

# Oil Review

Oil · Gas · Petrochemicals

## Middle East

VOLUME 24 | ISSUE 5 2021

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### THE NEW GENERATION EXTREME DRILLING MOTORS

- **WORKING TEMPERATURES UP TO 350 DEG C (662 F)**  
to drill complete well sections from A to B
- **MORE TORQUE**  
than even wall power sections
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operates in harshest environments
- **NO NEED TO RELINE**  
after use in High-Temperature environment or OBM
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with equivalent power performance
- **LONGER LIFE**  
than conventional power sections
- **NEW REVOLUTIONARY COMPOSITE MATERIAL**  
stator
- **"METAL TO METAL" ALTERNATIVE**
- **ALL SIZES**  
from 1" to 11.75"



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- Keeping oilfields safe and secure
- The benefits of sealless pumps
- Prospects for the MENA pipeline market
- Effective wellbore cleanup
- A new drilling services model

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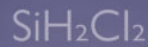
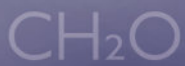
## Qatar bolsters its LNG supply dominance

- Keeping oilfields safe and secure
- The benefits of sealless pumps
- Prospects for the MENA pipeline market
- Effective wellbore cleanup
- A new drilling services model

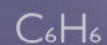
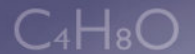
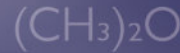
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## → Editor's note

THIS ISSUE'S COVER story on p14 focuses on Qatar, where Qatar Petroleum is pursuing expansion projects to raise output from its massive North Field to feed the increasing demand for gas. "The North Field expansion projects will solidify Qatar Petroleum's leading role in the LNG industry as well as in the energy transition," Qatar Petroleum's chief executive Saad Al-Kaabi has said.

We also take a look at the Middle East pipeline market, with plans from several countries to increase production capacity forecast to lead to an estimated 20,500 km of new pipeline installations in the next five years (p18).

On the technology side, we cover the benefits of sealless pumps (p30) and an effective wellbore clean-up solution (p24).

And, with the attack on the USA's Colonial Pipeline throwing the issue of oilfield security into sharp focus, we discuss the digital and physical security measures which protect the Gulf's energy infrastructure (p34).

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Cover image: Adobe Stock

## → Executives' Calendar, 2021

AUGUST			
16-19	OTC	HOUSTON	2021.otcnet.org
SEPTEMBER			
7-10	SPE Offshore Europe Virtual Conference	VIRTUAL	www.offshore-europe.co.uk/en-gb.html
13-16	Gastech	DUBAI	www.gastechevent.com
21-23	SPE ATCE	DUBAI	www.atce.org/about-dubai
OCTOBER			
4-7	GEO 2021	MANAMA	www.geo-expo.com
25-26	Upstream Digital Transformation Conference	DUBAI	www.offsnets.com/udt-mena
NOVEMBER			
8-11	Africa Oil Week	DUBAI	www.africa-oilweek.com
15-18	ADIPEC 2021	ABU DHABI	www.adipec.com
28-1 Dec.	Middle East Oil & Gas Show (MEOS 2021)	MANAMA	www.meos-expo.com

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

### Submissions invited for awards recognising well intervention excellence

SUBMISSIONS ARE SOUGHT for Offshore Network's OWI Global Awards 2021, which celebrate the best in global well intervention excellence.

OWI Global Awards 2021 features six key categories recognising a range of different types of contributions and successes achieved within the global well intervention community. The categories are:

- Most innovative solution
- Best project outcome
- Best example of collaboration
- HSE innovation
- Most impactful technology
- Significant contribution to the industry.

Judging criteria include originality, creativity and intent; functionality and technical qualities; ease of use and adoption; game-changing impact; implementation and performance; and sustainability and potential for growth.

The judging panel consists of leading well intervention experts representing operators from across the globe. They are: Emad Elfeki, Wells Operations Specialist, ADNOC; John Sixt, Global Well Intervention Advisor, BP; Rafael Ramirez, Senior Wells Engineer HPHT, Chevron; Dr. Wisdom Patrick Enang, Operations Engineering Lead, ExxonMobil; Mirick Cox, Senior Principal Engineer - Wells Management, ExxonMobil; Ts. Shahril Mokhtar, Head of Well Integrity & Workover (PCSB), PETRONAS; and Benjamin Ajaragu, Well Integrity Advisor, LI:



Image Credit : Adobe Stock

The Awards celebrate the best in global well intervention excellence.

Well Integrity SME & Production Technology TA2, Shell.

The awards ceremony will take place live in Aberdeen on 3 December, and will also be broadcast globally.

To be in for a chance to be recognised for the contributions you have made to the industry this year and receive unparalleled global exposure,

submit your entry at <https://offsnet.com/owi-awards/submit-an-entry>

Closing date for submissions is 9 August 2021. For further information, contact Isobel Singh, email: [isingh@offsnet.com](mailto:isingh@offsnet.com), tel: +44 (0)203 409 3043.

Website: <https://offsnet.com/owi-awards>

# Driving the industry towards a cleaner future

Gastech 2021, which takes place in Dubai from 13-16 September 2021, will enable the global gas, LNG, hydrogen, and energy industry to evaluate new business opportunities and source the solutions required to thrive, as disruptive forces accelerate the transition to cleaner energy.

**G**ASTECH WILL CONVENE NOCs, IOCs, IECs, utility companies, EPC contractors, E&P companies, service companies, technology providers, shipbuilders and manufacturers in their mission to provide low carbon, affordable energy for all.

Organised by dmg events, Gastech 2021 will be held under the patronage of H.H. Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, and is supported by the Ministry of Energy and Infrastructure of the UAE. It is expected to be attended by more than 25,000 visitors.

The Gastech 2021 Conference will bring together more than 300 speakers from across the full energy value chain, from energy ministers to industry CEOs, setting the agenda for the future direction of the industry. Policy makers, business leaders, disruptors and innovators will discuss strategies and technical innovation that will be instrumental in transforming the industry for decades to come, driving creative thinking in the approach to solving the trilemma of secure, affordable and sustainable energy. It features 15 Ministerial and Global Business Leaders Panels, five C-Suite Dialogues, three Gastech LIVE and 13 Strategic Insights.

Strategic themes covering the entire energy value chain include decarbonisation and emissions management; financing and project investment; adapting business models in a post-Covid world; integrated energy suppliers; gas and LNG supply and demand dynamics; diversification of the future workforce; trading, contracting and pricing; EPC and project progress/updates; and climate policies and the role of gas.

Speakers at the conference include H.E. Suhail Mohamed Al Mazrouei, Minister of Energy and Infrastructure, UAE; H.E. Dr Sultan Ahmed Al Jaber, Minister of Industry & Advanced Technology, UAE and managing director and Group CEO ADNOC; H.E.



Image Credit : dmg events

**Gastech 2021 will convene the global gas, LNG, hydrogen and clean energy industry to drive the energy transition agenda.**

Dharmendra Pradhan, Honourable Minister of Petroleum and Natural Gas, India; H.E. Chief Timipre Sylva, Honourable Minister of State – Petroleum Resources, Federal Republic of Nigeria; H.E. João Galamba, State Secretary for Energy, Portugal; Patrick Pouyanné, chairman and CEO, TotalEnergies; Arnaud Pieton, CEO Technip Energies; Klaus-Dieter Maubach, CEO, Uniper SE; Fatima Al Nuaimi, CEO, ADNOC LNG; and Lisa Glatch, president & COO, Sempra LNG.

With more than 400 exhibiting companies, 12+ international country pavilions, and five industry zones, Gastech will showcase the very best services, technologies and products from across the global energy value chain. Leading companies confirmed to participate include ExxonMobil, Shell, Gail, Petronet LNG, KBR, Novatek, Gazprom, BP, Cheniere, KOGAS and Woodside.

A high-profile thought leadership and enabling platform, Gastech Hydrogen, co-located with Gastech, will discuss hydrogen's role in the low carbon economy and highlight

pathways to future success. It will address the latest shifts and trends impacting the hydrogen value chain, including scaling up technologies and bringing down production costs, as well as the new regulatory frameworks and infrastructure development necessary to allow hydrogen to become more widely used in transport, buildings and power generation. It will showcase business models that are marketable and profitable, as well as next-generation hydrogen technology, R&D advances and game-changing hydrogen products, services and solutions.

H.E. Suhail Mohamed Al Mazrouei, Minister of Energy & Infrastructure, commented, "Gastech comes at an important time for the energy industry with a shared global mandate to lower carbon emissions and provide clean affordable energy for all. Gastech is a key enabler of the conversations and connections that drive the energy transition agenda." ■

For further information see [www.gastechevent.com](http://www.gastechevent.com)

## Partnership formed to explore low-carbon solutions

TOTALENERGIES AND TECHNIP Energies have signed a technical cooperation agreement to jointly develop low-carbon solutions for Liquefied Natural Gas (LNG) production and offshore facilities.

As part of the agreement, both parties will explore new concepts and technologies in order to reduce the carbon footprint of existing facilities and greenfield projects in key areas. These include: LNG production; cryogeny; production and use of hydrogen for power generation; and processes for Carbon Capture, Utilisation and Storage (CCUS).

By partnering, the companies will rely on complementary expertise to decarbonise LNG plants and offshore facilities.

Arnaud Breuillac, president of exploration and production at TotalEnergies, commented, "For TotalEnergies as a global LNG player, this collaboration brings opportunities to further innovate and strengthen our expertise in reducing GHG emissions, improving energy efficiency for our LNG and offshore assets and developing innovative technologies such as hydrogen. It is in line with our company's ambition to be Carbon Neutral by 2050."



*TotalEnergies aims to be carbon neutral by 2050.*

Image Credit: Adobe Stock

## CGG partners PGS to enhance CCUS capabilities



Image Credit: Adobe Stock

*CCUS is recognised as a key method for mitigating climate change.*

CGG AND PGS have signed a Memorandum of Understanding (MoU) to combine their seismic multi-client products and technical capabilities applied to the Carbon Capture Utilisation and Storage (CCUS) industry.

Together, the companies intend to explore, conceptualise and create new derivative data products using existing seismic data to facilitate screening and evaluation of carbon storage sites.

Dechun Lin, EVP, Multi-Client, CGG, commented, "CGG is actively committed to the climate and environment and constantly seeking ways to leverage its vast Earth library, technology and expertise. This MoU with PGS is consistent with our strategy to advance our data and geoscience offering to support the energy transition through accelerating the development and commercialisation of CCUS, hydrogen and ammonia storage, and geothermal energy. The initiative will benefit from the experience of both companies at delivering large-scale high-end seismic products. It will also capitalise on CGG's fifteen years of experience in CCUS projects and the expertise of our CCS & Energy Storage group, across storage evaluation, reservoir characterisation, engineering, instrumentation and monitoring. We look forward to developing with PGS the next generation of multi-client data tailored to the needs of the CCUS industry."

Berit Osnes, executive vice president of PGS New Energy, added, "PGS recognises the importance and potential of CCUS to mitigate climate change, and we are committed to contribute to this activity. Our comprehensive worldwide multi-client data library and geophysical competence will be valuable resources in addition to our acquisition services for optimal CCUS site derisking. By joining forces with CGG we can offer unmatched data coverage and unique services to help operators significantly accelerate their activities."

## Joy for Dana Gas in KRI and Egypt

DANA GAS HAS announced that in the Kurdistan Region of Iraq (KRI) and Egypt, its 2021 first half collections have increased 106% year-on-year to US\$185mn.

The company saw its share of collections from sales of condensate, LPG and gas in the KRI increase by 85% to US\$87mn in the first half of 2021 as compared to US\$47mn in the same period 2020. In the same period, Dana Gas' share of Pearl Revenue was US\$87mn, EBITDA US\$74mn, net income US\$57.4mn, cash balances US\$61mn and gross debt US\$93mn.

Dana Gas' share of Pearl Petroleum production for the first half of 2021 averaged 150MMscf/d of gas, 5,250bbls/d condensate and 350MT/d of LPG.

In Egypt, Dana Gas collected US\$98mn across the first half of 2021, compared to US\$43mn in the same period of 2020. This represented a 128% increase.

Patrick Allman-Ward, CEO of Dana Gas, said, "This is one of our best collection periods in the past several years, driven by the strong rebound in oil prices. The governments of both the KRI and Egypt are meeting their payment obligations, ensuring the petroleum industry investors are receiving their current monies on time and catching up on overdue payments."

## Subsea 7 caps strong performance with Middle East contract

SUBSEA 7 HAS announced that it have been awarded a sizeable contract (between US\$50mn and US\$150mn) in the Middle East.

The scope of work includes engineering, procurement, construction, and installation (EPCI) of various subsea pipelines. This will total approximately 40 km, with associated crossing structures and two composite power and fibre optic cables.

Engineering and procurement will commence immediately at Subsea 7's office in Singapore with operations led by Subsea 7's office in the Middle East. Offshore activities are scheduled to begin in 2023.

The company noted that no further details are able to be disclosed at this time due to contractual obligations.

This is yet another contract in what has been a strong performance for Subsea 7 in recent months. In this time, the company has been awarded another sizeable contract from Aker BP for the EPCI of pipelines, spools, protection cover and tie-ins using key vessels in the Kobra East Gekko field development.

Additionally, the company was awarded a contract by OKEA for the Hasselmus project, for the EPCI of subsea production systems (SPS) and subsea pipelines (SURF).



*EPCI of the pipelines will commence immediately.*

Image Credit: Adobe Stock



# Debating global energy and sustainability challenges

OTC 2021 will be held as a hybrid event at NRG Park in Houston from 16-19 August 2021, and will include both in-person and virtual programming.

**T**HE OFFSHORE TECHNOLOGY Conference (OTC) is the world's foremost event where energy professionals meet to exchange ideas and opinions to advance scientific and technical knowledge for offshore resources and environmental matters. It showcases leading-edge technology for offshore drilling, exploration, production, and environmental protection. The conference attracts attendees and exhibiting companies from around the globe.

The show will attract engineers, technical executives, operators, scientists and managers from all fields in the offshore energy sector. The 2019 event attracted more than 2,200 companies representing more than 40 countries, and more than 59,000 attendees..

This year's Opening General Session panel and first-ever Executive Dialogue series will discuss the role of the offshore sector in meeting global energy and sustainability challenges and creating new, viable pathways to achieve net zero by 2050.

During the Opening General Session, panellists will discuss the potential pathways for achieving mid-century climate goals and the role of the offshore sector in deploying low-carbon energy technologies and reducing global carbon footprint. Speakers will be

- Abdulrahman Abdulla Al Seiri, CEO – Abu Dhabi National Oil Company (ADNOC) Drilling
- Amy Bowe, head of carbon research – WoodMackenzie
- Jonathan Landes, president Subsea – TechnipFMC
- Bill Langin, senior vice president – Deepwater Exploration, Shell
- Erik Milito, president – National Ocean Industries Association (NOIA) (moderator).

The Executive Dialogue Series is a new 2021 initiative aimed at engaging executives at the top of their respective fields in thoughtful discussions about the innovations, corporate shifts, and policies needed to drive the future of offshore energy and the energy transition forward. Participants are:

- Damian Bednarz, external affairs director – EnBW



Image Credit : OTC

*The 2019 event attracted more than 2,200 companies and more than 59,000 attendees.*

- Dr. David Callender, president and CEO – Memorial Hermann Health System
  - Peter Green, deputy laboratory director, Science and Technology – National Renewable Energy Laboratory
  - Katie Mehnert, CEO – ALLY Energy
  - Ester Morales, executive director – Clean Energy Leadership Institute
  - Bill Vass, vice president engineering – Amazon Web Services
  - Daryl Wilson, executive director – Hydrogen Council.
- The event will see the return of familiar

features such as the Distinguished Achievement Awards and Spotlight on New Technology Awards.

“OTC serves as a critical forum for the leading industry experts to discuss, debate and deliberate the innovations and technologies shaping the next generation of offshore resource development,” said Leigh Ann Runyan, executive director, OTC.

“Right now, the industry is at an inflection point as energy companies are tasked with meeting increasing demand, while helping facilitate a low-carbon future. This year, we look forward to engaging our tableau of speakers in meaningful conversations about these challenges and other critical issues facing the offshore energy sector.” ■

For further information, visit <https://2021.otcnet.org>

“Right now, the industry is at an inflection point.”

## ADNOC invests US\$750mn in drilling-related services

THE ABU DHABI National Oil Company (ADNOC) awarded contracts worth a total of US\$763.7mn in integrated rigless services, across six of its artificial islands in the Upper Zakum and Satah Al Razboot fields to support its production capacity expansion to five million barrels per day by 2030. The investment by ADNOC Offshore was received by Schlumberger, ADNOC Drilling, and Halliburton.

More than 80% of the total award value will flow back into the UAE's economy under ADNOC's In-Country Value programme over the five-year duration of the contracts, reinforcing ADNOC's commitment to ensuring more economic value remains in the country from the contracts it awards.

"These important awards for integrated rigless services will drive efficiencies of drilling and related services, and optimise costs in our offshore operations as we ramp up our drilling activities to increase our production capacity and enable gas self-sufficiency for the UAE. The contractors bring best-in-class expertise and technologies with a proven track record in the industry and ADNOC Drilling's scope reflects its expanded service profile following its successful transformation into a fully integrated drilling services company, enabling it to offer its clients start-to-finish well drilling and construction services. Importantly, the high In-Country Value generated from the awards will stimulate new business opportunities for the private sector and support the UAE's post-Covid economic growth," said Yaser Saeed Almazrouei, ADNOC upstream executive director.

"These contracts are an important contributor to ADNOC Offshore's plans to build our production capacity to over two million barrels a day in the coming years to support the ADNOC Group's smart growth strategy. The award follows a highly competitive bid process, which included a rigorous assessment of how much of the contract value would support the growth and diversification of the UAE's economy through ADNOC's InCountry Value Programme," said Ahmad Saqer Al-Suwaidi, CEO of ADNOC Offshore.



The contracts will support ADNOC's production capacity expansion to 5mn bpd by 2030.

Image credit: ADNOC

## Petrofac proves value of digital modifications execution



Image credit: Adobe Stock

The solution has proven to present sustainable value and cost savings.

PETROFAC HAS COLLABORATED with asset management specialist, James Fisher Asset Information Services, to eliminate the need for offshore surveys ahead of modification scopes, reducing time and cost.

The digital process enables offshore crew to capture detailed visual and measurement data through Self-Capture Point Cloud. Photogrammetric data is collected using intuitive camera equipment, transferred directly to the asset's Digital Twin and converted into a point cloud, which can be used to design asset modifications to a high level of dimensional accuracy. Using this technique, Petrofac was able to undertake a spool piece replacement in the North Sea, avoiding the need to mobilise a survey team, a first for the UK energy industry.

"As our industry continues to balance its focus on the maximisation of economic recovery and accelerating towards a lower-carbon future, this type of digital execution provides a means to optimise use of existing infrastructure by extending field life, whilst reducing offshore travel.

Data is captured at the point of inspection and core teams are empowered to execute modifications without a time-consuming survey process, ultimately unlocking significant value for our clients through increased uptime and cost efficiencies," commented Steve Johnson, vice president of digital for Petrofac's Engineering and Production Services business.

Signaling the future way of working, the solution has proven to present sustainable value and cost savings, by eliminating the requirement for offshore surveys.

"With all our customers' assets requiring planned production shutdowns incorporating pipework anomalies and new subsea tiebacks requiring piping tie-ins, this technology will accelerate what is often a critical path activity and allow production to be started earlier than ever before," Johnson concluded.

## AMPO POYAM VALVES and Dar Massader Group establish 'AMPO Arabia'

AMPO POYAM VALVES announced a partnership with the Dar Massader Group to establish joint local subsidiary 'AMPO Arabia', together with launching a new manufacturing and servicing plant in Dammam.

"Fast, reliable and top-quality service at a global scale is one of AMPO POYAM VALVES' main success factors, and that is why it is considered as a world leader in highly engineered valves for the most severe applications and industries. By aiming to become a strategic partner and share the Kingdom of Saudi Arabia's Vision 2030, we have decided to align our future to become part of the local industrial cluster," said Salah Elkadiki, general manager, AMPO Arabia.

"AMPO Arabia's facility will commence manufacturing as early as the first quarter of 2022," he added.

AMPO Arabia's local plant will design and manufacture highly engineered valves, and provide services and technologies for the local and regional industry covering applications in the oil, gas, petrochemicals, chemical, water, mining and power sectors.

Dar Massader will assist AMPO Arabia's Saudi



Valves supplied to Saudi Arabia.

Image credit: AMPO POYAM VALVES

Arabia and regional expansion as it will provide market analysis and utilise its network to support local sales.

"Dar Massader's role shall primarily emphasise on realising the Saudi Vision 2030 by expanding national industry capacity, transferring global top-tier technology and know-how to the Saudi market and arming local manpower with competitive industrial positions that can add exponentially to the Kingdom's national economy," remarked Yazeed Alzoom, board director and deputy CEO, Dar Massader.



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## ProSep secures two ME chemical contracts

AS THE MIDDLE East strives for a more sustainable chemical field, ProSep, the global environmentally-friendly solutions provider targeting the reduction of chemical usage and the provision of safe and clean water, has announced the award of two multi-million dollar contracts that will lower the use of harmful chemicals in gas oil separation plants across the Middle East.

