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KSA: Transitioning into a Sustainable Powerhouse



Kanoo drives KSA localisation

Over the last decade, the company has evolved from a trading and product supplies company to a solution provider by developing local value content – Page 8



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Natural gas is not a clean bridging fuel to renewables, and plenty of failed investments attest to the many risks that come with gas projects – Page 14



KSA catching up on transition goals

Saudi Arabia can become an energy transition leader through investments, research, training and incentives that help accelerate the move – Page 18

KSA TO 'SET STANDARDS' FOR GLOBAL ENERGY INDUSTRY

By **ABDULAZIZ KHATTAK**

MANAMA: Saudi Arabia has made it clear: The country will be a trendsetter in producing all forms of energy to meet global demand.

When COP28 declared last December to "transition away from fossil fuels", the Kingdom interpreted it as 'one of several choices', *Climate Home News* had reported, citing Prince Abdulaziz bin Salman, the Energy Minister.

But Saudi Arabia is taking climate change issues seriously and has shifted its focus to all kinds of energy, not just oil, the Prince told the Future Minerals Forum in January, according to Reuters.

Although, he said, fossil fuel can be used in tandem with measures to capture its emissions.

"People are still interested in continuing to produce fossil fuels. However, like us, and we should be calling on everybody to do this, we have to work on mitigating these fossil fuels," he said.

In another major summit, Adel bin Ahmed Al-Jubeir, Saudi Minister of State for Foreign Affairs, Cabinet's member, and Climate Affairs Envoy, said the Kingdom advocated for the diversification of energy sources to meet the increasing global demand for energy.

Speaking at the World Economic Forum (WEF) Annual Meeting 2024 in Davos, Switzerland, he said the Kingdom aims to become the top exporter of all forms of energy and not just oil, reaffirming its commitment to reduce emissions and address the challenges of climate change, SPA reported.

"We are a responsible actor in the global community, and we want to not follow the standards, we want to set the standards," he said.

He also said the world's increasing need for energy has to be accommodated using alter-



Al-Jubeir speaking at the WEF 2024 in Davos, Switzerland

native sources of energy. "Renewables are a clear favorite."

Pointing to the Saudi Green Initiative (SGI), Al-Jubeir said the Kingdom has implemented more than 80 public and private sector initiatives, representing an investment of over \$188 billion towards achieving global climate goals.

He said the Kingdom was taking a comprehensive approach to preserving the environment including measures such as adoption of a circular economy approach to carbon, afforestation, city redesign and waste recycling.

In line with Vision 2030, the Kingdom is undergoing rapid economic transformation, led by the private sector.

Faisal Alibrahim, the Minister of Economy and Planning said 13 sectors had been prioritised that created the conditions for profitability for the private sector.

He said: "Saudi has a playbook that everybody is looking into, and this playbook is all about bold movement.

IPTC returns to KSA with 16th edition

MORE than 20,000 industry leaders, professionals, influencers and key players from the oil and gas industry are expected to join the 16th edition of the International Petroleum Technology Conference (IPTC) being held from February 12-14 at the Dhahran Expo.

Prince Abdulaziz bin Salman Al Saud, Saudi Arabia's Energy Minister will speak at the event in a one-on-one discussion.

Other industry leaders to speak include Aramco leaders Amin Nasser, President & CEO, and Nasir Al-Naimi, Upstream President, in addition to top officials from TotalEnergies, Woodside Energy, Exxon Mobil, SLB, PTTEP, Adnoc, Baker Hughes, and others.

See the IPTC Review – Pages 2-31.

SABIC advances with \$6.4bn China plant

RIYADH: SABIC, a global leader in diversified chemicals, will invest \$6.4 billion in the SABIC Fujian Petrochemical Complex (Sino-Saudi Gulei Ethylene Complex Project) in China's Fujian province, making it the largest foreign investment by far made in the province and demonstrating the Saudi giant's growing footprint in China.

It will be developed by SABIC Fujian Petrochemicals, a 51:49 joint venture between SABIC Industrial Investment Company (wholly owned by SABIC) and Fujian Fuhua Gulei Petrochemical (holding by Fujian Energy and Petrochemical Group).

The complex will consist of a mixed feed steam cracker, with an expected annual ethylene capacity up to 1.8 million tonnes, with a series of world-class downstream facilities, including ethylene glycol (EG), polyethylene (PE), polypropylene (PP), polycarbonate (PC), and several other units. The construction of the project targets to complete in 2026.

Abdulrahman Al-Fageeh, SABIC's CEO, said: "The project aims to support our goal of diversifying our feedstock sources and establishing a petrochemical manufacturing presence in Asia for a wide range of products, and the final investment decision (FID) decision fully reflects SABIC's commitment to provide solutions to our customers and maximize shareholder value. Building on this, we will continue to capitalise on our partnerships to expand our footprint and continue to contribute to the targets of Saudi's Vision 2030."

The construction and operation of the project is using nine of SABIC's leading technologies to meet the evolving demand for high-end chemical products for applications in electrical and electronics, artificial intelligence, smartphones, telecommunications, healthcare, automobile and advanced materials.

The FID marks the second key milestone related to SABIC's joint ventures in recent years, following the start of commercial operation for a new polycarbonate plant at the Sinopec SABIC Tianjin Petrochemical (SSTPC) in 2023.

Renewables face grid challenges

MANAMA: The lack of grid capacity has significant implications for international climate and energy goals too. And the task to correct it is daunting, says a joint report by Climate Investment Funds and the International Energy Agency (IEA).

It says, globally, over 80 million km of grid infrastructure will need to be added or refurbished worldwide by 2040 if countries are to fulfil their national climate commitments on time and in full. That is the equivalent of doubling the length of the existing grids worldwide.

Insufficient infrastructure or a lack of grid capacity also has implications for investments in renewables more broadly.

Of the \$770 billion funnelled each year into clean energy for advanced, emerging and developing economies (EMDEs), only one-fifth is currently directed into building, scaling and future-proofing electricity grids.



Adnoc to raise decarbonisation investment to \$23bn

ABU DHABI: Adnoc, Abu Dhabi's state-owned oil company, has decided to increase its budget for landmark decarbonisation projects, technologies and lower carbon solutions to \$23 billion.

This was decided in the annual meeting of the Adnoc Board of Directors presided over by UAE President Sheikh Mohamed bin Zayed Al Nahyan, who also directed the company to grow its diversified portfolio and provide secure, reliable and responsible energy to support the delivery of a just, orderly and equitable global energy transition.

Adnoc is tripling its renewable energy capacity through its shareholding in Masdar while delivering tangible actions towards its interim

targets of reducing its greenhouse gas intensity by 25 per cent and achieving near-zero methane emissions by 2030.

The board emphasised Adnoc's role as a catalyst for the UAE's economic and industrial growth and endorsed the company's goal to drive \$48.5 billion back into the UAE economy over the next five years, building on \$11.2 billion generated through its In-Country Value (ICV) programme in 2023.

Since 2022, Adnoc has signed local manufacturing agreements with UAE and international companies worth \$16.9 billion accelerating progress against its target to locally manufacture \$19 billion worth of products in its procurement pipeline by 2027.



These achievements bring the total value driven back into the UAE economy to \$51 billion.

Adnoc also created 6,500 jobs for UAE nationals in the private sector in 2023 through the programme, in partnership with the Emirati Talent Competitiveness Council (Nafis).

IPTC IS A RALLYING PLATFORM FOR SUSTAINABLE O&G SECTOR

The event takes a well-rounded approach to the industry's challenges whether it's technology, knowhow or human resources, and comes on the heels of COP28, where a declaration to transition away from fossil fuel was made

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AFRICA FOCUS

Making carbon markets work in Africa and Congo Basin

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Zero13, XTCC target \$100bn climate investments
Asean short by 10.7GW of utility-scale projects
\$131m US funding to boost EV battery supply chain
Shell to sell Nigerian onshore assets to consortium

REGIONAL NEWS

Adnoc broadens its carbon management portfolio
Qatar ready to sell first green bond
GE Vernova upgrades four gas turbines at Kuwait plant
Oman unveils sustainable finance framework

PRODUCTS & SERVICES

First 'fully-sustainable' gas pipeline laid in France
Alfa Laval launches rotating retractor for confined spaces
New ultrasonic testing provides accurate bearing life predictions
Xaminer offers precise values of reservoir fluid
iTrans 2 a versatile fixed gas detector with easy deployment
RealWear ships advanced smart glasses to KSA, UAE
AI enables refineries to self-diagnose fouling

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Adnoc Drilling, Alpha Dhabi JV completes first investment
Jafurah Gas Field Development - Phase 1

EXPO NEWS

More decisive action on energy transition needed
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By ABDULAZIZ KHATTAK

EXCLUSIVELY hosted by Aramco, the 16th edition of International Petroleum Technology Conference (IPTC) is anticipating the presence of over 20,000 industry leaders, professionals, influencers and key players within the oil and gas domain.

What started in 2005 in Doha, Qatar, has today become the flagship multidisciplinary technical event in the Eastern Hemisphere that plays a vital role in providing a platform for oil and gas professionals to share knowledge, collaborate and drive technological advancements.

This year's edition is being held under the patronage of Prince Saud Bin Nayef Bin Abdulaziz Al-Saud, Governor of the Eastern Province, at the Dhahran Expo from February 12-14.

It will also contribute to advancing the petroleum industry in Saudi Arabia as a sustainable energy supply and bring decarbonisation learnings to other key countries across the Mena region.

A number of key speakers, including ministers and industry leaders will shed light on the evolving energy landscape.

The ministerial session will see a one-on-one discussion with Prince Abdulaziz bin Salman Al Saud, Saudi Arabia's Energy Minister.

This will be followed by executive sessions with Aramco leaders Amin Nasser, President & CEO, and Nasir Al-Naimi, Upstream President, in addition to top officials from TotalEnergies, Woodside Energy, Exxon Mobil, SLB, PTTEP, Adnoc, Baker Hughes, and others.

IPTC is sponsored by four industry organisations and societies, the American Association of Petroleum Geologists (AAPG); the European Association of Geoscientists and Engineers (EAGE); the Society of Exploration Geophysicists (SEG); and the Society of Petroleum Engineers (SPE).

WHAT'S NEW AT IPTC 2024?

Every year at IPTC recognises outstanding industry projects. The IPTC Excellence in Project Integration Award is given to a project that adds value to the industry.

In the past, only projects above \$500 million were considered. However, this year there is an extra award category for projects between \$200-500 million.

The IPTC 2024 finalists in over \$500-million category include:

• **Coral South FLNG by Eni:** This integrated project comprises the installation of a floating liquefied natural gas facility (Coral-Sul FLNG) to gather the gas production from six gas wells at 2,000 m 80 km offshore northern Mozambique in the Rovuma Basin within Area 4.

The FLNG, which has a nameplate capacity of 3.4 million tonnes per annum (MTPA) and a design life of 25 years, is the world's first new-built ultra-deep water FLNG, Africa's first full functional open sea FLNG and the first in Mozambique.

• **Lisa Phases 1 and 2 by ExxonMobil:** These exploration wells offshore Guyana in the Stabroek Block 5 started production in 2019 and 2022, respectively, from the Liza Destiny floating, production, storage and offloading (FPSO) vessel, one of the fastest projects from discovery to first oil of its



Nasser, second from left, at the IPTC 2022 CEO Plenary Session

type in the industry.

The Liza development deployed new technologies and novel execution approaches to meet these challenges.

• **Shah Deniz 2 by bp:** This is one of the largest gas developments in the world. It integrates a 3,500-km southern gas corridor pipeline, delivering natural gas from the Caspian through seven countries, directly to European markets for the first time.

The \$28-billion, bp-operated, Shah Deniz 2 project supplies natural gas and condensate from two bridge-linked platforms offshore in the Caspian Sea.

The gas is produced through 26 subsea wells via 500 km of subsea pipelines, and 85 km of onshore pipelines, to the Sangachal terminal in Azerbaijan.

At plateau, the Shah Deniz 2 project produces 16 billion cubic meters of gas per year. And the finalists in the \$200-500 million projects are:

• **CCUS Evolution Journey by Adnoc:** The national oil company of Abu-Dhabi aims to add hundreds of millions of stock tank barrels (mstb) of oil using CO₂-enhanced oil recovery, with efficient CO₂ injection.

This project aligns with a sustainable future vision, making a significant contribution to achieving net-zero goals by 2045 as targeting 10 mtpa of CO₂ storage by 2030.

• **ABH Tight Oil Field Development by Cairn Oil & Gas, Vedanta:** The Aishwariya Barmer Hill (ABH) tight reservoir field, situated within the Development Area 1 in the RJ-ON-90/1 Block, in the northeastern part of the Barmer Basin in Rajasthan, India, defied initial skepticism to emerge as a triumph of ingenuity and persistence.

Discovered in 2013, the challenging and initially deemed uneconomical tight oil formation was successfully tapped through innovative practices and technologies.

• **Optimum Shah Gas Expansion by Adnoc Sour Gas:** The project in the UAE's Onshore Shah Gas Field stands out as a remarkable technical feat, processing 1.45 BSCFD of ultra sour gas and earning the distinction of being the largest plant of its kind globally.

The uniqueness of OSGE project is its EPC awarded at the peak of Covid 19 pandemic in June 2021. And despite the adversities, the project team embraced the challenge, employing unconventional approaches in execution and completing the project two months ahead of schedule.

YOUTH-FOCUSED ACTIVITIES

Despite being an international event of

repute, IPTC hasn't forgotten the youth, and has segments that help inculcate qualities that build tomorrow's industry leaders.

The Emerging Leaders Forum offers young professionals (YPs) the opportunity to get together for a day of inspiration, education, and collaboration.

It gives emerging leaders the chance to engage with their peers and industry and management professionals from around the world to debate critical issues, develop vital skills needed for the future of work, and address key challenges.

Another assembly of youth is Education Week. This exclusive university student offers a unique experience to assist selected students with their transition from student to young professional.

This year, 100 top undergraduate science, geoscience, and engineering students from diverse backgrounds have been chosen from 39 countries to attend the Education Week.

Under the theme, 'Shaping the Future of Energy', participating students will for five days experience activities that will prepare them for life beyond university.

These include learning from experienced and young professionals, working on joint projects, networking with industry peers and executives, attending technical and panel sessions and participating in dynamic field trips.

