

Oil Review

Oil · Gas · Petrochemicals

Middle East

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The business benefits of diversity and inclusion

- A sustainable future for Gulf petrochemicals
- Disrupting oil and gas with AI
- Pumps for energy efficiency
- Meeting business goals with autonomous agents
- The pipeline coatings market

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→ Editor's note

IN THIS ISSUE we focus on promoting diversity, equity and inclusion in the energy industry, and the business benefits a more diverse workforce can bring. Women currently account for only 22% of the workforce in the oil and gas sector, and 32% of the renewable energy sector. Clearly there is room for improvement, and with current shifts in the industry, there is much opportunity to energise the DE&I agenda (p20). We also hear from two inspiring women who have blazed a trail in the oil and gas sector – Dr Amani Musharah, Saudi Aramco and Salma Al Hajeri, Mubadala Petroleum – both of whom are outstanding role models for women looking to enter or advance further in the industry (p22).

Our article on p18 highlights the increasing focus of petrochemicals and chemicals companies on environmental sustainability and the increasing adoption of circular economy principles, while our technology section covers a wide range of topics including cyber resilience, pipeline coatings, the role of augmented reality (AR) in oil and gas, and energy-efficient pumps.

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Front cover image: Adobe Stock

→ Executives' Calendar, 2022

MAY			
2-5	Offshore Technology Conference (OTC)	HOUSTON	https://2022.otcnet.org
10-12	Med Energy Conference & Exhibition (OMC)	RAVENNA	www.omc.it
10-12	ME-TECH 2022	DUBAI	www.europetro.com/event/380
16-17	Middle East Petroleum & Gas Conference	MANAMA	www.mpgc.cc
SEPTEMBER			
5-8	Gastech	MILAN	www.gastechevent.com
5-8	SOGAT	ABU DHABI	www.sogat.org
6-7	MENA HSE Forum	DUBAI	www.hse-forum.com
OCTOBER			
4-6	Energy Intelligence Forum	LONDON	www.energyintelligenceforum.com
30-3 Nov.	ADIPEC	ABU DHABI	www.adipec.com
NOVEMBER			
TBC	Leadership Excellence Awards & Symposium	MANAMA	www.lewa-symposium.org

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

ME-TECH 2022 to discuss the latest refining and petrochemical developments

ME-TECH 2022, THE premier technical downstream event in the Middle East, will take place from 10-12 May at Address Dubai Marina Hotel, Dubai.

ME-TECH 2022 will bring together leading refining and petrochemical professionals to network and share valuable knowledge on the very latest industry innovations, market trends, challenges and the opportunities that come with them.

The event is designed especially for the region's refiners and petrochemicals producers, taking into account the specifics of the region with its challenges and opportunities that currently exist and that may present themselves in the future.

Through interactive panel discussions, presentations and case studies, ME-TECH 2022 will:

- Provide a platform to bring the region's industry together to reflect on the last 24 months, share lessons learned and present future ambitions
- Deliver the latest global market overviews, investment trends and projected growth, presented by the leading consultants
- Focus on the continued importance of integration for competitive advantage
- Share the latest technology updates – options for maximising conversion and meeting evolving demand

The event is designed especially for the region's refiners and petrochemicals producers.

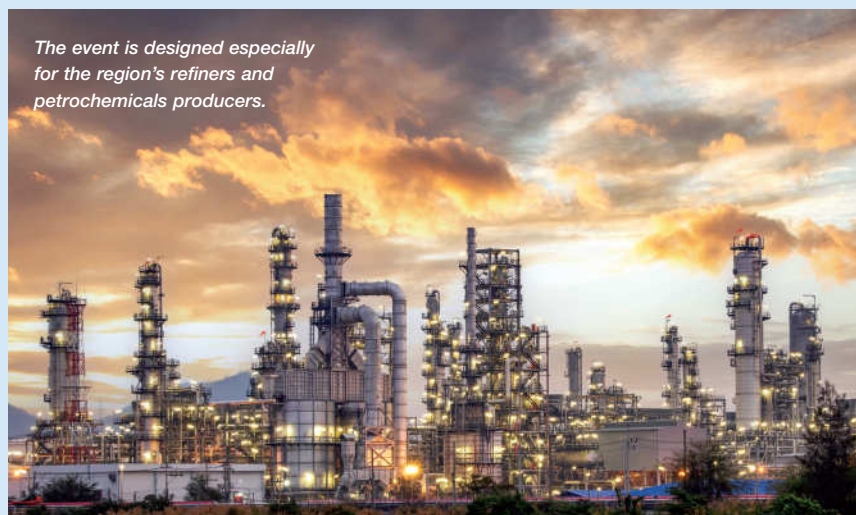


Image Credit: Adobe Stock

- Discuss the impact of the energy transition – from big oil to big energy and the road to 2050.
Topics include the role of the downstream sector in the energy transition; refining/petrochemical integration; asset configurations and conversion technologies; boosting production flexibility, diversification, reliability and efficiency; petrochemical production and chemical recycling; feedstock availability and supply chain

management; adapting technologies for the new refining and petrochemical landscape; low carbon and emission reduction technologies; catalyst technologies; incorporating renewable, biofuels and maximising co-processing strategies; project financing; and digital tools and technology.

For further information and to register, go to the website at <https://europetro.com/event/380>

Diverse perspectives: transitioning towards a carbon-constrained world

THE 29TH ANNUAL Middle East Petroleum & Gas Conference (MPGC 2022) takes place at the Four Seasons Hotel, Bahrain Bay, from 16-17 May 2022.

MPGC 2022 will be held under the Patronage of H.E. Shaikh Mohammed Bin Khalifa Al-Khalifa, Minister of Oil for the Kingdom of Bahrain, and will provide the options for both virtual and in-person attendance in Bahrain.

Ministerial addresses will be given by H.E. Shaikh Mohammed bin Khalifa Al-Khalifa, Minister of Oil for the Kingdom of Bahrain, and HRH Prince Abdulaziz bin Salman, Minister of Energy, Kingdom of Saudi Arabia.

The 29th annual event will address the continuing uncertainty in the global oil markets while coping with both disruption and changes driven by the pandemic, namely the growing energy transition momentum, the OPEC+ response, the return of Iranian supplies and a rebound in US growth. Forecasts of peak oil demand growth in the 2030's, entry of new Middle East refining capacity, emerging petrochemical dynamics coupled with



Image Credit : Adobe Stock

The conference will take place in Bahrain.

prospects of the oil and gas ecosystem shifting to a lower carbon future will underscore discussions at MPGC, against a backdrop of a shortage of LNG supplies and the prospects for the Gulf LNG markets. The long-running annual oil and gas industry gathering will once again deliver a high-level programme that comprises ministerial and keynote addresses, incisive discussion panels with industry visionaries and leaders, audience polls and networking opportunities.

MPGC Week 2022 will bring together four events, with the 29th Annual MPGC as the

anchor for the week, with executive briefings on crude oil and LNG, as well as a technical workshop on gasoline and diesel blending.

More than 450 participants from 25 countries are expected to attend MPGC Week 2022. All events are organised by Conference Connection and co-hosted by the Ministry of Oil, Bahrain, Bapco and no holding in association with key industry players.

Other events

Other events include the 15th Annual Middle East Gas Insiders Briefing, 15 May 2022, a one-day executive briefing on gas/LNG markets, presented by FGE; the Gasoline & Diesel Blending Course (GDB), 17-19 May 2022, a three-day course on gasoline and diesel blending techniques, presented by RAIL; and the 28th Annual Middle East Petroleum Insiders Briefing, 18-19 May 2022, a two-day executive briefing on the upstream and downstream oil markets, presented by FGE.

For further information see the website at www.mpgc.cc



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Optimising HSE and ESG strategy

The renowned MENA HSE Forum returns to Dubai in September, featuring the leading lights of health and safety from the region's foremost companies and organisations.

INDUSTRY LEADERS FROM key sectors including oil and gas, construction and tourism will convene along with regulatory authorities for the seventh edition of the MENA Health, Safety & Environment Forum, taking place in Dubai from 6-7 September 2022.

ADNOC, Petrofac, Aramco, KOC, AMAALA, Dubai Municipality, EGA, Abu Dhabi Waste Management Center (Tadweer) and Dubai Holding among others, will deliver keynote presentations to more than 200 stakeholders from the HSE community in UAE, Saudi Arabia, Kuwait, Qatar, Oman and Bahrain.

The MENA HSE Forum is the annual meeting point for MENA regulators, HSE practitioners and solution providers to come together to discuss current HSE developments and define their health, safety and environment strategy for a sustainable future. Attendees will receive insights on all the latest HSE trends and critical new technology, network with peers and industry partners, meet expert suppliers and industry bodies and lay the groundwork to achieve the fundamental HSE targets that matter most to the region.

Khushboo Narang, the conference producer, said, "This industry-leading conference will give unique access to expert analysis coupled with unrivalled business development opportunities in a brand new format, specifically designed to help the GCC's most important organisations embrace and achieve a safe and sustainable future."

Conference agenda

The conference agenda will comprise five sessions:

- Role of HSE leadership in crisis and business continuity management
- Future of digitalisation in the HSE sector
- Process safety and its framework
- Learning from the pandemic and other global transformations about occupational health and behavioural safety
- Sustainable value creation: how ESG moved from a cost centre to a value driver.



Image Credit: Alain Charles Publishing

The HSE Forum returned to a live format in 2021.

Two exclusive breakout workshops will cover the formulation of resilient safety cultures, and digital transformation – from strategy to execution.

Speakers set to present at the MENA HSE Forum 2022 include Tahir Azhibek, corporate HSE manager, ADNOC; Lynn Hobballah, head of health and safety, Petrofac; Dr Naseem Mohammed Rafee, director of health and safety department, Dubai Municipality; Eng Raed Mohammed Al-Marzooqi, manager of

studies and system section, health and safety department, Dubai Municipality; Dr Eng Hani Hossni, EHS director, Tadweer; Brian Maynard, HSE director for AMAALA; Saleh Ali Albalushi, HSE director, Dubai Holding Asset Management; Salman Abdulla, executive vice president, EHSQ & Sustainability, Emirates Global Aluminium; and Dr Essam Hassan, senior environmental consultant, Egyptian Environmental Affairs Agency and KGESS.

Saleh Ali Albalushi commented, "I can see many companies embedding HSE, not just for operational or corporate reasons, but because HSE is evolving. Discussions and forums like this will help drive the importance of HSE to businesses." ■

You can find out more and register at www.hse-forum.com/mena/conference-brochure

“Discussions and forums like this will help drive the importance of HSE to businesses.”



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The role of safety culture

In advance of the MENA HSE Forum, Wael Amin, head of HSE at Kuwait Energy Egypt, discusses the importance of implementing an effective safety culture.

What is safety culture?

There are many contemporary definitions of safety culture. Most are taken from the one given by the Advisory Committee on Safety back in the 1980s which defines it as, "The product of individual and group values, attitudes, competencies, perceptions and patterns of behaviour that determines the commitment to, and the style and proficiency of an organisation's health and safety management."

According to OSHA, "Safety cultures consist of shared beliefs, practices, and attitudes that exist at an establishment. Culture is the atmosphere created by those beliefs, attitudes, etc., which shape our behaviour".

How important is it to create an effective safety culture?

To know clearly the importance of safety culture in the work place we should firstly note the following:

The International Labor Organization (ILO) reports that there 2.3mn deaths a year around the world as a result of workplace incidents and work related ill-health. Globally that is an average rate of 13 deaths/100,000 workers. In developed countries the rate lies between 0.5 and 3.5 deaths/100,000 workers, while in emerging economies such as sub-Saharan Africa, Latin America and southern Asia the rate rises sharply to around 19 deaths/100,000 workers. Beyond the human tragedy, the economic cost of workplace accidents amounts to around 4% of GDP. Before the Health and Safety at Work act was



Wael Amin, head of HSE, Kuwait Energy Egypt.

Image Credit: Kuwait Energy Egypt

introduced in the UK in 1974, deaths resulting from workplace accidents were averaging around 650 each year. By 2016/2017 the number had fallen to less than a quarter of this, to 137 deaths.

A strong safety culture ensures that a high level of standards is set for all safety processes. The organisation sets strict processes for reporting, inspections, training and overall safety management. A safety culture is an organisational culture that places a high level of importance on safety beliefs, values and attitudes – and these are shared by the majority of people within the company or workplace. It can be characterised as 'the way we do things around here'.

How would you go about developing a good safety culture, and what factors are necessary for success?

- Treat safety as a core value, and not just a priority. Core values are what you live and breathe every day
- Management commitment – strong management commitment includes effecting prompt and attentive participation in all layers (layered safety interactions), so the safety management system (SMS) becomes more than just a formal exercise to demonstrate compliance with the law. The company actively cooperates at each level in achieving common values and objectives concerning the production operation
- Empowerment – empower individuals to successfully fulfill their safety

responsibilities to themselves, their family, and their coworkers

- Communication – ensure two-way communications and feedback, both top-down and bottom-up
- Continuous improvement – are we better than we were yesterday?

What are the main challenges to creating and maintaining a good safety culture?

- Safety is seen as a barrier rather than a value, and the main focus is on profit
- Autocratic and heavy-handed leadership
- Lack of trust, mainly because of a punitive culture
- Lack of reporting with very few reported incidents/concerns/near misses
- Poor work monitoring and review; performance indicators, audit findings, incident reporting are not used for analysis of SMS effectiveness and for organisational learning
- Poor competence of managers at any level to manage risk.

How does safety culture tie in with the safety management system?

A strong safety culture is generally considered as a vital condition to a well-functioning safety management system. This means that you will never have an effective safety management system (policies, procedures, formal plans, deal with risk and safety-related information) without having the safety culture (shared values, beliefs and attitudes about safety, etc.) in place. ■



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NESR awarded US\$300mn integrated conventional fracturing contract by Saudi Aramco

NATIONAL ENERGY SERVICES Reunited Corp (NESR), an international, industry-leading provider of integrated energy services in the Middle East and North Africa region, has announced that the company has been awarded a major contract for integrated rigless stimulation and testing services (conventional fracturing) in Saudi Arabia.

The contract is for a period of three years with an option to extend it to two years and is worth approximately US\$300mn, covering fracturing, testing, wireline, coiled tubing, slickline services and all associated chemistry, logistics and site services to conduct these operations.

NESR CEO and chairman Sherif Foda said, "We were the first national service provider in the region to successfully execute multiple integrated stimulation projects across the region and we are extremely proud to have been selected among a shortlist of service providers for this flagship fracturing award. We look forward to delivering innovative processes and technologies to take this project to the next level as our client leads the way in technology adoption."



Image credit: NESR

Sherif Foda, CEO and chairman, NESR.

Eni and Sonatrach to increase gas supplies from Algeria through TransMed pipeline

IN THE PRESENCE of the Algerian President Abdelmadjid Tebboune and the Italian Prime Minister Mario Draghi, the president of Sonatrach, Toufik Hakkar, and the CEO of Eni, Claudio Descalzi signed in Algiers an agreement that will allow Eni to increase the quantities of gas imported through the TransMed / Enrico Mattei pipeline under the umbrella of the long term gas supply contract in place with Sonatrach starting from the next autumn, confirming the strong cooperation between the countries. The agreement will exploit the pipeline's available transportation capacities to ensure greater supply flexibility, allowing for increasing volumes of gas – up to 9bn cubic metres per year in 2023-24.

The signing took place during the visit of the Italian Prime Minister to Algeria, which also included the signature of a wider letter of intent to strengthen cooperation in the energy field.

The new gas volumes covered by the agreement reflect the close collaboration in the development of upstream gas projects, leveraging Eni's distinctive fast track model, which is bringing a significant acceleration to the production potential of the Algerian fields.

Descalzi commented, "Today is a special day for the relations between Italy and Algeria, in particular for Eni and Sonatrach: thanks to the close, long-standing collaboration between the two companies, it was possible in a short time to sign this important agreement that further consolidates the partnership between the companies and strengthens the cooperation between our countries."

Besides its ambitious exploration and development programme, Eni is assessing opportunities in the fields of renewables, hydrogen, CCUS and bio-refining, in line with its commitment to achieving carbon neutrality by 2050.

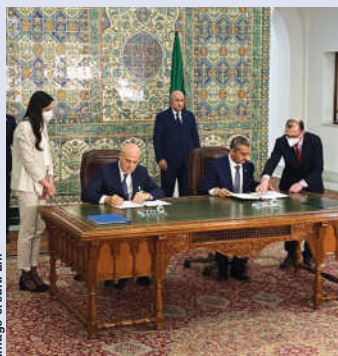


Image credit: Eni

This agreement will allow the exploitation of the pipeline's available transportation capacities to ensure greater supply flexibility.

In another development designed to strengthen its cooperation with North Africa, Eni has signed a framework agreement with Egypt's EGAS, to boost gas production and LNG exports. The agreement aims to promote Egyptian gas export to Europe, and specifically to Italy, in the context of the transition to a low carbon economy.

The parties agreed to increase jointly-operated gas activities and identify opportunities to maximise short-term gas production. Eni will also optimise the exploration campaigns in existing blocks and in the newly acquired acreage in the Nile Delta, Eastern Mediterranean and Western Desert regions. Eni has recently announced new oil and gas discoveries in the Meleiha concessions, in Egypt's Western Desert, for approximately 8,500 boepd.

This agreement, together with the one signed for the restart of Damietta liquefaction plant last year, will provide LNG cargoes for overall volumes of up to 3bcm in 2022 for Eni's LNG portfolio bound for Europe and Italy.

Searcher announces partnership with Oman MEM

SEARCHER, A LEADING multi-client data and service provider, is pleased to announce it has entered into a strategic partnership with the Ministry of Energy and Minerals of Oman (MEM) to acquire several new seismic surveys and reprocess legacy seismic data, both offshore and onshore Oman.

Reprocessing of the offshore legacy data in the Sea of Oman has commenced already and DUG Technology have achieved extraordinary uplift by applying a modern broadband processing sequence with diligent multiple removal technologies. Improving the imaging of the remarkable geology offshore Oman is both resolving uncertainties in the thrusts and fold belt plays and imaging the hitherto illusive stratigraphy below the decollement surface. These insights are revealing an

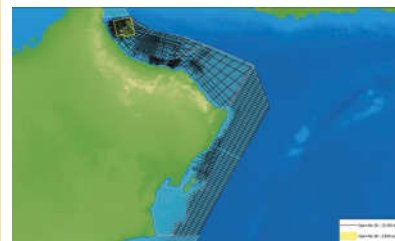


Image credit: Searcher

The offshore Oman 2D and 3D rectification project is already completed.

exciting oil prospectivity with unexplored yet significant resource potential. Searcher envisage that the whole 2D and 3D dataset will be reprocessed in this cooperation with MEM, in addition to acquisition of new 2D and 3D seismic in 2022/23.

The offshore Oman 2D and 3D rectification project is already completed, consisting of 32,000 km of 2D plus 2,500 sq. km of 3D legacy data which has been rectified using Searcher's proprietary post-stack reprocessing method. This resolves issues with navigation, metadata, amplitude, phase and time-shifts. The offshore Oman 2D and 3D Rectified Surveys are available via Searcher's on-demand platform, sAlismic which hosts global rectified seismic data as a subscription service.

Dr Neil Hodgson, VP Geoscience at Searcher said, "Our priority is to focus on the exciting offshore basins where we see significant prospectivity. Together with MEM we will reprocess legacy data and acquire new seismic to reveal new insights into the hydrocarbon system and bring new investors to this oil-rich region."

ComboCurve bolsters growth with additional funding

COMBOCURVE, A CLOUD-BASED energy analytics and operating platform, has raised US\$50mn through a Series B funding round led by Dragoneer Investment Group and Bessemer Venture Partners.

The Series B capital raise, which comes soon after its Series A funding less than six months ago, confirms ComboCurve as one of the fastest growing technology companies in the energy industry. The additional capital will allow it to accelerate the core product enhancements while expanding into other workflows, including greenhouse gas emission forecasting, scheduling, and modelling of renewable energy sources.



Image credit: Adobe Stock

The additional capital will allow ComboCurve to accelerate the core product enhancements while expanding into other workflows, including greenhouse gas emission forecasting,

ComboCurve has become one of the main energy operating platforms of choice, boasting 650% year-over-year growth and more than 170 customers with a collective enterprise value exceeding US\$600bn.

Armand Paradis, CEO and co-founder of ComboCurve, remarked, "ComboCurve was created to solve critical pain points, helping energy companies better manage their forecasting, valuation, reporting and decision-making functions. Our solution has resulted in widespread adoption by many of the world's leading energy companies, and this investment led by Dragoneer and Bessemer, two of the world's leading technology investment firms, will enable us to engage with additional energy companies to operate more efficiently."