ProSep will provide eight of its Multiphase Adjustable Xtreme (MAX) mixers to their contractual partners, which are scheduled to be completed, delivered and installed by the end of Q4 2021.

MAX mixers rely on small channels to control the velocity and shear force of injected chemicals, before a finger-folding pattern guides the focal line within the mixing cylinder. A modulating mixing cylinder ensures optimal performance – the manual or automatic operation of this cylinder makes the mixer more efficient than previous models. High turbulence provides rapid mass transfer, saving both time and operating costs, and outlet channels allow for uniform outlet flux to ensure the cylinder fluid is filled and mixed appropriately.

Liquid flow rates vary from a minimum of 3.7mn bpd to a maximum of 7.5mn bpd on the 3-inch mixer size to a minimum capacity 260mn bpd and a maximum capacity of 490mn bpd on the 24-inch mixer.

The highly efficient MAX mixers will allow optimal injection of chemicals upstream in fluid dehydration processes in their respective plants. With these two contracts, the total number of deployed MAX units across the Middle East has reached 37 over the past 20 months.

Operators are expected to benefit from greenhouse gas emissions reductions of more than 880 tonnes per year, as well as saving more than 200,000 gallons of chemical per year, allowing significant savings for its operator.

Raul Gonzalo, ProSep's Middle East sales and service manager, commented, "The Middle East continues to be a strong market for ProSep, underlined by these contract awards.

"They confirm once again that end users value our high-efficiency mixing technologies and their positive impact – not only on reducing operating costs but also on the environmental efficiency of companies. The spotlight is now firmly placed on the global industries to be more environmentally efficient as we transition to renewables, and we are proud that our technologies offer our clients sustainable solutions, which align with their strategic objectives".

MAX mixers feature low differential pressure, flow modulation and an easy-retrofit design to increase efficiency and save water during desalting applications.



Prosep will provide eight of its MAX meters to its contractual partners.

Image Credit: ProSep

## Halliburton wins Oman chemicals and services contract

HALLIBURTON COMPANY HAS announced its successful bid for the contract to provide Production Chemicals and Associated Services for a large inorganic chemical (IOC) project in Oman.

As part of the seven-year agreement, Halliburton will supply a full suite of customised products for the project, along with a range of specialised services to support the in-field chemical treatments.

Miguel Gonzalez, vice president of Halliburton Multi-Chem, commented, "We are excited to provide our production chemical expertise and management services to help our customer maximise their asset value in Oman.

"This collaboration aims to improve operational efficiencies and reliability by applying tailored solutions and close alignment parties."

Halliburton's Oman premises will support the project.

Along with the chemical supply and services, the company will manufacture key raw materials for the contract's portfolio at the new Halliburton Saudi Chemical Reaction Plant, which is set to open in Q4 2021.

The facility aims to increase Halliburton's capacity to support Oman and the surrounding region. The new plant will have the capacity to manufacture a broad slate of chemicals for stimulation, production, midstream- and downstream-engineered treatment programmes. It will join Halliburton's global laboratory in Dhahran Techno Valley to accelerate the next generation of chemical solutions.

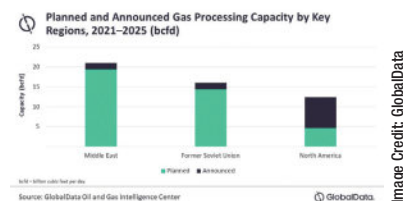
The company expects to hire and develop local personnel to deliver the contract's scope of work.



Halliburton will supply its range of customised chemical products.

Image Credit: Adobe Stock

## Middle East to lead gas growth



The Middle East is forecast to lead global gas processing capacity growth.

A STUDY BY GlobalData has suggested that the Middle East is set to lead growth in global gas processing capacity between 2021 and 2025.

Predictions in the report, 'Global Capacity and Capital Expenditure Outlook for Gas Processing Plants, 2021-2025 – Russia Continues to underpin Global Gas Processing Capacity Growth', anticipate that planned and announced projects over the next four years or so could account for around 37% of global gas processing capacity growth.

The new-build capacity of projects throughout the Middle East is expected to exceed 21.0 bn cubic feet (bcfd) by 2025; of this, 19.4 bcfd is from projects that have recently received approvals.

Nachiket Kaware, an analyst specialising in oil & gas at GlobalData, explained, "In the Middle East, a total of 26 planned and announced gas processing plants are expected to start operations by 2025.

"Of these, the planned Ras Laffan-NFE plant in Qatar has the highest gas processing capacity of 4.6 bcfd. It would process gas from the giant North Field East Project and help Qatar to maintain its status as one of the leading producers and exporters of LNG in the world."

GlobalData identifies Russia as the second highest region when considering its potential global gas processing growth, expanding with a new-build capacity of 2.7 bcfd of gas processing capability.

Leading the way in increasing capacity is the Ust-Luga processing plant, adding 4.3 bcfd of capacity by 2025; the Amur II plant stands second with a 2.7 bcfd contribution to regional capacity.

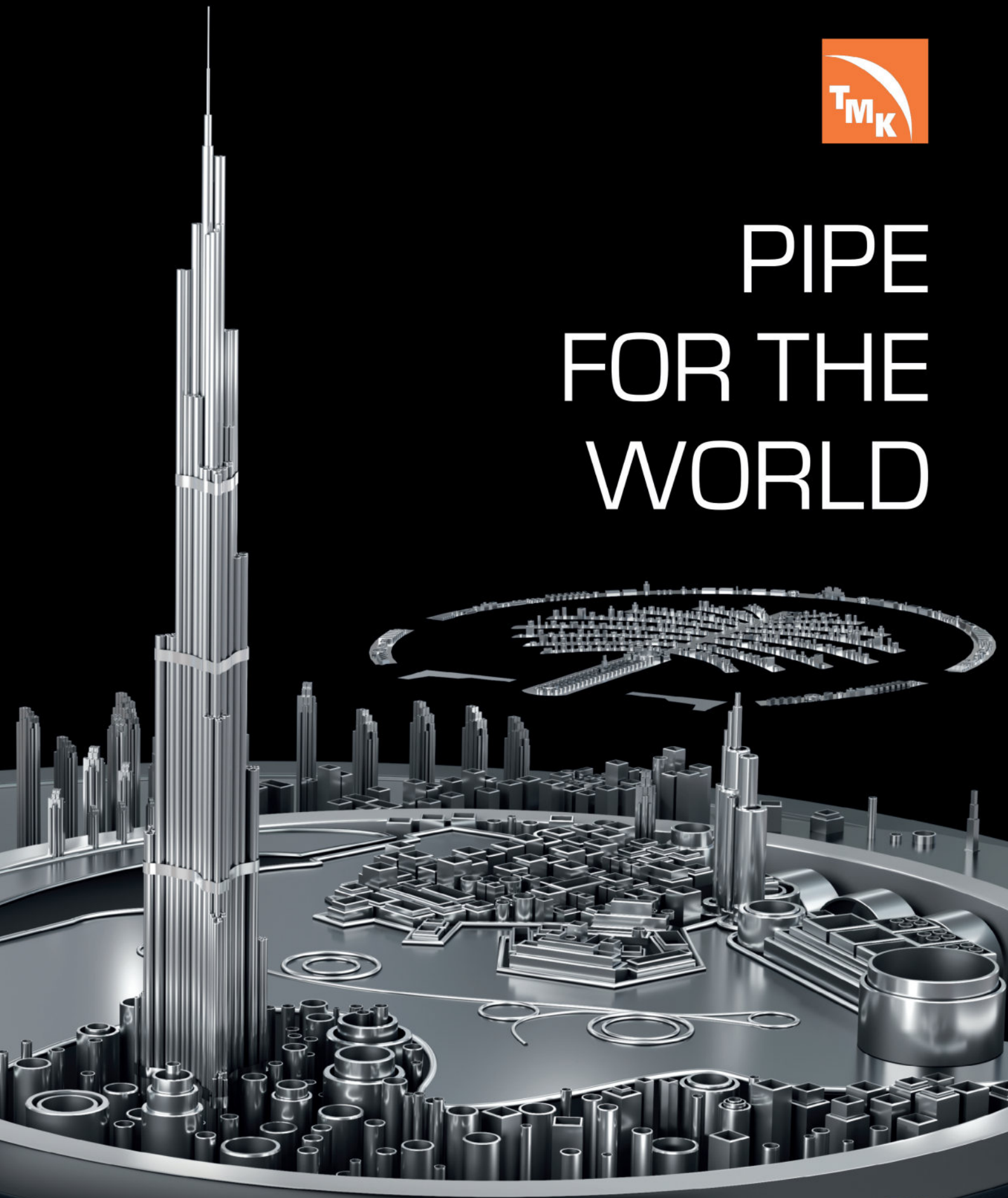
Globally, the gas processing industry is setting its sights on expansive growth over the next four years, should GlobalData's predictions ring true.

A 12% growth is anticipated by 2025, with the current 586.2 bcfd expected to rise to around 657.4 bcfd by 2023.

The report's predictions are based on the capital expenditure for planned and announced projects through 2023 and details of upcoming projects that are set to be operational by 2025.



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## Proserv wins major manufacturing order from BOC for Majnoon oil field

GLOBAL CONTROLS TECHNOLOGY company Proserv Controls has secured a contract to manufacture and deliver 22 wellhead control panels (WHCP) to the Basra Oil Company (BOC) for use on the Majnoon Oil Field in southern Iraq.

The deal has been arranged through KBR, the Houston based engineering, procurement and construction management (EPCM) company, which is the EPCM lead on BOC's plans to significantly ramp up production capabilities at the field.

The 22 WHCPs each has the capability of controlling up to four wells and they have been earmarked for use on 70 new wells which are currently in the development phase. BOC aims to double Majnoon's capacity to above 400,000 bpd from just above 200,000 bpd in the next two years.

Proserv will deliver the WHCPs in three lots, with the first due towards the end of Q3 2021, with the second scheduled for Q4 and the final tranche set to arrive in March 2022.

The firm will make use of its well-developed footprint in the Arabian Gulf to deliver this order, with the WHCPs being manufactured at Proserv's dedicated site in Jebel Ali, Dubai.



A Proserv facility in the UAE.

Image credit: Proserv Controls

## Wood enables safer, efficient field operations with new apps



Image credit: Adobe Stock

**The digital solutions and apps will allow field workers to embrace a digital future.**

WOOD IS CREATING a range of innovative digital solutions and apps, integrating Microsoft Dynamics 365, to allow field workers to embrace a digital future and empower clients to maximise value in deployment for safer and more effective operations.

The 'Connected Worker' apps are part of a multi-year collaboration with Microsoft which will combine Wood's experience in the energy sector with Microsoft's technology to improve operational services worldwide.

These cost-effective platforms are set to allow fast track deployment to 10,000 field workers across Wood's global operations. This will enable workers to access in-depth industry expertise and innovative, artificial intelligence (AI)-powered data science solutions. This in turn will reduce the need for site mobilisations, streamline traditionally administrative work, improve collaboration and team engagement, ultimately driving value for both customers and employees alike.

The project will leverage Dynamics 365 Field Services and Project Operations as well as Power Apps and Power BI solutions.

Daren Martin, chief technology officer, Wood, said, "By working closely with Microsoft to develop packaged connected worker solutions, we are empowering our technicians to collaborate more efficiently and work together across different locations to solve problems in real-time from their devices. This collaboration is pivotal to the success of Wood's ambitious and transformative Connected Worker Enterprise Programme."

Jacky Wright, chief digital officer, Microsoft USA, added, "Our service is designed to help Wood move to Dynamics 365 smoothly and confidently, so they can realise business value faster. This programme represents Microsoft's strong commitment to fostering technical adoption and creating environments in which teams are both safe and proud to work."

## JP Morgan top M&A financial adviser in oil and gas sector for H1 2021

JP MORGAN HAS emerged as the top financial adviser for mergers and acquisitions (M&A) by value and volume in the oil and gas sector for H1 2021, having advised on 18 deals worth US\$66.7bn, according to GlobalData, a leading data and analytics company.

A total of 802 M&A deals were announced in the sector during H1 2021.

According to GlobalData's report, 'Global and Oil & Gas M&A Report Financial Adviser League Tables H1 2021', deal value for the sector increased by 129.9% from US\$67bn in H1 2020 to US\$154bn in H1 2021.

Aurojyoti Bose, lead analyst at GlobalData, commented, "JP Morgan witnessed significant improvement in both deal volume as well as value in H1 2021 compared to H1 2020. However, the growth was more pronounced in terms of value.

"The firm managed to advise on 10 billion-dollar deals (valued more than or equal to US\$1bn), which also included three mega deals valued at more than US\$10bn. In fact, JP Morgan was the only firm to advise on three mega deals."

## bp joins Mærsk Mc-Kinney Møller Center for zero carbon shipping

BP AND THE Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping have signed a partnership agreement committing to a long-term collaboration on the development of new alternative fuels and low carbon solutions for the shipping industry.

As a strategic partner to the Center, bp will second experts to work on relevant research and development projects in the Center's portfolio and contribute to the development of methodologies and optimised pathways for safe and sustainable fuel solutions for shipping. Additionally, bp will join the Center Advisory Board providing guidance for transition strategies and further development of the Center's activities.

William Lin, bp's executive vice-president of regions, cities and solutions, said, "The shipping industry's transition to net zero is complex and requires technology advancements and policies that will give companies across the value chain the confidence to act. This is a privileged opportunity to collaborate and advocate with key industry players to progress solutions at the pace and scale needed."

In welcoming bp, the Center CEO Bo Cerup-Simonse, commented, "bp brings extensive expertise in production, storage, handling, transportation and usage of fuels and great experience in driving safety and efficiency in shipping. I see enormous potential in leveraging and applying this knowhow to accelerate the development of future net-zero solutions for the maritime industry."

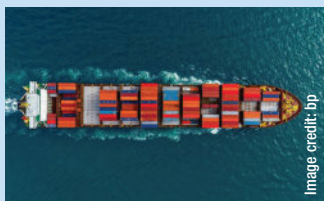


Image credit: bp

The collaboration aims to shape the future of shipping.

# Hydrogen on the horizon

A new paper from the World Energy Council informs worldwide energy dialogue on hydrogen's role in ongoing and future energy transitions and transformations.

**P**REPARED IN COLLABORATION with PwC and the U.S. Electric Power Research Institute (EPRI), the briefing, titled *Hydrogen on the Horizon: ready, almost set, go?* shares various hydrogen demand scenarios, country and regional-level priorities and identifies important enablers and barriers for large-scale hydrogen development.

Countries' views on hydrogen's potential role in the energy transitions are vastly different, with national hydrogen strategies showing significant differences across the world. A comparative assessment of existing worldwide hydrogen demand scenarios shows estimates varying between 6 and 25% of final worldwide energy consumption by 2050 (between 150 and 600 mega tonnes by 2050), depending on how hydrogen will compete with other clean solutions such as battery storage.

Asia and Europe currently seem more demand focused, while the Middle East and North Africa focus on the supply of hydrogen. Asia shows a greater focus on hydrogen as a liquid fuel in the form of ammonia and as a transport fuel for shipping and road transport. In contrast, Europe is more focused on using hydrogen to decarbonise the hard-to-abate sectors in industry and transport (e.g. heavy industries, HGVs, mass transportation). The Americas (North and South) are considering production for their own consumption and export.

## Challenges in scaling up

*Hydrogen on the Horizon* shows that scaling hydrogen up within the energy system faces significant challenges. Low-carbon hydrogen is currently not cost competitive with other energy supplies in most applications and locations, and is likely to remain so without significant support to bridge the price gap – which raises the question of who should fund this support.

However, environmental and political drivers are sending encouraging signals to the market and prompting growing interest, with

many pilot projects being under development, construction and in operation worldwide. These projects span the hydrogen value chain and are across all relevant sectors of the global economy. Additionally, some countries are actively developing bilateral partnerships to help form global hydrogen supply chains and secure clean hydrogen supply. With the appropriate policies and technologies to enable hydrogen scale up, some projections suggest that it could be cost competitive with other solutions as soon as 2030.

## Embryonic stage

The so-called "hydrogen economy" is at an embryonic stage of development. It faces the "chicken and egg problem" between supply and demand, both lacking secure volumes from the other to help establish the full value chain. Numerous hydrogen technologies are at different levels of maturity, contributing to a complex landscape with multiple paths being explored and few approaches as yet being fully eliminated.

Interest in clean hydrogen as an energy vector is surging across the globe as countries and companies seek to explore its potential to decarbonise the hard-to-abate sectors and uses, providing flexible storage for an increasing amount of renewables. While hydrogen's true potential within future energy systems remains unclear, there are increasing ambitions for new economic and social

opportunities, particularly to support the post-Covid-19 recovery.

With increasing commercial interest and political support, there is a pressing need to untangle the differing underlying drivers and actual opportunities to understand better the real potential of clean hydrogen in energy systems and in the energy transition.

Dr Angela Wilkinson, secretary general and CEO of the World Energy Council said, "*Hydrogen on the Horizon* puts the focus on the role of hydrogen users and demand, moving beyond traditional supply-centric energy perspectives. How countries want to produce and consume clean energy, and their immediate national priorities, will shape large-scale hydrogen development and end-user uptake. Identifying end-user priorities and triggers for enhanced demand is critical to better understand hydrogen's real potential in creating decarbonised societal futures."

Jeroen van Hoof, Global Energy, Utilities and Resources leader, PwC Netherlands, said, "As momentum intensifies around energy transitions, big steps are being made towards the replacement of fossil fuels with low carbon alternatives, and hydrogen has a big role to play.

"This decade is crucial to develop hydrogen projects along with the infrastructure to produce, transport, import, distribute and use hydrogen at large scale. If we do this successfully over the next few years, it can pave the way for hydrogen demand to grow exponentially beyond 2030. Additionally, hydrogen has the potential to create skilled jobs along the entire value chain, which connects almost all sectors of our global economy."

Neva Espinoza, vice president, Energy Supply and Low-Carbon Resources, EPRI, said, "The development of hydrogen as a source of energy is larger than the colour debate. The focus should be on the carbon intensity of hydrogen and the potential for large-scale deployment. This will be far more useful for groups and individuals seeking to achieve their decarbonisation goals." ■

“ Identifying end-user priorities and triggers for enhanced demand is critical to better understand hydrogen's potential in creating decarbonised societal futures.”

# Qatar: global gas giant

Qatar Petroleum is looking to raise output from the mighty North Field as the world demands more natural gas to ride through the coming energy transition. The gas giant is up for the challenge, as Martin Clark reports.

**Q**ATAR'S GAS RICHES have, in just a few short decades, transformed this tiny Gulf state into a global energy powerhouse. While the shift to alternative fuels and away from hydrocarbons poses great challenges for all countries long-term, it seems certain that Qatari gas will help the world ride through the transition.

That puts national champion Qatar Petroleum (QP) right in the hot seat. The company currently supplies roughly one in every five cargoes of liquefied natural gas (LNG) shipped around the world – and demand is not, it seems, easing up.

In recent weeks and months, QP has signed a flurry of new contracts with buyers for its gas, predominantly in Asia. These are also long-term deals: most recently, a 20-year contract to supply two million tons of LNG annually to Korea Gas Corporation (Kogas), commencing in January 2025. It means a flow of gas for the Korean energy major right into the middle of the century. Other contracts secured within recent months include buyers from Pakistan, China, Bangladesh and Taiwan.

## North Field expansion

As a result, QP continues to explore its supply options, with huge plans for growth.

In February, it signed a contract for the first phase of the North Field LNG expansion project, which aims to boost Qatar's LNG output to 110mn tonnes per annum (mtpa) by 2027 from 77 mtpa currently.

A joint venture of Technic and Chiyoda landed the contract for the major offshore engineering, procurement and construction expansion project, known as North Field East. The total cost of the project is estimated at US\$28.7bn. A second phase, known as North



Qatar Petroleum supplies around one in five cargoes of LNG shipped around the world.

“QP has signed a flurry of new contracts with buyers for its gas.”

Field South, is expected to lift production capacity further to 126 mtpa by 2027.

QP's chief executive, Saad Al-Kaabi, who is also Qatar's Energy Minister, has said that up to a 30% stake in the project's first phase will be offered to international firms. By June, QP had received offers for double the equity

available from potential partners in the project. ExxonMobil, Total, Shell and ConocoPhillips are long-standing partners in Qatar's existing LNG plants.

Al-Kaabi also hinted that there could be further expansion beyond the 126 mtpa.

“I would say ‘stay tuned’,” he said in February, when announcing the initial expansion.