Nearly half of the workforce in the oil and gas industry will retire in the next 5 to 7 years. This great challenge makes it an imperative for leadership development.

To address this challenge, the 'Building Bridges: It Starts with You' workshop will help participants identify and amplify their unique leadership styles while enhancing their mentorship capabilities.

It will immerse participants in a comprehensive exploration of critical themes, particularly the industry's impending transformation, known as The Great Crew Change.

In conclusion, IPTC has a well-rounded approach to the industry's challenges whether it's technology, knowhow, or the development of human resources.

This year's event comes on the heels of the key global conference on climate change, COP28, where a declaration to transition away from fossil fuel was made – a first for a UN climate conference.

* The OGN energy magazine is a media supporter of IPTC 2024.

Driving sustainability in KSA's evolving energy landscape

Oil and gas are key elements in KSA's energy mix, but significant strides are being made to turn the country from a fossil fuel producer to an energy producing country, Al-Khalifa of ChampionX tells **OGN**

SAUDI Arabia has an ambitious energy transition plan that is seeing the Kingdom expand its capabilities in renewables, green hydrogen production and carbon capture technologies.

Prince Abdulaziz Bin Salman, the country's Energy Minister, recently stated that Saudi Arabia aims to be a leading provider of all kinds of energy globally.

While oil and gas will remain a key element in the energy mix, significant strides are being made to diversify into more renewable energy sources and to shift the perception of the country as a fossil fuels producer, to an energy producing country.

Two years ago, Saudi Arabia's Crown Prince Mohammed bin Salman announced the Kingdom would contribute \$2.5 billion to The Saudi and Middle East Green Initiative over the next 10 years, in addition to hosting its headquarters.

The programme aims to reduce carbon emissions from regional hydrocarbon production by more than 60 per cent.

It also plans to plant 50 billion trees across the Middle East and restore an area equivalent to 200 million hectares of degraded land. The initiative will help reduce global carbon levels by 2.5 per cent.

As part of this long-term vision, the Kingdom is increasingly focused on delivering more sustainable practices to ensure oil is extracted as efficiently as possible.

Investment in new innovations is, therefore, crucial to success, with greater emphasis on supply chain and Environmental, Social and Governance (ESG) strategies.

ChampionX is a global leader in chemistry solutions, artificial lift systems, production automation, digital controls and chemical injection, equipment monitoring, and emissions detection technologies that help companies drill for, and produce oil and gas safely, efficiently and sustainably around the world.

The business has been active in Saudi Arabia for more than 30 years, addressing the sector's key objectives of enhancing existing hydrocarbon recovery while delivering greater efficiencies.

DRIVING CONTINUOUS INNOVATION

Supporting sustainable operations is at the core of ChampionX's solutions, and its values closely align with objectives set within the Green Initiative and Saudi Vision 2030.

As the country continues to bring new wells online, this has created more opportunities for the company to be involved from the early project stages to ensure production is maximised from the offset.

As Mohammed Al-Khalifa, formerly the general manager of ChampionX's Chemical Technologies joint venture in Saudi Arabia, Champion Arabia, and newly appointed as a Regional Sales Manager for the Mena region, explains: "The oil and gas market has evolved significantly over the last three decades, so it has been essential that we adapt to meet current industry challenges."

He says: "As a technology-driven company with extensive industry experience, our chemical technologies portfolio includes proven products, such as game-changing corrosion inhibitors, multi-functional products and emulsion breakers. These cutting-edge solutions play a crucial role in ensuring robust flow assurance throughout the life of a well."

With a focus on localisation, ChampionX has increased the sourcing of raw materials and



ChampionX has increased the sourcing of local raw materials thus reducing emissions from transportation



Al-Khalifa ... sustainability and innovation focus

blending of products in-country, which has the added benefit of reducing emissions in the transportation of finished products.

"We've seen the application of digital solutions become more prominent as operators realise the benefits of technology, such as AI, and this trend will undoubtedly grow in the coming months and years ahead," Al-Khalifa says.

"We have been working to combine technical advancements and multi-functional products in one package for our customers, and it is already delivering substantial project efficiencies in-country," he adds.

DEVELOPING SUSTAINABLE SOLUTIONS

ChampionX's capabilities across automation, artificial lift and production chemicals are a strong differentiator for the business.

By combining the company's many decades of expertise in chemical technology research and production with its experience in artificial lift, chemical injecting and automation, opera-

tors can effectively utilise one supplier.

This delivers significant value from cost and time efficiencies, particularly across large-scale projects, such as those in Saudi Arabia.

Al Khalifa says: "Innovation is in our DNA, and while our solutions already deliver efficiency and production gains for our customers, we are always striving for better. This attitude of continuous improvement led us to review our logistics fleet in 2020, and as a result, we selected United Stars of the Tristar Group as our bulk delivery solutions provider in the Kingdom.

ChampionX's vehicles are equipped with GPS tracking to ensure efficient management and optimised delivery trips, while utilising air diaphragm and hydraulic pumps, as opposed to diesel equipment, to create a safer and more sustainable offering.

"We are continuing to build on this with the addition of a new digital platform to allow for more detailed automation and enhanced forecasting," Al Khalifa says.

The company also underlined its commitment to sustainability in the past three years with the acquisition of several companies that have expanded its emissions detection and monitoring capabilities.

Today, the Emissions Technology (ET) segment combines leading methane detection technology with ChampionX's artificial intelligence predictive algorithms and extensive network of field technicians to enhance environmental stewardship practices across production assets.

Realising it can be daunting to choose the right emissions detection system, the ET team provides a straightforward solution to emissions management.

Rather than relying on a single method, they believe reliable and actionable insights come from combining continuous, top-down, and bottom-up solutions to give companies a true representation of their emissions profiles.

LONG-TERM GROWTH AND DIVERSIFICATION

Since ChampionX opened its first facility in Damman in 1982, the business has grown from six employees to more than 40 employees, including 64 per cent Saudi nationals.

As demand for its speciality chemicals continues to rise, the business has plans to expand its footprint with a second administration facility in the first half of 2024.

"In the last few years, we have seen the benefits of building diverse teams across our business, particularly in the Middle East. Our team in Oman and Qatar has developed into one of the most highly diverse workforces across the region. Based across the two countries, the 15-strong team of six women and nine men is comprised of seven nationalities from four continents, who between them speak six languages," Al-Khalifa says.

ChampionX has also made great strides within its team in Saudi Arabia with a focus on increasing diversity in the workplace. This has given the company a more balanced perspective, while also bringing forward new ways of working.

"By having a wider range of views to consider, we can better tackle our customers' challenges. This ensures we are poised to support the thriving market in Saudi Arabia and the wider Saudi Vision 2030," Al-Khalifa says.

As the Kingdom moves into 2024, its pivotal role in the global oil and gas market is undergoing a transformative shift with a firm commitment to sustainability and diversification.

"Within this dynamic landscape, companies like ChampionX play a crucial role in driving innovation and sustainability. Our strong track record and growth in the country, combined with our drive to remain at the forefront of technological advancements means we are in a strong position to shape a more resilient and environmentally responsible energy sector in Saudi Arabia and beyond," Al-Khalifa concludes.

Completion Energy promotes Made in Saudi label to world

Backed by in-house engineering and latest manufacturing facilities, the company has been successful in introducing patented Saudi-designed technology into the international market, Abdulmuin Alyousef tells **OGN**



The dissolvable SolvFrac plug is already being run in 28 Aramco wells

COMPLETION Energy, which maintains it's the first in the world to produce the unique dissolvable SolvFrac plug, has to date supplied 93 plugs to Saudi Aramco with the tool already being run in 28 wells.

The drilling and completion products manufacturer has embarked on a manufacturing journey with the aim of becoming one of the first private local companies to support the global oil and gas industry by manufacturing products made in Saudi Arabia.

Elaborating on the advantages of the SolvFrac, Abdulmuin Alyousef, CEO and board director of Completion Energy Company, tells **OGN** energy magazine: "Our SolvFrac plugs sustain (holds) down hole pressure up to 48 hours and takes 3-5 days for complete dissolution varied with down hole conditions."

This applies to a well stimulated with 28 per cent HCl acid, and a maximum bottom hole pressure of 18,148 psi.

A key advantage is that it eliminates the requirement for coiled tubing operations, thus saving time and money.

Completion Energy now plans to export its patented SolvFrac. In this regard, it has finalised setting up a joint venture with Renegade Wireline Services, one of the largest independent wireline services in the US market.

Renegade will support Completion Energy in introducing the plugs into US market. In return, Completion Energy will introduce the US company's new technologies, especially in the downhole casing repair segment (whilst maintain the casing integrity), into Saudi market.

Another of Completion Energy's success stories is its flagship product, the HighForce Extended Reach Tool.

The tool offers a unique solution, as it improves the high frictional forces generated by the flow displacement inside coil tubing in long trajectories, such as in long vertical or horizontal wells.

It generates axial displacement fluctuations and high-flow rates and can be used in clean-outs or stimulation treatments and high-torque connections that increase strength, which are useful in high-deviated and long-horizontal wells.

Originally designed for Aramco, the high-force extended reach tool has been successfully used in more than 100 projects.

According to Alyousef: "Previously, the HighForce Extended Reach Tool was utilised in Aramco projects in cooperation with big services providers. However, following its significant remarkable field performance (extended reach of more than 26,000 ft), Completion Energy entered into a direct contract with Aramco, thus signifying its success."

PROMOTING KSA-MADE PRODUCTS

Completion Energy has embarked on a manufacturing journey with the aim of becoming one of the first private local companies to support the global oil and gas industry by manufacturing

products made in Saudi Arabia.

"A key component of this strategy is the company's new factory, which will be uprunning within next few weeks," says Alyousef.

The company has already procured the machines and other resources including essential manpower required to start production.

The factory, which will have a monthly output of over 7,000 products, will be fully automated and utilise high precision CNC machines and robots in both perspective handling and machining. This is in line with the Kingdom's Vision 2030.

Completion Energy has thus far been successful in introducing patented Saudi-designed technology into the international market. Its strength lies in the fact that it offers in-house engineering, manufacturing and dedicated services to operators, and its production costs are currently lower than anywhere in the world, especially with fully automated machine shops.

A step in this direction is the company's endeavours to supplement its specialised thru tubing capabilities.

To achieve this, Completion Energy is making efforts to broaden current capabilities through collaboration with companies that specialise in technologies such as wireline, coil tubing, and snubbing unite services, among others.

It has already set up a JV to promote its thru-tubing milling tools portfolio, and it is now in the process of completing its thru-tubing fishing portfolio so it can form JVs with clients to provide a full package service to customers under the special lump sum turnkey (LSTK) contracts.

Outside the Kingdom, Completion Energy already has a presence in Abu Dhabi. It aims to expand its wireline services into the GCC, as a part of its strategy to introduce the dissolvable frac plug in the market.

Its strategy is to have joint ventures in Qatar, Kuwait, the UAE, Oman, Iraq, Libya and Egypt, among other places.

Completion Energy is the first Saudi company to own patents in well interventions and completions. It currently, has four in-house technologies patented, and is in the process of acquiring over 12 more.

Completion Energy is also the first 100 per cent Saudi company to publish two scientific reports in the Society of Petroleum Engineers (SPE) about its unique technology.

A paper it presented in the US (SPE-214841-MS) was on 'Evaluation and study of dissolvable frac plugs on horizontal well fracturing, plug and perf completions'.

It presented another paper in Dubai (SPE-214562-MS) was on 'Degradable plug technology holds pressure for 32 hours and eliminates risk of intervention in tight gas reservoirs'.



The HighForce Extended Reach Tool has a reach of over 26,000 ft

Kanoo drives KSA localisation through manufacturing & JVs

Over the last decade, the company has evolved from a trading and product supplies company to a solution provider by continuously investing into developing local value content, Manoj Tripathy of KI&E tells **OGN**

KANOO Industrial & Energy (KI&E), a key division of Yusuf Bin Ahmed Kanoo Group and a significant player in the region's energy industry, has always laid strong focus on localisation in Saudi Arabia and the wider region by continuing to set up local manufacturing facilities, collaborations and joint ventures with international partners.

This is in line with Saudi Vision 2030 and other localisation initiatives, such as Aramco's in-kingdom total value add (IKTVA) programme and adds real value to its offerings amidst an evolving energy landscape.

Under the leadership of Ali Abdulla Kanoo, Deputy Chairman, Yusuf Bin Ahmed Kanoo, KSA and Fahad Kanoo, Vice President of Kanoo Industrial & Energy, the business has evolved over last decade from a large trading and product supplies company to a solution provider by continuously investing into developing local value content whether it is in product supplies or in providing services.

Manoj Tripathy, the CEO of Kanoo Industrial & Energy, cites their facility in Jubail as example of this commitment.

"We are developing this 8,000-sq-m state-of-the-art facility for the maintenance of all kinds of rotating equipment and specific drilling equipment," he says.

Tripathy also realises that predictive maintenance is becoming a game-changer in asset maintenance, particularly for downstream plants with ageing assets.

"We have recognised the importance of this shift and are diving headfirst into AI and machine learning to revolutionise predictive maintenance," he says.

Through such initiatives, KI&E is not only bolstering the local Saudi industry, but it also adds to industrial diversification.

In fact, Kanoo has been a pioneer in driving localisation for decades.

Its first JV with Halliburton to locally produce drilling ores, such as barite and bentonite, was set up in Saudi Arabia almost 44 years ago.

The company has ever since actively sought opportunities to localise more manufacturing and service capabilities either as developers or investors.

Additionally, KI&E is also empowering local workmanship. Its in-house project team continues to develop local vendors for manufacturing and services as part of its commitment to growing the value of local content.

Another testament is its in-house valve assembly and manufacturing unit in Dammam, which has an approved plant ID from Aramco.

