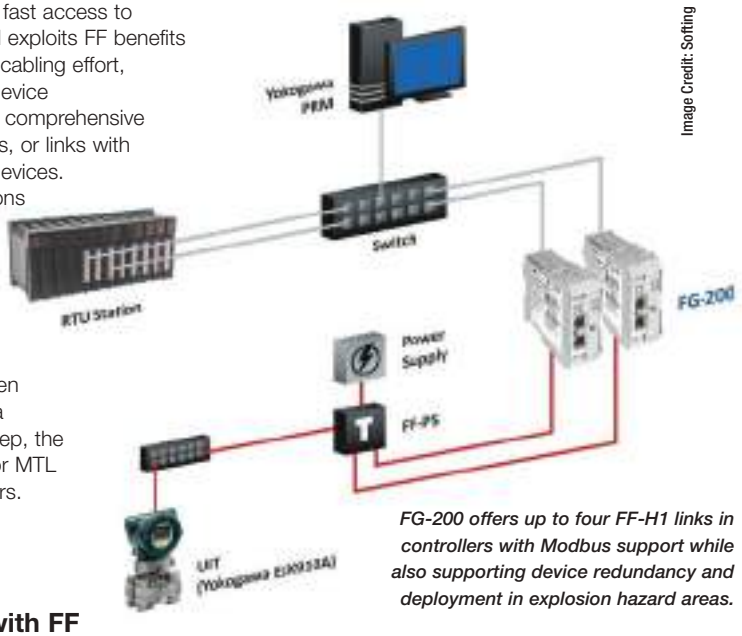

Image Credit: Softing

FG-200 offers up to four FF-H1 links in controllers with Modbus support while also supporting device redundancy and deployment in explosion hazard areas.

Simple parameter setting and monitoring with FF

During the project, Softing also provided training to Schneider Electric employees as well as the client's operator/maintenance team, whose previous focus had naturally been the Yokogawa systems. The deployment of an additional local technical support team during project commissioning ensured the successful acceptance of this proof of concept involving several different manufacturers.

The remote maintenance options offered for field devices by FF technology is a particular benefit for maintenance technicians, whose assignments would otherwise involve driving hundreds of kilometres around the extensive oilfield to fix a problem. Facility operators also benefit from the user-friendly solution, which includes browser-based parameter setting. Since the gateways can process commands sent using Modbus/TCP and FF protocols, control engineers can complete monitoring and diagnostic work from the comfort of the control room.

"Both of the teams at Schneider Electric and the oilfield operating company were very happy with the gateway technology and the support provided by Softing," commented George Melico, lead engineer at Schneider Electric. "So when the next expansion stage was due, we once again chose Softing gateways – this time picking the new FG 200 version." This lets the facility operator continue to deploy its preferred Foxboro controller solution from Schneider while also exploiting the low-cost, operator-friendly FOUNDATION Fieldbus technology in the field.

Thomas Hilz, VP Strategic Accounts at Softing said, "Projects on this scale demand outstanding flexibility and customer focus. We're proud to call these qualities our own, and we are very happy to have been a contributor in this project's success story." ■

Unified solution for reducing risk in converged IT/OT environments

TENABLE, THE CYBER exposure company, has announced the integration of Tenable.ot 3.7 and Nessus Professional to help organisations secure both IT and operational technology (OT) devices in converged environments. For the first time, customers can use a single solution – Tenable.ot – for visibility and control to secure IT assets alongside OT systems and reduce their cyber risk in converged, modern environments.

With digital transformation, cyberattacks are increasingly creeping laterally between IT and OT. The Tenable.ot 3.7 release comes on the heels of the National Security Agency (NSA) and Cybersecurity and Infrastructure Agency's (CISA) alert AA20-205A about the targeting of critical infrastructure by exploiting internet-accessible OT assets. This expanding attack surface and new attack vectors brought by convergence, whether planned or unplanned, require a holistic OT security solution that can precisely identify, assess and protect against both IT- and OT-specific threats within an OT environment.

"Modern OT environments increasingly interconnect with IT as organisations seek to optimise costs and accelerate innovation. The result is a complex, sensitive and vastly expanded attack surface where you cannot manage OT cyber risk discreetly," said Renaud Deraison, chief technology officer and co-founder, Tenable. "Tenable.ot 3.7 gives organisations the comprehensive visibility, control and precision to manage, measure and reduce the cyber risk of their IT assets alongside their OT systems."

Tenable.ot 3.7 allows critical infrastructure, manufacturing and industrial organisations to benefit from the efficiencies and cost savings of interconnecting their IT and OT environments without introducing unnecessary and unacceptable risk. Features include unified visibility; security and control of converged infrastructures; vulnerability prioritisation rating (VPR); adaptive assessment; extended depth and breadth of coverage; and threat intelligence from the security community.

Advancing the deployment of non-metallic materials

The benefits of non-metallics are increasingly being recognised, and Saudi Aramco is playing a leading role in promoting their use. Louise Waters reports.

NON-METALLIC MATERIALS ARE increasingly being deployed across multiple industries including oil and gas, construction, automotive, packaging and renewables. The use of non-metallic pipelines offers a number of benefits to operators over using metal pipes, as they are corrosion-resistant, durable, lightweight and flexible, with the added benefit of having a reduced carbon footprint compared to metallic alternatives. They have potential to be spoolable, reducing transport costs and facilitating installation. The application of non-metallic tubulars in downhole operations can lead to cost savings due to reduced workflow and interventions, greater well integrity, improved safety levels and lower environmental risk.

A leading proponent of non-metallics is Saudi Aramco, which now uses non-metallic pipe in the majority of its oil and gas facilities, as well as for most utility applications in its plants. The company has successfully deployed more than 5,000km of non-metallic pipes, resulting in a significant increase in efficiency and reduction in maintenance and replacement costs across the company's operations.

Commenting on the deployment of reinforced thermoplastic pipe (RTP) in the Khurais megaproject, Saad A. Qahtani, manager of Chemicals Business Strategy at Saudi Aramco said in an article entitled 'Beyond the pipeline', "Life cycle costs of RTP were determined to be a third of carbon-steel pipe, thanks to the elimination of corrosion monitoring costs. Installation time also revealed a stunning contrast, with the Khurais RTP flowline construction coming in at less than two days, compared to the typical 70 days for laying carbon steel.

"Our tests also endorsed RTP's safety advantages, including the pipe's lighter weight that made it easier to transport and install, and the elimination of some tasks including welding."

Promoting local manufacture

In view of these advantages, and in line with Saudi Aramco's strategy to support R&D, promote localisation, deploy lower carbon intensity applications and find new uses for its hydrocarbons, Saudi Aramco has sought to promote the local manufacture of non-metallic materials.

In April 2019 the USA's NOV announced the opening of its Fiber Glass Systems facility in Dammam, which manufactures spoolable and jointed GRE pipe, GRE high-pressure line pipe, and downhole tubing and casing.

"Bringing composite solutions from our Fiberspar and STAR product lines to the Kingdom will allow us to help our customers eliminate corrosion in their applications, reduce installation and maintenance costs over their pipe's life cycle, and more cost-effectively transport higher quality resources to the market," the company said. "Saudi leadership has consistently sought out improvements that will drive higher levels of efficiency, safety, and environmental stewardship, and modern, composite materials represent the latest advancements in that journey."

> "Further progress came with Saudi Aramco's signature of a joint venture agreement with Baker Hughes to establish a Non-Metallic Joint Venture."

Further progress in came with Saudi Aramco's signature of a joint venture agreement with Baker Hughes in February 2020 to establish a 50/50 Non-Metallic Joint Venture. The joint venture will be a multi-sectorial non-metallic investment platform designed to innovate, develop and manufacture composite materials for both oil and gas as well as non-oil and gas applications.

The JV will leverage polymer materials and manufacturing processes to deliver transformational non-metallic products, starting with Reinforced Thermoplastic Pipes (RTP) with an investment of around US$110mn. The JV facility will be located at the King Salman Energy Park (SPARK), and will serve the MENA region.

