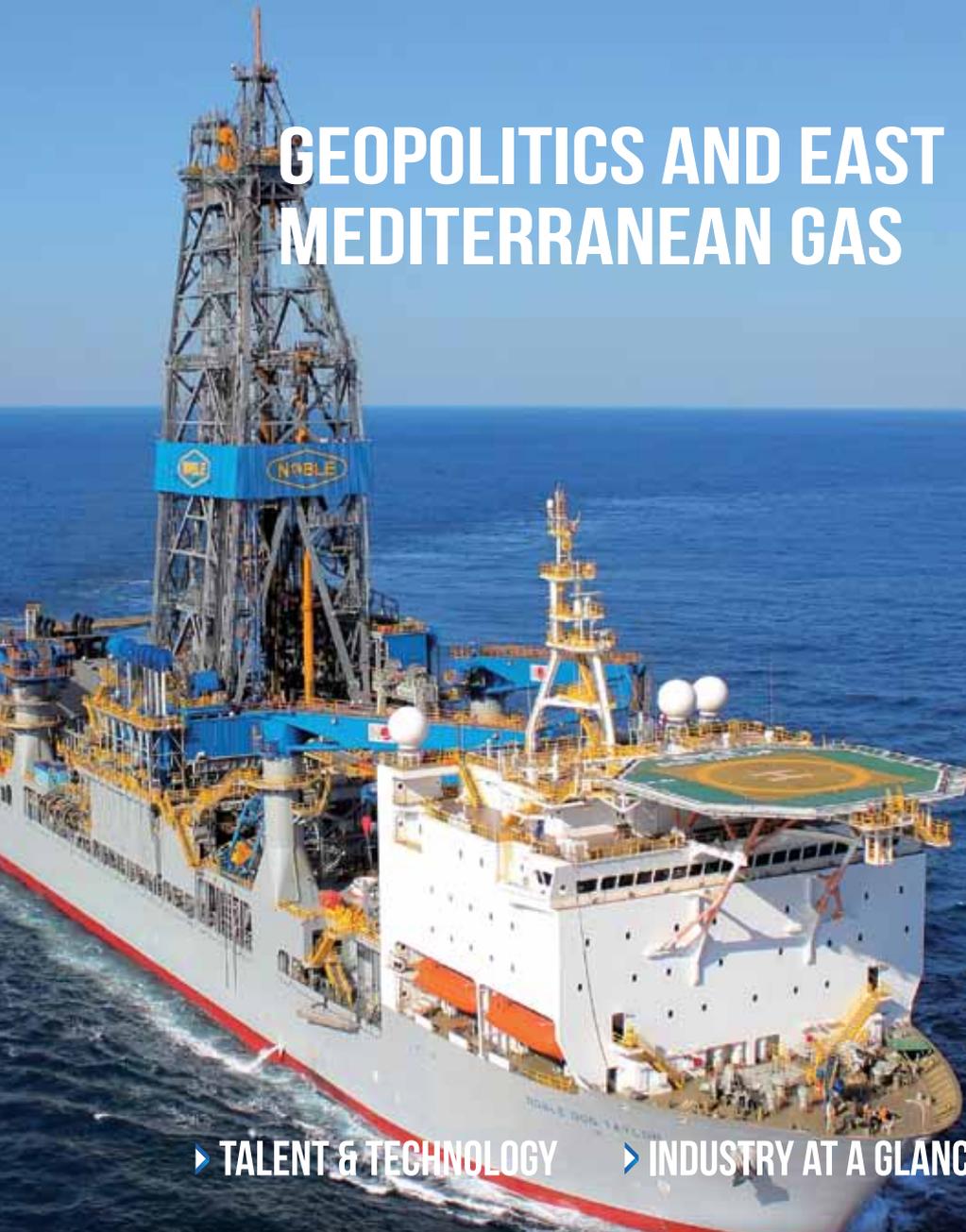




Petroleum Today

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GEOPOLITICS AND EAST MEDITERRANEAN GAS



AN INTERVIEW WITH

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▶ DIGITAL STARTUPS RAISE HUNDREDS OF MILLIONS TO MODERNIZE UPSTREAM SECTOR

▶ WHAT WILL 2020 LOOK LIKE FOR THE OIL AND GAS, ENERGY, AND PETROCHEMICAL MARKETS?

▶ TALENT & TECHNOLOGY

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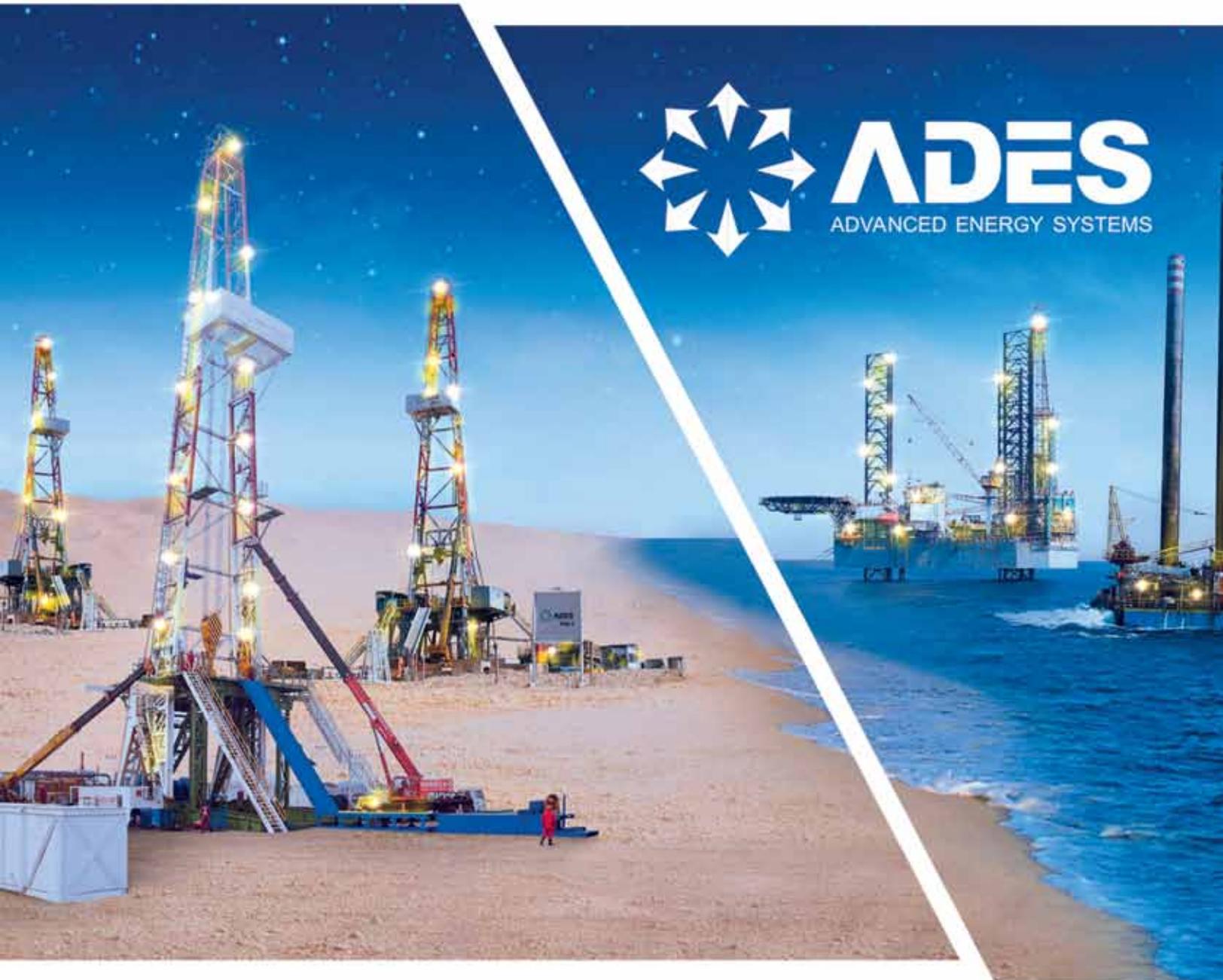
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M I C O P E R I



Above, the main vessel DLV SEMINOLE assisted by cargo barge and tugs is in operation at El-Hamra Field to install a 36" x 8.5 km subsea pipeline at El-Alamein, Egypt, in the Med Sea. The pipeline shall import and export crude oil between El-Hamra facility and tankers through a new offshore SBM system, including a new CALM buoy single point mooring, anchor legs, mooring hawser, floating hoses assembly and manifold (PLEM), for the tie-in to the onshore existing plant.

Main Contractor: Petroleum Marine Services (PMS), Egypt
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EGYPT EOPS
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٢ الرئيس يوجه بالاستمرار في تحديث وتطوير قطاع البترول

٥ انخفاض أرباح شل ٢٣٪ في ٢٠١٩

٦ عقوبات أمريكية جديدة على ٤ شركات نقلت وسهلت بيع البترول الإيراني

١٠ لقاء خاص مع المهندس: أحمد الختام رئيس مجلس إدارة الشركة المصرية للصمامات (إيفاكو)



ExxonMobil



A large offshore oil rig is shown in the foreground, with a yellow crane labeled 'MARLIN' and 'Esso' prominently featured. The rig is a complex of steel structures, including platforms, walkways, and support legs extending into the sea. In the background, another crane is visible against a blue sky with light clouds. The sea is dark blue, and a small red and white ship is visible in the distance.

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Egypt to Host MENA's Leading Oil and Gas Industrialists at EGYPS 2020

MENA's largest Oil and Gas Event, is set to hold at Egypt International Exhibition and Conference Center (EIEC) and Al Manara International Conferences Center. Under the auspices of Egyptian President Abdel Fattah El Sisi and support of the Ministry of Petroleum, EGYPS 2020 will take place on Tuesday 11th of February and will run for three days before ending on Thursday 13th of February.