## International ambitions

At the same time, QP is also making great strides in raising its international upstream profile, becoming increasingly active in overseas acquisitions. This could potentially

### Qatar gas production and LNG exports, bn cubic metres

	2015	2016	2017	2018	2019	2020	% of world total	% change 2010-2020
Gas production	175.8	174.5	170.5	169.1	172.1	171.3	4.4%	39.2%
LNG exports	105.6	107.3	103.6	104.9	105.8	106.1	21.7%	36.4%

Source: BP Statistical Review of World Energy, 2021



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Accidents Causing  
Absence from Work

## ACCIDENTS

685000 Accidents  
Everyday

Source ILO

## FATALITY

3000 Fatalities by  
Work Everyday,  
2 Every Minute

## FATALITY

In the GCC  
the Fatality Rate is  
4 Times Higher than  
Developed Countries

## SR370

MILLION

Work Injuries Cost  
in Saudi Arabia

[Source: Arabnews]

## 7766

Work Injuries Saudi  
Arabia in 2020

[Source: GOSI]

## 69 & 72

injuries Occurred  
in PDO Oman in 2015,

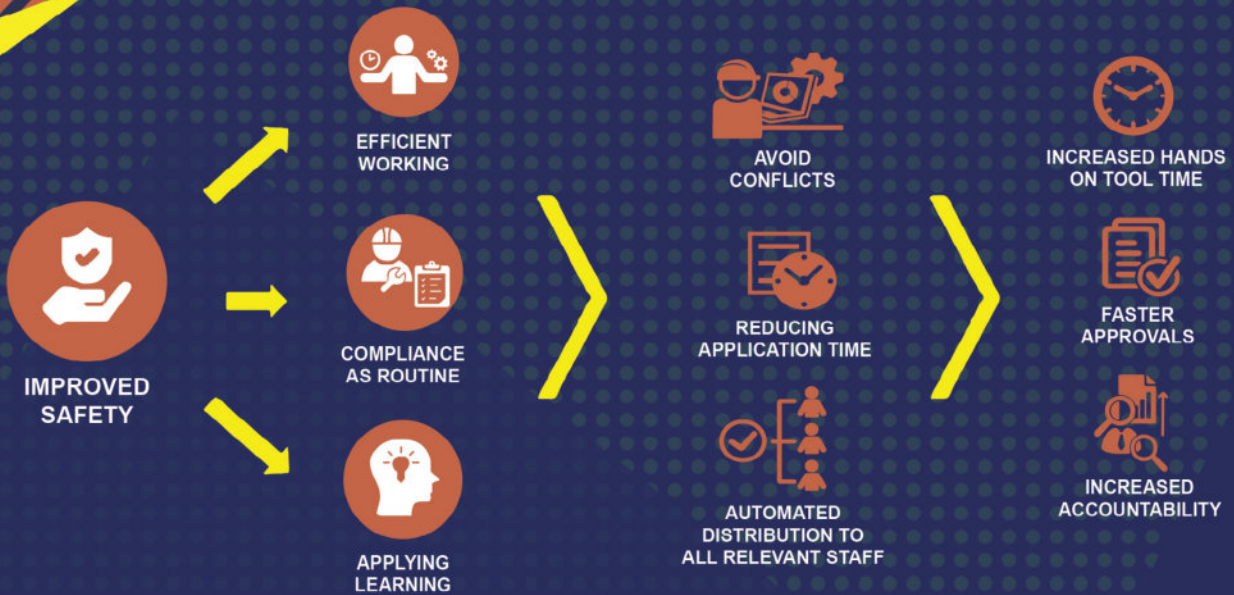
[Source: PDO HSE news]

## 121

Fatalities in  
Qatar in 2018

[Source: ilo.org]

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unlock further gas supply options worldwide.

In July, it entered into an agreement with TotalEnergies to acquire working interests in three more offshore exploration blocks in South Africa. Al-Kaabi said the move builds on recent drilling successes in the 11B/12B block, where a number of discoveries have been made.

Last October, a team including QP announced a second gas condensate discovery in the Outeniqua Basin, 175km off the southern coast of South Africa. It followed an adjacent discovery in 2019, which proved a significant new petroleum province. The three additional blocks are all located off South Africa's south-western flank. These add to two further offshore exploration blocks secured in April, in Namibia, just to the north of South Africa.

And across the Atlantic, QP signed up a further two offshore blocks (6 and 8) in Suriname, marking its debut in the country. Al-Kaabi said it "increases our presence in the Guyana-Suriname Basin and further strengthens Qatar Petroleum's footprint in Latin America, marking yet another successful step towards realising our international growth ambitions."

## Landmark financing

With upstream and production plans in full-on growth mode, QP has tapped into the global financial markets to bankroll its various

### Qatar proven gas reserves, 2020

Proven reserves	:	24.7 trillion cubic metres (871.1 tcf)
% of world total	:	13.1%
World ranking	:	Third largest after Russian Federation and Iran

Source: BP Statistical Review of World Energy, 2021

plans and projects.

On 1 July, it confirmed that it had raised US\$12.5bn in a multi-tranche bond offering, to be used to support its growth plans, particularly the North Field expansion projects. The landmark financing – the largest corporate issuance in the MENA region – is a strong testament to QP and its business strategy.

"The North Field expansion projects will solidify Qatar Petroleum's leading role in the LNG industry as well as in the energy transition," said Al-Kaabi. "We take special pride in the fact that investors recognised this

“The North Field expansion projects will solidify Qatar Petroleum's leading role in the LNG industry, as well as in the energy transition.”

role, the importance of our LNG projects and the bright future of our LNG industry."

QP is also looking to bolster its vast shipping fleet, as it seeks to upgrade production.

It has issued an invitation to tender for the chartering of LNG carriers for its future gas shipping requirements, including its ongoing expansion projects in the North Field.

## Sustainability strategy

Indeed, a part of QP's appeal is its commitment to transitioning with the wider world and the energy sector using gas as a bridge to new and alternative fuels later on. The company launched a new Sustainability Strategy at the start of 2021 to reflect the move into this area.

The new strategy establishes a number of targets in alignment with the goals of the Paris Agreement, and sets in motion a plan to reduce greenhouse gas emissions by 2030. It stipulates deploying dedicated Carbon Capture and Storage (CCS) facilities to capture more than seven million tons per annum of CO<sub>2</sub> in Qatar.

At an energy summit in June, the company's chief executive again reaffirmed this position and how gas can play a meaningful role in a fast-changing energy landscape.

"We see natural gas and the energy transition joined at the hip, and gas/LNG is part of the solution for a longer term transition. We are investing the majority of our capex in LNG, but we are also investing in renewables such as solar, here in Qatar but also worldwide," said Al-Kaabi.

QP expects to have a solar power portfolio of more than 4,000 megawatts by 2030. It has also joined the World Bank's Global Gas Flaring Reduction Partnership in the fight against routine flaring, among other initiatives.

"We all have a responsibility to produce in a more environmentally sensitive way," said Al-Kaabi. "We are using the best available emissions abatement technology, we are monitoring methane emissions to arrest it, and we are using carbon capture and sequestration."

Key sustainability measures have been built into the North Field East expansion design. The project will conserve 10.7mn cubic metres of water per year by recovering 75% of the plant's tertiary water, while NO<sub>x</sub> emissions will be reduced by 40% through the application of enhanced Dry Low NO<sub>x</sub> technology.

However the global energy transition pans out in the 21st century, Qatar and QP look set to play a central role. ■



Image Credit : Adobe Stock

QP has joined the World Bank's Global Gas Flaring Reduction Partnership.



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# Positive outlook for Middle East onshore pipelines

Ben Wilby and Arindam Das, Westwood Global Energy Group, discuss the outlook for the Middle East onshore pipeline market.

**T**HE ONSHORE PIPELINE market in 2020 was severely impacted by a combination of low commodity prices and restrictions on construction activity due to the Covid-19 pandemic. The Middle East was not immune to this, with a contraction in installation activity and stalling of future projects with large pipeline infrastructure requirements. However, 2021 to date has seen somewhat of a reversal, with projects such as Jafurah in Saudi Arabia returning to tender as market conditions and sentiment continue to improve. The pipeline infrastructure in the Middle East continues to be attractive to infrastructure investors, as highlighted by the recent ADNOC (gas pipelines) and Saudi Aramco (oil pipelines) transactions, wherein 49% stakes were sold for US\$10.14bn and US\$12.4bn to a consortia of investors led by Global Infrastructure Partners and EIG Global Energy Partners respectively.

Over the forecast period (2021-2025), demand for additional pipeline installations in the Middle East is expected to be strong, predominantly driven by GCC countries. Westwood forecasts that a total of around 20,500 km of additional pipelines could be installed in the region between 2021 and 2025. Notable projects contributing to this forecast include a new export pipeline from Iraq to Turkey and Saudi Arabia's North & South Haradh GCP pipelines (already under construction).

The c. 20,500 km expected over the forecast will be split relatively evenly between gas and liquid pipelines. Gas pipeline installation activity is expected to increase from around 1,600 km in 2021 to around

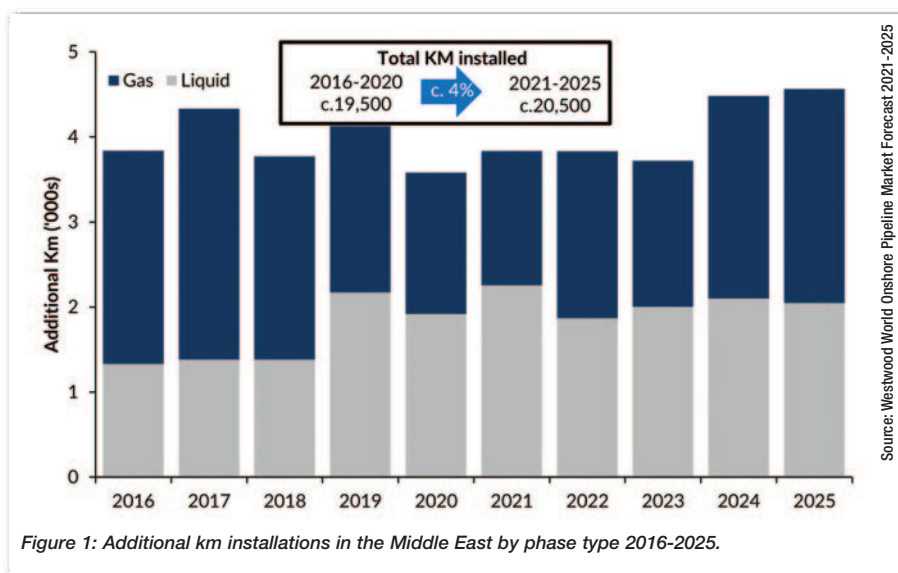


Figure 1: Additional km installations in the Middle East by phase type 2016-2025.

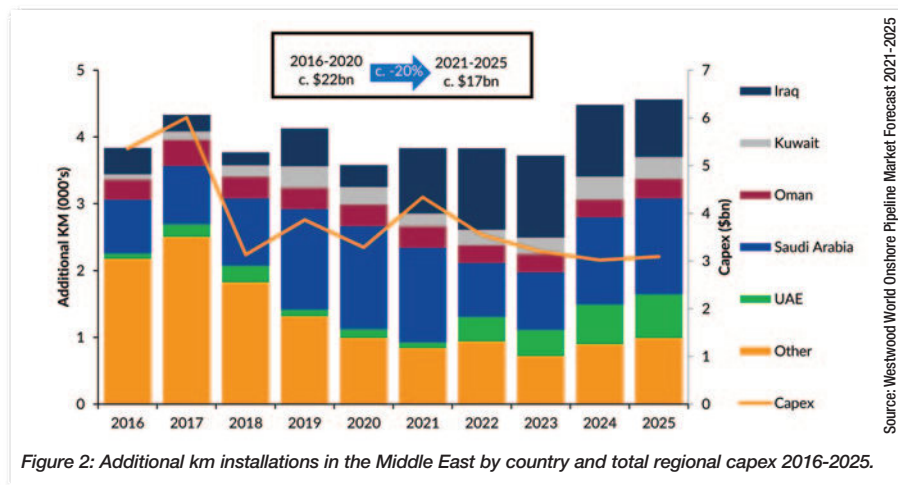


Figure 2: Additional km installations in the Middle East by country and total regional capex 2016-2025.

“Demand for additional pipeline installations in the Middle East is expected to be strong.”

2,500 km by 2025, driven by countries in the GCC area (eg. Iraq, Saudi Arabia and the UAE) increasing gas production to meet domestic power demand. Many of these countries (Iraq and Saudi Arabia in particular) are also looking to expand their liquid production capacity significantly over the next decade, thereby necessitating significant

pipeline installations. As a result, liquid pipelines are expected to continue to move forward, with an average of around 2,000 km expected to be installed each year over the forecast period.

Overall, Westwood expects pipeline capex to total around US\$17bn over the forecast period. This represents a decline of around

21% on the hindcast period, despite similar levels of additional kilometre installations. This is due to several large diameter hindcast projects, such as the TANAP pipeline, having higher per km installation costs, compared to many of the forecast pipelines.

Compared to installations and capex, opex is expected to remain relatively stable over the forecast period as continued maintenance is essential to ensure pipelines continue to operate at peak capacity. Overall Westwood expects around US\$17bn of opex expenditure over the forecast period, around 8% higher than the previous five years, as the installed base of pipelines increases and matures.

Westwood expects small diameter pipelines (0-23 inch) to continue to dominate spending over the forecast period due to the high proportion of the installed base they account for (around 87% in 2021). The Middle East has a large installed base of liquids pipelines and as a result, liquid pipelines are expected to account for the majority of opex, estimated at around 60% of total spend over the forecast.

With a diverse range of countries expected to see activity over the forecast, the Middle East is one of the most important regions for

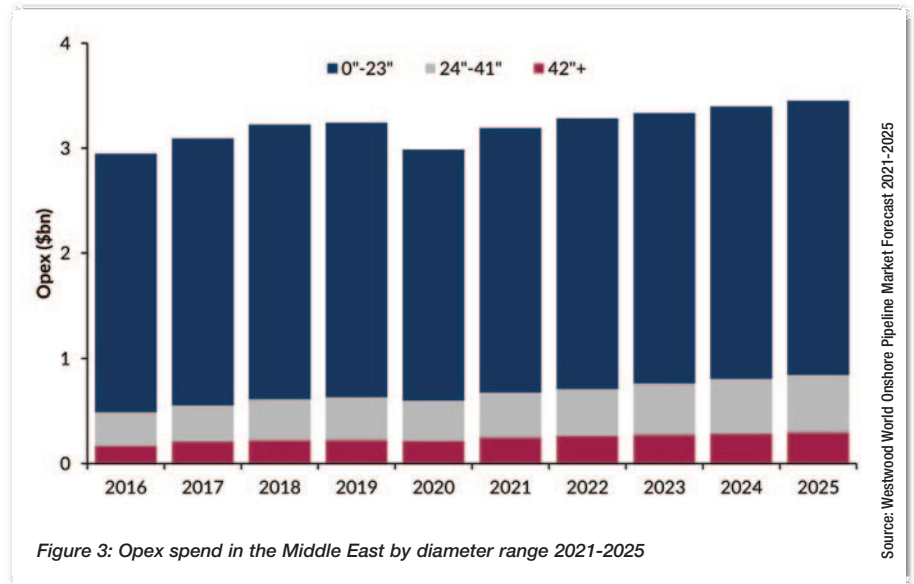


Figure 3: Opex spend in the Middle East by diameter range 2021-2025

onshore pipeline activity covered in Westwood's World Onshore Pipeline Market Forecast. Plans from several countries to increase production capacity will lead to an estimated 20,500 km of new pipeline installations in the next five years, while a

large (and growing) installed base will help opex expenditure grow year-on-year, reaching around US\$3.5bn by 2025. ■

<https://www.westwoodenergy.com/reports/world-onshore-pipelines-market-forecast-2021-2025>



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# A pipeline solution for gas applications

With the increased focus on gas, SoluForce is addressing the need for gas-tight flexible composite pipe.

**G**AS TRANSMISSION PIPELINES, bringing gas from remote locations to market, are a major focus for the oil and gas industry, increasing the importance of short- to long-distance natural gas pipeline infrastructure. As the world's oil and gas sector is becoming more gas oriented, the market is looking for a flexible non-metallic pipe to transport gas.

In addition to conventional high pressure flexible pipes, SoluForce also offers Gas Tight (GT) versions of the synthetic fibre-reinforced 'SoluForce Classic' and the high-strength steel wire reinforced 'SoluForce Heavy'. These special extensions to the portfolio have been developed for a wide range of gas applications, from wet gas directly from a well, to the transportation of gas from marginal fields.

## SoluForce Gas Tight products

All types of polymers show permeation of light hydrocarbons and gas. Small volumes of gas and hydrocarbons can permeate through the polymer of a thermoplastic pipe. Obviously this is something that needs to be avoided.

After years of Research & Development, SoluForce found the perfect material to stop permeation through the SoluForce pipe wall. A very thin layer of the purest aluminium available is wrapped around the inner liner pipe, resulting in the industry's only true gas-tight high pressure flexible pipe.

A property that makes SoluForce robust and distinguishes it from other options, is the bonded pipe structure. All layers in the pipe are chemically bonded, even the aluminium layer. Through extensive R&D, SoluForce has found a production method to chemically bond



Image Credit : Soluforce

*The SoluForce system has been in use in the Middle East since the year 2000.*

aluminium with HDPE. Therefore, even though the Gas Tight pipe system has a metallic layer imbedded in the middle, it still is fully bonded and retains the corresponding benefits.

The quality and reliability of all SoluForce products is guaranteed by extensive lab testing and long-term field experience. Furthermore, all solutions are certified and verified by internationally recognised testing bodies, against all the major certifications. For example, in addition to the standard certifications, the SoluForce Gas Tight is further certified according to ISO TS 18226 "Reinforced Thermoplastic Piping Systems for Gaseous Fuels".

## Track record

The SoluForce system has a solid track

record in the oil and gas industry, and has been in use since the year 2000 for a variety of applications, ranging from oil and gas utility pipelines to slurry transport in mining. The first flow lines were installed in the Middle East in 2000. These pipes have remained in service since then, without interruption. Every SoluForce product is developed with a strong focus on reliability, simplicity of installation and use – but above all safety. SoluForce maintains the highest levels of quality in the design, manufacturing and testing of all its products. As a result, they meet or exceed the various recognised international standards. ■

For more information visit the SoluForce website at: [www.soluforce.com](http://www.soluforce.com)

“ Small volumes of gas and hydrocarbons can permeate through the polymer of a thermoplastic pipe.”

# NEW TD-15M



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# A new drilling service model for a new era?

The prevailing uncertainties of the global market mean drilling companies are having to make careful judgment calls on the extent to which they keep their assets primed for work. And, says Leon Bickerstaffe of Sparrows Group, the growth trend in short-term contracts means a long-term outlook could help them get the balance right.

**T**HERE IS NO uniform way of summarising current activity levels in the international drilling market. Volatile prices and the pandemic-associated restrictions have of course created a backdrop of considerable insecurity for oil and gas operations, and in many parts of the world the watchword is still caution.

But in others – in particular, the Middle East and Asia – the drilling sector is very much back in business. In April, for example, the drilling group ADES International Holding announced renewals for seven rigs under contract in Saudi Arabia and recorded a total estimated backlog of US\$950mn. And we have witnessed a marked rise in demand for our drilling support services in these regions over recent months.

While this activity surge is by no means universal, the overall trend globally is still a positive one, as new contracts begin to materialise and rig reactivation programmes get underway as a consequence.

The rig services sector seems set for growth this year and beyond, spurred not only by the recovery in activity levels – offshore and onshore – but also by the associated need to address the maintenance backlog arising from the implications of COVID-19.

## The evolution of the short-term contract

There are signs too that these trends are likely to be matched by another characteristic of the drilling market in recent years: the growth of short-term contracts. They have always been part of the industry environment, of course, but there is certainly a sense that they are becoming more prevalent.

That presents a variety of challenges for drilling operators, but also opportunities for those who succeed in striking the right balance when it comes to investing in asset availability. For many it will be a careful calculation: do they spend potentially millions of dollars to get a rig up to specification, for



Image Credit: Adobe Stock

*Moving towards a more streamlined supply chain model can benefit drilling operators in the long term.*

perhaps only six months' work? That is unlikely to make commercial sense, but at the same time they need to have assets primed if they are to vie for short-term contracts materialising at short notice. And keeping a rig in a state of readiness in the hope of securing work inevitably means taking a commercial hit if the targeted contract does not come your way. As I say, fine strategic judgments are involved.

So, how to address these challenges? In an already tough financial environment, drilling operators are routinely looking around for efficiencies across their operations – without undermining safety or quality performance – and that extends to their practices for keeping rigs ready for the market.

One area that is currently subject to greater scrutiny is the supply chain community

around individual drilling companies. There is evidence of operators moving to more consolidated models – it has definitely been apparent in our Middle East and South East Asia operations in recent months, where we have delivered package-based projects covering crane, drilling and hoisting equipment for clients – as a means of streamlining vendor support.

## Choosing the long-term proposition

It certainly makes sense from several perspectives to move towards the concept of an end-to-end solution for support services. It applies greater control to project delivery: with one primary service provider, there is a simplified communications channel and the elimination of potential delays caused by



individual vendors failing to deliver their scopes on time within an inter-dependent project environment. All of which supports the goals of on-time and on-budget delivery.

It also addresses administrative inefficiencies – managing multiple vendors demands significant time and resources – and potentially puts the operator in pole position in the race for contract awards. An established partnership with a single-source provider means it is perfectly viable to work quickly to shape and execute a fit-for-purpose mobilisation plan.

There will be reservations among some drilling operators about committing to a more streamlined supply chain model; about putting all their eggs in one basket. This is why service firms with the capabilities to deliver comprehensive service packages are working to build a track record of delivery, as a means of demonstrating how it can add value.