In a bid to accelerate the global deployment of non-metallic materials and advance related technologies, the Non-metallic Innovation Centre (NIC) was established in 2018 in Cambridge, UK, a collaboration between Saudi Aramco, The Welding Institute and Abu Dhabi National Oil Company (ADNOC). The NIC (www.non-metallic.com) brings together partners from academia, oil and gas companies, composite material manufacturers, and other research entities to fast-track product development, testing, and commercialisation of composite non-metallic pipeline technologies.

Speaking at the official launch in September 2019. Ahmad Al-Khowaiter, Saudi Aramco CTO, said, "The industry is waking up to the benefits of non-metallic material for numerous applications.

"The NIC will promote the utilisation of advanced polymeric materials by conducting research that addresses challenges in their development and implementation. The initiative is part of Saudi Aramco's efforts to leverage its extensive hydrocarbon resources and technology development capabilities to deliver solutions that meet future energy needs in a sustainable way."

Dr. Alan Nelson, ADNOC's CTO added, "Non-metallic solutions are continuing to reshape industries around the world. From cost-efficient and durable pipelines to lightweight car designs, this technology has abundant science and engineering uses. In line with our Oil & Gas 4.0 mission, ADNOC

is dedicated to leading and advancing this technology. Accelerating growth in new non-metallic applications also creates new markets for crude and refined products. We are excited to partner with TWI and AramcoTech to help drive cutting-edge non-metallic solutions for the oil and gas industry and beyond."

Addressing the challenges

Despite the advantages of non-metallic materials, there is still some resistance in the industry to their use and deployment. Aramco's initial examination demonstrated that the slow penetration rate of non-metallic pipes and other equipment in the oil and gas industry is primarily related to the technical limitations of current products, in terms of temperature/pressure and chemical compatibility, and their failure to address new field challenges (increasing temperature cut and hydrogen sulfide/carbon dioxide levels). This is perpetuated by the lack of reliable inspection and fitness for service assessment methodologies of in-service composite pipes. Another issue is the lack of confidence in the long-term performance of non-metallic pipes and their potential degradation with time.

NIC's development activities are therefore initially focusing on four key areas related to composite pipes:

- Expanding the operating envelope: To further increase the implementation of spoolable compositive pipes, it is necessary to expand their operating window in terms of temperature and pressure, and cost effectiveness;
- The development of cost-effective inspection and monitoring techniques for composite pipes and joints, with statistics showing that most failures of composite pipes take place at the joints;
- Developing reliable integrity assessment procedures to quantify the severity of detects and flaws in non-metallic pipes, that help operators and engineers to take appropriate repair and maintenance decisions;
- Improving the existing standards and developing new ones that cover manufacturing and installation procedures, in addition to fitness for service assessment regulations.

> "The world is waking up to the benefits of non-metallic material for numerous applications."

NIC initiatives to date include an agreement with Future Pipe Industries on research towards enhancing the application of RTR (Reinforced Thermoset Resin) pipes in harsh environments found within the oil and gas industry; and an agreement with Netherlands-based flexible composite pipe solutions provider SoluForce to undertake collaborative R&D aimed at expanding the operational capabilities of plastic pipe systems in service. Research will focus on increasing the operating temperature and pressure that reinforced thermoplastic (RTP) pipes are able to withstand when transporting hydrocarbons, and develop an affordable RTP solution.

NIC has also invested in a TWI – DNV GL collaboration that will see them jointly develop the first industry guidelines for the design and qualification of composite tubing and casing for downhole oil and gas applications. These will lead to a reduction in the amount of full scale testing required, providing a toolkit with which to optimise associated costs and engender a higher level of confidence in product performance.

The guidelines will utilise experience from across the value chain of composite pipes, and state-of-the-art design pyramid practices developed in DNV GL composite standards such as DNV GL-ST-C501 and DNV GL-ST-F119. ■

The advantages of non-metallic pipe systems

Robert Jan Berg, managing director, SoluForce, discusses the benefits of SoluForce Flexible Composite Pipe systems.

How do you view the market for your products now in the Middle East oil and gas sector?

We see the market for Flexible Composite Pipe systems constantly growing against existing steel pipeline solutions. Why invest in steel infrastructure that is corroding away and needs constant attention and maintenance? We strongly believe that the market for non-metallic pipe systems will keep growing, certainly in the Middle East oil and gas sector. In difficult times especially, you want your investments to last and decrease operational cost. SoluForce non-metallic pipe systems do just that.

How do your pipes stand up to the high pressure/high temperature/corrosive environment in the Middle East?

First of all, SoluForce pipe systems are fully non-metallic so corrosion is never an issue. Furthermore SoluForce was designed with the Middle East market in mind. It offers a range of pipe systems to meet operating pressures up to 233 bar / 3384 psi and operating temperatures up to 85C / 221F.

SoluForce pipe systems are used extensively in the Middle East.

Image credit: SoluForce

To what extent is the COVID-19 pandemic impacting your business and operations?

Safety is our first concern for all and everyone involved. However we remain dedicated to support our customers in these difficult times, as best as we can. Many of our projects are still ongoing, however we do see some that are postponed until restrictions are lifted.

Are there any technology trends and developments you would like to highlight, or new products you are planning to launch?

Next to the traditional oil and gas markets, SoluForce is very much involved with new energy projects. Our H2T pipe system is the first certified non-metallic pipe system for transport of hydrogen at high pressure in the world. We are also closely connected to many other new energy developments, both on- and offshore. These are interesting times.

APM 4.0: from cost centre to revenue stream

Implementing APM 4.0 changes the asset from being merely a cost centre to a major driver of profitability, says Kim Custeau, global asset performance management lead, AVEVA.

NEW TECHNOLOGIES ARE a game changer for industry. These include things like the cloud, big data management, complex systems modelling and advanced analytics; and concepts, such as the Industrial Internet of Things (IIoT) and Industry 4.0. Independently, these technologies offer businesses the ability to strategically plan, forecast and optimise their operations. Combined, they are a hugely powerful set of tools that are enabling businesses to do more with less.

Nowhere is this more apparent than in machinery and its maintenance, something we refer to as Asset Performance Management (APM) 4.0.

Delivering operational excellence

APM 4.0 revolves around driving new insights and innovations for operational excellence. Traditionally, machine maintenance came at a cost; either planned through scheduled stops to address everything from equipment performance to inspections, or unplanned – those unforeseen events that reduce return on investment by causing disruptions in quality, cost and cycle time. To grasp the size of this problem, data from ARC Research estimates the average cost of downtime per hour at US$260,000.

This is simply not sustainable. In a global and competitive market, businesses need to improve asset reliability, increase asset life, and cut disposal costs. This is where APM 4.0 is turning maintenance from cost centre to revenue stream.

Prevent failure and optimise performance

Implementing APM 4.0 involves a comprehensive maintenance strategy that leverages existing data, predictive analytics and simulations, and forecasts to understand the true issues driving asset performance and reliability. By implementing risk-based maintenance, organisations can move beyond preventing failure and adopt a strategy that balances risk, cost and performance of assets for efficiency and profitability.

In other words, moving from, "What will happen?" to "What should we do?". This changes the asset from being merely a cost centre to a major driver of profitability for the business.

Image Credit : AVEVA

Kim Custeau, global asset performance management lead, AVEVA.

In an increasingly competitive market, organisations across multiple industries need to be able to take the bold steps necessary to optimise their maintenance strategies and operations. A rigorous, risk-based maintenance solution that can evaluate how risk, cost and performance should be balanced over time to deliver sustainable outcomes isn't a choice anymore, but a necessity.

Implementing APM 4.0 enables the transition to full, risk-based maintenance for improved asset performance, increased asset reliability, reducing risk and, ultimately, delivering maximum return on asset investments. ■

For more information on AVEVA and its APM 4.0 expertise visit the website at https://sw.aveva.com/asset-performance-management-4-0

Image Credit : Adobe Stock

New technologies are a game changer for industry.

