

# Oil Review

Oil · Gas · Petrochemicals

## Middle East

VOLUME 24 | ISSUE 6 2021

## Ensuring cyber resilience



- Kuwait powers on
- Game-changing technologies for the energy transition
- New business models for sustainable operations
- Proactive compressor maintenance
- The critical role of flame detectors in fire suppression

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## → Editor's note

IN THIS ISSUE we focus on Kuwait, which is pushing ahead with developing its heavy oil reserves and underdoing a major expansion of its refineries sector. Kuwait's oil sector is also looking to digital transformation to support the country's Vision 2035 objectives of boosting production and economic growth (see p14).

Digitalisation can also play a major role in promoting sustainable operations, a key consideration for oil and gas companies today, with the pressure on to meet net-zero emissions targets (p25). Also on the subject of sustainability, our article on p21 looks at the technologies which could be game changers for an accelerated energy transition.

Improving cyber resilience is another issue which has come to the fore as cyber attacks become more frequent and increasingly sophisticated (p30). We also cover Qatar's LNG dominance (p18), proactive maintenance for compressors (p32), fire safety (p34) and metering technologies (p24).

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Front cover: Adobe Stock

## → Executives' Calendar, 2021-22

### OCTOBER

6-7	<b>O&amp;G to Energy</b>	VIRTUAL	<a href="https://discover.parker.com/OilGas-virtual-event-registration">https://discover.parker.com/OilGas-virtual-event-registration</a>
15-17	<b>Upstream Digital Transformation Conference</b>	VIRTUAL	<a href="http://www.offsnec.com/udt-mena">www.offsnec.com/udt-mena</a>

### NOVEMBER

8-11	<b>Africa Oil Week</b>	DUBAI	<a href="http://www.africa-oilweek.com">www.africa-oilweek.com</a>
15-18	<b>ADIPEC</b>	ABU DHABI	<a href="http://www.adipec.com">www.adipec.com</a>

### DECEMBER

3	<b>OWI Awards</b>	ABERDEEN	<a href="https://offsnec.com/owi-awards">https://offsnec.com/owi-awards</a>
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### JANUARY 2022

16-18	<b>Intersec</b>	DUBAI	<a href="http://www.intersec.ae">www.intersec.ae</a>
17-19	<b>World Future Energy Summit</b>	ABU DHABI	<a href="http://www.worldfutureenergysummit.com">www.worldfutureenergysummit.com</a>
24-25	<b>Middle East Petroleum &amp; Gas Conference</b>	MANAMA	<a href="http://www.mpgc.cc">www.mpgc.cc</a>

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

## Parker Hannifin announces new two-day online oil and gas event

PARKER HANNIFIN, THE global leader in motion and control technologies, is holding an online trade show dedicated to the oil and gas industry, on 6 and 7 October 2021.

*O&G to Energy: Flexibility in a Changing World* will welcome oil and gas professionals across the globe to discuss the rapidly evolving energy world, together with related key challenges. The event focuses on four key themes:

- **Materials selection drivers** – including challenges such as tackling corrosion, materials availability and metallurgy considerations
- **Routes to carbon zero** – this explores emissions reduction, hydrogen applications, electrification, renewables and technology transfer options
- **Digitalisation and efficiency** – this covers how to improve efficiency through enhanced asset management, condition monitoring, predictive maintenance and automation
- **Improved skills, training and safety** – in particular, technology-based training and best practices to ensure industry safety and reduce risk.

Parker will showcase the latest oil and gas technologies from a series of virtual exhibition booths. There will also be a training zone with free, live presentations; a designated lounge area where oil and gas professionals can connect; and a lecture cinema screening new expert content on-demand – including insights into industry trends from Diveena Danabalan, senior energy analyst at the Energy Industries Council.

Joachim Guhe, president for Europe, Middle East and Africa at Parker, said, "The energy industry is in transition and we are proud to support many leading and growing companies on this journey.

"O&G to Energy is all about exploring new ways of working –

Image Credit : Parker Hannifin

**Parker**

**O&G to Energy:**  
Flexibility in a changing world  
**6-7 October 2021 | Online Exhibition**

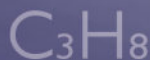
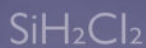
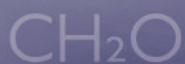
Free lectures and training sessions | exhibition booths | industry networking

**Watch, learn, explore & network**

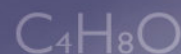
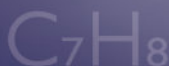
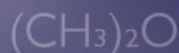
*The event will discuss the challenges of the rapidly evolving energy world.*

including opportunities to reduce emissions, streamline operations, boost productivity and make the best use of emerging technologies. We look forward to welcoming both new and established oil and gas contacts over the two days, and hope that delegates will find significant value in the activities available – from live training sessions to technical advice, on-demand lectures and networking opportunities."

*Find out more: [www.parker.com/oilandgas](http://www.parker.com/oilandgas)*



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## Cummins Arabia demonstrates commitment to hydrogen technology

AT THE 2ND MENA Energy Meet, held virtually from 30-31 August, Alan D. Kneisz, global business development director, Hydrogen and Fuel Cell, Cummins, elucidated the company's energy transition endeavor. As part of his presentation, he explained how Cummins has been expanding its footprint across the world with its hydrogen technology, for a sustainable present and the future. Cummins, with its research and innovation prowess, has been at the forefront of low-carbon technologies, and with its 70+ years of electrolysis and more than 25 years of fuel cell production experience, has built a diverse hydrogen technology portfolio and expertise in battery, fuel cell and hydrogen production technologies.

Kneisz shed light on how the demand for fossil fuels might dramatically decrease by 2030, giving rise to hydrogen energy demands, and how the MENA region is poised to become a world leader in fulfilling these demands. He highlighted the region's potential given the captive markets both locally and in Europe, having large demands of green hydrogen with aggressive decarbonisation targets.

Showcasing the highlights of Cummins' global leadership in electrolysis and fuel cell projects and its green hydrogen ecosystem, the presentation highlights also encapsulated the Cummins product line for both stationary and mobility applications, and the world's most advanced fuel cell modules.

The audience was led through the benefits of the advent of the hydrogen ecosystem in terms of leading to zero emissions, and as a low-cost alternative to CCUS. The focus was also on ease of adoption, achieved easily through zero-emission funding for carbon reduction in cities and with local partnerships. Touching upon the much debated topic of scalability, Alan justified how Cummins is well placed to achieve



Image credit: Adobe Stock

*Cummins has built a diverse hydrogen technology portfolio.*

this for hydrogen and fuel cells production and deployment in the MENA region, a fact backed by their real-world implementations in commercial applications which includes the world's first large FCEV bus fleet and the world's largest fuel cell project with Alstom.

He concluded by stressing the economic ability of Cummins to deploy large-scale hydrogen projects, reinforced by its global presence, mass production facilities, and the active participation in different global energy councils.

## Optimising human factors and change management to accelerate digital transformation

THE UPSTREAM DIGITAL Transformation Conference MENA will take place virtually from 26-27 October 2021, with the theme 'Optimise human factors and change management to accelerate digital transformation of the MENA oil and gas business.'

The past 18 months have been eventful to say the least. Covid-19, the volatility in the oil price and growing environmental considerations are changing every aspect of the business. This has made a dynamic and disruptive time which has accelerated the need to navigate change effectively.

The current climate has shown how crucial quick and demonstrable change is, and UDT MENA 2021 will highlight how operators' focus has shifted to optimise sustainable operations on the road to net zero. Digital transformation holds the key to this change.

While companies are looking to exploit new digital opportunities, companies will, however, still find that they face a number of significant change management challenges that need to be overcome. Indeed it has been estimated that around 70% of efforts devoted to digital transformation will focus solely on change management. Finding effective change management strategies is therefore key to making digital transformation a success.

It is for this reason that this is the focus for the Upstream Digital Transformation Conference MENA. The two days will feature five critical sessions that pinpoint discussions on the most important challenges and opportunities facing MENA operating companies, including:

**Culture Change:** Learn how your organisation's culture can help drive adoption, encourage innovation and get everyone working towards your digital objectives

**Structural Change:** Discuss how best to structure your business to promote the adoption of digital transformation while minimising disruption and maximising engagement

**Data:** Understand how to drive increased trust in data, expand its application and improve decision making to maximise its value to your business

*Digital transformation holds the key to optimising sustainable operations.*



Image credit: Adobe Stock

**Partnerships:** See how working closely with industry partners enables you to further your digital ambitions by sharing resources and expertise

**Digital Skills:** Explore strategies to develop and attract the competencies and knowledge that will allow you to expand your digital capabilities.

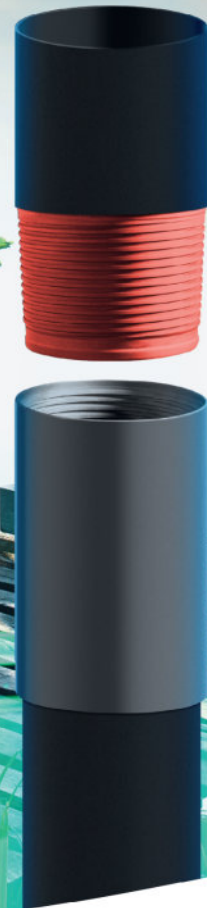
Experts sharing their best practices on these areas include Niyazi Amirbayov, regional transformation manager, BP; Harish Kumar Goel, tech management & digital transformation advisor, Kuwait Oil Company; Mohammad Rehan, senior contracts and procurement advisor, Saudi Aramco; Ossama Ahmad, IT manager, Shell; Fahad Al-Ateeq, director, IT applications, GASCO; Hani Bani Amer, head of cyber security operations, National Critical Infrastructure; Dr. Satyam Priyadarshy, technology fellow and chief data scientist, Halliburton; and Roberto Espinoza, senior executive advisor – field development, Dragon Oil.

For further information see the website at <https://www.offsn.net/udt-mena> or contact [Bhumika@offsn.net](mailto:Bhumika@offsn.net)

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ONE STEP AHEAD.

## Penspen secures more than US\$70mn worth of contracts in MEA

PENSPEN HAS SECURED more than US\$50mn from five new, long-term contracts from ADNOC, ADNOC Onshore, ADNOC Offshore and ADOC during 2021.

The engineering project consultancy (EPC) projects are being executed under Penspen's project management consultancy (PMC) supervision and will support the achievement of ADNOC's 2030 integrated strategy goals.

Penpen's asset integrity (AI) service line has secured more than US\$10mn from four new, long-term contracts from BP ROO, ADNOC Offshore, ADNOC Gas Processing and Dubai Petroleum.

In addition, Penspen's engineering service line has brought in more than US\$10mn from 17 new medium-term contracts from Robt Stone, Galfar Emirates, Target Engineering Construction Company, Archirodon, Arabian Industries, Probus Engineering Construction and Petrozim Line PVT Ltd.



Image credit: Adobe Stock

*The initiative is in line with Penspen's ambitious growth plan in the region.*

## Pearl Petroleum signs US\$250mn financing agreement with US International Development Finance Corporation

PEARL PETROLEUM COMPANY Limited, the consortium led by Dana Gas and Crescent Petroleum of the UAE, has signed a US\$250mn financing agreement with the USA International Development Finance Corporation (DFC) to support the gas expansion works currently underway at the Khor Mor gas plant in the Kurdistan Region of Iraq (KRI)

DFC is the development finance arm of the US government, and proceeds from the seven-year DFC financing will support an increase in gas production capacity by 50% to 690 million scf per day to meet rising demand for clean natural gas for electricity generation and industry in the KRI. The total project cost is US\$630mn, and the remaining financing has already been secured through a regional bank facility and the EPC contractor.

The KM-250 project is the first stage of a two-train expansion project at Khor Mor that aims to boost total production capacity to approach one billion scf/day. Work resumed in April 2021 after onsite construction was halted last year due to the Covid-19 pandemic and is currently on track for completion by April 2023.

Total investment by Pearl Petroleum at Khor Mor to date exceeds US\$2.1bn, with total cumulative production of more than 341 million barrels of oil equivalent (boe) in natural gas and liquids. The uninterrupted supply of gas to power plants in Erbil, Chemchemical and Bazian has resulted in significant fuel cost savings and economic benefits for the Kurdistan Region and Iraq as a whole.

The gas produced to date has enabled emissions savings of 42 million tonnes of CO<sub>2</sub> by displacing diesel fuel in power generation in the KRI, thereby making a major contribution to reducing greenhouse gas emissions and local air pollution in the region as well as supporting the transition to better energy sources to tackle global climate change.

Between 2018 and 2021, the Khor Mor Gas Plant also benefitted from a 45% production increase through an optimisation of the facility, bringing current total production to 106,000 barrels of oil equivalent per day (boepd).

## ADNOC and Helmerich & Payne form strategic alliance

THE ABU DHABI National Oil Company (ADNOC) and its subsidiary ADNOC Drilling Company and Helmerich & Payne, a global leader in rig technologies and drilling solutions, have announced a strategic alliance.

The initiative will see ADNOC Drilling acquire eight FlexRig land rigs from H&P for US\$86.5mn. Following this transaction, H&P will make a US\$100mn cornerstone investment into ADNOC Drilling's recently announced initial public offering (IPO).

The strategic alliance and rig acquisition will support ADNOC's target of reaching 5mn bpd production capacity and gas self-sufficiency for the UAE by 2030, along with plans to unlock its unconventional oil and gas resources. These agreements will further drive ADNOC Drilling's growth and expansion as well as enhance its rig-based operational performance by providing access to the world-class H&P FlexRig land rig fleet and leveraging H&P's expertise and technologies. In addition, the alliance will support ADNOC Drilling in further driving operational excellence through maintenance efficiencies, supplementing supply-chain capabilities, and adding engineering and rig design competencies.

## 3t Transform receives OPITO approval for digital MIST training course

LEADING SOFTWARE AND learning technology company 3t Transform has received OPITO-approval for its next generation digital Minimum Industry Safety Training (MIST) refresher course.

The MIST qualification is a mandatory requirement for anyone working in the offshore industry and must be completed every four years. Earlier this year, OPITO released a digital standard (MIST Further) enabling experienced offshore workers to renew their 3t Transform via approved online courses.

3t Transform's new OPITO-approved digital MIST refresher includes the most up-to-date e-learning content in five key areas: major accident hazards, workplace hazards and personal safety, risk management, control of work and helicopter safety.

Six months in development, the course uses the very latest training technology to personalise content to each individual's pre-existing knowledge and includes interactive activities to maximise engagement.

It is the latest e-learning course developed by 3t Transform, which is part of the 3t Energy Group. 3t Transform has created an extensive portfolio of more than 50 of the most in-demand e-learning courses, from HCA-approved dangerous goods by air awareness to working at height to authorised gas tester.

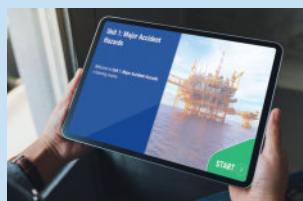


Image credit: Adobe Stock

*3t Transform has created an extensive portfolio of more than 50 in-demand e-learning courses.*



## PDO's Yibal Khuff Project (YKP) starts production

PETROLEUM DEVELOPMENT OMAN'S (PDO) Yibal Khuff Project (YKP) has started production, marking a key milestone for the landmark facility.

The installation's first sour wells were opened in early September, introducing sour oil to the YKP Central Processing Facility, and the project has already started exporting crude oil to the Main Oil Line. The plant's capacity will be ramped up over the coming months.

Spanning an area of 1.68 sq. km, YKP is the second largest, and most technically complex project in PDO's history – with COVID-19 adding another layer of complexity over the past two years.

YKP is of a high strategic value towards meeting Oman's growing medium and long-term oil and gas demands, as well as reducing PDO's net non-associated gas import.

The mega project will be delivering – when

fully operational – five million cubic metres of gas per day and around 20,000 bpd of crude.

PDO managing director Steve Phimister said, "The YKP coming on stream is a source of great pride for PDO. Despite the challenging environment and scale of this project, the project team were able to stay the course and deliver the project with an amazing HSE record, exceeding 46mn Lost Time Injury-free manhours."

## Tendeka awarded international contracts worth US\$30mn

GLOBAL COMPLETIONS SPECIALIST Tendeka has secured more than US\$30mn worth of international contracts within the last quarter, for implementation over the next three years.

This is in addition to long-term work it has secured with operators for its swellable packers and sand and inflow control technologies across key energy hubs, including the Gulf Cooperation Council (GCC), North Sea and Australasia.

Tendeka is also delivering its first significant FloSure autonomous inflow control devices (AICDs) campaign in the USA, following a successful trial earlier this year. The company has installed more than 50,000 FloSure AICDs around the world.

Brad Baker, CEO at Tendeka, said, "To secure a number of multi-year, international agreements is always satisfying, but even more so with what the industry has been going through over the last 18 months.



Brad Baker, CEO Tendeka.

"It has been an uncertain time for the sector, but due to the hard work of our team and our investment in technology, we have forged even stronger relationships with our global customers to enhance their operations.

"These wins for our sand and inflow control technology cement our position in the market as the industry leader of inflow control technology."





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## Westwood predicts 30% land rig demand growth

WHILE 2020 SAW a catastrophic fall in the onshore land drilling market due to the wide-felt impact of the Covid-19 pandemic, which resulted in operators slashing budgets and reducing operations or cancelling worldwide drilling projects entirely, Westwood Global Energy group has anticipated a 30% increase by the end of the upcoming half-decade from 2021 to 2025.

Last year saw an estimated 30% (around 38,000) decrease in the number of onshore wells drilled, with average global utilisation levels plummeting to an estimated 40%.

In its forecast for 2021-2025, however, Westwood expects demand for rigs to increase and recover from the drop in 2020, despite operators' propensity to maintain capital discipline within their projects.

From the prediction's base case scenario, the number of wells drilled year-on-year is expected to grow to around 50,200 by the end of 2025, up 30% from 2020's reports.

With an identified capable global rig fleet of around 9,060 rigs and an estimated demand of around 4,560 rigs by 2025, average market utilisation is forecast to improve to around 50%.

A large extent of the forecast rig demand is expected to be driven by NOC-dominated countries compared to the past, with countries in the GCC showing more resilience against the Covid-19-induced commodity crash of 2020 compared to IOC-dominated countries.

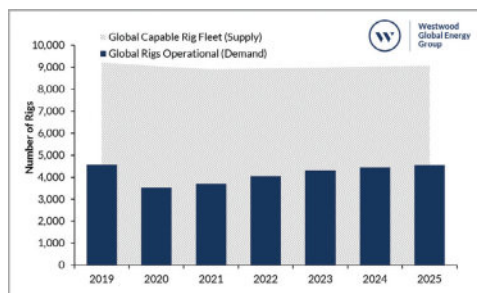
Strong drilling activity is expected to take place in the NOC-dominated nations leading up to 2025, resulting in utilisation levels of around 75% by 2025, in these nations in particular.

GCC countries, despite being hampered by OPEC+ communities at the start of the forecast, are expected to demonstrate notable growth in the later years of the forecast period up to 2025, driven by production capacity upgrades. Much of this growth relies on expansive projects across Saudi Arabia and the UAE, and extensive EOR drilling activity in Oman.

Along with China and Russia, the UAE and other GCC nations are expected to account for more than 2,750 of the operational rigs worldwide by the end of 2025, a notable increase from 2020's figures which stood at around 2,400. Should these figures be achieved, the GCC will account for around 60% of the world's operational land rigs by 2025.

Other key markets, such as the USA, are not expected to return to or improve upon previous levels recorded from 2016-2019, according to Westwood's base case scenario and projections.