Gaining value year after year, EGYPS 2020 reflects growing global interest in industry's prospects across the MENA region. Major national and international oil companies will be represented during the event. Of course, this will happen after huge discoveries in the MENA Region specifically in Egypt.

In this issue of Petroleum Today Magazine, you will find many interesting topics. We will discuss the importance of Mediterranean Gas Basin, that is the largest basin ever discovered on Europe's doorstep and was first explored by Egypt. The geo-economy of the production and consumption of energy has changed in the past five years. Natural gas will be a more important source of energy in terms of both supply and demand.

Digitalization can bring different benefits to day-to-day operations and cost reduction. For condition monitoring, specific, industry, historical and real-time data lets operators progress maintenance and inspection regimes. Real-time data from wells will allow timely decisions on underperforming wells and other potentially high cost issues. Detecting anomalies during drilling and operations will enable more effective decision making that can deliver cost savings.

Crude oil markets are finally preparing for a "lower for longer" outlook. Crude oil price averaged \$57/bbl in 2019 during which price volatility was quite low—within \$20 reflecting the increasing sentiment that the oil and gas industry was no longer growing. There has been talk of oil demand slowing for many years but, at 1.3 to 1.5 million B/D, actual growth has consistently surprised analysts. Oil producers, who never read the "slowing oil demand growth" memo, are now paying heed as investors are signaling an end to the party.

Egypt has a major opportunity to turn into the hub approved by all players to process the region's newly discovered wealth. Egypt succeeded in downsizing its massive subsidies, driving up domestic demand and dragging down production. "I would say there are many options for the Eastern Mediterranean. However, we believe that Egypt is the best choice, both economically and politically." Said Tarek ElMolla, the Egyptian Petroleum Minister.

In the end, greetings to you, Egypt has pride and dignity

Petroleum Today

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EGYPT NEWS

Egypt Signs 9 Oil & Gas E&P Agreements in Mediterranean and Western Desert



The Egyptian Ministry of Petroleum has signed nine agreements to search for and produce oil and natural gas in the Mediterranean and Western Desert regions. The agreements include drilling 38 wells with investments of a minimum \$452.3 million and signing grants of about \$84 million. According to a statement by the Ministry of Petroleum, the agreements signed were between the Egyptian Petroleum Corporation and Egyptian Natural Gas Holding Co. (EGAS), Apache Corporation, BP plc, Shell Company and Petronas Company. Minister of Petroleum and Mineral Resources Tarek El-Molla stated that with these nine agreements, the number of oil agreements signed by the ministry with investors and partners since July 2014 has reached 79 agreements. The minister added that another four agreements approved by the Egyptian House of Representatives will be signed later.

Chevron to Be Awarded Two Blocks in Egypt's Western Mediterranean

Twelve months on from first announcing the imminent launch of a bid round for eight Western Mediterranean offshore blocks, Cairo has decided it will award acreage on an ad-hoc basis, cancelling any bid round plans in the process. The first sign that this could be the case came at the end of December when US major ExxonMobil was awarded the North Marakia Offshore block. Not to be outdone, compatriot and fellow major Chevron is due to be awarded two blocks in the region. Chevron has been in discussions with Cairo about taking the acreage since the beginning of 2019 and along with Exxon was recently awarded acreage in Egypt's Red Sea region. This signaled Chevron's entry into Egypt, with the firm also looking to take Western Desert acreage.



Egypt's Independent Cheiron Is Frontrunner for Dana Gas' Assets



Egyptian independent Cheiron is the frontrunner for UAE-based Dana Gas' Egypt acreage, which was officially put on sale for \$500 million in July last year. Dana's decision to sell-up was precipitated following the flop of its Merak prospect, located in the country's Mediterranean offshore, north of the Sinai Peninsula, just 10km from the border with Gaza. Dana is looking to focus on its key gas assets in Iraqi Kurdistan where it partners key shareholder Crescent Petroleum.

Egypt's Push to Become East Mediterranean Gas Hub

Rapid growth in Egypt's natural gas supplies, boosted by the discovery of the Mediterranean's largest field, turned it from a net importer to exporter in late 2018. Partners in Israeli fields Leviathan and Tamar will supply Egypt with 85.3 billion cubic meters (bcm) of gas over 15 years. Texas-based Noble Energy, Israel's Delek Drilling and Ratio Oil own Leviathan. Noble, Delek Drilling, Isramco and Tamar Petroleum are leading partners in the Tamar field.

Egypt hopes its infrastructure and location will help it become a link for energy trading between the Middle East, Africa and Europe. Crucially, Egypt has two liquefied natural gas (LNG) plants that have been idled or running at less than their potential capacity and can be used for exports. The bulk of Egypt's gas exports is liquefied natural gas (LNG) sent from its Idku liquefaction terminal, run by Egyptian LNG, a joint venture between the state-owned Egyptian General Petroleum Corporation and EGAS, as well as Royal Dutch Shell, Petronas and Engie. It has two operational LNG trains, each with a capacity of 3.6 million tonnes, according to Egyptian LNG's website. The site has room for an additional four trains. Egypt has a second gas liquefaction plant at Damietta that has been idle since February 2013 after gas production slipped and the government diverted gas exports to the domestic market. It has also been at the centre of a dispute between Egypt and Italian-Spanish Company Union Fenosa Gas (UFG), which has a majority stake. Damietta has an annual capacity of up to 5 million tonnes and can store 130,000 tonnes of LNG, government websites show. Egypt exported the equivalent of 172.8 billion cubic feet (bcf) LNG in the 2018/19 fiscal year ending in June, according to EGAS's annual report. Egypt also exported 53 bcf to Jordan by pipeline and imported 51.6 bcf of LNG in the same period.

Egypt also has a network of gas pipelines, the most significant of which is the Arab Gas Pipeline which extends across northern Sinai via Al-Arish to Jordan and on to Syria and Lebanon. Egypt currently only exports gas to Jordan through it. The Arab Gas Pipeline connects to Israel via the underwater Arish-Ashkelon pipeline, which Egypt once used to export gas to Israel. Israeli gas from the 22 trillion cubic feet (tcf) offshore Leviathan and later the smaller Tamar field will flow to Egypt via that pipeline. The Arish-Ashkelon pipeline is owned by the East Mediterranean Gas Company (EMG). Noble and Delek partnered with Egypt's East Gas Company in a venture called EMED to buy a 39% stake in EMG to facilitate the export deal. Egypt also has the Sumed pipeline, which carries oil from a terminal at Ain Sokhna on the Red Sea to the Sidi Kerir terminal on the Mediterranean.

ExxonMobil Signs Deals with Egypt for Oil, Gas Exploration in East Mediterranean



The two exploration deals call for a total investment of at least US\$332 million, according to a statement from Egypt's petroleum ministry, carried by Reuters. At the end of 2019, ExxonMobil said that it had acquired more than 1.7 million acres offshore Egypt, adding upstream interests to its downstream business in the country. Exxon bought the 1.2-million-acre North Marakia Offshore block, five miles offshore Egypt's northern coast and 543,000 acres in the North East El Amriya Offshore block in the Nile Delta. ExxonMobil, which will be the operator of both blocks with 100-percent interest, plans to start exploration operations this year.

ARAB & INTERNATIONAL NEWS

Eni Makes Gas Discovery in UAE's Sharjah

Italy's major Eni said it has made a gas and condensate discovery in the Mahani exploration prospect located in the UAE's emirate of Sharjah. The Mahani-1 well was drilled to a total of 14,597 feet measured depth in the concession awarded to Eni in the first international competitive exploration licensing round by Petroleum Council of Sharjah. The well encountered a thick gas-bearing limestone reservoir in the Thamama of Lower Cretaceous age. The well was tested with flow rates up to 50 Mscf/d (million cubic feet per day) of lean gas and associated condensate, Eni said in a statement, adding that the size of the discovery will be further assessed with additional appraisal drilling. The new phase of exploration in the area, which has already been explored in the past, is targeting complex subthrust Jurassic and Cretaceous plays of the Arabian carbonate platform in the inner thrust zone of the Oman Fold belt and requires accurate and sophisticated seismic imaging



Wood Extends Saudi Aramco Contract for Unconventional Gas

Wood, Australian EPC contractor, said has signed a two-year extension for work with Saudi Aramco's overseas business unit for unconventional gas programme. The new contract with Aramco Overseas Company extends the original awards signed in 2014. Wood said its project execution teams will continue to work closely with Saudi Aramco to develop innovative engineering design and implementation strategies to deliver the programme's primary objective to produce and deliver significant volumes of gas from shale and tight gas reservoirs. Dave Stewart, CEO of Wood's Asset Solutions business in Europe, Africa, Asia and Australia, comments: "We are delighted to continue our role as the main engineering services provider on this programme. Saudi Aramco is a strategically important customer in the region, and we look forward to continuing our close partnership with them and furthering our commitment to building capability in-Kingdom."

Air Liquide Arabia Starts Hydrogen Supply to Saudi Refinery



Air Liquide Arabia said it has begun commercial operations at its west coast pipeline network in Yanbu by supply hydrogen to a refinery owned by Saudi Aramco and an Exxon Mobil subsidiary. The SAMREF refinery represents Air liquid Arabia's (ALAR) first customer on the Yanbu pipeline network, which will also start supplying three other major industrial companies in Yanbu Industrial City in the coming months. The hydrogen supply marks a shift towards cleaner fuels from crude for Saudi Aramco, amid rising global warming concerns that are adding pressure on the world's largest oil producers to take action. Saudi Arabia, the world's largest crude oil exporter, told the United Nations in 2015 it would reduce expected carbon emissions by up to 130 million tonnes a year by 2030.