Autonomous FloFuse optimises flow control and enables maximum recovery

TO ENSURE EFFECTIVE water injection distribution into the reservoir in horizontal wells, Injection Control Devices (ICDs) can be installed to balance the heel-to-toe outflux. However, in vertical or deviated wells, naturally fractured and hydraulically fractured reservoirs, passive ICDs are not effective, and additional measures are required. Common solutions include deploying complex intelligent well completions or sliding sleeve assemblies that can be functioned to isolate high outflux compartments in the wellbore, requiring intervention to log the well and deploy shifting tools.

Tendeka, a global specialist in advanced completions, production solutions and sand control, has developed FloFuse, a new autonomous ICD. As the first distributed injection valve that actively reacts to the dynamic well environment, the bi-stable device responds to existing or developing thief zones in the well to distribute injected water to lower permeability zones.

Importantly, this technology provides a simple and cost-effective alternative to both intervention-based methods of isolating thief zones, and to CAPEX-intensive intelligent well systems.

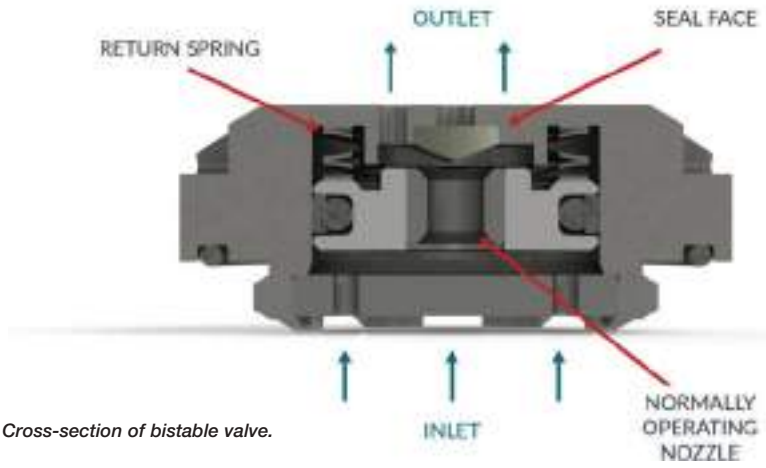

Image credit: Tendeka

Cross-section of bistable valve.

FloFuse operates by utilising the flow through a normally operating nozzle to create a piston force. Once the flow exceeds a predetermined rate, indicative of flow into a fracture, the valve reacts to isolate the normally operating nozzle, closing or restricting flow to that zone. The FloFuse completion is designed for the application using dynamic reservoir simulation to optimise the total injection capacity, flow distribution, number of zones and zonal capacity, and ensure effective management of fractures.

By autonomously optimising flow distribution into the fracture/matrix structure, the operator can minimise the impacts of natural fractures and dynamic fracturing on the injected fluid conformance, reducing the volume of water injected and increasing ultimate oil recovery.

Poor vendor advice main reason for digital transformation failure: IFS

CULTURAL MISALIGNMENT AND poor vendor advice are among the main reasons why digital transformation projects fail, according to a study from global enterprise applications company IFS.The study is based on responses from more than 3,000 global executives representing a broad industry scope.

Despite the uncertainties caused by the COVID-19 pandemic, the majority of companies are planning to increase their digital transformation spend, according to study findings earlier this year. With more businesses investing, with the aim of driving revenue post pandemic, the cost of failure is high, and it is becoming even more important to get investment right.

Poor advice from vendors tops the list of why digital transformation projects fail, at 37% of those surveyed. A resounding 48% of respondents at companies with revenues between US$850–950mn stated that they had been forced by senior management or the board of directors to use a well-known vendor that was a poor technological fit.

Combined with poor vendor advice, technology selection teams, especially among businesses with revenues around the one billion dollar mark, are also being pressured by senior management to select well-known vendors, even when they are a poor fit for the company's actual needs.

The top two most important traits when evaluating vendors were given as specialist industry expertise (32%) and long-term solutions (30%).

As digital transformation spend is increasing around the world, businesses look for technology vendors whose ethics (29%) and culture (23%) align with their own.

"The fact that a non-tangible such as ethics is ranked among the top three vendor traits is inextricably linked to the fact that poor advice from vendors was rated as the top reason for failure," IFS chief customer officer Michael Ouissi said. "Companies investing in technology should expect their vendors to adhere to sound sales and marketing practices based squarely on actual customer value."

Image Credit : IFS

Specialist industry expertise and long-term solutions are key traits required from vendors.

With a focus on previous experiences from past digital transformation projects, the study finds that budgets and timelines are two major pain points. Respondents indicate that failure in past projects makes management more reluctant to engage in future digital transformation efforts, with budget overruns topping the list of reasons management may put the brakes on critical projects at 28%, and 26% saying blown timelines on past projects have made management more risk averse.

Further analysis of the findings shows that success of these digital transformation projects primarily hinges on finding the right technological fit (44%) and establishing clear objectives (50%). In fact, the top three vendor trust factors highlighted by respondents are on-time delivery (44%), support before, during and after project completion (41%), and delivering projects faster to value (35%).

New radar antenna for level measurement

SIEMENS HAS INTRODUCED the Sitrans LR250 PLA (polypropylene lens antenna) radar level measurement transmitter, a field-proven device delivering reliable level readings for inventory management or critical process control.

This high performing horn and lens design is a perfect fit for corrosive chemicals level measurement with a nominal pressure and temperature environment.

Sitrans LR250 is available with HART (Highway Addressable Remote Transducer), Profibus PA, or Foundation Fieldbus protocols to support the digitalisation journey. With the graphical Quick Start Wizard, the Sitrans LR250 is operational in minutes, and the infrared handheld programmer supports local programming. Process Intelligence signal processing ensures reliability and maintenance-free operation. It has proven to be a reliable performer for bulk liquid storage tanks, process vessels with agitators, vaporous liquids and low dielectric media.

Image credit: Siemens

The Sitrans LR250 PLA radar level measurement transmitter.

Fluenta releases new flare gas meter software

FLUENTA, A SPECIALIST in ultrasonic measurement and management technology for the oil and gas, petrochemical and LNG industries, has announced the release of the new version of UFM Manager Software for the FGM 160 flare gas meter.

UFM Manager provides enhanced system control to customers through an accessible and user-friendly software programme that manages on-site Fluenta meters from any Windows 10 laptop, tablet or PC. The new software incorporates all the features required for daily maintenance. These include plotting graphs and live data, as well as custom flow meter alarms, both with full operator access available.

UFM Manager allows control room security to monitor and troubleshoot the FGM 160 system. As well as this, its access level can be assigned to each user. This includes maintenance engineers, ensuring access to the system is only available to properly trained personnel.

Julian Dudley Smith, director of Fluenta, commented, "The advancement in the new UFM Manager software is just a small insight into the innovative systems that Fluenta is currently working on."

AW-lake launches new clamp-on ultrasonic flow meters

AW-LAKE HAS introduced a new series of clamp-on ultrasonic flow meters that fasten on the outside of vertical or horizontal pipes ranging in size from ½" through 48". Housed in a water- and dust-tight NEMA 4X polycarbonate enclosure, the clamp-on ultrasonic flow meters are compatible with a range of metal and plastic pipe materials and "difficult liquids" such as chemicals, viscous liquids, and abrasives that would damage standard flow meters. The non-intrusive, clamp-on ultrasonic sensors feature enhanced flow measurement with no pressure drop in a range of applications such as food or chemical processing plants and oil refineries.

Operating from 100 – 240VAC, the clamp-on ultrasonic flow meters offer an isolated 4-20mA output that can transmit flow readings to remote displays, recorders, or controllers. The programmable relays are usable for flow control, pump protection or flow proportional pulse. A built-in keypad and simple menu system simplify calibration and programming of pipe diameter, pipe material, liquid types and measurement units. A 128MB data logger is standard. Optional MODBUS RTU via RS-485 or HART communication protocols are available for connection to automation systems that enable users to receive instantaneous flow rate, volume and total, run hours, and diagnostic information. The flow meters are designed to operate at temperatures of -40°F to 300° F (-40°C to150°C).