Should shale and other unconventional developments progress at a faster rate than currently predicted, there is upside potential for higher reports of active global land rigging, especially within the GCC, Russia and China.



Following current growth, a 30% increase in the number of wells drilled is expected by 2025.

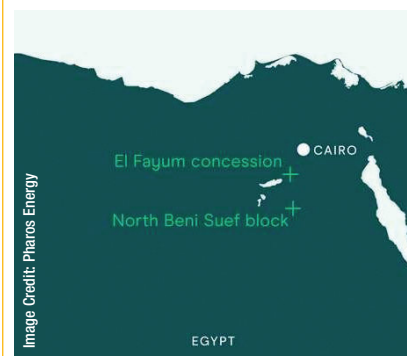
Image Credit: Westwood Global Energy Group

## Pharos Energy sells assets

ENGINEERING SERVICE AND support group Pharos Group and its energy-centric vertical Pharos Energy has confirmed that it has entered into conditional agreements for the farm-out and sale of a 55% working interest and operatorship in each of the Egyptian El Fayum and North Beni Suef concessions to IPR Lake Qarun Petroleum, a wholly-owned subsidiary of the IPR Energy group.

The initial consideration implies a gross (100%) value of up to US\$115mn for the assets, and consists of US\$5mn cash at the completion of the transaction.

Disproportionate funding from IPR Lake Qarun for the Pharos Group's retained interest share of the cost of future activities on the concessions amounts to approximately US\$38.425mn, which will be subject to working capital and interim period adjustments. A contingent consideration of up to US\$20mn on Brent oil prices in each of the four calendar years from 2022 to 2025 also applies.



Pharos Energy is farming out interests in the El Fayum and North Beni Suef concessions.

The agreement is expected to strengthen the Pharos Group's balance sheet, while also enabling a more comprehensive and quicker development of the El Fayum concession. The testing of the low-risk North Beni Suef Block concession will also be streamlined at a lower cost to Pharos Energy through a sustained drilling programme.

Ed Story, CEO for Pharos, explained, "I am extremely pleased to be able to announce the farm-out of a 55% operated interest in each of our Egyptian concessions... the farm-out, while instantly boosting our balance sheet, will allow the entry of a partner who has committed to carry Pharos on a capital programme on these Egyptian assets, which will lead to increased production, helping to fulfill the full potential of the concessions."

Completion of the agreement is currently estimated for Q1 2022.

Image Credit: Pharos Energy

## TAQA to conduct oil and gas strategic review

INTEGRATED UTILITY COMPANY, Abu Dhabi National Energy Company PJSC (TAQA), has announced its intention to initiate a strategic review of its international oil and gas operations.

Since 2005, the company has expanded its portfolio of upstream and midstream operations in various global locations, including the UK North Sea, the Netherlands, Canada, and the Kurdistan Region of Iraq.

Its portfolio spans onshore and offshore exploration, development and production of crude oil, natural gas and natural gas liquids, gas storage, and oil and gas processing and transportation.

Throughout the first half of 2021, the production across TAQA's portfolio reached levels equivalent to 124,000 bpd, which in turn generated revenues of AED 3.4bn (US\$937mn), totalling a net income of AED 533mn (US\$145mn).

During the company's planned review, the strategic options and optimal course for future development across the oil and gas division will be assessed. The evolution of the global energy industry, as it transitions to a cleaner and more sustainable future, will be an important consideration.

All options, including the sale of all or some of the company's assets, are set to be considered during the strategic review.



The company is set to review its oil & gas portfolio.

Image Credit: Adobe Stock



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## Mubadala Petroleum and Eni to cooperate on energy transition initiatives

MUBADALA PETROLEUM AND Eni, the integrated international energy company, have signed a Memorandum of Understanding aimed at identifying cooperation opportunities in the energy transition sector, including the fields of hydrogen and carbon capture, utilisation and storage, that align with their respective decarbonisation targets. The scope of the cooperation covers potential joint opportunities in the Middle East, North Africa, South East Asia, Europe and other regions of mutual interest.

The partnership is in line with Mubadala Petroleum's proactive approach to Environmental, Social & Governance (ESG) considerations and its energy transition goals. This includes pursuing a gas-weighted portfolio strategy that has seen the company's asset base reach almost two thirds natural gas, while reducing Green House Gas Emissions by 25% in the last three years.

The agreement was signed by Mubadala Petroleum's CEO, Mansoor Mohamed Al Hamed and Eni's COO of natural resources, Alessandro Puliti. The signing was witnessed by Khaldoon Khalifa Al Mubarak, managing director and group CEO of Mubadala Investment Company and Claudio Descalzi, CEO of Eni.



The agreement was signed by Mubadala Petroleum's CEO, Mansoor Mohamed Al Hamed and Eni's COO of natural resources, Alessandro Puliti.

Image credit: Mubadala Petroleum

## Aramco announces major expansion of industrial investment programme

ARAMCO HAS ANNOUNCED a major expansion of its industrial investment programme, Aramco Namaat, with the signing of 22 MoUs and one joint venture agreement focused on capacity building in sustainability, technology, industrial and energy services and advanced materials.

Aramco chairman HE Yasir Al-Rumayyan said, "Such initiatives help further drive economic growth and diversification, ensure greater reliability of energy supply, effectively localise the industrial supply chain, and create better jobs and skillsets."

Aramco president and CEO Amin H Nasser added, "The benefits for everyone involved are multiple as well as mutual and I am proud that Aramco continues to be a catalyst at the heart of the Kingdom's transformation, harnessing its expertise and resources to champion new markets and growth sectors. We believe these exciting target sectors offer significant opportunities for all the current and prospective parties involved."

Aramco senior vice-president of technical services Ahmed Al-Sa'adi said, "Through Namaat, we are attracting world-class partners who share our goal of continuous industrial development. These partnerships illustrate Saudi Arabia's significant appeal to international companies and pave the way for innovations in materials, processes and solutions."

The Namaat programme is focuses on four key areas that align closely with Aramco's objectives:

**Sustainability:** Aramco, which already has one of the lowest upstream carbon intensities in its industry, is implementing circular economy concepts to reduce waste and aims to pursue further emissions reductions through the deployment of green technologies, including carbon capture.

**Technology:** Aramco, through its Digital Transformation Programme, is capitalising on advanced 4IR technologies and adopting new solutions that enhance operational efficiency and improve performance in terms of safety, reliability, cost, and the environment.

**Industrial:** to maintain its low-cost production advantage and supply reliability, Aramco aims to achieve further supply chain efficiency through improvements in inventory management, procurement, logistics and localisation.

**Advanced Materials:** leveraging advanced solutions to unlock the value of every hydrocarbon molecule produced, Aramco is stepping up innovation in non-metallic materials, which offer potential benefits for the building and construction, oil and gas, renewables, automotive and packaging sectors.

The 22 MoUs were signed with companies including Honeywell, AVEVA, SOLVAY, Baker Hughes, Schlumberger, Halliburton, VEOLIA, Gulf Modular Industry (GMI), Samsung Engineering, Hyundai, Saipem and Shell AMG.



Aramco Namaat is focused on sustainability, technology, industrial and energy services and advanced materials.

Image credit: Aramco

## TotalEnergies invests in projects worth US\$10bn in Iraq

TOTALENERGIES, THE IRAQI Ministries for oil and electricity, and Iraq's National Investment Commission have signed major agreements covering several projects in the Basra region, designed to enhance the development of Iraq's natural resources to improve the country's electricity supply.

TotalEnergies will invest in installations to recover gas that is being flared on three oil fields and supply gas to 1.5 GW of power generation capacity in a first phase growing to 3 GW in a second phase. It will also develop 1 GWac of solar electricity generation capacity to supply the Basra regional grid.

These agreements include:

- The construction of a new gas gathering network and treatment units to supply the local power stations, with TotalEnergies also bringing its expertise to optimise the oil and gas production of the Ratawi field, by building and operating new capacities
- The construction of a large-scale seawater treatment unit to increase water injection capacities in southern Iraq fields without increasing water withdrawals, as the country is currently facing a water-stress situation. This water injection is required to maintain pressure in several fields and will help optimise the production of the natural resources in the Basra region.
- The construction and operation of a photovoltaic power plant with a capacity of 1 GWp to supply electricity to the grid in the Basra region.

These projects represent a total investment of approximately US\$10bn.

"These agreements signal our return through the front door to Iraq, the country where our company was born in 1924. Our ambition is to assist Iraq in building a more sustainable future by developing access to electricity for its people through a more sustainable use of the country's natural resources such as: reduction of gas flaring that generates air pollution and greenhouse gas emissions, water resource management and development of solar energy," said Patrick Pouyanné, TotalEnergies' chairman and CEO.

"This project perfectly illustrates the new sustainable development model of TotalEnergies. It also demonstrates how TotalEnergies can leverage its unique position in the Middle East, a region where the lowest-cost hydrocarbons are produced, to gain access to large-scale renewable projects," he added.

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# Kuwait

## powers ahead

Kuwait's oil and gas industry is powering on despite the many uncertainties posed by the past two years, as it steadies production and seeks to unlock new market opportunities, says Martin Clark.

**K**UWAIT'S OIL AND gas industry is powering on despite the many uncertainties posed by the past two years, as it steadies production and seeks to unlock new market opportunities.

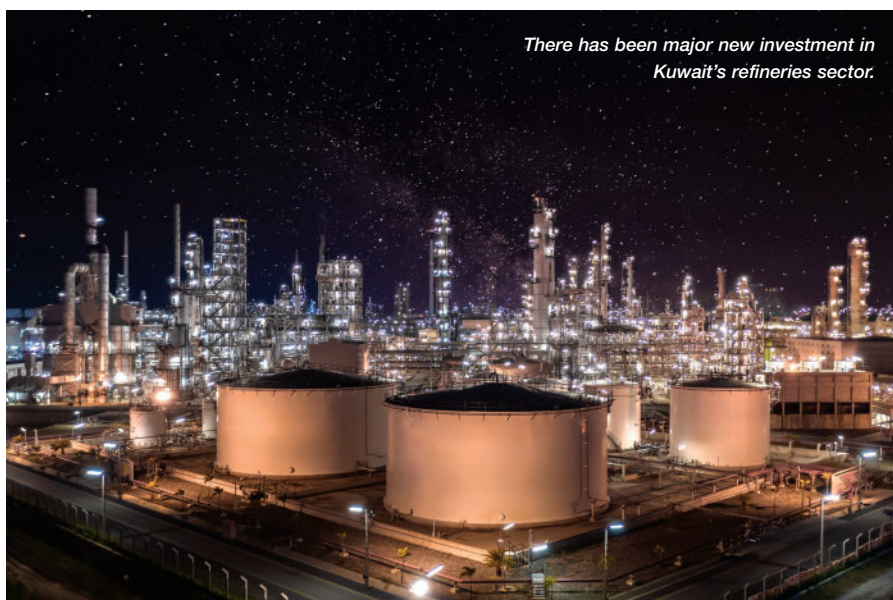
Despite the challenges of the past couple of years, Kuwait's energy sector has offered stability and consistency in what has been a time of huge uncertainty, with lockdowns triggering economic havoc worldwide.

That is a great credit to Kuwait Petroleum Corporation (KPC), the state-owned oil company that oversees the nation's vast, disparate and evolving energy industry. KPC subsidiary units dominate all strands of the nation's hydrocarbons sector. They include Kuwait Oil Company (KOC), Kuwait National Petroleum Company (KNPC), Petrochemicals Industry Company (PIC) and Kuwait Oil Tanker Company (KOTC).

Yet it has been a far from easy time, as falling energy demand due to pandemic-driven lockdowns eroded both oil demand and income. Kuwait's economy overall is reported to have contracted by about 8% in 2020. But with oil prices edging upwards again, and against a backdrop of improved demand forecasts, there is a hope that things have turned a corner.

Despite attempts to diversify its economy, Kuwait still makes around half its money from oil. An increase in revenues due to higher crude prices may not erase all the damage of the past year or so, but it is a step in the right direction.

“The heavy oil project is an innovative scheme in that it will also incorporate the use of wind energy to power facilities.”



*There has been major new investment in Kuwait's refineries sector.*

Image Credit : Adobe Stock

### Oil production

One thing Kuwait is not short of is crude oil. The country's reserves are estimated at around 101bn barrels, according to OPEC, but more is always being found. Two new discoveries were announced at the start of the year – one in the Houma oilfield in northwestern Kuwait, and the other in the Al-Qashaniya field in the north. Kuwait's Oil Minister Mohammad Abdulatif al-Fares also said that more conventional oil was discovered in the north of the giant Burgan oilfield, the nation's most prized energy asset. Burgan is one of the world's largest oilfields and has, at peak times, produced as much as 2.4mn bpd.

As well as conventional oil, Kuwait is also developing some of its heavy oil reserves, including at the South Ratqa field in the north, a project visited recently by KPC's chief executive, Hashem Sayed Hashem. Ratqa is another of the world's largest oilfields, with estimated reserves of 15bn barrels.

The heavy oil project is an innovative

scheme in that it will also incorporate the use of wind energy to power facilities across the oilfield – a first for Kuwait. This highlights another critical challenge for KPC, as it grapples with the demands of sustainability and environmental responsibility. In July, KOC signed two new contracts to remediate soil contaminated by oil spills in the north and south of the country, as part of the Kuwait Environmental Rehabilitation Programme. It reflects a growing group-wide commitment to improve the industry's eco footprint.

### Gas developments

Kuwait also holds substantial natural gas deposits, although these remain largely untapped for now. This means KPC is importing liquefied natural gas (LNG) cargoes from overseas in order to support domestic energy needs.

One of its newer subsidiaries, Kuwait Integrated Petroleum Industries Company (KIPIC), is rolling out new infrastructure at Mina Al Zour in support of the LNG sector

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and an expansion into petrochemicals, a key thrust of Kuwait's energy diversification. The first purpose-built LNG import terminal will have eight storage tanks and is scheduled for full completion in early 2022 with a 22m tons per year capacity. KOC recently inaugurated the flow lines from the gas import facilities to its pipeline system. The main contractor, Hyundai Engineering & Construction of South Korea, said recently that the development was now over 97% complete.

French engineering group Technip Energies announced in May that it had won a six-year contract from KIPIC for various projects in the Al Zour complex, including work linked to the refinery, petrochemical complex, as well as the LNG plant.

Separately, a new 100 km gas pipeline to Kuwait linking the Khafji export terminal, in the Kuwaiti-Saudi neutral zone, has entered service. The pipeline, the first to link the shared neutral zone and Kuwait, will supply the Al Zour power plant. Kuwaiti interests in the neutral zone are represented by the Kuwait Gulf Oil Company.

## New projects

While oil and gas production remains the mainstay of Kuwait's economy, there is a big national drive to diversify and add value to output, as well as explore new and alternative energy sources such as wind and solar power. This has meant major new investment into the refineries sector to upgrade and expand fuels production.

Earlier this year, KNPC announced the start of a new hydro cracking unit at Mina Abdullah Refinery (MAB). It works on breaking

“ Work at MAB reflects the massive overhaul that has gone into Kuwait's refineries sector.”

down heavy gas oil, then converts it into high-value and quality light products for sale. With a production capacity of 50,000 bpd, it is the second largest unit of its kind in Kuwait promoting the production of high-quality kerosene used as jet fuel and in other industries, plus the diesel that complies with increasingly demanding European specifications.

KNPC said in a statement that the new unit forms a part of KPC's 2040 strategy aiming to promote the growth of the country's refining and energy processing sectors. The work was undertaken predominantly by Kuwaiti nationals, another major policy objective.

Work at MAB reflects the massive overhaul that has gone into Kuwait's refineries sector in recent years, turning around outdated, inefficient plants into state-of-the-art facilities, including the new Al-Zour refinery project. Located some 90km south of Kuwait City, adjacent to the existing Al Zour South power plant, it will be one of the largest refineries in the world, producing 615,000 bpd.

## Foreign investment

Foreign investment has played a limited role in Kuwait's energy sector, and has courted heated controversy through the years, but

even here there are indications that the country is willing to explore new options on future developments.

Despite the goal of utilising more Kuwaitis in the workforce, the government is inviting investors to support new power projects with third-party finance. The country is looking to attract outside investors to fund several new projects under a public-private partnership programme that will cover more than half of its future electricity needs over the next two decades. Around 7,500MW of the 14,000MW it needs over the next 20 years will come through these partnerships, which will require investments of billions of dollars, according to officials. These projects include the Al Zour 2 & 3 plant, which has a capacity of 2,700MW; Al Khiran, with 1,800MW of capacity; and Al Shaqaya and Al-Debdiba, with a combined capacity of 3,000MW, the official Kuwait Authority for Partnership Projects has said.

For the most part, foreign companies have partnered with KPC subsidiaries on a contract basis. Greece's Hellenic Gas Transmission System Operator (DESFA), for example – whose shareholders include major gas players Snam and Enagas – has been awarded the contract for operation and maintenance services of LNG import at KIPIC's new Al Zour gas terminal. The minimum five-year contract supports a project of prime strategic national significance in terms of meeting Kuwait's future domestic energy needs. The terminal will be one of the largest LNG storage and regasification sites in the world, with eight liquefied gas storage tanks, each with a capacity of 225,000 cu/m. ■

## Accelerating digital transformation

KUWAIT'S OIL SECTOR is looking to digital transformation to support the country's Vision 2035 objectives of boosting production and economic growth.

Kuwait Oil Company (KOC), which is looking to digitalise 80% of its oilfields by the end of 2021, awarded a contract to Halliburton in February 2021 to collaborate on their digital transformation journey through the maintenance and expansion of digital solutions for their North Kuwait asset.

It will allow KOC to accelerate their data-to-decisions cycle by designing and operating digital twins of the field to automate work processes, supported by DecisionSpace 365, a cloud-based subscription service for E&P applications. This will help KOC engineers model, optimise and deploy intelligent work processes to plan, forecast and optimise production and asset operations, increasing ultimate recovery.

The contract was followed by the award of a similar one not into Halliburton in June to extend digitalisation across all KOC assets including West Kuwait, South and East Kuwait, and Heavy Oil.

Nagaraj Srinivasan, senior vice-president of Landmark, Halliburton Digital Solutions and Consulting said, “By using cloud computing, IoT and real-time technologies to drive new ways of working, we can improve production planning, scheduling and enable virtual and autonomous reservoir optimisation.”

Meanwhile, Kuwait National Petroleum Company (KNPC), which is

progressing major projects such as the upgrade and expansion of the Mina Abdullah and Mina Al-Ahmadi refineries, a sulphur handling project and a fifth gas train, has collaborated with VMware to accelerate its digital transformation.

“By embracing a cloud-first approach with VMware, KNPC has boosted its agility, efficiency and security to set in motion a new era of digital transformation,” said KNPC spokesperson and deputy CEO for admin and commercial affairs, Ahed Al-Khurayif.

“The company has already achieved more than 95% datacentre virtualisation, reducing its datacentre footprint by 70%, and realising total cost savings of more than 50% over three years, while enabling the rapid launch of modern applications.”

KNPC deployed its own private cloud in two data centres in Kuwait, with a Software Defined Data Centre (SDDC) approach, built on VMware solutions, virtualising compute, storage, network and security layers for maximum agility, in addition to reduced cost and complexity. KNPC's IT team is operating both sites in Active-Active configuration, allowing them to provide high resiliency and Service Level Agreements to the business units.

Imad Sfeir, country director – Gulf (Qatar, Oman, Kuwait, Bahrain, Yemen), VMware, commented, “As one of the most digitally advanced oil refineries in the world, KNPC is demonstrating what can be achieved by embracing a cloud-first approach that supports automation, big data, and smart applications.”