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OPEC Sees Lower 2020 Demand for Its Oil Despite Upbeat Global View



OPEC forecast lower demand for its crude in 2020, even as global demand is seen climbing upwards after a U.S.-China trade deal. The Organization of Petroleum Exporting Countries (OPEC) said demand for its crude was revised down by 0.1 million barrels per day (bpd) from last month's forecast to stand at 29.5 million bpd. This is around 1.2 million bpd lower than the 2019 level, OPEC said in its latest Monthly Oil Market Report. This follows a dip in OPEC's 2019 crude demand amid a struggling global economy – a picture OPEC sees improving in 2020. Meanwhile, it raised its forecast for non-OPEC oil supply growth in 2020 by 0.18 million bpd to 2.35 million bpd, up from 1.86 million bpd in 2019. For 2020, OPEC revised oil demand growth up by 0.14 million bpd from the previous month's assessment to forecast it at 1.22 million bpd, mainly reflecting an improved economic outlook for 2020.

Equinor Awards Several FEED Contracts in Brazil

Equinor has, on behalf of the partners ExxonMobil and Petrogal Brasil entered into Front End Engineering and Design (FEED) contracts with early commitments and pre-investments for phase 1 of the Bacalhau (formerly Carcará) area in Brazil. Contractors have been selected for both the SURF (Subsea, Umbilical, Risers and Flowlines) and the FPSO (Floating Production, Storage and Offloading) contracts. Subsea Integration Alliance, SIA formed by Subsea7 and OneSubsea has been selected for the SURF contract and MODEC Inc. for the FPSO contract.



Mubadala Petroleum Completes Farm out in Indonesia



Mubadala Petroleum announced that it has completed the farmout of a 20 percent participating interest in each of the Andaman I and South Andaman Gross Split Production Sharing Contracts (PSCs) to Premier Oil following Indonesian Government approvals. Following completion, Mubadala Petroleum, as operator, has an 80 per cent participating interest in each of the Andaman I and adjacent South Andaman PSCs, with Premier Oil holding the remaining 20 percent participating interest in the two blocks. Mubadala Petroleum is also a partner with a 30 per cent participating interest in the Andaman II Gross Split PSC, which is operated by Premier Oil. With participating interests in these three adjacent blocks, Mubadala Petroleum is the largest net acreage holder in the area, securing the core of the underexplored but proven North Sumatra basin offshore Aceh for future exploration growth.



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CORPORATE NEWS

A new success story for SAPESCO in Lybia

Another remarkable success story is added to **SAPESCO Chemical Services - SCS'** achievements; this time the achievement has taken place in AGOCO - LIBYA, where a well located in NAFORA field was facing contaminated hard scale in its production tubing leading to a reduction in the internal diameter of the tubing to 1.8" with a production rate of 800 BBLD at 140 PSI Well Head Pressure.

AGOCO concerned team discussed the case with **SAPESCO** team, within a short period of time **SAPESCO's** R&D team submitted a special job design using **SAPESCO's** exclusive descaling chemicals.

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- Daily production rate became 912 BBL.
- Well Head pressure reached 230 PSI.

Thank you AGOCO for the challenge, looking forward to more challenges across the Oil & Gas industry.



SDX Energy Sees 2020 Production Jump From Egypt, Morocco Drilling

SDX Energy, the Middle East and North Africa-focused Oil and Gas Company said it expects production to get a boost from new drilling in Morocco and Egypt. The company, which saw its 2019 production rise 12 per cent to 4,020 barrels of oil equivalent per day (boe/d) compared the year before said it sees 2020 production rising to up to 7,000 boe/d, up 6874- per cent from 2019.

We have entered 2020 in a strong position with production at record levels, good monthly cash generation, a strong balance sheet and a busy work programme of drilling ahead of us, which is all fully funded," Mark Reid, CEO of SDX said in a statement. "With eight wells planned for the first half 2020, six of which are exploration/appraisal in nature, we are moving into a very exciting period of activity.

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Aiming to support the Egyptian market with new strong partners in the field of process equipment and to stratify our customers' demands, SHOTEC has signed representative agreements with the following new business partners:

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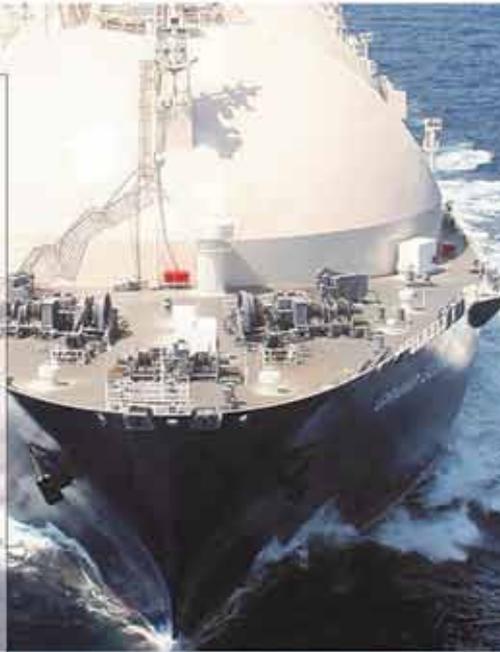
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ADNOC, Eni to Explore Carbon Capture and Storage Opportunities

Abu Dhabi National Oil Company (ADNOC) signed a strategic framework agreement with Italy's energy company, Eni, to explore new opportunities for collaboration in carbon capture utilization and storage (CCUS). Under the terms of the agreement, ADNOC and Eni will jointly explore opportunities for collaboration in relation to innovative geomechanical and geochemical workflows for CCUS programs as well as in advanced analysis and modeling of thermally induced fractures in oil and gas reservoirs. Geomechanics refers to the study of how subsurface rocks deform or fail in response to changes in stress, pressure, and temperature, while geochemistry relates to the study of the chemical composition of the earth's crust. Both geomechanics and geochemistry relate to the development of CCUS programs.



Masdar, Cepsa Form Renewable Energy JV for Spain, Portugal Projects

Masdar, a subsidiary of Mubadala Investment Company, and Spain's Cepsa, owned by Mubadala and The Carlyle Group, and announced an agreement to establish a joint venture company to develop renewable energy projects in Spain and Portugal. The new company, Cepsa Masdar Renovables, will focus on developing wind and solar photovoltaic (PV) projects in the Iberian Peninsula, with an initial target of 500600-MW. The 50:50 venture was signed in the presence of Khaled Abdulla Al Qubaisi, Chief Executive Officer, Aerospace, Renewables & ICT, Mubadala Investment Company, and Mussabbeh Al Kaabi, Chief Executive Officer, Petroleum and Petrochemicals, Mubadala Investment Company and Director and Chairman, Cepsa.

Total and Apache Make Major Oil Discovery off Guyana

Total and Apache have made a material oil discovery with the Maka Central-1 well on Block 58 offshore Surinam, in Guyana. The Maka Central-1 well was drilled by a water depth of about 1,000 meters and encountered more than 123 meters net pay of high-quality light oil and gas rich condensate net pay, in multiple stacked reservoirs in Upper Cretaceous Campanian and Santonian formations, according to Total. The companies will conduct further drilling and testing will be carried out to appraise the resources and productivity of the reservoir.

We are very pleased with this first significant oil discovery, made just after our entry into Block 58. The result is very encouraging and proves the extension of the prolific world-class Guyana Cretaceous oil play into Surinam waters," said Kevin McLachlan, senior vice president Exploration at Total. "We are optimistic about the large remaining potential of the area still to be discovered and will test several other prospects on the same block.



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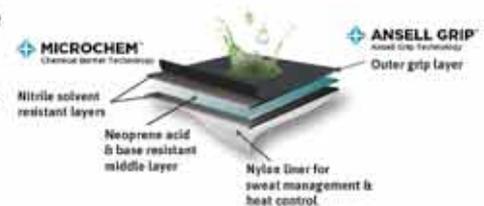
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LAGCOE Technology Showcase Ultrerra SplitBlade PDC bit



[Fig- 1 Ultrerra SplitBlade PDC bit]

Drilling in clay formations offers a number of challenges, with drilling cuttings management likely topping most directional drillers' lists. Clay not only clogs tool faces, it creates very long cuttings that will wind up the drillstring, slowing rate-of-penetration and operational performance. Increasing the weight on the bit reaches an inflection, or flounder point, at which increasing the weight on the bit will rapidly decrease rate-of-penetration. When a high rate-of-penetration is achieved, cuttings volume also increases, reducing overall performance. The Ultrerra SplitBlade PDC bit includes three key features to deliver a cleaner tool face for faster drilling. The primary blades are separated after the cone and the outer shoulders are rotated, freeing up more area for the junk slot. Double barreled hydraulics focus on the tool shoulder, ensuring cuttings are swept up the junk slot directly, while a second channel of flow evacuates cuttings from the cone of the bit. This design enables cuttings to be cleared up to seven times faster than possible with conventional PDC bit designs. Design of the tool face also enables self-piloted directional drilling. Torque changes when drilling a curve with a typical bit. The design of the SplitBlade delivers better cone stability, while the shoulder steers the bit. This configuration tightens the torque band, serving to nearly double rate-of-penetration in directional applications. In its first year on the market, the SplitBlade has drilled more than 20 MMft, over the course of more than 4,500 runs, averaging 36% more footage than competing bits.

EM & I remote inspection technology used for FPSO in New Zealand

EM&I has used its NoMan remote camera technology for inspections of difficult to access to areas, including on an FPSO in New Zealand.

Although designed originally for remote inspection of confined spaces such as ships tanks and pressure vessels, NoMan has extended its capabilities to carrying out close visual and general visual inspections of areas that would otherwise have needed rope access or scaffolding – incurring additional time, cost and risk.

A further benefit is that this way of

working is more environmentally friendly, as it reduces the carbon footprint, with fewer helicopter trips and reduced energy costs in preparing tanks for man entry.

EM&I recently proved this by carrying out successful inspections of a Cargo Oil Tank to the satisfaction of the class society's attending Surveyor, along with the structure under the helideck; the structure under the main deck, and void spaces on the well head, for an FPSO in New Zealand.

The NoMan approach proved to be more than 50% faster, with a

proportionate reduction in cost, risk, and environmental impact, and provided higher quality outputs for those reviewing the data.