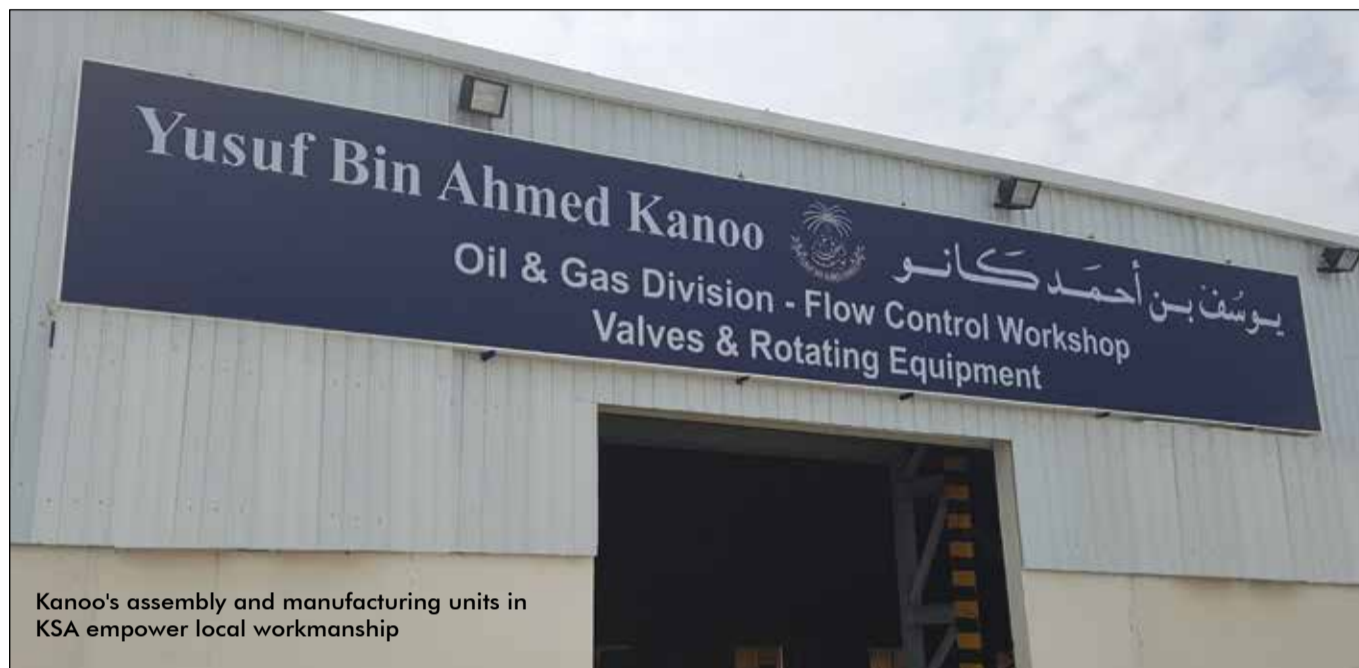
It is also in the process of localising the manufacturing of ultrasonic flowmeters for flared gas under a licensing agreement from one of its global partners.

Under a new agreement last month, the company will manufacture – including engineering, assembly and testing – of flare gas flowmeters in Saudi Arabia under license from SICK, Germany.

KI&E's Dammam team will also provide installation and commissioning of the flowmeters at the hands of trained and certified engineers from the German company.

"We are passionate about encouraging our partners to identify areas that can be localised in addition to our own plan to expand our service capabilities in the diverse segments in which we operate to drive the localisation of capabilities within the kingdom," Tripathy explains.

Furthermore, the company will soon finalise a partnership agreement with a 3D services company to support the industrial sector in developing the localisation of the supply chain through



Kanoo's assembly and manufacturing units in KSA empower local workmanship



Ali Abdulla Kanoo and Fahad Kanoo (right) ... transforming the company into a solution provider

on-demand additive manufacturing.

Speaking of partnerships, Kanoo has over 35 JVs across the region with leading companies in diverse segments, such as Halliburton, Maersk, AkzoNobel, BASF and Exxon Mobil (Infinium).

These joint ventures serve as catalysts for innovation and growth and have allowed Kanoo to tap into their expertise and leverage their global networks.

"For over 40 years, our JV with Halliburton has positioned us as a major player in the drilling fluid manufacturing business, while our partnership with Maersk has propelled us in the maritime industry. These ventures, along with others, enable us to expand our capabilities, explore new markets and deliver exceptional value to our customers," says Tripathy.

The company recently added two new JVs to its portfolio: Manuchar, global chemical sourcing company from Belgium; and CleanMax, a Brookfield Renewable company and an Asian leader in the rooftop solar business.

A segment KI&E has made a strong mark in is the heavy equipment rental business.

Through long-term leasing, the company provides a compel-

ling value proposition to major industry players, such as Aramco, with which it has contacts that extend over 10-15 years.

"We handle the heavy equipment so they can focus on what they do best," says Tripathy.

KI&E currently boasts a fleet of over 1,300 machines and has plans to expand this by another 1,000 units as demand grows.

Its strong value proposition is not only the diversity of the equipment but operating and maintaining the machinery as well.

Additionally, with workshops and skilled personnel spread across the region, customers are ensured of full-time availability for service and breakdowns.

POWERING A SAFER FUTURE THROUGH CLEAN ENERGY

Kanoo has made a strong commitment to boosting clean energy in the Kingdom and helping it achieve its net-zero goal.

It started at home when it took a bold decision to exit the fossil-fuel based power business and transition into renewable energy.

In pursuit of its commitment, the company provides sustainable solar solutions to customers in Saudi Arabia and Bahrain through its JV with CleanMax.

But that's not all. Kanoo offers zero-investment solar solutions, where it invests, installs and operates the solar power plant at the customer's premises and in turn offers energy on a 20-year power purchase model.

Separately, KI&E is actively involved in offering pipeline natural-gas-based power solutions as it realises the key role gas will play in the industrial sector.

In partnership with leading OEMs providing gas-engine and turbine solutions, the company offers high-efficiency gas-based BOOT and EPC power solutions. These include combined cooling, heat and power (CCHP) solutions that offer efficiencies of more than 90 per cent.

A remarkable achievement it made here was with the commissioning of a 13-MW gas-engine plant on a BOOT basis in Ras Al Khaimah, the UAE.

The company has also been awarded another EPC contract for a 16-MW CCHP project in Abu Dhabi, while work is on a pipeline in Saudi Arabia as well.

"Through these solutions, Kanoo Energy helps clients reduce their carbon footprint and optimise their energy usage," says Tripathy.

Furthermore, KI&E is exploring ground-breaking solutions in the increasingly important carbon capture segment.

It is collaborating with UK-based Carbon Clean, which is pioneering modularised and containerised carbon capture systems, to install the region's first modular carbon capture unit at Adnoc.

In conclusion, Kanoo maintains its position of a trailblazer in the industry, and it is constantly pushing the boundaries of innovation. What sets it apart is its unwavering commitment to diversification.

"At Kanoo, we embrace the spirit of a challenger, combining our extensive business portfolio with an unwavering commitment to innovation. By staying agile, investing in innovative technologies, and expanding our horizons, we continue to shape the industry and deliver sustainable excellence to our clients," concludes Tripathy.



One of Kanoo's services is power TR testing



Kanoo's roteq workshop will serve all industries

Localisation and innovation: Packers Plus redefines norms

By focusing on local production, promoting sustainability, and actively participating in community initiatives, the company aims to solidify its commitment to the region's growth

PACKERS Plus Saudi Arabia Industries, a vital player in the Kingdom's oil and gas sector since 2007, emphasises local manufacturing excellence, environmental responsibility, and community engagement.

Its strategic investments in state-of-the-art facilities in Dammam underscore its commitment.

"By catering to the needs of the in-kingdom initiatives, the company supports the growth of the local economy and creates job opportunities for Saudi nationals," says a company spokesman.

Packers Plus actively participates in the In-Kingdom Total Value-Added (iktva) programme, promoting economic growth, sustainable business practices, and fostering local talent development.

To ensure the highest standards are met, Packers Plus seamlessly integrates its well-established quality management system (QMS) from North America into the local Saudi facility.

Doing so guarantees that the products manufactured locally adhere to stringent requirements of both the domestic and international markets.

Also highlighting Packers Plus' unwavering commitment to excellence is the company's achievement of the American Petroleum Institute (API) Q1 Standards, underscoring its adherence to quality management system requirements.

In addition, Packers Plus is on track to becoming the first completion services provider in KSA for acquiring the API Q2 certification standards and providing a tangible experience within its core values of operational excellence, customer intimacy, and innovation.

"The API certifications hold immense signifi-



Packers Plus has been recognised as a Success Partner by the Eastern Province Municipality and the Ministry of Municipal, Rural Affairs and Housing

cance in the oil and gas industry, validating compliance with rigorous quality and operational excellence standards," the spokesman says.

The API Q1 certification ensures that Packers Plus consistently meets customer requirements and enhances overall operational efficiency to manufacture products for the industry.

Meanwhile, the API Q2, explicitly designed for service providers in the oil and natural gas industry, focuses on risk management and service quality, further demonstrating Packers Plus' dedication to delivering top-tier services.

These certifications validate Packers Plus Energy Services' commitment to excellence and enhance its credibility in the industry.

The benefits of these certifications include improved operational efficiency, reduced risks, and increased customer satisfaction, ultimately contributing to the company's continued success in the competitive landscape.

Recognising the importance of environmental care, community engagement, and social responsibility, Packers Plus takes an active role in making a positive difference in the industrial cities of Saudi Arabia.

Through collaborations with the Eastern Municipality, many sponsor companies, and young volunteers, the company spearheads a series of cleanup events to restore and preserve the natural aesthetics of the region.

Packers Plus has been recognised as a successful partner in the Ministry of Housing and Eastern Municipality's volunteering day ceremony, exemplifying its dedication to community and social responsibility.

At Packers Plus, prioritising employee well-being is a priority. The company promotes positivity in the workplace by increasing communication and organising team-building activities.

This approach improves morale, productivity, and work satisfaction among employees.

In addition to supporting its workforce, Packers Plus is committed to fostering educational growth.

Through its cooperative education programme, the company collaborates with reputable institutions, including the King Fahd University of Petroleum and Minerals, Jubail Technical Institute, the International Technical Female College, and others, to support students and contribute to sustainable development in the region.

In conclusion, Packers Plus Energy Services exemplifies local manufacturing excellence and environmental and community engagement in Saudi Arabia's oil and gas industry.

By focusing on local production, promoting sustainability, and actively participating in community initiatives, the company solidifies its commitment to the region's growth.

"Packers Plus is proud to contribute to the local economy, nurture local talent, and positively impact the environment and communities in which it operates," says the spokesman.

AFI wins innovation award for BlowVac

AFI of Saudi Arabia has been crowned the 2023 winner of the Asian Oil & Gas Award for Innovation for its industrial vacuum loader.

The prestigious award was presented by Asian Power at the awards ceremony held in Malaysia.

AFI's BlowVac, one of the multiple models of industrial vacuum loaders designed and manufactured by AFI in Saudi Arabia, was scored the highest by the judges for innovation in terms of productivity, functionality, health and safety, as well as environmental friendliness.

"We are proud to be among the other illustrious category winners like Aramco, Yasref, Petronas, Shell and others, many of whom we are honoured to call our customers and partners," says a company spokesman.

He adds: "This award serves as a testament

to the faith our customers and partners have in our organisation's continued commitment to excellence, to achieving our goal of being the top manufacturer of quality products, and to maintaining our status as a superior service provider."



AFI officials with the award



The BlowVac industrial vacuum loader ... designed and manufactured by AFI in Saudi Arabia

Nabors advancing automation and decarbonisation in region

The company has been leveraging its core competencies in drilling, engineering, automation, data science and manufacturing to innovate the future of energy and enable the transition to a lower-carbon world, officials tell **OGN**

As new industry megatrends, such as digitalisation, automation and decarbonisation, take hold, Nabors stands at the forefront of drilling innovation, delivering technologies and solutions that are transforming oil and gas operations in the region.

In an exclusive interview with *OGN* energy magazine, Siggi Meissner, President, Energy Transition and Industrial Automation, and Subodh Saxena, Senior Vice-President, Technology and Services, from Nabors Industries, discuss recent efforts to bringing the future of drilling to the Middle East and how Nabors is supporting Saudi Arabia's Vision 2030.

Tell us a little about Nabors.

Saxena: Most people see Nabors as a drilling contractor. The reality is Nabors is a leader in advanced technology for the energy industry.

We have operations in about 15 countries and have established a global network of people, technology and equipment to deploy solutions that deliver safe, efficient and responsible energy production.

As the industry has evolved, we have been leveraging our core competencies, particularly in drilling, engineering, automation, data science and manufacturing, to innovate the future of energy and enable the transition to a lower-carbon world.

So, while we do have a global footprint of drilling operations supporting our customers around the world, our portfolio is much broader.

What about your operations in Saudi Arabia? Bring us up to speed with your efforts in-kingdom and anything else you have been working on.

Meissner: We have a long history of operating in the Kingdom. Perhaps, most visibly is our 50-50 joint venture with Aramco, known as SANAD.

SANAD has nearly 50 active rigs in Saudi Arabia and a runway to activate as many as 50 new build rigs over 10 years.

Canrig, a division of Nabors, has also been very active in the region. Last year, we expanded our manufacturing facility in Saudi Arabia, where we predominately provide regional value and support with new manufacturing builds and repair, recertification, and rebuilding services for Canrig and customer drilling equipment.

To support future growth and expansion in Saudi Arabia, we are opening a new regional office in February 2024, which will feature our state-of-the-art Rigline 24/7™ Center and provide world-class customer service and remote support for all Nabors services and technology.

The goal is to help transform Middle East operations and support the kingdom's recent transformation and Vision 2030 for economic diversification and global engagement.

In the last few years, Nabors has also established and been pursuing several energy transition initiatives to support the broader industry's decarbonisation efforts.

Our guiding vision is to help deliver "energy without compromise" by using technology to overcome the challenges and tradeoffs between hydrocarbons and clean energy.

Our venture portfolio is made up of several companies across concentrated solar power, geothermal and energy storage, and we are pursuing several internal projects in hydrogen and ad-



Nabors' recently expanded KSA manufacturing facility



Meissner and Saxena (right) ... supporting Vision 2030

vanced materials.

The world needs clean, renewable, dispatchable and scalable power and we are working with our portfolio companies to achieve it.

What else are you excited about as you look ahead for the Saudi market?

Saxena: I would highlight the work we are doing to bring the future of drilling to the Middle East.

Deploying our digital and automated solutions has the potential to drive huge performance improvements in safety, efficiency and sustainability.

In the last year, Nabors has upgraded several SANAD rigs with our SmartROS™ rig operating system, equipping those rigs to run leading edge digital and automated technologies that have been proven and heavily utilised in the US.