# Natural gas - powering economic growth

Natural gas is set to play a pivotal role in powering economic growth in the UAE over the next 50 years, according to His Excellency Dr. Sultan Ahmed Al Jaber, UAE Minister of Industry and Advanced Technology and managing director and group CEO of the Abu Dhabi National Oil Company (ADNOC).

**D**ELIVERING THE OPENING address of Gastech 2021, H.E. Dr. Al Jaber highlighted the UAE's leadership in natural gas and said natural gas will support the nation's vision for economic growth.

"Gas will play a pivotal role in this blueprint for growth, as the essential fuel stock for our downstream hub in Ruwais and our industrial joint venture, TA'ZIZ," H.E. Dr. Al Jaber said.

Speaking virtually, the Minister explained that the UAE is strengthening its position as a regional leader in natural gas and the emerging blue hydrogen market.

The UAE is on track to achieve gas self-sufficiency as ADNOC leverages advanced technologies to expand into unconventional gas, tap into gas caps and unlock new reservoirs, as part of the company's integrated gas strategy launched in 2018.

"At the heart of this goal, is the expansion of our producing assets, like Shah and the development of new ones, like the unique Umm Shaif gas cap and the Hail, Ghasha and Dalma project," H.E. Dr. Al Jaber said.

"Construction of artificial islands is underway and we are leveraging our

experience in world-class developments to ensure costs are minimised and commercial benefits maximised for all our partners. Together, these projects will deliver more than 3 billion standard cubic feet of gas per day, enough to power several million homes."

His Excellency went on to share his perspectives on natural gas markets and the role natural gas will play in the energy transition.

"As the world consolidates its recovery from the Covid-19 pandemic, LNG and broader gas markets globally are tightening, with demand outpacing supply. Longer-term, the outlook is also robust, driven particularly by markets in Asia. Today, gas provides almost one-quarter of the world's energy supply and will continue to play a critical role in the global energy system. No other fuel source can reliably supply the baseload power to heat and cool homes, drive heavy industry and expand economies, all while keeping emissions at a minimum."

His Excellency added that as innovations are helping to make gas even cleaner and more sustainable, the UAE is applying technology to create zero-carbon fuels from gas such as hydrogen. "Already at ADNOC,

we produce about 300,000 tons of hydrogen a year. By leveraging our existing gas infrastructure and commercial-scale CCUS capabilities, the UAE can and will become a major player in the emerging blue hydrogen market."

Concluding his remarks, H.E. Dr. Al Jaber extended an open invitation for partnership in the UAE's gas industry, noting that building strong partnerships across the world is one of the key principles for the UAE's economic vision.

Gastech 2021's official opening ceremony also featured a Ministerial Panel in which Ministers from the world's leading energy economies shared insights on the role of natural gas in the energy transition, future directions on how to create a hydrogen economy and what roadmaps are needed to meet the growing demand for energy and cleaner fuels.

Gastech is the world's foremost gas, LNG, hydrogen, and energy event. The 2021 edition took place in Dubai from 21-23 September under the patronage of His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai. ■

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# Well positioned for global LNG market domination

Qatar is poised for global LNG market domination, as it pursues major expansion plans with a competitive production cost and strong environmental credentials. Moin Siddiqi, economist, reports.

**T**HE STATE-OWNED QATAR Petroleum (QP) is on the threshold of the next lucrative phase of production from its 6,000 sq km North Field, the world's largest non-associated gas field. The North Dome expansion will provide the biggest capacity in the LNG industry when fully operational, with the potential to mitigate a projected 'supply gap' by the mid-2020s due to deferral or postponement of high-cost projects in the past year.

Qatar has barely raised production in the past decade (Table 1), but increasing competition, especially from the USA and Australia, has shifted its emphasis on capacity. The North Dome expansion entails two mega-LNG liquefaction projects. Phase-1, the US\$28.75bn North Field East (NFE) project, one of the energy industry's largest in terms of capital expenditure, will raise output from 77mn tons per annum (Mtpa) to 110Mtpa by 2025. While Phase-2, the North Field South (NFS) project, currently in the front-end engineering design stage, would further boost capacity to 126Mtpa, representing a total increase of 64% or 49Mtpa by 2027 – the biggest LNG capacity addition ever.

Both projects involve building six new LNG mega-trains (NFE: four and NFS: two), each with a liquefaction capacity of 8Mtpa, and installed with associated offshore and onshore facilities for gas treatment, natural gas liquids (NGL) recovery, helium extraction and refining. Post-2027, a further 55Mtpa of LNG projects are in the pipeline.

Saad Sherida Al Kaabi, Qatar Energy Minister, said, "QP is currently evaluating a further increase in LNG capacity beyond the 126Mtpa." To fund the expansion, QP needs an LNG price of around US\$4 per million British thermal unit (Btu), according to industry experts.

Qatar's LNG expansion will have spill-over effects on downstream industries. QP estimates that the LNG target of 110Mtpa can also produce approximately 5,000 tonnes/day of ethane, 260,000 barrels/day of condensate, 12,000 tonnes/day of liquefied petroleum gas (LPG), 1,800 tonnes/day of sulphur and 20 tonnes/day of pure helium by 2027. Feed gas of approximately 4.6bn standard cubic feet/day will be piped to onshore facilities. Phase-1 also includes the development of eight wellhead platforms, from which 80 new wells will be drilled. First gas from NFE is due online by end-2023.

North Dome projects would solidify Qatar's status as No.1 LNG producer, overtaking Australia, which currently has the most liquefaction capacity. However, Australia's proved natural gas reserves at 84 trillion cubic feet are less than 10% of Qatar's total (Table 2) – thus raising doubts over the sustainability of Australia's long-term capacity.

## Most competitive producer

Qatar's natural gas production costs are among the lowest in the world. Despite global competition, "Nobody can compete with Qatari costs," said the Oxford Institute of Energy Studies. The proposed U.S. LNG projects: Port Arthur LNG; Driftwood LNG; Plaquemines LNG; and Freeport Train-4 have a breakeven price of between US\$6.3 to

**Table 1: Qatar's natural gas and liquefied production (bn cubic metres)**

	2015	2016	2017	2018	2019	2020
Natural gas	175.8	174.5	170.5	169.1	172.1	171.3
(%) Middle East total	29.3	27.9	26.6	25.5	25.4	25.0
LNG exports	105.6	107.3	103.6	104.9	105.8	106.1
(%) Middle East total	84.2	85.1	84.7	83.3	83.0	83.6

*Qatar occupies a crucial position in global gas industry as the largest LNG and second-largest natural gas exporter.*

*Source: BP Statistical Review of World Energy 2021*

**Table 2: Top five holders of proved natural gas reserves (end-2020)**

	Trillion cubic feet	~R/P ratio (years)
Russia	1,320.5	58.6
Iran	1,133.6	128.0
Qatar	871.1	144.0
Turkmenistan	480.3	230.7
USA	445.6	13.8
Total	4,251.0	
As (%) World Total	64.0	48.8*

*\*Global average ~Reserves-to-production ratio*

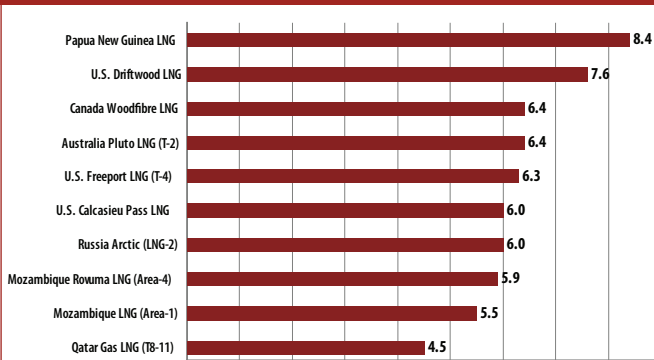
*Source: BP Statistical Review of World Energy 2021*

US\$7.6/Mn Btu delivered to Asia, compared to US\$4.5/Mn Btu for QP NFE T8-11 (Figure 1.)

Besides its geographical position, low costs of LNG production also enable cargoes to be shipped at competitive rates compared to competing suppliers, thus helping Qatar to win higher market share, particularly in fast-growing, more price-sensitive Asian emerging markets (Figure 4). "Qatar will continue to face fierce competition in the global LNG space, although its decarbonisation strategies in production and transportation will continue to provide it with a unique, competitive edge over rivals," noted London-based Fitch Solutions.

The distribution network is pivotal for LNG domination. QP has signed contracts with top Korean shipbuilders: Daewoo Shipbuilding and Marine Engineering, Hyundai Heavy Industries, and Samsung Heavy Industries for the commissioning of large LNG tankers. Some 60 new vessels are required to support the North Dome expansion, with potential demand exceeding 100 before 2030. QP estimates that it has

**Figure 1: Breakeven prices for greenfield LNG projects, US\$ per mn Btu\***

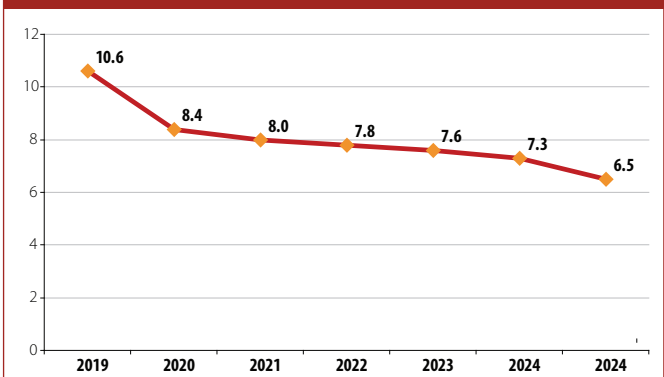


*Breakeven price incl. feed gas, LNG capex, liquefaction opex, and transportation cost to East Asia.*

*\*British thermal unit*

*Source: Rystad Energy Ucube, September 2019*

**Figure 2: LNG price projections, US\$ per mn Btu Japan CIF\***



*\*Cost + insurance + freight.*

*Global LNG prices are linked to crude oil*

*Source: World Bank (2021).*

commissioned more than half of global tanker building capacity for the next seven years. New LNG tankers will be greener than the typical competitive ships, hence giving Qatar an edge in low carbon marketing of the super-chilled fuel.

**Decarbonisation efforts**

In accordance with the 'National Vision 2030', Qatar is pursuing

sustainable development strategies alongside its economic diversification drive. In particular, QP aims to become a leader in the decarbonisation of the LNG value chain – with a target of a 25% reduction in (carbon dioxide) emissions from LNG plants by 2030 (below competitors' operations). Qatar's mega-LNG projects will have a positive effect on global CO<sub>2</sub> output due to the country's efficiency. In fact, it stands to rank as the most efficient producer in terms of extraction compared to rivals in the USA, Australia, Russia, Malaysia, Norway, and Nigeria.



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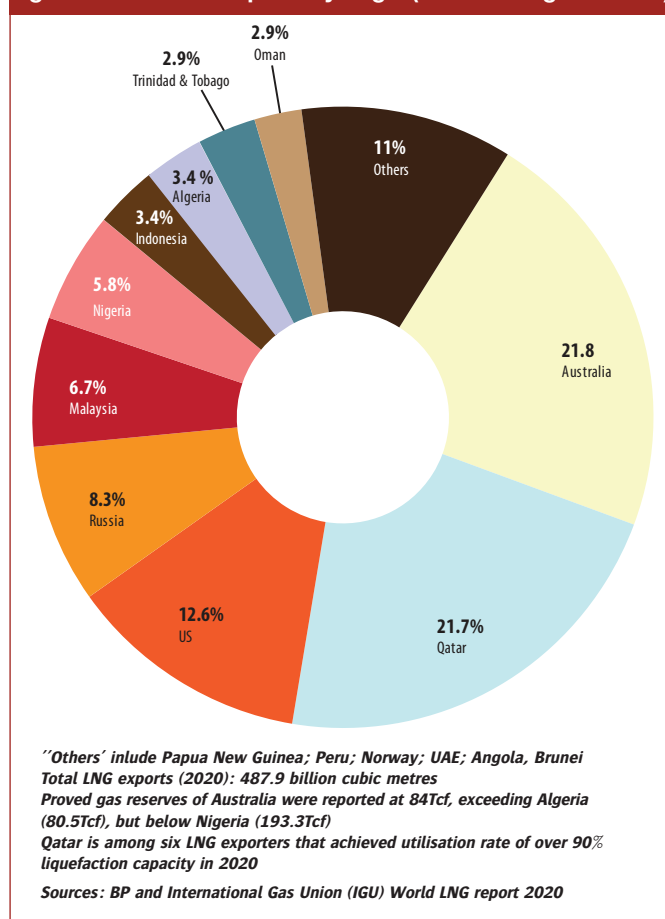


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Figure 3: 2020 LNG exports by origin (% share of global total)



Qatar has taken concerted actions to address climate change challenges. For example, it recently commissioned the Gulf’s (and the LNG industry’s) largest carbon capture and storage (CCS) facility in Ras Laffan, with installed capacity to capture/store 2.1m tonnes of CO<sub>2</sub>, rising to approximately 5mn and 7mn tonnes, respectively, by 2025 and 2030, coupled with using natural gas in its enhanced recovery processes. Power for the CCS scheme will be sourced from an 800 megawatts (MW) solar power plant under construction nearby, further reducing the project’s carbon footprint.

Qatar’s ‘environmental’ credentials should provide even more of a competitive edge against other key LNG exporters, as global markets seek to pursue an energy transition away from polluting fuels and towards cleaner alternatives.

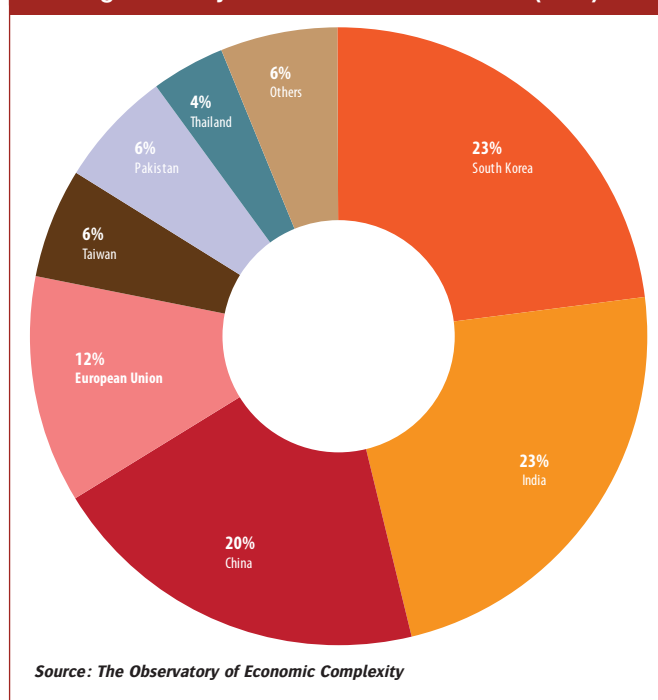
### Liquefaction capacity kingpin

Qatar is poised to achieve higher growth in the coming years. Mega-LNG expansion will exert powerful multiplier effects upon the economy, with nominal gross domestic product (GDP) doubling in size to US\$300bn by 2027, according to Bank of America (BoA) Global Research.

“Qatar’s LNG strategy appears to be focused on defending and, in due course, growing its market share. Qatar’s structural cost advantage makes it well-positioned to retain its pre-eminent supplier position, while allowing for greater flexibility in contract pricing,” said BoA.

“Qatar’s ambitions offer a timely boost for international oil companies”

Figure 4: Major markets for Qatar's LNG (2020)



As the global economy recovers from the Covid-19 downturn, Qatar’s ambitions offer a timely boost for international oil companies, as well as engineering, procurement and construction firms, shipbuilders and local/regional businesses. Although other LNG producers are also expanding output, QP remains confident that comparatively low production costs, combined with the growing demand for reliable/clean power sources, will enable it to profit from heavy investments in the energy sector. Low-carbon LNG is likely to enjoy robust long-term demand – projected by Shell at around 700Mtpa by 2040.

In sum, Qatar is firmly on path of securing the No.1 LNG spot for the foreseeable future. While Vision 2030 envisages a future beyond hydrocarbons, natural gas remains Qatar’s bedrock resource, paving the way for cleaner energy sources whilst providing financial buffers to grow in new directions. ■

### Footnotes

*\*In 2019, the Energy Ministry reported North Field’s ultimate recoverable gas resources to exceed 1,760 trillion standard cubic feet, with a further 70bn barrels of condensates. This figure would give Qatar the world’s biggest share of natural gas, if certified by international energy institutes.*

*\*Based on current sanctioning, Rystad Energy expects Qatar’s actual LNG output to reach 107Mtpa in 2030 – equivalent to 22.5% of global sanctioned supply of 476Mtpa. By contrast, the USA and Australia are likely to produce 98Mtpa and 76Mtpa, respectively. Globally, LNG importers will remain reliant mostly on Qatar, thanks to the North Dome expansion.*

*\*Natural gas is viewed as a transition fuel in global drive towards carbon emissions reduction, including in power generation, and climate change mitigation, serving as a bridge between coal and renewable energies, thus achieving a balance between the environmental and socio-economic dimensions of sustainable development. Gas emits less carbon dioxide when it is burned, while renewable energy projects are still too expensive to power electricity grids, factories and transport on a mass scale. Natural gas is expected to be the fastest-growing fossil fuel by 2045, driven by higher urbanisation rates, industrial demand and its competitiveness over coal in power generation.*

# Game-changing technologies for a 1.5°C future

At a webinar to mark the launch of DNV's Energy Transition Outlook 2021, global energy and finance leaders discussed which technologies will drive deep decarbonisation, where the opportunities lie and how the energy transition can be accelerated.

**T**HE CLEAR MESSAGE from DNV's latest *Energy Transition Outlook* is that, despite the efforts being made, and progress in electrification and renewables, the energy transition is not progressing fast enough to achieve the 2050 net zero emissions Paris goals and limit global warming to 1.5°C. Fossil fuels, especially gas, will still constitute 50% of the global energy mix by 2050, making the need to invest in and scale hydrogen, and carbon capture and storage (CCS) all the more important.

At the webinar session, David Eyton, EVP, Innovation & Engineering, bp; Arne Sigve Nylund, EVP, Projects, Drilling & Procurement, Equinor; Andrian Dacy, global head of Transportation, JP Morgan; and Geir Bjørkeli, CEO, Corvus Energy discussed which technologies could be game changers for a 1.5°C future.

Kicking off the discussion, Eyton commented, "We can't wait for game-changing technologies to address climate change – that means game over for the world," he said. "What would be game changing would be to scale up and deploy the technologies we have at pace. By investing and deploying them we will drive the costs down." He noted the progress in wind and solar, although there is a need to manage cost-effective sources of energy storage for intermittency. "We already have electrification of transport, and I am confident battery challenges will continue to improve, and grid-to-grid can help address intermittency," he said.

"At bp, we're scaling up bioenergy production, taking an integrated approach, investing in digital technologies, which have the capacity to optimise systems, and doubling external investment in innovation to our corporate venture capital arm." He added that bp have established a new Innovation & Engineering capability, combining science, engineering, digital and new business models.

Equinor, which in common with bp is looking to be a net zero company by 2050, will ensure it plays a leading role in the energy



Image Credit : Adobe Stock

*Decarbonising hard-to-abate sectors such as shipping will be critical to achieve climate change goals.*

transition through three initiatives: optimising oil and gas, accelerating renewables and working hard on low carbon solutions, said Nylund.