ComboCurve's platform unlocks the power of its clients' data with sophisticated software to forecast and report the performance of energy assets and run scenarios with thousands of assumptions in a matter of minutes. Executing on a broader roadmap, ComboCurve's mission is to become the software for energy asset management, including renewables.

Carbon flaring emissions drop, but experts anticipate rebound

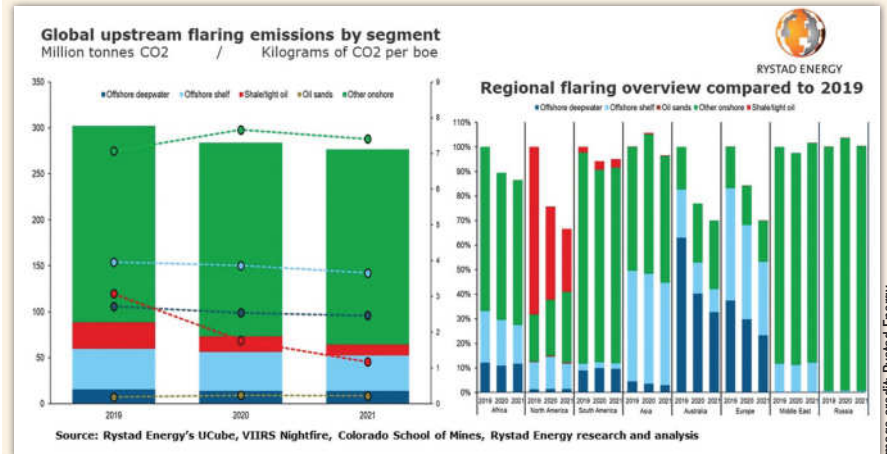


Image credit: Rystad Energy

ACCORDING TO RYSTAD Energy research, gas flaring activity in the global upstream sector sank to a 10-year low last year driven, primarily, by improved productivity, increased environmental awareness and lower fuel demand caused by Covid-19 lockdowns and resultant travel restrictions.

Upstream flaring emitted around 276mn tonnes of CO₂ in 2021 which is down marginally from 283mn tonnes in 2020. These estimates indicate a continued downward trend since the onset of the pandemic.

A significant driver of the decline in flaring activity is improvements in the US shale sector. The tight oil sector, which is dominated by the US, flared the equivalent of around 12mn tonnes of CO₂ in 2021— less than half of the 30mn tonnes recorded in 2019.

In Africa, improvements in the offshore market are particularly positive from a climate perspective. Most notably, there have been significant reductions recorded in Algeria, both in upstream flaring activity and performance. A continental production decline, alongside reduced output from mature offshore wells, has also helped lower the continent's environmental impact associated with flaring.

Despite this welcome, positive trend, a rebound in flaring is likely. The continued global relaxation of Covid restrictions is driving an increase in fossil fuel demand and, due to sanctions on Russian after the invasion of Ukraine, supply remains tight.

Dzenana Tiganj, analyst at Rystad Energy, commented, "Flaring represents around 30% of the total carbon dioxide emissions produced by the oil and gas industry, and the practice has come under increased scrutiny over its environmental impact in recent years. Even with the backdrop of the pandemic and supply decline, there are still signs that the latest improvements could be partially sustained."

Although a rebound is expected, it is important to note that many exploration and production players have set ambitious targets to end flaring. bp, for instance, has led on this front by implementing improved practices at the well start-up phase and has optimised flaring set points to comply with environmental targets and increase fuel efficiency. This has led to the UK becoming recognised as a key driver of flaring reduction efforts.

Through satellite data estimation, Rystad Energy detects and tracks flaring activity globally with analysis showing that global flaring reduction efforts have not seen any significant effect as flaring activity has remained relatively flat for the past 10 years. However, 2020 marked a step in the right direction, and the 2021 estimate indicates that the trend is continuing.

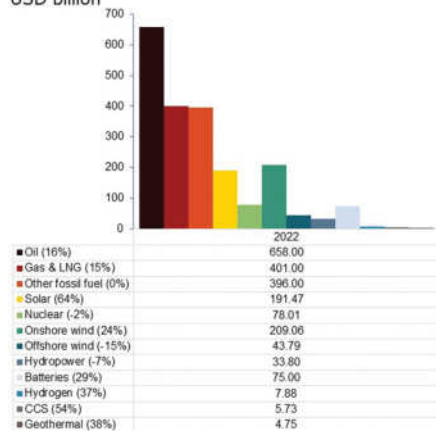
The shale sector's downward momentum of flaring activity is the most striking reduction in recent years. On a per barrel of oil equivalent (boe) basis, tight oil flaring has dropped by 60% from 2019 to 2021. Other onshore production flaring continues to stand out, with flaring intensity exceeding 7 kg of CO₂ per boe in 2021. The other supply segments show very marginal, almost flat developments.

Rystad Energy's research indicated that, in comparison to pre-pandemic flaring volume levels, Africa, North America, Australia and Europe showed persistently decreasingly flaring activity. Other regions have remained flat.

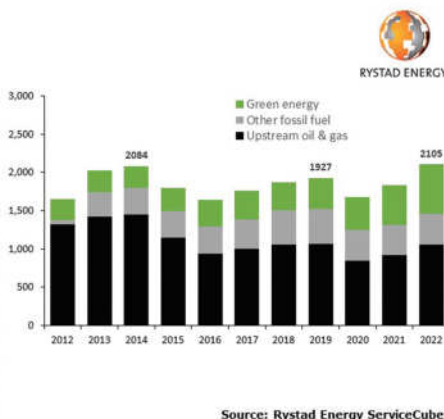
While regional developments showcase the global effort to reduce flaring on multiple fronts, the major contributors to global upstream flaring remain the same: Russia, Iraq, Iran, Venezuela, Nigeria, the USA, Algeria, Mexico, Libya and Chile. Combined, these countries represent more than 70% of global upstream flaring emissions.

Global energy spending set to reach record high, led by oil and gas

Forecast energy industry spending in 2022 by sub-sector
USD billion



Energy industry spending by sector
USD billion



Oil and gas leads the way in energy spending.

SURGING OIL, GAS and power prices together with the European Union (EU)'s goals of becoming less dependent on Russian supplies and post-Covid-19 pandemic inflation will catapult global energy spending this year to US\$2.1tn, Rystad Energy research shows.

A concern in energy markets is that the ongoing war in Ukraine will derail the energy transition, but the latest data suggests that spending on green energies will grow faster than in the fossil fuel sector. Without the invasion, however, there would have been less growth in investments in oil and gas and the share of green energies in global energy spending would be slightly more than today's 31%.

Upstream oil and gas spending is now projected to grow 16% – or US\$142bn– compared to last year as oil and gas producers around the world up their investment budgets to increase output. For green energy in 2022, based on the current pipeline of projects, global capacity will grow to 250 gigawatts (GWac) within the wind and solar and lead green energy spending to grow by 24%, or US\$125bn.

Another important factor pushing energy spending to new highs is the global inflation of material prices, labour costs and shipping rates caused by the pandemic and the sanctions imposed on Russia. Compared to 2020 levels, project costs in oil and gas have increased by between 10% and 20%, due largely to steel price rises and a tighter market among suppliers. Within renewables, lithium, nickel, copper and polysilicon – which are all important materials in battery and solar PV manufacture – have sent renewable project costs up by between 10% and 35% within the same timeframe.

"One can see a major shift in the amount of spending on green energy, which has increased, with a drop in expenditure on oil and gas. However, expenditure on other fossil fuels, such as coal, has remained constant," said Audun Martinsen, head of Energy Service Research at Rystad Energy.

SNC-Lavalin awarded contract for ADNOC offshore operations power project

SNC-LAVALIN, A FULLY integrated professional services and project management company with offices around the world, has been awarded a four-year advisory and engineering services contract to support Abu Dhabi National Oil Company (ADNOC) offshore operations power project. The contract is awarded by the project developer which is a consortium comprised of Korea Electric Power Corporation (KEPCO), Japan's Kyushu Electric Power Co. and Electricité de France (EDF). A first-of-its-kind high-voltage, direct current (HVDC-VSC) subsea transmission system in the Middle East and North Africa (MENA) region, the project will power ADNOC's offshore production operations with cleaner and more efficient energy.

The project, which is in partnership with Abu Dhabi National Energy Company PJSC (TAQA), is expected to reduce the carbon footprint of ADNOC's offshore operations by more than 30%, replacing existing offshore gas turbine generators with more sustainable power sources available on the Abu Dhabi onshore power network. This will be achieved by developing two subsea HVDC-VSC links from onshore Alternating Current (AC) power substations to artificial islands. The project will be supported by the company's global HVDC Center of Excellence in Canada, and its regional expertise based in the Middle East.

QatarEnergy awards first batch of LNG ship-owner contracts

QATARENERGY HAS SIGNED a series of time-charter parties (TCPs) with a subsidiary of Mitsui O.S.K Lines (MOL) for the long-term charter and operation of four LNG ships, constituting the first batch of TCPs awarded under QatarEnergy's massive LNG shipping program.

Concurrent with the signing of the TCPs, back-to-back LNG carrier shipbuilding contracts were signed between MOL and Hudong-Zhonghua Shipbuilding Group (Hudong), a subsidiary of China State Shipbuilding Corporation (CSSC), for the construction of four new LNG carriers to serve QatarEnergy's LNG growth projects and future fleet requirements.



The signing of the contract marks the conclusion of the ship-owner invitation to tender that was launched by QatarEnergy in March 2021.

The signing of the first LNG ship-owner contract marks the successful conclusion of the ship-owner invitation to tender that was launched by QatarEnergy in March 2021 to a large group of LNG ship owners for the chartering of LNG carriers for its future requirements. Other ship-owners that have been selected by QatarEnergy as part of the process will be announced in due course.

QatarEnergy had earlier entered into an agreement, in April 2020, with Hudong to reserve LNG ship construction capacity in China for QatarEnergy's future LNG carrier fleet requirements, including for the North Field expansion projects. The contracts signed mark the commencement of the design and construction of the first four new LNG carriers from Hudong, announced in October 2021.

Image credit: Rystad Energy

Image credit: QatarEnergy

UAE calls for pragmatic approach to the energy transition

AT THE ATLANTIC Council Global Energy Forum held at Expo 2020 Dubai in March, the UAE called for a positive, pragmatic approach to the energy transition and practical climate action to ensure energy security and economic progress.

Delivering the opening remarks at the event, His Excellency Dr. Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology, special envoy for Climate Change and managing director and group CEO of Abu Dhabi National Oil Company (ADNOC), explained that current volatility in energy markets is a result of geopolitical tensions, an unrealistic approach to the energy transition and long-term under-investment in oil and gas.

“We are all witnessing first-hand how sensitive energy markets are to geopolitical shocks. Yet, the current volatility in oil prices is the result of a deeper underlying structural issue. Long-term under-investment in oil and gas has left markets more exposed to risks of any kind and wherever they take place.

“According to the IEA (International Energy Agency), annual investment in oil and gas is US\$200bn below where it needs to be, and that is just to keep up with demand through 2030. Near-term, we are also seeing markets tighten, with demand up almost 3mn barrels over the last year and expected to reach pre-pandemic levels by the fourth quarter of this year,” H.E. Dr. Al Jaber said.

“In short,” His Excellency added, “the push to divest from hydrocarbons has met a stark reality.”

H.E. Dr. Al Jaber called for energy transition policies that are “tailored to real-world scenarios.”

“An unrealistic approach that ignores basic economics will only lead to tighter markets that are more exposed to geopolitical shocks. Divesting from the energy sources that drive the global economy will lead to a systemic supply crunch that erodes economic growth. Put simply, we cannot and we must not unplug the current energy system, before we have built the new one,” H.E. Dr. Al Jaber said.

His Excellency pointed out that policymakers around the world are now starting to come to terms with these realities.

“They are acknowledging that the transition will take time. They are pivoting their policies to ensure that near-term energy security is not undermined by long-term goals. And they have now come to the same conclusion that we came to a while ago, that we need to hold back emissions, not progress.”

The UAE is adopting a balanced, proactive and positive approach to the energy transition that is “pro-growth, pro-sustainability, pro-prosperity and pro-climate,” according to H.E. Dr. Al Jaber.

“As such, we are increasing investments in low-carbon and no-carbon energy sources. We are expanding production capacity of the world’s least carbon-intensive oil to more than 5mn barrels per day, while also growing our renewable portfolio five-fold. We are growing our natural gas capacity by 30%, enhancing our ability to supply more LNG.

“We are doing all this, with a strategy that is based on a sound business case and a belief that a realistic, well-planned energy transition provides a resilient pathway for new industries, new jobs, and long-term sustainable economic growth,” H.E. Dr. Al Jaber said.

His Excellency explained the UAE is driving a new low-carbon, high-growth economic model that will guide its development for the next 50 years, pointing out that the UAE is home to the three largest and lowest cost solar plants in the world.

Greater resilience in energy supply required

Majid Jafar, the CEO of Crescent Petroleum said the geopolitical conflicts and energy supply crises impacting world economies have underscored the need for greater resilience in energy supply and the need for a smarter carbon transition policy.

Jafar said that lasting progress on carbon emissions requires policies that fit the needs and dynamics of each country, particularly in the developing world where energy demand is growing rapidly and where energy security challenges are felt most acutely. And in this

regard, the wise energy strategy for 2050 of the UAE recognises the continued importance of oil and gas, while also growing the contribution of cleaner energy sources from solar and nuclear power.

“Current events demonstrate that energy policies need to deliver affordable and reliable energy supplies to withstand supply shocks and other challenges. We have witnessed how lower winds in Europe impacted wind generation, and how conflict created oil and gas supply and price shocks. The world must account for such challenges while delivering reductions in carbon emissions because an energy transition without energy security will not succeed,” said Jafar.

“The UAE’s visionary energy policy for 2050 highlights how this can be achieved by combining natural gas with cleaner sources such as solar power and nuclear energy, in order to maintain energy resilience while reducing carbon emissions. As the UAE prepares to host COP28 in 2023, this will only reinforce the country’s proven leadership in energy policy and international engagement,” he added.

At the event, the Atlantic Council and Crescent Petroleum launched an in-depth report entitled *Leading Oil and Gas into the Carbon Transition*, which outlined the opportunities presented by the carbon transition and the critical role that oil and gas companies must play in enabling the transition itself.

Held in partnership with the UAE Ministry of Energy and Infrastructure as part of the World Government Summit, the Atlantic Council Global Energy Forum brought together global energy leaders to advance the energy transition amid a geopolitical crisis and short-term energy security challenges.

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Reducing the risk of future shocks

Energy consultancy Wood Mackenzie, a Verisk business, discusses how to manage the shift to lower-carbon sources while strengthening energy security.

THE CRISIS CAUSED by Russia's invasion of Ukraine has highlighted the challenges for energy supplies as the world moves to tackle the threat of climate change. The uptake of low-carbon technologies can help address problems of energy security and affordability, and strengthen resilience to shocks in the future. But businesses, investors and governments need to manage the transition in the right ways.

Ed Crooks, vice-chair, Americas at Wood Mackenzie, said, "Soaring fossil fuel prices are a threat not only to consumers and the economies of energy-importing countries, but also to the energy transition itself. If governments want to continue to make progress on cutting emissions, they will need to show that they can deliver energy security and affordability at the same time through timely investments and clear policies."

The five key lessons drawn by Wood Mackenzie analysts are:

1. The world is still reliant on fossil fuels, and the energy transition needs to be focused on cutting demand first, rather than supply

The Covid-19 pandemic and the war in Ukraine have highlighted the central importance of fossil fuels to the global economy and how finely balanced these markets are, with fossil fuels still accounting for roughly 80% of primary energy worldwide.

If policy and investment decisions constrain oil and gas supplies, such as

“If governments want to make progress on cutting emissions, they will need to show they can deliver energy security and affordability at the same time.”



Image Credit: Adobe Stock

Solar and wind power have made significant inroads.

discouraging investment in upstream assets or new pipelines, while demand remains robust, that volatility will threaten consumers with periods of high prices.

Ann-Louise Hittle, vice president of Oils Research at Wood Mackenzie, said, "To avoid worsening the risk of future oil price spikes, the emphasis needs to be on reducing demand, with supply following as higher-cost, higher-emissions sources are no longer needed. Curtailing supply while demand remains strong is a recipe for crisis."

2. Resilience and security can be expensive, but the costs are worth paying as insurance against price volatility

"Electrification is central to cutting emissions and reducing vulnerability to commodity price shocks, but to do this, electricity systems must deliver power reliably and with

low emissions, which can be expensive," Crooks said.

Solar and wind power have made significant inroads, but fossil fuels still dominate power supplies in most markets, accounting for around 60% of electricity generation worldwide in 2021.

"The EU and the UK have in total developed an impressive 428 gigawatts of wind and solar capacity this century, but over the same period, their reliance on imports has increased from 44% to 60% of their primary energy," Crooks added.

There are other options for managing variability, including demand response and energy storage, but each have limitations and further technological innovation is needed. Although the costs of wind and solar generation have fallen rapidly and are likely to decline further in the long term, the cost of maintaining a stable grid is rising.

Crooks said, “In the long term, declining costs for low-carbon energy should ease the burden on consumers, but that will take time. Until then, one way to help consumers struggling with energy costs is to use tax and spending policy. Cuts in taxes on energy may be politically unavoidable at times, but they obscure the price signals encouraging people to reduce consumption. A better solution would be to use flat-rate rebates to help relieve hardship.”

3. Innovation in new technologies is crucial for energy security, as well as for tackling climate change

Prakash Sharma, vice president of Multi-Commodity Research at Wood Mackenzie, said, “The only way to achieve a largely electrified energy system based on zero-carbon generation will be through advances in technology. We have seen some promising progress in recent years, but the technologies in the design, prototype or demonstration phases need to receive regular government funding to establish commercial viability.

“They also need regulatory and legal frameworks that encourage development, so

the private sector can invest, scale up and deploy,” Sharma added.

Energy efficiency can also be an important way to curb demand and reduce vulnerability to price shocks, but only if there is a comprehensive policy to unlock it.

“Policy support is crucial for innovation. If it is left to the private sector, it will not make progress fast enough to address the challenges of climate and energy security on the urgent schedule that is required,” Sharma continued.

4. Linkages between energy markets have become stronger. Shocks in one sector or region can be rapidly transmitted to another, increasing the need for resilience

The globalisation of gas has only really emerged in the past 10 years, as LNG increased its share of global trade from 35% in 2010 to 50% in 2021. And as the global gas market becomes more integrated, customers and policymakers need to do more to provide flexibility in both supply and demand, to cushion the impact of shocks between sectors and regions. This could include broadening their sources of supply,

sometimes under long-term contracts, increasing the availability of storage and import infrastructure, and creating flexibility in the power market through demand response programmes.

5. Globalisation creates geopolitical risks for energy security. Consuming countries need to manage those risks through stronger domestic production and greater investments overseas, or both

The pandemic and the war in Ukraine have triggered a general reassessment of the vulnerabilities of international supply chains, as well as the reconfiguration of energy trade flows around the world, a process that Wood Mackenzie analysts describe as ‘re-globalisation’ rather than ‘de-globalisation’.

“Today’s energy crisis has put a spotlight on other potential threats to energy security – from low-carbon technologies as well as fossil fuels and from countries other than Russia, highlighting the need to support diversity of supply in key sectors, from the electric vehicle and battery supply chain to the mining of critical minerals,” Crooks said. ■

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Aramco bumps up capital expenditure to boost production

ARAMCO HAS ANNOUNCED that it is ramping up capital expenditure in 2022 to US\$40-50bn, compared with US\$31.9bn in 2021, to boost production in response to increased global demand.

Reporting its 2021 financial results, Aramco announced that it will continue to raise crude oil maximum sustainable capacity (MSC) to 13mn bpd by 2027, and potentially increase gas production by more than 50% by 2030. In its Downstream business, the company plans to expand its liquids to chemicals capacity to up to 4mn bpd. Aramco also intends to develop a significant hydrogen export capability and become a global leader in carbon capture and storage (CCS).

In addition, the company is targeting investment in renewable energy and nature-based solutions, as it pursues its ambition of achieving net-zero Scope 1 and Scope 2 greenhouse gas emissions across its wholly-owned operated assets by 2050. This includes an aim to reach near-zero upstream methane emissions by 2030.

Aramco's net income increased by 124% to US\$110.0bn in 2021, compared to US\$49.0bn in 2020. The increase in net income reflects higher crude oil prices, stronger refining and chemicals margins, and the consolidation of SABIC's full-year results, according to the company. Aramco declared a dividend of US\$18.8bn for the fourth quarter, to be paid in Q1 2022.