These technologies deliver safe, consistent and repeatable outperformance across rig fleets. In early deployments, connection times on rigs running SmartROS have been reduced significantly.

More recently, Nabors was awarded the first tender for automation and will be providing services to Aramco in the Kingdom.

This achievement validates the efficacy of our cutting-edge technology solutions, which focus on digitalisation, automation and lowering the carbon footprint of operations.

We plan to deploy on multiple rigs in early 2024, some of which are non-Nabors rigs.

We are also excited about introducing our Red Zone Robotics (RZR) Rig Floor Automation Module to the region.

Equipping a land rig with the RZR system enables companies to fully automate routine drilling operations.

The hands-free pipe handling operation means you can clear

crews from hazardous redzone workspaces, such as the rig-floor and derrick, and deliver consistent repeatable outcomes without compromising performance.

In fact, one of the systems has been working on a Nabors rig in West Texas, one of the most competitive drilling basins in the world. Just recently, our customer recognised the rig as a top performer in its fleet.

Lastly, we are also seeing great success of our digital and automated solutions in Iraq through our collaboration with Halliburton.

Through initial deployments of our technologies, non-Nabors rigs increased rate-of-penetration by as much as 40 per cent.

Are there other benefits to automation?

Meissner: I would say the other piece is delivering responsible operations. Efficiency means fewer days on well and, therefore, a lower carbon footprint. So, by drilling more efficiently, we can drill more responsibly.

Nabors has also established a purpose-built portfolio of technologies specifically to lower emissions from drilling operations. We have been piloting many of them in the region.

Do rig upgrades present a challenge for deploying automation?

Saxena: Outperforming in today's drilling environment requires an AC rig. Recognising this would be a prerequisite for most of the rigs in Saudi, and our team has worked to simplify upgrades.

Historically, DC to AC rig conversions required that the rig be rebuilt entirely – until now.

By swapping the existing DC top drive and DC drawworks with AC models and adding a compact drillers' cabin equipped with built-in drives to power and control the top drive and drawworks, an upgrade can be performed during a rig move.

Using this method, an older rig can be outfitted to interface with new technologies to capture efficiency gains within a significantly shortened timeline.

Any final thoughts?

MEISSNER: Just that we are excited to continue delivering for our customers in the region and to extend our long-standing leadership position in these new areas such as digitalisation, automation and decarbonisation.

We encourage everyone to stop by our booth at the International Petroleum Technology Conference (IPTC) in Dhahran, Saudi Arabia from February 12-14, 2024.

We will be showcasing many of these technologies and successes and will have our subject matter experts there to answer any questions you may have.



SmartPOWER ... using AI to optimise rig engine management

Why do some natural gas investments fail?

Natural gas is not a clean bridging fuel to renewables, and plenty of failed investments attest to the many risks that come with gas projects, writes Dong Liansai, an energy sector observer for China Dialogue

ON November 7, 2023, China released a high-level plan on managing methane emissions that called for stronger monitoring and to “gradually improve the technical specifications for leak detection and repair in the oil and gas sector”.

The little-highlighted link between natural gas and methane emissions, which the document points to, is just one of several challenges facing gas projects today.

More than 200 financial institutions around the world already have coal exit policies, under which they are ceasing to finance new coal projects and gradually divesting from existing ones.

Natural gas, by contrast, is being cast by some as a cleaner alternative to coal and a “bridge fuel” for the global low-carbon transition.

Demand for gas has grown substantially in recent years and the technology for its extraction has continued to mature.

Coupled with the fact that gas is often the preferred choice for energy security, plenty of countries have given gas projects their blessing, and its investment outlook appears highly promising.

As the latest Banking on Climate Chaos report notes, liquefied natural gas (LNG) firms attracted nearly 50 per cent more finance in 2022 than in 2021.

However, many high-profile gas projects have also flopped. These, and especially the features they have in common, need bearing in mind.

According to a 2021 report from the NGO Global Witness, the EU has squandered almost 440 million euros (\$482 million) on gas infrastructure projects that have either failed or are likely to fail – and it’s not just an EU problem, as demonstrated by failed projects worldwide.

This is a challenge for the gas industry on the whole, and it should be sounding alarm bells for future gas investments.

UNREALISTIC EXPECTED RETURNS

In every gas-fired power project, anticipated return-on-investment figures are meticulously calculated at the appraisal stage.

Actual profit, however, is heavily subject to fuel price fluctuations and supply instability, which can lead to projects being suspended and even cancelled.

The cost of generating electricity from gas is typically two to three times that of coal. Transport and distribution costs are high, and fuel generally accounts for up to 85 per cent of the cost of power from gas. Fluctuations in the price of LNG have a critical bearing on the returns from gas-fired power generation. The volatility of exchange rates further adds to the uncertainty, given that most countries rely on imports for their supply of the fuel.

Two China-backed gas plants in Yangon, Myanmar, halted operations in July 2021, as reported on the Irrawaddy news site.

The plants, fuelled by LNG imported from Malaysia, had become financially unsustainable after little more than a year.

Reasons included the rising price of gas in international markets, the depreciation of the kyat against the dollar, a decline in electricity demand, and the government’s inability to pay electricity suppliers, a source from Myanmar’s energy ministry told the Irrawaddy.

VPower, one of the owners, divested from two (out of its three) gas-fired power projects in Myanmar, leaving much of the government’s \$800 million investment stranded.

Myanmar’s is not an isolated case. Economic returns for many gas plants that rely on im-



Pipeline projects are sometimes cancelled due to cost issues

ported LNG are highly susceptible to geopolitical shifts.

Following Russia’s invasion of Ukraine, LNG prices went up worldwide, as Europe imported more of the commodity to reduce its dependence on Russian supply, according to analysis from thinktank the Institute for Energy Economics and Financial Analysis (IEEFA).

The US cashed in by exporting more LNG to Europe, which pushed the price of gas on the US domestic market to its highest in nearly a decade, at \$8.04/MMBtu (million British thermal units), compared with \$1.96/MMBtu in 2016.

STALLED PIPELINE PROJECTS MAKE SUPPLY UNCERTAIN

Unlike coal, gas plants usually require investment to build LNG terminals and pipelines, to ensure a stable supply of fuel.

In some cases, pipeline projects are cancelled or suspended indefinitely due to cost issues, as well as environmental, social, and political concerns.

This has happened multiple times in the EU, most notably in the 2020 case of the Bulgaria–Romania–Hungary–Austria (BRUA) natural gas pipeline.

The project soon stalled as no one downstream would commit to buying supply without confirmation of gas production upstream, while developers upstream could not progress without the assurance of downstream usage.

Consequently, developers cancelled the 430-million-euro (\$472 million) project after completing only its first section.

In the US, Duke Energy has since 2013 cancelled \$11.6 billion worth of pipeline projects at various stages of development due to escalating costs, environmental lawsuits, and diminishing expected returns.

But the most high-profile, recent example of a pipeline rendered defunct might well be the sabotage of Nord Stream pipelines in 2022.

These four natural gas pipelines run under the Baltic Sea linking Russia to Germany.

The 16.9-billion-euro project was co-financed by companies from Russia, Germany, France, the Netherlands and Australia.

The two pipes that constitute Nord Stream 1 came online in 2011 but Russia turned off the gas supply in 2022 following its invasion of Ukraine.

A new pair of pipes, called Nord Stream 2, was completed in 2021 but never came online.

Doubts over the future of Nord Stream were subsequently cemented when a series of man-made explosions ruptured three of the four pipelines. As of March 2023, plans were in place for Nordstream to be mothballed.

When a pipeline cannot come into service as expected, it removes an affordable, dependable supply of gas, which in turn leaves potential proceeds from gas power projects even more vulnerable to market fluctuations.

DEMAND SQUEEZED BY THE RENEWABLES BOOM

The market share for gas-fired power has been shrinking with advances in renewable energy tech, along with policies that prioritise grid connections for renewables.

According to the energy thinktanks Ember and IEEFA, in 2022 power generated from wind and solar in the EU exceeded that from natural gas for the first time – and the gap is widening.

Generators of gas-fired power have clutched at the fuel’s notional status as a “transitional energy” as something of a last hope.

Meanwhile, however, peaks in power demand are being brought down by the remarkable development of distributed energy resources (DER) – smaller, consumer-side power generation sources – such as rooftop solar systems and battery storage.

In scenarios studied by IEEFA, rooftop solar and battery storage with battery trading could reduce peak demand for electricity in the 4-8 pm market by 67 per cent-92 per cent.

Australian households have already spent around A\$25 billion (\$16.3 billion) on DER, and that figure is likely to grow, at least, six-fold over the coming decade.

In France, the market for demand-side flexibility (the portion of electricity demand that can be increased or reduced) was approximately 2.4 gigawatts (GW) in 2022 and is expected to grow by 12 per cent in 2023.

With the development of demand-side response and power storage technologies, the peak demand curve for electricity will flatten, and demand for transitional energy sources such as gas will fall.

In addition, fossil fuel power plants have been criticised for the huge sums they charge when regulating peak demand, even when allowing for exceptional circumstances where renewable power fails to satisfy the peak demand.

In March this year, for example, the Guardian reported that the Coryton gas-fired plant in Essex, UK, had bids accepted to produce power at £1.95 per kilowatt-hour – well above the average of between £0.2 and £0.4.

This exorbitant tariff sparked a furore, even after accounting for British consumers’ adaptation to higher electricity costs since the Russian invasion of Ukraine.

Months later, Ofgem, the UK regulator for gas and electricity markets, announced new rules to prevent backup generators from reaping excessive profits.

‘CLEAN’, BUT NOT LOW-CARBON

The climate policies and low-carbon transition commitments of various countries have no doubt constrained developments in the fossil fuel industry.

Natural gas may be a “clean” energy for some, but increasingly, the impact of greenhouse gas emissions policies on the industry cannot be overlooked.

In fact, agencies such as the United Nations Environment Programme (UNEP) reject the idea of natural gas as a first choice for tackling climate change.

At the same time, many governmental and financial organisations are considering new policies and transition roadmaps for managing expansion of the gas sector.

Gas-fired power plants emit 50 per cent less CO₂ than coal-fired plants, but technology limitations on monitoring methane emission and leakage mean that total life-cycle methane emissions of natural gas have long been underestimated.

As a greenhouse gas, methane has 80 times the potency of CO₂ in the first 20 years after it reaches the atmosphere.

Taking methane leakage into account as part of a lifecycle emissions analysis puts paid to any notion of natural gas being a “clean” source of energy.

A study published this year in the journal Environmental Research found that even with methane leaking at a rate of just 0.2 per cent, carbon emissions from coal and gas are practically the same over a 20-year period.

And when different rates of leakage are factored in, total life-cycle greenhouse gas emissions from natural gas are likely to exceed those from coal.

The technology for collecting data on methane emissions has evolved in recent years. Comprehensive satellite surveillance now enables closer scrutiny of existing gas projects for methane leakage.

The EU and US have started to develop stricter limits for methane emissions.

While the identification of excessive emissions is unlikely to force all gas-fired plants to shut down, compliance-driven emission retrofits would push up operating costs, further weakening their competitiveness compared with other energy sources.

Meanwhile, proposed new projects will increasingly have to shoulder additional environmental liabilities before they can be approved.

In South Africa, for instance, methane emissions – and their detrimental impact on the community – have become a central argument in several legal challenges to proposed natural gas projects.

Such projects can be expected to face more constraints as the climate crisis intensifies and the regulatory regime for carbon emissions tightens.

To read full article, visit www.ognnews.com

Innovative tech ushering green energy revolution

As data becomes more prevalent and accessible in 2024, energy management solutions will become more precise and amplify the benefits customers can derive from renewable energy, Matt Tormollen, CEO, POWWR, tells **OGN**



Innovative technologies are facilitating green energy revolution

AFTER a few false starts, energy companies are firmly looking to transition away from fossil fuels and adopt more sustainable forms of energy production in the future. So much so that it is predicted that renewables' share of the power generation mix is set to rise to 35 per cent by 2025.

Whilst a major catalyst has been increased consumer demand for renewable energy, another has been the emergence of innovative technologies that have facilitated this green energy revolution.

Software, in particular, has been playing a significant role in how the industry has been able to build the systems and processes necessary to clean up its act. But what are the key areas and what changes are we likely to see in 2024?

A DIGITISED FUTURE

Innovative software is already facilitating everything from providing an end-to-end connected journey for energy sales, to managing risk at a time of unprecedented price volatility.

However, as the industry moves towards net zero, it is in the areas of solar, electric vehicles (EVs) and heat pumps that software will perhaps be seen the most.

The solar market continues to scale rapidly worldwide. One of the reasons is that there are not many incumbent IT stacks to circumvent.

However, the solar installation process itself is complex. Therefore, a host of software solutions have emerged to digitise the solar lifecycle from site selection to ongoing maintenance.

Central to this has been those that ensure that the solar farms themselves are placed in the optimum locations.

As solar adoption continues to swell, we will only see more software solutions emerging to facilitate the change.

By the end of the decade, EVs are projected to represent the majority of new car sales, with everyone from Mercedes to Mazda launching models.

Software is already touching every aspect of the value chain, from battery analytics, to charging, to fleet electrification.

Yet, in 2024 I predict there will be more solutions launched that build on top of existing charging offerings to provide billing and payment solutions that strengthen the ecosystem.

Many countries now have government grants to encourage end users to switch from traditional gas boilers to modern heat pumps.

The sector will undoubtedly drive forward in 2024. Software will become increasingly instrumental in facilitating heat pump design, speeding up proposal creation, and improving the time it takes for contractors to assess a home's readiness for heat pumps.

USE OF AI IN FORECASTING

Like most industries, the energy sector is starting to use artificial intelligence (AI) to streamline mundane tasks and reduce the propensity for manual errors.

In an industry such as energy, the latter is particularly important as the ramifications of an error can be catastrophic.

AI and machine learning is being used particularly effectively on the forecasting side.