A separate development which will be announced soon is the combination of visual and synchronous laser scanning methods, patented by EM&I which will transform methods of assuring structural integrity remotely. This further demonstrates EM&I's relentless drive to use robotic and digital technology to provide enhanced safety, cost efficiency and sustainable clean energy.

Gardner Denver releases new pump

Gardner Denver Petroleum & Industrial Pumps (P&IP) has introduced the new Thunder 5,000 HP Quintuplex pump. The pump is designed for dual fuel gas engines, electric motors, diesel engines and gas turbine direct drives.

Edward Bayhi, Vice President and General Manager, Petroleum & Industrial Pump Division, said, “The Thunder 5,000 HP Quintuplex pump has successfully made it through validation testing. Crucially, operators can now substantially decrease their consumable cost and fatigue cycles due to the pump’s long stroke advantage. This means slower operating speeds can be maintained, resulting in longer consumable life and reduced fatigue cycles. The same flow rate can be achieved with smaller plungers, reducing operating load on the pump, leading to extended pump life and



[Fig-2 Gardner Denver Thunder 5,000 HP Quintuplex pump.]

less downtime.”

Gardner Denver constructs pumps that deliver the lowest total cost of ownership due to their rugged, modern designs, which improve serviceability in the field. With stainless steel construction and innovative geometry

designed to minimise stress, the pump features a range of next generation fluid end technology. The pump’s 11 in. stroke length meets or exceeds the pressure and flow output of high rod load/short stroke (8 in.) pumps, and can increase consumable life by 37%.

Lightweight compact cable for offshore connectivity

Huber+Suhner has launched a fire-resistant version of its Radox cable system for offshore applications. The Radox OFL (Oil & Gas Flexible Lightweight) cable reduces weight and space by up to 60 percent compared to other cables on the market. The cable’s small bend radius and thin wall – which is half the size of standard cables – reduces stripping time by 60 percent, making installation easier and quicker. This has the potential to save industrial and offshore facilities several hundred thousands of dollars in structural design by overcoming space and weight restrictions. The OFL cable is highly fire-resistant and low smoke halogen free (LSFH), which provides exceptional performance in harsh outdoor environments and offshore industrial applications. Core cables do not melt or drip in the event of a short circuit, ultimately minimising emergency repairs and the potential for hazardous fume inhalation. The OFL cable is also oil, mud and hydraulic oil resistant according to the highest standard NEK606 Cat. a-d.

In addition, the Radox technology offers a 120°C sheath and 145°C core temperature threshold, giving the cable an expected lifetime which is eight times longer than standard 90°C offshore cables. The polymers in the insulation of the wires and in the cable sheath are cross-linked using electron beams which provides resistance to mechanical, chemical, temperature and weather influences..



[Fig-3 Huber+Suhner fire-resistant version of its Radox cable system]

Xylem introduces industrial-strength product lines to handle critical challenges in the oil and gas industry

Xylem is helping the oil and gas industry effectively manage the millions of gallons of water required for production with the expansion of its pump portfolio to include: the rugged and efficient e-MP multistage ring section pumps, e-XC single stage double suction centrifugal pumps, and larger vertical turbine pumps. The company has critical expertise in how strategic water management can impact the environment, production and profitability, and the introduction of these robust products supports the producers' goals of safeguarding the sustainability of their operations. Designed to address the industry's biggest issues, including minimising downtime and boosting and transporting water, these pumps deliver operational and cost efficiencies to help producers master the entire use cycle in a smarter, holistic way.

More benefits of the products are outlined below.

E-MP – The multistage ring section pump is ideal for high-pressure applications, such as produced water and crude oil LACT units. Versatile mechanical configuration and optimised pump hydraulics enable reduced energy consumption and wear and tear, while intelligent pumping features boost monitoring and control performance with multiple sensor interfaces and options.

E-XC – Designed for maximum durability and performance in even the harshest environments, the e-XC comes in multiple models, configurations and a wide range of materials to handle myriad aggressive applications. A corrosion-resistant stainless steel impeller and wear rings as standard reduce downtime, increase efficiency and enhance overall performance.

Vertical turbine pump – The highly efficient extension to the existing Xylem vertical turbine product line, it's scaled with capacities up to 1.7 million barrels per day (bpd) for the largest oil and gas fluid needs, including crude oil pipeline boosting and storage terminal transport. With bowl efficiencies near 90% and broad hydraulic coverage, operators can realise greater energy savings while maintaining superior pumping power.

Weatherford releases new business intelligence and data visualisation platform



Weatherford announced the integration of Microsoft® Power BI into the ForeSite® production optimization platform for the oilfield industry.

This integration accelerates ForeSite users' ability to deep dive into their production data, conduct analyses, and create simple, easy-to-digest data visualisations that illustrate virtually any production scenario from the well to asset level.

Power BI features are fully integrated into the ForeSite optimisation workflow, enabling visual data exploration to condense vast amounts of oilfield data from any corporate data source into actionable dashboards and reports. ForeSite users will be able to create and visualise customised data reports or select from a series of built-in visualisation dashboards and reports that monitor KPIs and identify production optimisation opportunities. Among the pre-built, production-data analysis package are:

Financial Health Report lets users assess production versus spend by job, by service provider, by asset group, and more. This leverages data from ForeSite Field Services Management module.

Failure Analytics Report lets user assess current and historical failure data to gain insight into vendor or technology efficiency, including equipment performance of two or more vendor brands to determine the lowest total cost of ownership.

Asset Performance Dashboard gives real-time update on preset KPIs such as production targets, asset downtime, uplift potential, and more.

Manager's Report gives a broad, asset level performance visualisation for an asset or enterprise including estimated versus actual spend and production.



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PETROSAFE is one of the leading companies in the field of HSE, engineering, oil spill combating, waste management services and technical support, with over 22 years of experience in conducting and executing HSE technical studies, reviews, consultations, training and systems evaluation, marking highly distinguished fingerprint on the major oil and gas industry as well as other industries in Egypt.

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Wild Well Control adds new 10 000 psi-rated capping stack to WellCONTAINED programme

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Well-SENSE, s ,Active-FLI, technology completes first onshore well survey

Active-FLI is the only sensing system on the market to combine distributed and single point data in a fast and portable well interrogation solution. It greatly reduces the operational footprint and risk for the operator, using less time, personnel, space and equipment and can reduce survey costs by up to 90% depending on the application and well environment.

As part of this project, and for the first time, Well-SENSE also demonstrated its own miniature surface recording device. A 'first look' set of results was provided to the operator immediately after reaching total well depth. Real-time data logging continued for five hours then a complete report was submitted within 24 hours of the end of the survey. This saw the E&P firm receiving high quality results at least 5075%-faster than conventional wireline logging.

The scope of work required Well-SENSE to provide an accurate pressure and temperature gradient survey for the entire wellbore, combined with a casing collar locator survey and bottom hole pressure and temperature monitoring of the operator's 1500 ft test well. The well also contained a combination of steel and fiberglass casing which FLI was required to locate, along with confirmation of total well



[Fig -4 Well-SENSE 'Active-FLI' Sensor Technology]

depth. The results would be used to enhance the operator's well intelligence for future operations and to verify Active-FLI's capabilities.

Whilst descending through the well, the CCL survey confirmed the depth of the steel and fiberglass casing joints along with the total accessible depth of the well. The CCL data also identified the location of multiple geophone sensors mounted behind the fiberglass casing. The bottom hole temperature data matched a prior logging run within 0.1 degree Fahrenheit and the bottom hole pressure reading was within 4% of the anticipated hydrostatic pressure.

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Geopolitics and East Mediterranean Gas

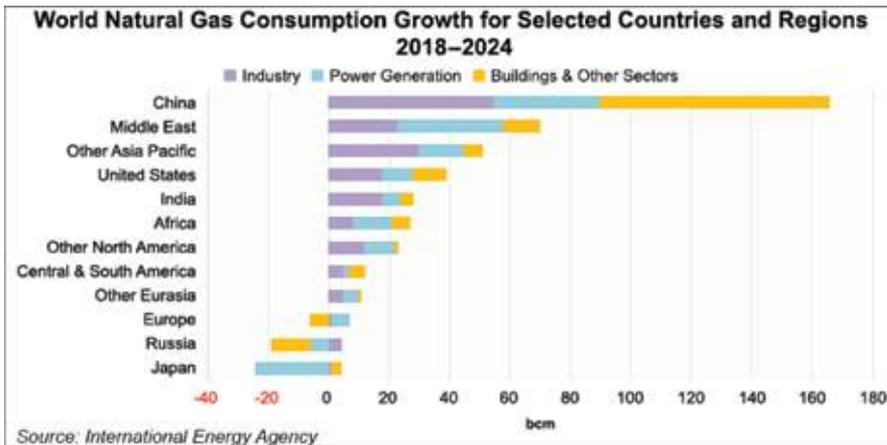
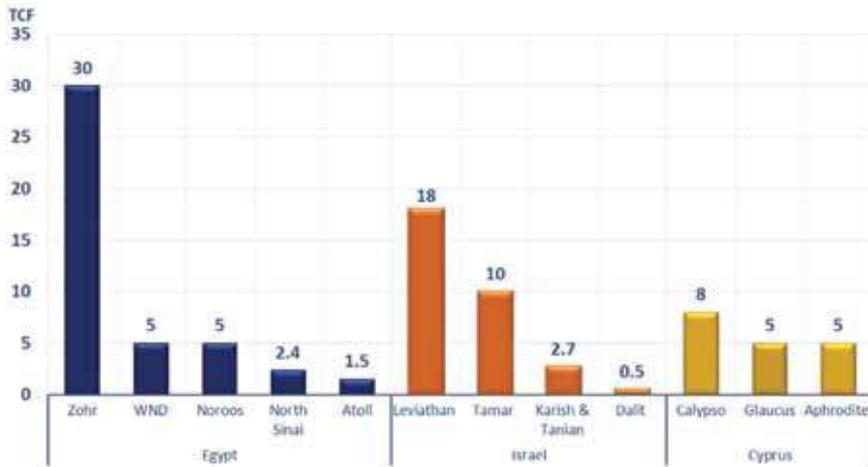


Mediterranean gas basin is the largest basin ever discovered on Europe's doorstep and was first explored by Egypt, then by Cyprus and Israel. With the recent discoveries, market dynamics have shifted and both Egypt and Israel are aiming to become a major player in the regional and international market. Lebanon also sits on the Levant Basin in the Eastern Mediterranean. Beirut tried to launch its first offshore explora-

tion in 2013, but domestic political problems delayed it until 2017. Offshore energy development has been a central ambition for successive governments in Lebanon, but political paralysis has caused years of delays. Furthermore, the country is in dispute with Israel over the maritime border along some exploration blocks. Lebanon awarded a first license for offshore gas exploration and production in 2018 to a consortium comprising France's

Total, Italy's ENI and Russia's Novatek. One of the blocks awarded in the first licensing round was located on the maritime border with Israel, but the consortium assured it would not drill near the disputed waters. The East Mediterranean gas discoveries have the potential to offer two things of value to the European Union: energy security and an improvement in regional cooperation between Middle Eastern countries.