"We have to reduce emissions from our current oil and gas assets, and we are working hard on that," he said. "We are at a good starting point in reducing emissions, being carbon efficient, but we are now working with concrete initiatives when it

comes to power from shore, to supply power to installations through offshore floating wind farms and other initiatives.

"We need to be profitable in a very volatile market," he stressed. "New projects coming onstream by 2030 will have a break even point below US\$35 a barrel, and payback time less than two and a half years; this is important because we need cash flow to finance the transition going forward."

## Decarbonising hard-to-abate sectors

The DNV report says that decarbonising hard-to-abate sectors such as shipping, aviation and heavy industry requires far greater scaling of hydrogen, e-fuels and biofuels, predicting that combined, hydrogen and e-fuels will cover only 5% of global energy demand by 2050. Discussing the technologies with the greatest potential to decarbonise, Dacy said

“What would be game changing would be to scale up and deploy the technologies we have at pace.”

he was encouraged by the incremental steps made over the past few years to begin to decarbonise the industry, but that change would not happen overnight.

“There is a need to realise the scope of challenge is substantial; it will be an incremental process, of going through a series of different pathways, including digitalisation, optimisation opportunities through software to improve engine performance, weather routing etc, making nuanced adjustments that have a significant impact on consumption and carbon emissions,” he said. Design factors and different technologies can be implemented to reduce drag on vessel, reducing consumption and emissions, he noted.

“In addition to that, there’s the fuel transition – there’s a big debate on what the ultimate final fuel will be,” he said. He noted there are substantial technical challenges in implementation, but immediate incremental options are available. These include LNG, which reduces emissions but still has methane issues. Methanol, which Maersk has adopted in newer vessel orders, will further reduce emissions, but is also not a perfect solution, he added.

“The holy grail is ammonia and hydrogen, which requires retrofitting engine design and ship design; hydrogen requires more space, and is harder to contain, so containment systems need to be improved.” Dacy predicted that as hydrogen becomes more available in a sustainable way, with increasing numbers of companies building electrolyzers for hydrogen production, it would spur the development of vessels and aircraft that could use hydrogen or hydrogen derivatives.

On the subject of carbon-based taxation systems, he commented, “People don’t make difficult decisions involving millions of dollars without perhaps being motivated from a regulatory perspective, so all factors need to be brought to bear.”

Bjørkeli discussed how Corvus Energy is overcoming challenges with storage and other clean energy solutions in its mission to power a clean future.

“We are spending a lot of time R&D – focusing first on safety in these new technologies, to make them feasible for marine and offshore applications.” He said the company launched its first maritime battery in 2009, and has since significantly reduced its volume, weight and footprint, making it easier for shipowners to adapt, and reducing costs.

“We are also spending time technology scouting, seeing what is available in EV and other industries and seeing if we can bring these technologies to maritime and offshore,” he added. The company is working on fuel cells with Toyota with a view to bringing fuel cells as well as batteries to the maritime industry. The company also has a programme for solar oxide fuel cells that can burn LNG and ammonia.



*DNV predicts that hydrogen will not scale before the next decade.*

Image Credit : Adobe Stock

“What is important is how you optimise between batteries and fuels cells, to improve fuel efficiency and get cost of ownership down,” he said, adding that the company is also focusing strongly on digitalisation.

## Scaling up hydrogen

The DNV report predicts that hydrogen will not scale before the next decade, and that it will account for only 5% of the energy mix by 2050. “Extraordinary” action will be needed to bring the hydrogen economy into full force earlier, it says. So how can hydrogen be scaled faster?

“ CCS has still not left the starting block.”

“I don’t see how we can achieve net zero in hard-to-abate sectors without hydrogen, and the stars are beginning to align,” commented Eyton. “Technology is advancing at pace, and government support is growing, with national policy a key driver,” he said. He noted UK policy to drive investment in this space, starting with industrial clusters and existing markets. bp is developing the UK’s largest blue hydrogen production facility, targeting 1GW hydrogen production by 2030.

“The DNV prediction may seem small, but it is higher in share than nuclear today, which is significant, since we’re starting from close to zero,” Eyton noted.

The report predicts that blue hydrogen will gradually lose its cost advantage vis a vis

green hydrogen, accounting for only 19% of hydrogen generation by 2050.

Eyton commented, “The reality is hydrogen is expensive to transport, so solutions at will be local to start with. Blue hydrogen starts off with an advantage today in places where it works, although green hydrogen may be more cost effective where there are no natural gas systems or reservoirs. We do see more competitive potential for green hydrogen with costs coming down more significantly in time as electrolyzers, fuel cells and storage improve. Our own forecasts out to 2050 are for a 50/50 balance.”

The DNV report says that CCS deployment is too slow, predicting that only 3.6% of fossil CO<sub>2</sub> emissions are abated in 2050. Arne agreed, “CCS has still not left the starting block. We need to step up on CCS, it’s needed to reach the net zero goal globally. Equinor is in a unique position when it comes to the North Sea basin, we have storage capacity, infrastructure, and countries around the basin which are very interested in both CCS and hydrogen. We think that going this route, by developing technologies and building scale we will evolve, but it’s a tough race and we need to speed up.

“The ETS carbon price today is five euros per tonne, so it could be an interesting proposition. We are seeing growing attention on CCUS and hydrogen. As an example, in 2024 our Northern Lights CO<sub>2</sub> storage project will receive CO<sub>2</sub> from various industrial players and will be able to store one million tonnes a year, rising to five million tonnes by 2026. We will work hard to meet that important goal by stepping up carbon capture and storage.” ■

## bp, ADNOC and Masdar collaborate on clean energy solutions

BP, ADNOC AND Masdar have signed three agreements with the potential to lead to billions of dollars of investment into clean and low carbon energy, creating potentially thousands of energy jobs.

The first agreement would see the companies collaborate to initially develop two gigawatts of low carbon hydrogen across hubs in the UK and UAE, with the intention to expand as the project progresses. Access to clean hydrogen – a critical fuel in the decarbonisation of hard-to-abate industries – can reduce emissions, enable new, low carbon products, and unlock future fuels. Today's announcement could enable a significant contribution towards the UK Government's target to develop five gigawatts of hydrogen production by 2030.

It could also lead to the first international investment in the low carbon hydrogen facility in Teesside (H2Teesside), which aims to produce one gigawatt of blue hydrogen starting in 2027. H2Teesside would capture and store up to two million tonnes of CO<sub>2</sub> a year through the Northern Endurance Partnership (NEP). As part of the first agreement, bp, ADNOC and Masdar also intend to pioneer decarbonised air corridors between the UK and UAE.

Bernard Looney, bp's CEO, said, "The UK and UAE governments have bold plans for decarbonisation. The UK is our home and we have worked in the UAE for nearly a century. By partnering with the visionary leaders of ADNOC and Masdar, we see massive business opportunity to generate the clean energy the world wants and needs – and at the same time revitalise local economies and create the jobs of the future."

UK Prime Minister Boris Johnson added, "This is a fantastic

investment in the industries of the future, creating high value jobs across the UK as we build back better and greener. It is clear indication that businesses in the energy sector are taking the transition to cleaner solutions seriously, and a major boost to the UK's own ambitious net zero goals."

HE Dr Sultan Ahmed Al Jaber, minister of industry and advanced technology, managing director and Group CEO, ADNOC and chairman, Masdar, commented, "The UK and UAE have enjoyed decades of strong economic ties and the agreements signed today between ADNOC, Masdar and bp will serve to deepen the strategic relationship between our countries. We look forward to building upon this legacy to strengthen both countries' ambitions to generate economic growth through low-carbon initiatives."

bp and Masdar have also agreed to explore opportunities to develop, build and operate sustainable energy and mobility solutions for cities – in the UK, UAE and beyond – on the road to net zero. The two companies will initially focus on the application of energy efficiency and storage, cleaner fuels and distributed renewables generation.

Finally, bp and ADNOC plan to deepen their collaboration to decarbonise oil and gas operations in Abu Dhabi, including the potential development of carbon capture use and storage (CCUS) hubs. The two companies would also harness advanced methane emission detection and reduction technologies and create Smart Decision Centres in the UAE, where digital and AI technology would then be used to accelerate operational efficiency.

## COMPLETE PLANTS & TECHNOLOGY FOR PRODUCTION OF



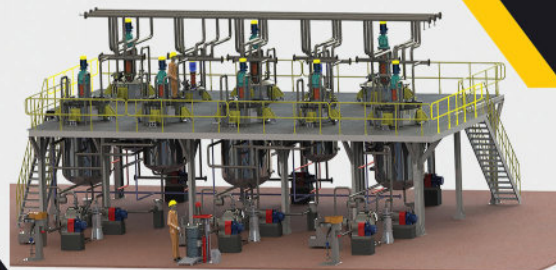
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# Digital flow meters: advantages for oil and gas

Gordon Lindsay, technical lead at TÜV SÜD National Engineering Laboratory, speaks with Deblina Roy about the evolution from analog to digital flow meters, and how these digital meters are helping oil and gas operators reduce costs and increase output.

**T**HE FORMAT OF information produced by analog and digital devices is different. However, it is ultimately referring to the same measurement value – in this case, flow. For the mechanical meter, it is a simple case of mechanical motion, where the flow turns a turbine. When a turbine blade passes an electromagnetic pickup on the meter body, a pulse is generated, the number of pulses over a given time interval is used to calculate a flow rate.

If there is high-voltage equipment near the analog meter, electrical noise may interfere with the signal, which in turn can give false signal amplitudes and pulse counts which ultimately increases the uncertainty of measurement in the flow measurement reading. This was the main disadvantage of the analog devices.

## Main advantages

“One of the key advantages of digital devices is that the data can also be streamed to more than one place. With an analog device, generally, a cable is hardwired from say a turbine meter to a pulse counter, or to somewhere in a control cabinet. We then make that information available to a local PC or data logging software. With a digital device, if it’s networked using a digital Fieldbus such as, Profibus, Modbus or Foundation Fieldbus, the data can effectively be streamed to multiple data servers, allowing control, data acquisition and machine learning systems to access the data which essentially means that the data interrogation and assessment is more dynamic,” Lindsay explained.

“Digital flow meters have potentially hundreds of different variables, but even an experienced operator doesn’t necessarily understand what these variables are, or even if the operator does understand them, they may not understand how they behave depending on different operating scenarios. So, the best way to improve confidence is to use emerging data science techniques to develop condition-based monitoring (CBM) software. CBM software takes these variables



Image Credit: TÜV SÜD

**Gordon Lindsay is the technical lead at TÜV SÜD National Engineering Laboratory.**

and determines hidden relationships between them as well as patterns that can point to error or failure states.

“One of the key advantages of digital devices is that the data can also be streamed to more than one place.”

“With enough data, these systems can be used to not only flag live errors but also predict future errors based on the data trends and patterns present within its historical databases. It’s increased user confidence and these systems aim to provide. For example, software that displays credible information which is now meaningful and understandable for the end-users.”

## Data is the key

“Data will take different forms depending on the source and application. That’s a challenge that a lot of companies face and it’s going to be up to companies to make it as easy as possible for the customers to hand over data, understand it and then generate these models as quickly and as efficiently as possible.

“To give a more specific example: a condition-based calibration (CBC) can be a key next step, which builds upon the concept of condition-based monitoring (CBM). Every quality critical metrology device that an oil and gas company uses will require calibration.

“For example, a flow meter requires calibration regularly. Once or twice a year (depending on site-specific requirements), a customer will remove the meter from the pipeline, send it to a calibration lab and then reinstall the device – which is a very costly process. This is typically referred to as a time-based calibration (TBC). However, in some instances, the device may not have even required calibration. The device might have been performing perfectly fine and there was no drift from the baseline calibration.

“By using a CBC system, the operator can therefore streamline this process and make calibrations and operations, in general, more dynamic. By using data-driven modelling the operator can also monitor a system based on its available historical data to determine if a device requires calibration. If the device doesn’t require calibration, there’s no need to stop the process. Thus, the operator understands the system better and this data-driven modelling system has reduced operating costs.” ■



# Sustainable business models for oil & gas

Sebastien Grau, regional vice president Middle East, Turkey and Africa, Rockwell Automation explores how leaders in oil and gas can use digital transformation to support their sustainability efforts and ready themselves to be leaders in the market of tomorrow.

**T**HE OIL AND gas industry has underpinned modern society for many decades, serving essential needs across areas such as energy, automotive and aviation, as well as many everyday consumer goods. Given the events of the past year, we are at a pivotal point in defining the oil and gas industry's role in today's – and tomorrow's – economy.

Emerging from the current challenges, we expect demand for oil and gas products to remain strong. However, it won't be a return to 'business as usual' – even the largest companies in the sector are recognising the urgent need to reinvent operations, invest in more sustainable business models and focus on renewable sources of energy.

For example, the Oil and Gas Climate Initiative (OGCI), which includes BP, Chevron, ExxonMobil and Shell, announced in 2020 a

target to reduce carbon emissions by 13% from member companies' aggregated upstream oil and gas operations by 2025. This milestone shows that the issue is a broad industry priority and one that will be central to their strategies for growth post global lockdown.

While a common goal, it requires every business to define how they'll work towards reaching their net-zero emission targets and make sustainability core to how they operate. It will become increasingly apparent which companies are leading in this regard over the coming decade, as they will hold the advantage in emerging as the sector's leaders.

With the deadlines of the Paris Agreement looming, and greater value being placed on environmental consciousness at a customer level, it is imperative that oil and gas businesses see sustainability as an investment in their future success.



Image Credit : Rockwell Automation

Sebastien Grau, Rockwell Automation.

## Balancing priorities

As with everything in business, there are trade-offs involved. As such, oil and gas leaders need to balance short-term dependencies with their longer-term aspirations.

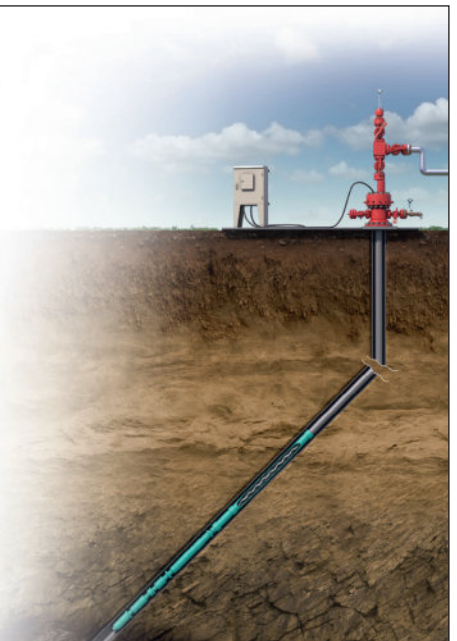
## Technology for a clear Future

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In the short term they are compelled to meet fluctuating market demand for oil and gas products, especially with the potential surge post-lockdown. Alongside these immediate priorities, there is a growing requirement to consider what the world will look like in 2030 and aligning strategies and future investments in that direction.

The pressures for change are coming from various sources. Not only are there regulatory pressures to reduce carbon emissions, but there are also changing expectations from internal stakeholders and consumers for more sustainable practices. Satisfying those demands requires a change in business model and a modernisation in the technologies used to support the transformation.

Digital technologies are foundational to this transition. More than two thirds (77.3%) of Chief Information Officers recognised digital transformation as their number one budget priority going forward, according to the CIO Outlook for 2021 Survey, with 72.7% citing automation as the area where they anticipate the greatest returns.

The oil and gas industry recognises this and is progressing towards digital maturity. Underpinned by digital technologies, companies are now looking to build strategies for more efficient business models in order to make better use of their current resources and decarbonise their future production.

## Implementing sustainable models

There are three core pillars oil and gas leaders can leverage in order to elevate the role of sustainability, both in their current operations and in shaping future business models.

**1. Invest in efficiency** – Efficiency remains a key objective for the sector. More efficiency means less waste and lower energy costs – it is a business win as well as an environmental one. According to the Global Center on Adaptation (GCA), every dollar invested in building climate resilience could result in between US\$2-US\$10 in net economic benefits. Investing in digital tools to support less wasteful or energy-intensive processes is therefore a prudent choice.

The mutually beneficial relationship between efficiency and sustainability means that oil and gas leaders are incentivised to look across their current processes and operations to find areas and specific use cases where new efficiencies can be introduced.

**2. Improve measurement** – Improving efficiency entails having greater visibility into operations. Having real-time insights into granular aspects of operations at every phase of the production process is critical to making the best decisions and maximising value quickly.

To achieve this, oil and gas companies need to more easily analyse their data. The process of gaining comprehensive insights can be more difficult in oil and gas than in



Image Credit : Adobe Stock

other industries due to the difficulties associated with placing sensors in remote or rugged locations. However, it is from these sources that some of the greatest opportunities for improvement can be found.

There are several elements that can help to improve the visibility and measurability of processes. Firstly, there is the need for standardisation in measurement methods. By assigning a carbon value to every single energy product, operators can make relative and historical comparisons to identify opportunities to reduce waste in current processes. Secondly, there's the need to capture data from disparate assets and bring the information together as reliable and meaningful insights. For example, Sensia, our joint venture with Schlumberger, offers this type of integrated insight through its ConnectedProduction IoT platform. Thirdly, data science capabilities and algorithms can be applied to the data in order to predict where there may be opportunities for greater efficiency in future.

These technologies and approaches can contribute to better calculations and decision-making frameworks around energy consumption, not just in today's energy usage, but also to look ahead to what their energy needs will be over the course of days, weeks and months.

**3. Building towards a net-zero business model** – While 'doing better' with current assets clearly presents an opportunity for improved green performance, it must be matched with an ambition to reinvent operations to set in motion a more sustainable, less carbon-intensive future business model.

This transition is twofold. On one hand, it involves accelerating the move towards more diverse energy sources. On the other, it requires investment in innovation to shift towards cleaner operating models. The components of such models are wide-

-ranging, comprising the use of efficient and circular infrastructures, inventive solutions for fugitive emissions and unavoidable carbon products, leaner supply chain operations and more resourceful approaches to asset utilisation and ownership.

As companies may lack expertise in all these varied aspects, the role of partnerships takes on vital importance.

## Why partnering is key

To realise the full value of digital tools, there must be an innovative and collaborative environment. It is not enough for companies to simply spend more on technology; instead they must find real business cases where carbon emissions can be reduced – this is where partnerships become valuable.

Our goal at Rockwell Automation, throughout our long experience in the oil and gas industry, has been to support producers at every step of the value chain. With a wide diversity of knowledge and capabilities required to assist end-to-end and identify cases where sustainability can support business outcomes, we have made it a strategic priority to assemble an extensive partner and solutions ecosystem for our oil and gas customers to tap into.

Through our work with Sensia, combined with our own sector-specific service offerings, we can bring the necessary set of expertise that help producers to optimise systems, improve process efficiency and maximise the productivity of assets. We also help customers to get ahead in terms of defining a future vision for their organisation, and then helping to invent and assemble the business models that will be resilient to ongoing market turbulence and regulatory requirements.

By taking control of their environment, producers can reap the opportunities to reconcile process efficiency with more sustainable practices today, and be ready to compete in the market of tomorrow. ■

# Designing an oil refinery expansion

BK Struttore used Bentley Systems' STAAD to create 3D models of concrete and steel support structures for a pipeline system on the Jebel Ali Refinery Expansion Project. Jana Miller, manager, product marketing, structural analysis at Bentley Systems, explains how this helped to optimise the design process, saving time and costs.