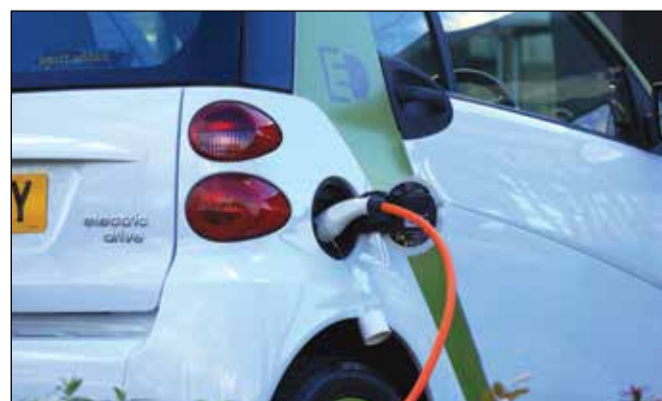
Whereas with fossil fuels demand used to be the variable, supply was relatively constant. However, with renewable energy it has switched 180 degrees.

A windfarm is not particularly useful without wind and a solar farm is not especially useful without the sun.

Therefore, optimum weather forecasting is imperative so that energy suppliers can make informed decisions and load balance the network effectively. Remember, though, that AI is only as good as the data that flows into it.

DATA IS DRIVING ACCOUNTABILITY

Data is driving accountability within the sector. In the past,



Software is already touching every aspect of the EV value chain

certain more unscrupulous suppliers have been accused of using deceitful marketing gimmicks to exaggerate their environment-friendly actions.

However, consumers are remarkably savvy, and those suppliers have recognised the need to leave such 'greenwashing' behind and become accountable.

It has not been straightforward though. Energy has become increasingly decentralised as it has become decarbonised.

Therefore, ensuring complete energy genealogy throughout the supply chain has been difficult due to a lack of consistent data.

However, times are changing. Technology such as Internet of Things (IOT) sensors are now being used to facilitate accountability by collecting energy data from a whole host of distributed devices.

This data can be used to produce a certificate of authenticity – such as a Renewable Energy Certificate (RECs) – that proves that the energy generated is from the renewable sources it claims.

As data becomes more prevalent and accessible in 2024, energy management solutions will become more precise and amplify the benefits customers can derive from renewable energy.

They will be able to save on energy costs, whether by procuring energy from the cheapest supplier or facilitating energy use when rates are cheapest.

KEY ENABLER TO THE GREEN ENERGY REVOLUTION

The industry's combined move towards net-zero has led to a need for software to both optimise physical asset performance and increase the accountability of the supporting energy ecosystem.

So much so that many legacy oil and gas service providers themselves now view themselves as technology service providers.

For example, just last year oilfield services giant Schlumberger rebranded itself as a digital services provider and supporter of cleaner energies.

In 2024, the technologies needed to address our energy challenges will take many forms, from AI being used to better forecast the weather to IOT sensors being used to provide the intelligence to optimise delivery.

Yet there is no doubt that technology has become the key enabler to the green energy revolution.

Will international carbon markets finally deliver?

Although the discussion of carbon markets has been dominated by revelations of their pitfalls, it is more important than ever to make international cooperation work in ways that yield long-term climate benefits while supporting sustainable development and global equity

ARTICLE 6 of the 2015 Paris Agreement details how countries can cooperate to achieve their greenhouse gas emission reduction targets, as set out in their nationally determined contributions (NDCs).

It recognises that these efforts can be effectively complemented through cooperation among governments and others to cut emissions and support credible carbon offset projects.

Article 6.2 covers government-to-government carbon credit deals where the credits – known as Internationally Transferred Mitigation Outcomes – are reported to a central registry.

To date, there have been three bilateral Article 6.2 deals, each with Switzerland as the buyer.

These deals support low-carbon rice cultivation in Ghana, electric buses in Thailand, and solar panels in Vanuatu, respectively.

Compared with the roughly 260,000 voluntary carbon deals since 2010, it is an understatement to say that public carbon deals under Article 6.2 are off to a slow start.

The good news is that close to 130 bilateral pre-feasibility projects are now up and running.

A few explore issuing carbon credits between developed countries for carbon capture and storage (CCS).

While nature-based carbon solutions like forest or peatland carbon offsets have barely featured under Article 6.2 until now, in September 2023, Suriname became the first country to announce plans to sell forestry-based Internationally Transferred Mitigation Outcomes under Article 6.2 (at US\$40 per tonne).

PRIVATE CARBON MARKETS IN DISARRAY

It is too early to determine whether Article 6.2 will help create an international carbon exchange that contributes significantly to climate mitigation efforts.

The reputation of voluntary private carbon markets has been tarnished by recent media revelations and academic reports, as well as lawsuits based on companies' carbon offsetting and "carbon neutrality" claims – such as the \$1-billion suit facing Delta Air Lines.

Economist John Maynard Keynes deemed unregulated international financial markets a "parody of an accountant's nightmare".

Today's international carbon markets appear to match this characterisation rather too well.

Earlier this year, an investigation by The Guardian concluded that 90 per cent of carbon credits for land-based removal of carbon dioxide approved by Verra were "useless".

Similarly, a Goldman School assessment said that voluntary carbon credits have been "exaggerated across all quantification factors".

While projecting that global carbon offset trading will grow 15-fold by 2030 and 100-fold by 2050, the US's Fifth National Climate Assessment, published earlier this year, politely noted "concerns" about carbon markets.

In response, there have been growing calls for governments to regulate private-sector carbon markets.

While 39 jurisdictions have carbon emission trading systems in place, only a handful – notably, California and British Columbia – have rules covering carbon offsets.

Developed countries are slowly addressing this regulatory deficit in private carbon markets.

A new European Union (EU) carbon removal



Article 6 allows countries to transfer carbon credits and meet climate targets

certification framework proposes a verification system for all EU-based carbon credit claims, while the European Parliament and Council recently reached a provisional agreement on new rules to ban misleading environmental claims and "greenwashing" advertisements.

Canada plans to release federal carbon offset regulations in 2024. That said, even if these initiatives turn out to be impactful, they will only cover a small part of the global carbon credit market.

DEFINING CARBON CREDIT AND GREENWASHING

All of this leads us to the second pillar of Article 6: Article 6.4, initially considered the part of the rulebook with the greatest potential.

Tasked with developing standards, guidance, and methodologies for carbon markets and credits, Article 6.4 and its Supervisory Body have spent the last 2 years doing just that.

To date, the 12-person Supervisory Body to Article 6.4 has advanced some welcome standards, notably setting out under what conditions carbon removals from forests, grasslands, peatlands, and other natural ecosystems can be counted toward a carbon credit.

The same guidance concludes that all CCS projects should be disqualified from Article 6.4. The expert body excluded natural carbon uptakes that are "not directly caused by human activities" in its definition of carbon dioxide removals and has deemed engineered CCS projects as outside of its scope, which created a predictable backlash from the CCS industry.

One consequence of this definition could be that more CCS projects will instead be advanced between governments (under Article 6.2) in the future.

Many specific rules await the finalisation of the Supervisory Body; of these rules, guidance around additionality is among the most urgent.

The Supervisory Body's current definition of additionality includes revenues from carbon credits (financial additionality), the impacts of regulations (impacts of laws and industry standards), changes in practices (common practice additionality), and performance against industry or sector benchmarks (perfor-

mance additionality).

Since the concept is based on comparisons against a hypothetical counterfactual, it is likely that the carbon market rules on additionality will emerge from evolving practices, as well as the Supervisory Body's guidance.

For example, while carbon credits from solar and wind projects are an important focus of Article 6.2 projects, most experts argue that since the price of renewable energy is at parity with fossil fuels, the case for renewables' additionality will become increasingly limited.

TACKLING THE TRIPLE CRISES OF DEBT, CLIMATE, AND NATURE

The third pillar of Article 6 (Article 6.8), which covers non-market forms of international cooperation for emission reductions, is the least examined to date.

Article 6.8 is beginning to explore several important – and innovative – forms of international climate cooperation.

One of them is technology transfers, which was identified as a key part of the pillar already in the 2015 Paris Agreement.

Article 6.8 opens up new opportunities for major technology producers to export clean technologies to developing countries below market cost in exchange for carbon credits.

More recently, governments have identified debt-for-climate swaps as another topic for Article 6.8.

Earlier this month, leading multilateral development banks launched a task force that will help developing countries get additional access to climate finance, including through debt-for-climate swaps.

Perhaps most promising is the possibility of Article 6.8 generating financing for intact natural areas, which has been discussed at several recent meetings of the Subsidiary Body for Scientific and Technological Advice.

THREE THINGS TO FOCUS ON

The discussion of carbon markets has been dominated by revelations of their pitfalls, a lack of oversight, and an inability to contribute to climate mitigation and nature protection efforts in a meaningful way. And with good rea-

son.

Yet rather than scrapping them, it is more important than ever to make international cooperation on emission reductions and nature protection work in ways that yield long-term climate benefits while supporting sustainable development and global equity.

To do so, its policymakers need to accelerate their work and deliver on three main areas in the coming 12 months.

- **Rule Completion:** Article 6.4 is due to become operational in late 2024 or early 2025. While the Supervisory Body has been busy examining different possible rules, it now needs to accelerate this work and complete a clear, concise, and workable set of standards in the next 12 months.

Important rules for additionality, leakage, permanence, and safeguards – as well as processes for appeals and grievance – need to be completed soon to enable a functioning public carbon market to grow.

- **Coherence:** While Article 6 mandates three distinct approaches, it is important to ensure some overarching rules and principles across the three pillars, particularly those rules that determine the approach to additionality, permanence, and leakage.

Contradictory approaches – for example, the inclusion of CCS in Article 6.2 but its exclusion from 6.4 – will undermine the integrity of the whole system.

- **Blended Finance:** With voluntary carbon markets still reeling from damaging media stories, private investment in carbon markets has dropped by nearly 20 per cent since 2021. One option to address this decline is to expand recent work among MDBs, led by the World Bank, in de-risking Article 6 international deals with the aim of crowding in private investors.

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The global LNG carrier fleet plays a crucial role in the transportation of LNG



LNG carrier fleet will be bedrock of sector growth

By monitoring the LNGC fleet and orderbook, industry stakeholders can gain insights into the supply-demand dynamics of the LNG market and make informed decisions to support the growth and sustainability of the industry

AFTER liquefied natural gas (LNG) emerging as a transformative force in the global energy landscape, the crucial role of LNG carriers in the transportation of LNG from production facilities to consumption markets around the world can be overstated enough, explores a report by American Bureau of Shipping (ABS).

In the, 'LNG Value Chain' report, ABS reports a significant increase in the global demand for LNG over the past decade and is expected to continue growing rapidly in the future.

This surge in demand can be attributed to the increased interest in cleaner energy sources to fuel economic growth to replace coal and traditional oil-based fossil fuels.

LNG, which is produced through the liquefaction of natural gas, has emerged as a crucial component in meeting the energy requirements of various regions across the globe.

One of the key factors driving the development of gas resources in developing countries is the promotion of domestic access to energy resources and the growth of the electricity and industrial sectors.

LNG exports have become a viable option for those countries to secure the financial resources required for developing their gas resources.

Furthermore, LNG export projects typically allocate a portion of the gas for domestic consumption while the rest is directed towards the liquefaction plant.

This approach enables countries to meet their domestic energy needs while also tapping into the global LNG market. As a result, LNG plays a critical role in promoting energy security by diversifying energy sources and reducing reliance on traditional fossil fuels.

In the context of recent events, such as the Russia-Ukraine war, the role of LNG in global energy security becomes even more significant.

This conflict has highlighted the vulnerabilities associated with relying heavily on a single source or route for energy supplies.

With the cut of gas supplies from Russia, the EU needed over 45Mt of LNG to meet its energy needs.

Supply routes shifted from the traditional Far East consumers to Europe. LNG prices tripled compared to the pre-war within just three

months to reach over \$95 MBTU.

Furthermore, the LNG import market over the last two years flipped from the Asian market being the largest importer of LNG in 2021 to the European market leading the imports in 2022.

The ability to transport LNG from producing regions to distant countries provides an opportunity to diversify energy supply chains and reduce geopolitical risks.

By unlocking stranded natural gas resources and establishing LNG infrastructure, countries can enhance their energy security and reduce their dependency on specific regions for energy imports.

LNGC FLEET & ORDERBOOK

New trends and innovations have revolutionised the LNG industry. The midstream sector – encompassing liquefaction, transportation via pipelines, specialised LNG carriers and small-scale LNG distribution – plays a crucial role in ensuring the efficient and reliable movement of LNG from production centers to end-users across the globe.

Traditionally, LNG liquefaction plants have found their homes onshore, and while some of these facilities were situated in remote areas, they demanded the establishment of entire cities and intricate infrastructures to support the plant operations and personnel.

Venturing into the vast and remote offshore gas fields often posed significant challenges due to the substantial upstream costs, including the construction of extensive pipelines.

The quest for a more cost-effective solution led to the concept of floating liquefaction facilities (FLNGs), where both liquefaction and necessary pre-processing occur on a floating structure that is positioned in proximity to the gas discovery site.

LNG, along with potential by-products like LPG and Condensate, could be directly offloaded onto product carriers, swiftly reaching the market from the floating LNG facility.

The global LNG carrier fleet plays a crucial role in the transportation of LNG from production facilities to consumption markets around the world.

The LNG carrier fleet consists of specialised vessels designed to safely transport LNG at ex-

tremely low temperatures and under precise storage conditions. These vessels are equipped with advanced technology and insulation systems to ensure the integrity and safety of the cargo throughout the journey.

The LNG carrier (LNGC) fleet is constantly evolving and expanding to meet the growing demand for LNG. The LNG carriers orderbook shows almost 50 percent growth.

Over 300 vessels have been ordered to the existing world fleet of just over 650 vessels.

This historical orderbook reflects the investments and commitments made by companies to meet the anticipated increase in LNG production and consumption.

By analysing the LNGC fleet and orderbook, industry stakeholders and market analysts can assess the supply-demand dynamics of the LNG market and make informed decisions regarding infrastructure investments and energy strategies.

The size and capacity of LNG carriers vary, with vessels ranging from small-scale carriers to large-scale vessels capable of transporting huge volumes of LNG.

The LNGC fleet includes both single-screw and dual-screw vessels, each designed to cater to specific operational requirements and trade routes.

The fleet is predominantly made up of vessels with membrane-type cargo containment systems, which provide excellent thermal insulation and allow for efficient loading and unloading of LNG.

It is important to consider factors such as vessel age, technological advancements and environmental regulations when evaluating the LNGC fleet.