Image credit: AW-Lake

The flow meters fasten on the outside of pipes.

Collaboration for real-time well visualisation

Image credit: Jonathan Cutrer/Flickr

The collaboration will provide next-level real-time well visualisation in 2D and 3D.

WEATHERFORD INTERNATIONAL HAS announced a strengthened collaboration with upstream data visualisation provider INT to provide next-level, real-time well visualisation in both 2D and 3D. Weatherford will embed INT's IVAAP framework into the Weatherford Centro digital well delivery software, advancing its data visualisation capabilities.

"Weatherford's selection of the IVAAP framework for their Centro software is extremely exciting for INT," said Dr. Olivier Lhemann, president of INT, Inc. "Centro is leading the industry-wide digital transformation as part of a new generation of applications built fully in HTML5. It is both highly collaborative and powerful, but still very user-friendly. INT has worked with Weatherford for many years and we are proud to be part of their innovative approach to integrating data and analytics within a single platform."

Weatherford Centro digital well delivery software offers workflows that seamlessly integrate every element of an operator's well data, allowing team members from any global location to access, share, and store all vital project information at any time. Combining Centro's advanced data visualisation capabilities with the IVAAP framework provides next-level real-time well visualisation in 2D and 3D.

"Weatherford provides digital solutions that help our customers reduce costs and increase operational efficiency," said Gustavo Urdaneta, Drilling Software global manager at Weatherford. "The proven E&P data visualisation and open architecture design was a critical factor in selecting the IVAAP framework to enhance the value of user centric visualisations in our well delivery software."

Both companies have built a strong relationship by embedding advanced HTML5 domain visualisation libraries and modules from INT in several Weatherford software applications.

Jotun signs contract with MSC

JOTUN HAS SIGNED the first commercial contract for Jotun Hull Skating Solutions (HSS) with MSC (Mediterranean Shipping Company).

MSC will install the Jotun HullSkater, a robotic technology that has been designed for proactive cleaning, and the specially developed high performance SeaQuantum Skate antifouling as parts of the Hull Skating Solutions, on the 14,000 TEU MSC EVA later this year. The solution will then proactively work to ensure an "always clean" vessel hull, with no biofouling, optimal efficiency, reduced fuel costs and significantly lower CO_2 emissions.

Image credit: Jennifer C./ Flickr

The solution prevents fouling.

Designed to help shipowners facing the most severe biofouling challenges, HSS combines the antifouling and robotic cleaner, housed onboard the chosen vessel, with proactive condition monitoring and high-end technical service, with performance and service level guarantees. Jotun operators control the HullSkater via a 4G connection, conducting cleaning and inspections in line with individual vessel schedules developed through a proprietary algorithm and big data.

"We are acutely aware that the shipping industry needs to adopt innovative solutions to meet ambitious environmental goals," stated Giuseppe Gargiulo, head of Newbuildings, MSC Mediterranean Shipping Company. "We believe HSS will help solve the problem of biofouling, equating to strong benefits for the natural world – through reduced emissions and decreased spread of invasive species – and better results for our business, customers and society."

The Jotun HullSkater, which utilises magnetic wheels to cling to vessel hulls, works to remove individual bacteria and biofilm before macro-fouling grows. This not only delivers peak performance, and unlimited idle days for shipowners, but minimises the need for reactive cleaning, cutting costs, environmental risk and optimising fleet flexibility.

EQUATE Group introduces inspection robot

THE KUWAIT-BASED EQUATE Group has announced its third internationally-patented invention – an innovative 'Mobile Non-Destructive Testing Inspection' robot that will increase safety, efficiency and quality during maintenance of its facilities. The new robot enables new levels of access to confined locations during maintenance inspections without human intervention.

Image credit: Michael Coghlan/Flickr

The robot will increase safety during maintenance.

The robotic solution, successfully patented through the United States Patent & Trademark Office, was invented by a team of EQUATE engineers, in collaboration with the Kuwait Foundation for the Advancement of Sciences (KFAS) and the Sabah Al-Ahmad Center for Giftedness and Creativity (SACGC).

Nawaf Al-Khaledi, vice president for Technical Services at EQUATE Group, said, "The invention is a measurable improvement in the use of effective technology to support and advance maintenance. This robotic solution will not only keep employees safe, but also improve productivity levels, cost and time efficiencies for our business."

Inatech launches ShiptechLite for smaller firms

GLENCORE'S INATECH HAS launched a new version of its Shiptech bunker fuel management system, called ShiptechLite, addressing the needs of smaller shipping firms.

Alok Sharma, senior vice president at Inatech said, "We have collaborated closely with smaller shipping companies to match the product very closely to their differing needs at a price point that suits their business models."

ShiptechLite is a cloud-based decision support tool that focuses on the bunker procurement process. It automates the entire RFQ process at a glance, managing everything from creating and sending out requests to conducting multiple stakeholder negotiations, and finally to stemming the order. It has a powerful negotiation tool which makes port recommendations, and analyses the tactics of suppliers based on previous orders to make choosing the best deal easier. Other tools include vessel position tracking and access to Ship & Bunker market prices for 250+ bunker ports across America, EMEA and Asia/Pacific regions. It supports multiple product types and all new fuels including HSFO, LSFO, VLSFO (0.5%), ULSFO (0.1%), IFO, LNG, sludge and additives.

ECOM launches 10-inch tablet for hazardous areas

ECOM HAS INTRODUCED the Tab-Ex Pro, a 10-inch Android tablet for Zone 2/22 and Div. 2 hazardous areas. The Tab-Ex Pro's large display is ideal for demanding applications and for accessing web-based content. It allows employees to easily transition from working in the field to working at the office.

The new tablet enables customers to meet the challenges of digitalisation while simplifying the way employees work in increasingly complex environments.

The tablet's 10-inch screen is perfectly suited for displaying and working with interactive, web-based, and augmented reality content and apps, even in hazardous areas.

Rugged and lightweight, the Tab-Ex Pro is based on Samsung's Galaxy Tab Active Pro tablet, with features such as Google AR Core, facial recognition, and a Qualcomm SDM670 Octa-Core 64 bit 2.0 GHz, 1.7 GHz processor. Samsung KNOX and Android 9 guarantee high data and device security. With the help of Samsung DeX mode, users can connect the tablet to a large screen and keyboard. The

Image credit: ECOM

The new product will be available with NEC/CEC approval starting in September, and with ATEX/IECEx approval starting in October.

Tab-Ex Pro supports applications for lone worker protection, which are especially necessary for industrial use and in hazardous areas. It is equipped with a programmable button for fast and effective emergency calling.

The Tab-Ex Pro is tailored to applications in the oil and gas, chemical, pharmaceutical, food and beverage, and aviation industries. The new product will be available with NEC/CEC approval starting in September, and with ATEX/IECEx approval starting in October.

Geoteric introduces new seismic interpretation products

GEOTERIC HAS LAUNCHED two new AI-powered seismic interpretation products.

Collaborative AI enhances traditional interpretation, and efficiently extracts faults from seismic data at the click of a button. By moving from line by line manual analysis to Collaborative AI, the interpretation is augmented with artificial intelligence, which enables faster and more accurate results.

Geoteric Stratum is a new cloud-based AI software that delivers simple usability and even greater detail for fault identification, reservoir compartmentalisation, and well trajectory planning. It provides an extra dimension of analysis with an intuitive workflow, and provides critical information that will inform exploration and development decisions.

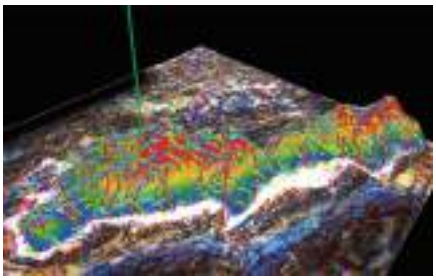

Image credit: Geoteric

The new products provide additional insights into assets.