**T**O HELP MEET the growing demand for energy in the United Arab Emirates, the Emirates National Oil Co. initiated a US\$1bn project to expand the Jebel Ali condensate oil refinery and increase its capacity from 140,000 bpd to 210,000 bpd.

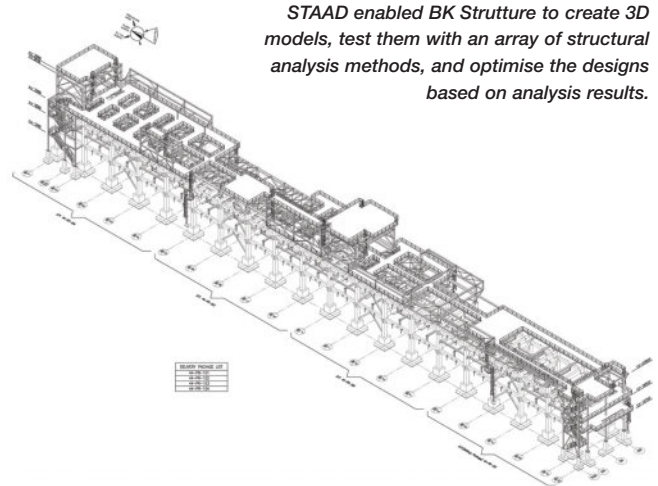
Covering an area larger than six football fields, the expansion includes a new condensate processing train, a liquid petroleum gas/naphtha hydrotreater, an isomerisation unit, a kerosine hydrotreater, a diesel hydrotreater, 12 storage tanks, interconnecting pipelines, and a 31,000 sq ft (9,448.8 sq m) warehouse.

Italian company BK Struttore Srl was retained to design the expansion's mixed concrete-steel structural components of the main pipe rack and process structures in Unit 44. The massive scale of the project required careful load evaluations, structural analysis, and safety checks.

BK Struttore sought software that would ensure that their design work supported all the piping and electrical components designed by other vendors. Specifically, their rack had to provide a structure for pipes running 175m in length at a maximum height of 30m, with a diameter of up to 61cm. In addition to supporting the pipes, the design needed to incorporate steel structures for air cooler supports, platforms, cable trays, and other elements. The complex design required equally complex analysis from the project owner, including static elastic, p-delta, dynamic, and seismic analysis methods. However, they had to finish the design and analysis in three months. With all these challenges, they knew that traditional workflows would be insufficient.

After considering their software options, BK Struttore chose STAAD to effectively design structures and then test them with structural analysis. They began by creating 3D models of the frames and their surrounding environment. Then, they carried out the battery of structural analysis methods the project required. They were able to automate the simulation of varying forces caused by wind and earthquakes, saving time compared to manually inputting different levels of these forces. Results from these analyses allowed them to adjust the support design, integrating comments by team members into STAAD files.

With STAAD, BK Struttore finished the structural designs on time and met the client's high standard of quality. They estimated that the application helped them reduce the time needed to finish the design by



*STAAD enabled BK Struttore to create 3D models, test them with an array of structural analysis methods, and optimise the designs based on analysis results.*

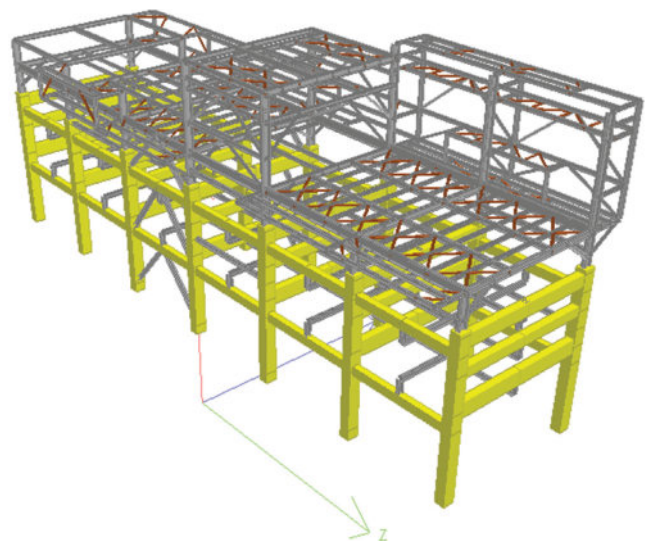


Image Credit: BK Struttore

“Optimising the design with advanced analysis helped them avoid design errors, reducing costs by 10%.”

15%, compared to using other types of structural design software. Additionally, optimising the design with advanced analysis helped them avoid design errors, reducing costs by 10%. Completing the design on time prevented delays on the overall construction, and the client considers the design of Unit 44 as the best in the plant expansion. ■

# The top 10 oil and gas trends to watch

Simon Cushing, senior director analyst, Gartner, discusses trends that oil and gas CIOs should be aware of to ensure that their organisations are agile and resilient in an increasingly complex future.

**G**LOBAL OIL AND gas markets are poised between two competing drivers – rising pressure to decarbonise energy provision, and increasing demand for energy in developing economies. Executives must find new ways to maintain competitiveness and growth.

The unique stresses of 2020 have elevated three business imperatives for 2021: optimising business performance, creating new capabilities, and strengthening technology foundations. The 10 key trends in this report reflect reformation of the industry in the face of complex growing challenges.

CIOs who understand these trends can enable breakout performance that will differentiate them and their organisations in the months ahead.

**1. Enterprise capabilities diverge as new business strategies emerge** – As individual business strategies become more nuanced and differentiated, companies will need novel enterprise capabilities to facilitate implementation. For example, refining companies are exploring biofuel and bioplastics production and deepening their presence in regional petrochemicals products. Oil and gas CIOs will need to facilitate these business innovations by incorporating composable architecture principles in the design of the new enterprise architecture.

**2. Accelerating digital innovation is now table stakes for CIOs** – An increase in discretionary cash flows and strong balance sheets in 2021 are accelerating digital innovation in the oil and gas industry. According to the Gartner 2021 CIO Survey, 87% of CIOs expect their digital programmes to increase or stay the same in 2021. This commitment to digital innovation is a relatively new priority for oil and gas companies. According to Gartner, 85% of CIOs in the oil and gas industry have assumed responsibility for creating a change-enabling technical platform, and 79% are working to build a stronger change leadership culture in IT. CIOs



Image Credit: Adobe Stock

will need to reorient themselves toward value delivery by introducing service delivery models that replace cost-based IT siloes with value-based IT products.

**3. Digital twins drive transparency and automation** – Digital twins can deliver value across the business via the increased integration of internal systems, human activity and external ecosystems. A digital twin is a virtual representation that serves as the real-time digital counterpart of a physical object or process.

Digital twins are trending because of their capacity to improve the performance of business assets. Digital twins improve operational efficiency, prevent downtime, reduce maintenance and maintenance costs, and allow for more effective collaboration between experts and operators.

**4. Comprehensive engineering creates intelligent assets** – To improve outcomes, such as production efficiency, uptime and yield, oil and gas companies are supplementing traditional monitoring and control systems with additional sensors, cloud-based data aggregation platforms, advanced analytics and AI. According to the Gartner 2021 CIO Survey, as many as 50% of

oil and gas companies plan to increase investments in analytics, AI/machine learning (ML), automation, IoT and cloud this year. CIOs are responsible for creating intelligent asset capabilities using the increased budgets.

**5. Key vendor partnerships define enterprise platforms** – Covid-19 pushed CIOs of oil and gas organisations to reconsider traditional vendor engagement. While oil and gas CIOs continue to take a lead in their relationship with large IT vendors, they are also developing more open partnerships with a small number of key vendors in areas such as engineering. The distinguishing characteristic of these vendors is their ability to offer an integrated suite of technologies strong enough to serve as a sub-platform for one domain hub within their emerging enterprise platform.

**6. Reliance on AI becomes more widespread and less visible** – AI/ML are quickly gaining acceptance in the oil and gas industry. Gartner survey data suggests that oil and gas CIOs list AI/ML/analytics and the industrial IoT as the top game-changing technologies in 2021. Several trends in AI technology and approaches promise to

increase AI accuracy and deployment speed and reduce data science effort. As more decisions involve AI input, the reliance on AI will become more widespread. CIOs will need to stay on top of AI developments and evaluate and roadmap the development of AI capabilities.

**7. Connected field workers drive efficiency and reliability** – Many oil and gas companies have sold assets, reduced capital and operating expenditure and shed workers after the events of 2020. The financial and human resource scarcity has compelled organisations to explore opportunities to harness digital technologies in better ways as well as manage risk and improve productivity in difficult conditions.

While remote operations are now well established, oil and gas CIOs must focus on increasing adoption of technologies such as augmented reality and machine vision, cost-effective wearable location devices and increased connectivity on sites.

**8. Establish a roadmap to avoid carbon management chaos** – In the next decade, oil and gas companies will increase their focus

on reducing greenhouse gas (GHG) emissions as conversation around climate change become more intense globally. Many oil and gas companies are committing to reducing GHG emissions to net zero between 2030 and 2050. In order to make this vision a reality, they have started investing in clean energy solutions such as wind and solar power. CIOs need to provide appropriate IT infrastructure, services and talent to meet emerging carbon requirements. They must also start due diligence early, because the market for these solutions is immature, and implementations will be complicated.

**9. Face the challenge of attracting fresh talent** – Post 2020, talent retention has become a struggle for many industries, and the oil and gas sector is no different. Along with the health and safety challenges that have emerged during the pandemic, the industry is challenged with negative perceptions related to climate change. This makes retention of top talent difficult. CIOs can play an active role in creating an attractive and rewarding place to work in a changing societal and economic context.

The need for digital workers is a fairly new

phenomenon for this sector, and finding appropriately skilled talent is even more challenging. CIOs will need to reengineer the IT operating model to offer tangible career development based on premium digital skill sets, thereby attracting the right talent to the industry.

**10: Multiple disruptions yield hybrid reformation of IT operating model** – Disruptive forces such as the cost reductions due to demand-supply challenges since 2020, growing demand for new systems and more IT agility are driving significant changes to IT operating models. While oil and gas CIOs do not expect another year like 2020, they know disruptions will continue in the sector. Oil and gas CIOs are facing a sustained period of constant flux.

Oil and gas organisations need to provide a hybrid IT operating model that balances new and traditional capabilities against a continuously evolving set of business priorities. This will include reskilling the IT workforce, accelerating digital transformation, improving cybersecurity performance and establishing a composable computing landscape for agility. ■



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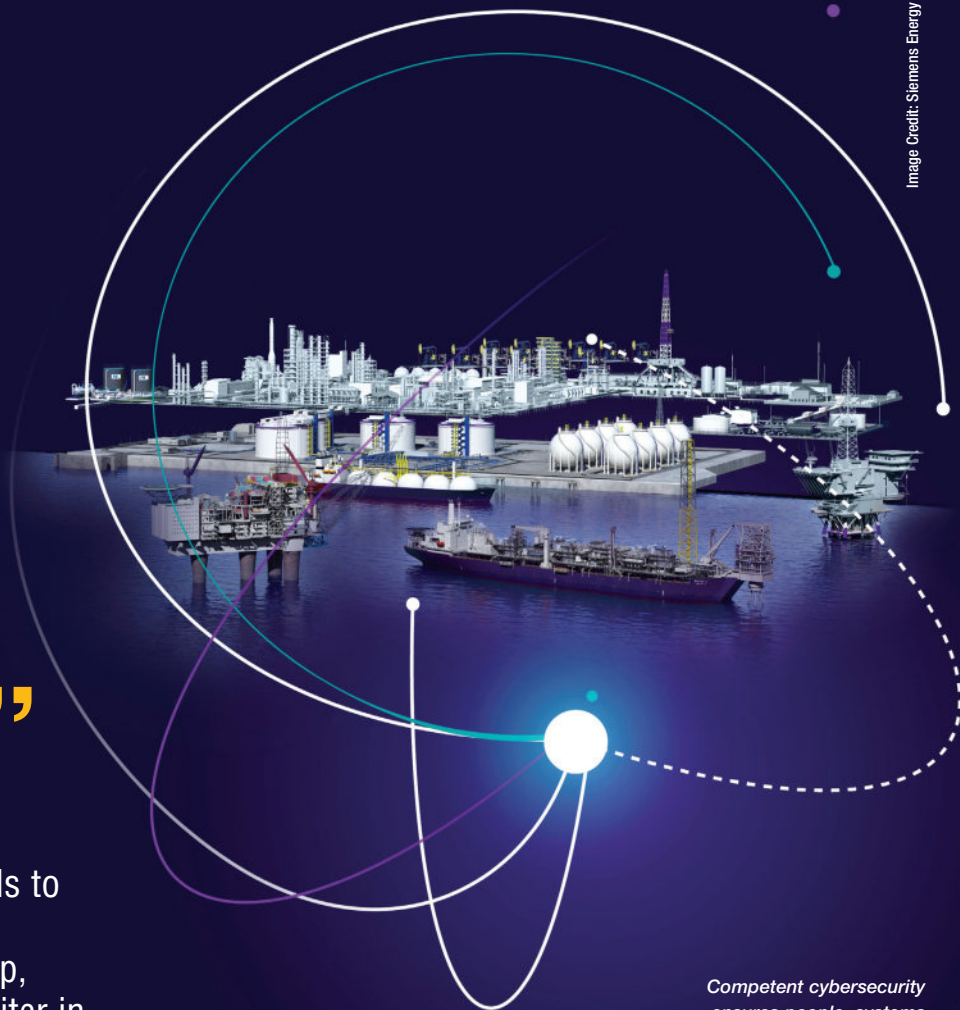
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# “We’re all potential cyber targets”

The oil and gas industry needs to increase its systems’ cyber resilience now, says Nina Terp, specialist author/freelance writer in the area of energy.



*Competent cybersecurity ensures people, systems and data are kept safe from cyberattacks.*

**I**N MAY 2021, the possibility of a cyberattack on the oil and gas industry was brought to the public’s awareness when U.S. pipeline operator Colonial Pipeline suffered a ransomware attack. This latest example shows that attacks are becoming more and more frequent – and more sophisticated. The threat did not begin with the establishment of digital applications in this sector: Information systems (IT) and especially operational technology (OT) are also at risk. Their protection ensures the safety of people, systems and data. Siemens Energy is convinced that the only way to remain one critical step ahead is by taking immediate action.

Ahmed Bakr is a senior cybersecurity officer (CSO) based in the Saudi Arabian city of Jeddah. He and his colleagues support the various Siemens Energy Business Units and their customers in every aspect of cybersecurity. Services include critical asset identification, vulnerability management for IT applications and support for those responsible for industrial cybersecurity of Siemens Energy’s portfolio, which also covers the oil and gas business field. According to Bakr, “Oil and gas companies are targets of cyber

criminals. We all are. Their attacks are intended to target a company’s systems and inflict damage by compromising the availability, integrity, and confidentiality of data for example. Although awareness is growing, defence against cyberattacks will have to be taken even more seriously in the future.”

“Attackers are no longer limiting themselves to implanting malware.”

The case of Colonial Pipeline in the USA shows what a single attack can do. The company was forced to stop running the systems that operate its 5,500 mile pipeline. The economic damage was tremendous. The next cyberattack is on its way; the only question is when and how. “The oil and gas industry has to prepare right now,” Bakr says.

As early as 2017, the U.S. research institute Ponemon was commissioned by Siemens to conduct a survey of the oil and gas industry.

According to its findings, 68% of U.S. oil and gas cyber managers said that their organisation had experienced at least one loss of confidential information or disruption to operations in their OT environment over the past 12 months. At the same time, the study asserted that many of the organisations lacked awareness of the OT cyber risk.

## Cybersecurity can save lives

“Although the most common motive of cyber criminals is to make money, attackers are no longer limiting themselves to implanting malware. Some simply want to destroy systems and harm people. So it’s also a matter of protecting the physical operational technology,” Bakr comments.

For some time, people in the industry have been talking about one of the most dangerous attacks on industrial oil and gas facilities so far. According to an analysis by cybersecurity company FireEye, one of these attacks was not only planned to disrupt operations, but also to cause physical damage threatening human lives. But what is clear, according to Bakr, is that successful cybersecurity needs to be based on a so-called layered defense

approach to prevent the worst and save lives.

A layered defense, also called 'defense in depth', is a proven concept based on various types of overlapping cybersecurity controls. The idea is that if one control fails or gets bypassed by the attacker, another layer offers protection.

### Strict internal and external standards

As an experienced authority on the industry, Siemens Energy makes its comprehensive expertise available to the oil and gas industry to assist in its fight against cyberattacks. The company's offerings range from cybersecurity products and their implementation to consulting and training services as well as comprehensive cybersecurity solutions.

Having established its own robust in-house organisation to fight cyber criminality years ago, Siemens Energy now has more than 100 cybersecurity experts stationed worldwide who are directly supported by their colleagues in the various business areas known as Product and Solution Security Officers (PSSOs). The PSSOs are responsible for ensuring that products and solutions comply with global industry standards such as IEC 62443. This means that compliance with extremely high cybersecurity standards is constantly being promoted – beginning with development and throughout the entire value chain all the way to product hardening and cybersecure project execution. Suppliers and the company's partner network are also subject to strict requirements.

One of these requirements is cybersecure products. Another is the secure use of these products, for example, in oil and gas companies. Experts agree that technology companies should take more responsibility and become more involved in the deployment of solutions in the customer's environment. "We employ a variety of approaches to support our customers' cybersecure operations," says Bakr. "For example, our division Industrial Applications has achieved IEC 62443-2-4 certification in several locations for project execution processes to provide secure solutions."

“ Knowledge is an important key to an effective defence.”

However, some companies don't have any in-house cybersecurity processes, let alone a dedicated organisation, or else they have no qualified personnel. In these cases, they can purchase expert knowledge – including, of course, from Siemens Energy, whose goal is to become the world's most valued energy technology company. Upon request,



Image Credit: Siemens Energy

Ahmed Bakr (left), senior cybersecurity officer, Siemens Energy and Ahmed Khalifa (right), technical sales manager for Cybersecurity, Siemens Energy.

customers can be supplied with everything they need for cybersecurity structures and vulnerability or gap analysis, including measures and their implementation. This is called 'cybersecurity as a service.'

### Consulting and analysis

The first step is usually a consultation on the latest cyber threats, gateways, and potentially effective measures. Ahmed Khalifa is the company's technical sales manager for Cybersecurity. He and his colleagues are located in Dubai in the UAE.

"Many of the initial measures are easy to implement and aren't very expensive," says Khalifa. "For example, knowledge is an important key to an effective defence."

Knowledge lays the foundation for secure processes and successful access management, and it also raises the awareness of all personnel. In 2020, a study by Stanford University professor Jeff Hancock and the security company Tessian determined that 88% of data breaches are caused by employee error. This means that one of the greatest risks to cybersecurity – human error – can be prevented through training.

### Does digitalisation offer more benefits than risks?

One thing that the two cyber experts emphasise is that while the unstoppable growth of digitalisation can increase certain cyber risks, these risks are outweighed by the benefits for industry.

Khalifa notes, "Digitalisation, which is especially practical for the oil and gas industry, doesn't automatically mean operation in the cloud. For critical

infrastructures like oil and gas, it primarily means using digital applications to monitor physical assets such as gas compressors and offshore drilling equipment, with the goal of making the operation more efficient and cost-effective. We're able to protect these functions from cyber threats very effectively."

Whether it is from remote monitoring or predictive maintenance, reduced carbon emissions or optimised fuel consumption, useful data is only transferred in one direction, thanks to a Siemens Power Plant Automation (SPPA) unidirectional gateway that turns data highways into one-way streets. Data transfers in the opposite direction – in the direction of the plant – are absolutely impossible. The benefits for customers are a comprehensive overview of their systems' health status and automatic notification if any disruptions occur.