That value, I believe, lies primarily in the long-term proposition. Short-term fixes with local yards might sometimes work as an immediate option, and there are more upfront costs in working to a sustained inspection and maintenance regime. However, it is our belief drillers will get more operational years

out of a longer-term partner; that kind of investment will save costs across the full maintenance cycle.

It is a service model in which we have already invested, not least because we have the resources and geographical reach to make it work. A sustainable partnership approach makes it viable for vendors to support individual rigs as they potentially move from region to region, especially in a short-term contract world. It creates one single point of contact for the client, regardless of where its assets are operating, and provides access to a stock of spare parts held across a network of bases.

### A partnership with genuine substance

There is perhaps a further dividend from taking this approach. It lies within the context of the well-acknowledged drain of experience and knowledge from the drilling sector as it is perceived to move beyond its peak years. As rig crews are streamlined and ‘veterans’ increasingly take the retirement option, and as young people entering the industry are no longer able to tap into their know-how and insights, it is recognised that the consequent

knowledge gap is growing. A sustainable relationship with a single-source provider, one based on trust and confidence, can serve to offset that to an extent: drilling companies can tap into the vendor’s pool of experience for complementary support as and when required. A partnership with genuine substance.

Ultimately, drilling companies want that sense of confidence to extend across everything their supply chain is doing for them. They want to know the work will be done reliably and safely, and the rig released on time.

It is a significant area of focus for companies like ours as we create a multi-disciplined proposition across many of the inspection, maintenance and service functions, specifically in our case in the drilling equipment arena. A new mindset for the industry, perhaps, but one that looks to the future, and shifts the balance towards sustainability. ■

*Leon Bickerstaffe is head of Drilling Services with Sparrows Group, a global provider of engineered products and services to the oil and gas, renewables and industrial sectors.*

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# Delivering an effective wellbore clean-up solution

Saleh Al Saeed, Coretrax, describes how a ‘single trip’ clean-up and cement removal solution delivered rig-time and sustainability savings in Saudi Arabia.

**W**ELLBORE CLEAN-UP IS a vital process as discarded debris and residue can result in reduced productivity or even significant non-productive time (NPT). Ensuring this is performed as efficiently and as sustainably as possible not only enables faster access to first hydrocarbons, but also greatly reduces cost, risk and carbon footprint.

During a recent drilling project in the MENA region, a major Saudi operator tasked Coretrax, the global well integrity and production optimisation leader, to create an innovative, one-trip wellbore clean-up assembly solution. For the first time, the company combined its CX-LTTT (Liner Top Test Tool) multi-packer tool with the CX-Bumper Sub to perform clean-up, inflow testing and casing pickle operations, without compromising the lower completion that had already been deployed.

Pickling the casing prior to an acid job removes mud and cement debris, mill scale, mineral scale and corrosion by-products. Circulating chemicals and removing remains around the hole protects the well and minimises the number of workovers or the need to reopen wells to counter the potential of leaking or corrosion in the future.

## Two technologies – one trip

Unlike conventional clean-up activity, the operator required a 7" landing sub to locate itself precisely on top of a 4 1/2" TOL at a 66° inclination to stop the mule shoe hitting and causing damage to the ceramic disk: a physical barrier used to provide well control in temporary wellbore isolation applications. A second 9 5/8" landing sub was also required to land on top of a 7" TOL. This dual operation would safeguard the integrity of the lower completion, ensuring there was no potential for leakage, while at the same time, casing pickling would safely and effectively remove suspended solids and debris without damaging the disk and potentially causing a major well control issue.

As a multi-set packer with three separate elements, the CX-LTTT (Liner Top Test Tool) combines cement drill out, wellbore clean-up,



Image Credit : Coretrax

Saleh Al Saeed, Coretrax.

displacement and isolated positive or negative inflow testing on liner tops and casing shoes, in a single trip. This eliminates the need for a dedicated drill out run (Figure 1).

Along with non-rotating scrapers, brushes, magnets and circulating tools, the device works by setting down weight to compress and extrude the elements. It can be used during both drilling operations and the displacement process. The large bypass area under the packer element enables quick running speeds when running to depth and a generous flow area past the tool to achieve high flow rates. This is essential for the

efficient and accurate recovery of debris out of hole and thereby, minimising risk of damage to the packer. It can also work across different metallurgies in the shoe track.

The packer is designed with customisable shear value torque through capabilities to ensure it is suited to a range of applications, including HPHT, extended reach drilling and multi-lateral projects, as well as being able to run in one trip. The tool is essentially a purpose-built packer added to the wellbore clean-up assembly to allow inflow testing to be performed concurrently in the harsh operating environments in the Middle East. This includes being successfully set at 17,500 ft with a well inclination of around 74 degrees.

Capable of combining the clean-up, displacement and inflow test operations in the same run, the heavy-duty and robust device is a proven and reliable inflow test packer.

To enable the CX-LTTT to land at two separate points with the same string in one run, it was deployed alongside the CX-

“ The device works by setting down weight to compress and extrude the elements.”

Bumper Sub to deliver an integrated, more accurate and cost-effective solution. As a purely mechanical operation, this can avoid any risks or any mistakes when activating or deactivating the tools (Figure 2).

As a heavy-duty travel joint designed to transmit high torque, the CX-Bumper Sub allowed the CX-LTTT to travel down at incremental stages without moving the lower section. This could then secure a positive indication and activate the tools before moving to the next area. Due to the complexity and risk associated with drilling through multiple layers of material such as shoe tracks, plug sets and cement, this is normally carried out across two trips in hole and can take more than three days to complete.

The hex-shaped mandrel is incorporated in the tool design, providing a large contact surface on which the torque transmits through the tool. Proven bonded seals are used to provide a seal across the full stroke of the bumper subs, which are rated to 10,000 psi.

As this was the first time the devices were paired, numerous simulation tests were carried out prior to the project to evaluate risk and ensure a successful operation. Coretrax worked closely with the operator to agree operational procedures and sequences.

### Rig-time savings

The project in Saudi Arabia took a total of 48 hours and was successfully completed in just one trip. Compared to traditional methods, the Coretrax solution saved the operator 1.5 days rig-time, enabling the E&P company to drill and complete the well faster, leading to earlier first oil production.

As a less complex operation overall, this unique integrated technology solution was more reliable and deployed fewer personnel. It also used less time ultimately, cutting cost,



*Figure 1: The LTTT-HD is designed to allow for drilling, inflow testing and displacement to be completed in a single trip.*



*Figure 2: The BHA design and placement of the bumper subs allowed for optimum placement of the LTTT-HD and subsequent testing of both liner tops in a single trip.*

risk and carbon footprint. It has so far been deployed on eight wells and has the potential to be used on up to 25 wells per year across a range of applications.

Since 2017, the CX-LTTT has achieved more than 400 jobs in Saudi Arabia alone. The CX-Bumper Sub devices, which are fully compatible with a range of Coretrax equipment, have achieved a substantial run history and exceptional results for operators in the MENA region.

The Aberdeen-headquartered company,

which boasts its largest base in Saudi Arabia, continues to develop and enhance the CX-LTTT for global use. For example, it has created the CX-LTTT (HD), which is designed to be robust enough to withstand the debris that is generated from the drilling activities and still function as required after several hours of drilling. To date, it has successfully reached 430 well runs, saving a Saudi operator more than 36,120 hours of rig-time and around US\$150mn in costs. ■

## Coretrax doubles the size of its Middle East headquarters

FOLLOWING SUSTAINED GROWTH in the region, Coretrax has doubled the size of its Middle East headquarters in Dubai, UAE, after moving into a new DMCC office space in the city and an operations hub in Abu Dhabi.

Murray Forbes has been appointed as vice president of Sales and Marketing and will be located at the new site. He brings more than 25 years' experience in well operations, technical support and product development. Forbes held several senior positions at major oilfield service companies and was most recently global sales director at Welltec. He will work closely with Coretrax's global senior leadership team to drive and enhance the company's current technology offering.

Forbes is supported by Bob Murdoch who has been appointed as Eastern Hemisphere Expandables Operations manager. He has more than 30 years' experience in technical operations, joining the business from the firm from Halliburton where he was operations manager – liner hangers. He will be responsible for leading Coretrax's fast-growing, expandable technology range in the Middle East and Asia Pacific.

The Aberdeen-based company has recently consolidated its European headquarters into a new facility in Aberdeen to support increased business demand across the region, with plans to increase headcount this year. The company's newly appointed EARC regional manager, Keith Bradford, will be responsible for leading Coretrax's expansion across Europe, Africa, Russia and Caspian.

Kenny Murray, CEO at Coretrax said, "Our new, larger offices in Aberdeen and Dubai are a significant milestone for the business as we gear up for further expansion in the next 12 months. Despite the challenges that the Covid-19 pandemic has presented, we are continuing to see increased demand for our technology and this is testament to the high-quality service our people consistently deliver.

"Our new senior appointments each bring substantial knowledge and experience to the business which will be vital as we implement our ambitious growth strategy. As the industry continues to focus on driving operational efficiencies and responsible oil recovery, we are ideally placed to support operations at all stages of the well lifecycle. We already have a healthy pipeline of work moving into the remainder of this year and I look forward to expanding our footprint across the oil and gas and renewable sectors in the coming months."

# The growth of integrated solutions and collaboration

At the virtual Offshore Well Intervention Asia Pacific Conference, an expert panel discussed how a growing emphasis on collaboration is complementing the shift to integrated services, unlocking value for both operators and service providers.

**C**OMMENTING ON THE rise in integrated services, Scott Deacon, Subsea Intervention lead, Baker Hughes, opened the session by stating, “This is a growing area in the light well intervention space, and it is also growing in the plug and abandonment (P&A) space as well. To have integrated solutions allows us to collaborate and support each other and brings cost effective and efficient solutions for operators.”

Chin Siang Tan, senior services manager at Baker Hughes, added, “When we go into discussions with operators, they are much more open to the idea of us putting things together in a customised package, and it is a very wide range of offers we are talking about now. Not just hardware but things like digital, software, remote surveillance etc are really striking interest in the conversation with operators now.”

“The scope of these integrated services is not just defined by operators, but as a service contractor we have a responsibility to integrate and support not just within ourselves but outside our capabilities. Working with key subcontractors will help provide a bigger range of coverage and exercise the flexibility to customise solutions and provide the best project value for operators.”

Ankesh Nagar, lead engineer Petroleum Engineering & Surface facility North East India, Cairn Oil & Gas, said, “Looking at a decade of our discrete services, we realised there were some slippages on key contracts and projects which were ultimately due to some discrete contracts unable to deliver in the right spirit of the project. We as a group thought that when we moved into integrated solutions for both OPEX and CAPEX we would be able to take care of that aspect and improve on delivery. This is exactly what we saw when we took this step from 2015 onwards. Now we have multiple, regional, integrated service contracts for drilling as well as drilling and testing integrated services. We have found that even if you have projects over large areas, you can still manage the delivery of them with leaner teams and achieve the objectives of your business plans.”

Muhamad Zaki Amir Hussein, Well Intervention specialist, Petronas MPM, noted that while it can be more messy for smaller providers to merge with others in order to offer these integrated services, generally the advantages far outweigh the associated challenges. He said, “For services providers, this can align and focus your resources rather than having separate businesses developed for different service lines and having to manage separate contracts and performance levels. Having a single contract is more efficient and gives them more room to work in terms of economies of scale.”

## Collaboration

The growing popularity of integrated services, combined with the Covid-19 restricted climate, has put a much greater emphasis on collaboration, with most service providers and operators now considering this a far greater part of their business model.

Deacon said, “Collaboration has been highlighted as the way



Image Credit : Adobe Stock

*The growing popularity of integrated services, along with Covid-19 restrictions, has heightened the focus on collaboration.*

forward, and I think it is key for industry, especially through the times we have just had. Service providers need to work together, operators need to work together. By looking outside of the business, you can utilise other solutions which may be the best solution for the operator.”

Commenting on how his company has expanded this aspect, Nagar said, “We do an annual workshop with not only the service companies who have done work with us but also discrete and more niche services present as well. Then, when we project a need for a solution, there is already a good networking platform for these niche companies to showcase their potential, so they can ultimately become part of the integrated service solution. Since our objective is to get a good quality output, it is important to ensure there is good collaboration not just between us but also on their end as well. At the end of the day, good communication and good collaboration equals good delivery of projects.”

Zaki added, “I agree there are great opportunities for smaller service providers with standalone solutions to learn through collaboration. There is great potential for syndication, experience and resource sharing across these service providers via collaboration for integrated solutions. As for collaboration among operators, there are more opportunities for this, especially for bigger packages like workover and subsea work where mobilisation costs are high.”

“Bigger mobilisation and higher spread rates with subsea and workover packages require more economies of scale. Hence, we try to find synergies and encourage collaboration across operators for this in the form of joint tenders or farming into an existing, awarded contract.” ■

To view the full session, follow the link below:

<https://www.youtube.com/watch?v=1mPcYhTsBfE>

# Middle East recovery spells boom for compressors

The compressor market is set to expand as the Middle East economy rebounds from the Covid-19 pandemic.

**A** REPORT PUBLISHED ON Mordar Intelligence stated that due to the growing refining capacity of the region, the use of compressors within the oil and gas industry for applications such as extraction, transportation and refining processes will expand. Saudi Arabia, which is rapidly exchanging its power generation from oil to gas, is expected to be the fastest-growing market for compressors. The Middle East and African compressor market is expected to rise at a CAGR of 3.1% during 2020-2025.

Additionally, the construction market within the Middle East and North African regions is forecast to experience a slow recovery after the effects of Covid-19 last year, with initiatives such as the Saudi Arabian Public Investment Fund and projects such as the New Administrative Capital in Egypt on course to ensure construction companies will be kept busy for the next few years. With portable, towable, and heavy duty air compressors a common sight on most construction sites across the world, this will also benefit from the blossoming of building work projected for the region.

With global economies beginning the slow ascent out of the Covid-19 slump, a number of compressor suppliers have moved to take advantage of the promising market outlook:

## Doosan Portable Power

The portable power business of Doosan Bobcat has announced a new global leadership structure to provide the company with increased efficiencies in terms of operational footprint, product platforms and other key initiatives in order to streamline performance.

Jan Moravec, the newly appointed general manager of Portable Power for Europe, the Middle East and Africa (EMEA) commented, "Our key goals for this year include the completion of our Stage V compressor range with the introduction of a new family of small compressors, enhancing our product offering for MEA markets, and to continue to strengthen our dealership network and to fulfill all of our customers' needs in the EMEA region."

The Portable Power range from Doosan Bobcat boasts a number of portable compressors for the construction, rental, quarrying and many other industries.

## CompAir

CompAir has introduced new models to its renowned L-Series range of oil-lubricated screw compressors, delivering cutting-edge performance



CompAir's L06 Tank Dryer.

and reliability.

Covering 2.2kW to 7.5kW models, the new fixed speed units are highly versatile and only require a minimum floor space of 60 x 65 cm, with the receiver-mounted models being exceptionally space-saving. From a stand-alone compressor to a complete air station with a high-performance dryer and intelligent control system for low-pressure losses, the systems can help meet a range of individual customer requirements.

The latest L-Series compressors feature a new C-Pro1.0+ controller as standard, too. Information about pressure, oil temperature and compressor status are provided to the operator together in one display. The controller offers a host of other features too, including a communication port RS485 supporting Modbus. The controller can be used also as a sequencer between two machines with C-Pro 1.0+, continuously monitoring all the critical parameters of the compressor. ■

“Our key goals for this year include the completion of our Stage V compressor range.”

# Supporting the energy transition in the Middle East

Ahmad Hussein, country head of electrification business, ABB, Saudi Arabia, discusses ABB's initiatives to promote smart and sustainable energy operations.

## What opportunities do you see arising from the energy transition in the Middle East, and how is ABB helping the region move to a low carbon future?

The Middle East and Africa region is making solid renewable energy progress, and is on track to realise its vast renewable energy potential and diversify its energy sources. Moreover, owing to the availability of low-cost gas resources, the region plays a significant role in exporting blue and green hydrogen.

The energy sector also calls for energy storage policy regulations to unleash the full potential and make power trading more commercialised. In addition, a rapid expansion of renewable integration to the grid in the world's fastest-growing region in terms of energy consumption, and the transition to low carbon communities, require a modern, smart and flexible power grid.

In response, ABB is developing innovative grid solutions to enable power distribution products, solutions, and services digitally. Our smart technologies help customers to create reliable, efficient, and more resilient grids. Designed to optimise operational costs and reduce capital expenditure, they enable fast integration of future-proof solutions and decision-making based on real-time data from the ABB Ability™ cloud solutions.

## To what extent can electrification help oil and gas operators reduce their carbon footprint and improve their operations?

We see more and more every day the aim of oil and gas operators to reduce their carbon footprint. Related to this need, there is a new trend from oil and gas players to improve energy efficiency and use renewable energy. ABB can support in different ways to provide efficient, safe, smart and more sustainable electrification: from providing EV chargers for their facilities to controlling and managing energy to push for green hydrogen to become cost-competitive and take advantage of this.

## How can ABB technologies facilitate the integration of renewables into the grid, while maintaining grid stability?

Grids are evolving in line with the sustainable



Ahmad Hussein, country head of electrification business, ABB, Saudi Arabia.

energy transition, and the grids of the future will be completely different in structure from the traditional model we know. Networks with decentralised power generation will require decentralised solutions to ensure grid stability and resilience. Weather determines how the power plants operate by generating "non-synchronous" power, and creates grid challenges regarding stability and resiliency. ABB Electrification is proud of the industry's most comprehensive portfolio designed to meet the current and future challenges in the grid. Attention has turned to ABB synchronous condensers with their former function of reactive power compensation in that context. Together with solutions that secure grid stability, the key for facilitating the

integration of renewables is working with partners to develop solutions for a safe, smart and sustainable future, maximising the benefits from the existing robust infrastructure instead of a "rip-and-replace" strategy.

## How can digitalisation help to optimise the management of utilities, and what are the main challenges?

We live in an era of revolution: energy revolution with renewables; energy storage and the introduction of electric vehicles; and the Fourth Industrial Revolution, which builds on the digital process, representing new ways in which technology becomes embedded within society.

Utilities that focus on asset management, leveraging advanced data analytics and applying digital technologies can significantly improve operational performance, improve customer services and overcome the main challenges with DER integration or ageing infrastructure.

## How can data-driven energy management solutions help companies to improve energy efficiency and operate more sustainably?

Data-driven energy management solutions are gaining traction for optimising energy efficiency, availability and environmental sustainability.

Energy efficiency has become essential to running cost-efficient operations. ABB Ability™ Energy Manager provides a real-time understanding of energy consumption and identifies areas of improvement. It is scalable and can monitor site performance and supervise the electrical system and allocate costs.

Scheduled automatic data exports execute and analyse to improve the use of assets and help managers to make informed decisions to optimise the business. In addition, alerts and notifications support predictive maintenance to key personnel with remote implementation to achieve energy savings.

Data-driven decision making improves reliability and performance by enabling organisations to predict system behaviour and optimise performance of assets to increase overall efficiency and productivity. ■

## Grundfos urges the use of high efficiency IE5 motors and pump solutions

LEADING GLOBAL MANUFACTURER of pumps and pump equipment Grundfos argues that E-motors are the ideal solution for better efficiency and reducing energy consumption.

In an article on its website, the company points out that as much as half of the world's electricity is consumed by motors. There is a growing focus on improving the efficiencies of motors and reducing energy consumption to meet the carbon emission targets around the world.

"There is a lot of excitement around the world of motors, given the recent high profile investments in this area, validation from key governments and industry leaders to further promote the development and adoption on energy efficient motors across the various sectors," comments Grundfos.

The International Efficiency (IE) standards stipulate the energy efficiency with five levels of motor efficiency: IE1 to IE5, the highest efficiency level being IE5. These IE codes serve as a reference for governments who specify the efficiency levels for their minimum energy performance standards for motors in their respective countries.

Pumps account for a large portion of this electricity consumed across the various sectors, especially in industries and commercial sectors, Grundfos points out. As a leading manufacturer of pumps and pump equipment, Grundfos has several decades of experience in building state-of-the-art electronic controlled pumps (E-pumps) and has been manufacturing its own motors with integrated frequency converters with energy-saving and speed control functionality for domestic, commercial, and industrial pump applications.

Commenting on the growing focus and adoption of E-Motors, Markus Brandstetter, chief technology officer, Grundfos said, "Our focus on developing

IE5 E-motors is strategic not only for our business, but we see that it is a critical solution to alleviate the world's energy and climate issues. E-motors are known to not only improve the efficiency of the entire system but also help in reducing energy consumption and helping us mitigate climate change. This is what we push further to the benefit of our customers and end-users in reducing cost and CO<sub>2</sub> emissions."

High efficiency E-pumps with IE5 motors contribute substantially to energy savings and reduced CO<sub>2</sub> footprint, Grundfos stresses. In 2020 alone the avoided CO<sub>2</sub> emissions from Grundfos E-pumps was 270,000 tons.

The Grundfos MGE E-motors are the most energy efficient yet, exceeding the IE5 requirements. For example, looking at a MGE 11.0 kW 3x380-500V medium speed, the IE5 requirement for the motor efficiency is 93.2%, but the Grundfos MGE E- motor has a motor efficiency of 95.7% at 380V/2600 rpm.