"We have combined over 30 years of geological experience with an in-depth knowledge of AI to create customised networks that generate high fidelity results," said Nicola Blanshard, CEO of Geoteric. "The feedback has been very positive."

Partnership for digital twin software

SHELL GLOBAL SOLUTIONS International B.V. has awarded Kongsberg Digital an enterprise framework agreement for the supply of its digital twin software, Kognitwin Energy.

The agreement covers digital twin cloud-based services for the company's global portfolio of assets and capital projects within its upstream, integrated gas, downstream and manufacturing business lines.

The Kognitwin Energy Software-as-a-Service ("SaaS") solution will provide integration, visualisation and analytics capabilities to Shell assets globally. The solution will be supplied through Kongsberg Digital's cloud-native Kognitwin Energy dynamic digital twin service platform, which will integrate and contextualise real-time sensor data, historical data, engineering information and other transactional business data across a variety of data sources, enabling Shell to improve work processes and optimise facility performance through digitalisation. When adopted, the solution will provide Shell with the ability to access its portfolio assets from anywhere, expanding the scope of remote operations.

Image credit: Kongsberg

The partnership will help Shell to unlock value and increase resilience in a challenging business environment.

"Shell is a frontrunner when it comes to the development and adoption of cutting-edge technologies for the energy industry, and now they are looking to increase operational optimisation and value creation through broad and deep digitalisation of their asset portfolio. They are a perfect partner for Kongsberg Digital, where we invest in deep industrial solutions that turn digital value creation into reality. We are delighted to have this opportunity and confident that our approach, which combines deep industry domain and digital expertise with hybrid analytics, will be of great benefit to Shell," said Hege Skryseth, president of Kongsberg Digital.

Yuri Sebregts, chief technical officer, Shell said, "Our collaboration with Kongsberg Digital in developing digital twins brings in a new era of visually interacting with data and models at the asset, equipment and component level. Digital twins drive efficiency by enabling remote operations, automation and significantly improved collaboration. It supports our front-line operations to better leverage insights from big data, transforming ways of working to unlock value and increase resilience in the changing business environment".

In October 2019, Shell Norway and Kongsberg Digital entered a digitalisation partnership to operationalise an advanced dynamic digital twin of the Nyhamna onshore gas plant facility. The solution has been in service since January 2020 and is continuously evolving through new product releases.

Standardising drilling language

THE WAY DRILLING crews speak on rigs could soon be standardised across the globe to improve safety and maximise efficiencies, thanks to research by the University of Oklahoma using Drilling Systems' simulators.

The University of Oklahoma conducted detailed studies into drilling language and commands using real-life scenarios on a Drilling Systems' simulator, which found significant differences in response and reaction time according to the specificity of phrases or instructions.

Associate professor at Mewbourne School of Petroleum and Geological Engineering, University of Oklahoma, Catalin Teodoriu, said, "In aviation there are standard phrases for all operations, so it doesn't matter what language you speak or which plane you are flying, you know exactly what the meaning of any particular command is.

Image credit: Drilling Systems

Drilling simulator research at the University of Oklahoma.

"For the oilfield, this type of universal standardisation in drilling communications has never been fully implemented, but our research shows it could make a huge difference to the number of human error incidents and in maximising efficiencies.

"Drilling Systems' simulators create an extremely realistic, immersive environment, and place people on the rig in a drilling scenario. Because the graphics and scenarios are so realistic, reaction times are the same as they would be in the field. It was immediately clear that by establishing a 'perfect' and complete drilling language on the simulator we could make radical improvements in safety and efficiencies in oilfield drilling and in teaching students. We are currently working with Drilling Systems on a White Paper to highlight our findings to the industry and are hoping to gather feedback on the idea of a universal drilling language."

To find out more please visit https://www.linkedin.com/in/catalin-teodoriu-a7770615/and mpge.ou.edu.

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS

Project	City	Facility	Budget (US$)	Status
Advanced Petrochemical - SK Gas - Polypropylene (PP) Compounding Plant	Jubail	Polypropylene	40,000,000	Project Announced
Advanced Polyolefins Company	Jubail	Polypropylene	1,800,000,000	FEED
Al-Khafji Joint Operations (KJO) - Dorra Gas Field Development	Eastern Region	Gas Field	3,000,000,000	Feasibility Study
Dow - Polymers Production Facility	Jubail	Polymers	100,000,000	Feasibility Study
Farabi Petrochemicals Company -LAB Plant	Yanbu	Linear Alkyl Benzene (LAB)	450,000,000	Commissioning
Ibn Sina - Methanol Plant Upgrade	Jubail	Methanol	250,000,000	Engineering & Procurement
Ineos - Amiral Petrochemical Complex - Acrylonitrile Plant	Jubail	Acrylic Acid	665,000,000	FEED
INEOS - Amiral Petrochemical Complex - Linear Alpha Olefin (LAO) Plant	Jubail	Alpha Olefins	665,000,000	FEED
Ineos - Amiral Petrochemical Complex - Poly Alpha Olefin (PAO) Plant	Jubail	Alpha Olefins	665,000,000	FEED
INOCHEM - Soda Ash and Calcium Chloride Complex	Ras Al Khair	Detergents	300,000,000	Construction
JUPC - Ethylene Oxide/Ethylene Glycol (EO/EG) Plant III	Jubail	Ethylene Oxide	700,000,000	Construction
Midchem - Chlor Alkali Plant and Calcium Chloride Plant	Riyadh	Chlor Alkali	60,000,000	Construction
MISA - Unibio - Edhafat - BioProtein Facility	Various	Gas Processing	200,000,000	Project Announced
MODON - Methoxide Sodium Production Plant	Jeddah	Sodium Cyanide		Project Announced
NIGC - Jubail GAS Phase 9	Jubail	Industrial Gas Production	900,000,000	Construction
Petrokemya - Jubail - Olefins 1 Plant Expansion	Jubail	Alpha Olefins	80,000,000	FEED
RCC - Hydrocarbon Resin Complex	Jubail	Hydrocarbon Resin	500,000,000	Feasibility Study
Royal Commission for Jubail & Yanbu - KeroTech Industries	Jubail	Kerosene Plant	166,000,000	Project Announced
Sabic - PK Cluster	Jubail	Petrochemical Plant	500,000,000	FEED
Sabic - Saudi Aramco - Yanbu Crude Oil To Chemicals (COTC) Complex	Yanbu	Petrochemical Plant	20,000,000,000	FEED
SADAF - CLC Chlor Alkali Revamp	Jubail	Chlor Alkali	45,000,000	Construction
Sadara - Ethylene Oxide (EO) and Propylene Oxide (PO) Pipeline	Rabigh	Ethylene	40,000,000	Construction
SAMREF - Hydrogen Addition Residue Project (SHARP)	Yanbu	Hydrogen		FEED
SATORP - Debottlenecking Train 2	Jubail	Oil Refinery	200,000,000	Construction
Saudi Aramco - Abqaiq Oil Plant Revamp	Abqaiq	Oil Production	1,000,000,000	Pre-FEED
Saudi Aramco - Aindar and Fazran Oil Fields	Eastern Region	Water Treatment	250,000,000	Construction
Saudi Aramco - Annual Onshore Maintain Potential Programme	Eastern Region	Maintenance	5,000,000,000	Construction
Saudi Aramco - Arab Heavy Pipeline to Yanbu Crude Oil Terminal	Various	Oil Pipeline	250,000,000	Construction
Saudi Aramco - Berri Offshore Pipeline	Berri	Offshore Oil Pipeline	400,000,000	Construction
Saudi Aramco - Berri Oilfield Expansion - GOSP Expansion	Berri	GOSP	1,700,000,000	Engineering & Procurement
Saudi Aramco - Berri Oilfield Expansion	Berri	Waste Water Treatment	100,000,000	Engineering & Procurement
Saudi Aramco - Berri Oilfield Expansion - Two Drilling Islands Project	Berri	Dredging/ Reclamation	150,000,000	Construction
Saudi Aramco - Berri Oilfield Expansion - Water Injection System Expansion	Berri	Water Injection	200,000,000	Construction
Saudi Aramco - Dammam Oilfield Redevelopment	Dammam	Oil Production	1,000,000,000	Engineering & Procurement
Saudi Aramco - Fadhili Gas Plant - Overview	Eastern Region	Gas Treatment Plant	6,600,000,000	Construction
Saudi Aramco - Gas Storage Facilities	Various	Gas Storage Tanks	1,000,000,000	Project Announced
Saudi Aramco - Haradh Gas Increment Program	Haradh	Flowlines	470,000,000	Construction
Saudi Aramco - Haradh Gas Increment Program Construction	Haradh	Gas Compression	1,200,000,000	Construction
Saudi Aramco - Hawiyah Gas Plant Expansion	Hawiyah	Gas Processing	1,200,000,000	Construction
Saudi Aramco - Hawiyah Unayzah Gas Reservoir	Hawiyah	Gas Storage Tanks	1,700,000,000	Engineering & Procurement
Saudi Aramco - Jazan Refinery to Abha	Southern Region	Oil Pipeline	150,000,000	Engineering & Procurement