As older vessels are retired from service, new orders are placed for technologically advanced carriers that offer improved efficiency, safety and environmental performance.

The adoption of new technologies and design features helps to reduce fuel consumption and greenhouse gas emissions, contributing to sustainability efforts in the maritime industry.

The retirement of the older vessels, which are mainly steam propelled, accounts for about of a third of the existing fleet.

This transition is expected to further test the resilience of the LNG supply chain in the coming years while maintaining high prices for LNG.

In recent years, the LNGC fleet has witnessed significant growth, driven by the expansion of LNG production and the development of new liquefaction plants in various regions.

This growth is expected to continue as demand for LNG increases, particularly in Asia, where countries like China, Japan and South Korea have been major LNG importers.

The orderbook reflects this trend, with a substantial number of LNG carriers being built to cater to the anticipated demand from these markets.

It is to be noted that there are some uncertainties related to countries' commitment in pushing regulations and implementing measures to support their respective pledges to reduce GHG emissions.

With these uncertainties, investors have shied away from reaching financial investment decisions (FID) for several LNG projects.

After 2028, demand overcomes supply mainly because of a lack in investments.

Unless the energy demand is met by new renewable sources of energy, this situation might stress the global energy market further.

In conclusion, LNG will continue to play a crucial role in meeting the future global energy demand.

Its significance is amplified by recent geopolitical events and the need to enhance energy security.

By leveraging LNG as a cleaner and more flexible energy source, countries can diversify their energy supply chains and reduce their reliance on specific regions.

This, in turn, contributes to a more secure and sustainable energy future for the global community.

Strongly associated to the growth of the industry is LNG carriers. The LNGC fleet and orderbook are critical indicators of the current and future state of the LNG industry.

It reflects the investments and commitments made by companies to meet the growing demand for LNG.

By monitoring the LNGC fleet and orderbook, industry stakeholders can gain insights into the supply-demand dynamics of the LNG market and make informed decisions to support the growth and sustainability of the industry.

Saudi Arabia is catching up on energy transition goals

Saudi Arabia can become an energy transition leader by developing investments, research programmes, training and education, and incentives that help accelerate the move to electrification, energy efficiency and hydrogen use



Since the launch of SGI, 43.9 million trees have been planted

By ABDULAZIZ KHATTAK

SAUDI Arabia was named the fastest growing G20 economy in 2022 by the International Monetary Fund (IMF) in September last year, growing at 8.7 per cent, but it was also the 16th largest emitter of greenhouse gases (GHG) with a 1.5 per cent share of the global total.

The Kingdom has since 2021 moved at speed to reduce its climate impact to reach its net-zero goal by 2060, making significant progress under the Saudi Green Initiative (SGI) launched by His Royal Highness Mohammad bin Salman, the Crown Prince, Prime Minister, and Chairman of the Higher Committee for the initiative.

From 1990-2022, the country's emissions grew at a compound annual growth rate of 3.9 per cent, one of the highest in the world.

On a per capita basis, every Saudi produces 20.5 tonnes of carbon dioxide equivalent (tCO₂e), ranking the Kingdom 13th out of 191 in the world, according to the Emission Index.

The energy industry was the highest emitting sector in 2019, having produced 582 million tonnes of GHG emissions, which amounted to 80.5 per cent of the country total.

This was followed by industrial processes and waste in second and third place, producing 14.6 per cent and 4 per cent of total GHGs, respectively.

The country has long been a dominant player in the oil market, and in recent years has undergone a significant energy transition, recognising the need to shift towards renewable energy and reduce its carbon footprint.

This is visible from the country's Effective Energy Transition (ETI) score kept by the World Economic Forum (WEF).

The ETI benchmarks countries on their current energy system performance and provides

a forward-looking measure of transition readiness.

Over the past 10 years, Saudi Arabia has shown an 11 per cent improvement in its overall ETI score, the WEF's 'Fostering Effective Energy Transition 2023' report said.

Its current score of 55.3 ranks it 57th out of 120 countries, and the leader in the Middle East, North Africa and Pakistan region.

Although its sustainable ranking is making progress, there is still room for improvement, particularly in reducing energy and carbon intensity.

KEY IMPERATIVES & POLICIES

The King Abdullah Petroleum Studies and Research Center maintains that "non-oil exports are an important component of Saudi Arabia's economic diversification, as they can play crucial roles in sustainable economic development and job creation".

According to one analysis, "hydrogen production would allow Saudi Arabia to become less reliant on domestic oil as a key source of income" and would use its existing oil and gas infrastructure and supply chain networks.

Saudi Arabia's National Hydrogen Strategy, targeting 4 million tonnes per year of clean hydrogen, aims to make the country a leader in its production and export.

The Public Investment Fund (PIF) has invested in several hydrogen-related projects, including a joint venture with Air Products to build \$5 billion green hydrogen plant in the country.

In October 2022, PIF also successfully auctioned 1.4 million tons of carbon credits, making it the first voluntary carbon market in the region.

In December 2023, at the SGI Forum held in conjunction with COP28 in Dubai, Saudi

officials focused on the steadfast progress towards the Kingdom's aim to reach net-zero by 2060, highlighting the nation's contribution to global climate goals through the implementation of over 80 public and private sector initiatives representing an investment of over \$88 billion, for a greener future for all.

A statement by SGI said Saudi Arabia is on track to achieve its goal to reduce carbon emissions by 278 million tonnes per annum (mtpa) by 2030.

The Kingdom aims to achieve an optimal energy mix for electricity production by having gas and renewable energy at approximately 50 per cent each by 2030. When achieved, it will displace approximately 1 million barrels of liquid fuel currently used.

Since 2022, an additional 2,100 MW of renewable energy has been connected to the grid, bringing the total capacity of installed renewable energy to 2,800 MW (2.8 GW), generating energy equivalent to powering over 520,000 homes.

This marks a 300 per cent increase in installed capacity, demonstrating the pace at which Saudi Arabia is accelerating its energy transition.

By 2023-end, the production capacity of renewable energy projects under construction in Saudi Arabia was expected to exceed 8 GW, with an additional 13 GW of renewable energy capacity in various stages of development across multiple projects.

Saudi Arabia's efforts to transform its domestic power mix also involves several projects to reduce reliance on liquid fuel and replace it with gas to produce energy.

As of December 2023, four high-efficiency gas-fired power plants with a total capacity of approximately 5,600 MW started operation.

Additionally, in October 2023, the Saudi Pow-

er Procurement Company (SPPC) announced the winning bidders for four combined cycle gas turbine (CCGT) power plants totalling 7.2 GW in capacity, with provision for carbon capture and sequestration (CCS) readiness.

At 2021-end, gas-fired generation represented 46 per cent of Saudi Arabia's installed capacity with 41 GW and 57 per cent of its power generation with 228 TWh.

The Kingdom is also building highly efficient plants equipped with carbon capture and storage technologies, with a total capacity of approximately 8.4 GW.

As part of its ongoing investment into future-proof fuels, Saudi Arabia is progressing development on the \$8.4 billion green hydrogen plant in Neom, which is set to be the world's largest.

Several bilateral agreements were signed with international counterparts throughout 2023, with the aim of producing and exporting clean and green hydrogen.

Separately, since the launch of SGI, 43.9 million trees and shrubs have been planted and 94,000 hectares of degraded land – equivalent to over 146,000 football fields – have been rehabilitated across the Kingdom, contributing to the target to grow 10 billion trees in Saudi Arabia over the coming decades.

Over 40 initiatives are already underway, directly supporting progress towards the interim target of planting over 600 million trees and rehabilitating 8 million hectares of land by 2030.

In conclusion, Saudi Arabia can become an even stronger leader of the energy transition in the region by developing joint investments, research programmes, training and education, as well as incentives that help accelerate the move to electrification, energy efficiency and use of hydrogen.

O&G ranked in top 10 popular personal investments of 2023

By ABDULAZIZ KHATTAK

FOSSIL fuel and critical metals were amongst the top 10 popular personal investments in the US in 2023.

The list was, however, topped by gold and silver, taking first and second places, respectively.

This was revealed in a study conducted by financial publisher The Lazy Trader, which used Google search data to examine the number of searches for each type of personal investment.

Each of these was combined with terms such as 'investment tips' and 'tips' to discover which ones had the highest search volume overall, thus determining the ranking.

Oil came in third place, with an average monthly search volume of 588,808. Due to the high demand of fossil fuels, oil supplies are decreasing while the demand remains high, resulting in oil becoming a more valuable resource.

Oil has huge potential for big profits and positive return on investments (ROI), the study said.

The International Energy Agency (IEA) had expected investment in fossil fuel supply to rise by more than 6 per cent in 2023, reaching \$950 billion.

Following oil, in fourth place for personal investment, was natural gas. The commodity had an average monthly search volume of 150,880.

Natural gas is another fossil fuel that comes with its investment advantages.

It is environment-friendly and more affordable than coal and gas. With growing concerns about global warming and ways to make the planet greener, natural gas is already used in replacement of coal to reduce fuel emissions into the atmosphere (ROI).

However, these two commodities failed to beat the lustre of good old gold and silver.

The most searched personal investment in the US is gold, with an average monthly search volume of 1,191,827.



Oil offers potential for big profits

Gold is a commodity that trades based on supply and demand; the ratio between supply and demand determines the price of gold at the time of the investment.

With the elevated interest rates and the continual concerns of a recession in the US, gold can be a reliable long-term investment and outperform other assets like properties and different equities as it is easier to liquidate.

There are also tax advantages in gold investments; gold prices have increased considerably in 2023 and have shown stability compared to other markets.

Silver was the second most searched personal investment, with an average monthly search volume of 677,527.

Silver is a valuable, hard asset when it comes to investments and is cheaper to invest in than gold, while still fighting inflation.

Silver mining has gradually decreased since 2015, making it a valuable asset to invest in before it becomes a rarer raw material.

Silver is used for many different purposes from machinery to medicine, and the global demand is constantly increasing the

value of the commodity overall.

From the critical metals category, copper and platinum took the 7th and 10th spots, respectively as most sought-after personal investments.

Copper had an average monthly search volume of 69,468. It is a popular commodity, and due to the coronavirus pandemic, mining has slowed down; companies could even struggle to mine at all if the price of copper drops.

Copper can be a risky investment as it is recyclable and is less precious than other metals, yet it is used in many different industries, from building industries to automobiles.

The metal is key in renewable energy and will be essential for protecting the environment, which suggests a reliable investment in the long term.

Meanwhile, platinum, with an average monthly search volume of 34,533, remains valuable and in demand across all industries due to its non-corrosive properties and diverse use across different industries.

Platinum is an easy investment to liquidate to get cash quickly instead of stocks or bonds, which is a longer process.

In other rankings, forex was fifth, with an average monthly search volume of 85,112; real estate, with an average monthly search volume of 81,397, was sixth; options, with an average monthly search volume of 51,448, was eighth; and ranking as the ninth most popular personal investment was penny stocks, with an average monthly search volume of 41,351.

Commenting on the findings, Robert Colville, CEO of The Lazy Trader, says: "When it comes to choosing the right personal investment for yourself, it can be difficult weighing up the pros and cons.

But he adds: "It is important to be well educated on where you invest your money, as some methods will be more successful than others; make sure you have conducted extensive research and remain aware of what your choice of investments will entail."



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Unlocking treasures: KSA's \$1.3trn mineral wealth

Opportunities exist to achieve very significant growth in minerals that would make Saudi Arabia a global leader in mineral value chains

By ABDULAZIZ KHATTAK

As energy transition exponentially pushes the global demand for critical minerals, Saudi Arabia, with its vast untapped mining resources can play an instrumental role in delivering a sustainable future.

Beneath the Kingdom alone, the Arabian Shield is estimated to contain \$1.3 trillion worth of potential mineral value, across numerous commodities, including copper, phosphate, gold, iron ore and rare earth minerals.

"Opportunities exist to achieve very significant growth in minerals that would make Saudi Arabia a global leader in mineral value chains globally," said Turki Abdulrahman Al-Babtain, Saudi Arabia's Deputy Minister, Mining Development.

This year's Future Minerals Forum, which took place from January 9-11, brought together more than 16,000 participants from 145 countries to address some of the most pressing issues for the minerals sector, under the theme, 'Creating Resilient and Responsible Mineral Value Chains in Africa, Western and Central Asia'.

The Kingdom and the surrounding Super Region of Africa and Western and Central Asia has vast quantities copper, lithium, nickel, cobalt and other rare earth elements that are essential in many of today's clean energy technologies – from wind turbines and electricity networks to electric vehicles.

Take for instance the amount of minerals required in a single electric car. A typical EV battery requires approximately 8 kg of lithium, 35 kg of nickel, 20 kg of manganese and 14 kg of cobalt.

In addition, the charging infrastructure necessary to keep zero emissions vehicles on the road requires vast amounts of copper.



A yellow and brown ore stone containing copper and other minerals

Similarly, solar panels use copper, silicon, silver and zinc, while wind turbines are constructed largely from iron ore, copper, and aluminum.

Saudi Arabia is trying to attract global players to invest into its mining sector. The Kingdom has the potential to be among the top three phosphate producers in the world, in addition to increasing gold mining output by over ten times, doubling the production of steel, and expanding into new value chains of uranium, titanium, rare earth elements and niobium/tantalum.

Eng. Khalil bin Ibrahim bin Salamah, Deputy Minister of Industry and Mineral Resources for Industrial Affairs, emphasised the importance of forming a sustainable supply chain for minerals that contributes to achieving global value from mineral extraction.

He highlighted the need for fair investment in all stages of the supply chain to ensure equitable participation and stability in the medium and long term, especially in regions with significant mineral resources that the world needs.

In this regard, Saudi Arabia announced the creation of a Minerals Innovation Acceleration Park (MIAP), the first of a series of centers of excellence which will enable capacity building across the minerals value chain.

Saudi Arabia has the advantage of possessing extensive geological data. Its National Geological Database provides fully transparent, online access to 80 years' worth of geological, geophysical, and geochemical data, including thousands of detailed reports on mining targets and prospects.

It has also launched the Regional Geological Survey Programme, which is conducting new geophysical and geochemical surveys to produce a detailed map of nearly 700,000 sq km of the Arabian Shield.

The third edition of FMF witnessed the signing of agreements between a number of government agencies, companies and institutions, while new exploration sites were announced as well.