These permanent magnet synchronous motors (PMSM) are designed especially for frequency converter operations and optimised for pump applications and high part-load efficiency. The motor PMSM also has a built-in frequency converter that enables variable-speed operation with benefits in pump applications ranging from energy savings, process control, extra functionalities, built-in motor protection, higher performance and more compact pumps, reduced water hammer due to long ramp times and low starting currents. This results in lower energy and lifecycle costs.

Grundfos' MGE E-Motors are currently utilised in a wide range of its pumps.

<https://www.grundfos.com/about-us/news-and-media/news/grundfos-endorses-the-use-of-high-efficiency-ie5-motors-and-pump>

### Vertical Pressure Leaf Filter

For filtration of liquids with suspended solid contents upto 7%. No filter cloth requirement. Automatic dislodging of filtered cake by pneumatic vibrator or oscillating sluice header. Dry or wet cake discharge is possible. Filtration area upto 120m<sup>2</sup>.

#### Application

- Resins
- Bleaching earth / activated carbon
- Crude oil
- Ni-catalyst
- Brine Filtration
- Glucose
- Fatty acid
- Winterisation
- Electrolyte
- Beverage Industry

### Horizontal Pressure Leaf Filter

Sharpex Horizontal Pressure Leaf Filter (shell retraction or bundle retraction) features horizontal pressure vessel, filter leaves, pneumatic vibrator assembly, bottom structure housing, hydraulic power pack for bonnet ring opening / closing and shell or bundle retraction. Filter leaves are mounted on a central outlet manifold with perfect 'O' ring sealing. Filtration areas from 2m<sup>2</sup> to 200m<sup>2</sup>. Dry cake discharge or wet cake discharge is possible.

Filters are also supplied with fix or oscillating sluicing arrangement for wet cake dislodging.

#### Application

- Bleaching earth filtration
- Wax filtration in edible oil industry
- Hydrogenation (catalyst filtration)
- Crude oil filtration in edible oil
- Alkyd resin filtration
- Molten sulphur filtration
- Catalyst filtration



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# Think twice – think sealless

Charlie St Laurence, business development manager, HMD Kontro, outlines the benefits of sealless pumps and why they should be considered as an alternative to conventional mechanical seal pumps.

**T**HE OIL AND gas industry is subject to the most stringent requirements when it comes to employee health and safety concerns, as well as protecting the environment against accidental emissions. Breaches of compliance not only have a human and environmental cost but could also affect the company's reputation. From an operational standpoint, any disruption of production may also incur unexpected costs and losses, with potentially damaging financial implications where the loss of high value product or business continuity are involved.

## Sealless safety

Mechanical seals are widely regarded as the weakest point in any system using them, accounting for up to up to 85% of unexpected pump failures. A magnetic drive, sealless pump has no seals or seal support system and so provides total liquid containment, eliminating potentially dangerous and costly leaks from the outset. This ensures the integrity of the pumping system, even at high temperatures and pressures, protecting and extending equipment as well as component life.

Thanks to the complete containment of liquids, sealless pumps are suitable for most liquid types, minimising safety risks across a wide duty and application base. In the oil and gas sector, this includes offshore oil and gas pumps, for example process pumps to move and handle oil and water, pressure and HTF pumps and refinery applications such as the handling of hydrocarbon condensates, anhydrous HF and other complex processes involving caustic or toxic chemicals.

## Sealless savings

Specifying sealless, magnetic drive pumps can also offer other clear advantages before, during and after installation, resulting in considerable time and cost savings and associated productivity gains, all issues at the forefront of consideration for specifiers.

Initial upfront purchase and installation costs can be a barrier to modernisation and



Image Credit : HMD Kontro

*A magnetic drive, sealless pump has no seals or seal support systems, providing total liquid containment and ensuring the integrity of the pumping system.*

“ Mechanical seals are widely regarded as the weakest point in any system using them.”

replacement programmes. The simpler and leakage free design of magnetic drive sealless pumps helps reduce the financial outlay. With no need for seal support systems and reduced instrument wiring and configuration requirements, lead times are substantially reduced, and project build costs minimised. Associated system costs in the form of utility installations and water- or air-cooling systems can also be bypassed; this can include many of the lengthy HazOps (Hazard and

Operability) and SIL (Safety Integrity Level) studies.

## Lifetime efficiencies

Once up and running, sealless pumps really come into their own. The simplicity of design of a magnetic drive pump, together with a proven track record, provides a ‘fit and forget’ advantage, particularly when it comes to the latest systems.

HMD Kontro, pioneer of magnetic drive sealless pumps technology, has developed the CSA/CSI range of pumps which are based on proven technology with a new approach. A modular format has simplified systems designs, streamlining the selection process and standardising the range, while still offering a wide range of pump options.

With greater interchangeability of parts, servicing is minimised, and on-site replacement of components can be



accomplished without the need for hot working or skilled labour. Extending MTBM (mean time between maintenance), increased reliability and providing the appropriate parts to effect fast servicing and quick replacement where needed will help to reduce downtime.

Improving inventory management for spare parts also results in ongoing cost savings and

increased plant profitability, making magnetic drive sealless pumps an attractive option in lifecycle terms.

### Worth a second look

Overall, magnetic drive sealless pumps represent a cost-effective alternative to conventional mechanical seal pumps,

delivering substantial whole life savings while assuring better operator safety and a cleaner environment, with less potential for compliance breaches. ■

*To access additional learning resources and more information on magnetic drive pumps, visit [thinksealless.com](http://thinksealless.com).*

## Supplying pumps and drives for Abu Dhabi National Oil Company (ADNOC)

FLOWSERVE UAE PARTNERED with motors and drives specialist WEG to upgrade the fuel circulation pumps for ADNOC Group's North Depot aviation fuel facility at Abu Dhabi International Airport. The whole system was being replaced as it was not very energy efficient. Flowserve looked to WEG's expertise and experience to upgrade the variable speed drives (VSD).

WEG supplied four custom-built LV VSD panels, two 132kW and two 185kW, along with filters, in a complex bespoke solution, built at WEG's manufacturing facility in Brazil. The panels had to be built at one of WEG's facilities that had been approved by ADNOC. The solution addressed specific key requirements, such as a need for a low harmonic solution, often requested in oil and gas applications; WEG's solution was to provide input harmonic filters for the VSDs. WEG's engineering and application local support team will provide assistance with installation set-up and commissioning, as required by the customer, as well as providing any support required throughout the life of the installation.

"In recent years we have added significantly to our after sales support team in the region, and this was certainly a factor that has allowed us to deliver both the products and the service that these type of projects require," said Darshan Balkrishna Shejekar, development sales manager, LV Automation at WEG.

The panels will also have to be extensively tested, in line with ADNOC testing requirements.

Being involved in a project for ADNOC is a fantastic opportunity for any company operating in the region, but it is not an opportunity that is easily gained, says WEG. To be trusted by one of the biggest oil

and gas companies in the world and earn a place on its approved vendor list (AVL) requires considerable effort, investment and commitment alongside expertise and experience.

In addition to the increasing personnel in Dubai, the company has partnered with an agent in Abu Dhabi, which has helped to increase the In-Country Value score that is essential to getting approval in this case. Positive references from within the oil and gas industry have also contributed. WEG has been a trusted supplier to Saudi Aramco and PDO Oman, and has established its reputation in the region through projects such as the Duqm refinery project.

Engineering expertise, experience and contribution to In-Country Value have also been factors in Amarith's successes with ADNOC. The designer and manufacturer of low lifecycle cost centrifugal pumps and associated equipment secured a US\$1mn order in June with its agent NAMA Development Enterprises for 14 API 610 VS4 vertical pumps for the ADNOC Ruwais Refinery East.

NAMA was approached for its reputation of delivering into major projects and high In-Country Value. Amarith also has a good understanding of ADNOC processes and practices following numerous successful projects completed for ADNOC which, combined with its engineering and manufacturing agility, demonstrated how it would meet the demanding requirements of this project.

The 14 API 610 VS4 vertical pumps with Plan 53B seal support systems and top-up trollies will be installed at the Ruwais East Refinery for closed drain duties, condensate and oil transfer. Depending on their duty, the pumps will be manufactured in either stainless steel or carbon steel, and all are ATEX Zone 2 compliant.

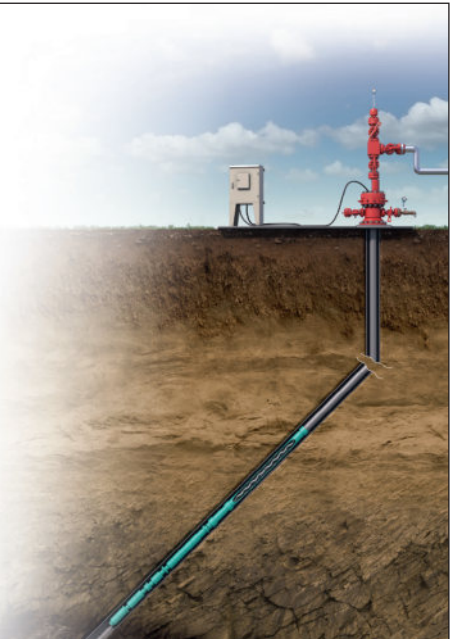
## Technology for a clear Future

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# Increased safety for gas pipelines

Andreas Thieme, Dillinger, describes the development of the company's Eddy Current testing system (D-TECT) for the detection and elimination of local hard zones, which can cause sudden stress corrosion cracking in pipes transporting sour natural gas.

**T**HE MOVE TOWARDS new technologies with less impact on global warming is a long process, requiring bridging technologies that are already securing a significant reduction in CO<sub>2</sub> emissions. One of these is the use of natural gas, which is mainly transported through pipelines.

Pipelines transport natural gas at high pressures through a variety of environments, some of them inhospitable, eg. cold arctic tundra, hot deserts or seismically active areas, as well as being laid offshore in deep waters or at low temperatures. Beside these mechanical loads, corrosion problems can also be caused by the transported medium. In the worst case, it shows acid sour gas characteristics that can cause various types of cracking inside the pipe wall or on the surface. This forces the designer already in the stage of the material selection to specify mechanical-technological and corrosion properties. These are characterised by special toughness at low temperatures, distinctive crack-stop behaviour and special corrosion resistance, to be adjusted evenly throughout the entire production.

Life, environment and invested capital have to be protected for the duration of the operation of the pipeline, which can be several decades. With growing experience over the operational life of pipelines, more projects built and technical improvements, new knowledge can be gained about possible new damage, usually in small steps of development. However, when unknown damage mechanisms are causing larger failures, it can force the whole supply chain to develop and introduce new technologies in a short time, to solve the issue.

## Fatal stress corrosion cracking

An example is the failure of a pipeline in 2014 in Asia. In presence of H<sub>2</sub>S as a promotor for the absorption of hydrogen in the steel, stress on the pipe and susceptible areas on the surface, a very severe sour gas attack occurred in a new, as yet unknown form. This

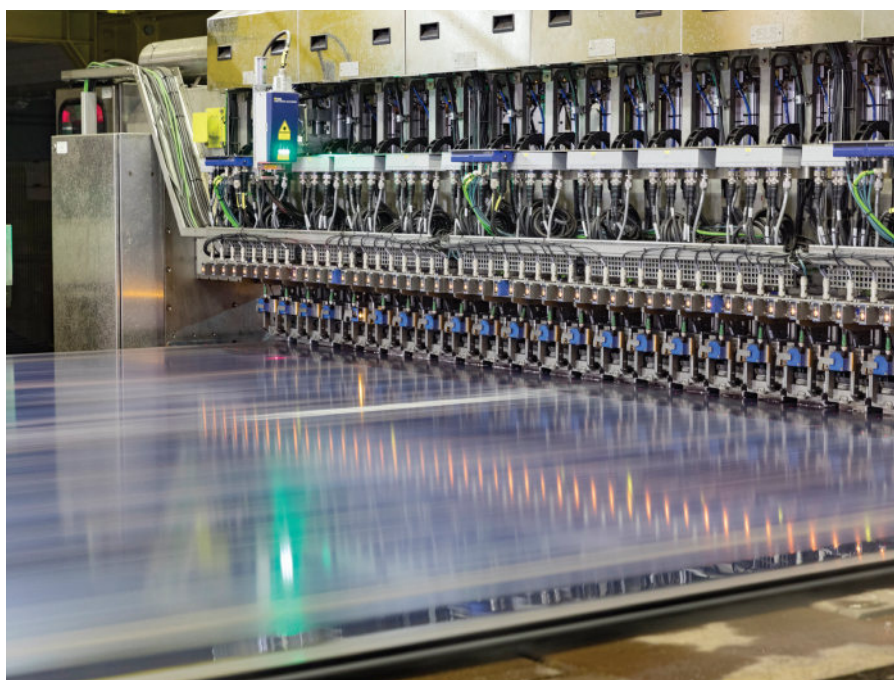


Image Credit : Dillinger

*Dillinger together with an industrial partner specialised in NDT developed a testing method on the basis of Eddy Current (EC) that is able to detect small hardness differences on the plate surface.*

sour gas attack led to Sulphide Stress Cracking-type (SSC) cracks through the wall of the pipes, which prevented continuing operation. These cracks are assumed to be related to very thin local hard zones on the surface of the pipes. Since this case became known, all manufacturers of plates for natural gas pipelines dealt more or less intensively with the phenomenon that occurs on high tech steel plates for sour service, produced by thermomechanical rolling and accelerated cooling (TM+ACC). In the meantime, the local hard zones have been well investigated. It became clear that the formation of these zones is generally related to several steps in the production process of this type of plates.

These local hard zones have four characteristics: 1. Their hardness is well above the hardness level of the base material. 2. With a thickness of a few 10ths of a

millimetre, these hard zones are very thin. 3. Their occurrence over the plates is irregular and rare. 4. Research showed that they cannot be prevented completely.

Conventional testing methods are not able to detect these zones on the plates.

## Problem solving for current sour service pipeline projects

Due to the uncertainties after finding the harmful phenomenon of local hard zones, most of the oil and gas majors did not allow the use of TM+ACC material for the transport of sour natural gas any more. However, due to its advantages in terms of mechanical-technological properties and its efficiency, it is today's first choice, both in production and processing. Therefore, every attempt had to be made to regain confidence in this type of material and find a technical solution.

As it was clear, local hard zones cannot be avoided completely. A method to find them on the plates during large-scale production had to be developed. To achieve this, Dillinger together with an industrial partner specialised in NDT, developed a testing method on the Eddy Current (EC) basis that is able to detect small hardness differences on the plate surface. Eddy Current Testing (ECT) is a well-known and proven testing method that has been used in steel production, for example to detect cracks on hot wide strip materials.

Through cooperation between Dillinger, plant engineers and research institutes, the system was adapted so that differences in hardness on the surface were detectable. The system detects areas of diameters 20 mm and above by using physical characteristics of the different structures in comparison to the base metal. These show with a certain threshold the hardness increase versus that of the base. These areas can be repaired with light grinding.

The Eddy Current device, currently in operation in both of the Dillinger plate mills in Germany and in France, tests plates inline during production for the occurrence of hard zones, without any interruption of flow. All

plates tested on the appearance of local hard zones are marked with the brand name D-TECT (Dillinger - Totally Eddy Current Tested).

Since there were no existing standards or specifications dealing with the subject, it was necessary to approve the testing method in the production of heavy plates. Most importantly, the testing and the final approval of the method and the installation had to be done together with the end customers, such as the oil and gas majors. Together with them, a test programme on the basis of the Dillinger ECT procedure was established. The sensitivity of the system and the Probability Of Detection (POD) were demonstrated. This approach for verifying new test methods is described in DNV.RP-F118 and in mathematical models.

Test plates with different kinds and sizes of artificial and natural local hard zones, covering the known different material structures responsible for hardness variations, were driven through the EC device. The detectable minimum size of these areas was checked, depending on the size and thickness of the hard layer. In addition, the repeatability of the test was determined. At the end of the test, it was proven that the

system could find hardened areas in sizes of 15 mm in diameter and above having the same thickness of 100 µm as the natural ones. Furthermore, it was shown in multiple successive tests that the reproducibility was very high. As the artificial hard zones were circular and significantly smaller than those occurring naturally, in combination with the high reproducibility, it can be stated that the system fulfills the task to detect local hard zones in plate production safely.

Both the POD of the Eddy Current Test device and test procedure were approved by several oil and gas companies. Combined with its experience of large complex pipeline projects, Dillinger is the first supplier for upcoming highly complex sour gas projects, especially in the Middle East. Through its subsidiary Europipe, 160,000 tonnes of plate for Qatargas NFPS project will now be supplied exclusively by Dillinger from Germany and its sister plant in Dunkirk, France.

Due to travel disruption at the current time, the inspection of plate production can be done remotely with the Dillinger myE-Service. This system allows the follow-up of all relevant production steps directly and inspection of all the material testing on a web-based platform. ■

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# Keeping oilfields safe and secure

A mesh of digital and physical security measures surrounds the Gulf's energy infrastructure, shielding the oil and gas supply that keeps the world moving from an ever-growing list of threats and harms. Martin Clark reports.

**W**ITH MIDDLE EAST oil and gas output underpinning global energy supply, the safety and integrity of installations in the field, from pumps to pipelines, is vital. That includes the safety and security of any personnel on the ground, but it also extends to protecting the data systems that keep modern oilfields running smoothly. The cyber attack on the US Colonial Pipeline in May, which resulted in the complete shutdown of its network, underscores the danger to energy systems posed by technology.

In the Middle East, a region prone to volatility, security in all its guises has become an integral part of the industry. Some of the region's oil fields are simply too big to fail.

The bulk of the world's giant, super-giant and mega-giant oilfields are located either in or in close proximity to the Gulf – and together these fields account for a majority share of the planet's recoverable oil.

Saudi Arabia's Ghawar field and Kuwait's Burgan field are two prime examples.

Spread across such a vast area – Ghawar measures up to 280km long by 30km wide – it is also evident that security poses a great challenge.

This means trained personnel performing essential safeguarding tasks, from routine checks to emergency response. Security experts at G4S have been providing mobile security services to the Basrah Gas Company (BGC) in Iraq since 2016. The project, the largest gas venture ever undertaken in Iraq, and spread across a wide area, brings together Shell and Mitsubishi Corporation with Iraq's South Gas Company.

Over the past five years, G4S has provided close protection and secure, safe transport for



*Protecting the Gulf's vast oilfields is a challenge.*

Image Credit: Adobe Stock

more than 405,000 clients on the project, reaching a key milestone earlier this year of 20mn km driven with no major incidents.

"Each G4S employee is put through intensive security, road safety and continued defensive driving training," said John Nestor-Bergmann, G4S project manager. "We currently transport over 3,000 clients every month, using a fleet of 60 armoured vehicles. Our number one priority is safety and security of our clients, their assets, our own employees and the communities living around them."

Even during the coronavirus pandemic, the company continued to operate, completing more than 100 journeys every day in support of work at the field. For Iraq, the success of the Basrah gas project is strategically important for its recovering economy.

## Changing nature of security threats

But the nature of security threats to energy infrastructure is also changing fast.

While computer threats, notably cyber attacks, have come to prominence in recent years, technology-based counter measures are also helping operators to stay one step ahead.

In 2012, Saudi Aramco was hit by the Shamoon virus damaging 30,000 of its computers, yet the company still managed to keep production unaffected.

As well as monitoring integrity of systems and performance, and detecting potential security breaches, technology is also being deployed in proactive, more tangible ways in the field as well. Aerial drones, for instance, can provide a quick visual assessment of

“Security in all its guises has become an integral part of the industry.”

potential threats across a vast field or network area, as well as record more specific data to shore up defences where needed.

And, in the heat of the desert, solar powered high-definition surveillance cameras fitted with motion sensors and night vision provide reassuring eyes on the ground.

All of these tools are now part of an ever-widening armoury for operators and contractors seeking to maintain the integrity of assets.

Right now, however, it could be argued that the greatest threat is faced online.

In mid-July, Aramco was again reported to have suffered a fresh cyber attack, with 1 terabyte of stolen data, which is now being offered for sale on the dark web. Reports suggested that hackers, a cybercriminal group known as ZeroX, had not managed to breach the network and systems of the oil giant itself, but those of third-party contractors working for the company.

“More than ever, cybersecurity has to be at the core of companies’ business models, especially in the oil and gas industry.”

Again, Aramco has said that the data breach has not affected its operations, but it is a mounting cause of concern, not only for data security reasons, but also the potential for operational impact going forward.

It is also unfortunate timing for Aramco, coming shortly after it released a report on cyber security alongside Siemens Energy and the World Economic Forum. The report: *‘Cyber Resilience in the Oil & Gas Industry Playbook’* establishes a blueprint for boards and business leaders to evaluate digital risks and enhance security across the industry.