Major East Mediterranean Gas Fields Reserves



Geo-economic changes

The geo-economy of the production and consumption of energy has changed in the past five years. Natural gas will be a more dominant source of energy in terms of both supply and demand.

According to IEA, the overall growth of energy demand is brought about by developing countries, led by India. As recently as 2000, Europe and North America accounted for more than 40% of the global energy

demand and developing economies in Asia for around 20%. By 2024, these numbers will be completely reversed. The second biggest increase of natural gas consumption will occur in the Middle East.

North America has become a net exporter of energy on a permanent basis with its "shale boom" as of 2018, which also changes the world's geo-economy. The USA is likely to become the world's third largest LNG exporter this year. The

flow of crude oil will keep on growing over the next few years with major consequences for the oil industry, global politics and even whole economies. OPEC, for example, will face challenges keeping oil prices high, while USA is in possession of a new and potent diplomatic weapon.

Furthermore, Russia is intensively developing its pipeline network to become a major supplier to China, which is expected to become the biggest importer of natural gas. As a competitive pipeline to the EastMed pipeline, Russia and Turkey are building the so-called TurkStream.

TurkStream is another export gas pipeline stretching from Russia to Turkey across the Black Sea. The first string of the pipeline is intended for Turkish consumers, while the second string will deliver gas from Russia to Southern and Southeastern Europe. Another pipeline that is intended to supply Europe and especially Germany with gas until end of this year is the Nord Stream 2. The resulting increased dependence on imports from Russia faced much resistance from other EU countries like France and even criticism within Chancellor Angela Merkel's own CDU party. More than 50% of Germany's natural gas imports came from Russia in 2017, a number that will increase further once Nord Stream 2 is operating.

LNG (Liquified Natural Gas) is also changing the energy markets of the future. In May-2019, Peter Altmaier, Germany's Minister for Economic Affairs and Energy, introduced a policy paper on German foreign trade. This paper advises that the EU and USA should cooperate more closely regarding common strategic challenges in trade policy, including

the construction of two private LNG terminals in Germany. As a diversification strategy to Nord Stream 2 and in order to ease tensions with the USA in this matter, Altmaier announced that liquefied natural gas (LNG) will also be imported from the US in the future next to the cheaper Russian gas. In line with the natural gas demand worldwide, LNG exports will also increase. As of now, Qatar, Australia and the USA are globally the biggest LNG exporter.

The existing gas infrastructure in Germany, Europe and in the Middle East can also be used for gas produced from bio mass, wind and hydrogen, which offers the necessary means to play a sustainable role in an energy system of the future. Although the global gas markets are becoming more interconnected, a global gas price does still not exist. The transportation by pipeline or as LNG constitutes a relative high share of the delivered cost. The geographical proximity for the EU to the resource-rich Mediterranean basin can be an important determining factor for the affordability in the future. The role of policy regulations is critical to shape gas market developments, while the improvement of the cost competitiveness of gas is seen as the key challenge for the years to come. The high cost of either pipeline or LNG infrastructure requires all countries in the Mediterranean to agree to a joint use of transportation facilities in order to justify the investments.

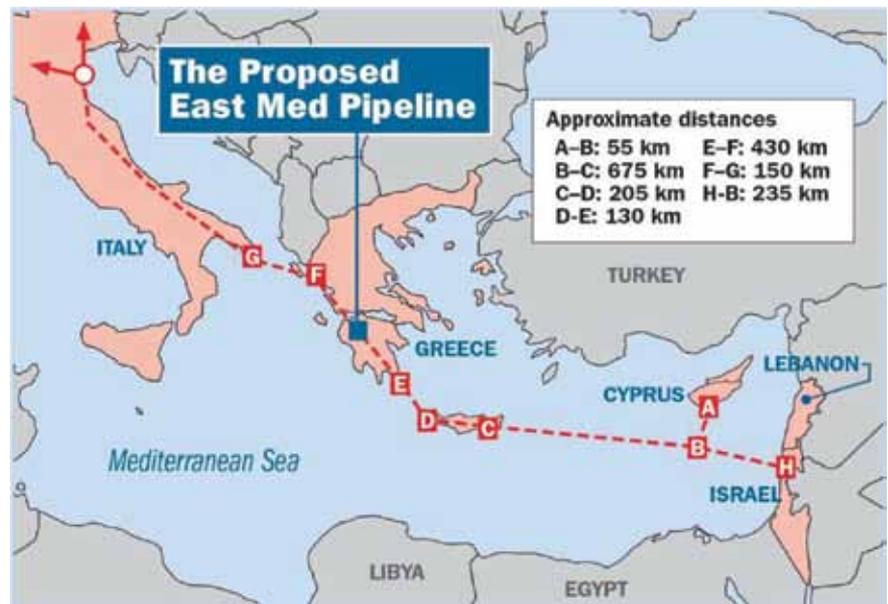
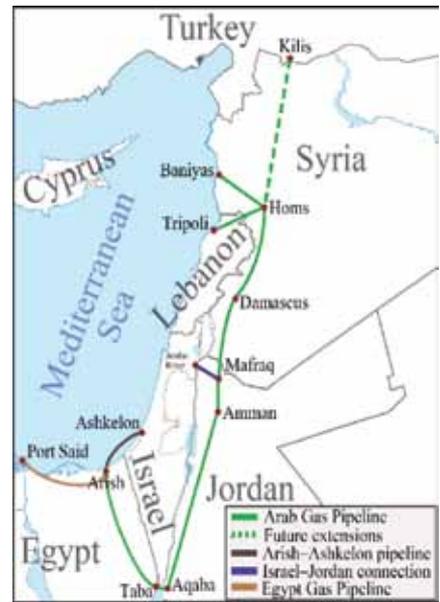
Arab Gas Pipeline (AGP)

AGP runs from the South of El Arish, which links in Northern Sinai to the North of Jordan which is a model for strategic Arab Cooperation proj-

ects, as it connects Egypt to Jordan, Syria, and Lebanon as well as other countries in Africa, Asia, and even Europe (long term strategy).

East Mediterranean Gas Pipeline (EMG)

The natural gas produced from fields in the Eastern Mediterranean is mainly supplied through the EMG pipeline that connects the Israeli coastal city of Ashkelon and El-Arish in Egypt's Sinai Peninsula. The EMG pipeline ownership is currently transferred to Delek Drilling, Texas-based Noble Energy and Egypt's East Gas.



The complexity of the east Mediterranean oil and gas

Turkey's illegally bid to increase its share in the oil and gas resources of the eastern Mediterranean which is opposed by all stakeholders in the region, as well as by the United States and the European Union. The only exception is the UN-backed Libyan Government of National Accord (GNA), based in

Tripoli. The GNA's support for Turkey is not because of oil and gas, but for the military support it expects from Turkey.

Everything started in 2009 with the discovery of a rich gas reserve of 223 billion cubic meters in Israel's Tamar gas field. It could relieve Israel of its reliance for energy on neighboring Arab countries. The discovery opened the eyes of other East Mediterranean countries that

have contiguous Exclusive Economic Zones (EEZ) with Israel.

Because of other priorities, Turkey was slow in taking any initiative in this field. In Dec-2019, it took a belated initiative by negotiating two memoranda of understanding with Libya; one on military cooperation, the other on the delineation of maritime boundaries.

Egypt, Greece and the Greek Cypriot administration agreed in 2014 to cooperate in various fields, but mainly in the field of oil and gas exploration. In 2016, a similar agreement was reached between Israel, Greece and the Greek Cypriots.



Border disputes

Lebanon/ Israel

Lebanon and Israel have an unresolved maritime border dispute over a triangular area in the Mediterranean that extends for 860 sq. km. This area includes several blocks for exploratory offshore drilling that Lebanon bid for tender two years ago.

The issue grew more relevant and became an open conflict following the natural gas discoveries in the Mediterranean Sea. Lebanon, which wanted to pursue gas drilling off its coast, submitted its demarcation of the maritime borders to the UN ten years ago, making this area part of its Exclusive Economic Zone (EEZ).



Cyprus/Turkey

The illegal natural gas drilling by Turkish ships within the Exclusive Economic Zone (EEZ) of Cyprus sparked new tensions in the old conflict revolving around the Cyprus dispute. Ankara, which does not have diplomatic relations with Cyprus, claims that certain areas in Cyprus's offshore maritime zone

fall under the jurisdiction of Turkey. The island is divided between a Greek majority in the south and Turks in the breakaway north since the 1974 Turkish invasion. Turkey does not accept the EEZ of Cyprus, which has been defined by the "median line" between the island and its neighbors Egypt, Lebanon and Israel.