### Artificial intelligence protects against cyber crime

Digitalisation itself is one of the most effective weapons against cyber threats, and so is artificial intelligence (AI). AI is the basis for Siemens Energy's innovative Plant Security Monitoring. The company wants to use AI primarily to help small and medium-sized oil and gas companies protect their plants from cyberattacks. As Khalifa explains, "The Plant Security Monitoring algorithms study and learn a plant's 'normal' behaviour. Afterwards, if any deviations occur, the system records the abnormal behaviour and issues an alarm. This is how we make very effective use of every aspect of digitalisation's strengths – including and especially in the fight against cyber criminals and terrorists." ■

# Proactive maintenance of compressor systems

Rajesh Fotedar, product manager for Oil-free Industrial Compressors at CompAir, discusses why a proactive maintenance model – enabled by the IIoT – can deliver enhanced efficiencies and reduce risks for compressed air systems.

**W**ITH INDUSTRY AVERAGES suggesting energy costs account for more than 80% of the total cost of ownership of a compressor, any initiatives that can help companies identify inefficiencies and assist with performance optimisation, leak reduction and practical air management processes should be welcomed. The IIoT is without doubt, the greatest opportunity available today to help businesses work smarter.

Data analytics can help operators to understand how efficiently a compressor is running, and whether any improvements can be made. These insights will not only help highlight any potential issues now, but also enable operators to forecast any potential future problems too, based on deteriorating machine performance. Predictive maintenance models based on real-time data can then be established to help reduce energy consumption, improve process efficiencies, and mitigate any potential risks.

However, for a proactive maintenance model to realise its full potential, the right information must be provided at the right time. Proactive maintenance requires a proper plan of action and correctly defined interfaces.

## Enabling proactive maintenance

Along with cloud technology and software advances, sensors form the heart of the IIoT, helping owners and operators to better understand their systems. Developments in the field of sensor technology have resulted in more compact, intelligent, and cost-effective products.

Digital networking of these components in a system – which will typically cover a compressor, its filters, and downstream equipment like dryers – can minimise costs while ensuring any issues are tracked and identified quickly. Indeed, digital networking is a key factor when it comes to making savings. Not only does it influence and reduce energy and service costs, but it can also lead to greater reliability around a site's processes, as well as improved cost control.



Implementing a proactive maintenance model delivers a range of key benefits.

“Proactive maintenance requires a proper plan of action and correctly defined interfaces.”

Digital networking provides data relevant to wear, costs, and quality. Once the compressed air component is equipped with sensors and networked via the IIoT, it can share messages with those responsible for maintaining the system. This then provides them with precise information about when maintenance and inspections may need to be performed, or perhaps when a component has reached the end of its service life prematurely. This approach helps ensure

timely intervention, so any problems can be remedied quickly.

Operators will typically find that service requirements will mainly be based on two sets of criteria: either detailed information relating to the system itself, covering its functions and historical machine data or environmental factors, which might include weather conditions, room temperature and humidity. These sensors will report the status of the monitored systems in real-time, with defined parameters – such as temperature, speed, and humidity – observed and evaluated over a specific period, to help inform and contribute towards predictive analysis strategies.

## Reactive vs. proactive maintenance

Let's consider how a reactive approach to maintenance differs from a proactive strategy. In terms of notifications, for traditional ways of



working, a service engineer will only be notified when a problem arises. At this point, the problem has already occurred, and now must be resolved. With a proactive maintenance approach, temperature, infrared, vibration and sound alarms in the system monitor all the compressed air unit's functions and feed this data into the digital network. Service employees can monitor these developments, with warning signals able to make them aware of any upcoming maintenance work required.

In terms of servicing any problems, reactive service only takes place once it is too late. Therefore, the only option is to either replace the component or, in worst case scenarios, the machine itself. Both cases mean downtime for the business. In comparison, the IIoT provides connected services, so the health of a system can be monitored on an on-going basis. Should it

look like there might be a potential issue, this can be resolved before it becomes a problem, avoiding more costly repair measures.

The IIoT allows processes to be optimised, too. Optimisation before the IIoT was generally less targeted and more expensive to undertake. Elaborate test series and long planning phases could also have a negative effect on maintenance. In contrast, 24/7 IIoT capabilities ensure an enormous amount of data can be collected, helping owners and operators continuously improve the performance of their system. Modern IIoT software enables digital prototypes to be created, so this 'digital twin' of a compressed air system set-up can be tested under various parameters, without the need for time-consuming real-life testing.

### A smarter solution

Implementing a proactive maintenance model delivers a range of key benefits. First, maintenance can be undertaken in a timely manner, reducing the risk of downtime. Maintenance work can also be planned better, minimising the cost and time of unnecessary servicing. Spare parts management can be undertaken more intelligently as well, and the

system's performance will be optimised throughout its service life.

The advantages of a cloud-based IIoT platform for a compressed air system are numerous too. Not only does this approach save on hardware costs, but it means a site's IIoT platform can be easily developed and expanded to meet growing needs, software updates and cloud-based backups are progressed and created automatically, and data can be shared with ease.

It is no surprise high-quality energy and performance at a cost-effective price continues to be a key consideration for all businesses. The IIoT's ability to enable companies to monitor and analyse data every step of the way, then, is creating a real opportunity for compressed air users to consider how data can improve performance and help identify any inefficiencies. For those seeking a smart, proactive maintenance improvements, this is the most valuable means of evaluating compressed air generation yet available. ■

To find out more, please visit <https://www.compair.com/en-ae/about-us/news/whitepaper>

“The IIoT allows processes to be optimised, too.”

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# The critical role of flame detectors in fire suppression

Flame detectors are key to an effective fire suppression system, says Nishant Thankappan, business development manager - Analytical & Detection, Emerson Automation Solutions.

**M**ANY PLANTS AND facilities deal with large quantities of flammable and explosive liquids and gases that, even with the application of best practices, are prone to equipment and operator errors, causing leaks and resulting in fires.

The first step to battling a blaze is recognising when it is happening through selecting and applying the right detectors for spotting flames, with little to no false alarm conditions.

A flame detector that activates an automated fire suppression system can prevent potential incidents by cutting off the fuel source and extinguishing the fire to minimise equipment damage, personnel injury, and environmental impact.

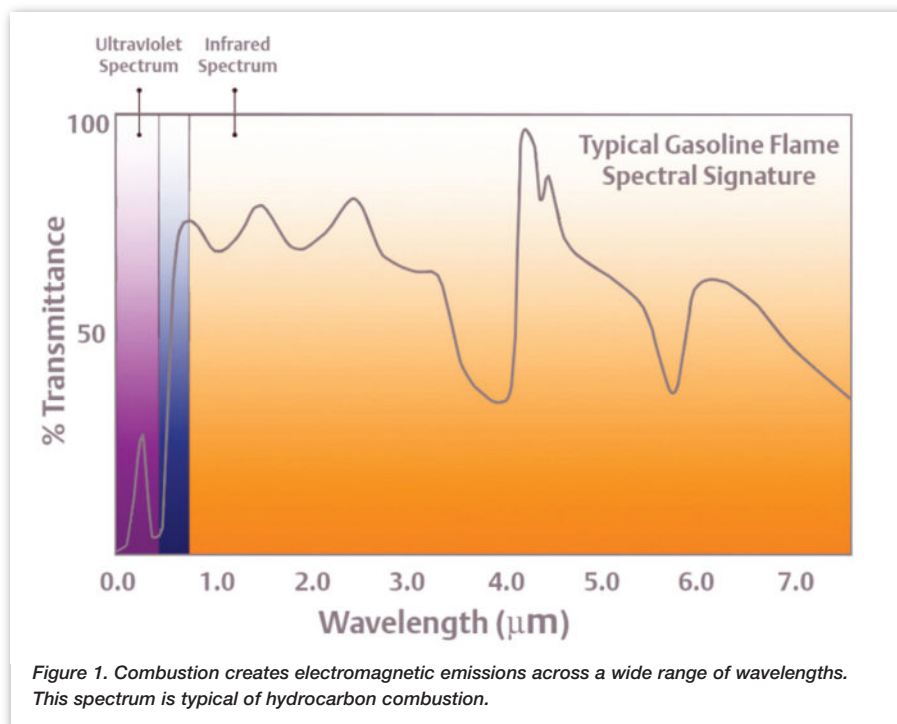
The flame detector also alerts first responder plant personnel to arrive at the scene promptly. Fire detection and prevention can be carried out immediately before incidents escalate with effective safety systems and personnel training. Plants of the past used to depend mainly on human operators to trigger firefighting efforts. Today, automated systems are considered a best practice in initiating efforts with improved flame detectors and fewer human operators.

Recognising flames is the fastest way to detect fire, as they form immediately upon initial gas or liquid combustion; however, doing this quickly and correctly proves to be a challenge.

## Detecting flames

Humans recognise flames through the light and heat they generate. However, different fuels burn differently, as alcohol burns almost invisibly compared to oil. Flame detectors can distinguish these differences (Figure 1) and identify hot emissions and products of combustions, radicals, and other by-products in the electromagnetic spectrum. When placed effectively, these can trigger a response in a matter of seconds.

Most products considered as combustible contain carbon, producing carbon dioxide as a primary effluent. However, other inorganic



products such as hydrogen, ammonia, metal oxides, and silane are not fuelled by carbon, but by hydrogen producing water vapour. Alcohols, hydrocarbons, and other fuels contain hydrogen and carbon, generating carbon dioxide and water vapour effluents.

Regardless of the fuel source, flames and the resulting hot gases generate electromagnetic radiation in a variety of wavelengths (see Figure 1) from ultraviolet (UV) through the visible spectrum and into infrared (IR). Hydrocarbon fire creates hot carbon

dioxide emissions at 135-260nm, detected by UV, and 4.2-4.5 µm (micrometers), detected by IR. Hot carbon dioxide has a strong peak at 4.2 – 4.5 µm, with hot water vapour at 2.7 µm. Flame detectors are typically designed to detect light emission at those wavelengths with intensity patterns common to open flames.

## Understanding flame detector technologies

There are four primary optical flame detector technologies depending on line-of-sight radiation:

- Ultraviolet (UV)
- Ultraviolet/infrared (UV/IR)
- Multi-spectrum infrared (MSIR)
- Visual flame imaging

Within the major categories, specific types vary according to application.

**UV detectors** respond to radiation in the

“Recognising flames is the fastest way to detect fire.”

0.18 – 0.26 μm range. They offer the fastest response and good sensitivity at comparatively short ranges (0 – 15 m for a 0.1 square meter heptane pool fire). The downside is their susceptibility to arc welding, halogen lamps, and electrical discharges such as lightning. They tend to be used indoors, but thick, sooty smoke can cause failures due to attenuation from UV radiation.

**UV/IR hydrogen detectors** combine a UV optical sensor (0.18 – 0.26 μm range) with an IR sensor (2.7 – 3.0 μm range) designed to detect water vapour from hydrogen and hydrocarbon combustion. The combined UV/IR flame detector mitigates the drawbacks of a straight UV detector so it can be used outdoors, but with a slightly slower response time. As with UV detectors, the detection range may be reduced by heavy smoke.

**SIR multi-spectrum hydrogen detectors** zero-in on infrared spectral regions at 2.7 – 3.0 μm and 4.2 – 4.7 μm to detect water and carbon dioxide emissions. The hot water band is particularly useful for detecting hydrogen fires, the flames of which are practically imperceptible in the visible light range. This type has a long range and high immunity to smoke and false alarms.



The Rosemount 975UF flame detector.

**MSIR multi-spectrum hydrocarbon detectors** concentrate on a wide infrared band to detect carbon dioxide emissions produced by hydrocarbon fires but with no sensitivity to water vapour. This type can detect fuel and gas fires at long range and has high immunity to false alarms, but cannot recognise hydrogen fires.

**Visual flame detectors** employ a charged couple device (CCD) image sensor and flame detection algorithms. The imaging

algorithms process live video images from the CCD array and analyse the shape and progression to discriminate between flame and non-flame sources. Unlike IR or UV flame detectors, CCTV visual flame detectors do not depend on emissions from carbon dioxide, water, and other combustion products to detect fires, nor are they influenced by fires' radiant intensity. Visual flame detectors cannot detect flames invisible to the naked eye, such as those produced by hydrogen fires. Heavy smoke also impairs their capacity.

Emerson's Rosemount 975 Flame Detector family offers a wide range of sophisticated flame detectors. Rosemount 975MR Multi-Spectrum Infrared detects hydrocarbon fuel and gas fires at long distances and provides the highest immunity to false alarms. Rosemount 975HR Multi-Spectrum Infrared for Hydrogen offers the combined capability to detect hydrocarbon and hydrogen fires. Rosemount 975UR Ultraviolet Infrared Dual UV and IR detector is suitable for detecting flames produced by clean-burning hydrocarbon fuels. Rosemount 975UF Ultra-Fast Ultraviolet Infrared detects hydrocarbon fires plus hydroxyl, hydrogen, metals, and other inorganic fuels. ■

Image Credit : Emerson Automation Solutions

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# Unlocking new value opportunities in the energy system

ADIPEC returns to the Abu Dhabi National Exhibition Centre as an in-person event from 15-18 November, providing eagerly anticipated opportunities to reconnect, establish business relationships, gain exposure to the latest technologies and debate industry challenges in the transition to a net-zero energy world.

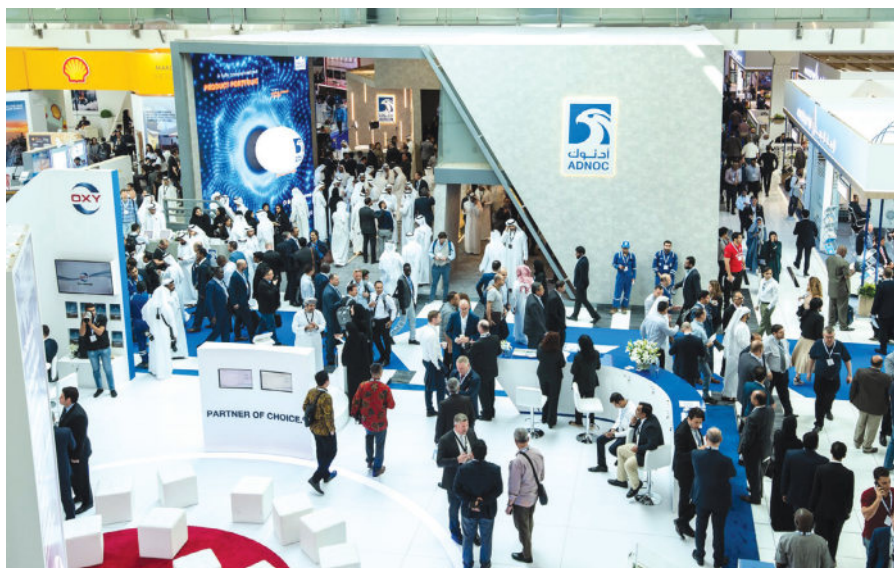
**H**OSTED BY THE Abu Dhabi National Oil Company (ADNOC), ADIPEC is the world's most influential meeting place where oil, gas and energy companies and professionals will convene in-person, safely and securely, to engage and identify the opportunities that will unlock new value in an evolving energy landscape.

The exhibition provides opportunities for buyers and sellers to meet, learn, network, do business and discover new products, solutions and technologies from more than 2,000 exhibiting companies, which include more than 51 NOCs, IOCs and IECs from around the world, along with 26 international country pavilions, providing a world-class environment for trade across the industry's full value chain.

## New Smart Manufacturing Zone

This year sees the launch of the Smart Manufacturing Zone, which bridges the gap between energy, manufacturing and high tech sectors to accelerate economic development and diversification. This will feature products, solutions and technologies from exhibitors across core event sectors, including Materials Management 4.0, Industrial Internet of Things (IIoT), Supply Chain and Logistics, Computer-aided Manufacturing, and many more. It will provide a unique platform for the manufacturing industry to gain insights into the energy transition and identify the

“The Strategic programme will provide an unparalleled opportunity to gain unique insights into how the industry has responded to the challenges of Covid-19.”



ADIPEC returns as an in-person event in November.

challenges and opportunities for manufacturing in the drive to net-zero carbon energy.

Returning this year are the Offshore and Marine Zone focusing on the offshore, marine, maritime, shipping and logistics sector; and the Digitalisation in Energy Zone, a global showcase of the technological solutions that can help the industry unlock untapped value as digitalisation becomes more deeply integrated into all aspects of operations.

The conference programmes provide both strategic and technical insights as more than 1,000 leading Ministers, CEOs, policy makers and influencers debate and share their insights on the latest developments that shape the industry across the strategic programme, and more than 800 technical experts from around the world, deliver 127 sessions across four days of business critical knowledge exchange.

## Strategic programme

The ADIPEC 2021 Strategic Programme will provide attendees with an unparalleled

opportunity to gather and gain unique insights into how the energy industry has responded to the challenges of Covid-19, and how it is adapting more broadly in the face of accelerated energy transitions, growing global ambitions for sustainable integrated energy value chains and net-zero emissions.

Through a series of panels, interviews, debates, keynote addresses, live studio commentary and live sessions ADIPEC will gather leaders from industry, government, finance and technology to share perspectives on the fast pace at which the energy landscape is changing and discuss crucial industry topics, such as changing energy demand dynamics, the impact of new technology, shifts in government policy, and the different needs and specific energy solutions that are required to succeed and pivot in the emerging global energy ecosystem.

Taking place immediately after COP26, ADIPEC 2021 is positioned to be the global forum to discuss the key debates and

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# UNLOCKING NEW VALUE OPPORTUNITIES IN THE ENERGY SYSTEM

The ADIPEC 2021 Strategic Programme will provide attendees with an unparalleled opportunity to gather and gain unique insights into how the energy industry has responded to the challenges of COVID-19, and how it is adapting more broadly in the face of accelerated energy transitions, growing global ambitions for sustainable integrated energy value chains and net-zero emissions.

## STRATEGIC CONFERENCE THEMES:

- New market dynamics in a changing energy world
- Fueling the future: the new energy agenda
- Building the energy company of the future: new business models and investment flows
- Transformational technologies: unlocking the engines of change
- Dedicated hydrogen sessions throughout the four day conference

*Taking place immediately after COP26, ADIPEC 2021 is positioned to be the global forum to discuss the key decisions of the climate meeting.*

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decisions of the climate meeting, and how they will shape the strategic and policy environment for the energy industry as it pivots to deliver net-zero energy. It focuses four major themes that will provide insights and answers to the questions facing the energy industry today and in the years, ahead:

- New market dynamics in a changing energy world
- Fueling the future: the new energy agenda
- Building the energy company of the future: new business models and investment flows
- Transformational technologies: unlocking the engines of change.

Speakers include H.E. Dr. Sultan Ahmed Al Jaber, Minister of Industry & Advanced Technology, UAE and managing director and Group CEO, ADNOC; H.E. Suhail Mohamed Faraj Al Mazrouei, Minister of Energy and Infrastructure, UAE; and energy ministers and deputy ministers from Bahrain, Iraq, Nigeria, Sierra Leone, Sri Lanka and Russian Federation.

This year's Strategic Conference will include dedicated hydrogen sessions,



*HE. Dr. Sultan Ahmed Al Jaber, Minister of Industry & Advanced Technology, UAE & managing director and Group CEO, ADNOC will give a keynote address at ADIPEC.*

providing key insights from the industry leaders at the forefront of the hydrogen industry. Discussions will include new business models and strategies required to unlock, create and maximise value from hydrogen's potential as a future clean energy source. As a highly flexible energy carrier, hydrogen can potentially deliver a holistic, clean, integrated and multi-sector systems approach to energy that could contribute decisively to solving energy's environmental issues and securing net-zero targets.