Commenting on the results, Aramco president & CEO Amin H.

Nasser, said, "Our strong results are a testament to our financial discipline, flexibility through evolving market conditions and steadfast focus on our long-term growth strategy, which targets value growth for our shareholders.

"Although economic conditions have improved considerably, the outlook remains uncertain due to various macro-economic and geopolitical factors. But our investment plan aims to tap into rising long-term demand for reliable, affordable and ever more secure and sustainable energy.

"We recognise that energy security is paramount for billions of people around the world, which is why we continue to make progress on increasing our crude oil production capacity, executing our gas expansion programme and increasing our liquids to chemicals capacity.

"We are also investing in CCS, renewables and low-carbon hydrogen production – supporting the global energy transition and advancing our net-zero ambition."

Capital expenditure in 2021 was US\$31.9bn, an increase of 18% from 2020, primarily driven by increased activities in relation to crude oil increments, Tanajib Gas Plant and development drilling programmes. Aramco expects 2022 capital expenditure to be approximately US\$40-50bn, with further growth expected until around the middle of the decade, reflecting the company's belief that substantial new investment is required to meet demand growth, against a broader decline in upstream investment across the industry globally.

In November 2021, the company announced the award of contracts worth US\$10.0bn for the vast Jafurah field development, a key component of its unconventional gas programme, which will contribute to greenhouse gas emissions avoidance in the domestic energy sector.

In 2021, Aramco's average hydrocarbon production was 12.3mn bpd of oil equivalent per day (mmbod), including 9.2mn bpd of crude oil. In March 2022, Saudi Arabia pumped 10.28mn bpd of crude oil, up 50,000 bpd month on month, broadly in line with its OPEC+ quota. The OPEC+ alliance has so far stuck to an agreement to marginally increase output each month.

Saudi Arabia's economy is benefitting significantly from the current high oil price. Jadwa Investment forecasts that Saudi Arabia's oil GDP is expected to rise 15.5% in 2022.

Image credit: Saudi Aramco



Aramco is ramping up capital expenditure to between US\$40-50bn for 2022.

HYDROGEN AND INNOVATION DEVELOPMENT CENTER (HIDC) established at NEOM

ENOWA, THE ENERGY, water and hydrogen subsidiary of NEOM, has established a Hydrogen and Innovation Development Center (HIDC) in NEOM's advanced manufacturing and innovation city.

The new facility aims to accelerate lab-to-market solutions and business development across the spectrum of hydrogen, green fuel production, utilisation and transport.

Scheduled to open in 2023, HIDC will be a testing ground for new technologies in the clean energy industry and a collaborative learning community for research institutions focused on hydrogen and the circular carbon economy (CCE). Through these collaborations, HIDC will look to produce and adopt decarbonised and clean synthetic fuels in partnership with Saudi Aramco.

Together with Aramco, Air Products and ACWA Power, HIDC will validate hydrogen innovations, demonstrating the potential for upscaling across the Kingdom and around the globe. By leveraging HIDC's capabilities in green hydrogen, Aramco will seek to fast-track development of its flagship in-house synthetic fuels programme and demonstrate the commercial and technical feasibility of synthetic fuel production. This collaboration will also enable HIDC to tap into Aramco's experience in engineering, energy logistics and fuels research and development and to align with Aramco's ongoing efforts to explore the potential for hydrogen-based low carbon fuels to support the global energy transition.



Image credit: ENOWA

HIDC partners at the launch announcement.

Aramco's chief technology officer Ahmad Al-Khowaiter said, "With a new vision of future living, NEOM is a perfect place for Aramco to explore and test the boundaries of our in-house cutting-edge technologies. Its vast potential to generate wind and solar power also offers a unique opportunity to deliver renewable hydrogen to power the growth of low carbon synthetic fuels, while offering a platform to test their commercial viability."

Chemicals joint venture

BAKER HUGHES AND the Saudi Arabian Industrial Investments Company (Dussur), have signed an agreement to form a joint venture company focused on providing oilfield and industrial chemicals in the Kingdom of Saudi Arabia.

The JV supports Baker Hughes' efforts to better serve the chemical market in the region and includes the company's existing chemical blend plant in Dammam and manufacturing facility in Jubail. The JV brings Baker Hughes closer to customers and suppliers, creating efficiencies including lower operating expenses and locally-sourced raw materials.

"This partnership is directly aligned to our broader strategy to invest for growth and leverage our existing strengths, while exploring new business models to better serve our customers and the regions in which we operate," said Maria Claudia Borrás, executive vice president of oilfield services at Baker Hughes.



Image credit: Baker Hughes

The agreement signing.

As part of the JV, Baker Hughes' manufacturing facility in Jubail will directly support chemicals focused on the Kingdom's needs, while expanding localisation opportunities. The JV's objectives include increasing Saudi Arabia's supply base targets of raw materials and accelerating the development of manufacturing skills and capabilities of the local workforce.

"Baker Hughes' expertise and technology leadership made them the ideal partner in this joint venture," said Dr. Raed Al-Rayes, CEO, Dussur. "Expanding the role of oilfield chemicals manufacturing in Saudi Arabia is an important link to Dussur's mission to support the Kingdom's industrialisation journey and localise technologies that will introduce new value chain capabilities. We are looking forward to commencing our work with Baker Hughes to contribute to the security of supply in the region and build local capabilities for the jobs of the future."

Baker Hughes will own 51% of the JV, and Dussur, which is owned by the Saudi Arabian Public Investment Fund (PIF), Saudi Aramco and SABIC (Saudi Basic Industries Corporation) will own 49%. The transaction is expected to close in the third quarter of this year.

Progressing the circular economy

AT A SESSION on the circular economy held at the International Petroleum Technology Conference, Ahmad Al-Khowaiter, Aramco's chief technology officer, discussed the role of the circular economy in reducing emissions and meeting net zero targets.

"Why the circular economy? It is the most economic thing to do, not just the quickest," Al-Khowaiter said. "If you want to decarbonise the world economy through reduction alone, ie. through the elimination of hydrocarbons, that will incur massive costs of around six trillion dollars year, but if you incorporate other means, such as utilising hydrocarbons where it makes sense, and using technologies such as carbon removal technologies, you can reduce costs incredibly to around two trillion dollars a year. This is the thinking behind how we transition, economically, practically and realistically.

"The circular economy considers all options of reducing emissions – reducing is a very important option and makes sense in many applications. But in other sectors such as hard to decarbonise sectors we need other options, and reusing the CO₂ in enhanced oil recovery is an area where the oil industry has taken a lead and demonstrated how we can economically and financially reduce emissions. Removing entirely from the system using nature-based solutions or technology-based solutions is another option. Finally, recycling CO₂ and emissions in the form of synthetic fuels and chemicals is another option, technologically driven.

"Where do we believe we can achieve this? Firstly, there is huge potential to reduce emissions from our own industry, through good basic engineering and industry practices, efficiency in energy production, cogeneration, zero flaring – these are low hanging fruits and they pay for themselves. Saudi Aramco is leading in this area. With good petroleum engineering practices we can reduce energy, lower costs and cut emissions so it's good business sense and good technology. Carbon intensity and methane intensity is also an area where we lead.

"Efficiency in the existing use of hydrocarbons is important; we are working with many companies around the world, especially in the transport sector, to improve efficiency from existing engines and combustion. We're working on greater use of chemicals or oil in non-fuel applications, going directly from crude oil to chemical with the lowest capital energy cost. The acceleration of CCUS offers tremendous promise, and we are seeing great progress in scaling up those technologies and the regulations accepting them. As for growth areas in the energy industry, low carbon hydrogen is a fantastic opportunity. Hydrocarbons are of course hydrogen with carbon, so splitting and capturing the CO₂ is a natural solution. Low carbon fuels, recycling the CO₂ into synthetic fuels is another solution for transport sector, finally moving to the ultimate option which is direct air capture, capturing CO₂ from the atmosphere and recycling and removing it in the most economic way."



Image credit: Adobe Stock

The circular economy can make a significant contribution to emissions reduction.

SABIC wins awards for innovative technologies

SABIC HAS WON the prestigious Edison Awards 2022 for its innovative technologies aligned closely with Saudi Vision 2030.

In the Thermodynamics category, SABIC won a silver award for its fire-resistant Thermoplastic EV Battery Cover, which delivers enhanced fire protection for a pHEV battery pack cover, a global automotive first. In the same category, the company won a bronze award for its LNP THERMOCOMP compounds for ADAS Radar Cover to help meet the need for high-performance materials that can optimise the capabilities of today's higher-frequency (>75 GHz), millimetre-wave (mmWave) radar for advanced driver assistance systems (ADAS).

In the Plastic Upcycling category, SABIC won a silver award for its Microsoft Ocean Plastic Mouse, which has an exterior shell containing 20% recycled ocean plastic (OP).

In the Bio-Sourced Materials, the company won bronze for its LNP ELCRES EXL7414 & LNP ELCRIN EXL7414B, which feature superior flame retardance that can help meet enhanced product safety requirements for ultra-thin-wall components by meeting the new rigorous IEC 62368-1 safety standard for consumer electronics. The latter is based on renewable sources and further helps customers reduce carbon footprint.

In the Environmental Impact category, SABIC won a bronze award for its LNP THERMOCOMP DC0041PE-7M1D145W, which is a bio-based, flame retardant, carbon fibre-reinforced compound used in the injection moulding of housings for equipment and devices.



Image credit: SABIC

SABIC has won awards for its innovative technologies.

A sustainable future for Gulf petrochemicals

Patrick Cooke, Oxford Business Group’s managing editor, Middle East and Asia discusses the importance of petrochemicals and chemicals to the Gulf’s diversification efforts, and the increasing focus of R&D efforts on sustainable products and processes.



Image Credit: Adobe Stock

THE RECENT TURMOIL in global commodity markets precipitated by the war in Ukraine has reignited debate in the West about the pace of the global energy transition and the risks inherent in relying on oil and gas imports from a relatively small but powerful group of large net-hydrocarbon exporters.

In the Arabian Gulf – home to several of the aforementioned net-exporters – discussion is framed around how to extract maximum benefits from its remaining hydrocarbon wealth while also playing a responsible role in global efforts to both mitigate climate change and maintain stability in international energy supplies.

“Looking ahead, innovation efforts will be increasingly focused on sustainable products and processes.”

Indeed, the UAE, Saudi Arabia and Bahrain have all made public pledges to achieve net-zero carbon emissions by 2050 (in the case of the UAE) or 2060. Meanwhile, Qatar has joined Saudi Arabia as a founding member of the Net-Zero Producers’ Forum – a cooperative body representing 40% of global oil and gas production, which seeks ways to harness technology to accelerate the energy transition and reduce greenhouse gas emissions from fossil fuels.

One of the key ways Gulf countries plan to extract maximum benefits from their hydrocarbon wealth is by catalysing investment in downstream production and export capacity for petrochemicals and chemicals. By doing so effectively, countries in the region can diversify their export revenues, enhance the resilience of public finances, and create high-value employment for the growing mass of young and educated citizens.

As shown in the recent Covid-19 Recovery Roadmap report on *Innovation in the Gulf Petrochemicals Industry*, produced by Oxford Business Group in partnership with the Gulf Petrochemicals and Chemicals Association (GPCA), the sector’s importance to regional

economic diversification was growing significantly in the years leading up to the pandemic.

Prior to the global coronavirus outbreak, petrochemicals and chemicals contributed around one-third of the region’s manufacturing GDP, with more than 80% of local production exported beyond the region. The sector also directly supported some 613,000 jobs in 2018, equivalent to 2.4% of the GCC’s workforce. That same year, the Gulf industry invested an estimated US\$438mn in research and development (R&D), supporting 7,100 jobs and US\$71mn in economic activity. Between the years 2010 to 2019, R&D spending in the regional industry almost doubled, from US\$293mn to US\$480mn – outpacing the 42.5% rise in the global industry over the same period. Looking ahead, with the global energy transition well under way and Gulf governments firmly committed to reducing national carbon emissions, innovation efforts will be increasingly focused on sustainable products and processes.

Evolution of innovation

The significant growth in R&D in the regional

petrochemicals and chemicals industry in the decade leading up to the Covid-19 pandemic was powered by a focus on chemical synthesis, which accounted for 1,629 of the 2,461 chemical patents granted by the GCC Patent Office from 2009 to 2019. This was largely driven by rising demand for new synthetic methods for developing commercially important compounds used in corporate laboratories. The second highest number of patents filed during this period was in the category related to catalysts, which are key to the development and application of petrochemicals and chemicals. Cracking – or the process by which complex hydrocarbons are broken into lighter molecules by means of hydro, catalytic, steam and thermal processes – accounted for the third-largest category in terms of patents filed during this period. As with the other top categories, this is a mature area of research which presents opportunities to enhance competitiveness along the value chain.

In future, it is widely expected that R&D efforts will focus on processes to reduce the carbon footprint and environmental impact of production, as well as innovation in product applications, company services and business models. One of the biggest challenges facing petrochemicals and chemicals companies in the region relates to environmental sustainability. Producers are under scrutiny for their water usage, waste disposal practices, and the climate impact of their operations and products. In addition, consumers and investors alike are increasingly cognisant of the environmental toll of certain products derived from petrochemicals and chemicals. For instance, single-use plastic products are becoming the target of regulatory efforts to discourage their usage around the world. Consumers are also abandoning single-use plastics in significant numbers – a 2022 survey by polling firm IPSOS found that 75% of people around the world would like to see single-use plastics outlawed as soon as possible, while 82% said they favoured products with less packaging.

Adopting circular economy principles

In response to this global sustainability shift, producers in the GCC region are increasingly embracing circular economy principles to improve their performance in this area. For example, the adoption of closed loop value chains for plastics can help retain used plastics within the value chains by redeploying them for use in feedstock, monomers and polymers.

Policymakers across the region have begun to adopt circular economy policies and strategies at the highest levels. For example, Saudi Arabia is targeting a national zero-waste circular economy by 2035. One area where progress can be seen in practice is in the petrochemicals and chemicals sector, where SABIC – the chemicals conglomerate

ranked by the US-based Boston Consulting Group as the third most innovative firm in the MENA region – has joined forces with the Saudi Investment Recycling Company (SIRC) to develop a chemical recycling plant in the kingdom that will convert mixed plastic waste into feedstock for pyrolysis oil, a synthetic fuel that could be used as a replacement for petroleum. Next door in Bahrain, plastic manufacturer BASF has launched a Circular Economy Programme that aims to process 250,000 MTs of recycled and waste-based raw materials annually by 2025, and double sales generated from circular economy innovations to Euro17bn. Its strategy focuses on circular feedstocks, new material cycles, and new business models. Across the region, government and corporate stakeholders are increasingly aware that long-term value creation in the vital petrochemicals and chemicals industry cannot be achieved without innovation-led sustainable products and practices.

Supply chain opportunities

Beyond the production process itself, emissions along the industrial supply chain, including final product distribution, are among the most significant contributors to greenhouse gas emissions in the broader petrochemicals and chemicals industry. However, accurately measuring and calculating these Scope-3 emissions – those that are neither direct corporate emissions, nor indirect emissions associated with the purchase of electricity, steam, heat or cooling from third-party suppliers – presents a challenge for the segment.

“Producers in the GCC region are increasingly embracing circular economy principles.”

With more than 80% of the petrochemicals and chemicals produced in the GCC being exported beyond the region, companies involved in the trade need to consider how best to optimise shipping routes and fleets to minimise the environmental impact of supply chains. Freight costs are already at elevated levels due to pandemic-related bottlenecks, and uncertainty over how best to replace ageing fleets due to regulatory uncertainty over fuels could push prices up further. In this sense, the strategic position of the GCC offers some advantages for firms looking to reduce Scope-3 emissions globally. For companies based in North America, Europe and the Far East, adding Middle Eastern producers to supply chains could help to reduce emissions from long-distance shipping.



Image Credit : Oxford Business Group

Patrick Cooke, managing editor, Middle East and Asia at Oxford Business Group.

For their part, producers in the region are adopting big data solutions to predict changing market conditions. These technologies can not only help boost time and cost efficiency in bringing a new product to market, but also facilitate business model innovation and increase competitiveness. In particular, big data and analytics can enable the integration of information from suppliers, production plants, internal departments and third-party logistics providers. Analytics tools, meanwhile, can accelerate the innovation process, augment product quality, strengthen supply chain resilience and enhance customer service.

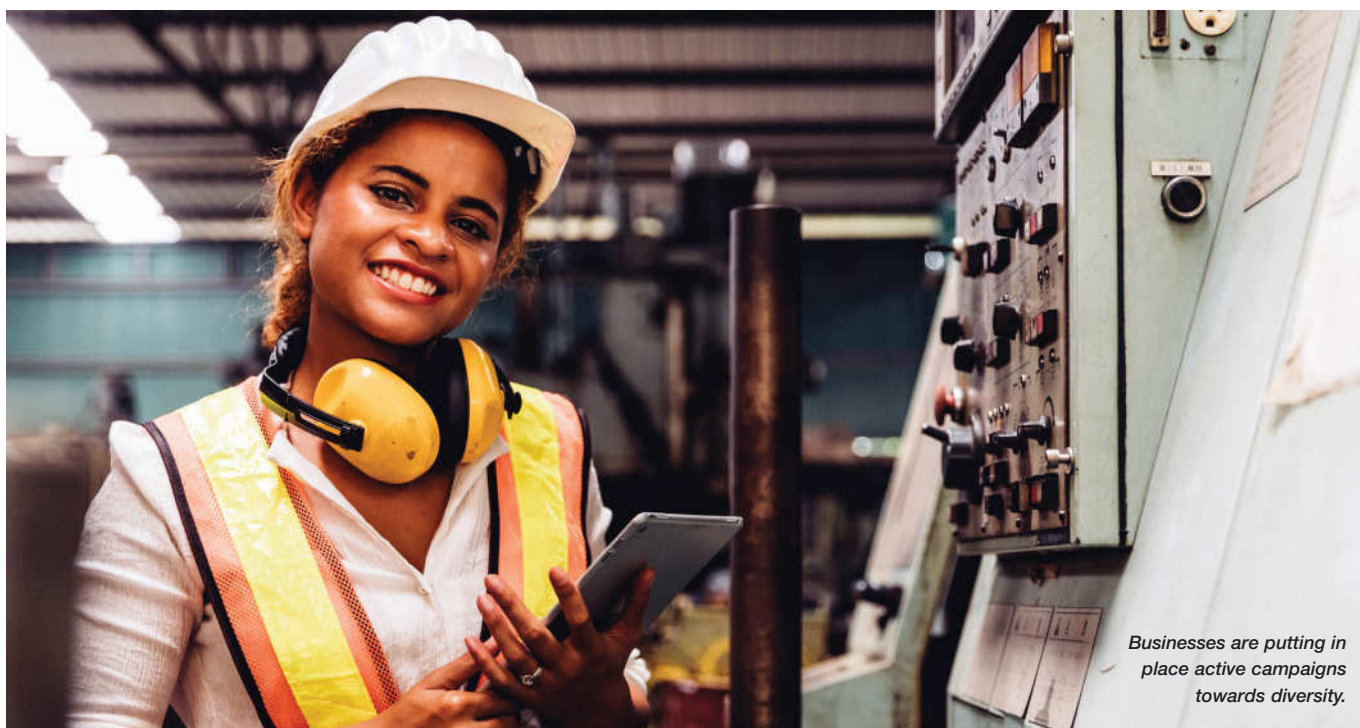
Increased investment in research and innovation will be pivotal to drive product differentiation, increase process efficiencies, secure cost advantages and enhance sustainability – ultimately helping the region's producers become more competitive in the global arena. ■

As OBG's managing editor for the Middle East and Asia, Patrick Cooke oversees research and production of the group's broad suite of business intelligence products across the dynamic and varied markets of the Gulf and Asia-Pacific. At the same time, he is instrumental in developing new content ideas and features that reflect the dynamism in high-potential markets across these regions and the growing appetite for actionable intelligence and advisory services on the opportunities within. He can be contacted at pcooke@oxfordbusinessgroup.com.

To download the 'Innovation in the GCC Petrochemicals Industry' report, see <https://oxfordbusinessgroup.com/news/report-what-post-covid-19-outlook-gcc-chemicals-and-petrochemicals>

Empowering diversity & inclusion in the energy industry

Crinuta Poiac, MEA diversity, equity & inclusion leader, Emerson Automation Solutions, discusses the business benefits of diversity in the workforce, and how to further promote diversity, equity and inclusion in the energy industry.



Businesses are putting in place active campaigns towards diversity.