The borders of the EEZ are geopolitically very important as they mark the maritime limits of the EU. The EU, USA and Egypt sent clear warnings to Ankara in response to this provocation. EU High Representative for Foreign Affairs and Security Policy, Federica Mogherini, condemned the illegal drilling in an open statement and urged Turkey



to respect the sovereign rights of Cyprus in its EEZ. She warned that if Turkey did not refrain from any such illegal action, the EU would respond appropriately and in full solidarity with Cyprus.

Libya/Turkey

Turkey negotiated an agreement with the GNA this agreement with Libya came after eastern Mediterranean coastal countries completed the delineation of their maritime jurisdiction areas.

This agreement is based on Turkey's thesis that three Greek island – Rhodes, Karpathos and Crete - do not have a continental shelf. Therefore, they only have six miles of territorial waters and outside that is the continuation of the continental shelf of the Anatolian peninsula.

When the continental shelves of these three islands are excluded, Turkey's continental shelf and its EEZ joins Libya's EEZ, south of the island of Crete.

There are maximalist approaches on both the Turkish and the Greek sides. For example, retired Colonel Ümit Yalım, former Secretary General of the Turkish Ministry of Defense, persistently raises the question in the Turkish media saying that three-quarters of Crete belongs to Turkey. He says that, according to the 1913 Treaty of London, only one-quarter of Crete was given to Greece and the remaining three-quarters was given to Bulgaria, Serbia and Montenegro. These three countries later relinquished their rights. Therefore, he says, their share went back to its original owner, that is the Ottoman Empire. However, the Turkish government did not take this thesis into account and negotiated the memorandum of understanding with Libya assuming that Crete belongs to Greece in its entirety.

On the Greek side, the maps made available by its authorities show that the tiny island of Kastellorizo,

off the Turkish coast, has also a continental shelf. The island has an area of just 7.1 square km. If it were allowed to have continental shelf, Greece would gain a maritime jurisdiction area 2,000-times bigger than the island itself.

The Turkish-Libyan agreement may have cheered those pushing the Turkish government to take action to protect its rights in the eastern Mediterranean, but the situation is not clearer now with so many actors against Turkey.



AN INTERVIEW WITH

MATHIOS RIGAS

Energean Group CEO



We are eager to know more about yourself, your studies and your professional career.

I am one of the founding shareholders of Energean, a Petroleum Engineer with a combination of oil & gas and investment banking experience.

Prior to setting up Energean, I spent 18 years in investment banking working on deals predominantly in the oil and gas sector. In the '90s, I was a Vice President of Shipping, Energy & Project Finance at Chase Manhattan Bank in London and arranged financing in excess of US\$5 billion, mainly in the oil & gas sector. With the combination of skills gained from my petroleum engineering background and time in banking, I established Energean in partnership with trusted business partners in 2007.

I hold a Degree in Mining and Metallurgical Engineering from the National Technical University of Athens and an MSc / DIC Degree in Petroleum Engineering from Imperial College London.

How do you oversee EGYPS2020?

EGYPS 2020 is definitely a landmark event, hosting top level officials from governments and companies.

The event provides the basis for the energy market to strengthen their collaboration in dealing with the challenges that our industry faces – namely sustainability and climate change. I believe the conference will shed light on how the industry will be able to deliver the energy needs of tomorrow and achieve a smooth energy transition that will secure the supply of clean and affordable energy to consumers worldwide.

We believe that Energean's participation in a number of panels will substantially contribute to fruitful dialogue with focus on how the industry will manage to deliver the energy needs of tomorrow. We will also exhibit in EGYPS 2020 to introduce Energean to a distinguished audience and provide information on the company's visions and plans.

Energean seeks to achieve its goal of becoming the leading E&P Company in the Mediterranean, what are the steps taken for this goal?

In 2007, Energean was a company with a small amount of production and just 2



mmbbls of oil reserves in Greece. Today we have evolved to a Group with approx. 600 mmbbl reserves that operates production, development and exploration assets in eight countries in the Mediterranean, inclusive of the acquisition of Edison E&P. Egypt was the first country we expanded into, then Montenegro in the Adriatic, and in 2016, we made the big step with the acquisition of Karish and Tanin gas fields that contain 2.4 Tcf of gas offshore Israel. Karish is now under development through a \$1.6 billion project with our FPSO the "Energean Power", which will be the first FPSO ever to operate in the East Mediterranean, an infrastructure that will be a gas hub in the region, as adjacent fields can be tied back and developed easily.

Another milestone for the Company was the 2018 IPO on the London Stock Exchange – the biggest IPO in the E&P sector in the previous four years. A parallel listing on the Tel Aviv Stock Exchange followed. In July 2019 we announced the Edison E&P acquisition, a deal which gives us scale of reserves, resources and production and makes Energean one of the largest independent E&P companies in Europe.

With the backing of all of our key stakeholders, Energean seeks to achieve its sustainable development guided firmly by our values, namely being ethical and responsible, being transparent and accountable, creating an attractive workplace and being an employer of choice, mitigating environmental impacts and minimising our footprint and supporting local communities.

Where exactly will you run the business & where is your biggest market share?

Inclusive of the Edison E&P acquisition,

we will be present in Egypt, Italy, Israel, Greece, Croatia, Montenegro, Malta and Cyprus. We have so far achieved to secure app. 30% market share in the Israeli gas market as of 1H 2021, when the Karish field is scheduled to come on steam. In Egypt we will be operating one of the country's main gas producing assets, the Abu Qir fields.

The Edison E&P portfolio also includes production from several assets in Italy as well as a key development, Cassiopea. Cassiopea will contribute approximately 35% of overall Italian reserves and is expected to more than double Italian production, becoming one of the country's largest producing gas fields.

What are the recent awarded contracts by yours in the region?

We have so far secured 5.0 bcm/yr of firmly contracted gas sales to Israeli domestic buyers, namely IPPs and industrial consumers. We have also secured 1.3 bcm/yr of contingent gas sales and 2.0 bcm/yr of potential sales under a Letter of Intent with Greece's DEPA in the context of the East Med Pipeline project. With the above we are fast approaching our goal to fill the 8 bcm/yr capacity of the Energean Power.

In 2018, Energean also agreed with BP to extend, until November 2025, a long-term offtake agreement for the production from the Prinos Basin in Northern Greece.

Edison E&P has its own sales agreements, as 100% of the gas produced at Abu Qir is sold to EGPC and 100% of the production in Italy is sold to Edison SpA.

Energean operates assets that have been producing oil & gas since 1981. Since 2007, you have been creating your own history in the Mediterranean E&P sector. Do you have any plans to invest in other different regions?

We are now focused on the completion of the Edison E&P acquisition, but we are always seeking investment opportunities in the Mediterranean. Our strategy is quite clear: ESG Stewardship – Risk Mitigation – Operational Excellence – Effective Project Execution – Disciplined Capital Allocation.



Energean has been operating in Egypt since 2010, how do you see the Egyptian activity and what are your next plans in Egypt?

Egypt is a key country for the production and transportation of gas in the region and Energean is strongly committed to the country. Apart from the producing Abu Qir field, we are also looking forward to the development of Python and Yazzi, the two fields in the 100% owned and operated by Edison NEA concession, and Idku. We are also excited to explore, discover and develop the potential of concessions such as the North Thekah and we are confident that the Egyptian market will provide us with further opportunities in the M&A front too.

I would like to highlight here the importance of the East Med Gas Forum in which Egypt plays a crucial role. We participated in the first Gas Industry Advisory Committee (GIAC) meeting held in Cairo and we

believe that , in collaboration with the governments of Egypt, Italy, Israel, Greece, Jordan, Lebanon, Cyprus, the Palestinian Authority and the operators in the region, we can achieve to enhance competitiveness, optimize infrastructure and harmonize regulation, whilst building a sustainable, cost-efficient energy market for the benefit of the economies in the region, the companies and the populations.

Can you talk about the great energy transition with a company evolving from 100% oil producer to a gas focused company?

Energean started as a 100 per cent oil producer and has a clear strategy to play a role in the energy transition. Following the Edison E&P acquisition, 80% of Energean’s reserves and production are natural gas. We are committed to the Science Based Targets Initiative for reducing our greenhouse gas emissions

in line with the Science Based Targets criteria across our value-chain activities, by adopting in the following two years a medium term plan with a duration of 5 to 15 years.

Our commitment to the environment was underlined by Energean being one of the first E&P companies to commit to become a net zero emitter by 2050 and to run an ambitious near term plan to reduce our GHG emissions intensity across scope 1 and scope 2 emissions by more than 70% in just three years from now.

We also strive to meet United Nations’ 17 Sustainable Development Goals through our day-to-day operations and a wide range of CSR initiatives. Ethos, a Greek word, is at the heart of Energean and we strongly believe that it is Our World we operate in and Our Responsibility to make sure that this World will be a better place for our children to live in.

Advansys projects. Excellence and achievements in 2019 and new ambitious vision in 2020



Advansys Projects Company continues to play its growing role in the construction of energy and infrastructure projects with the support of the strong demand in the Egyptian and Arab market for specialized construction work in these fields due to the current and expected surge in Energy and industrial sectors.

The company has proven the ability to fulfill its commitment in terms of quality and accuracy of implementation through large groups of qualified technical labor who operate under the supervision of an engineering and administrative team with a high degree of expertise and competence to carry out mechanical and electrical works, welding work and precision devices as well as the civil works. In terms of safety, quality and timely completion during implementation.