Also returning this year will be the Technical Conference; Leadership Roundtables; Offshore and Marine conference; and Forum for Diversity, Equality and Inclusion.

Other features returning this year include Young ADIPEC, designed to attract the youth into the industry and highlight the career opportunities in the energy sector; the ADIPEC Awards; and the Middle East Energy Club. ■

[www.adipec.com](http://www.adipec.com)

Image Credit: ADNOC

## ADIPEC Awards finalists announced

The ADIPEC Awards honour projects, innovators and ideas at the forefront of the energy industry's transformation as it responds to the accelerating demand for sustainable energy. More than 700 entries from more than 50 countries were received for the 2021 Awards. Finalists are as follows:

### BREAKTHROUGH RESEARCH

- ADNOC & MicroSilicon: Real-time asphaltene detection sensor using Quantum RF: A paradigm shift making reactive processes
- Saudi Aramco: Saudi EXO-STORM technology to enhance oil production
- Shell Catalyst & Technologies: Shell Blue Hydrogen process

### BREAKTHROUGH TECHNOLOGICAL PROJECT

- ADNOC: Non-metallics: Disruptive materials for longer assets life cycle
- L&T Hydrocarbon Engineering: Implementation of full automation in Haliba Development Project – the first ever in GCC
- Shell: Robust well location optimisation technology

### DIGITAL TRANSFORMATION PROJECT

- ADNOC: Thamama Center – The Digital Transformation Hub of ADNOC Upstream
- ADNOC: 10x-Portfolio optimisation & opportunities - maximise asset value from existing resources
- Saudi Aramco: Futuristic technology powering the world's largest intelligent oil field

### SOCIAL CONTRIBUTION AND LOCAL CONTENT PROJECT

- OMV Petrom: Romania plants for tomorrow
- OMV Petrom: Oilmen's School
- Saudi Aramco: In-Kingdom Total Value Add Program (iktva)

### OIL AND GAS INCLUSION AND DIVERSITY COMPANY

- ADNOC: ADNOC Onshore Diversity & Inclusion: Powering innovation & sustainability for competitive advantage
- ADNOC: THRIVE Culture Program - A collaborative, cross

functional program for a thriving Bourouge

- Emerson Automation Solutions: Emerson's diversity & inclusion programmes and Initiatives

### YOUNG TECHNICAL PROFESSIONAL

- ADNOC: Fatima Yousif Al Suwaidi
- Saudi Aramco: Mohammad Aljubran
- Saudi Aramco: Bashayer Aldakkan

### INNOVATION IN DECARBONISATION COMPANY

- Baker Hughes: Baker Hughes, Taking Energy Forward: Our decarbonisation story
- Saudi Aramco: Innovation in decarbonisation
- Siemens Energy: Innovating the energy transition: Forging a net-zero future from fossil fuels to renewables

### OIL AND GAS START-UP COMPANY

- DAMORPHE INC: DAMORPHE, an innovative technology start-up
- Data Gumbo: Data Gumbo to lead smarter, faster, leaner and greener future for oil & gas
- ResFrac Corporation: ResFrac evolving the modelling landscape to support a culture of continuous improvement

### OPERATIONAL EXCELLENCE COMPANY

- ADNOC: Thinking differently to a post-pandemic future to exceed operational excellence during COVID-19
- OMV New Zealand Ltd: The rise of the digital twins and augmented reality - delivering on the promise of remote operations
- Saudi Aramco: Resilience in the face of adversity at Khurais Producing

The winners will be announced at the Awards ceremony on 15 November 2021 in Abu Dhabi.

## Partnership to demonstrate CCS monitoring solutions

LYTT, A PROVIDER of real-time operational insights to oil and energy operators through a fibre optic sensor and analytics platform, and SINTEF, an independent institute for applied research, are collaborating to demonstrate the effectiveness of novel technology to monitor CO<sub>2</sub> transport and migration in storage reservoirs.

Carbon Capture and Storage (CCS) will be a vital tool for keeping global carbon emissions to a minimum and even provide net CO<sub>2</sub> removal. A key area of focus is demonstrating the permanent effectiveness of CCS solutions.

Although CCS technology has existed since the 1980s, CCS is not being as widely or as quickly adopted as it needs to be to support decarbonisation. Onshore as well as offshore facilities need to be developed, requiring broader trust in the safety of CCS.

SINTEF and LYTT have, through their long-term collaboration, developed and validated the latter's cost-efficient analytics technology applied to distributed acoustic sensing (DAS) of oil and gas wells. This was based on extensive laboratory testing at SINTEF's Multiphase Flow Laboratory.

LYTT and SINTEF found tracking dynamic multiphase flow to be a key issue when monitoring the long-term effectiveness of CCS solutions. For underground storage of CO<sub>2</sub>, understanding the storage site is crucial. However, the collaborators have highlighted that following the journey of CO<sub>2</sub> from ground level to storage, such as during injection, is also critical and can be realised through investment in innovative subsurface intelligence gathering tools.

Christian Brekken, project manager at SINTEF Multiphase Flow Laboratory, said, "CCS will play an increasingly important role in facilitating a low carbon society as the 2050 deadline draws closer. Working to accelerate the adoption of CCS is, therefore, a critical piece of the emissions reduction puzzle, and advances in monitoring will help build trust in the technology to pave the way for a net zero future."

Nils Røkke, executive vice president Sustainability, SINTEF, added, "The CCS market must scale by the hundreds by 2050 to limit the effects of the climate crisis. Storage capacity will be needed at scale and in different geological settings – both offshore and onshore."



Onshore as well as offshore facilities for CCS need to be developed.

Image credit: Adobe Stock

Tommy Langnes, co-founder, LYTT, concluded, "The possibilities of CCS have been opened up due to innovations in oil and gas. LYTT's offering centres on a framework of novel fibre optic sensor feature extraction and pattern recognition algorithms which have been industrially proven to help improve operational efficiency, reduce cost and manage risk. LYTT is working to develop a CCS monitoring solution to ensure the integrity and performance of CCS systems, monitor containment and de-risk the process."

## The benefits of custom pressure measurement solutions

THE KELLER STANDARD product catalogue covers most areas of application for pressure measurement technology. However, there are often great benefits to optimising pressure sensors specifically for use and integration into higher-level complete systems.

KELLER's modular product design offers great flexibility and allows customer-specific adaptations to be made without causing soaring costs – even for small production runs.

### Sharing expertise to create the perfect sensor solutions

KELLER has been carrying out countless challenging projects in the field of piezoresistive pressure measurement technology for almost 50 years. Even applications that may appear trivial at first glance can prove highly complex upon closer analysis. By taking the actual usage conditions of the sensor into consideration right from the outset, we can achieve major improvements in effectiveness and durability. A mutual exchange of expertise with our customers is therefore central to our success. Sharing our knowledge is what enables us to find the best sensor solution.

### The stages of creating a tailored customer-specific solution

1. Define basic sensor specifications in order to select the appropriate components
2. Assess the environmental conditions to determine the appropriate design for the intended location
3. Design the requested customer-specific solution taking all standards and laws into account
4. Assemble the electronic modules, taking into account application-specific customer requests
5. Configure electrical interfaces and connections
6. Custom product labelling with laser engraving or labels

The «Custom Solutions» product category on the KELLER website now features everything you need to know about the possibilities and requirements for customer-specific product solutions involving pressure measurement technology.

[keller-druck.com/custom-solutions](http://keller-druck.com/custom-solutions)



Image credit: KELLER AG

KELLER AG is at the forefront of piezoresistive pressure measurement technology.

## SafeSTS and Gail Thomson unveil emergency release system

SAFESTS AND GAIL Thomson have collaborated to produce a new ship-to-ship emergency release system for offshore use.

The system is designed for 'Vision Zero' crude oil ship-to-ship operations, to mitigate risks to crew at mooring stations and hose manifolds from uncontrolled breakaways.

In the oil ship-to-ship transfer industry, cargo transfer operations are currently carried out with no passive or active protection- Camlock fittings allow for a quicker manual disconnection, but problems and risks still remain in emergency disconnection situations.

The new system aims to solve loss and risk issues with a quick and automatic release solution to be utilised in emergency situations.

Utilising the flip-flap marine breakaway coupling technology, the PTX offers rapid and safe on-demand release within the marine hose transfer system, safeguarding offshore oil transfer operations against emergency scenarios.

Captain Robert Gilchrist, marine director of SafeSTS, said, "The PTX is a step-change in the STS transfer market, and this innovation supports our strategy for 'Vision Zero' whereby the overall system protects itself against critical incident to people or the environment in the event of breakaway.

"Safety is not always free, but it does not have to be expensive, and investment needs to continue into ways to reduce incidents, and the consequences of incidents, in an STS environment."

The PTX can be installed directly over the vessel's manifold drip tray, minimising the risk of spills and providing 100% leak-tight shut off following closure, protecting the environment, surrounding machinery, and operators and staff from possible damage from spills.

Gail Thomson's business development director, Fred Boufennane commented, "We are delighted to bring the PTX to market in conjunction with SafeSTS. It is yet another example of the on-going Gail Thomson research and development programme delivering solutions based on the evolution of proven technology combined with real-world experience."

The PTX's ultra-compact system includes its own hydraulic power unit (HPU) and reset skid.

"Going forwards, adoption of the PTX allows it to be demonstrated to all relevant stakeholders, from the owners of the cargo and the vessels to the local regulatory authorities, that the operator has taken all reasonable steps to ensure the highest level of safety and environmental protection."

"The PTX is exclusively offered into the offshore STS market by SafeSTS from where full details are now available," concluded Boufennane.



Image Credit: SafeSTS/Gail Thomson

The new system offers rapid and safe on-demand release.

## Inmarsat reports rapid levels of industrial IoT maturity in 2021

IN A NEW report entitled 'Industrial IoT in the Time of Covid-19', Inmarsat, the global mobile satellite communications leader, reveals a significantly rapid increase in the maturity level of industrial Internet of Things (IoT) usage across the oil and gas sector, especially since the start of the Covid-19 pandemic.

Respondents, which were comprised of exploration, extraction and distribution businesses, on the whole reported that Covid-19 only exacerbated the importance of IoT technologies to their operations, with many accelerating planned IoT deployments in response to the pandemic and the technical difficulties it proposed.

Inmarsat's research recorded a huge level of progress between 2020 and 2021 amongst the oil and gas sector. 74% of all business respondents reveal they have now fully deployed at least one IoT project, of which 44% achieved this in the 12-month period from Q2 2020.



Image Credit: Adobe Stock

Oil and gas respondents to Immersat's survey reported that the pandemic exacerbated the importance of IoT technologies to their operations.

Of the remaining 26% of respondents that have not yet adopted IoT, all of those surveyed confirmed they are currently trialling some form of the technology, or plan to deploy or trial at least one IoT project within the next two years.

A further 81% of the survey's respondents indicated their intention to accelerate IoT adoption in response to the challenges which arose due to Covid-19. Of this figure, 51% comprises businesses who have already accelerated the IoT adoption, with 17% planning to accelerate it within the next 12 months and 13% who intend to accelerate deployment beyond this period.

Inmarsat's market development specialist, Damian Lewis, said of the acceleration of IoT in the oil & gas industry, "The oil and gas sector has a history of innovation, and our research reveals that the pace of IoT adoption in the industry has significantly increased as a result of the pandemic. The sector is now relatively advanced in its adoption of IoT, demonstrating the importance businesses are attributing to the technology as a way to respond to both Covid-19 and wider industry challenges.

The 51% of businesses that have already accelerated their IoT adoption are less likely to state that the pandemic has negatively impacted their ability to operate, proving the link between the rise of IoT and business continuity during the pandemic.

"In a sector where so much activity takes place in some of the world's most remote and inhospitable conditions, this accelerating rate of IoT adoption reflects the need that oil and gas businesses have to increase their ability to monitor, manage and automate remotely," added Lewis.

More than half of respondents in the sector indicated that the business and operational challenges faced during the Covid-19 pandemic have underlined the importance of the Internet of Things.



# Pipe for gas applications

SoluForce, the leader in Flexible Composite Pipe (FCP) solutions, has developed special extensions to its portfolio for a wide range of gas applications.

**G**AS TRANSMISSION PIPELINES, bringing gas from remote locations to market, are a major focus of the oil and gas industry, increasing the importance of short- to long-distance natural gas transportation using 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.

SoluForce, the leader in Flexible Composite Pipe (FCP) systems, has developed special extensions to its portfolio for a wide range of gas applications, from wet gas directly from a well, to the transportation of gas from marginal fields.

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'.

All types of polymers show permeation of light hydrocarbons and gas. Small volumes of



*The SoluForce Classic Gas Tight pipe.*

Image Credit: SoluForce

gas and hydrocarbons can permeate through the polymer of a thermoplastic pipe. Obviously this is something that needs to be avoided.

SoluForce found the perfect material to stop permeation through the SoluForce pipe wall. A very thin layer of aluminium is wrapped around the inner liner pipe, resulting in the industry's only true gas-tight high pressure flexible pipe. Furthermore, 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 aluminium with HDPE. Therefore, even though the Gas Tight pipe system has a metallic layer embedded 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.

## 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. 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:

<https://www.soluforce.com/product-overview/pipe-types/gas-tight.html>

Follow the SoluForce LinkedIn page at:

<https://www.linkedin.com/company/soluforce/>



*SoluForce has addressed the demand for a flexible non-metallic pipe to transport gas.*

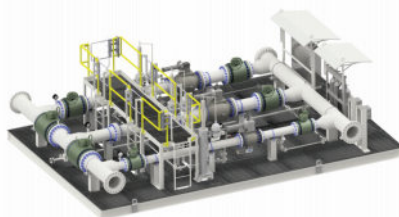
Image Credit: SoluForce

## New surge relief solution

THROUGH ITS M&J Valve brand, Celeros Flow Technology has developed a patented surge relief solution that reacts to unexpected pipeline pressure surge events in a rapid and efficient manner.

This solution integrates the DANFLO surge relief valve into a fully skidded surge relief system that provides protection against dangerous pressure spikes in piping systems and pipeline surges. DANFLO surge relief valves are rated ANSI 150-900 and essentially comprise a dynamically balanced plug assembly that slides back and forth easily to rapidly open, close and throttle.

DANFLO valve technology is used in the M&J Valve rate-of-rise surge relief system. This innovative design combines a surge pressure relief valve with a predictive pressure rate-of-rise system to allow preventive action against a developing surge event. To predict the rate of rise of the system pressure, the M&J Valve surge relief solution utilises a differential pressure pilot valve. This additional pressure control is constantly monitored and, upon reaching a pre-set limit, will trigger the main surge relief valve to open. As the surge dissipates, the valve closes without slamming shut.



The surge relief system.

Image credit: Celeros Flow Technology

## Sonardyne unveils new model of its navigation platform

SONARDYNE HAS INTRODUCED a range-topping model of its hybrid, underwater and surface vehicle navigation platform, SPRINT-Nav Mini.

The new Navigator version extends the capability of the Guidance model introduced last year, by calculating and providing the position of a remote, autonomous or piloted underwater vehicle, or uncrewed surface vessel, in addition to its velocity, depth and attitude.

SPRINT-Nav Mini is engineered to provide accurate, precise and robust guidance, and also survey and inspection capabilities, for vehicle platforms that would normally not be able to host high-end navigation systems. These include observation-class ROVs, low-logistic AUVs, manned submersibles, swimmer delivery vehicles and USVs operating in shallow waters.



Image credit: Sonardyne

**Sonardyne's SPRINT-Nav Mini expands the horizons for underwater robotics.**

With field-proven technology transferred from Sonardyne's popular SPRINT-Nav product line, the Mini family combines an INS, AHRS, pressure sensor and 500 kHz DVL in a single subsea housing that is just 215 mm high, 149 mm in diameter and as little as 0.7 kg in water.

SPRINT-Nav Mini continues to work even in challenging environments, such as around surface structures and GNSS denied environments, providing a continuous stream of latitude and longitudes, orientation, velocities, depth and altitude at up to 200 updates per second to a vehicle's primary control system. It is available in 300m and 4,000m depth options.

Business development manager, marine robotics at Sonardyne, Aidan Thorn, said, "This new flagship model will enable vehicle manufacturers and operators to enjoy all the benefits of Doppler inertial navigation from a single instrument."

## Yokogawa upgrades safety monitoring software

YOKOGAWA ELECTRIC CORPORATION has announced a major upgrade to its Exaquantum Safety Function Monitoring (SFM) software, an OpreX asset operations and optimisation solution that helps identify whether actual operating performance meets safety design targets. The new upgraded software, SFM R3.35, provides continuous monitoring and evaluation of safety data to highlight deviations or failures in plant safety system performance.

Already in use across the globe in industries such as oil and gas, SFM collects all safety-related data to track and analyse key performance metrics, including safety instrumented function (SIF) activations and maintenance (proof testing), independent protection layers (IPLs), and initiating causes and overrides. This new version now supports the International Electrotechnical Commission (IEC) 61511 standard, a regulatory standard for functional safety in the process industry, and includes several new features to help SFM users identify potential safety issues, optimise maintenance activities, and improve overall safety solution design.

SFM assists plant managers by identifying any potential safety issues, reducing unnecessary maintenance activities and improving the overall safety solution design.

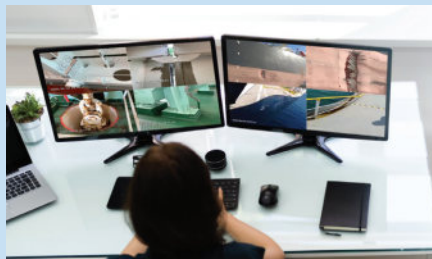
## LR and Inmarsat collaborate on remote inspection solution

LLOYD'S REGISTER (LR) AND Inmarsat have announced an industry-first collaboration between a satellite communications provider and classification society to provide a connectivity solution that will address challenges experienced during remote surveys.

The new solution uses LR Remote, a specifically engineered application for remote inspection that enables crew members to livestream video, photos and audio from on board a ship to an LR technical specialist located elsewhere. It will be empowered by Inmarsat's certified application provider (CAP) dedicated bandwidth service called Fleet Connect, available on the Fleet Xpress digital platform.

Fleet Connect provides an uninterrupted dedicated satellite link between vessels and seafarers, offering users function-specific bandwidth that is independent of business-critical vessel operations or crew communications. With no additional communication hardware required, the separation allows LR Remote to be enabled remotely without any intervention on-site. It can increase the potential of remote surveys on vessels, with flexibility and 24/7 availability enabling surveyors to perform surveys efficiently using a blend of techniques.

This collaboration follows increased uptake in remote services throughout the COVID-19 pandemic as access to ships and assets became more challenging.



A remote survey in action.