THE OIL AND gas sector is going through a transformational period with diversity, equity, inclusion, and sustainability being drivers for change in the way businesses approach their work. This industry-wide shift opens up opportunities to build and elevate conversations on DE&I and its potential to accelerate innovation and progress in the oil and gas sector.

A sector-wide look into DE&I

Women account for 48% of the global workforce across all industries. Zooming into the oil, gas, and energy industry, women

make up only 22% of the oil and gas sector, and 32% of the renewable energy sector. This percentage only gets smaller as we go further into the leadership level, with women taking up 27% of entry-level positions, 17% of senior executive-level positions, and only 1% of C-suite leaders.

However, the disparity is not solely down to the shortage of diversity programmes. The lack of

women in technical and field roles must also be considered. Women in the oil and gas sector typically take up roles with support functions such as human resources, legal and marketing, with only a small percentage whose expertise is in engineering, manufacturing, and research.

The good news is there is much opportunity to energise the DE&I agenda. With sustainability

influencing a rapid transformation in the global energy landscape, there is a massive increase in job opportunities that require varied specialisations up to 2050, which leaves more room for diversification in the sector. Other than this, businesses have also begun active campaigns towards diversity, setting metrics and quotas, reviewing work policies, and consciously promoting DE&I initiatives.

For Emerson, DE&I is aligned with the company's values, culture, and commitment to leaving the world a safer, smarter, more sustainable place. Emerson believes that diversity promotes innovation as it encourages new

“ Women make up only 22% of the oil and gas sector, and 32% of the renewable energy sector.”

ideas from different perspectives that inspire richer, more meaningful conversations that contribute to bringing better service to its customers.

In 2017, the company launched its DE&I programme in the Middle East and Africa, aimed at addressing diversity, equity and inclusivity in the local context, making sure to accommodate the experiences of women and minority groups in the region.

Since its launch, the programme has become an inherent part of the regional company culture, leading to the employment of more than 50 nationalities with the highest employee satisfaction rate and lowest attrition rate in the industry, a 19% increase of women in leadership and executive-level roles in 2017, and a 13% increase of women in its talent pool from 2018 to 2020.

Why DE&I counts

Aside from fostering good work dynamics, culture, and overall employee satisfaction, research suggests that diversity also enables improved financial performance and profitability. In a 2019 McKinsey analysis, companies in the top quartile for gender diversity on executive teams were 25% more likely to have above-average profitability than companies in the fourth quartile. Studies also show the higher rate of outperformance of gender, ethnically, and culturally diverse companies compared to those with less such representation.

One of the major reasons why this could be so is through the disruption caused by varying perspectives and experiences that can only be brought by a diverse group of people. In a sector such as oil and gas that is rapidly changing, diversity in thought and perspective is key in maintaining agility and navigating through the transformation.

The role of digital

Throughout the pandemic, digital technologies and remote work have surfaced as viable solutions in enabling flexibility in work-life balance. The exploration of hybrid work models has opened avenues for women to take their

place in the engineering and manufacturing space, where roles were previously limited to men due to harsh on-site conditions.

Along with remote work, the decentralisation of learning through digital solutions and virtual learning has become an avenue for diversity to flourish, encouraging a more sustainable way to attract, retain, and upskill talent as it presents a clear developmental opportunity for career progression in the workforce, particularly for women.

“Leadership plays a key role in driving affirmative action.”

Overcoming the barriers

In addressing DE&I at an organisational level, leadership plays a key role in driving affirmative action. The active promotion of DE&I at an executive level sets a trickle-down effect throughout the organisation that steers a step-change in hiring processes, leadership composition and career development policies. Alongside this, mentorship, coaching, and learning programmes must continuously be explored and offered to employees regardless of gender or ethnicity. In a study conducted by Heidrick & Struggles, women and minorities valued mentorship programmes as vital in their career progression. Likewise, mentors also benefit from these programmes since they develop more empathy as they learn more about their mentees, which makes them more open to divergent ideas and opinions.

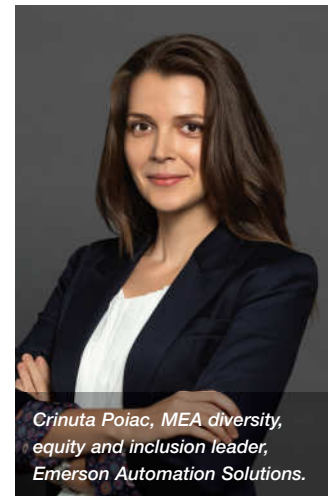
For Emerson, a Diversity, Equity, and Inclusivity council made up of 15 women leaders across the region was launched alongside the DE&I programme to ensure the success and continuous development of programme initiatives such as those mentioned.

In terms of widening the talent pool, Emerson strongly believes in collaborations and partnerships with educational institutions and communities to engage and

attract the youth and women into the STEM professions. In 2020, Emerson recruited more than 31 engineering students from 11 nationalities as part of their collaborative internship programme with RIT Dubai. More recently, Emerson has signed an MoU with Abu Dhabi Polytechnic last February to support their STEM students through internship and learning programmes. With these, Emerson also regularly initiates STEM competitions enabling the youth to participate in activities that encourage STEM-related learning.

Diversity, equity, and inclusion in the oil and gas sector has come a long way, but there is still much to be done. Businesses are encouraged to look into parallel industries to see how they overcame similar challenges in their DE&I programmes to proactively address it.

And, although businesses are taking great strides in their own



Crinuta Poiac, MEA diversity, equity and inclusion leader, Emerson Automation Solutions.

Image Credit: Emerson Automation Solutions

initiatives, it is important to remember that DE&I culture building takes unyielding, long-term, conscious efforts from industry leaders to confront barriers within their organisation, which hopefully lead to incremental changes that impact the way they do business and engage with their communities. ■

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Trailblazing role models for women in energy

Oil Review Middle East spoke with LEWAS award winners Dr Amani Musharah, lab supervisor, Crude and Products Characterization Unit, Saudi Aramco, and Salma Al Hajeri, vice president – Non-Operated Assets, Operations MENA & Russia, Mubadala Petroleum. Dr Amani Musharah is winner of the LEWAS 2021 Leading with Excellence Award, and Salma Al Hajeri is winner of the LEWAS 2021 Woman of Achievement Award.

How did you come to enter the oil and gas industry?

Dr Amani Musharah: As I developed a passion for chemistry during my school years, I decided to pursue my undergraduate degree in this fascinating field. I came to learn about different aspects and uses of chemistry in our daily lives. How chemistry controls our bodies and our daily activities was something that I wanted to explore even further.

Working for Saudi Aramco gave me the opportunity to penetrate the secrets of one of the most valuable commodities in the world, crude oil. As a scientist in the Research and Development Center, I learned a lot about crude oil and how it is converted to even more valuable products, their composition and specification, and how we can make them better for the environment and the consumer.

Salma Al Hajeri: I was always interested in engineering and science-based subjects and, when I was working my way through education, I was lucky that the government was especially focused on training future leaders in these fields. This meant there were a range of opportunities to build my

experience and gain the qualifications needed to grow and develop. That's not to say it was easy, and as a women there have certainly been added challenges to find my place within a traditionally male-dominated sector.

Thankfully, the leading oil and gas companies in the UAE have placed a real focus on encouraging women and UAE nationals into the field and I was lucky enough to start my career at the national oil company, ADNOC, where I gained deep practical experience as a reservoir engineer. Learning both the academic side of the job and having real-world experience has been an important foundation for building my career. Today, I hold three degrees and have been in the oil and gas industry for 20 years.

What has been your experience of working and advancing in the industry? How did you get to your position you are in now?

Dr Amani Musharah: I have been working for Saudi Aramco for more than 14 years. Every day I learn something new. I started as a lab scientist with limited experience in the field. The company invests tremendously in its most precious resource: people. Saudi Aramco has many impressive programmes to help developing talents and advancing knowledge and career of its employees.

Today, I have become a specialist in fuels, providing critical analytical services to many functional areas within the company and across its supply chain, and providing consultancy to different committees and organisations that take critical decisions with regards to our fuels. In addition, I am the head of a large team who serves as the technical arm for Saudi Aramco when it comes to



Image Credit : Saudi Aramco

Dr Amani Mushara, lab supervisor, Crude & Products Characterization Unit, Saudi Aramco.

characterising crude oils and fuels, and their specification, and verifying and approving anything that goes into our fuels. I could only achieve this with the great support I got from my management, who invested a lot in me and believed that I could make a difference.

Salma Al Hajeri: I hope that my journey can be an inspiration for all people looking to build a career in oil and gas. We desperately need new talent coming through that can drive forward innovative ideas, embrace digital and help find solutions to the big challenges around ESG issues. I've always said that if you are passionate about making a change, better to be inside the tent driving action than outside throwing stones. Our industry has the scale, skills and opportunity to make a huge difference, while also providing the vital energy that communities need to thrive and prosper.

I'm also extremely passionate about the role of women in our industry and the wider workforce. Since 1995, according to the World Bank, labour force participation for women in UAE increased from 28% to well over 50% today. In the UAE there has been a concerted effort to encourage women into the workforce, with many successful examples in

“ I could only achieve this with the great support I got from my management, who invested a lot in me and believed that I could make a difference.”

government and the private sector. There is of course more to do, and the challenge is more acutely felt in our sector than others. I hope my experience shows that there are plenty of opportunities available for women in oil and gas.

Did you come up against any challenges and obstacles along the way, and if so, how did you overcome them?

Dr Amani Musharah: Challenges would mostly be around striking the right balance. The right work-life balance. The right balance to keep developing yourself, as you are often overwhelmed with many tasks. Taking it easy and stopping every once a while to take a breath and evaluate your priorities always helps. A good support network, both at home and at work is priceless. There are many programmes and classes that help in guiding us through such challenges, in order to succeed and achieve the best in all aspects of our lives.

Many people might anticipate that proving myself against my male counterparts would be the most challenging thing, but what I would like to say is that Aramco is working diligently to empower women, adopting the 2030 Vision of the Kingdom. If you are good, you will stand out, no matter what.

Salma Al Hajeri: I spent my first few years of childhood living in the desert before moving to a house allocated by the Abu Dhabi government in the early 1980s. I still remember the two-hour drive between school and our desert “tent”. My father, thinking that it was not a sustainable lifestyle, stubbornly refused to move to newly constructed villages or towns. It was at this time that polio was also spreading and afflicting children with weak immune systems or who were not jabbed. I was one of those children. But this has not held me back.

In contrast to some of the social norms in my home town, I joined the Faculty of Engineering at Al Ain University in 1995 and graduated in 2001 as the first female engineer from my small town. A few years later, my relatives and neighbours started to encourage their daughters to follow in my footsteps. My story has helped to promote the importance of education for young women in what was a fairly conservative community.

Can you give us some information about the projects you have led and been involved in?

Dr Amani Musharah: Many of the projects I handle are confidential. However, I can mention a few examples:

- Investigation of long term storage of fuels, where fuels are stored for extended periods of times for strategic reasons. My job is to ensure that by the time these fuels are released to the end-users, they are still good to be used. This is through extensive analysis of fuels quality and



Image Credit : Mubadala Petroleum

Salma Al Hajeri, vice president, Non-Operated Assets, Operations MENA & Russia, Mubadala Petroleum.

“ I hope my experience shows that there are plenty of opportunities available for women in oil and gas.”

performance, and storage conditions.

- Evaluation of additives performance and impact on our fuels, so these additives can be used safely to improve the performance and economy of our fuels, and to reduce harmful emissions.
- Investigations on fuels adulteration and smuggling.
- Crude oil assays: a series of tests looking into fine details of crude oils, that mimics how a crude oil would behave in a refinery. This is used for oil pricing and production planning.

Salma Al Hajeri: As vice president of Non-Operated Assets I look after a diversified global portfolio of assets. My role sees me get involved in a wide range of asset management activities. We pride ourselves on bringing a unique and active approach to asset management, which means that we engage both in the financial and technical aspects of running a diversified global asset base. I've been involved in a number of major deals, including the likes of our 10% participating interest in the offshore Shorouk Concession in Egypt, which contains the supergiant Zohr gas field. Projects like this see me and my team work hand in hand with partners such as ENI and BP to deliver on the

project's KPIs and priorities such as HSSE.

How can oil and gas companies support and encourage women to advance in the industry and achieve leadership positions? Are there any particular initiatives or measures you have benefited from in this regard, or been involved in?

Dr Amani Musharah: I believe that many companies are already doing a lot to encourage women to advance in their careers in the energy sector. This is evidenced by the number of women who have started to shine as leaders in the Middle East, to be specific. With organisations that recognise these talents and leaders in the field, such as LEWAS, we start to see how many outstanding ladies there are in different sectors in the industry, and how they are advancing.

Aramco is one of the leading companies in providing support and encouragement to young talent, men or women. I have personally benefitted from a number of programmes, such as the Professional Development Program, Specialist Development Program, Advance Degree Program, and Women in Business and Leadership, which prepares women with high potential for future leading roles.

Salma Al Hajeri: I think the main way we can encourage more women into the sector is simply by ‘showing not telling’. There is a growing number of women forging their careers and now in leadership positions across the sector. We need to be better at getting their stories out there. I'm a real believer that seeing what others have achieved will inspire future talent.

Our government, and the leading UAE industry players, have done a good job of creating opportunities for women in the sector. We need to continue to ensure that there are real world, practical job experience opportunities that can be applied to career development and growth.

There is no silver bullet, but we are making progress. When I started out I was one of only a handful of women entering the sector in the UAE. Now there are hundreds, if not thousands, of talented women joining the sector.

At a time when the oil and gas industry is facing ESG concerns, the energy transition and pressure to reduce carbon footprint, how do you view career prospects now in the industry, and what would be your advice for young people considering entering the oil and gas industry?

Dr Amani Musharah: The oil and gas industry is one of the leading industries in the whole world, and will remain so for a long time to come. The industry itself is evolving to adapt to all these changes, in order to align with regulations and future needs. Opportunities to develop and grow in your career in the oil and gas industry are



Some of the best innovation is taking place within the energy sector.

Image Credit : Adobe Stock

unlimited. Having a career in this field is very rewarding on many fronts, and the most important thing is that I am really enjoying it.

Salma Al Hajeri: In my view, change is a constant and it is coming faster than we thought. History has taught us that to thrive in an era of rapid change, we must look at it as an opportunity, not a threat. That has been my story, and it is also the story of the UAE.

As I've said before, if you want to make a difference on critical issues such as

“The industry is evolving to adapt to all these changes, in order to align with regulations and future needs.”

climate change, where better place to do it than within the energy sector? This is

where the solutions will be found, and this is where some of the best innovation is taking place. Within the oil and gas sector are some of the most passionate individuals when it comes to the energy transition and ESG. We have achieved remarkable access to affordable, reliable and safe energy at an enormous scale. By directing this level of engineering and innovation capability to the challenges of energy transition, I believe we will also achieve the change we all want to see. ■

Leadership Excellence for Women Awards & Symposium (LEWAS)

THE LEADERSHIP EXCELLENCE for Women Awards & Symposium (LEWAS) began in 2013 with the objective to Engage, Empower and



The 2021 award winners and supporters.

Image Credit: LEWAS

Elevate women in energy. Since its inception, it has recognised and honoured women who are not only making a mark but are also being an advocate for women empowerment in the Middle East. The platform celebrates women who have consistently pushed boundaries, having shown excellence by producing tangible and path-breaking leadership traits, raising the bar for gender diversity, and finding new avenues to address inclusion issues. In addition to recognising women it also recognises male advocates and corporations who champion women in energy, enabling women to shatter stereotypes and support the industry to advance.

The LEWAS Awards recognise outstanding women in the energy industry who have excelled professionally and personally through their unmatched contribution in the areas of leadership, innovation, talent, research and outreach.

‘Energy Future: Infinite Possibilities, the 8th Leadership Excellence for Women Awards & Symposium (LEWAS)’ will be held in November 2022 in Bahrain. Applications for the 2022 Awards are now open.

See the website at www.lewa-symposium.org for further information.

Connectivity to optimise gas detector fleet management

Leveraging connectivity helps streamline the gas detection fleet management process while also improving safety and compliance, says MSA – The Safety Company.

EFFICIENT AND EFFECTIVE management of a fleet of portable gas detectors is important to maintaining the health and safety of employees.

There are many factors that can impede this process.

For many safety professionals, it is a big and time-consuming challenge to equip every worker with the correct personal protective device so that they are prepared to begin the work day. It is not uncommon for safety teams to spend hours overseeing safety programmes at different plant locations. This includes writing incident reports, checking in and checking out equipment, and keeping a manual record of use and maintenance.

A big challenge for safety managers in managing a fleet of gas detectors is ensuring that the fleet is ready for work. Failing to do so can impact equipment availability, causing unnecessary downtime and non-compliance.

Tracking and maintaining dozens or even hundreds of devices is far from easy. Pen-and-paper methodologies have proved to be less than ideal.

Fortunately, this is the digital age, and new technologies, including cloud connectivity, have made their way into fleet management.

Using connectivity to automate fleet management can save time for safety managers. It also boosts productivity by providing insight into actions that should be taken, making it possible to take a proactive approach in managing the fleet. All in all, it helps to eliminate frustrations and prevents unnecessary downtime.

Gas detection software services can help streamline all aspects of gas detection management – from real-time situational awareness to simplify fleet management and improve safety outcomes, to automated record-keeping.

The cloud-based MSA Grid services are a remote monitoring and smart compliance management solution for the MSA Altair fleet of portable gas detectors. Powered by Safety io, a software subsidiary of MSA – The Safety Company, it helps to automate fleet



Gas detection software services can help streamline all aspects of gas detection management.

Image Credit: MSA - The Safety Company

management – with no upfront capital investment.

Gas detectors store a lot of data that, with the right lens, can provide you with unique safety insights not only to proactively manage any size fleet of portable gas detection, but also for improved safety programmes and outcomes.

Using ready-to-use data available on the MSA Grid, safety managers can learn from data to adjust safety processes and

procedures, drive worker accountability, track trends and identify potential issues. ■

See this interactive video at <https://gb.msasafety.com/safety-io#driveSafety> on how the MSA Grid can help address the most common safety challenges when it comes to portable gas detectors. To learn more about MSA connected solutions, go to <https://gb.msasafety.com/msaaltair-msagrid>

Honeywell launches gas detector assembly facility

HONEYWELL'S NEW ASSEMBLING facility for personal gas detectors in Dammam, Saudi Arabia will become fully operational by the end of April 2022, having recently received its required licensing and regulatory approvals.

With this facility, Honeywell has become the first international company to assemble gas detectors in the Kingdom, enabling local availability of the equipment, shorter lead times and on-the-ground customer support. The devices will provide a reliable and cost-effective way to ensure the safety, compliance and productivity of workers who are operating in hazardous environments in Saudi Arabia.

"We are excited to ramp up operations to full capacity at the facility as we advance the production of critical safety technology for use across multiple sectors in Saudi Arabia," said Shabbab AlGhamdi, country leader, Saudi Arabia and Bahrain for Honeywell Safety and Productivity Solutions. "While supporting the industrial development of the nation, we're proud to be contributing to the IKTV objectives. We are creating job opportunities and enhancing skills through this facility, where nearly all of the workforce is comprised of Saudi nationals."

Multiple types of Honeywell gas detectors will be assembled at the facility, including single gas detectors (BW Solo), multi gas detectors (BW Micro clip XL and BW MAXTII) and fixed gas detectors (Optima and XNX).

The future of oil and gas pipeline coatings

Nikhil Kaitwade, associate vice president (AVP) – market research at Future Market Insights (FMI) discusses the market for pipeline coatings and the increasing demand for sustainable solutions.

A NUMBER OF FACTORS are boosting the market for pipeline coatings. Exposure to harsh weather, and economic losses incurred by leakages and blasts are pushing oil and gas industries to invest in the maintenance of pipes for longer periods, and an increase in production and offshore exploration activities is also positively influencing the demand for pipeline coatings for oil and gas. Meanwhile government regulations to reduce carbon emissions are playing a key role in spurring the development of sustainable pipeline coatings.

Weathering and economic loss driving demand for pipeline coatings

Exposure to harsh weather conditions corrodes the metal of the pipelines. Corrosion, in turn, possesses a threat to the integrity of the pipe and creates the chance for gas and oil leaks and chemical deterioration. For instance, in July 2021, three workers were killed as a result of a gas pipeline leak in Iran. In another instance in November 2021, a pipeline in southern Iran exploded. Ageing infrastructure of the pipes was the key reason for the loss. No casualties were recorded, but the pipeline blast incurred heavy losses to the industries.