The Ministry of Industry and Mineral Resources and the Japan Organization for Metals and Energy Security (JOGMEC) signed an MoU with a special focus on the supply of vital minerals.

An MoU was also signed with Jiangxi Copper to evaluate and explore investment opportunities in the Kingdom's copper value chain, covering the initial, middle and final stages.

Furthermore, the Innovation Mining Oasis Initiative was launched in cooperation between the Ministry of Industry and Mineral Resources, King Abdulaziz City for Science and Technology (KACST), the National Industrial Development and Logistics Program, the Geological Survey Authority, the Saudi Arabian Mining Company (Ma'aden).

The first day of the forum also saw the announcement of unexplored mineral estimates, rising from \$1.3 trillion to \$2.5 trillion, and the unveiling of new incentives to boost mining exploration by about \$182 million in cooperation with the Ministry of Investment.

The forum witnessed the submission of the exploration license competition for the Jabal Sayid mineral belt, which contains a large wealth of base and precious metal ores, with an area of more than 4,000 sq km.

Also, 33 new exploration licenses were submitted through competition within the upcoming licensing rounds for 2024.

Ma'aden certified largest clean ammonia producer

Saudi Arabian Mining Company (Ma'aden), the largest multi-commodity firm in the Middle East, has been certified by the international assessor DNV as having produced 614,000 tonnes of ultra-low carbon ammonia, representing the largest quantity accredited in the world to date.

This is a significant step forward in Ma'aden's plans to grow and transform its business to become an ESG role model in the Kingdom.

This accreditation highlights Ma'aden's commitment to operational excellence and increasing its portfolio of premium products as the company positions itself in key global markets

at the same time as driving the decarbonisation of supply chains across the fertiliser industry and supporting sustainable food production.

With a world leading fertiliser business which is now the second largest exporter of phosphate fertilisers, there is significant potential for Ma'aden to consolidate its presence as a leading producer of ultra-low carbon ammonia.

This follows Ma'aden's ambitious program to ship over 138kt of blue ammonia to major global markets, including the European Union and China, signalling the company's growing activity in global value chains.

Robert Wilt, CEO, Ma'aden, said: "We are now at the forefront of supplying the world with a lower carbon fuel source that has potential to support the global energy transition. It's great to see our plans for growth and transformation not only being realised and putting Ma'aden on a sustainable path for the future, but also having the potential to help drive Saudi Arabia's green ambitions."

Geir Fuglerud, CEO of DNV SCPA, stated: "This accomplishment stands as a testament to Ma'aden's dedication to environmental stewardship and its commitment to a sustainable future. This achievement not only aligns with global sustainable developments goals but also demonstrates Ma'aden's industry leadership position in the Kingdom of Saudi Arabia."

Separately, Ma'aden and Hexagon, a global leader in digital reality solutions, have partnered to launch the Middle East's very first digital mine.

Hexagon's life-of-mine technology solutions are being successfully deployed at Mansoura Massarah mine, combining sensor, software, and autonomous technologies to enhance efficiency, productivity, quality and safety across the mine's operations.

Duncan Bradford, Executive Vice-President Base Metals and New Metals, Ma'aden, said: "This partnership strongly aligns with our digitisation strategy, as we work to use the vast amounts of data that we mine to make our mine safer and more efficient. We look forward to working closely with Hexagon to implement and utilise the region's first digital mine to elevate Mansourah Massara's operations."

Nick Hare, President of Hexagon's Mining division, said: "We are excited to help bring to life this important shift toward digitisation of the mine, one that wholistically leverages intelligent data and automation across workflows to minimise the impacts of mining while simultaneously improving safety, productivity and operational efficiency. This is about co-authoring the next chapter of mining in this region with a partner who shares in our drive toward a sustainable future."



Wilt, centre, receiving the accreditation certificate

The A-PRO system implementation resulted in several advantages for the producer, including double barrier well integrity restoration and compliance to the annulus SAP

Interwell helps SAP well maximise production

INTERWELL, a global service company providing products and services that increase integrity and performance across the lifecycle of wells, helped a major oil producer in the UAE turn around operations and bolster production using a unique autonomous sustained annulus pressure (SAP) management system.

The producer faced the challenge of shutting down a high producing well, due to high SAP awaiting workover. The well, not being connected to SCADA, raised HSE risks and required significant resources for frequent monitoring and bleed down.

Wells with sustained annulus pressure were in breach of this client's double barrier well Integrity management policy.

Some of these SAP wells are usually only flowed under dispensation, which require frequent labor-intensive monitoring and blow down activities. Wells often have to be closed in for significant periods of time, awaiting resources to blow down the

SAP reaching MAASP. The interventionless analysis of real-time data helped with understanding the severity and manageability of the SAP and the wells risk profile.

It also reduced HSE risks, the number of operation site visits

and opex, while allowing remote communication and alerts/alerts for various well and equipment conditions. This eliminated the need to close in a high producing well production and the subsequent workover.



The A-PRO ... a fully autonomous SAP management system

annulus pressure.

If the situation is so severe, that regular manual blow down is impractical, the wells are closed in for long periods awaiting workover, resulting in significant financial and HSE impact.

Interwell suggested and successfully installed PTC's A-PROTM – the Middle East's first fully autonomous SAP management system – on the well.

The highly customisable A-PRO SAP well management system, utilises double barrier VR Sense™ P&T sensor and Annulus Safety Valve technologies (HSAS).

The annulus pressure and temperature data are continuously monitored using the PTC VR Sense.

The PTC Annulus Safety valve is used to facilitate annulus pressure bleed off to the production flowline. These two components restored double barrier well integrity compliance in SAP annulus.

The associated fully autonomous control system provides warnings and alerts, and automatically manages SAP between pre-set limits.

The A-PRO triggers an alarm in both the control room and on the mobile phone, of selected operations staff once a pre-defined SAP is reached.

In the event the SAP continues to rise, but the field operators are unable to visit the well, the system will automatically bleed off the pressure to the production flowline.

Being a remote well, the A-PRO was designed to be self-contained with solar power, HPU system, GSM communication and cloud dashboards.

RESULT

The A-PRO system implementation resulted in several advantages for the producer, including double barrier well integrity restoration and compliance to the annulus SAP; real time monitoring of SAP and data storage; and automatic SAP management between preset pressure limits to avoid



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- **API 12J:** Separators
- **ASME-U:** Manufacture of Pressure Vessel
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Byrne prepares for the evolving energy sector

While energy transition pushes away from conventional rental equipment, posing logistical and financial challenges for rental companies, Byrne is taking advantage of the moment to redefine its business model and approach, Pat Fallon from Byrne tells **OGN**

By ABDULAZIZ KHATTAK

BYRNE Equipment Rental's growth in the Kingdom of Saudi Arabia is a testament to its dedication to quality service and continuous improvement.

The expansion of its rental fleet, introduction of new product categories and collaborations with leading brands underlines that commitment to providing clients with a comprehensive and cutting-edge suite of equipment rental solutions.

In an exclusive interview, Pat Fallon, Group Deputy CEO of Byrne tells **OGN** energy magazine how the company is reviewing and adjusting its current inventory to align with decarbonisation goals.

With decarbonisation now expected to gather pace in the region after the COP28 declaration, what challenges and opportunities does this bring for the region, especially in the equipment rental segment?

Following COP28, decarbonisation has become a major focus, creating a unique landscape of challenges and opportunities for the equipment rental industry.

One of the biggest hurdles is transitioning away from conventional equipment towards more sustainable alternatives, which could pose logistical and financial challenges for companies with established fleets.

However, this shift towards sustainability also presents opportunities for innovation and growth within the equipment rental sector.

Companies must navigate the challenges of adapting to the new inventory while also leading the way in providing eco-friendly solutions.

Despite the challenges posed by the current situation, Byrne Equipment Rental is taking advantage of the moment to redefine its business model and approach. We recognise the need to invest in a more diverse range of environmentally friendly equipment rental options, thereby creating a comprehensive fleet that aligns with COP28's sustainability goals.

To facilitate this transition, we plan to explore and hopefully collaborate with equipment manufacturers to develop and make available viable green alternatives.

Education is also a critical component of this change, both for our team and our clients.

Over time we aim to raise awareness about the benefits of adopting eco-friendly solutions,



Byrne is expanding its fleet of solar-powered temporary buildings and lighting towers



Fallon ... taking a sustainability approach

establishing Byrne as a leader in sustainable equipment rental.

How is Byrne responding to this and what impact will it have on the company's current inventory that may not be aligned with decarbonisation efforts?

In response to the COP28 declaration, Byrne Equipment Rental is taking a forward-thinking approach towards embracing sustainable practices.

As mentioned earlier, working on partnerships with manufacturers to hopefully integrate greener alternatives, as well as expanding our fleet of solar-powered temporary buildings and lighting towers, initially reducing our carbon footprint.

As the world moves towards a more sustainable future, Byrne Equipment Rental is committed to reviewing and adjusting its current inventory to align with decarbonisation goals.

While certain equipment may not be immediately compatible with sustainability initiatives, Byrne is committed to responsibly tackling this challenge without negatively impacting our client operations.

What has contributed to the growth of the rental equipment segment in Saudi Arabia?

Several factors have contributed to the flourishing equipment rental industry in KSA. Renting equipment is an affordable option for companies looking to access various equipment types without significant upfront investments.

It also allows businesses to scale resources quickly, resulting in increased operational efficiency.

Rental reduces ownership responsibilities while enabling adaptability to changing project requirements, ultimately mitigating risks.

For companies operating in KSA's dynamic oil and gas landscape, renting equipment is a practical and desirable option.

What are some lessons learned from camp installations – where Byrne has a track record – in the oil and gas industry?

One crucial lesson learned is the importance of flexibility. Oil and gas projects often operate in remote and ever-changing environments, demanding adaptable solutions.

Our experience has enabled us to develop a modular and customisable fleet that caters to the specific needs of each project.

This flexibility ensures that our high-quality modular camps can seamlessly integrate into diverse locations and accommodate varying project dynamics.

Scalability is another key lesson. Oil and gas projects may experience fluctuations in workforce size or operational needs.

Byrne's camp installations are designed to scale up or down efficiently, allowing our clients to manage their workforce and facilities in alignment with project requirements.

This adaptability is crucial for optimising costs and ensuring that the camp remains a valuable asset throughout the project lifecycle.

How has Byrne's fleet in KSA grown over the years?

With nine strategic depots located throughout the Kingdom, Byrne Equipment Rental has consistently grown its rental fleet over the years.

Today, we boast a diverse range of equipment that covers various categories to meet the extensive needs of our clients.

Our rental fleet of mechanical and non-mechanical comprises over 15,000 pieces of equipment.

Our commitment to providing a single source solution is reflected in the strategic growth of our rental fleet.

We regularly update and expand our inventory to keep up with the latest technological advancements and meet the ever-evolving demands of the oil and gas industry.

In order to maintain our position as a single source provider, we constantly expand not only our fleet, but also our services.

We have placed a high priority on sustainability throughout 2023 adding solar powered temporary buildings and lighting towers to reduce fuel consumption and provide eco-friendly alternatives.

Additionally, we provided battery solutions for independent power and synchronised options using the main supply power (generator/grid) that can reduce fuel consumption.

Can you share a case where you specified solutions to the client's satisfaction?

Byrne was appointed to provide a turnkey solution for a temporary camp supporting an exploration project situated in a remote location.

The challenge involved creating a comfortable and functional living space for the workforce while adhering to stringent safety and environmental standards.

Our dedicated team designed a modular camp precisely aligned with the unique needs of the project.

This installation encompassed temporary accommodation, catering facilities and recreational spaces.

The modular design allowed for swift deployment and customisation, adapting to the evolving requirements of the project.

Client feedback emphasised the successful implementation of our turnkey solution, meeting not only safety and environmental standards but also providing a comfortable living environment for the workforce.

The adaptability of our camp was a pivotal factor contributing to the client's satisfaction.



Byrne's modular camps can seamlessly integrate into diverse locations and accommodate varying project dynamics

The facility will contribute to crucial iktva program elements, including fostering collaboration, expanding local supply chain capabilities, and supporting local suppliers

HIMA inaugurates first facility in Saudi Arabia

HIMA Group, a global independent provider of safety-related automation solutions for the process and rail industries, has solidified its presence in KSA with the establishment of HIMA Saudi Arabia.

industrial safety across KSA and beyond.”

With commitment to safety as one of its guiding principles, HIMA is positioned as a global leader in protecting people, assets and the environment from harm.

As a family-owned business with safety-DNA and the vision to set the pace in the digitalisation of functional safety, HIMA is dedicated to delivering safety-related automation solutions with the highest level of reliability and unparalleled product continuity.



The inauguration event was attended by Saudi industry leaders, HIMA partners and customers

Dedicated to advancing operational safety and reliability, this strategic move aligns seamlessly with the Vision 2030 strategy and actively supports the Kingdom's localisation programmes in the industrial sector, championed by the transformative Saudi Aramco in-kingdom total value add (iktva) programme.

With over a century of experience and more than 50 years of certified safety expertise, the company established HIMA Saudi Arabia to provide the Kingdom with customised solutions that can reduce risks, increase efficiency, and ensure compliance with industry standards.

The facility will actively contribute to crucial iktva program elements, including fostering collaboration, expanding local supply chain capabilities, and supporting suppliers in-Kingdom.

HIMA Saudi Arabia will also play a vital role in advancing innovation and strengthening Saudi Arabia's position as a preferred export hub.

The inauguration event was attended by Saudi industry leaders, HIMA partners and customers.

Also present were senior management officials from Saudi Aramco, the German-Saudi Arabian Liaison Office for Economic Affairs (GESALO), and HIMA's executive management.

A ribbon-cutting ceremony, led by the senior management teams from both Saudi Aramco and HIMA, marked the official inauguration of HIMA Saudi Arabia.

Commenting on the venture, Steffen Philipp, Managing Partner of HIMA, said: "HIMA celebrated the inauguration of our first facility in Saudi Arabia, marking a significant milestone in our global leadership in safety-related automation solutions.

"With this launch, we have reiterated our commitment to the Kingdom and Vision 2030 strategy. Our mission is to support regional goals, develop local talent, and aid in the development of a safer future. HIMA Saudi Arabia will thus stand as a representation of our commitment to the aspirations of the visionary people of Saudi Arabia."