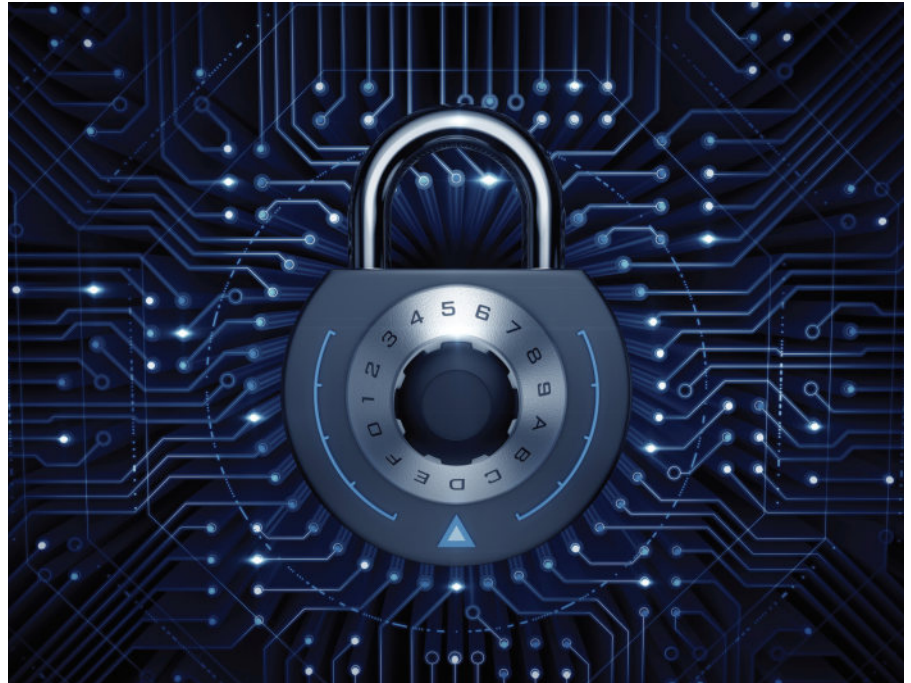


Image Credit: Adobe Stock

*Oil and gas companies need to focus strongly on cybersecurity.*

Basim Al-Ruwaii, Aramco’s chief information security officer, said it aims to set the industry standard for improving cyber resilience.

“Establishing and aligning cybersecurity practices across the industry enhances our collective resilience efforts and allows us to present a united front against cybercrime and other critical security threats,” he commented.

It may suggest greater standardisation and cross-industry collaboration in the years to come in order to protect industry assets.

The joint cyber report gathered the thoughts and opinions from more than 40 senior executives from right across the sector.

“Digitisation is empowering the oil and gas sector to become ever more efficient, resilient and reliable but it also opened vast new vulnerabilities to cyberattack,” said Leo Simonovich, vice president and global head,

industrial cyber at Siemens Energy. The Siemens group has been active for decades across all strands of the Middle East’s vast oil and gas industry.

“More than ever, cybersecurity has to be at the core of companies’ business models and operations, especially in the oil and gas industry. Effective defence depends on robust monitoring and detection, which means companies cannot act alone. Coordination and alignment is crucial; this latest playbook, drawing on insights from leaders across the oil and gas sector, reflects these efforts.”

From now on, it will not be just boots on the ground that maintain security, but a holistic, shared approach stretching from the remote PC terminal right down to the wellhead in the field and the long pipelines that traverse the desert. ■

## New report highlights growing cyber threats

A NEW REPORT from Nozomi Networks Labs finds cyber threats growing at an alarming rate in the first half of 2021

The attacks are largely driven by the emergence of Ransomware as a Service (RaaS) gangs, cashing in on critical infrastructure organisations. Analysis of rising ICS vulnerabilities found critical manufacturing was the most susceptible industry, while a deep dive into IoT security cameras showed how quickly the attack surface is expanding.

“Colonial Pipeline, JBS and the latest Kaseya software supply chain attack are painful lessons that the threat of ransomware attacks is real,” said Moreno Carullo, co-founder and chief technical officer, Nozomi Networks. “Security professionals must be armed with network

security and visibility solutions that incorporate real time threat intelligence and make it possible to quickly respond with actionable recommendations and plans. Understanding how these criminal organisations work and anticipating future attacks is critical as they defend against this unfortunate new normal.”

Nozomi Networks’ latest OT/IoT Security Report gives an overview of the OT and IoT threats analysed by the Nozomi Networks Labs security research team. The report found that the analysis of DarkSide, REvil and Ryuk highlights the growing dominance of RaaS models. ICS-CERT vulnerabilities have increased 44% in the first half of 2021, and vulnerabilities in the critical manufacturing sector rose 148%.

The major three industries affected include critical manufacturing, a grouping identified as multiple industries, and the energy sector. With more than a billion CCTV cameras expected to be in production globally this year, insecure IoT security cameras are a growing concern.

“As industrial organisations embrace digital transformation, those with a wait and see mindset are learning the hard way that they weren’t prepared for an attack,” said Nozomi Networks CEO Edgard Capdevielle. “Threats may be on the rise, but technologies and practices to defeat them are available now. We encourage organisations to adopt a post-breach mindset pre-breach and strengthen their security and operational resiliency before it’s too late.”

# Sharing strategies for effective HSE performance

The inaugural HSE Oman Forum, which took place virtually from 22-23 June, provided a platform for experts from PDO, Port of Salalah, Oman Dry docks, Yokogawa RAC and other leading government and private sector entities to share their best practices, insights and strategies for the optimisation of safety performance.

**T**HE EVENT OPENED with a presentation from Mark Breese, global sales manager, Yokogawa RAP, on ‘Savings through Safety’, which was followed by a panel session on the Zero Incident Framework. Breese described the three key pillars of control of work: plant assets and process, plant system and technology, and safe working practices, which should be linked together to make a proper balance between risk assessment, isolation management and permit to work. He stressed that digitalisation and digital solutions are the easiest way to achieve this. Digital solutions such as RAP provide proven intelligent safety at the forefront of the digital control of work in high hazard industries.

In the panel session, Nadhira Al Hinai, general manager Al Tasnim Group, stressed the importance of hands-on training for employees to improve HSE elements in the organisation, and highlighted the role of effective communication to ensure a robust HSE management system. She spoke about the seven Cs of Communication – Clear, Concise, Concrete, Correct, Coherent, Complete and Courteous. These are crucial for effective training and teaching to contribute to the zero-incident culture.

Neelesh Sogani, chairman, IOSH Oman, highlighted the importance of investing in HSE and allocating a budget for it. If a single incident can be prevented, it decreases downtime, and thus increases profitability.

Jose Petrizzo, senior industrial hygienist, Petroleum Development Oman (PDO), said a proper management system can lead to opportunities for growth, decreasing the level of accidents, ultimately increasing the Return of Investment (ROI) and productivity while mitigating the risks. Petrizzo said that it is important to analyse why systems fail, and the sequence of events. A management system provides a late recovery measure in order to stop a disaster. The operator may not avoid errors, but should be able to reduce incidents



Image Credit : Adobe Stock

*Good communication is essential for effective training to contribute to the zero-incident culture.*

“ It is important to analyse why systems fail, and the sequence of events.”

by analysing the trends and the consequence of these incidents.

Suriya Narayanan, consultant – business development manager, Yokogawa Middle East & Africa RAP – control of work solutions, said it is important to take the right managerial decisions and also take appropriate actions at an appropriate time to ensure safety. The operator needs to understand the plant’s capability and understand and assess

stakeholders’ expectations. The operator needs to have balance in doing that, with a proper business case to meet those expectations.

## Effective health, safety and environment management

In the following session on environmental footprint and health and safety management across the Middle East, PDO’s Nadiya Al-Harthy and Arabian Industries Projects’ Porchelvan Nandanam discussed the implications of environmental regulations on projects and contractors, as well as the pressing need for tighter competency management.

The panellists discussed ways of reducing environment footprint, such as careful selection of materials, banning single-use plastics and improving energy efficiency, as

well as considering the role of energy beyond its costs, considering environmental regulations and local and community impact. Arabian Industries Projects is focusing in particular on waste management initiatives, which can minimise environmental impact during construction.

The pair also discussed the HSE management challenges in terms of the environmental crisis. Nadam explained that while there are vast opportunities opening for new players in the renewable energy industry, many of them have little experience of HSE management.

"Increased competition, along with pandemic-related time and workforce strength constraints, has resulted in a far from level playing field for HSE management sub-contractors," he added.

"Throughout the process, corners will be cut... HSE happens to be an easy target. This results in sub-contractors and the workforce having little awareness of HSE protocol. Plants and workers who are used to the practises of 10 to 15 years ago aren't quite changing with the times."

On the key issue of waste disposal, Al-Harthy said, "Our role here is to hold the hands of contractors and developers, and build a more positive culture around HSE to become more responsible.

"Sometimes management looks at the current stage alone. Companies need to invest more in predicting footprint and the levels of disposable materials generated in the long term."

Nadanam added, "Stakeholder management is another challenge, considering the huge footprint that is involved in these projects. Biodiversity and waste disposal are becoming two of the biggest issues. It is possible to dispose of waste responsibly, but it is a matter of quantity. Environmentally damaging waste disposal is a lot less expensive than the responsible way."

Nadanam added, "We need to talk about much more than compliance. We should all hold the responsibility to not just report to clients and ministries, but hold individual responsibility as companies."

Moving on to competency management, Nadanam concluded, "Organisations need to clearly establish competence management techniques; it's a lot more than attending or distributing training sessions and materials. Competency is the ability to apply this knowledge; assessments should be continued at every level to ensure competencies are shown in the workforce."

Al-Harthy suggested, "Organisations should have competency framework to identify critical positions, and what level of competency is required across these positions. You need to work on building competencies across all departments. As fluid workforces become all the more common and



Image Credit: Adobe Stock

*Fourth Industrial Revolution technologies can play a big role in preventing incidents.*

“ At the end of the day, the tool is only as good as the people who are using it.”

workers move around between departments, companies must find a way to measure the adherence of competencies.”

### Reducing incidents with Fourth Industrial Revolution safety systems

In a session moderated by Dr Oualid Ali, founder and president of the Tunisian Association for Future Foresight, Yousra Kindi, snr. behaviour and safety advisor for Petroleum Development Oman and Willem Nel, GM HSSE, Port of Salahah, discussed the HSE systems that their organisations have put in place in order to limit workplace incidents.

Opening the session, Dr Oualid Ali said, "We are living in the biggest challenge to global health with Covid-19 and a lot of challenges related to the environment. But the good news is the Fourth Industrial Revolution comes with a lot of technology to tackle these challenges such as IoT, big data, blockchain. AI especially, with things such as computer vision, machine learning and deep learning, has many applications for HSE. It can be used, for example, to detect when people are wearing safety equipment or, in the case of Covid-19 whether they have a high

temperature or not. Machine learning and data science can also be used to predict and prevent future incidents. There are hundreds of case studies I could give for applications of technology used in the field of HSE."

Yousra Kindi then described IHTIMAM, PDO's Behaviour Based System which is utilised across the company and all its contractors. This gives employees the ability to report safe and unsafe behaviours, along with their root causes, and remotely input them into the system which will then generate actionable insights to prevent such occurrences from happening again. As each contractor has their own tasks and risks, they receive a customisable card to identify areas they would like to focus on and behaviours they would like to correct to prevent incidents from happening again.

Willem Nel described how the Port of Salahah uses digitised capture to identify high risk hot spots and generate corrective and preventive actions. When observations are made they are investigated and receive a preventive action which will then be categorised into the high risk standard they relate to. If an employee does not take the advised action to prevent the incident in the future then it will be flagged to a gatekeeper who will prompt them and take higher steps if necessary.

Panellists highlighted the importance of implementing policies to engage employees. Nel said, "At the end of the day, the tool is only as good as the people who are using it. People do resist change, so you must first get buy in from top management and then get it down to front line management. Also, make

sure the tool is designed to be user friendly; we have made our system into an app on a mobile phone. Additionally, the tool must be accurate so people believe and can see the output of it. Finally, as it is the front line staff who play the vital role in making sure people are safe, we give front line management KPIs (such as a certain amount of observations a week) to encourage them to use the tool."

The implementation of such systems has improved action response on the ground, and also makes big data available for executive management to observe facilities across the whole organisation, providing a bird's eye view. However, Nel concluded the session by cautioning against over-reliance on such systems, as comfort zones can lead to relapses.

In the final session, Fahad Rabani, Petroleum Development Oman (PDO), Ubaidul Haq, Oman Drydock Company (ODC), and Fahad Al Kiyumi, Oman Electricity Transmission Company (OETC), gave a risk overview for their respective organisations, and discussed procedures put in place to address HSE risks and challenges.

Underlining the importance of HSE is to all organisations, Fahad Rabani explained,

"Safety is a concern for all organisations. Harming people, harming assets, or harming the environment is not welcome at any organisation. These days, reputation is crucial; any incident can spread widely and, while incidents may be used as learning experiences, repeated incidents show weakness.

"We care about others, we care about ourselves, we care about our assets, and we care about our environment."

Discussing HSE challenges for OETC and other transmission specialists, Fahad Al Kiyumi said, "We have lots of challenges... our work is often at an elevation of 50 metres or more, so we rely on finding competent people for our workforce, provide them with awareness and training, and all relevant competencies, to ensure the environment is as safe as possible.

"The most important aspects are the equipment, what you will use to keep the workforce safe, and emergency procedures. All the information about the nearest hospitals and ambulance availability must be in place.

"The HSE team inspect, audit, and monitor these procedures. They also ensure the infrastructure is in place for emergency procedures."

Al Kiyumi suggested regular review of these procedures, revealing that OETC reviews all HSE procedures year-on-year, both amongst the HSE team and top management, with external consultants used as well.

On initiatives that have been used for risk management and to reduce issues around HSE, Ubaidul Haq, ODC, suggested, "Top management has decided we can't accept any lost time accidents (LTAs) across the company.

"To achieve this, we use PDCA – Plan, Do, Check, Action, beginning with brainstorming and past incidents, engaging an external consultant, and then drafting a development plan. We work out leadership and competency within this development plan to make sure everyone can arrive at work safely, work safely, and leave safely... our priority is education. This development plan fuels the DCA section of PDCA, making sure everything is brought back to management's development plan to be as efficient as possible."

"Also, we set up 'Golden Rules' across ODC, with any violations resulting in investigation no matter where, or under whose control, the violation took place." ■

## Savings through Safety

YOU MAY THINK that safety is an issue only for developing economies, and economically advanced countries would have standards, policies, and budgets to prevent major incidents. Unfortunately, this is not always correct, as incidents occur even in advanced countries. Moreover, most of them have not learned from previous expensive incidents.

In Saudi Arabia, the cost of medical treatment for injuries from unsafe working conditions in 2019 was SR370mn (US\$98.7mn). In 2019 OSHA reported that fatalities resulting from slips and falls increased 11% over the previous year. Safe work at industrial sites is not only an issue but also one that is not improving.

These unsafe working conditions must change with all the digital tools available in today's Industry 4.0 technology. Safety is the foundation of a highly productive and efficient workforce for all types of industry and risks. So everyone from the top management to the shop floor must be committed together to improving safety.

Ensuring safety results in higher profitability through less risk of lost time and penalties. It also lowers the business risk and enables workforce safety to be at the forefront of a successful business strategy.

We at Yokogawa RAP have more than 25 years of experience with the digitalisation of control of work. The RAP<sup>4</sup> System is designed to promote ideal human behaviour



Image credit: Yokogawa

### Ensuring safety results in higher profitability.

by creating a collaborative environment between various departments, thereby facilitating a safe culture of work.

RAP<sup>4</sup> is a fresh, intelligent alternative to just digitising a paper-based system, and it puts Risk Assessment at the heart of the permitting process. Our experience gained over millions of man-hours in risk assessment, permitting, and isolation

management works is embedded into the RAP icons which is the knowledge base of potential hazards and mitigating controls to enable safe work at sites.

*Want to achieve Savings through Safety? Let us show you how, please contact us now.*  
enquiries@rap.yokogawa.com  
www.yokogawa-rap.com



## KHI selects Sonardyne technologies for AUVs

KAWASAKI HEAVY INDUSTRIES' (KHI) has chosen a suite of subsea navigation, positioning and communications technologies from Sonardyne to navigate, track and control its first commercial SPICE autonomous underwater vehicles (AUVs).

The SPICE (Subsea Precise Inspector with Close Eyes) AUV, complete with a submerged docking system and unique robotic arm for non-destructive testing, has been designed and built by KHI for intelligent and low-logistic pipeline and subsea asset inspection operations down to 3,000 m water depth.

To support accurate and long-duration navigation on its missions, while minimising complexity and payload space consumption, the vehicle is fitted with Sonardyne's hybrid navigator SPRINT-Nav.

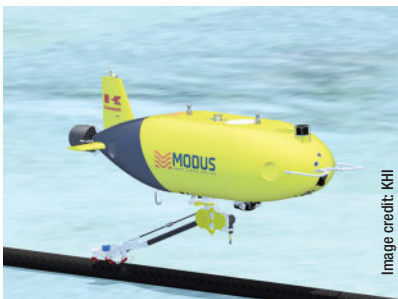


Image credit: KHI

**KHI's SPICE AUV will use tracking, communications and navigation technology from Sonardyne on its long-endurance missions.**

For underwater positioning and communications, the SPICE AUV is using Sonardyne's AvTrak 6 – a combined transponder, modem and emergency relocator beacon all in one. KHI has also been using Sonardyne's Mini-Ranger 2 Ultra-Short Baseline (USBL) system with a Robotics Pack to support tracking and communications during development and testing.

Two SPICE AUVs have already been ordered by UK-based Modus Subsea Services for cable and pipeline inspections, as well as more conventional surveys.

"Our goal with the SPICE AUV is to enable operational efficiency of inspection operations, to reduce cost and reduce the burden and risk experienced by crews working on support vessels offshore. We believe that Sonardyne's instruments will support the highly accurate navigation of the SPICE AUV, supporting our goals," said Noriyuki Okaya, Development & Design section, AUV Department Kobe Shipyard, at KHI.

## Septentrio introduces next-gen GNSS receivers

SEPTENTRIO, A LEADER in high-precision GNSS positioning solutions, has launched the AsteRx SB3 receiver family, enclosed in an IP68 housing. This receiver offers superior availability of RTK high-accuracy positioning due to its ability to track a wide variety of signals from all currently operating Global Navigation Satellite Systems (GNSS). Even in dual antenna mode, AsteRx SB3 uses triple-frequency tracking to maximise robustness and availability of its heading angles.

"The AsteRx SB3 brings state-of-the-art GNSS positioning and heading performance in a very compact and rugged enclosure that is fully certified and ready to use," said Silviu Taujan, product manager at Septentrio. "Its simplicity and ease of use make it a plug-and-play device, allowing customers to have a fully operational system within minutes."

The new product line includes two types of receivers, both offering unique triple-band sub-degree GNSS heading. AsteRx SB3 Pro is a high-performance rover receiver while AsteRx SB3 Pro+ also has base station functionality and internal logging, along with higher update rates and ultra-low latency.



The new product line offers state-of-the-art GNSS positioning.

Image credit: Septentrio

## Sercel's seabed nodal solution to be used for Middle East survey

CGG HAS ANNOUNCED the first major sale by Sercel of its recently launched GPR300 seabed nodal solution to BGP Inc., a worldwide major geophysical service provider. The sale includes 18,000 nodes that will be deployed in Q4 2021 on a large-scale, long-term, multi-vessel operation in the Middle East region.

Designed for seismic acquisition in shallow water environments down to 300 metres, the new-generation GPR300 nodal solution was developed in partnership with BGP. Featuring QuietSeis, the most advanced and ultra-sensitive digital MEMS sensor on the market, the GPR300 delivers high-fidelity, high-quality datasets for high-precision subsurface imaging.

Gou Liang, BGP managing director, said, "With Sercel's QuietSeis MEMS sensor, we can be confident of providing our customer with the best cutting-edge seismic technology available for enhanced imaging resolution."

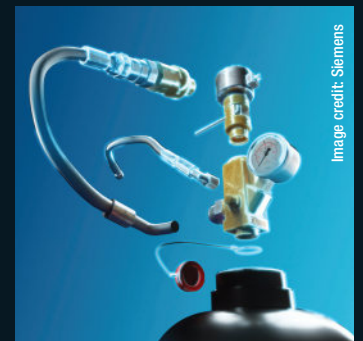
Emmanuelle Dubu, Sercel CEO, said, "Sercel is the first and only supplier to offer the market an OBN solution with an integrated broadband digital sensor that delivers both ultra-quiet performance and true broadband data."

## Siemens launches natural fire extinguishers

SIEMENS SMART INFRASTRUCTURE has introduced its new natural agent fire extinguishing portfolio, Sinorix NXN. Focusing on the protection of lives, assets and business continuity, the new portfolio combines simplicity with advanced technology to modernise traditional fire safety. The agents consist of the natural gases argon, nitrogen and carbon dioxide. They are ideal for specific application areas such as storage rooms for chemicals (argon), critical electrical infrastructure (nitrogen) or unmanned areas (carbon dioxide).

The new Sinorix NXN portfolio uses only agents and compounds that are naturally found in the atmosphere and do not harm the environment. They do not create harmful reactions or byproducts on contact with fire, leaving no residue behind for clean up or disposal. They feature zero ozone depletion potential (ODP) and they are not subject to regulatory restrictions or phaseout. In addition, the extinguishing products follow EN standards and guidelines, and are backed by appropriate certifications.

The extinguishing systems are developed for easy integration in complete fire safety solutions, including fire detection and evacuation to increase safety and reduce risks. This integration also optimises facility management by enabling cloud-based, digital services that substantially reduce operational and maintenance costs.



The new agents do not harm the environment.