Corrosion and abrasion issues have been exacerbated by the shut-down of oil and gas production activities and end user industries in the Covid-19 pandemic, due to restrictions on movement.

The chances of oil and gas leaking due to improper coating and unsupervised pipelines at different geographical locations are high. In addition, exposure to extreme weather conditions is playing a crucial role in the increasing demand for maintaining the health of pipelines.

As some pipelines are under water and underground, the chances of water and dirt seeping into the pipeline increases. This has the potential to deteriorate the quality of oil and gas.



Image Credit: Adobe Stock

Coatings can prolong the life of pipelines, thereby helping to reduce carbon footprint.

Leaks and pipeline clogging lead to heavy economic losses to both the supplier and the end-user. The improper transportation of oil and gas also increases the threat to human life and the environment. To avoid the same, government bodies of different countries have implemented strict rules and regulations. Thus, the demand for covering pipelines with coatings has escalated.

According to Future Market Insights (FMI) report on *Oil and Gas Pipeline Coatings Market**, the sales for pipeline coatings are expected to register a positive CAGR of 5.5%, accumulating a market value of US\$6,958mn by the end of 2029.

Fusion-bonded epoxy coating favoured by oil and gas industry

Five different types of pipeline coatings are widely used to cover gas and oil pipelines, namely fusion-bonded epoxy coating, polyurethane coating, coal tar enamel coating, concrete coating and polyolefin coating. Among these, fusion-bonded epoxy coatings are widely used for steel pipelines as they are made of thermosetting materials and protect against the wearing of pipelines. FMI's report on the oil and gas pipeline coatings market expects fusion bonded epoxy coatings to register a CAGR of 6.1% up to 2029.

Polyurethane coating, too, is widely used in the oil and gas industry. Polyurethane

“Government regulations to reduce carbon emissions are playing a key role in spurring the development of sustainable pipeline coatings.”

coating helps in protecting pipelines from weathering, abrasion and corrosion owing to its durable nature. Moreover, polyurethane coating is customisable and can be formulated to become transparent, opaque or glossy. Thus, the adoption of polyurethane coating is expected to rise rapidly.

Recent innovations and developments in pipeline coatings technology

Key players in the oil and gas pipeline coatings such as BASF SE, Sherwin Williams Company, 3M, PPG Industries and AkzoNobel are focusing on widening their presence by offering new products. Furthermore, with the implementation of regulations by governments across the globe designed to reduce emissions, pipeline coating manufacturers are investing in research and development to develop sustainable coatings that will reduce carbon footprint, while end user industries are investing in sustainable pipeline coatings that are harmless to the environment and human

life. Some recent developments:

- In February 2022, PPG Industries, Inc. acquired the powder coating manufacturing business of Arsonsisi. The acquisition will enable the company to offer its products in the Middle East and Africa. Furthermore, the company is focusing on gaining 40% of sales from sustainable advantaged products.
- In May 2021, BASF SE collaborated with industry partners for exploring sustainable refinishing coating solutions to achieve the new volatile organic compounds target.
- In October 2020, Sherwin Williams Company expanded its high-performing pro-industrial line by introducing water-based urethane. This coating material is ideal for petrochemical tanks and general coating. Moreover, it eliminates the need for on-site measuring and mixing of material.

Visual inspection by highly trained surveyors is commonly used to check the quality of pipelines. This increases the threat to human life and in certain cases, pipes that

are infected with corrosion can go unnoticed. Thus, oil and gas industries are integrating artificial intelligence and machine learning to study the health of pipelines and rectify corrosion-prone areas. By integrating these systems, oil and gas industries can analyse and maintain pipelines by studying the health of the pipelines after the coating is applied. ■

**<https://www.futuremarketinsights.com/report/oil-and-gas-pipeline-coatings-market>*

ESOMAR-certified market research and consulting firm Future Market Insights (FMI) serves clients in more than 150 countries and is headquartered in Dubai, with offices in the USA, UK, and India. MarketNgage, its market research subscription platform, assists stakeholders in obtaining in-depth research across industries, markets and niche segments. Sign up for a seven-day free trial at <https://www.marketngage.com/signup>. You can connect with Nikhil on LinkedIn.

New study reviews lifecycle carbon footprint of pipelines

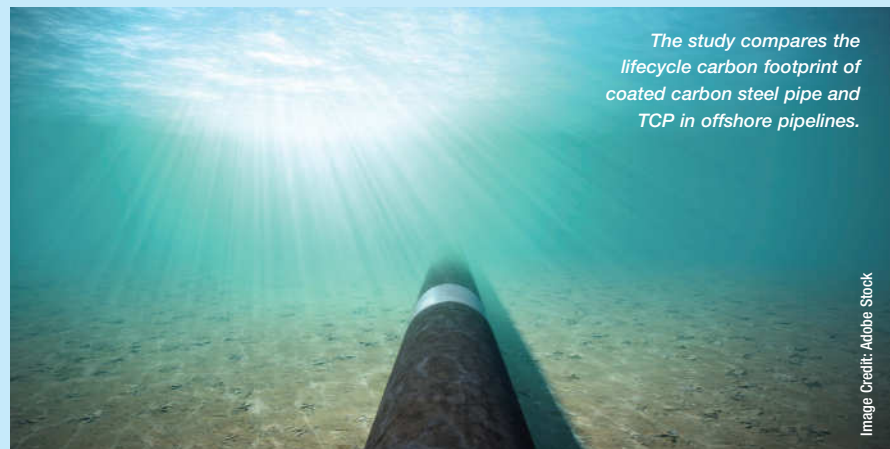
DNV, STROHM, AND the Non-Metallic Innovation Centre (NIC) have launched a report comparing the lifecycle carbon footprint of externally-coated carbon steel pipe and thermoplastic composite pipes (TCP). The report, *Offshore pipelines: a life cycle carbon footprint comparison study* shows that TCP has a significantly lower carbon footprint, in the range of 30-60%, than an equivalent carbon steel pipeline solution for the defined case study.

The companies considered all steps of the lifecycle carbon footprint which is a measure of the direct and indirect greenhouse gas (GHG) emissions associated with all activities in the product's life cycle, from material extraction and production to the end-of-life stage of the pipelines.

The report outlines the results from a joint industry project (JIP) between DNV, Strohm and NIC, focusing on the lifecycle of a 22km pipeline transporting produced water for injection in a field outside Angola in Western Africa, with an operating lifetime of 20 years.

Prajeev Rasiah, executive vice president for Energy Systems, Northern Europe at DNV said, "This study shows the importance of choices made about technology, design, transport logistics, and installation of offshore pipeline solutions, when it comes to the lifecycle GHG impact.

"It focuses on the importance of efficient transport logistics and installation, including selection of vessels which have a high impact on the total carbon footprint for both steel and TCP. While admittedly limited to certain geographies and scenarios, the current case



The study compares the lifecycle carbon footprint of coated carbon steel pipe and TCP in offshore pipelines.

Image Credit: Adobe Stock

study has shown that TCP has an advantage within this area.

"Pipelines are a critical part of offshore infrastructures and should be considered when assessing the overall carbon footprint. Choosing a technology and design that provides the least GHG emissions from a cradle to grave perspective is a step towards the goal of a low carbon future."

Caroline Justet, business growth executive for energy in transition at Strohm added, "We are excited about the results of the study as it's a great step towards establishing TCP as a suitable alternative to steel in offshore applications.

"The greatest GHG benefits from using TCP compared to steel will be in the cases when the pipe needs to be transported over long distances. TCP is spoolable and

lightweight, allowing it to be delivered in long lengths and installed using small vessels or subsea pallets, significantly reducing CO₂ emissions."

"The NIC is proud to have been a part of this study which proves and now underpins one of the major benefits of non-metallic technology deployment," said NIC director, Mihalis Kazilas.

"The findings from this collaboration complement a previous NIC study assessing CO₂ footprint for onshore flowlines, with both studies showing consistent results. In a world where all companies are seeking to improve their environmental credentials, deployment of TCP can offer oil and gas companies an easily deployable and greener alternative to their historically steel-based infrastructure."

Maximising energy efficiency with pumps

Paul Davis, Wanner International’s managing director, discusses the role of pumps in reducing carbon footprint.



Wanner Hydra-Cell pumps in operation.

Image Credit : Wanner International

What are the challenges that the oil and gas industry is facing due to the lack of sustainable pumps?

The global shift towards more sustainable energy is driving technical advancements and developments within a range of industries operating pump technology, the oil and gas industry being no exception.

Within industries which use pumps intensively, pumps can account for as much as 50% of the energy usage. This makes it vital to choose the right pump and fully maximise energy efficiency. With sustainability at the forefront of a lot of businesses’ minds, optimising energy usage has never been so important.

“ Within industries which use pumps intensively, pumps can account for as much as 50% of energy use.”

In contrast to Hydra-Cell, alternative pump technologies suffer with inherent internal losses such as mechanical friction and internal "back flow", which increase as internal parts wear and liquid viscosity reduces, starting to become less efficient as the discharge pressure goes above 10 bar and worsening with increasing pressure.

How do Wanner’s Hydra-Cell pumps help the oil and gas industry to reduce the carbon footprint?

Wanner International is dedicated to enabling its customers to save energy and resources. The flexibility of the Hydra-Cell pump to handle many different liquids and many different applications enables effective repurposing. This, coupled with its high energy efficiency and reliability, has a large role to play in reducing the carbon footprint.

The Hydra-Cell pump’s true positive displacement action and minimal internal energy losses achieve high efficiencies from pump shaft to hydraulic power; this, combined with the wide range of flow rate

controllability, ensures optimum energy usage.

We recently replaced a major US oil and gas company’s existing Api674 plunger pumps with Hydra-Cell pumps to reduce hydrocarbon emissions and operating costs within the natural gas liquid transfer operation.

How do Hydra-Cell pumps stand out in terms of cost-effectiveness?

Not only do the Hydra-Cell sealless pumps offer performance benefits, they also offer a more cost-effective solution than other pumps, such as API 610 multistage centrifugal pumps and traditional piston diaphragm process pumps. When compared with traditional API 675 metering pumps, Hydra-Cell “pulse-less” metering solutions are best-in-class for life cycle cost with lower acquisition costs, energy consumption and minimal servicing.

Thanks to its hermetically sealed design, the Hydra-Cell pump is able to reduce maintenance and repair costs, minimising the cost of spare parts when compared with other pumps. ■

Amarinth wins pumps order for SABIC refinery

AMARINTH, DESIGNER AND manufacturer of low lifecycle cost centrifugal pumps and associated equipment, has delivered an order through Gas Arabian Services for bespoke compact API 610 vertical in-line pumps to be used in the Saudi Basic Industries Corporation (SABIC) petrochemical refinery, Yanbu.

The Yanbu petrochemical refinery in the Al Madinah province of Saudi Arabia processes 400,000 bpd of crude oil from the Manifa offshore field, producing high-quality, ultra-low sulphur-refined products. Two horizontal pumps were originally specified for the hazardous area, but these would not fit within the heavily restricted space. Amarith therefore proposed using API 610 vertical in-line pumps.

The pumps were required on a tight 30-week delivery schedule and so Amarith leveraged its existing range of API 610 vertical in-line pumps and created a bespoke design with a footprint of just 420mm x 420mm. The company used FEA analysis and a suite of design tools to ensure the pumps would operate reliably within the tight design envelope.

Oliver Briggshaw, managing director of Amarith, commented, "We are delighted to have delivered this further order from Gas Arabian Services for Yanbu refinery, which underlines our strength and strong partnerships within the Middle East."

New partnership for pump manufacture in Saudi Arabia

CELEROS FLOW TECHNOLOGY and Al Khorayef Petroleum Co. have signed an MoU promising a multi-million dollar investment to localise the manufacture of Celeros FT's best-in-class pump solutions, process filtration and flow control systems within Saudi Arabia.

Celeros FT's CEO Jose Larios commented, "Al Khorayef Petroleum Co. is our trusted partner and will provide in-country expertise to our ClydeUnion Pump customers, accelerating the delivery of flow control solutions in the kingdom and also giving quicker access to servicing and support."

"We are proud to support a strategy that promotes the advancement of local talent through the transfer of technical know-how to the Kingdom. We are also confident that this investment will deliver a better customer experience for our key accounts."

Celeros FT and Al Khorayef Petroleum will collaborate closely over the coming months with a view to having the new manufacturing facility fully operational before the end of 2023.

Verder launches e-PURE electrically-driven diaphragm pump

VERDER HAS LAUNCHED the Verderair e-PURE electrically-driven double diaphragm pump, the latest addition to its Verderair PURE range.

The e-PURE uses a new kind of technology for diaphragm pumps. This pump series works according to a horizontal fluid flow path, which results in less friction losses and an optimum fluid speed, thereby increasing pump efficiency. A direct result is reduced maintenance, lower energy costs and a longer life time.

The pump housing is manufactured from solid machined PTFE or PE (UHMW). The other wetted parts are made from PEEK and SS 316L. High speed low stroke technology enables low pulsation. No compressed air is needed as it is electrically driven.

The e-PURE is ideal for dosing and continuous flow applications pumping abrasive liquids. It is available in three models, with maximum capacity of 30, 50 or 100 l/minute.

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A fighter jet in tubular form

Joost de Bakker, CEO of CRA-Tubulars, outlines his company's unique solution for combatting corrosion and well integrity issues – Titanium Composite Tubing (TCT) technology.

Well integrity issues can cause significant financial problems for operators.



Image Credit: Adobe Stock

WITH AROUND 32% of wells suffering from well integrity issues globally (according to a previous estimate from the Society of Petroleum Engineers), CRA-Tubulars is preparing to enter the market with its TCT technology to provide a unique, cost-effective and reliable solution that will help tackle this constant headache for operators.

Joost de Bakker noted that while this issue has consistently been a thorn in the side of operators around the world, it is one that has been somewhat swept under the rug or at least not given the attention and investment it deserves. Traditionally, capital has been spent on short term, cheaper solutions and then the life-cycle is dealt with as it comes – with tubulars often replaced every couple of years. Now, however, this narrative is changing and many large oil companies are starting to change their philosophy to be more prepared early on and spend less on their wells in late life.

"Volume-wise, populations are increasing

and wells are producing less. Because of this, the strategy of working over wells is becoming more unmanageable. In addition, HSE considerations are pushing companies to be more responsible when managing their assets from both a human and environmental perspective," de Bakker remarked.

CRA-Tubulars' TCT addresses these issues by offering a robust and highly corrosion-resistant solution for the global oil country tubular goods (OCTG) market. The product offers corrosion-free completion (titanium) with carbon fibre and aerospace epoxy superior tri-

axial strength of the OCTG. It is API-5CT and NACE MR0175/ISO 15156 compliant and has a max. operating temperature of 140°C. It has been tested to 18,000 PSI and 240,000 lbs tensile load for a 4.1/2" tubing, half the weight of an equivalent metal pipe. This cost-effective solution therefore offers advantages of the more traditional duplex or nickel alloy tubulars, which are more susceptible to corrosive elements and Stress Corrosion Cracking (SCC).

Meeting market demand

Explaining the company's history, de Bakker said, "We were officially founded in 2019, however, this is a natural succession from a team of inventors and engineers who have been working in this field for more than 20 years. Composite and non-metallic tubulars have been developed a lot over the last 20-25 years, but one area that could never be truly tackled was downhole corrosion due to direct contact with a reservoir and the corrosive

“Essentially we have repurposed aerospace technology and turned it into a tubular form.”

elements such as CO₂ and chlorides, for example. Composite materials are not very good at performing as a barrier in this context and meeting the standards of barrier philosophies, hence the design with a titanium liner acting as a permeation barrier to overcome this. The idea for our company and product came out of decades of experience and an intent to rectify this.”

CRA Tubulars are therefore fast-tracking the TCT to commercialisation as a replacement for nickel alloys, which are traditionally used for the most challenging well conditions globally.

“At this point in time we have built and tested prototypes. Based on that and modelling we can build on the decades-long experience of defence and aerospace development because we are using the same materials that have been used for aerospace applications – essentially we have repurposed aerospace technology and turned it into a tubular form to meet the requirements of the harsh downhole conditions in oil and gas, CCUS and geothermal wells.

“We therefore do not need to test extensively ourselves as it has already been proven how the materials interact and perform in similar conditions (in terms of temperature and pressure) to how we are using them in downhole solutions. You could almost say that we have patented a fighter jet in tubular form for downhole applications and are using it to meet the demands of the oil and gas community.”

With the prototypes built and tested to extreme conditions, the next step is certification. For this, the company has found an international operator who is supporting it financially and technically in taking the product through this process. In addition, CRA Tubulars is working with several partners to do field testing by putting pieces of TCT in their completion strings. By doing so, the company hopes to build confidence in their product to ultimately benefit the community when the first commercially presentable product is supplied (which is expected by the end of the year).

Looking ahead to this time, de Bakker discussed what markets the company will first be targeting. He said, “At the moment, we are very much looking at competing directly with

the nickel alloy market. This is a market worth several billions of dollars in sales per year and when you break these down you can see the majority of oil and gas nickel alloy use is in the Middle East (it covers around half the global market because of the high volume of wells and often very sour conditions). However, we don’t want to stick to that area alone.”

Bakker suggested that while the critical market is oil and gas corrosive belts, there are also new areas such as carbon capture and storage (CCS) which the TCT could thrive in. “Many oil and gas companies are looking to use their old assets for this purpose, and the CO₂ and other elements could prove problematic for nickel alloys and carbon steel pipes. We are getting a lot of interest from companies in this market who are looking to build their future CCS portfolio, predominantly from North America, Western Europe and Australia.”

In recognition of this, de Bakker noted that the company has recently been awarded a global IOC and technology programme for certifying TCT for applications in CCUS.

“Our founder has built a team of shareholders which have a diverse field of expertise.”

Perfect timing

It appears that TCT could not be hitting the market at a better time. First and foremost, the economic squeeze caused by the pandemic is forcing oil and gas companies to pay closer attention to their finances. TCT in the long-term will save capital as the long-serving solution will mean wells can continue to produce for longer and at higher rates without requiring workovers.

Additionally, as de Bakker explained, because of the global political instability, the price of competitor product metals (such as nickel) has dramatically increased, whereas CRA-Tubulars’ product markets are much more stable.

“Finally, in the Middle East there is a general push for developing a broader supply chain. A steel plant can cost up to US\$150mn for nickel alloy products whereas a factory for ours, capable of producing 50 wells worth of material per year, would cost around US\$8mn dollars. For competitors therefore it is more likely that manufacturing locations will be set up and distributed across the world (which brings additional costs and can take a long time), whereas we can have manufacturing fragmented where it is needed. This is very attractive from an in-country value perspective.”

Coming to the market

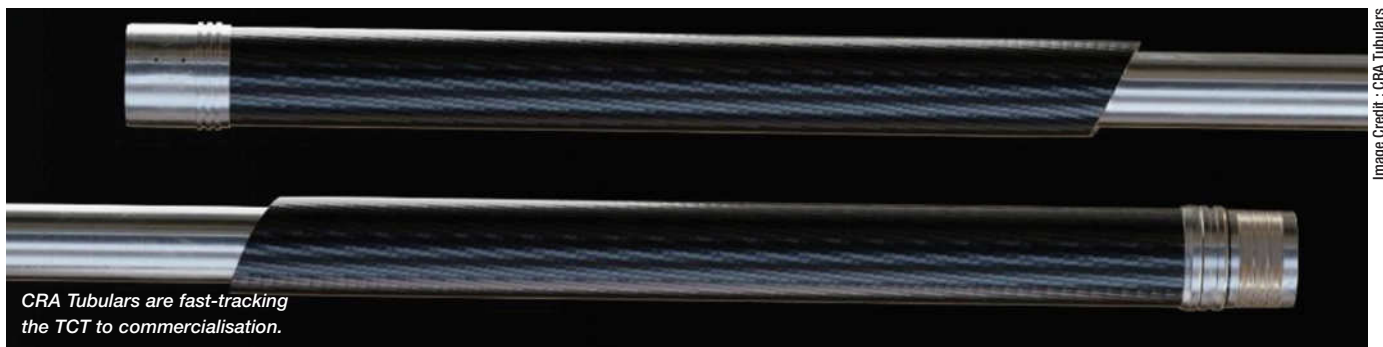
While de Bakker aims to bring a commercially presentable product to the market by the end of the year, he warned this is not a fixed point and, after that, volume manufacturing is of course a complex process and takes time to deliver.

Nevertheless, the CEO is excited for the future and paid homage to his incredible team which has helped get TCT this far, and will no doubt help drive it in the future.