During 2019, the company participated in the implementation of the following projects:

- Project for Petro salam platform in the Ras Bakr (the Gulf of Suez region) with a production capacity of 5,000 barrels per day, depth of 65 meters during the period from March 2019 to July 2019, includes works of steel piles, welding and installation of steel piled up to 165M depth under the sea surface with total of 400 tons.
- Complete rehabilitation for offshore drilling rig Admarine 260 including steel replacement and piping modification for more than 200Tons.
- Renewable energy project, waste recycling at Al-Aamiriya Cement Factory with annual production capacity of 100 thousand tons of waste, includes the dismantling, installation, maintenance, and cutting and separating the waste in addition to all engineering, supply and complete construction works.
- Advansys has carried out complete electrical installations and successfully commissioned a 65 mega watt solar power plant in the south of Egypt (Bin Ban).
- New Administrative Capital Towers project as a Sub contractor to China state construction company in concrete structures of podium reinforced concrete



slabs for tower C01 of more 20,000M2. In addition to various site activities, carried out during mobilization including accommodation camp and roads works. Advansys projects is also in process of signing a new contract for infrastructure work of the same towers.

- Eastern company for smoke, General Construction works including concrete ground water tank 3000M3, steel bridges and general maintenance contract for company facility in 6th October industrial Area.

The company has also signed a memorandum of cooperation with an Indian company specialized in engineering works for energy projects to expand the company scope of work and increase its contribution of the Energy projects.

On the other hand, the company has provided 1,500 job opportunities during 2019 in the previous projects from engineers, administrators, technicians and specialized workers. We expect to increase the volume of business during the year 2020 through the expansion of construction projects in the new capital. The company also seeks to develop its business through expansion in brotherly Arab countries, such as Saudi Arabia and Iraq, for example, to obtain a number of projects in those countries.



ADVANSYS PROJECTS



MYDESIGN

An EPC Contractor for oil & gas, Infrastructure and industrial sectors both onshore and offshore multi-disciplinary projects. Projects arm of Intro group that is operational since 1980 in different fields related to the Oil & Gas sector.

Advansys Projects as an EPC contractor provide the following services in Egypt and North Africa:

- Offshore platform rehabilitation
- Plant construction
- Pipelines
- Storage tanks
- Process equipments
- Infrastructure
- Buildings
- Solar Energy

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Cairo, Egypt

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www.advansys.me



Rig installed platform concept

Enppi has successfully accomplished the installation of the NWO platform in Gulf of Suez for PETROSALAM/GPC JV.

The rig installed platform concept was adopted for this minimum facilities platform, the concept which benefits from utilizing the drilling rig in platform installation, rather than HLV, in optimizing installation cost and schedule beside enabling drilling during construction, which substantially improves the ROI for the marginal fields.

The 1st in Egypt and one of the few worldwide where drilling rig installs platforms in such relatively deep water (65m).

Enppi as the EPCI consortium leader undertook the conceptual, FEED & detailed engineering, procurement, installation, overall management and pre-commissioning.



Close interaction with the rig operator started from early stage of engineering to assure perfect competability of the platform components with the nominated offshore drilling rig considering one single position for all installation activities and hence eliminate any potential installation risk.

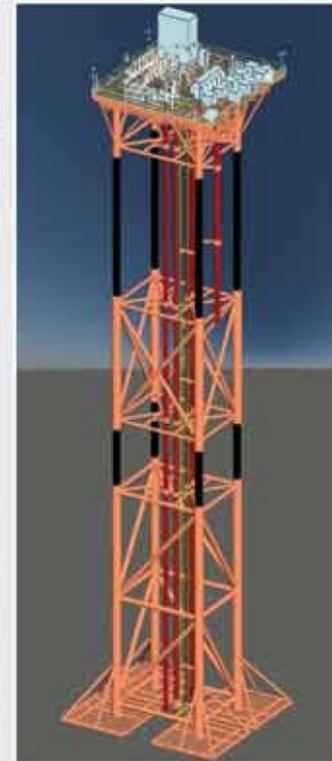
1st in
Egypt
& one of few
worldwide

www.enppi.com

The platform substructures and topside were fully fabricated in Zeit Bay PTJ yard and towed to the site where the drilling rig was positioned at the exploration well location, this required particular attention to be paid to the positioning system and the placement of the rig.

The template was lifted off from material barge and deployed over the exploration conductors, then four vertical piles were driven through the template legs to the target penetration, grouted to template leg and cut off, the material barge holding the stacked frame was moored alongside the installed piles, then the frame was lifted off and stabbed over the piles to the target elevation below sea level, the stacked frame legs were grouted to the piles, and finally the topside was installed over the piles.

Platform Data	
Template	8.5m x 11m x 28m height Weight 225 tons
Stacked Frame	8.5m x 11m x 15m height Weight 105 tons
Piles	4 Nos. 36" x 1.5"
Topside	16m x 16m One level Weight 150 tons



Since 1983, Enppi has executed tens of local and regional offshore projects, our Scope of service covers the full spectrum of the project life cycles starting from the conceptual up to the operating phase.

Enppi's diversified offshore portfolio includes; all types of fixed offshore platforms, ports & loading terminals, subsea production systems & sea-lines and offshore & subsea assets integrity management.





Digital Startups Raise Hundreds of Millions to Modernize Upstream Sector

Digitalization in the oil and gas sector

The so-called 'Internet of Things' is where objects and equipment, such as sensors, interconnect and transmit digital information. It generates vast volumes of data ('Big Data'), arriving at high speed ('velocity') in varying formats ('variety') with various degrees of reliability ('veracity') for decision making. Advanced analytics of Big Data can uncover patterns and make predictions. This can reveal potential new business models and give stakeholders a better overview of operations, and more control and independence for managing assets. (DNV GL) has conducted in-depth interviews on this topic with 25 key stakeholders – operators, rig owners, IT suppliers and consultants. Their views are summarized below.



Benefits

Digitalization can bring various benefits to day-to-day operations and cost reduction. For condition monitoring, specific, industry, historical and real-time data lets operators improve maintenance and inspection regimes. Real-time data from wells will allow timely decisions on underperforming wells and other potentially high-cost issues. Detecting anomalies during drilling and operations will enable more effective decision making that can deliver cost savings. There are also potential benefits for health, safety, security and environment (HSSE) performance. Data-enabled dynamic barrier management can provide a more accurate view of condition status, allowing better prediction and mitigation of equipment failure. Extensive data on efficiency and emissions provides for better monitoring of HSSE performance and compliance. Data analytics improves understanding of environmental risks, and authori-

ties can create more effective regulations and monitoring.

The size of the digital prize is undoubtedly large – with as much as US\$150 billion per annum in potential operating cost savings available to companies that embrace digitalization. But the challenge of implementing digitalization is enormous. To date, we believe there's been more talk than action – and little evidence of tangible change to top or bottom lines.

Digitalization is gaining traction in US unconventional play. The shift has allowed shale teams to improve well performance. Some wells are now being drilled 20% faster and staying in pay zones more than

95% of the time. These drilling efficiencies and landing zone improvements could save L48 companies up to US\$45 billion throughout the exploitation of tight oil. And in existing wells, smart production systems could drastically reduce lease operating expenses: a 10% drop could add US\$25 billion of value to fields across the L48.

Why has the digital revolution not had the impact we hoped for?

Most companies have struggled to scale and embed digital technologies. Few are committed to experimenting at the scale needed for radical change. And many investment horizons are too short to test, validate

Mentions of digitalisation in earnings and analyst calls



and implement digital technologies in the conventional space. Digitalization is not a silver bullet. But there is a significant first-mover advantage for companies that get it right.

A sample of the most recent funding rounds and acquisitions of upstream-focused startups shows that oil producers and outside investors are looking for a wide array of innovations to improve the bottom line of this trillion-dollar industry. They include technologies aimed at mitigating fugitive-methane emissions, new inspection and analysis systems, and cloud-based products that make buying oil and gas equipment as simple as using Amazon or Alibaba. Since October, a handful of startups have raised a disclosed sum nearing a quarter of a billion dollars. The sum far exceeds the \$70 million raised in the months prior. However, the trend of where these investments are going remains largely on course. Developers of digital technologies—those that exist purely in the realm of software along with those combining emerging software and hardware products—dominated this most recent cycle just as they did in the one before. (JPT)

SparkCognition, \$100 million, October

Investors: March Capital Partners, Others

Founded in 2013, SparkCognition offers cybersecurity, document management, and machine-learning services to the aerospace, renewable energy, and oil and gas sectors. The Austin-based firm has partnered with large corporations that include Boeing, Hitachi, and Aker BP. Shell has also tapped the company to be part of its Game Changer accelerator program to work on pore-pressure prediction, an application described by the companies as critical for well planning and safe operations. SparkCognition's most recent capital raise was part of its series C financing. The company has raised a total of \$175 since it was founded in 2013, boasting a reported valuation over \$725 million.

GoExpedi, \$25 million, November

Investors: Top Tier Capital Partners, CSL Ventures, Crosslink Capital, Others

Houston-based GoExpedi is a grow-

ing e-commerce platform for the oil and gas industry, offering more than 200,000 parts and supplies on its website. The e-commerce model delivers pricing transparency to a marketplace historically defined by opaque pricing, long-maintained for the competitive advantage it hands suppliers.