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS

Project	City	Facility	Budget (US$)	Status
Saudi Aramco - Jizan Export Refinery - Overview	Jizan	Oil Refinery	2,100,000,000	Construction
Saudi Aramco - Juaymah Enhanced LPG Piping Network	Juaymah	Gas Pipeline	100,000,000	Engineering & Procurement
Saudi Aramco - King Salman Energy Park (SPARK) - Overview	Abqaiq	City	4,400,000,000	Construction
Saudi Aramco - King Salman Energy Park (SPARK) - Phase 1	Abqaiq	City	1,600,000,000	Construction
Saudi Aramco - LNG Receiving Terminal	Jeddah	LNG	200,000,000	Feasibility Study
Saudi Aramco - Marjan Field Expansion - Interlinked Pipeline Installation	Marjan	Pipeline	600,000,000	Construction
Saudi Aramco - Marjan Field Expansion - Overview	Marjan	Oil & Gas Field	16,000,000,000	Construction
Saudi Aramco - Marjan Field Expansion - Package 1	Marjan	GOSP	5,000,000,000	Construction
Saudi Aramco - Marjan Field Expansion - Package 10	Marjan	Gas Treatment Plant	1,200,000,000	Engineering & Procurement
Saudi Aramco - Marjan Field Expansion - Package 11	Marjan	NGL	1,000,000,000	Engineering & Procurement
Saudi Aramco - Marjan Field Expansion - Package 14	Marjan	Sulphur Recovery	100,000,000	Engineering & Procurement
Saudi Aramco - Marjan Field Expansion - Package 16	Marjan	Oil Pipeline	130,000,000	Engineering & Procurement
Saudi Aramco - Marjan Field Expansion - Package 17	Marjan	Oil Pipeline	100,000,000	Engineering & Procurement
Saudi Aramco - Marjan Field Expansion - Package 18	Marjan	Oil Pipeline	200,000,000	Engineering & Procurement
Saudi Aramco - Marjan Field Expansion - Package 19	Marjan	Dredging/ Reclamation	56,000,000	Construction
Saudi Aramco - Marjan Field Expansion - Package 2	Marjan	Oilfield	400,000,000	Engineering & Procurement
Saudi Aramco - Marjan Field Expansion - Package 3	Marjan	Water Injection	5,000,000,000	Construction
Saudi Aramco - Marjan Field Expansion - Package 4	Marjan	Gas Field	1,500,000,000	Construction
Saudi Aramco - Marjan Field Expansion - Package 5	Marjan	Water Injection	400,000,000	Engineering & Procurement
Saudi Aramco - Marjan Field Expansion - Package 6	Marjan	Gas Compression	1,500,000,000	Construction
Saudi Aramco - Marjan Field Expansion - Package 7	Marjan	Oil Pipeline		Construction
Saudi Aramco - Marjan Field Expansion - Package 9	Marjan	Gas Compression	1,000,000,000	Engineering & Procurement
Saudi Aramco - Marjan, Berri, Zuluf and Safaniyah Expansion	Eastern Region	Oil & Gas Field	7,000,000,000	Construction
Saudi Aramco - Master Gas System Expansion (MGSE)	Various	Non Associated Gas	4,050,000,000	Construction
Saudi Aramco - Master Gas System Expansion (MGSE)	Western Region	Gas Pipeline	830,000,000	Construction
Saudi Aramco - Master Gas System Expansion (MGSE)	Central Region	Gas Pipeline	367,000,000	Construction
Saudi Aramco - Master Gas System Expansion (MGSE)	Eastern Region	Gas Pipeline	374,000,000	Construction
Saudi Aramco - Multiple Pipelines Revamp	Eastern Region	Gas Pipeline	250,000,000	Construction
Saudi Aramco - Offshore Maintain Potential Programme - (Program)	Eastern Region	Oil & Gas Field	7,000,000,000	Construction
Saudi Aramco - Ras Tanura Pipeline	Ras Tanura	Oil Pipeline	270,000,000	Commissioning
Saudi Aramco - Ras Tanura Refinery - Asphalt Production	Ras Tanura	Asphalt	200,000,000	Construction
Saudi Aramco - Ras Tanura Refinery - Clean Fuels Project	Ras Tanura	Petroleum Oil Refinery	2,000,000,000	Construction
Saudi Aramco - Ras Tanura Refinery - Residue Facility Upgrade	Ras Tanura	Hydrocracker	500,000,000	Pre-FEED
Saudi Aramco - Safaniya Debottleneck Onshore Plant	Safaniyah	Oil Production	800,000,000	Engineering & Procurement
Saudi Aramco - Storage Tanks	Various	Bulk Storage	250,000,000	Engineering & Procurement
Saudi Aramco - Storage Tanks and Associated Equipment	Yanbu	Gas Storage Tanks	400,000,000	Construction
Saudi Aramco - Total - Amiral Petrochemical Complex	Jubail	Petrochemical Plant	9,000,000,000	FEED
Saudi Aramco - Unconventional Gas Program	Various	Gas Field Development	7,000,000,000	EPC ITB
Saudi Aramco - Unconventional Gas Program	Al Jafurah	Gas Compression	1,500,000,000	EPC ITB
Saudi Aramco - Unconventional Gas Program	Al Jafurah	Gas Export Pipeline	500,000,000	EPC ITB
Saudi Aramco - Unconventional Gas Program	Al Jafurah	Gas Processing	500,000,000	Engineering & Procurement
Saudi Aramco - Unconventional Gas Program	Al Jafurah	Gas Processing	2,500,000,000	Engineering & Procurement
Saudi Aramco - Unconventional Gas Program	Al Jafurah	Gas Pipeline	500,000,000	EPC ITB

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E-mail: comms@technicalreview.me

Web: www.alaincharles.com

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Project Databank

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Project Focus

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Project Summary

Project name	Saudi Aramco - Berri Oilfield Expansion - Gas Oil Separation Plant Expansion
Name of Client	SAUDI ARAMCO - Saudi Arabian Oil Company
Revised Budget (US$)	2,000,000,000
Contract Value (US$)	1,900,000,000
Award Date	2019-Q2
Main Contractor	Saipem
Facility Type	Gas Oil Separation Plant (GOSP)
Status	Engineering & Procurement
Location	Berri, Saudi Arabia
Project Start	2016-Q1
End Date	2023-Q1