“Our founder has been in the composite business for more than 20 years and has built a team of shareholders which have a diverse field of expertise. We have tried to attract the best in the field – for instance, our carbon fibre expert has a PhD in carbon fibre technologies and has worked extensively in the oil and gas industry for carbon fibre technology in downhole applications.”

De Bakker concluded with a nod to partners which he noted were incredibly important to how the company does and will work. “Independent parties have expertise and the critical structure that we, as a start-up, are lacking, and will help accelerate commerciality for our benefit and the benefit of end users.”

As demonstrated in September last year when the company received the global SPE ATCE rising star award for start up and new technology, CRA Tubulars is offering an innovative product that has the potential to offer significant value to operators. As a result, there is little doubt that many are keeping a close watch on the company’s progress towards commercialisation, and that there will be no shortage of suitors for potential partnerships in the future. ■



CRA Tubulars are fast-tracking the TCT to commercialisation.

Image Credit : CRA Tubulars

Improving operations with AR and remote support

Simran Bagga, head of engineering at Omnix International, discusses the role of Augmented Reality in remote support and the benefits it has to offer the oil and gas industry.

Can you comment on the growth of remote working and the need for remote support in the wake of the Covid-19 pandemic?

Remote working and remote support were in high demand during the pandemic. While there were challenges, our project implementations had to be on track with prompt submissions. What we now see is that the situation has moved on to become the norm.

The state-of-the-art cloud solutions and remote support solutions by Omnix have helped our project managers to tackle the need for the colocation of project team members. Our remote support was not only being geared towards client requirements but also augmenting the frontline workforce using smart glass technologies coupled with some great Augmented Reality (AR) solutions from TeamViewer.

What role does AR play in remote support, and can you comment on the prospects?

Mixed Reality (MR), which is a combination of Augmented Reality (AR) and Virtual Reality (VR) plays a very important role in remote support. AR remote assistance allows businesses to provide the same high-quality service, but remotely. It allows field technicians through their mobile Augmented Reality compatible devices, to have access to instant and high-quality support wherever they are working. From training machine operators to develop new processes, training personnel in Health & Safety (H&S) issues to surgeons performing complex operations, AR allows users to be immersed in a real-world/digital simulation where they are digitally interacting with the learning subject.

How can AR and remote support help oil and gas operators improve their operations?

Whether the work is within a factory environment, a customer's home or on an oil rig, technicians can carry out the required work, safe in the knowledge that they have access to expert assistance if needed while



Simran Bagga, head of engineering at Omnix International.

Image Credit : Omnix International

increasing productivity and first-time fix rates with AR and remote support. These, of course, correlate to cost savings as this reduces the need to send experts out to the site.

In the oil and gas industry, AR headsets that clip onto hard hats can project hands-free instructions that a technician needs to conduct an inspection or maintain a system. Precise AR animations dramatically boost efficiency and reduce errors and uncertainty by showing the necessary steps, tools and parts. They can also provide checklists and sensor data, and can visually demonstrate which parts to adjust, remove or replace. Instead of being dependent on manuals, AR enables this information to be delivered graphically, where and when it is needed.

AR can also help technicians plan changes they intend to make to equipment. Faced with the challenge of installing a cable in a complex environment on a ship, an organisation used AR to help mechanics visualise exactly where the cable would need to go and how it would need to be fastened. This provided a clear idea of the challenges they would face.

A critical application for VR in oil and gas is in training. Instead of studying theory in a classroom or transporting people to remote locales, trainees can use a VR headset to enter an environment or interact with a piece of equipment virtually. As in gaming applications, the experience is entirely immersive. Given the complexity of refineries, drilling platforms and processing plants, the opportunity to experience life-like training before entering these environments is invaluable, and companies save money that they would otherwise spend on transporting trainees to sites.

How does Omnix view the Middle East market for its solutions?

We see tremendous potential in the AEC sector, Oil & Gas, and Gaming. We are also looking forward to expanding business in the media and entertainment industry.

How receptive do you find Middle East companies to digital solutions generally?

Omnix has been evangelising these digital solutions a lot in the Middle East. We can see that customers are taking their digital transformation seriously and are putting in focused efforts to achieve their digital transformation goals. Omnix is currently working alongside many major corporates across the Middle East in this area. We help them implement digital twin and digital transformation technologies. ■

Using AI to control a chemical plant

A field test confirmed that reinforcement learning Artificial Intelligence can be safely applied in an actual plant.

YOKOGAWA ELECTRIC CORPORATION and JSR Corporation announced the successful conclusion of a field test in which AI was used to autonomously run a chemical plant for 35 days, a world first.

This test confirmed that reinforcement learning AI can be safely applied in an actual plant, and demonstrated that this technology can control operations that have been beyond the capabilities of existing control methods and have up to now necessitated the manual operation of control valves based on the judgements of plant personnel.

The initiative was selected for the 2020 Projects for the Promotion of Advanced Industrial Safety subsidy programme of the Japanese Ministry of Economy, Trade and Industry.

Control in the process industries spans a broad range of fields, from oil refining and petrochemicals to high-performance chemicals, fibre, steel, pharmaceuticals, foodstuffs and water. All of these entail chemical reactions and other elements that require an extremely high level of reliability.

In this field test, the AI solution successfully dealt with the complex conditions needed to ensure product quality and maintain liquids in the distillation column at an appropriate level while making maximum

possible use of waste heat as a heat source. In doing so, it stabilised quality, achieved high yield and saved energy.

Masataka Masutani, general manager of production technology at JSR, commented, "In an environment that is changing due to factors such as the fully-fledged introduction of 5G and other developments towards a digital society, as well as the ageing of the

“ The AI solution successfully dealt with the complex conditions needed to ensure product quality and maintain liquids at an appropriate level.”

human resources who ensure plant safety and a lack of human resources to replace them, the petrochemical industry is under strong pressure to improve safety and efficiency in its production activities by utilising new technologies such as IoT and AI. We verified that AI is able to autonomously control the processes that were previously performed manually on the basis of operators'



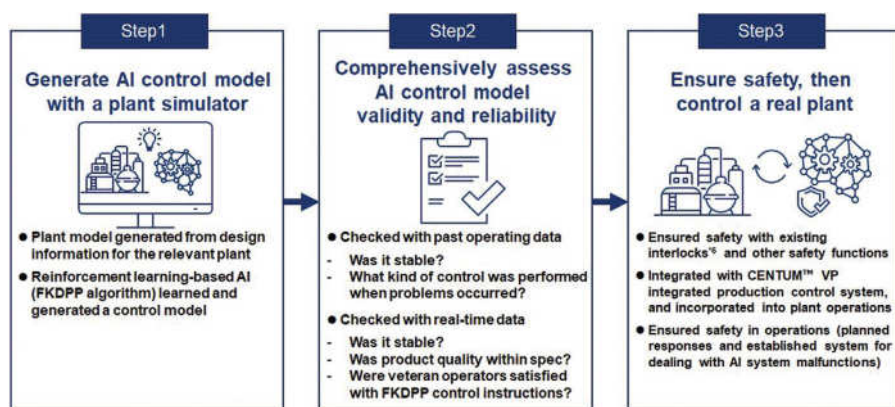
Image Credit: Yokogawa

Distillation columns at the JSR chemical plant.

experience, and we are firmly convinced of the usefulness and future potential of AI control. We will expand operations controlled with AI, and work to enhance chemical plant safety, stability and competitiveness."

Takamitsu Matsubara, associate professor at NAIST, remarked, "The reinforcement learning AI FKDPP algorithm was jointly developed by Yokogawa and NAIST in 2018 to realise autonomous control in chemical plants. Despite having to refer to a large number of sensors and control valves, the AI can generate a robust control policy in a limited number of learning trials."

Yokogawa Electric vice president and head of Yokogawa Products Headquarters, Kenji Hasegawa added, "The success of this field test came from bringing together the deep knowledge of the production process and operational aspects that only the customer can provide, and Yokogawa's strength of leveraging measurement, control and information to produce value." ■



Ensuring safety in plant operations.

Meeting business goals with autonomous agents

Mike Brooks, senior director, APM Consulting at AspenTech discusses the benefits of autonomous agents for early risk detection.



The APM 4.0 approach aligns the availability of assets to a business's production and financial goals.

Image Credit: Adobe Stock

THE WORLD IS much smaller today than it was even 10 years ago. Products can be developed in many locations and delivered anywhere. That has led to pressures on margins across the asset-intensive industries, and businesses have responded by seeking lower costs and greater productivity.

Production processes have become more complex and volatile, suffering greater uncertainty and ambiguity from any changes or deviations along a total product supply chain. We call this a VUCA (volatile, uncertain, complex and ambiguous) marketplace. Under such circumstances, manufacturers must rapidly understand the impact of impending disruptions and act quickly to seize business opportunities and minimise safety, environmental, and profit risks.

The good news is that digitalisation has now continued its trajectory beyond reactive, preventative, predictive and reliability-centred maintenance to a new asset performance management (APM) 4.0 approach that utilises autonomous agents to monitor and detect precise risks much earlier. This aligns the availability of assets to a business's ever-evolving production and financial goals.

The advent of autonomous agents

At the plant, the APM 4.0 approach is focused around three key areas; the asset, the process and random events that are unexpected or out of the norm. In oil and gas, for instance, a typical asset problem might be a pressure anomaly where the plant has abnormal increasing pressure in a reciprocating compressor. A process issue, however, may manifest itself as a compressor efficiency problem where an engineer identifies that a compressor is not operating optimally, and the plant needs to make an adjustment to fix the problem.

Random events by their nature cover many unexpected occurrences in the plant. One example might be erratic discharge from the plant when feed and intake pressures are out

of the norm. The keynote here is these events are unknown or unfamiliar but need to be quickly diagnosed and fixed.

Rolling out the agents

The process of distributing autonomous agents across the plant starts with AI-powered, role-based applications. Applications looking at asset risks can be targeted at reliability engineers. Those addressing process risks can be steered towards process engineers, and event analytics tools focus on frontline operators. Data scientists can also be brought in to evaluate unique scenarios and risks. The use of these applications helps rapidly create thousands of autonomous agents which can be used to blanket the plant and continuously monitor for and detect precise risks.

These agents are effectively digital twins that learn normal and degradation behaviours and keep watching and warning. Agents process real-time data across time and multiple dimensions, combined with asset management system data. Failure agents can alert on root causes of degradation and provide prescriptive guidance on exactly when to service and repair or how to adjust the

“ Digitalisation has continued its trajectory to a new asset process management (APM) 4.0 approach.”

process to avoid the damage altogether.

Anomaly agents learn the precise patterns that declare normal behaviour and alert when there is a deviation. The deviation could be a signature of degradation or a normal change in process behaviour. The anomaly agent reacts by embedding the new pattern of normal behaviour so that no false alarms occur. Additionally, agents can work on any asset in any industry for any failure mode.

The key benefit of this approach for asset-intensive plants, however, is that it enables the earliest possible risk detection, thereby maximising mitigation options and minimising negative impacts on production. That is because the intelligence generated by these autonomous agents can potentially then flow into collaborative alert assessment and mitigation workflows.

Typically, when it comes to reliability and

process engineers and frontline operators, the consequent actions will involve the mitigation of specific issues in their domains. However, the information delivered by agents can also help higher level business functions take a plant-wide look and consider what the impact would be if they make a specific change. Sometimes it might be better to run an asset failure than to jump in and make a maintenance mitigation decision, but autonomous agents will help these senior staff make the right decisions.

Scaling up

An approach based on autonomous agents has the potential therefore to bring far-reaching benefits to asset-intensive plant operations. It can ensure early planning to minimise maintenance time and cost and reduce impact on production. It can guard against process-induced damage to equipment and reduce financial impact and risk.

The best of these approaches, however, can also scale easily, especially when they are using off-the-shelf applications. That enables them to build agents quickly and apply them to an asset, an approach that can then be quickly replicated with other similar assets



Image Credit: AspenTech

Mike Brooks, senior director, APM Consulting, AspenTech.

across the plant. At enterprise level, learnings derived at one plant can then be taken and applied at other similar plants across the operator's estate. Once again, it is a compelling example of how autonomous agents can help businesses across the asset-intensive industries to meet their production and broader business goals. ■

“ The best of these approaches can also scale easily.”

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Optimising cyber resilience in the energy sector

A CySSIG webinar provided some essential advice on optimising cyber resilience in the energy, power and utilities sectors.

WITH ALMOST HALF of the world's known oil and gas reserves, and much of the capacity to process or utilise them, the Middle East and North Africa (MENA) region is a cornerstone of today's global energy and industrial system. As the region's energy and utilities industries continue to digitalise their assets, they have increasingly become targets of cyber threats. In fact, the region has been, and continues to be, a strategic target of cyber attacks, and 50% of these attacks are on the energy industry.

Effectively protecting and securing data and systems through the supply chain is now a business imperative for every company, and a recent webinar demonstrated how to do this effectively, bearing in mind that modern day operations often span complex IT (information technology) and OT (operational technology) infrastructures. This webinar, by the Cyber Security Special Interest Group (CySSIG), brought together a group of eminent and experienced experts, who presented firsthand accounts of the challenges faced and the value of modern solutions.

Eric Byers, chief technology officer at aDolus Technology Inc. spoke about uncovering supply chain risk in OT software, focusing on the technical details of the SolarWinds and Log4j incidents. He covered the research on the current exploitability of the OT software supply chain as well as specific recommendations from the Atlantic Council on how to guard against these kinds of attacks, and went on to explore how the Software Bill of Materials (SBOMs) can help both vendors and operators assess the validity and safety of all the components of any given software package. Byers also described why advanced AI techniques are essential to stay ahead of these well-funded, sophisticated attacks.

Andrew Dennant, VP of HIMA Middle East, spoke about four key areas where understanding the difference between a potential consultant's IT and OT cyber security expertise can have a dramatic impact on the effectiveness of OT cyber security implementation, with the first about domain

Key take-aways

- IEC 62443 provides a comprehensive framework to provide guidance**
- 62443 can be daunting budgetarily and resource intensive without technology**
- A tech-enabled approach that focuses on largest risks and takes a walk-run model can demonstrate progress and allow longer-term increases in SL-A's**
- The tech-enabled approach also allows for an efficient organization design for assessment through to monitoring SL-As**

VERVE

Image Credit : VERVE

David Brown of Verve explained how to build an effective risk and governance platform for OT security featuring IEC 62443.

expertise in the OT space and the second on standards compliance. Thirdly, he emphasised that the implementation of the system(s) means nothing if the plant's personnel are not appropriately trained, and concluded that better OT cyber security organisations give end users the opportunity to test their knowledge, skills and theories in an offline lab.

Simon Heath, who currently leads the Cyber security & IoT team at 3W Networks, then discussed how to go about understanding current cyber security posture, how to identify and assess the risks faced and how to mitigate those risks through a three-phase process, touching on the current threat landscape, attack surfaces and the key fundamentals of protecting operational technology.

David Brown, who is responsible for sales leadership and global operations at Verve Industrial, concluded the line-up of practical and experienced speakers. He explained how to build an effective risk and governance platform for OT security featuring the well-respected standard, IEC 62443, that provides comprehensive, risk-based security for industrial control systems. He stressed that the practical realities and the depth and

complexity make implementation difficult and time-consuming, and shared his findings from many years' experience of deploying systems to address these challenges globally centred around actual security levels (SL-As).

The speakers were then joined by Thomas Konigstein, CISO of HIMA for an open panel session, when they addressed attendees' concerns and provided sound advice on how to overcome them. They underlined CySSIG's aims to provide a free, practical, useful and timely opportunity for those tasked with the protection of critical infrastructure in a post-Covid world, where there are more calls for remote operations and cross-network cooperation with vendors, suppliers and information service providers. ■

CySSIG will repeat the webinar on 25 May 2022. Please visit www.cyssig.org for more information. Going forward, the free-to-join group will organise events on key areas of cyber security, including AI, Zero Trust Models for CS, Transport CS and Manufacturing CS in addition to providing practical cyber security meetings addressing members' concerns.

Pursuing Middle East expansion

OSSO, Aberdeen-headquartered provider of specialist fluid temperature control and separation solutions, is expanding globally – and the Middle East is a key focus. Oil Review Middle East spoke to James Scullion, OSSO's CEO, to find out more.

OSSO IS PURSUING an aggressive global growth strategy, seeing burgeoning demand for its separation and heat transfer solutions from the energy and industrial markets. A move to larger headquarters, the appointment of new hires across the Middle East and Europe and the signing of new partnerships will enable the company to expand its fleet and augment its global presence.

In November 2021, the company appointed a new Middle East manager in Dubai to spearhead its regional growth strategy, and plans to significantly grow its Middle East footprint in the next three years.

As part of this expansion, OSSO has signed a partnership with Medra Arabia, the national diversified oil and gas service company in Saudi Arabia. It is the company's second in the Middle East, where the company has had a partnership with Sigma in Abu Dhabi for several years now.

"We've been operating in the Middle East for a number of years, but what has become increasingly apparent is that local content in the region is becoming more and more important, and rightly so," says Scullion. "So, it's a key part of our strategy to ensure we have local partners within the key areas where we know our technology offering is most applicable."

Through the agreement with Medra Arabia, OSSO is providing clients with direct access to its rental fleet of equipment, along with rig site support and heat transfer solutions. The partnership enables OSSO to significantly reduce turnaround time of equipment and personnel – providing a greater economic support structure with added expert local knowledge. The partnership provides additional on the ground technical support to customers. Additionally, OSSO will provide in-country training on its technology and equipment, further upskilling Medra's in-field engineers in Dammam, enabling additional In-Kingdom Value Addition in line with Saudi Arabia's 2030 Vision.

Scullion explains that demand for the company's technologies, which offer benefits both in terms of rig efficiencies and safety, is growing.

"With higher temperature and deeper gas wells in the region, downhole temperatures are increasing significantly, which wears out a lot of the downhole components. We're providing customers with a solution that enables them to actively manage the mud and downhole well temperatures, to mitigate risks, preserve tool life, and avoid any costly delays due to thermal fracturing."

Saudi Arabia's oil and gas sector offers huge business potential, particularly given Aramco's recent announcement that it is ramping up



James Scullion,
CEO, OSSO.

capital expenditure to US\$40-50bn for 2022 to boost production.

"We see the Saudi market as buoyant, with a lot of drilling coming up," says Scullion. "Of course, there are challenges – drilling plans can be fluid and change quite regularly – but there is a good pipeline of drilling coming forward. Furthermore, the market is pushing for newer solutions like ours, that offer efficiencies in rig times and contribute to a reduction in environmental impact, which is another area we're addressing."

"So yes, we see potential for expansion in Saudi; a key part of our growth strategy is to help the oil and gas market become as efficient as possible, and using our mud cooling technologies to help with rig efficiencies is a key part of that."

"Moving forward, we're really pushing to develop the environmental aspect, minimising the inevitable environmental footprint of oil and gas drilling and upstream operations as far as possible. Anything we can do to reduce waste streams on site, treat and reuse other oil products is a key focus for us. That's where we see the opportunity with Medra, and that's where we'll require even more skilled individuals to operate that equipment and service it efficiently in-country." ■

“Moving forward, we're really pushing to develop the environmental aspect.”

Disrupting the oil and gas sector with AI

Ram Ramachandran, senior vice president and head, Middle East & Africa at Tech Mahindra discusses the potential for AI to enhance operations in the oil and gas sector.



TODAY, MORE THAN ever, oil and gas companies are relying on cutting-edge technology to get the job done for activities such as pipeline pig location. The deployment of artificial intelligence (AI) is at the forefront of these efforts. Industry experts have unanimously vouched for its transformative capabilities and the pace at which it is disrupting oil and gas dynamics. For the GCC region, the adaptation of AI, robotics and machine learning (ML) into the oil and gas industry is not only the need of the hour, but a must to sustain its supremacy in this market.

Taking the UAE for example, in 2020 it captured a 13.2% share of the Middle East's oil production, accounting for 3.66 mn bpd production. It also holds 11.5% of the

“ In upstream operations, AI is taking oilfield development to the next level.”

region's proven oil reserves. With a view to achieving its 2030 goals of generating a more profitable petroleum sector, the country has formulated plans to significantly enhance investments in the midstream and downstream sectors in the coming years.

For that to happen, new-age technologies such as AI, ML and predictive analytics augur well to aid the industry in enhancing

operations. According to research, these disruptive technologies have the potential to reduce costs by up to US\$5bn in upstream oil and gas activities. With AI's potential to amplify or even replace some human competencies, allowing them to focus on more creative and value-added activities, a recent survey highlighted that more than 92% of oil and gas companies are either currently investing in AI or plan to do so in the next two years. The results are already extremely positive. Recent studies found that high-performance AI frameworks powered by graphics processing units (GPUs) can improve profitability by more than 13% in field planning scenarios in comparison to traditional methods. It can also reduce the number of injector wells drilled by 58%, which further

lowers drilling costs by up to US\$5-10mn per well while at the same time minimising drilling environmental hazards.