Meanwhile, Jorg de la Motte, CEO of HIMA, said: "The opening of HIMA Saudi Arabia marks a significant step in our efforts to elevate industrial safety in the region. The expansion highlights our steadfast commitment to offering security and convenience to our clients with first class safety technologies and services, while also aligning with the ambitious goals of Vision 2030. We will continue to reinvent our offerings and hope to shape a future characterised by collaborative development and transformative safety solutions."

On his part, Andrew Dennant, Vice-President of HIMA Middle East, said: "With our extensive knowledge of the industry, applications, cybersecurity, and innovative products, we are committed to better understanding and catering to the evolving needs of our customers. Our new facility is therefore designed to act as a key enabler in attaining these ambitious goals. We look forward to leveraging our industry expertise and collaborating with our partners and customers to shape the future of

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Zeeco ultra-low-NOx burners overcome H2 fuel challenges

The company's radiant wall burner design is capable of firing more than 90 per cent hydrogen fuel gas combinations while producing less than 100 mg/Nm³ NOx emissions, writes Eric Pratchard, Director, Burner Products for Zeeco

RISING fuel costs, new regulations requiring carbon footprint reductions, and global net-zero carbon initiatives continue to pressure the refining and chemical industry markets.

The two main methods to reduce CO and CO₂ emissions are capturing and sequestering the carbon in the fuel gas or removing carbon from the fuel before firing.

Many organisations are considering refuelling existing fired equipment with sustainable, low-carbon fuels such as hydrogen (H₂).

As H₂ displaces hydrocarbons in the fuel composition, carbon atoms decrease. A fuel stream composed of 100 per cent H₂ cannot generate CO or CO₂ as a by-product of combustion due to the lack of carbon in the combustion reaction.

Therefore, the higher the H₂ content of a fuel, the lower the overall CO and CO₂ emissions – but not without some design modifications.

DESIGN CHALLENGES

Most fired heaters and process furnaces today were designed for firing natural gas or refinery fuel gases that contain a high proportion of saturated hydrocarbons with a make-up of hydrogen, inert gases, and traces of other compounds.

Typical hydrogen content for refinery fuel gas may vary between 20–40 per cent by volume.

When using hydrogen as a primary fuel, H₂ concentrations of 90–100 per cent are probable, changing the operating parameters of the burner.

Firstly, the laminar flame speed of hydrogen is significantly higher than that of hydrocarbon fuels, promoting a more rapid combustion process and increased heat release per unit volume.

For example, the flame speed in H₂ combustion is approximately 5.7 ft per second (ft/s), while the flame speed of natural gas is significantly slower at only 1.3 ft/s.

H₂ firing has a higher stoichiometric adiabatic flame temperature of 3,960 deg F, while natural gas has an adiabatic flame temperature of 3,518 deg F (Combustion – Second Edition by Irvin Glassman, 1987). These characteristics require engineers to evaluate the materials used in burner construction and the type of burner used.

The increased flame temperature of H₂ requires upgrading the steel used for nozzle construction, throat construction, and flame stabilisers to a higher grade stainless or alloy.

Refractory used within the burner should be carefully evaluated, and its composition modified to withstand the elevated temperatures characteristic of H₂ firing.

Increasing hydrogen content in the fuel gas lowers the specific gravity of the fuel, causing the fuel gas mass flow rate to decrease.

Consequently, increasing the fuel gas pressure is often necessary to achieve the same burner heat release.

• **Retrofit burners for High H₂ firing:** The higher adiabatic peak flame temperatures present when firing high hydrogen fuels lead to elevated temperatures local to the flame, which directly increases NOx emission rates by up to a factor of three.

Employing ultra-low-NOx burner technologies can help to remain within legislative NOx emission requirements when firing high H₂ fuel.

• **Ultra-low-NOx diffusion burners:** The



Pratchard ... innovating to reduce carbon footprint

Zeeco ultra-low-NOx Free Jet burner utilises internal flue gas recirculation to precondition the fuel gas with inert products of combustion prior to mixing with combustion air.

The reconditioned fuel mixture prolongs the combustion reaction, thus reducing peak flame temperature and thermal NOx production.

Without steam injection or post-combustion emissions control, this burner can achieve NOx emissions of less than 50 mg/Nm³ on 90 per cent hydrogen fuel.

To achieve this, discrete high-velocity jets of gas are injected through a ring of gas tips on the outside of the tile.

The gas jets help to counteract the high flame speed of hydrogen flames, ensuring a stable and robust flame over a wide operating range.

Another consideration when firing high hydrogen fuel gas is using a burner with low-mass gas tips.

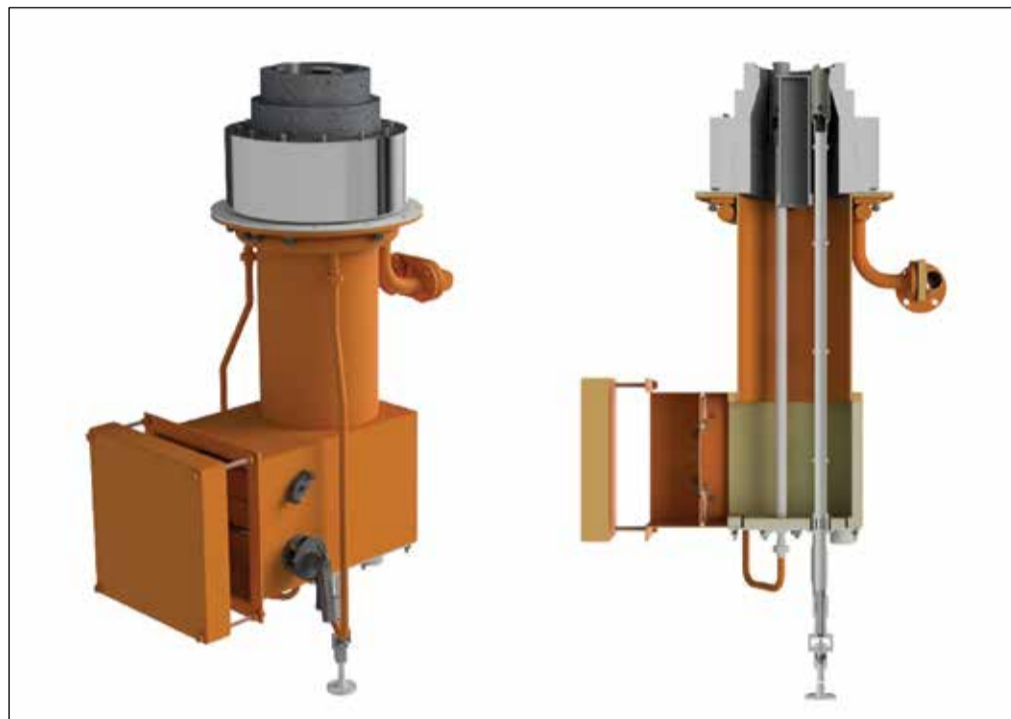
In the Zeeco Free Jet burner example, the gas tips protrude through the furnace floor by approximately 25 mm, significantly reducing the thermal intensity over the gas tip profile.

This means the gas tips are suitably designed to withstand the elevated temperatures characteristic of hydrogen firing with an extended operating life.

• **Ultra-low-NOx pre-mixed radiant wall burners:** Pre-mixed radiant wall burners,



A Zeeco ProFlame scanner ... an example of a UV spectral range scanner that can reliably detect hydrogen flames



Isometric and cutaway views of a Zeeco FreeJet burner showing staged fuel risers to create the necessary turbulence and mixing zone necessary for counteracting the high speed of hydrogen flames

commonly used in ethylene-cracking furnaces, present a different challenge when firing high hydrogen fuels due to the propensity for a flashback.

Because of this, burner designers must consider the flammability window and flame speed of each specific fuel composition.

The flammability window of pure methane is between 5 per cent and 17 per cent, with a flame speed of 1.3 ft/s.

This means that when mixed with air at a concentration between 5 per cent and 17 per cent, methane will support combustion at that speed.

The flammability window for hydrogen is between 4 per cent and 74 per cent, with a flame speed of 5.7 ft/s.

As the industry pushes hydrogen concentration higher, it becomes increasingly difficult to design burners with exit velocities to overcome this flame speed increase while also operating efficiently on natural gas.

The flame will propagate inside the burner if the designer gets this balance wrong.

Known as flashback, this can be detrimental to the mechanical integrity of the burner com-

ponents and thermal NOx emissions levels.

To overcome this challenge, Zeeco developed a radiant wall burner design capable of firing more than 90 per cent hydrogen fuel gas combinations while producing less than 100 mg/Nm³ NOx emissions.

This burner design utilises a proprietary fuel staging design that produces two separate mixture zones exiting the tip, allowing the burner to generate the exit velocity needed in the lean zone to prevent flashback while delaying combustion in the rich zone long enough to mix fuel with inert flue gas products.

This burner can be retrofitted in existing ethylene furnaces for firing high H₂ fuels even in challenging furnace applications with extremely tight burner-to-burner and burner-to-tube spacing, still meeting the less than 100 mg/Nm³ emissions requirement.

FLAME SCANNERS

Conventional flame scanners are configured to detect combustion radiation in the UV, visible, and IR spectrum.

When firing high hydrogen fuels, the absence of carbon means the spectral range of radiation produced by the combustion process is significantly narrowed and shifted towards the UV spectrum.

For scanners utilising the UV spectral range only for flame detection (no IR component), peak response occurs at the OH-radical emission wavelength.

Therefore, the absence of carbon in the flame does not impede the scanner's ability to detect radiation from the target burner nor cause nuisance trips.

One example is Zeeco's ProFlame scanners, which can reliably detect 100 per cent hydrogen flames, a critical furnace safety interlock when firing high hydrogen fuel.

The burner flame may become much shorter when firing high hydrogen fuels due to increased flame speed.

Therefore, sighting the flame scanner properly is essential to ensure it is aligned with the target flame.

This will reduce the chance of unwanted background signals being detected by the flame scanner.

The venture will allow manufacturing and assembly of air dive systems, power packs, and scuba replacement units in Saudi Arabia, resulting in substantial local workforce utilisation

Unique Group expands with latest KSA facility

By ABDULAZIZ KHATTAK

IN tandem with the global rush of international companies towards Saudi Arabia, drawn by its status as one of the fastest-growing markets among the G20 economies, Unique Group, a global leader in subsea technologies and engineering has announced the grand opening of its newly expanded facility in Dammam, Saudi Arabia.

This strategic multi-million-dollar investment and expansion initiative signifies a pivotal milestone for Unique Group, following years of collaboration with key partners such as Aramco, NEOM, National Center for Wildlife (NCW), King Abdullah University of Science and Technology (KAUST), General Authority for Survey and Geospatial Information (GEOSA) and Red Sea Global, both directly and through contractual engagements.

Aligned with the Kingdom's Vision 2030 for growth and development, Unique Group's enhanced presence in the Saudi Arabia underscores its commitment to delivering cutting-edge solutions that propel the local industry forward.

This endeavour seeks to bolster the objectives of the 'Made in Saudi Arabia' initiative, which is geared towards bringing the production and assembly of Unique Group's distinctive subsea technologies and engineering to the local forefront. By doing so, it not only fosters job localisation but also positions Dammam as a pivotal hub for the industry.

Notably, 50 per cent of the manufacturing and assembly of air dive systems, power packs, and scuba replacement units will be completed in Saudi Arabia, resulting in a minimum of 40 per cent local workforce utilisation.

The newly inaugurated facility occupies 2,000 sq m and is equipped to handle a diverse range of equipment, including survey tools, unmanned surface vessels (USVs), diving and life support solutions, buoyancy and water weights equipment available for both sale and rental.

The facility also extends its offerings to encompass lifting and mooring products and services, the first of its kind in the region.

Under the umbrella of lifting and mooring, the facility is poised to offer calibration and servicing for leading brands, bolstering the availability of cutting-edge technology within the local market.

It also hosts Saudi Arabia's largest dynamic winch test bed with a static pull capacity of 600 tonnes and a dynamic live load test capability of up to 40 tonnes.

Commenting on the expansion, Sahil Gandhi, CEO of Unique Group, says: "The strategic expansion of our operations in Saudi Arabia signifies a pivotal moment for Unique Group, as we introduce the lifting and mooring solutions division and initiate the local assembly of diving equipment. This initiative underscores our unwavering commitment to addressing the distinctive requirements of our clientele in the region."

The establishment of the state-of-the-art workshop in Dammam serves as a tangible demonstration of Unique Group's dedication to cultivating robust partnerships with esteemed collaborators in the region.

Noteworthy is the fact that this facility sets an industry benchmark, offering a comprehensive turnkey solutions package that is unparalleled in its rarity.

Gandhi further says: "We are confident that these strategic initiatives will significantly elevate our support to clients in Saudi Arabia, enabling us to address their challenges comprehensively through the delivery of high-quality products, integrated services, and cost-effective solutions. This milestone not only marks a pivotal moment in the continual advancement of our company but also contributes to the growth and prosperity of the Kingdom."

Unique Group boasts a two-decade-long collaboration with prominent governmental authorities, universities, and marine hydrographic survey organisations in the Kingdom of Saudi Arabia (KSA).

These enduring partnerships have been cultivated through the successful execution of large-scale projects, serving as the cornerstone for pioneering developments in the Red Sea region and Neom.

Unique Group was a successful partner with General Authority for Survey and Geospatial Information (GEOSA), where some members of GEOSA emphasise the significance of this collaboration, stating: "Unique Group has been a longstanding partner for our projects. Their unwavering commitment to excellence and cutting-edge technology has been pivotal in several of our successful work initiatives. We appreciate Unique Group's dedication, expertise, and the high-quality solutions they consistently provide, contributing significantly to the advancement of our marine business and geospatial information objectives."

The strategic investment in this cutting-edge facility is underscored by key partnerships and alignment with the Saudi Vision 2030, reinforcing Unique Group's commitment to enhancing local capabilities and technological innovation.



The inauguration of Unique Group's expanded facility

The facility reflects its dedication to delivering top-notch solutions in harmony with the Kingdom's aspirations for diversified growth.

Looking ahead, Unique Group remains steady

fast in its commitment to nurturing local talent, contributing to economic prosperity, and advancing technological frontiers within the vibrant community of Dammam.



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