Background

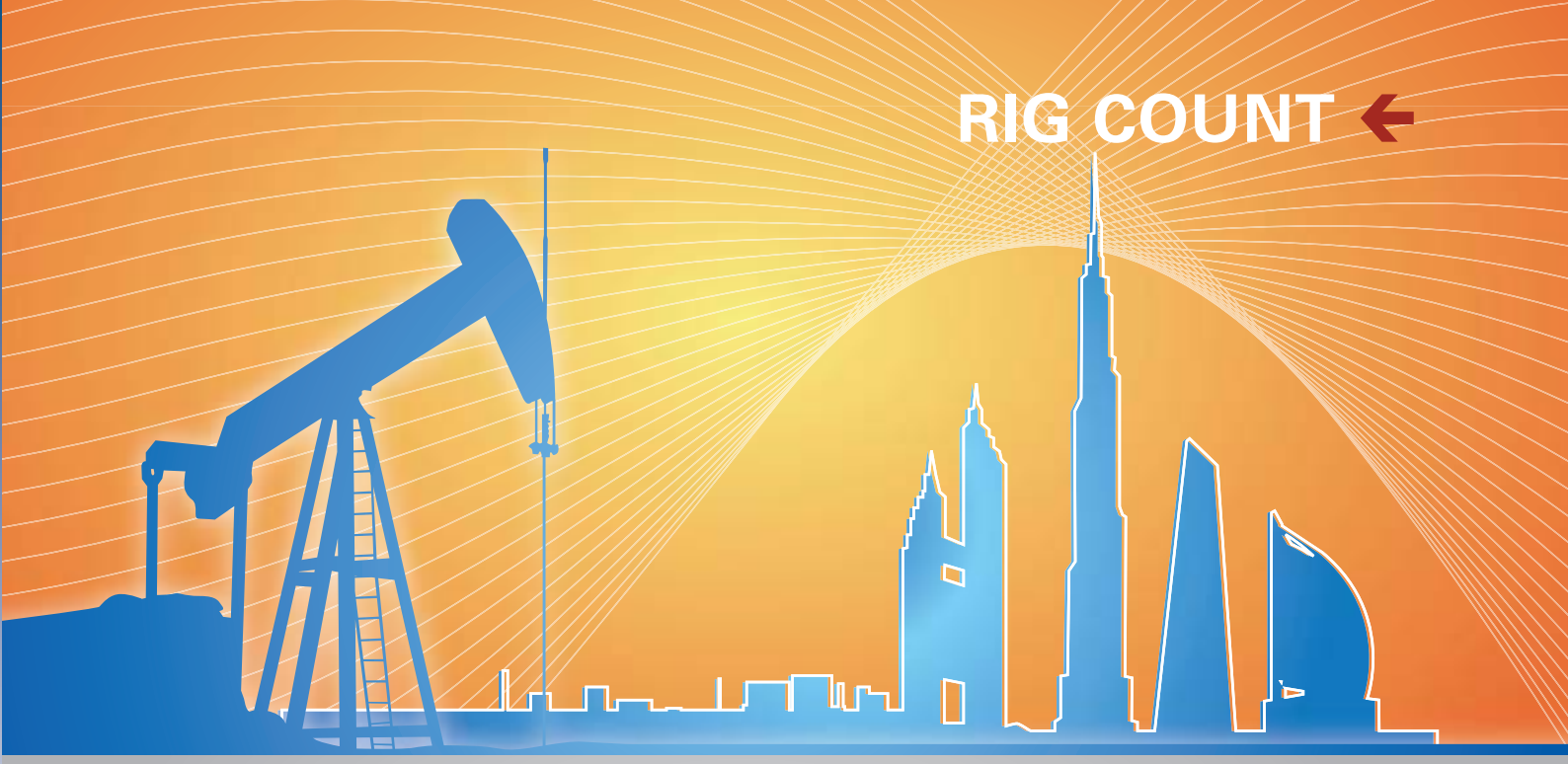
Saudi Aramco is planning to add 250,000 barrels of oil per day from Berri oilfield in the Arabian Gulf. In it is efforts to develop Berri oilfield, Aramco will construct new gas-oil separation facilities at Abu Ali and Khurasniyah plants to process the additional light crude output from Berri oilfield.

Project Status

Date	Status
Aug 2020	Construction of temporary storage facilities is still ongoing. Saipem continues to face delays due to COVID-19 and is expecting to begin the main construction work by Q4 2020 or Q1 2021.
Apr 2020	Saipem has declared force majeure on the GOSP expansion as restrictions related to COVID-19 containment have delayed project execution.
Jun 2019	Saipem officially wins the Berri GOSP contract at a value of US$1.9bn.
Sep 2018	Saudi Aramco begins the tendering process of several packages related to Berri Increment Program, including the expansion of Berri's Gas-Oil Separation Plant.
Jun 2018	SNC Lavalin is at an advanced stage to complete the detailed engineering work for Berri Gas Oil Separation Plant. The design work is complete and detailed engineering is near completion.
Apr 2017	Aramco awards SNC-Lavalin the US$1.7bn FEED and project management contract for expanding Berri oilfield gas-oil separation plant. Contract terms additionally allow Aramco an option to use SNC-Lavalin for delivery of technical support services during the construction phase.
Feb 2017	Aramco examines the expansion of its oil and gas production from Berri offshore oilfield. In the meantime, Aramco invites companies to bid for several packages of FEED contracts related to the project worth US$6bn.

Project Scope

The project scope includes a gas-oil separation plant with the capacity of 250,000 barrels of oil at Abu Ali Gas Plant. Additional facilities will be developed at the Khursaniyah Gas Plant to process 40 mn bpd of hydrocarbon condensate. The plant will be installed with a 140 MW gas-powered generation unit also equipped with sulfur removal trains to process 370 million standard cubic feet per day (scf/d) of associated sour gas.



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.

	AUGUST 2020			VARIANCE	JULY 2020		
Country	Land	OffShore	Total	From Last Month	Land	OffShore	Total
Middle East							
ABU DHABI	36	15	51	-2	39	14	53
DUBAI	0	0	0	0	0	2	2
IRAQ	29	0	29	-3	32	0	32
KUWAIT	43	0	43	-6	49	0	49
OMAN	44	0	44	+1	43	0	43
PAKISTAN	15	0	15	0	15	0	15
QATAR	1	6	7	+2	1	4	5
SAUDI ARABIA	69	14	83	—9	78	14	92
YEMEN	1	0	1	0	1	0	1
TOTAL	237	35	272	-18	258	32	290
North Africa							
ALGERIA	30	0	30	0	30	0	30
EGYPT	23	4	27	+3	18	6	24
LIBYA	13	0	13	+2	11	0	11
TUNISIA	1	0	1	0	1	0	1
TOTAL	67	4	71	+5	60	6	66

Source: Baker Hughes

بأنهم ما زالوا في المراحل الأولى من النضج الرقمي. وتشمل التقنيات الواعدة، التي تم تحديدها في الاستراتيجية والدراسة، أنظمة تنفيذ التصنيع والحوسبة السحابية وتحليلات الطاقة وإنترنت الأشياء (الأجهزة المتصلة)، والتعلم الآلي. وتشترك هذه التقنيات جميعها في قدرتها على دمج البيانات الآنية والتحليلات المتقدمة لإدخال التحسينات على عملية صنع القرار وتطبيقات الطاقة لتحسين الكفاءة والاستدامة بشكل كبير. وقد تم نشر هذه الأدوات بالفعل بنجاح في مجالات صناعية أخرى. وقد اتخذت شركات النفط الوطنية في دول مجلس التعاون الخليجي خطواتها الأولى نحو التحول الرقمي على غرار نظيراتها العالمية. فقد قامت هذه الشركات بتجربة التطبيقات الرقمية وتعديل الهياكل التنظيمية الخاصة بها لتضمين التحول الرقمي. كما قامت أيضا بتطوير نماذج رقمية وتصور رقمي لتدفق الهيدروكربونات عبر محافظها. ومن خلال عملية التحول الرقمي، التي لا تزال في المراحل المبكرة لاعتمادها في الصناعة، فإن شركات النفط الوطنية لديها فرصة للتقدم للمرحلة التالية من التحول الرقمي مع سيطرة أكبر على العمليات عبر سلسلة القيمة. هذا، ويجب على شركات النفط الوطنية تطبيق أربعة مبادئ رئيسية لتحقيق الريادة في مجال التحول الرقمي.