AI is gradually being used to improve various upstream, midstream, and downstream processes in the industry, ranging from functions such as boiler diagnostics to actual drilling, besides improving quality control, prediction planning and predictive maintenance. Companies are also deploying AI in areas as diverse as monitoring operations for plant efficiency and uptime improvements to analysing production data and trends and managing product formulations and output. AI is facilitating companies to make better, more informed decisions about resources and assets, while enabling new data sources from connected sensors that are opening up a considerable number of potential uses.

In upstream operations today, AI is taking oilfield development to the next level. AI solutions support oilfield planning by enhancing and complementing traditional physics-based simulation models. Cognitive AI software, which unites historical and real-time data with embedded human knowledge and human-like reasoning, enhances existing predictive methodologies and helps field planners pinpoint drilling opportunities, reducing the time to process reservoir data from months to days.

“ The combined power of AI and ML tools can enable companies to recognise emissions sources and in turn reduce energy consumption.”

Cognitive AI-powered solutions support the longevity of wells so that exploration companies can get the best possible extraction rate and ensure resources are utilised to their optimum. AI enables companies to extend the productive life of their wells and boost productivity over time by integrating historical data with real-time sensor data and human expertise captured by cognitive reasoning technology. This, in turn, maximises the resources that can be extracted and also reduces the need to drill new wells.

Refinery operations are typically complex, and accomplishing operational targets can be an uphill task. Working with IoT sensors, cognitive AI solutions help in monitoring dynamic refinery conditions and unplanned events in real-time and can even predict problem areas such as equipment

Tech Mahindra

Ram Ramachandran, senior vice president and head, Middle East & Africa at Tech Mahindra.

Image Credit: Tech Mahindra

breakdowns. Such advanced intelligence gives plant operators enough time to take corrective action. These augmentations enable refinery operators to be more profitable. Some cognitive AI solutions have optimised refineries in a short time, with up to 17% improvement in operating to plan. Better plant management and maintenance increases uptime, extends asset life, and reduces risk to assets, personnel, and possible environmental contamination.

AI use case

An oil and gas customer needed AI and analytics-driven services for diverse use cases capable of mining enterprise documents to extract information, having the ability to support voice communication and being able to adapt to different environment acoustics and language accents.

Tech Mahindra implemented a data science platform which aggregates and correlates data from disparate data sources to build analytical results and access to deeper insights for data scientists. This will be interfaced through chat bots across use cases.

Going sustainable

In a bid to be sustainable, globally leading oil and gas companies have already started working towards achieving net-zero emission targets. Despite the current economic challenges, many companies have made efforts to decarbonise their operations and value chains. While the journey to sustainability may still be in its infancy, cognitive AI technology can prove to be revolutionary in addressing the biggest challenges that oil companies have been facing for many years. The combined power of AI and ML tools can enable companies to recognise emissions sources and, in turn, reduce energy consumption and optimise

operational energy efficiency.

The integration of AI in the oil and gas sector has already started taking shape, albeit slowly. Oil companies have started focusing on creating 'digital oilfields' of the future that can radically change the way oilfield workers, machines, and the holistic enterprise operate in achieving results. As we move ahead in the digitised era, these new digital oilfields will prove to be disruptive technologies that create new value streams for exploration and production, ranging from automated decisions and reactions in real-time aimed at improved operational efficiencies, to connected infrastructure platforms, and much better interaction between machines and humans.

A Mordor Intelligence report estimates that the global AI in oil and gas market was valued at US\$2,034.9mn in 2021, and is expected to reach US\$3,669.8mn by 2027 while registering a CAGR of 10.81% during the forecast period (2022-2027). The report forecasts that as the cost of IoT sensors declines, more major oil and gas organisations will start integrating these sensors into their upstream, midstream, and downstream operations, along with AI-enabled predictive analytics. It highlights the multiple applications of AI in the oil and gas industry, such as production optimisation with computer vision to analyse seismic and subsurface data faster, downtime minimisation using predictive maintenance for oil and gas equipment, reservoir understanding, and modelling to predict corrosion risks to reduce maintenance costs.

If the GCC region wants to sustain its leadership in oil and gas, the industry quickly needs to embrace new technology solutions such as AI & ML. The time is now for oil and gas companies to explore the possibilities of AI and be the frontrunners in bringing sustainable change. ■

The evolution of video wall technology

Piet Vanhuysse – segment marketing director of Large Video Wall Experience at Barco, discusses the development of video wall technology.

What are the key visual display and audio playback technologies that make up a modern video wall, and how are they improving and developing?

There are three dominant technologies in the visual display game – LCD, rear-projection cubes (RPC), and direct view LED. Each of these individual technologies has their own strengths and use cases, and it is important that potential customers match their needs to the technology.

LCD is the most budget-friendly of the technologies, and is a great pick for somewhere like a workplace lobby, where you need sharp picture quality and a scalable solution. RPC is confined mostly to control rooms, and has endured mainly due to its



Piet Vanhuysse – segment marketing director of Large Video Wall Experience at Barco.

Image Credit: Barco

robustness. In situations where companies need to constantly monitor their network, a solution that has a very long lifetime and an absence of burn-in effects is perfect for 24/7 monitoring in mission-critical scenarios. LED is often perceived as the rising star in the visual display world, and is the primary choice for creative processes when a seamless canvas is required and where the image needs to make an impact. While it is the most expensive technology, its colour reproduction and viewing angles make it the de facto option in places such as broadcast environments.

“When discussing creative applications, people are mostly talking about LED.”

When discussing creative applications, people are mostly talking about LED. Since the early 2000s, the size of the panels that you need to mount LEDs on have become a lot smaller, and unlike LCD or RPC, LEDs are also not restricted to a rectangular shape. That has opened a whole host of creative solutions, from the types of displays you see at concert halls, all the way to flexible LEDs. As LEDs are essentially single pixels that are mounted on surfaces, that allows for a lot of creativity in the way you can approach a video wall.

How are maintenance and repairs carried out, and how is this changing? And how do operators ensure the video wall continues to look its best without deterioration?

Firstly, quality deterioration is not simply a post-care issue. Deterioration has a lot to do with the product design process, and it's something that begins with the quality of the materials you choose. Deterioration is particularly important in mission critical 24/7 applications. If you have any deterioration in

the video wall of a power company monitoring the grid, you might not know when a neighbourhood loses power. That's why component selection, strict quality processes and embedded redundancy are key in designing and bringing products to market.

When service interventions do need to be made, you want to make them as safe and quick as possible. Service diagnostics can now be run from the cloud for an entire fleet of video walls, so by the time a maintenance expert needs to go on-site, the issue has already been diagnosed. In terms of physical servicing, you want to minimise the potential disruption to any operation. Being able to access the inside of an LED video wall from the front and back, as well as motorised extraction for the quick and safe removal of parts, is one way this is already being done. In less than a minute, an engineer can safely swap an LED module out in a way that is as unintrusive as possible.

Looking further ahead, what new developments can we expect to see in video walls in the future, and what advantages will they bring?

One of the most exciting things that we're seeing around video walls is peoples' changing perceptions towards them. Video walls are no longer simple signage, they have come to be thought of as having a critical impact on a business's functionality. Barco worked with a London-based company a few years ago who wanted to develop an internal meeting space that would facilitate cross collaboration and drive employee engagement across 120 countries. Through the installation of a touch screen 18-panel LCD video wall in collaboration with our partners, we created a centrepiece for the organisation and radically transformed the space the firm inhabited. In so doing, the video wall became a part of that company's overall business journey and became reflective of their brand. Video walls are no longer a place to put the lunch menu, but a centrepiece around which workplaces and work cultures can be redesigned. ■

A new era of level sensing

VEGA has introduced the radar sensor VEGAPULS 6X. Fyna Ashwath was present at the technology launch.

THE VEGAPULS 6X launch presented by Günter Kech, managing director and product managers, Florian Burgert and Jürgen Skowaisa outlined how VEGA is continuously pushing the limits towards excellence. The company's Middle East team demonstrated how VEGAPULS 6X has simplified the monitoring of industrial processes and is suitable for a diverse range of applications.

One sensor for all applications

VEGAPULS 6X, the latest VEGA Radar sensor that replaces its past 'Pro' line in its entirety, is a single sensor that can measure every conceivable level application. The choice of sensor is no more about knowing the model in the product range. It is now about the needs of the user and the requirements in the intended application.

Traditionally, the search for a suitable radar level sensor begins by asking which frequency would be best for the specific application, or by determining the properties of the medium, the temperature ranges involved and the process fittings required. Until now, choosing an instrument was a laborious task, but VEGA is now transforming the process completely with its new VEGAPULS 6X.

"Ultimately, it is not the sensor that counts, but what the users can achieve with it in their individual processes," said Florian Burgert, who, as a product manager at the VEGA headquarters in Schiltach, Germany, has been closely involved in product development from the very beginning. "Just knowing that they have chosen the best possible measurement solution and will reach their goal faster with it makes a big difference in their everyday operations."

The radar chip inside the VEGAPULS 6X combines the experience gained from 30 years of radar level measurement engineering. Arguably, this is the single most important innovation for the sensor. VEGA had separate sensors dedicated to measurement of liquids and solids, from water to very poorly-reflecting oils, from gravel to fine powders. The challenge for electronics is to recognise the different reflections. The combination of narrow bandwidth and advanced electronics logic enables the VEGAPULS 6X to perform perfectly on any process material.

The new sensor will encompass past technologies that had been optimised for specific applications. Effectively, the new VEGAPULS 6X combines the best of the previous 80 GHz, 26 GHz and 6 GHz sensors, such as the VEGAPULS 64 and VEGAPULS 69, in one device. The full range of process conditions from low to high temperatures, to high pressure, and extra safety requirements are all covered in the device. The user does not need to remember the appropriate model any more – just indicate the working conditions, and generate the appropriate configuration.

The new VEGAPULS 6X offers a selfdiagnosis system that immediately detects damage or interference, thus ensuring significantly higher availability and safety. It has new radar-chip technology with expanded application possibilities and simpler operation.



Image Credit: VEGA

Effectively, the new VEGAPULS 6X combines the best of the previous 80 GHz, 26 GHz and 6 GHz sensors, in one device.

New challenges of the 21st century include increased risks in the digital security field. Security standard IEC 62443-4-2, covering strict requirements for communication security and access control, are observed for the sensor.

VEGA produces 438,000 sensors every year, supplied all around the world.

"At VEGA we do not do a hundred different things, we concentrate on what we do best – radar," observed Skowaisa. The company's office in Dubai, belonging to the French subsidiary VEGA Technique SAS, provides technical knowledge and expertise across the Middle East.

In the future, the customer will no longer need to worry about the technology, frequency or instrument version. Even setup and commissioning require just a few clicks and basic application parameters. Imagine ordering a device that is interchangeable between a diesel tank, a cement silo, and a water pump room, with a single set of spare parts and optimum performance. It is the VEGAPULS 6X. ■

GD Energy Products unveils timesaving valve cover

GD ENERGY PRODUCTS, the total solutions provider for the drilling, well servicing and frac pumps market, has launched SafeLock, a hammerless quarter-turn valve cover lock for drilling modules. SafeLock delivers safer and faster removals without additional tool requirement.

Durable and hammerless, the unit eliminates hazards and increases operational efficiency by reducing the number of revolutions required to remove valve cover locks to a quarter-turn.

Corrosion-resistant threading and grease zerks keep threads lubricated between service intervals, while a robust handle design increases leverage and ergonomics.

Ryan Huseman, lead engineer, GDEP, said, "SafeLock's mechanical lock design requires no preload and eradicates the need for hydraulic pumps, torque wrenches, drills and impact guns.

"With SafeLock, we have essentially converted a dangerous multi-minute process to a tool-less and hazard-free 10 seconds."



Image Credit: GD Energy Products

The unit reduces valve cover lock removal revolutions to a quarter-turn.

Schlumberger and Sintela announce tech share agreement

STRIVING TO DEVELOP new fibre-optic solutions for a range of industrial markets, Schlumberger and Sintela have confirmed a technology sharing agreement.

Schlumberger will market and deliver solutions in the energy, carbon capture and storage, and geothermal industries, with Sintela delivering the combined solutions to other markets.

"Working together with Sintela, we will deliver a range of fibre-optic solutions that enhance measurement data handling capability at the edge, rapidly delivering actionable insights to our upstream and midstream customers in domains such as geophysics, well integrity, production monitoring and pipeline monitoring," said Aparna Raman, president, Reservoir Performance, Schlumberger.

"Sintela brings years of cross-industry R&D knowledge and experience with DFOS technologies that we will leverage with our combined IP and industry domain knowledge to accelerate the pace of innovation, deploy solutions at scale, and develop more integrated and open workflows with customers, leveraging artificial intelligence and machine learning (ML)."

Halliburton introduces real-time StrataStar visualisation

HALLIBURTON HAS INTRODUCED its latest deep azimuthal resistivity service, StrataStar.

The new technology provides multilayer visualisation to maximise well contact with the reservoir and improves real-time reserves evaluation.

"Beyond its superior depth of investigation, StrataStar is different from other azimuthal resistivity technologies due to its ability to deliver a high-fidelity picture of the reservoir, along with a comprehensive understanding of resistivity, including anisotropy," said Halliburton vice president of Sperry Drilling Jim Collins.

"This means faster, more accurate reservoir characterisation to precisely place wells in the most productive zones to maximise asset value."

The StrataStar service is the latest addition to Halliburton's iStar intelligent drilling and logging platform, which combines deep subsurface insights with artificial intelligence to achieve improved drilling performance and more consistent well delivery.

Acquiring real-time measurement and visualisation of surrounding geology and fluids up to 30 feet around the wellbore, StrataStar applies a sophisticated algorithm to map the position, thickness, and resistivity of interbedded rock and fluid layers, helping operators stay within targeted boundaries.

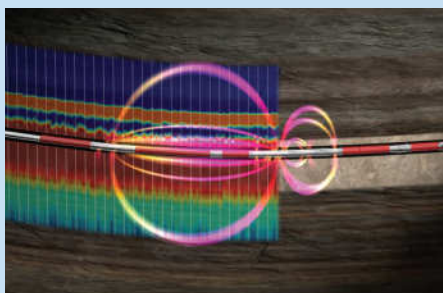


Image Credit: Halliburton

The StrataStar system utilises insights and artificial intelligence.

CGG and Kent announce carbon capture and hydrogen partnership

TO ACCELERATE THE global decarbonisation goal, CGG, a leader in geoscience, has partnered with Kent, an energy service engineering company, to realise decarbonisation opportunities through CCUS development and hydrogen production and supply.

The partnership will provide customers in the energy and industrial sectors with 'end-to-end' services across projects' lifecycles.

Bringing the capability to masterplan entire CCUS clusters, CGG will deploy its subsurface characterisation and subsurface risk analysis capabilities, along with its extensive Earth data library and seismic multi-client data. Kent will offer its capabilities in design and engineering of facilities, carbon capture, and transportation through pipeline to wellhead, working alongside CGG from wellhead into storage reservoir.



Image Credit: CGG

Decarbonisation opportunities throughout the production and supply lifecycle will be maximised.

John Kent, chief energy transition officer, Kent, said, "Kent is delighted to collaborate with CGG and highlight the benefits of CCUS and hydrogen production that will play an important role in decarbonising the broader energy sector. By bringing our complementary capabilities together, we can help each other, and our customers, move at a faster pace on the energy transition journey. Working together is critical if we are going to decarbonise the sector fully – no one company or organisation can do it alone."

Peter Whiting, EVP, Geoscience, CGG, said, "Our partnership with Kent will provide clients in energy and industrial sectors with the end-to-end solutions they need to achieve their energy transition goals with CCUS and H₂ storage projects.

"By capitalising on the capabilities of both companies, we can bring to our customers a fully integrated view of their projects from the subsurface to the surface across the lifecycle of these projects."

Cost efficiencies and sustainability drive IoT technologies adoption

GREATER COST EFFICIENCIES and improving environmental sustainability are the top drivers behind IoT adoption among oil and gas businesses, recent research by Inmarsat, a leader in global, mobile satellite communications, has revealed.

More than half (52%) of oil and gas respondents stated that cost efficiency is a key driver behind their adoption of IoT technologies, while improved environmental sustainability (50%), increased staff productivity and reduced downtime (both 47%) followed. Despite these benefits, many oil and gas organisations continue to face several key barriers when deploying IoT – in particular a lack of available capital to invest in IoT projects and a lack of in-house skills in the deployment phase.

Despite the accelerating speed of IoT adoption over the course of the Covid-19 pandemic, improvements are still needed to draw the optimum benefits from the technology. Unreliable connectivity, inadequate data strategies, and a lack of skills are hampering many businesses' ability to reap the rewards of IoT.

Damian Lewis, market development manager at Inmarsat Enterprise said, "It is promising to see that meeting sustainability goals is a key driver of IoT adoption within the oil and gas sector – alongside cost efficiency. Unlocking the capital to invest in IoT solutions and developing in-house skillsets to deploy and leverage them most effectively, will enable oil and gas companies to fully benefit from their IoT projects."

Mike Carter, president of Inmarsat Enterprise added, "Organisations struggling to implement the right connectivity strategies are lagging behind their peers, and those with a formal IoT strategy are better placed to reap the benefits of optimised and more sustainable operations."

"We can see that too many businesses still struggle to deploy IoT projects due to unreliable, insecure, or poor connectivity. This is where satellite IoT connectivity can play a key role. Some of the most valuable data often hails from the hardest to reach places, so investing in effective collection, storage and analysis of that data is crucial to successful IoT strategies."

"Inmarsat ELERA, our industry-leading narrowband network, is ideally suited to the rapidly evolving world of IoT. ELERA is inspiring new possibilities and enabling organisations from all sectors to access IoT anywhere."

Fish-like autonomous underwater robot developed

VERLUME, A LEADER in intelligent energy management and storage technologies for the energy industry, has joined with consortium partners to progress the development of an autonomous underwater robot that moves like a fish.

The agile biomimetic autonomous underwater vehicle (AUV), named RoboFish, is designed to facilitate offshore inspections in harsh and hard-to-reach environments. It is made up of several self-contained modules with self-managed battery and actuator control for full-body, autonomous movement around underwater structures. RoboFish

was initially devised by researchers at the University of York, Department of Electrical Engineering and the University of Strathclyde, Department of Naval Architecture, Ocean & Marine Engineering with grant support from the EPSRC Supergen Offshore Renewable Energy Hub.

Verlume is assisting with the development of an intelligent power solution for RoboFish. The company will supply an underwater power system for charging, as well as an integrated intelligent battery management system. Both have been designed for the harsh underwater environment, providing a reliable, uninterrupted power supply for use on the seabed.



The RoboFish prototype.

Image credit: Verlume

Sandvik adds Sanicro 625 bar to its offering

SANDVIK IS ADDING super alloy Sanicro 625 bar (UNS 06625) to its growing family of high-performing nickel-alloys. The bar will be used to machine advanced components that are exposed to acids, alkalis, seawater and other wet corrosive conditions in both cryogenic environments and temperatures up to 593°C (1100°F).

"This is great news for customers who are looking for a reliable supply of high-quality 625 bar stock," says Henrik Zettergren, global product manager. "625 is among the toughest of nickel-based alloys and really sets the gold standard for safety, reliability and performance. When you've got a flange, valve or fitting that simply cannot fail, it ensures high strength, extraordinary corrosion resistance, good fabricability and excellent welding properties."

The decision to manufacture Sanicro 625 bar and build up local stocks with trusted distributors and at its own mills in the USA, Europe and Asia was largely prompted by customers experiencing sourcing challenges during the pandemic, says Zettergren. The need for extreme safety and reliability is high among energy producers, refineries, chemical processors and marine companies.

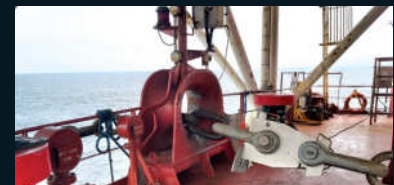
Emergency release system launched

IN ORDER TO reduce the significant safety risks associated with the manual emergency release of mooring systems during FPSO tandem offloading ocean towage, heading control, positioning and decommissioning, Gall Thomson has released the PODx (Powered Offshore Disconnect) – an innovative new automatic actuation system.

PODx minimises the risk of personnel injury, damage to equipment and subsequent downtime by remotely releasing mooring hawser chains under full load, quickly and safely. It utilises release bolt technology that automatically separates on demand, providing an identified parting point in the mooring line. This allows for a reliable release in under 100 milliseconds.