Image credit: Lloyd's Register

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# Project Databank

Compiled by Data Media Systems

## OIL, GAS AND PETROCHEMICAL PROJECTS, KUWAIT

Project Name	City	Facility	Budget (US\$)	Status
KNPC - Clean Fuels Project - Overview	Various	Petroleum Oil Refinery	13,800,000,000	Commissioning
KIPIC - Al Zour New Refinery - Overview	Al Zour	Petroleum Oil Refinery	13,400,000,000	Commissioning
KIPIC - Al Zour New Refinery - Package 4 - Tankage	Al Zour	Storage Tanks	1,600,000,000	Construction
KIPIC - The Petrochemical Refinery Integration Project (PRIZe)	Al Zour	Polyethylene, Polypropylene	8,800,000,000	FEED
KOC - Water Management Project - Overview	Various	Gathering Centre	681,000,000	Commissioning
KOC - Water Management Project - Gathering Centers 3, 4, 7, 21	South Kuwait	Gathering Centre	245,000,000	Construction
KOC - Southeast Kuwait BS-140 & BS-150 Upgrade	Southeast Kuwait	Gas Processing	300,000,000	FEED
KOC - Jurassic Production Facilities (JPF-4 & JPF-5) - Overview	Northern Kuwait	Oil Production, Gas Production	1,884,000,000	Engineering & Procurement
KOC - Jurassic Production Facilities (JPF) - JPF-4 and JPF-5	Northern Kuwait	Oil Production, Gas Production	980,000,000	EPC ITB
KOC - Kuwait Bay Exploration	Various	Exploration	904,500,000	Engineering & Procurement
KOC - Installation Of New Desalter Trains At GC-9, GC-10, GC-19 & GS-21	Various	Crude Oil Distillation Unit	250,000,000	Construction
KOC - West Kuwait BS-171 Gas Sweetening Facility	West Kuwait	Gas Processing	300,000,000	Feasibility Study
KOC - Jurassic Production Facilities (JPF) - JPF-4 & JPF-5 Off-Plot Works	Northern Kuwait	Oil Production, Gas Production	884,000,000	Engineering & Procurement
KOC - North Kuwait Manifold Gathering System for Gathering Centers (GC) 29, 30, 31	Northern Kuwait	Gathering Centre	2,500,000,000	Construction
KNPC - Mina Abdulla Debottlenecking of Coker Unit 20	Mina Abdullah	Petroleum Oil Refinery	93,700,000	Commissioning
KOC - North Kuwait Gathering Center (GC) 32	Northern Kuwait	Gathering Centre	1,650,000,000	Construction
KGOC - Al Khafji Gas and Condensate Export Pipeline - Phase 2 - Second Pipeline	Al-Khafji	Gas Pipeline		Project Announced
KOC - New Strategic Gas Export Pipeline From North Kuwait To Mina Al-Ahmadi Refinery	Northern Kuwait	Seamless, Gas Pipeline	480,000,000	Construction
KOC - Water Management Project - Gathering Centers 6, 8,11, 19	Southeast Kuwait	Gathering Centre	240,000,000	Commissioning
KOC - Water Management Project - Gathering Centers 9, 10,20, 22	East Kuwait	Gathering Centre	196,000,000	Construction
KNPC - New Local Marketing Depot At Matlaa Area	Northern Kuwait	Storage Tanks	1,040,000,000	FEED
KGOC - Al Khafji Gas and Condensate Export Pipeline	Al-Khafji	Seamless, Gas Pipeline	2,100,000,000	Construction
KOC - Al Zour New Refinery Crude Oil Pipelines	Ahmadi	Welded, Pipeline	845,000,000	Construction
KOC - New 48" Crude Transit Line From North Kuwait To CMM (TL-5)	Northern Kuwait	Welded, Pipeline	395,000,000	Commissioning
KIPIC - Al Zour New Refinery - Package 2 - Support Process Plant	Al Zour	Petroleum Oil Refinery	3,800,000,000	Construction
KIPIC - Al Zour New Refinery - Package 3 - Utilities and Offsites	Al Zour	Offsites & Utilities	2,100,000,000	Construction
KOC - Wara Pressure Maintenance Project - Train 3	Southeast Kuwait	Oil Field Development	187,000,000	Construction
KNPC - Mina Al Ahmadi Refinery Fifth Gas Train	Mina Al Ahmadi	Gas Processing	1,500,000,000	Construction
KIPIC - Al Zour New Refinery - Package 5 - Marine Facilities	Al Zour	Petroleum Oil Refinery	1,550,000,000	Construction
KOC - Jurassic Production Facilities Off-Plot Works	Northern Kuwait	Oil Field Development	254,000,000	Construction

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# Project Databank

Compiled by Data Media Systems

## Project Focus

Compiled by Data Media Systems

### KIPIC - Al Zour New Refinery - Package 4 - Tankage

<b>Name of Client</b>	Kuwait Integrated Petrochemical Industries Company (KIPIC)
<b>Estimated Budget (US\$)</b>	1,600,000,000
<b>Facility Type</b>	Storage Tanks
<b>Sector</b>	Oil Refining
<b>Status</b>	Construction
<b>Location</b>	Al Zour
<b>Project Start</b>	Q4-2004
<b>End Date</b>	Q4-2021
<b>FEED</b>	Fluor Corporation
<b>PMC</b>	Wood
<b>Main Contractor</b>	Saipem, ESSAR
<b>Contract Value (US\$)</b>	1,570,000,000
<b>Award Date</b>	Q3-2015

### Background

The Al-Zour new refinery is key to Kuwait's hopes of meeting growing power demand. The 615,000 bpd facility will supply 225,000 bpd of low-sulphur fuel oil for power generation. The scheme will be one of the largest single-phase refineries ever built. The project has been tendered twice before, only to be awarded and cancelled before construction could begin. The refinery will ultimately provide low sulphur fuels to power stations. The five packages are as follows: Package 1 (Main Process Plant), Package 2 (Support Process Plant), Package 3 (Utilities & Offsites), Package 4 (Tankage), Package 5 (Marine Facilities).

### Project Status

Date	Status
Aug 2021	The implementation of the package faces several complications related to tanks. KIPIC is making every effort to speed up the project work.
Aug 2020	Dome roof installation for the tanks is underway.
Jul 2020	Due to COVID-19, the commissioning of the package (Package 4) has been pushed back.

### Project Scope

The project scope includes:

- Construction of a tank farm
- 28 fixed-roof tanks
- Two dry slop tanks, each with a capacity of 200,000 barrels
- Two wet slop tanks, each with a capacity of 67,000 barrels
- A plant fuel oil tank with a capacity of 100,000 barrels
- A continuous flushing oil tank with a capacity of 10,000 barrels
- An intermittent flushing oil tank with a capacity of 50,000 barrels
- Four crude pipelines
- Two imported fuel gas lines
- Two low sulphur fuel oil lines
- Road works
- Associated facilities

### Project Finance

Kuwait National Petroleum Company (KNPC) is setting up a new company to run the Al Zour New Refinery called KRBC.

## 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	AUGUST 2021			VARIANCE		JULY 2021		
	Land	Offshore	Total	From August 2020	From July 2021	Land	Offshore	Total
<b>Middle East</b>								
ABU DHABI	24	13	37	-14	-6	30	13	43
DUBAI	0	0	0	0	0	0	0	0
IRAQ	41	0	41	+12	0	41	0	41
KUWAIT	26	0	26	-17	+2	24	0	24
OMAN	43	0	43	-1	0	43	0	43
PAKISTAN	16	0	16	+1	0	16	0	16
QATAR	2	8	10	+3	+1	1	8	9
SAUDI ARABIA	52	6	58	-25	+1	51	6	57
YEMEN	1	0	1	0	0	1	0	1
<b>TOTAL</b>	<b>205</b>	<b>27</b>	<b>232</b>	<b>-41</b>	<b>-2</b>	<b>207</b>	<b>27</b>	<b>234</b>

### North Africa

ALGERIA	24	0	24	-6	+3	21	0	21
EGYPT	22	5	27	0	0	24	3	27
LIBYA	13	0	13	0	-1	14	0	14
TUNISIA	0	1	1	0	0	0	1	1
<b>TOTAL</b>	<b>59</b>	<b>6</b>	<b>65</b>	<b>-6</b>	<b>+2</b>	<b>59</b>	<b>4</b>	<b>63</b>

Source: Baker Hughes

ينتقلوا من منطقة إلى أخرى، خاصة في عالم العقود قصيرة الأجل. كما يقوم بإنشاء نقطة اتصال واحدة للعميل، بغض النظر عن مكان تشغيل أصوله، ويوفر الوصول إلى مخزون من قطع الغيار الموجودة عبر شبكة من القواعد.

## شراكة ذات مضمون حقيقي

ربما يكون هناك عائد آخر من اتباع هذا النهج. وهو يقع في سياق الاستنزاف المعترف به جيدا للخبرة والمعرفة من قطاع الحفر، حيث يُنظر إليه على أنه يتجاوز سنوات الذروة. فمع تبسيط أطقم الحفارات واتخاذ «كبار المتمرسين» خيار التقاعد بشكل متزايد، وبما أن الشباب الذين يدخلون الصناعة لم يعودوا قادرين على الاستفادة من معرفتهم وآرائهم، فمن المعروف أن فجوة المعرفة الناتجة عن ذلك أخذة في الازدياد. ويمكن أن تعمل العلاقة المستدامة مع مزود آحادي المصدر، على أساس الثقة والالتزام، على تعويض ذلك إلى حد ما: حيث يمكن لشركات الحفر الاستفادة من مجموع خبرة البائع للحصول على دعم تكميلي عند الاقتضاء. أي شراكة ذات مضمون حقيقي.

في نهاية المطاف، تريد شركات الحفر أن يمتد هذا الشعور بالثقة عبر كل ما تقوم به سلسلة التوريد الخاصة بها من أجلها. فهذه الشركات تريد أن تعرف أن العمل سيتم بشكل موثوق وآمن، وسيتم إطلاق المنصة في الوقت المحدد.

إنه مجال تركيز كبير لشركات مثل شركتنا حيث نقوم بإنشاء عرض متعدد التخصصات عبر العديد من وظائف الفحص والصيانة والخدمة، وتحديدًا في حالتنا في مجال معدات الحفر. إنها طريقة تفكير جديدة لإدارة الصناعة - ربما - لكنها تتطلع إلى المستقبل، وتنقل التركيز نحو الاستدامة.

مع مزود خدمة أساسي واحد، هناك قناة اتصالات مبسطة مع القضاء على حالات التأخير المحتملة التي يسببها البائعون الأفراد الذين فشلوا في تسليم نطاقاتهم في الوقت المحدد ضمن بيئة مشروع متداخل. وكل ذلك يدعم أهداف التسليم في الوقت المحدد وفي حدود الميزانية.

كما أنه يعالج أوجه القصور الإدارية (تتطلب إدارة العديد من البائعين وقتًا وموارد كبيرة) ويحتل أن يضع المشغل في موقع الصدارة في السباق لترسية العقود. حيث تعني الشراكة القائمة مع مزود آحادي المصدر أنه من الممكن تمامًا العمل بسرعة لتشكيل وتنفيذ خطة تعبئة مناسبة للغرض.

سيكون هناك تحفظات بين بعض مشغلي الحفر حول الالتزام بنموذج سلسلة إمداد أكثر انسيابية حول وضع كل بيضهم في سلة واحدة. وهذا هو السبب في أن شركات الخدمات التي لديها القدرة على تقديم حزم خدمات شاملة تعمل على بناء سجل حافل بالتسليم، كوسيلة لإثبات كيف يمكن أن تضيف قيمة.

أعتقد أن هذه القيمة تكمن أساسًا في التوجه طويل المدى. فقد تعمل الإصلاحات قصيرة المدى مع الساحات المحلية في بعض الأحيان كخيار فوري، وهناك المزيد من التكاليف الأولية في العمل على نظام فحص وصيانة مستدام. ومع ذلك، نعتقد أن القائمين بالحفر سيحصلون على المزيد من السنوات التشغيلية من الشريك الأطول أجلاً، وسيوفر هذا النوع من الاستثمار التكاليف عبر دورة الصيانة الكاملة.

إنه نموذج خدمة استثمرنا فيه بالفعل، لأسباب أقلها أن لدينا الموارد والمدى الجغرافي لإنجاحه. كما أن نهج الشراكة المستدامة يجعل من الممكن للبائعين دعم الحفارات الفردية، حيث من المحتمل أن

متنوعة من التحديات لمشغلي عمليات الحفر، ولكنه يمثل أيضًا فرصًا لأولئك الذين ينجحون في تحقيق التوازن الصحيح عندما يتعلق الأمر بالاستثمار في توافر الأصول. وبالنسبة للكثيرين، سيحتاج الأمر حسابًا دقيقًا: هل ينفقون ملايين الدولارات للحصول على جهاز مطابق للمواصفات، ربما لمدة ستة أشهر فقط؟ من غير المحتمل أن يكون هذا منطقياً من الناحية التجارية، لكن في نفس الوقت يحتاجون إلى أصول جاهزة إذا أرادوا المنافسة في الحصول على عقود قصيرة الأجل تتحقق في غضون فترة زمنية قصيرة. كما أن الحفاظ على المنصة في حالة استعداد على أمل تأمين العمل، يعني حتمًا تلقي ضربة تجارية إذا لم يأت العقد المستهدف في طريقك. فالأمر كما أقول دائمًا، هناك أحكام استراتيجية جيدة.

إذن، كيف نتعامل مع هذه التحديات؟ في بيئة مالية صعبة بالفعل، يبحث مشغلو الحفر بشكل روتيني عن الكفاءات عبر عملياتهم، دون تقويض السلامة أو جودة الأداء أو المساس بهما، ويمتد ذلك إلى ممارساتهم لإبقاء الحفارات جاهزة للسوق.

أحد المجالات التي تخضع حاليًا لمزيد من التدقيق هو مجتمع سلسلة التوريد حول شركات الحفر الفردية. فثمة أدلة على انتقال المشغلين إلى نماذج أكثر تماسكًا. لقد ظهر ذلك بالتأكيد في عملياتنا في الشرق الأوسط وجنوب شرق آسيا في الأشهر الأخيرة، حيث قمنا بتسليم مشاريع على صورة صفقة إجمالية تغطي الرافعات ومعدات الحفر والرفع للعملاء، كوسائل لتبسيط عملية دعم الموردين.

## اختيار التوجه طويل المدى

من المؤكد أنه من المنطقي - من عدة زوايا - التحرك نحو مفهوم الحل الشامل لخدمات الدعم. إذ أنه يطبق قدرًا أكبر من التحكم في تسليم المشروع:

## ← مفكرة الفعاليات 2021

### أكتوبر/تشرين الأول

17 - 15 مؤتمر التحويل الرقمي في قطاع التنقيب والإنتاج النفطي افتراضي [www.offsnnet.com/udt-mena](http://www.offsnnet.com/udt-mena)

### نوفمبر/تشرين الثاني

11 - 9 أسبوع نفط أفريقيا دي [www.africa-oilweek.com](http://www.africa-oilweek.com)

18 - 15 معرض أديك 2021 أبوظبي [www.adipec.com](http://www.adipec.com)

### يناير/كانون الثاني 2022

18 - 16 المعرض الدولي للأمن والسلامة والوقاية من الحرائق - إنترسك 2022 دي [www.intersec.ae](http://www.intersec.ae)





الاتجاه نحو سلسلة إمداد أكثر انسيابية يمكن أن يفيد مشغلي الحفر على المدى الطويل

## عمليات الحفر: نموذج خدمة جديد لعصر جديد؟

تشير حالات عدم اليقين، السائدة في السوق العالمية، إلى أنه يتعين على شركات الحفر اتخاذ قرارات متأنية بشأن مدى احتفاظها بأصولها في حالة جاهزة للعمل. وفي هذا المقال، يشير ليون بيكرستاف، رئيس خدمات الحفر في سباروس جروب، إلى أن اتجاه النمو في العقود قصيرة الأجل، يعني أن التوقعات طويلة الأجل يمكن أن تساعد في تحقيق التوازن الصحيح.

في الخارج والداخل - بل أيضا بسبب الحاجة المرتبطة لمعالجة تراكم الصيانة الناشئ عن تداعيات كوفيد 19-

### تطور العقد قصير الأجل

هناك أيضا علامات على أن هذه الاتجاهات من المحتمل أن تقابلها سمّة مميزة أخرى لسوق الحفر في السنوات الأخيرة: ألا وهي نمو العقود قصيرة الأجل. فلقد كانت دائما جزءاً من بيئة الصناعة بالطبع، ولكن هناك - بالتأكيد - شعوراً بأنها أصبحت أكثر انتشاراً. يمثل ذلك الأمر مجموعة

السعودية، وسجلت إجمالي أعمال متراكمة مقدرة بحوالي 950 مليون دولار أمريكي. وشهدنا ارتفاعاً ملحوظاً في الطلب على خدمات دعم الحفر في هذه المناطق خلال الأشهر الأخيرة.

وعلى الرغم من أن هذه الزيادة في النشاط ليست بصورة عالمية بأي حال من الأحوال، فإن الاتجاه العام على مستوى العالم لا يزال إيجابياً. فقد بدأت العقود الجديدة في الظهور وبدأت برامج إعادة تشغيل منصات الحفر نتيجة لذلك. إذ يبدو أن قطاع خدمات الحفر مهياً للنمو هذا العام والأعوام المقبلة، ليس مدفوعاً فقط بالتعافي في مستويات النشاط -

لا توجد طريقة موحدة لتلخيص مستويات النشاط الحالية في سوق الحفر الدولي. وبطبيعة الحال، خلقت الأسعار المتقلبة، والقيود المرتبطة بالبواب، خلفية من انعدام الأمن بشكل كبير في عمليات النفط والغاز، وفي أجزاء كثيرة من العالم لا تزال الكلمة الأبرز هي الحذر مما هو قادم. لكن في مناطق أخرى - الشرق الأوسط وآسيا على وجه الخصوص - عاد قطاع الحفر إلى العمل بشكل كبير. ففي أبريل/نيسان، على سبيل المثال، أعلنت مجموعة الحفر، أديس الدولية القابضة، عن عمليات تجديد لعدد سبع حفارات بموجب عقد في المملكة العربية

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ملخص محتويات القسم الإنجليزي:

تقارير خاصة: الكويت.

استطلاعات: الغاز الطبيعي المسال، تقنيات، المكثفات، الأمن السيبراني، تمديد الأنابيب والمسارات.

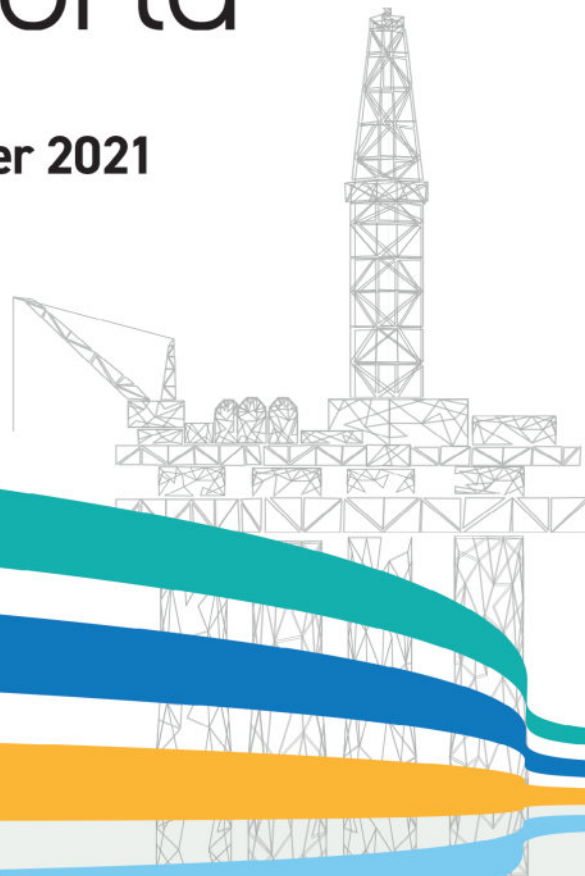
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