أولا: يجب أن تكون المبادرات الرقمية مدفوعة بأولويات الأعمال بدلا من اعتبارها امتدادا لتكنولوجيا المعلومات «التقليدية». وتكون زيادة الكفاءة عن طريق خفض التكاليف و/أو زيادة الإنتاج وإدارة توقعات الاستدامة المتزايدة هي أولويات الأعمال الأساسية وذلك على غرار الشركات الأخرى في القطاع. وبالإضافة إلى ذلك، يمكن أن يلعب التحول الرقمي دوراً رئيسياً في المساعدة على ضمان تحسين تدفقات الهيدروكربون وتعظيم القيمة عبر المحفظة. ويجب تحديد المبادرات الرقمية ودعمها من قبل «مالكي» الأصول التي يتوقع أن تعود الفوائد عليها.

ثانيا: تحتاج الشركات إلى الاستثمار في القدرات التأسيسية التي تتضمن زيادة التركيز على التحسين السريع لمهارات القوى العاملة الحالية لديها، مع توظيف خبراء خارجيين عند الضرورة إذا كان لديها نقص في مهارات التقنيات الناشئة. وسيتطلب ذلك استخدام منصات عبر الإنترنت وأكاديميات رقمية وبرامج تدريب مكثفة للمسرّعات الرقمية لتطوير المهارات الداخلية المهمة بسرعة في التقنيات الناشئة وتحليلات البيانات والأمن السيبراني وهندسة تكنولوجيا المعلومات.

ثالثا: تحتاج الإدارة إلى اعتماد نموذج تشغيل رقمي مع إرشادات واضحة للحوكمة والمساءلة. وعادة ما يشمل ذلك مديري البرامج الرقمية الذين يقدمون تقاريرهم إلى كبير المسؤولين الرقميين وإدارة سلسلة من المبادرات الرقمية بالتعاون الوثيق مع «مالكي» برامج الأصول. وبالنسبة لشركات النفط الوطنية في دول مجلس التعاون الخليجي والتي كانت تتمتع تقليديا بأصول قوية تعمل بدرجة من الاستقلالية، سوف تتطلب الحوكمة الرقمية الفعالة إعادة معايرة العلاقات بين الأصول والوظائف المركزية.

رابعا: يجب أن تدرك فرق قيادة شركات النفط الوطنية أن التحول الرقمي يتجاوز مجرد الاستثمار في التقنيات الجديدة. وستحتاج الشركات ـ بدلا من ذلك ـ إلى إعادة التفكير في طرق العمل التقليدية ونموذج أعمالها وثقافتها، لتصبح أكثر ألمعية وذكاء ومرونة. وفي الواقع، يمكن للتحول الرقمي أن يصبح عاملا قويا لتمكين التعاون متعدد التخصصات والوظائف وتحسين العمليات بالنسبة لشركات النفط الوطنية في دول مجلس التعاون الخليجي. لا شك أن صناعة النفط والغاز في جميع أنحاء العالم تواجه تحديات كبيرة بسبب جائحة كورونا (كوفيد- 19) وانخفاض الأسعار على المدى القريب، وانخفاض الطلب مع استبدال مصادر الطاقة بمصادر الطاقة المتجددة على المدى البعيد. ولكن على الرغم من ذلك، لا تزال شركات النفط الوطنية تتمتع بميزة هائلة عن بقية قريناتها على مستوى العالم، وذلك بتكلفة أساسية أقل بكثير من الشركات العالمية. فقد اتخذت أيضا خطوات لبدء تنفيذ التحول الرقمي في بعض أجزاء مؤسساتها، مما يعني أنها تواكب الصناعة بشكل عام حتى الآن. ويتمثل التحدي الآن في استكمال هذا التقدم من خلال نهج متسارع وشامل للتحول الرقمي للحفاظ على مصالحها والاستمرار في تزويد العالم بالطاقة.

تعتبر شركة Strategy & Germany جزءاً من شبكة برايس ووتر هاوس كوبرز.

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21 ـ 20	معرض بترول العراق	افتراضي	www.cwciraqpetroleum
29 ـ 27	جائزة المرأة للامتياز في الإدارة ـ LEWAS	افتراضي	www.lewa-symposium.org
نوفمبر/تشرين الثاني			
12 ـ 9	مؤتمر ومعرض أبوظبي الدولي للبترول ـ ADIPEC	افتراضي	www.adipec.com
نوفمبر	منتدى دبي للصحة والسلامة والبيئة	دبي	www.hse-forum.com

التحول الرقمي حيوي لتحسين الكفاءة والمرونة

ضرورة التحول الرقمي في الخليج

«تحتاج شركات النفط الوطنية إلى تبني نهج عاجل وشامل للتحول الرقمي للحفاظ على مصالحها»، حسبما صرح كل من أنيل باندي، الشريك في شركة Strategy & Middle East وديفيد برانسون، كبير المستشارين التنفيذيين في شركة Strategy & Germany، خاصة وأن الصدمة المزدوجة لجائحة كورونا (كوفيد - 19) والانخفاض الحاد في أسعار النفط، قد أحدثت تحديات كبيرة لشركات النفط في جميع أنحاء العالم. ولهذا السبب فقد تميل بعض الشركات إلى وقف الاستثمارات في التحول الرقمي لعملياتها.

لكن، على الرغم من ذلك، ظل التوجه نحو الاستثمار في التحول الرقمي نشطا كما هو الحال دائما بالنسبة لمعظم الشركات.

وبصرف النظر عن التحول المستمر للطاقة، فسيظل النفط جزءاً مهماً من مزيج الطاقة في المستقبل القريب.

وتتمتع شركات النفط الوطنية في دول مجلس التعاون الخليجي بوضع جيد نظرا لانخفاض تكاليف الإنتاج، إلا أنها أيضا بحاجة إلى تحويل مشاريعها لتعزيز ميزة التكلفة الطبيعية لها، ودعم الكفاءات، والحفاظ على مرونتها وقدراتها التنافسية في مواجهة تأرجح الأسعار والطلب.

ولهذا فإن التحول الرقمي يعتبر عنصراً حاسماً في هذا الصدد.

وقد نشرت شركة Strategy & Germany، في الآونة الأخيرة، نشرة بعنوان «دراسة العمليات الرقمية لعام 2020 لشركات النفط والغاز». وقد أظهرت نتائج هذه الدراسة أن فرق القيادة في جميع أنحاء العالم تدرك جيدا إمكانات التطبيقات الرقمية لتحسين الأداء التشغيلي والمالي.

ويتوقع كبار رجال الصناعة زيادة بنسبة 10 في المائة في الإيرادات من تنفيذ المشاريع عبر الإنترنت بشكل أسرع، وانخفاض بنسبة 8,5 في المائة في التكاليف من الكفاءة التشغيلية في خلال السنوات الخمس المقبلة.

ونشير تحليلاتنا أيضا إلى أن معظم شركات النفط الوطنية وكبار الشركاء الدوليين والجهات المستقلة، لا يزالون في المراحل الأولى من التحول الرقمي. ومن بين أكثر من 200 شركة في مجال النفط والغاز المدرجة في الدراسة، عرّفت 7 في المائة فقط من الشركات نفسها على أنها «متاصرة للتحول الرقمي»، بأدوات رقمية مطبقة على مستويات متعددة من المؤسسة ومتكاملة في علاقات الشركاء والعملاء. هذا بينما صرح أكثر من 70 في المائة من المستجيبين

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Country	Representative	Telephone	Fax	Email
India	Tanmay Mishra	[illegible]	[illegible]	[illegible]
Nigeria	Bola Olowo	[illegible]		[illegible]
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الإنتاج: نيلاي ميندير

بريد إلكتروني: production@alaincharles.com

الإشتراكات: بريد إلكتروني: circulation@alaincharles.com

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