Designed for use in a variety of offshore applications including FPSO, emergency mooring release systems and anchor handling vessels, PODx uses a range of block and release bolt sizes specific to the load requirement.

Fred Boufennane, business development director at Gall Thomson, said, "PODx is a simple and robust solution to a serious safety problem that has long been recognised as presenting significant risks to personnel and capital equipment. The technology is proven, and its operational costs are substantially lower than traditional alternatives."



PODx minimises the risk of personnel injury and damage to equipment by remotely releasing mooring hawser chains under full load, quickly and safely.

Image credit: Gall Thomson

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS, KUWAIT

Project Name	City	Facility	Budget (US\$)	Status
KIPIC - The Petrochemical Refinery Integration Project (PRIZe)	Al Zour	Polyethylene, Polypropylene	10,000,000,000	FEED
Al Khafji Joint Operations (KJO) - Dorra Gas Field Development	Neutral Zone	Gas Field Development	3,000,000,000	Project Announced
KOC - Jurassic Production Facilities (JPF-4 & JPF-5) - Overview	Northern Kuwait	Oil Production, Gas Production	1,884,000,000	Construction
KOC - Jurassic Production Facilities (JPF) - JPF-4 and JPF-5	Northern Kuwait	Oil Production, Gas Production	980,000,000	Construction
KOC - Gas Export Pipeline From North Kuwait To Mina Al-Ahmadi Refinery	Northern Kuwait	Seamless, Gas Pipeline	480,000,000	Commissioning
KIPIC - Al Zour New Refinery - Overview	Al Zour	Petroleum Oil Refining	16,000,000,000	Commissioning
KIPIC - Al Zour New Refinery - Package 2 - Support Process Plant	Al Zour	Petroleum Oil Refining	3,800,000,000	Commissioning
KNPC - New Local Marketing Depot At Matlaa Area	Northern Kuwait	Storage Tanks	1,040,000,000	FEED
KOC - Al Zour New Refinery Crude Oil Pipelines	Ahmadi	Welded, Pipeline	845,000,000	Commissioning
KOC - North Kuwait Gathering Center (GC) 32	Northern Kuwait	Gathering Centre	1,650,000,000	Construction
KOC - Installation of New Desalter Trains	Various	Crude Oil Distillation Unit	250,000,000	Commissioning
KOC - Water Management Project - Overview	Various	Gathering Centre	681,000,000	Commissioning
KOC - Water Management Project - Gathering Centers 9, 10, 20, 22	East Kuwait	Gathering Centre	196,000,000	Commissioning
KOC - Water Management Project - Gathering Centers 6, 8, 11, 19	Southeast Kuwait	Gathering Centre	240,000,000	Commissioning
KOC - Water Management Project - Gathering Centers 3, 4, 7, 21	South Kuwait	Gathering Centre	245,000,000	Construction
KIPIC - Al Zour New Refinery - Package 4 - Tankage	Al Zour	Storage Tanks	1,600,000,000	Commissioning
KOC - Southeast Kuwait BS-140 & BS-150 Upgrade	Southeast Kuwait	Gas Processing	300,000,000	FEED
KOC - Wara Pressure Maintenance Project - Train 3	Southeast Kuwait	Oil Field Development	187,000,000	Construction
KOC - West Kuwait BS-171 Gas Sweetening Facility	West Kuwait	Gas Processing	300,000,000	Feasibility Study
KIPIC - Al Zour New Refinery - Package 3 - Utilities and Offsites	Al Zour	Offsites & Utilities	2,100,000,000	Commissioning
KOC - Kuwait Bay Exploration	Various	Oil Exploration	904,500,000	Engineering & Procurement
KOC - Jurassic Production Facilities (JPF) - JPF-4 & JPF-5 Off-Plot Works	Northern Kuwait	Oil Production, Gas Production	884,000,000	Engineering & Procurement
KNPC - Mina Abdulla Debottlenecking of Coker Unit 20	Mina Abdullah	Petroleum Oil Refining	93,700,000	Commissioning
KOC - New 48" Crude Transit Line From North Kuwait To CMM (TL-5)	Northern Kuwait	Welded, Pipeline	395,000,000	Commissioning
KOC - Jurassic Production Facilities Off-Plot Works	Northern Kuwait	Oil Field Development	254,000,000	Construction
KOC - East Kuwait Gas & Condensate Pipeline Modernization	East Kuwait	Gas, Gas Pipeline	75,000,000	Engineering & Procurement
KOC - South Kuwait Gas & Condensate Pipeline Modernization	South Kuwait	Gas, Gas Pipeline	95,000,000	Engineering & Procurement
KOC - Jurassic Light Oil Export Facilities Upgrade	Jurassic	Oil Pipeline	150,000,000	Feasibility Study
KNPC - Mina Al-Ahmadi Refinery - LPG Trains - Heating Furnace Modification Project	Mina Al Ahmadi	Liquefied Petroleum Gas	30,000,000	Engineering & Procurement

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- Latin America
- North America
- Central America
- Russia & CIS
- East Africa
- North Africa
- West Africa
- India
- China
- Europe

SECTORS COVERED



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Project Databank

Compiled by Data Media Systems

Project Focus

Compiled by Data Media Systems

KOC - Jurassic Production Facilities (JPF) - JPF-4 and JPF-5

Name of Client	KOC - Kuwait Oil Company
Estimated Budget (US\$)	980,000,000
Award Date	2021-Q4
Main Contractor	Jereh, NAPCO - National Projects Alliance Company, Spetco International Petroleum Company
Facility Type	Development Drilling & Production, Gas Production
Status	Construction
Location	Northern Kuwait, Kuwait
Project Start	2018-Q1
End Date	2023-Q2

Background

The Kuwait Oil Company (KOC) has recently established three plants to produce free gas and light oil according to Jurassic Production Facility (JPF) system. Each plant has a capacity for 104 million standard cubic feet (mmscf/d) of free oil per day and 40,000 barrels of light oil per day (bopd). KOC plans to establish two more JPFs which will be called JPF-4 and JPF-5. Together they will create an onshore surface production facility with the capacity to produce 50,000 bopd and 150 mmscf/d of gas. JPF-4 & JPF-5 will be used for testing, processing, treating and handling of wet and sour hydrocarbon well fluids from the following oil and gas fields: Raudhatain, Sabriyah, Northwest Raudhatain, Umm-Niqa, Dhabi, Bahra, the fields of Marrat, and Najmah-Sarjelu.

Project Status

Date	Status
Apr 2022	Gulf Spic General Trading & Contracting Company is in charge of the engineering works for JPF-5. Fortune Engineering & Energy Services and Axens are supplying a gas treatment package for JPF-4 and JPF-5, respectively.
Feb 2022	The EPC contractors have started developing the land and will start building the temporary facilities at the project site.
Dec 2021	KOC and Spetco have signed the EPC contract for JPF-4.
Dec 2021	KOC and Jereh/NAPCO have signed the EPC contract for JPF-5.
Dec 2021	A tender for the construction of a US\$100mn pipeline within the project is expected to be issued in 2022

Project Scope

The project scope includes:

- Two Jurassic Production Production Facilities (JPF) with the capacity to produce 50,000 barrels of oil a day (b/d) (Jurassic light oil with 40°-50° API) and 150mn standard cubic feet of gas a day (scf/d).
- JPF-4 will be located close to the Sabriyah field in the north of Kuwait and JPF-5 will be located less than 10 km to the east of JPF-4.
- A water treatment unit.
- A sulfur recovery unit.
- Associated facilities: a control room, substations, and buildings.

Middle East & North Africa

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

Country	MARCH 2022			VARIANCE From February 2022	FEBRUARY 2022		
	Land	Offshore	Total		Land	Offshore	Total
Middle East							
ABU DHABI	28	12	40	+6	26	8	34
DUBAI	0	1	1	+1	0	0	0
IRAQ	47	0	47	+1	46	0	46
JORDAN	0	0	0	0	0	0	0
KUWAIT	27	0	27	-1	28	0	28
OMAN	48	0	48	+1	47	0	47
PAKISTAN	17	0	17	+1	16	0	16
QATAR	3	8	11	+1	3	7	10
SAUDI ARABIA	63	11	74	+7	58	9	67
YEMEN	1	0	1	0	1	0	1
TOTAL	234	32	266	+17	225	24	249

North Africa

ALGERIA	30	0	30	+4	26	0	26
EGYPT	25	8	33	-1	24	10	34
LIBYA	15	0	15	0	15	0	15
TUNISIA	2	0	2	0	2	0	2
TOTAL	72	8	80	+3	67	10	77

Source: Baker Hughes

مراقبة الانبعاثات بل التنبؤ بها. إذ يمكننا، باستخدام تحليلات البيانات وإمامنا بعملية الإنتاج، إخبار عملائنا بكمية ثاني أكسيد الكربون أو أكاسيد النيتروجين أو أول أكسيد الكربون التي ستنبعث من منشآتهم خلال الأسبوع أو الشهر المقبل إذا ظلوا يستمسكون بالعملية التي يستخدمونها الآن. وهكذا يمكننا تمكين عملائنا من الموازنة بين أهدافهم التجارية وأهدافهم البيئية من خلال تحليل البيانات».

ويسلط بيسكر الضوء على نموذج يخص عميلا من عملاء الشركة في الشرق الأوسط، إذ أجرت «سيمنز للطاقة» عملية تحسين بنظام مغلق لإنتاج الطاقة داخل أحد توربينات الغاز لهذا العميل. فيقول: «يكن المحور الرئيسي بالنسبة للانبعاثات، سواء أكانت ثاني أكسيد الكربون أم أكاسيد النيتروجين، في كيفية الاحتراق، ودرجة نظافة الاحتراق. ونحن - لذلك - نراقب الاحتراق، ونتابع الاهتزازات، وتدقق الغاز داخل التوربين، مع مراقبة ناتج الطاقة والانبعاثات في آن واحد».

«فهذا نظام مغلقٍ تمام الإغلاق؛ فقد ابتكرنا نظاماً فريداً حاصلًا على براءة اختراع. إذ تتحكم وحدة تحكم مستقلة في عملية الاحتراق بطريقة تقلل الانبعاثات دون أي تدخل بشري، مع الحفاظ - في الوقت نفسه - على الأهداف التجارية لعملائنا. وهكذا نساعد العميل على تحقيق أهداف ناتج الطاقة، مع تقليل الانبعاثات في آن واحد، وكانت النتيجة أننا نجحنا في تقليل الانبعاثات بنسبة تتجاوز 10 في المائة، مقارنة بالوضع السابق».

وقد بلغ من انبهار العميل بالنتائج، بعد تجربة النظام لمدة عام واحد، أنه طلب من «سيمنز للطاقة» ألا تقتصر عملية التحسين على توربين الغاز، بل تشمل عملية الإنتاج بأكملها، فما كان منها إلا أنها صارت

تستخدم التكنولوجيا والمنهجية ذاتها الآن في إحدى محطات العمل، وكان من ثمار ذلك تقليل احتراق الغاز بشدة، وزيادة الكفاءة الإجمالية بنسبة تتجاوز 1 في المائة، هذا فضلا عن تفادي كمية تتجاوز 100,000 طن من انبعاثات ثاني أكسيد الكربون سنويا. ويشير بيسكر إلى أن هذه المكتسبات تحققت دون أي تغييرات في المعدات، واستثمار ضئيل في التكنولوجيا - اقتصر على استخدام خوارزمية - والاستعانة بنظام تحكم ذاتي مغلق.

ويرى بيسكر أن هذه قصة نجاح كبيرة وشديدة الاتساق بواقع المنطقة في ظل إعلان الإمارات والسعودية عن أهدافهما للتخلص من الانبعاثات الكربونية. فيقول: «تساعد تقنيات كهذه التقنية وابتكارات نزع الكربون، عملاءنا على تحقيق أهدافهم الخاصة بالتخلص من الانبعاثات، مع الحفاظ على أهدافهم التجارية في الوقت نفسه». وقال إن «سيمنز للطاقة» نفسها تعهدت بالتخلص من الانبعاثات في عملياتها بحلول عام 2030.

وذكر بيسكر أن الشرق الأوسط زاخرٌ بعملاء متحمسين لاستخدام الرقمنة. فهو يقول: «لقد استغل عملاؤنا في المنطقة آخر عام ونصف من الجائحة لتثقيف أنفسهم حول أحدث التقنيات، ولذلك تجاوزنا الآن فترة إثبات المفهوم والمشاريع التجريبية. فهم يعرفون ما يريدون وطموحاتهم كبيرة، وأمست مواكبة طلباتهم تحديا أمام «سيمنز للطاقة» وطموحاً يحركها. فقد وجدنا هنا بيئة تنظيمية مناسبة، وعملاء كبارا أصحاب رؤية، غايتهم إثبات قدرتهم على الريادة في مجال نزع الكربون من عملياتهم. فالكبار يخطون الخطوة الأولى دون انتظار صدور اللوائح، في حين يغلب الحذر على العملاء في أوروبا وآسيا».

ويضيف قائلا: «يرى عملاؤنا أن وصولهم إلى مرحلة

محايدة الكربون وامتلاكهم خارطة طريق لنزع الكربون، يمكن أن يمنحهم ميزة تنافسية في جذب عملاء أو موردين أو شركاء جدد». وأشار إلى لجوء شركات البترول إلى التنوع في أشكال أخرى من الطاقة، مثل شركة «قطر للبترول» التي غيرت اسمها إلى «قطر للطاقة». وتابع أن الأهداف متوسطة الأجل يجب أن تركز على تقليل تكلفة مبادرات نزع الكربون مستقبلا. فيقول: «نعرض مشروعا للتخلص من غازات سداسي فلوريد الكبريت من القواطع الكهربائية المعزولة بالغاز. فهذه تكنولوجيا مثبتة ويوجد عملاء يريدونها، ولكن ما دامت حوافز الحد من الانبعاثات ودعم المبادرات الخضراء محدودة، فسيترددون في الاستثمار في تكنولوجيا تبلغ تكلفتها ضعف تكلفة التكنولوجيا التقليدية. فهذا مثال على التحديات الكبيرة التي تواجهنا، بهدف تقليل تكلفة المنتجات المحايدة كربونياً، ويمكن أن يكون للرقمنة دورٌ في التوريد وتحسين العمليات وتصنيع الأجزاء واستبدالها وإطالة عمرها. فإن كان عليّ استبدال جزء بعد 13 عاما بدلا من 10 أعوام لعلمي بأنه ما يزال مفيدا، بناء على ما تخبرني به المعدات، فقد يؤدي ذلك إلى خفض إجمالي انبعاثات ثاني أكسيد الكربون».

«وبالعودة إلى موضوع ريادة المنطقة في مجال الرقمنة، يختتم بيسكر كلامه قائلا: «يرغب عملاؤنا في المنطقة في التميز، وذلك بأن يكونوا أصحاب الريادة في كل شيء. ويوجد من يُنظر إليهم على أنهم أصحاب المبادرة، أو المنارات التي ترشد للطريق السوي، ثم يوجد أصحاب السبق. فلدينا عددٌ لا بأس به من هؤلاء العملاء، لا بل الشركاء، المستعدين لتجربة تقنيات جديدة معنا لأنهم يثقون بنا ويثقون في مبتكراتنا. وفيما يتعلق بالرقمنة والتطبيقات الأولية، فقد فاقت العلاقة بين المورد والعميل وصارت شراكة».

← مفكرة الفعاليات 2022

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الرقمنة توفر الإمكانيات لاكتساب رؤى أفضل داخل الأصول والعمليات للتوصل إلى قرارات صائبة

الرقمنة لتحقيق التخلص من الانبعاثات

في هذا المقال، يقول المهندس مارتن بيسكر، رئيس قطاع الرقمنة بشركة «سيمنز للطاقة»، إن الرقمنة قادرة على مساعدة الشركات على تحقيق استدامتها وأهدافها التجارية. فلا ريب أن تحقيق الاستدامة، وتقليل الانبعاثات، يعتبران من أبرز أولويات شركات النفط والغاز الآن. إذ وضعت عدة شركات منها أهدافاً طموحاً للتخلص من الانبعاثات الكربونية تماماً. وأوضح بيسكر أن الرقمنة تزخر بالإمكانيات اللازمة لتوفير رؤية عملية للأصول والعمليات، مما يساعد على اتخاذ قرارات أفضل في سبيل استدامة العمليات.

يقول بيسكر: «الرقمنة قائمة على البيانات دائماً، أي الاطلاع على بياناتك، وإيجاد النقطة المضيئة فيها، والتعرف على ما يخبرنا به المشغلون والمعدات. فهي سبيل للنظر داخل الأصول والعمليات والمنشأة بأكملها في النهاية، وليست غاية في حد ذاتها. وإنما نستخدمها كوسيلة للتوصل إلى رؤى أفضل. وتتجسد الرؤى الحقيقية في إلمامك بالأصول أو العمليات أو المنظومة نفسها». وأضاف قائلاً: «علينا استخدام كل ما تبوح به البيانات؛ أي ما يتجاوز ما نستطيع رؤيته. ومثال ذلك أننا نحلل البيانات للتعرف على حالة الأصول،

القيم الرئيسية للرقمنة بالنسبة لنا». ويستلم بيسكر بأن هذا لا يسهم مباشرة بالضرورة في تقليل انبعاثات ثاني أكسيد الكربون: «بيد أن المخرج من ذلك يكمن في التعرف على حالة معدتك، ويمكنك بذلك التخطيط لأوقات إيقافها وحسن التخطيط لعملية الإنتاج». واستدرك قائلاً: «تزايد أهميتها في عملية الإنتاج للتخطيط لنواتجها، من حيث الطاقة أو براميل النفط أو المنتجات الكيميائية، وللتخطيط للانبعاثات، لا سيما في هذه المنطقة. فلا تقتصر استفادتنا من البيانات على

فنستخدم الذكاء الاصطناعي والتعلم الآلي لإعطائنا المؤشرات الأولية لما تبوح به البيانات، إلا أن القوة الحقيقية التي تقدمها «سيمنز للطاقة» تكمن في إلمامنا بالأصول نفسها. ولذلك لا نكتفي بالنظر إلى العلاقات المترابطة، بل نضيف معرفتنا الناشئة من خبرتنا في تشغيل المنشآت وصيانة الأصول. وينصب اهتمامنا على جمع العلاقات المترابطة وجمع المؤشرات. وهذا ما نفعله حين نستعين بالرقمنة؛ إذ نحلل البيانات ونربط البيانات الصحيحة لتقديم التوصيات الصحيحة بشأن الإجراءات اللازمة، فهذا ما يجسد رؤيتنا لواحدة من

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الرقمنة لتحقيق التخلص من الانبعاثات ٤

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تقارير خاصة: المملكة العربية السعودية، أرامكو السعودية.

استطلاعات: الأمن السيراني، التنوع والحلول، التكرير والصناعات البتروكيميائية.

تقنيات: الرقمنة، طلاء الأسطح، المضخات، اكتشاف تسرب الغاز.

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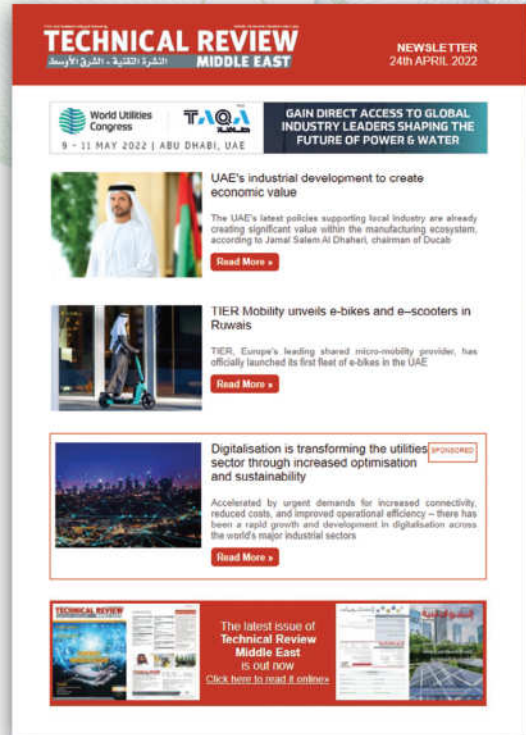
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تُعنى بالنفط والغاز والبتروكيماويات

النشرة النفطية

المجلد 25 العدد الثالث 2022

الشرق الأوسط



الرقمنة لتحقيق التخلص من الانبعاثات

الرقمنة قادرة على مساعدة الشركات على تحقيق استدامتها وأهدافها التجارية