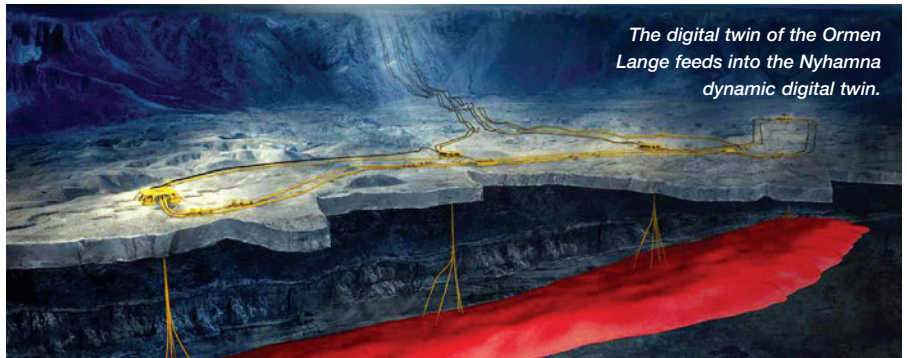
Image credit: Siemens

## Kongsberg creates first integrated reservoir to market digital twin

NORSKE SHELL IS using Kongsberg Digital's digital twin solution, Kognitwin Energy, to create a virtual representation of their Ormen Lange deepwater gas field. Feeding into the onshore digital twin developed at Nyhamna gas processing facility, the two will combined become the first ever fully integrated reservoir to market digital twin, according to Kongsberg.

In October 2019, Norske Shell joined forces with Kongsberg Digital to operationalise an 'asset of the future' through a partnership development of the Nyhamna dynamic digital Twin, using Kongsberg Digital's Kognitwin Energy solution. The twin was deployed and up and running by the end of the year, and has been evolving continuously, focusing on safe, effective and integrated work processes and optimisation of production and energy use. The decision was made to expand the collaboration with another digital twin of the related Ormen Lange deepwater gas field, which feeds gas to Nyhamna.

"With Ormen Lange, we are very proud to have been awarded the contract for the development of a second digital twin for Norske Shell. This is a direct result of our successful collaboration around the Nyhamna dynamic digital twin. We are eager to help Norske Shell realise the full potential of their assets through integration of these two digital twins," said Hege Skryseth, president of Kongsberg Digital and EVP KONGSBERG.



The digital twin of the Ormen Lange feeds into the Nyhamna dynamic digital twin.

Image credit: AS Norske Shell

"The first version of the Ormen Lange digital twin comprises primarily data integrations and visualisation of subsea 3D models including production and MEG pipelines, well surface locations and well-bore paths, seabed bathymetry data detailed around the production templates, built documentation and drawings, real time data from DCS and PI and much more. For disciplines and teams across the initial Ormen Lange user base – Subsea Maintenance, Wells, Flow Assurance, Production Technology, Reservoir Engineering, Process Engineering and Operations – the twin provides unified data for everyone to access across the same work surface. This is the starting point of a longer journey where Kongsberg Digital and Norske Shell will

continue to develop valuable features and target specific use cases to enable user groups, disciplines and teams with new ways of working."

"Digital twins are technology for people. The partnership model, combining Kongsberg Digital's digital capabilities with our own employees' expertise in the operations and maintenance domain, has been very effective in delivering use cases that let our teams to collaborate better and become more effective. This in turn enable us to save costs and optimize production whilst improving safety and environmental impact," said Rolf Einar Sæter, digitalisation manager in Norske Shell.

The first version of the Ormen Lange digital twin was released to users in Norske Shell in June.

## Frigmaires Engineers launches skid-mounted grease plants

FRIGMAIRES ENGINEERS OFFERS skid-mounted grease plants which are containerised and designed for small batches and for firms wishing to enter the grease business. They are recommended for installations in remote and logistically challenged areas. These units can be installed indoors, as well as outdoors. A provision for connecting a generator to operate the entire system can be provided as an option to make it independent of the local power supply.

The units are assembled and fully tested at the company's facility before being delivered in 20 or 40 FT containers with no need for on-site assembly, pipework, electrical wiring or mounting of components. These are simple plug-and-play units. The base oils are charged directly from flexitanks to be connected to the feed manifold.

The main components of the plant are the feed manifold, feed & discharge pumps, load cell mounted kettles, heating unit, online filters, piping, valves, instrumentation and filling station, which are connected and operated through a semi-automatic PLC system with HMI controls.

The end user has to simply connect the base oils from flexitanks to the feed manifold. Each package is provided with basic laboratory testing equipment, a set of spares, maintenance tool kit, a booklet for starting formulations and basic laboratory quality tests. A quick change-over flushing system is also provided for product turnarounds.

This plant is used for production of lithium, calcium, chasis, complex, non-soap, specialty grease and food grade grease. Know-how and starting formulations are provided with each plant for the production of greases.

Advantages:

- Short delivery and installation time
- Quick and homogeneous blends
- Connects directly to flexitanks



The grease plants can be used in remote and logistically challenged areas.

Image credit: Frigmaires Engineers

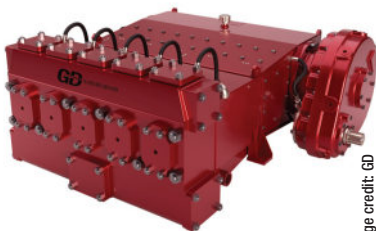
- Low investment costs
- Reduced on-site erection and hook-up time
- Factory tested and manufactured
- Single source responsibility, ensuring fewer interfaces for the client to handle
- Self-contained operations
- Manufactured to CE specifications.

Frigmaires also offers turnkey solutions for the production of lube oil blending and grease plants that cater to the requirements of small or large scale lubricant and grease manufacturers. Constant innovation remains the company's top priority, ensuring delivery of high-quality solutions to customers in the industry.

## New pump for horizontal directional drilling market

GARDNER DENVER HIGH Pressure Solutions (GD) has expanded its suite of pump offerings for the horizontal directional drilling (HDD) market with its new GD 800HDD pump.

The pump features an extremely high flow rate of more than 1000 gpm, making it suitable for the most demanding HDD projects. Its light weight eases transportation between work sites and its extremely high rod load rating of 53,000 lbs ensures the pump is tough and long lasting. The pump is also designed to operate at a slow run speed, delivering the same output, flow, and pressure as faster pumps with less violent actions, wear and friction. By delivering fewer strokes, consumable life is extended.



The GD 800HDD pump.

Image credit: GD

The release of the GD 800HDD pump follows on from the launch of the company's 250HDD pump last year, which expanded GD's pump options into the HDD space for the first time. GD pumps are both qualified as maxi rig pumps and provide a suite of options to the HDD industry when tunnelling under rivers and roads and laying sewerage systems, water pipes, fibre optic lines and pipelines.

Adam Avey, engineering supervisor, GD, said, "As an extremely powerful but lightweight 800 breaking horsepower (BHP) pump, the GD 800HDD is an ideal fit for the HDD market, which has traditionally been reliant on heavy, less mobile oil and gas drilling pumps. The quintuplex (5-cylinder) pump runs with great efficiency and can make fast work of the largest HDD projects. Additionally, there is no requirement to change pistons to meet any required pressures."

Brandon Janda, high pressure industrial product line director, GD, said, "Our pumps serve as an American-made, rugged and reliable industrial pump option for the HDD market.

"In addition to its manufacture, customers can be confident that the pump's aftercare service and replacement parts also originate from within the U.S."

## Yokogawa releases plant data transformation platform

YOKOGAWA ELECTRIC CORPORATION announces the development and release of OpreX™ Data Model Broker, a plant data transformation platform in the OpreX Connected Intelligence lineup which promotes the interoperability and increased utilisation of data throughout the plant life cycle.

OpreX Data Model Broker automatically verifies the consistency of data in different plant designs and instrumentation systems and enables their inter-utilisation by applying ontology, an AI technique, in database operation and management. Design Data Validation, the first component to be released by Yokogawa for this platform, assists in the complicated and time-consuming task of systematically identifying and confirming inconsistencies between piping and instrument diagrams (P&ID) and 3D piping diagrams.

By automatically identifying such inconsistencies in massive volumes of data, this component greatly enhances work efficiency and drastically reduces the number of man-hours required for such work.



Image credit: Yokogawa

The platform promotes the interoperability and increased utilisation of data throughout the plant lifecycle.

## Collaboration for OCTG platform

CORROSION RESISTANT ALLOYS, LP (CRA), a manufacturer of high-grade corrosion resistant alloy tubulars, and digital technology company PipeSearch have launched the PipeSearch platform to connect oil country tubular goods (OCTG) demand to supply.

PipeSearch offers a suite of services for both buyers and sellers with a focus on confirmed quality inventory solutions for buyers and increased asset recovery value for sellers. It is centered on intelligent data collection and offers customers options to fulfill urgent needs and recover asset value. These efforts are fully supported by CRA's experienced commercial, quality, and technical services team, just-in-time (JIT) manufacturing global infrastructure, and industry leading quality credentials in the corrosion resistant alloys OCTG field.

Cole Patchell, president, PipeSearch and vice-president, CRA, said, "It is the responsibility of our industry to reduce its carbon footprint by repurposing existing inventories instead of always buying new. This exciting collaboration is driving a shift to digital value-added services in the industry and building the future of the tubular industry through global digital transformation."

## Ultrasound method for fire fighting foam tests

DNV HAS ISSUED a verification statement allowing global survival technology specialist Survitec to use its fire foam testing process onboard maritime vessels or offshore structures.

Survitec's new Produced Foam Live Test method uses ultrasound technology to verify the effectiveness of fire-fighting foam, according to IMO mandatory requirements. The ruling applies to any vessel or offshore structure that has a deck foam system, a high expansion foam system (engine room) or Heli-deck foam system.

The ratio of foam concentrate and seawater has to be correct for the produced foam to work. It is thought to be the first time ultrasound technology has been used to quantify the exact water/foam ratio. Two ultrasonic flow meters are used to compare both values.

Unlike existing techniques, the Survitec method means testing can be performed while the vessel is berthed alongside, without having to discharge any foam overboard or send samples to testing labs. Current test methodologies have to run the fire-fighting system with foam for at least two minutes, so there is a heavy consumption of costly concentrate, and the produced foam is discharged overboard. Survitec's test does not need to use the concentrate or produce foam in the test, using only seawater, which is more environmentally friendly than alternative solutions.



Image credit: DNV

Survitec's Produced Foam Live Test means testing can be performed while the vessel is berthed alongside.

## TÜV SÜD NEL releases real-time software to aid reservoir management

TÜV SÜD NATIONAL Engineering Laboratory (NEL) has launched NEL-SURE, a real-time software tool for the verification of subsea multiphase flow meters (MPFM), to help operators optimise reservoir management and revenues.

Marc Laing, head of software and modelling at TÜV SÜD NEL, said, "While the industry relies on MPFMs as inaccessible reservoirs are exploited, the lack of validation possibilities has impacted the accurate allocation and taxation of hydrocarbon assets. The challenge is to take the calibration process from the laboratory and move it to the 'in situ' location. This will ensure that flow meter verification accounts for the different effects of pressure, temperature and fluids at each individual well.

"NEL-SURE meets this challenge by reducing financial exposure and delivering operators increased confidence in the deployment and use of MPFMs. These intelligent meter health checks will save industry millions of pounds per year from unnecessary calibrations, maintenance and shutdowns," Laing added.



NEL-SURE was developed at NEL's Advanced Multiphase Facility.

Image Credit: TÜV SÜD NEL

## Well intervention market set for period of growth

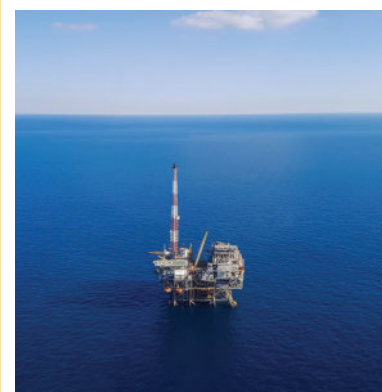


Image Credit: Adobe Stock

The global well intervention market is projected to reach US\$9.3bn by 2026.

A REPORT PUBLISHED on Reportlinker.com, titled 'Well Intervention Market by Service, Intervention, Application Well Region – Global Forecast 2026' suggests that the global well intervention market is projected to reach US\$9.3bn by 2026, up from US\$7.6bn in 2021.

This growth represents a steady CAGR of 4.2%, with the main driver being the growing need to maximise product potential of mature oil and gas fields.

The report continues by suggesting that the horizontal well segment, by well type, is projected to dominate the global well intervention market due to the increasing horizontal directional drilling activities to optimise production from wells. Such wells are expensive when compared to vertical wells, but they are often preferred due to their efficiency in increasing oil field production and their ability to access subsurface reservoirs that are not directly accessible from above.

By application, the offshore segment is expected to be the fastest growing market from 2021-2026 as companies have been increasingly exploring offshore locations due to the fact that offshore locations have a large number of untapped reserves.

Despite fluctuating oil prices, the application of offshore well intervention services is expected to rise, due to the increasing deep and ultradeep water drilling and production activities and an increase in the number of maturing subsea wells.

According to the report, North America represents the largest and the fastest-growing region in the well intervention market and is expected to dominate the global well intervention market between 2021 and 2026. The region has the largest shale reserves, which makes it a lucrative market for drilling activities and for oilfield service providers.

## Gaming technology utilised for production enhancement

NEPTUNE ENERGY HAS made use of an innovative data visualisation platform based on 3D gaming technology to enhance drilling and production efficiency and reduce time and cost.

The new digital twins of Neptune's wells, located in Norway, were developed in collaboration with InformatiQ, a leading oil and gas data visualisation specialist that combines infrastructure, wells and geology data to create detailed 3D models.

The developer's GeologiQ software combined raw E&P data in 3D and 2D environments and used 3D gaming technology to enable Neptune's drilling and wells teams to visualise both historical and live data to improve well design and incorporate learnings in future operations.

Thor Andre Løvoll, director of drilling and wells for Norway at Neptune Energy, commented, "By digitalising all subsea wells within our Norwegian portfolio we have greatly improved our ability to plan interventions, monitor drilling and production operations in real-time and gain better understanding of the wells' history.

"Investing in innovations such as these improves efficiency by enhancing communication, interaction and decision-making across our business."

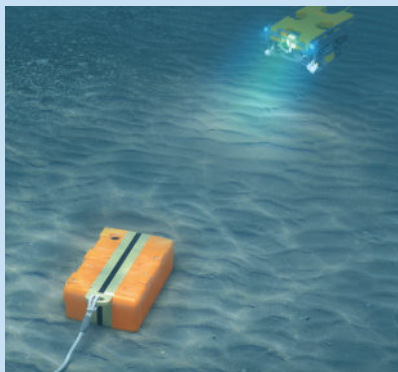
## BGP to use GPR300 solution for Middle East operation

SERCEL HAVE ANNOUNCED the first major sale of its recently launched GPR300 seabed nodal solution to BGP Inc., a worldwide major geophysical service provider. The sale includes 18,000 nodes that will be deployed in Q4 2021 on an operation in the Middle East.

Designed for seismic acquisition in shallow water environments down to 300 metres, the new-generation GPR300 nodal solution was developed in partnership with BGP and features QuietSeis, the most advanced and ultra-sensitive digital MEMS sensor on the market. Its low-noise performance delivers high-fidelity, high-quality datasets for high-precision subsurface imaging.

Gou Liang, BGP managing director, commented, "We have chosen to partner with the best seismic equipment manufacturer to acquire this major survey in the Middle East.

"With Sercel's QuietSeis MEMS sensor, we can be confident of providing our customer with the best cutting-edge seismic technology available for enhanced imaging resolution."



GPR300 deployed by a remotely-operated underwater vehicle. The system can also be deployed as a node-on-a-rope.

Image Credit: Sercel

## Axora announces finalists of Global Cost-Saving Technology Challenge



Image credit: Adobe Stock

**The aim of the competition is to discover new cost-saving digital technology.**

AXORA, THE DIGITAL solutions marketplace for industrial innovators, has announced the seven finalists in its Global Cost-Saving Technology Challenge. The competition was launched in May to discover new digital cost-saving technology for the mining and metals and oil and gas industries, which would deliver rapid benefits, including full payback, within one year.

Dr. Nick Mayhew, chief commercial officer, Axora, said, “The seven digital solutions we shortlisted all have a common focus on achieving results in just twelve months – instead of the typical three-year ROI – so that industrial firms can become more efficient, more quickly.”

The seven shortlisted solutions are as follows:

- A field worker productivity and safety platform - FYLD
- A digital Permit to Work solution, which reduces costs associated with paperwork and manual error in authorising planned work procedures - GoArc
- A single, integrated SaaS platform to manage safety, projects, stakeholders, and operations - Hardhat
- An AI-powered platform for standardising and harmonising mining data sets - Minerva Intelligence
- An AI-based predictive maintenance solution to reduce unplanned downtime - Razor Labs
- An insurance-backed predictive maintenance solution - Senseye
- A secure industrial IoT solution for integrating multiple data sets - Tyrion.

The finalists will pitch their solutions to a judging panel in September, after which Axora will validate the ROI models and vet the solutions. The winner will receive the ‘Axora Market Accelerator’ sales and marketing package worth £10,000 (US\$13,631).

## Saipem launches green hydrogen solution

SAIPEM HAS LAUNCHED SUIISO, a technological solution for the production of green hydrogen and the conversion of oil and gas facilities.

SUIISO combines various renewable energy sources such as floating wind, floating solar and marine energy in a single system. The aim is to power, together or individually, electrolyses installed on existing offshore platforms for the production of green hydrogen. The technology responds to the growing demand for green hydrogen production and, at the same time, it allows the conversion of oil and gas offshore facilities which have now reached the end of their life cycle. The oxygen resulting from this process can be used in various areas such as aquaculture or seaweed production.

Francesco Caio, CEO of Saipem, commented, “The SUIISO brand is an example of Saipem’s ability to find innovative and sustainable solutions to lead its clients in the energy transition. The solution is adaptable to the changing characteristics of the marine sites and to the different production needs.”



Image credit: Adobe Stock

**The technology allows the conversion of oil and gas offshore facilities which have reached the end of their life.**

## Halliburton furthers digital strategy with Digital Well Program

HALLIBURTON IS EXPANDING its digital collaboration with oil and gas companies, with the deployment of services operating in iEnergy, Halliburton’s hybrid cloud environment to manage exploration and production applications.

Aker BP is leveraging Halliburton’s Digital Well Program, a DecisionSpace 365 cloud application, built on an open architecture to provide integrated well planning and design to increase collaboration and connectivity across drilling activities. It enables well planning and design to become a live process where field development scenarios are continuously updated and compared to a digital twin to deliver safe, cost-effective, and productive wells.

“With the implementation of Digital Well Program on iEnergy, we deliver on both ambitions and are proud to be the first E&P company to put this platform into use,” said senior vice president Drilling and Wells Tommy Sigmundstad for Aker BP. “Our current deployment already consists of more than 100 micro services, several to external third-party systems. In the platform, data can flow seamlessly through the established well construction design workflow, and we have seen significant workflow improvement only a few months into deployment.”

“Handling multiple designs simultaneously is not a challenge anymore. We are currently working to implement automation and simulation microservices in the platform, and I am confident that we through iEnergy will increase efficiency and create substantial value in the future,” added Sigmundstad.

“We are excited to deliver Digital Well Program and its transformative capabilities as a cloud service to Aker BP and their extended ecosystem to create an unparalleled experience for a well construction digital twin,” said Nagaraj Srinivasan, senior vice president of Landmark, Halliburton Digital Solutions and Consulting. “Consistent with Halliburton’s digital strategy, our secure cloud environment, machine learning algorithms, and data science expertise will help Aker BP maximise their asset value.”

Halliburton has also signed a contract with Petrofac to adopt Digital Well Program to automate drilling, completions, and engineering processes.

The three-year contract will enable Petrofac to incorporate artificial intelligence, machine learning, and data science to optimise its well engineering service offering. The agreement is part of Petrofac’s digital strategy to significantly reduce non-productive time and drive efficiencies across its global operations.

“DecisionSpace365 enables Petrofac to combine well engineering with productivity tools in the cloud to deliver unique value to their customers. We look forward to collaborating with Petrofac to support their digital transformation journey,” said Nagaraj Srinivasan, senior vice president of Landmark, Halliburton Digital Solutions and Consulting.

“By combining our decades of well engineering experience with the latest digital technology, such as Halliburton’s iEnergy Hybrid Cloud and Digital Well Program, we will drive further efficiencies for our clients,” said Nick Shorten, chief operating officer of Petrofac Engineering and Production Services.

# Project Databank

Compiled by Data Media Systems

## OIL, GAS AND PETROCHEMICAL PROJECTS, QATAR

Project	City	Facility	Budget (\$ US)	Status
Qatargas - North Field Expansion Project - LNG Trains Onshore Facilities - Package 1 - LNG Trains	North Field	LNG	20,000,000,000	Engineering & Procurement
Qatargas - North Field Expansion Project - Onshore Facilities - Overview	North Field	Gas Field Development	28,750,000,000	Engineering & Procurement
Qatargas - North Field Expansion Project - Onshore Facilities - Package 2 - LNG Storage and Loading Facilities Expansion	North Field	Storage Tanks	2,000,000,000	Engineering & Procurement
Qatargas - Helium 3 Production Plant	Ras Laffan	Helium	600,000,000	Commissioning
QP - Dukhan fields - Well Flowlines Construction	Dukhan	Water Injection	200,000,000	Construction
QP - Dukhan Production Facilities Upgrade - Phase 1A - Overview	Dukhan	Gas Processing	260,000,000	Construction
Qatargas - Qatar Barzan Gas Field Development Project - Overview	North Field	Gas Field Development	11,300,000,000	Construction
Qatargas - North Field Production Sustainability (NFPS) - Phase 2 - Offshore Facilities Package	North Field	Gas Processing	2,000,000,000	Engineering & Procurement
Qatargas - North Field Production Sustainability (NFPS) - Phase 2 - Overview	North Field	Gas Processing	3,000,000,000	Engineering & Procurement
Qatargas - North Field Production Sustainability (NFPS) - Overview	North Field	Gas Processing	4,000,000,000	Construction
Qatargas - North Field Production Sustainability (NFPS) - Phase 1 - Wellhead platforms, Topsides and Jackets	North Field	Gas Processing	1,000,000,000	Construction
Qatargas - North Field Production Sustainability (NFPS) Compression Project	North Field	Gas Compression	5,000,000,000	FEED
Qatargas - North Field Expansion Project - Offshore Facilities	North Field	LNG	3,000,000,000	Construction
QP - LPG Transfer & Associated Works	Doha	LPG pipeline (welded)	35,000,000	Construction
NOC - Al Shaheen Oil Field Development - Offshore Upgrades Works (DBN - PWT)	Ras Laffan	Offshore Oil Field	220,000,000	EPC ITB
QP - Oil Storage Tanks Overhaul Works	Halul Island	Storage Tanks	60,000,000	Construction
QP - Dukhan Field - Tie-in Works	Dukhan	Oil Field Development	30,000,000	Construction
QP - Dukhan Fields - Oil Flowlines and Gas Lift Flowlines Installation	Dukhan	Oil Field Development	80,000,000	Construction
QP - CO2 Water Alternating Gas (WAG) Pilot Project	Dukhan	Water Injection	200,000,000	Engineering & Procurement
Qatargas - North Field Expansion (NFE) - Topside Facilities and Offshore Pipelines - Overview	North Field	Oil Production	500,000,000	EPC ITB
NOC - Al Shaheen Offshore Field Development Plan - Phase 3 - Wellhead Platforms and Modifications - Overview	Qatar	Offshore Oil & Gas Field	1,200,000,000	EPC ITB
NOC - Al Shaheen Offshore Field Development Plan - Overview	Qatar	Offshore Oil & Gas Field	800,000,000	Construction
NOC - Al Shaheen Offshore Field Development Plan - Phase 1 - Wellhead Jackets	Qatar	Offshore Oil & Gas Field	300,000,000	Construction
NOC - Al Shaheen Offshore Field Development Plan - Phase 3 - Package 4 - Modifications	Qatar	Offshore Platform	300,000,000	EPC ITB
NOC - Al Shaheen Offshore Field Development Plan - Phase 3 - Package 2 - Central Processing Platform	Qatar	CPF (Central Processing Facility)	300,000,000	EPC ITB
NOC - Al Shaheen Offshore Field Development Plan - Phase 3 - Package 1 - Wellhead Platforms	Qatar	Offshore Platform	300,000,000	EPC ITB
NOC - Al Shaheen Offshore Field Development Plan - Phase 2 - Wellheads and Connecting Bridge	Qatar	Offshore Oil & Gas Field	300,000,000	Construction
Qatargas - North Field Expansion (NFE) - Topside Facilities Package	North Field	Offshore Oil Production	500,000,000	EPC ITB
QP - Expansion of Idd el-Shargi North Dome (ISND Phase-5) - Package 2 - Wellheads Topside and Offshore Pipeline	North Dome	Offshore Oil Field	400,000,000	Construction
QP - Expansion of Idd el-Shargi North Dome (ISND Phase-5) - Package 1 - Wellheads Platforms and Subsea Pipeline	North Dome	Offshore Platform	350,000,000	Construction
QP - Expansion of Idd el-Shargi North Dome (ISND Phase-5) - Overview	North Dome	Offshore Oil Field	780,000,000	Construction
QP - Bul Hanine Redevelopment	Bul Hanine	Offshore Oil Field Development	11,000,000,000	Construction
Qatargas - North Field Expansion Project Package 3 - Storage Tanks and Utilities	North Field	Welded, Storage Tanks	1,200,000,000	EPC ITB
TotalEnergies - Al Khalij Oilfield - Pipeline Replacement	Halul Island	Welded, Oil Pipeline	200,000,000	Construction
QP - New Tank Farm Facility	Mesaieed	Welded, Storage Tanks	100,000,000	EPC ITB
Qatargas - North Field Expansion (NFE) - Offshore Pipelines Package	North Field	Welded, Oil Pipeline	500,000,000	EPC ITB
QP - Ras Laffan New Petrochemicals Complex	Ras Laffan	Polyethylene	5,000,000,000	FEED
Qatargas - North Field Production Sustainability (NFPS) - Phase 2 - Subsea Pipelay Package	North Field	Welded, Submarine Gas Pipeline	1,000,000,000	Engineering & Procurement
NOC - Al Shaheen Offshore Field Development Plan - Phase 3 - Subsea Pipelines	Qatar	Welded, Offshore Gas Pipeline	300,000,000	EPC ITB
QP - New NFA Wellhead Platform WHP-3	North Field	Welded, Offshore Platform	200,000,000	Commissioning
Qatargas - North Field Expansion Project - Sulphur Handling Facilities	Abu Nakhla	Sulphur Handling Facility	4,400,000,000	EPC ITB

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# Project Databank

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## Project Focus

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### Qatargas - North Field Production Sustainability (NFPS) - Phase 1 - Wellhead Platforms, Topsides & Jackets

<b>Name of Client</b>	Qatargas - Qatar Liquefied Gas Company Limited
<b>Estimated Budget (US\$)</b>	1,000,000,000
<b>Facility Type</b>	Offshore Gas Production
<b>Status</b>	Construction
<b>Location</b>	North Field
<b>Project Start</b>	Q2-2018
<b>End Date</b>	Q4-2021
<b>FEED / Main Contractor</b>	McDermott International
<b>Contract Value (\$ US)</b>	800,000,000
<b>Award Date</b>	Q1-2019

### Background

Qatargas are aiming to implement the North Field Sustainability project in several phases to reach a total output of 100 million tonnes per annum, up from the current 77 million tonnes per annum. The different phases are expected to be worth billions of dollars. The first phase of the North Field Sustainability project includes two nine-slot wellhead platforms, including topsides, jackets and piles, as well as a new riser platform including topsides, jackets and piles.

### Project Status

Date	Status
Jun 2021	McDermott states that the construction works are ongoing and set for completion as per schedule.
Jul 2020	Fugro has completed the first phase of the offshore site geophysical investigation. The geotechnical analysis will be carried out until the end of August 2020.
May 2019	The construction work has started.
Mar 2019	McDermott has been awarded the EPCI Contract for phase 1. The duration of the work is expected to be approximately 34 months.
Aug 2018	McDermott has completed the FEED study for the project.
Apr 2018	Qatargas starts the pre-qualification process for the Engineering Procurement and Construction (EPC) contract, which will include a number of new platforms and other infrastructure.

### Project Scope

The project scope includes:

- Brownfield modifications at existing offshore facilities
- New facilities: six new offshore jackets as well as three associated topsides
- Eight kilometres of 28-inch corrosion-resistant alloy clad pipeline
- Two inter-platform bridges
- Eight kilometres of composite cables



## Middle East & North Africa

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

Country	JUNE 2021			VARIANCE		MAY 2021		
	Land	Offshore	Total	From June 2020	From May 2021	Land	Offshore	Total
<b>Middle East</b>								
ABU DHABI	30	15	45	-9	+2	30	13	43
DUBAI	0	0	0	0	0	0	0	0
IRAQ	38	0	38	-3	+3	35	0	35
KUWAIT	22	0	22	-28	-1	23	0	23
OMAN	44	0	44	-1	+1	43	0	43
PAKISTAN	15	0	15	-2	+1	14	0	14
QATAR	1	7	8	+3	-3	2	9	11
SAUDI ARABIA	51	8	59	-41	-7	56	10	66
YEMEN	1	0	1	0	-1	2	0	2
<b>TOTAL</b>	<b>202</b>	<b>30</b>	<b>232</b>	<b>-81</b>	<b>-5</b>	<b>205</b>	<b>32</b>	<b>237</b>

### North Africa

ALGERIA	25	0	25	-4	-3	28	0	28
EGYPT	23	4	27	-1	+1	21	5	26
LIBYA	12	0	12	0	0	12	0	12
TUNISIA	0	0	0	-1	0	0	0	0
<b>TOTAL</b>	<b>60</b>	<b>4</b>	<b>64</b>	<b>-6</b>	<b>-2</b>	<b>61</b>	<b>5</b>	<b>66</b>

Source: Baker Hughes

بياناتها، فسيؤدي ذلك إلى تعزيز فرص معالجة الآبار بسرعة وتحقيق قيمة للمشغلين في نهاية المطاف. وقال عادل عامر: «إذا أردنا المضي قدما في العصر الرقمي، فنحن بحاجة إلى تبادل البيانات وإتاحة مجموعات البيانات».

## تأثير كوفيد - 19

كما تحدث المشاركون عن كيفية تأثر تخصص سلامة الآبار بفيروس كوفيد 19، مشيرين إلى أنه ربما يكون التغيير الأكثر أهمية، والذي من المرجح أن يستمر في المستقبل، هو تقليل الاعتماد على المصادر الخارجية. فعلى سبيل المثال، أشار عادل عامر إلى أنه في مصر، تطلب الشركة عادة الكثير من المواد من الخارج، ولكن هذا لأسباب واضحة، أعاقته قيود السفر بشكل كبير، وبدلا من ذلك، بدأت الشركات المحلية في تصنيع معدات أكثر تقدما.

وهناك أيضا تركيزاً على التدريب لضمان توفر الخبرة داخل الشركات بدلا من البحث عنها من مصادر خارجية. وأشار عيسى إلى أن الشركة أصدرت مؤخرا في أدنوك تعليماً إلكترونياً حول سلامة الآبار، والذي كان إلزامياً ليس فقط لتلك المتعلقة بالتخصص، ولكن أيضا للحفر والعمليات وما إلى ذلك لضمان معرفة جميع الموظفين بالمخالفات والقضايا المحتملة التي يجب عليهم البحث عنها.

وعلى الرغم من أن قطاع سلامة الآبار قد قطع أشواطاً كبيرة على مدى العقود القليلة الماضية، إلا أن عوامل مثل الافتقار إلى المراقبة والإحجام عن مشاركة البيانات تعيق تقدمه. لذا، ستؤدي معالجة هذه العقبات في النهاية إلى آبار أكثر سلامة مع عمر إنتاج طويل، وقدرة على توفير المزيد من القيمة للمشغلين والصناعة ككل.

الضخمة والرقمنة، وهناك الكثير من البيانات التي يجب النظر إليها ومن السهل جدا تفويت بعض المعلومات الأساسية. وتعد قدرة الذكاء الاصطناعي على تفسير البيانات والتنبؤ بقضايا سلامة الآبار في المستقبل سببا كبيرا للتفاؤل، وأعتقد أنه سيكون له دور مهم للغاية مستقبلاً».

وأضاف عادل عامر: «من بين تحديات تنفيذ الإجراءات التصحيحية عدم توفر المواد. ولكن من خلال الاعتماد على نموذج بيانات بسيط، يمكننا التخطيط مسبقاً لمثل هذه الحالات من خلال رؤية عدد الأخطاء التي حدثت في السنوات السابقة للتنبؤ بالمواد التي سنحتاجها في المستقبل. وأعتقد أن المزيد من الحلول مثل هذه ستظهر إذا جعلنا البيانات متاحة للعقول الذكية».

وعلى الرغم من التقدم الهائل الذي تم إحرازه في مجال الرقمنة والذكاء الاصطناعي، فإن المشاركين لاحظوا أنه لا يزال هناك العديد من مجالات التحسين التي لديها القدرة على تعزيز قدرة سلامة الآبار بشكل كبير.

فعلى سبيل المثال، أشار عيسى إلى أنه في حين أن هناك الكثير من البيانات التي يتم جمعها من مصادر مختلفة، مثل سجلات التآكل وسجلات الأسمت وما إلى ذلك، لا تزال بيانات المراقبة التي يتم إجراؤها غير كافية. كما أن تحسين هذا الأمر لن يؤدي إلا إلى تعزيز القدرة على التنبؤ بالمشكلات ومعالجتها بسرعة.

وثمة مجال آخر للتحسين وهو مشاركة البيانات. إذ يحتفظ مشغلو صناعة النفط والغاز، بشكل جماعي، بعدد كبير من البيانات من مواقع في جميع أنحاء العالم.

وإذا كانت الشركات أكثر شفافية فيما يتعلق

أنا سنكون قادرين على نسيان هذه الآبار بمجرد التخلي عنها، وستكون هناك عناصر مخاطرة ستستمر في تحدي الصناعة».

التخلي سيظل موضوعاً صعباً للصناعة لأنه، في المحصلة النهائية، لا يعود بأي ربح، وفي كثير من الأحيان يمكن إهماله. تتوقع بلومبيرج أن أكثر من 32 مليون بئر في جميع أنحاء العالم لم تعد تنتج وتنتظر عملية التخلي المناسبة.

ولضمان تنفيذ هذه العمليات، والأهم من ذلك، القيام بذلك بطريقة مناسبة لضمان عدم المساس بسلامة الآبار، اقترح أعضاء الفريق أنه يجب توقع التكلفة المستقبلية، بحيث يمكن للمشغلين التخطيط لهذه النتائج المالية مقدماً بدلا من تحمل العبء الأكبر بشكل غير متوقع في نهاية حياة البئر. بالإضافة إلى ذلك، من شأن اللوائح الأكثر صرامة أن تضمن أن التخلي سيكون مطلباً، ولكن بالطبع تنفيذ اللوائح يختلف من منطقة إلى أخرى. وفي نهاية المطاف، اتفق المتحدثون على أنه إذا كان هناك حدث يتعلق بسلامة الآبار المهجورة، فيمكن أن يكون بسهولة حدثاً كارثياً يؤثر على الجميع، وليس فقط المنطقة المحلية. لذلك، تقع على عاتق صناعة النفط والغاز، وليس فقط الجهات التنظيمية، مسؤولية ضمان أخذ سلامة الآبار والتخلي عنها على محمل الجد وتنفيذها بطريقة مسؤولة من الناحية البيئية.

## دور التكنولوجيا

لاحظ المشاركون في المؤتمر أن التكنولوجيا لعبت، وستستمر في لعب دور كبير في قطاع سلامة الآبار، وربما تم تحقيق أهم التطورات في مجال الذكاء الاصطناعي والبيانات الضخمة في السنوات الأخيرة. وقد علق فيرجسون قائلاً: «نحن في عصر البيانات

## ← مفكرة الفعاليات 2021

أغسطس/ آب			
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23 - 21	المؤتمر والمعرض التقني السنوي لجمعية مهندسي البترول - SPE ATCE 2021	دي	<a href="http://www.atce.org/about-dubai">www.atce.org/about-dubai</a>
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7 - 4	معرض ومؤتمر الشرق الأوسط لعلوم الأرض - GEO 2021	المنامة	<a href="http://www.geo-expo.com">www.geo-expo.com</a>
نوفمبر/ تشرين الثاني			
18 - 15	معرض ومؤتمر أبوظبي للبترول - أدبيك	أبوظبي	<a href="http://www.adipec.com">www.adipec.com</a>



ناقش المشاركون في المؤتمر الدولي الذي تلعبه التكنولوجيا في قطاع سلامة الآبار

## الدور المتطور لقطاع سلامة الآبار

في مؤتمر التدخل في الآبار البحرية في الشرق الأوسط وشمال أفريقيا 2021، ناقشت لجنة من الخبراء سوق سلامة الآبار. وقد انضم هوست تورال يوسوبوف، مهندس أول سلامة الآبار في شركة بترول أبو ظبي الوطنية (أدنوك)، إلى فايز عيسى، مستشار سلامة الآبار في شركة بترول أبو ظبي الوطنية (أدنوك) لمناقشة هذه القضية. وقد تحدث الحضور حول دور التكنولوجيا والرقمنة، والحالات التي يتحتم فيها التخلي عن البئر غير المنتجة. كما جرى النقاش أيضاً حول تأثير كوفيد - 19 على التخصص المتعلق بسلامة الآبار.

سجلات التآكل وما إلى ذلك. والآن، بعد ست سنوات، ستضطر الشركة إلى دفع المزيد لإصلاح الأسباب غير المعروفة للتآكل كما ستضطر إلى فحص الآبار.

### التخلي

غُيّر السيد فيرجسون محور تركيز النقاش إلى موضوع «التخلي». إذ قال: «أحد مخاوفي هو كيف نساعد العملاء على التخلي عن آبارهم بأمان عندما تكون هناك حاجة إلى التخلي عنها. هناك الآن توقع بأن هذه الآبار ستبقى هكذا إلى الأبد. ويتمثل التحدي التالي في معرفة كيفية القيام بأفضل عمل ممكن لضمان سلامة الآبار، ليس فقط أثناء فترة تشغيل البئر، ولكن بمجرد التخلي عنها أيضاً. لا أعتقد

والمبيعات للتدخل وسلامة الآبار في إكسبرو جروب، إلى أن إكسبرو لديها الآن 50 في المائة من محفظتها مخصصة لهذا التخصص، بينما كانت 20 في المائة فقط قبل 20 عاماً. وعلى الرغم من أن هذا التخصص قد نما بشكل ملحوظ على مدى العقود القليلة الماضية، فقد لاحظ المشاركون في حلقة النقاش أنه لا يزال هناك مجال للتحسين.

وقد أشار مصطفى عادل عامر، مسؤول سلامة الآبار في شركة بدر الدين للبترول (بايبتكو)، إلى أنه «منذ عشر سنوات، بدأت بايبتكو في تنفيذ أنظمة إدارة سلامة الآبار، مما أدى إلى تسريع بناء المعرفة. لكن لسوء الحظ، بعد الانهيار في عام 2014، اتخذت الشركة قراراً لتوفير التكاليف وإيقاف أشياء؛ مثل

قال فايز عيسى: «لقد مرت عملية سلامة الآبار بمراحل مختلفة. فإذا عدنا إلى الوراء قرابة 30-40 عاماً، كان هناك حد أدنى من المعرفة وتم إنجاز الكثير من الأشياء بأقل تكلفة. ولكن بعد العديد من الحوادث والكوارث الكبرى، أصبحت المعرفة بسلامة البئر جانباً حيوياً من جوانب صناعة النفط والغاز. لقد تغير الوضع كثيراً منذ 10 سنوات بعد الأحداث التي وقعت في حقل ماكوندو في خليج المكسيك. فإذا كان من المقرر الآن أن يستمر البئر لمدة 30 عاماً، إذن يجب تصميمه ليستمر لتلك الفترة الطويلة، وهو تغيير يرجع - جزئياً - إلى التحديات البيئية واللوائح الأكثر صرامة». وأشار نيل فيرجسون، مدير تطوير الأعمال

المحررة: لويز ووترز

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تحليلات

الدور المتطور لقطاع سلامة الآبار ..... ٤

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تقارير خاصة: قطر للبترول، التقرير السنوي لخطوط الأنابيب.

استطلاعات: الحفر، تقنية الصحة والسلامة والبيئة، معدات وخدمات الضخ، التحكم في الآبار، الطاقة في موقع العمل، أمن حقل البترول/خط الأنابيب.

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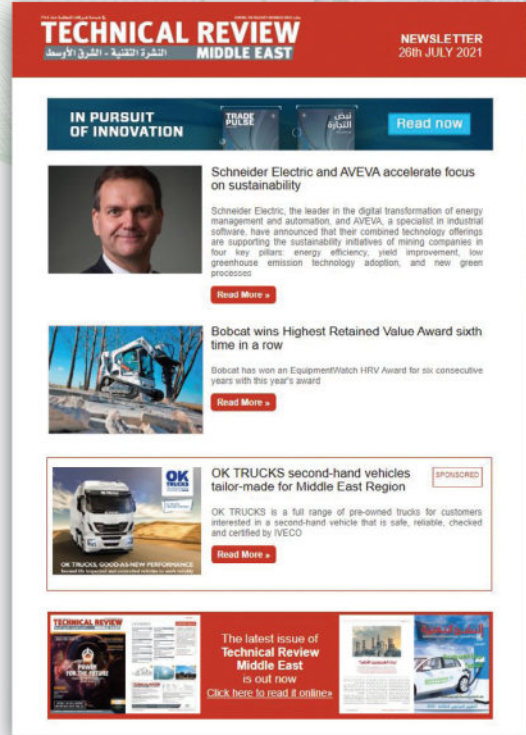
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تُعنى بالنفط والغاز والبتروكيماويات

# النشرة النفطية

المجلد 24 العدد الخامس 2021

الشرق الأوسط

الدور المتطور

لقطاع

سلامة الآبار



الضغوط التي تشكل سوق سلامة الآبار، والعوامل التي تدفع إلى التغيير