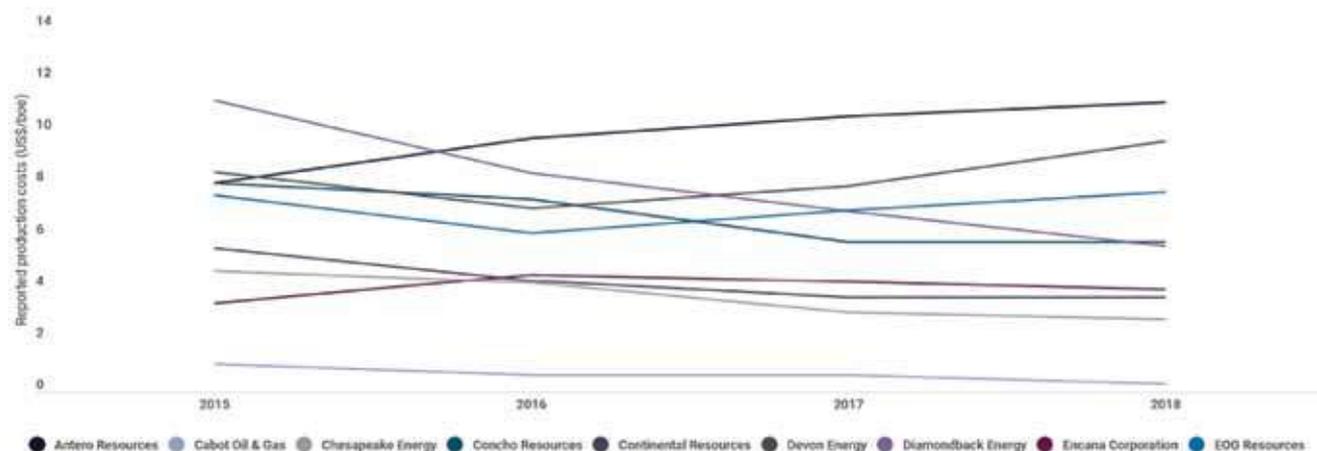
The supply-chain focused platform has trimmed product delivery costs as well, typically by 25%, according to GoExpedi. Founded in 2017, the startup is mostly focused on the US onshore market but plans to use the new funding to expand its business to offshore, midstream, and downstream markets globally. More than 20 firms are regular users of the platform, including two of the largest drilling contractors in the US. Last year, the company secured \$8 million in equity financing through its series A round.

Rebellion Photonics, Undisclosed, December

Buyer: Honeywell

Houston-based Rebellion is the developer of an automated visual monitoring technology that detects gas leaks and plumes—or what the

Cost reductions yet to show up in earnest



firm calls a Gas Cloud Imager—at oil and gas facilities. The firm was founded in 2009 out of the Houston Technology Center, an incubator that has since ceased operations. In 2013, Rebellion was named “Start-up of the Year” at The Wall Street Journal’s inaugural startup contest. Before the sale to the industrial automation giant Honeywell, Rebellion counted international majors Chevron, BP, and Shell as clients. BP used the startup’s sensors on drones to seek out methane leaks in Oman. Shell recently installed the company’s technology at its “well pad of the future” in west Texas.

Intelligent Mud Solutions, Undisclosed, December

Investor: Equinor

Intelligent Mud Solutions (IMS) is a developer of a portable automated drilling fluid analysis system. The technology works in real time and replaces the need to send drill mud samples to a laboratory for further testing. The skid-based apparatus is hooked into the return line of a shale shaker on a drilling rig where it measures the mud’s rheology, viscosity, density, and gel strength. Based in Stavanger, IMS says its motivation for the technology was to bring mud mixing and property analysis—a largely manual process—up to par with technologies such as automated pipe handling systems that are now common on modern offshore rigs. The data generated by the IMS system is considered to be an enabling input for drilling automation and control systems. Equinor’s venture group has become one of the largest shareholders of the firm through its undisclosed investment.



Crusoe Energy Systems, \$70 million, December

Investors: Bain Capital Ventures, KCK Group, Upper 90, Others

Denver-based Crusoe has developed a flare-mitigation technology that uses otherwise burned natural gas from well sites to power modular cloud-computing systems that have been designed to meet the rugged requirements of the oil field. The company reports that it has systems in the field today working for privately owned and publicly traded oil and gas companies.

Over the course of the first half of 2020, the goal is to deliver 40 more units to the field. Current projects are located in Wyoming, Colorado, North Dakota, and Montana—all home to active shale plays. Each system is capable of consuming millions of cubic feet of gas per day. The capital raise breaks down to \$30 million in equity funding and \$40 million in project financing.

Seeq, \$24 million, January

Investors: Saudi Aramco, Chevron, Altira, Others

Seattle-based Seeq received its second major injection of capital

from several of its original investors. Large oil and gas producers have adopted Seeq’s data analytics software to monitor anything of value that produces a time-stamp. This includes flow meters, compressors, production facilities, and refineries. So-called time-series data has historically represented one of the most challenging aspects of “big data” since it requires considerable time to extract from spreadsheets and to then visualize.

The attraction to Seeq is also due in part to the software’s user-friendly interface and back-end data management that provides seamless access to equipment data. Seeq said the cash raise of this second round might extend to \$30 million upon closing. In total, the company reports it has raised \$60 million to date.

LaserStream, Undisclosed, January
Buyer: Stress Engineering Services
LaserStream specializes in laser mapping of tubular assets, e.g., marine risers and flowlines, which are susceptible to erosion along with wear and tear. The data-acquisition service delivers high-resolution images that can be used for non-destructive testing, asset condition monitoring, and predictive analytics.

Founded in 2014 in the Houston area, LaserStream adapted technology originally born within the defense industry to take internal scans of gun barrels on large-caliber artillery units and tanks. The firm was selected as one of the 10 most-promising startups at Rice University's fifth annual Rice Alliance Startup Roundup event held at the 2019 Offshore Technology Conference. Stress Engineering said it plans to scale up the LaserStream's application to midstream, downstream, aerospace, consumer, and medical services.

M1neral, \$1.6 million,
January

*Investors: Amnis Ventures,
Pheasant Energy, Others*

Described as an early-stage startup,

M1neral is developing a platform that seeks to reduce the complexity involved with buying and selling royalty and mineral rights—a \$500 billion market. Despite the large value of US royalties and minerals, the marketplace is highly fractionated with more than 12 million owners spread across the country. Interest is rising in the company for its promise to use modern cloud technology and artificial intelligence to enhance asset queries and accelerate transactions.

Generating, sharing, analyzing and storing data are collectively an important enabler of digital transformation (e.g. in the adoption of IIoT, or in ecosystem collaboration). Governments should ensure that current concerns over data privacy and usage, se-

curity and interoperability can be resolved. Today, governments are expected to observe the development of digital technologies and be open to a dialogue with the industry on best practices related to the collection, sharing and use of data.

Finally, the industry, governments and civil society will not maximize the benefits of digitalization to the industry, wider society and the environment if they each act separately on the important topics above. Instead, addressing digital transformation with a multistakeholder approach stands to reap potential gains that have never been greater.





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CHELPIPE GROUP

is one of the leading industrial groups in the Russian metallurgical industry. At the end of 2017, the company accounted for 17.5 % of the country's total pipe shipments. ChelPipe Group brings together enterprises and companies involved in ferrous metallurgy: the Chelyabinsk Pipe Plant; Pervouralsk Pipe Plant; a warehouse complex that sells the group's pipe products in the regions; the scrap-metal collection and recycling company META; enterprises producing trunk pipeline equipment: Pipeline Bonds, ETERNO, MSA (Czech Republic), and Rimera, which provides oilfield services.

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AN INTERVIEW WITH

Mr. Matteo Babini

Commercial Director of Micoperi SpA



Micoperi is an EPCI contractor operating for over 70 years in the offshore sector of Oil & Gas Industry. Its versatile fleet, in-house engineering capabilities and highly experienced and motivated project team allow to carry out the most challenging projects meeting its clients' expectations.

Micoperi has headquarters base in Italy and branches and subsidiaries all across the Mediterranean basin, West Africa and Central America.



Micoperi is a leading engineering, procurement, construction and installation (EPCI) company focused on complex offshore oil and gas projects worldwide. What do Micoperi's Middle East operations entail?

Micoperi is a turnkey contractor focused on the offshore installation activities in shallow waters and mainly active in the Middle East countries that overlook the East of the Mediterranean Sea. As of today, only occasionally Micoperi works in the Persian Gulf, but the target is to develop and to strengthen its commercial position in all the Middle East Region.

What is the current breakdown of your product portfolio?

75% of our business is related to the offshore installation of green fields, where 40% is about pipelaying, 20% SURF and 15% platforms installation. The remaining 25% is pertaining to maintenance that is a growing market for Micoperi, especially in the last years of oil crisis.

Micoperi operating for over 70 years in the offshore sector of Oil & Gas Industry. How does this long-standing history help differentiate Micoperi from your competitors in the region?

The expertise of a company is very much dependent on two

factors: the experience and the innovation. Certainly a long-standing and remarkable history proves how much, over the decades, Micoperi is reliable and capable to adapt itself to a changing world and to uncertain conditions.

What is the positioning of Micoperi's business today in North Africa and specifically Egypt?

The Mediterranean Sea has always represented the domestic market for Micoperi, especially the North Africa, where we have established our subsidiaries with local partners. Among the North African countries, undoubtedly Egypt is the main market for our organization. In fact, through our Egyptian free-zone subsidiary "Engineered Offshore Petroleum Services" (EOPS), we are active in the Country for more than 15 years and working for the main joint operating companies.

What expertise are you bringing to the supergiant gas projects in the Mediterranean Sea?

The core expertise of Micoperi is the engineering and installation in shallow waters such as the nearshore pipelaying of large diameters and the offshore installation of platforms and subsea structures (SURF). Micoperi reputation is to be an experienced and very flexible contractor that can partner up with both the operating companies and the largest contractors.

How exactly does Micoperi build up sustainable local operations in this way?

Certainly our subsidiary EOPS represents the way how Micoperi has developed sustainable operations in Egypt, meeting EGPC expectations.

The mobilization, education, training of local engineers and the utmost use of the local supply chain with the aim at working in a sustainable manner are crucial for Micoperi and EOPS, especially in the context of the current environmental and economic crises.

What do you envision for Micoperi in the Egypt & global operations over the next few years?

The recent oil crisis and the current ecological one are definitively changing the O&G Industry by setting new standards, making the FIDs more scrupulous and reducing the number of players. The resilience and flexibility of

Micoperi have allowed the company to remain in the market, to change and to innovate. We are now positive to develop further our portfolio, but, above all, to remain focused on our core business in the regions we operate, such as Egypt.

The current downturn in oil prices has created a challenging operating environment for all players across the oil and gas value chain. How can companies unlock more value by partnering with Micoperi, as opposed to some of your peers in the market?

As private family driven company, Micoperi can support the operating companies and the main contractors by taking advantage of its flexibility and its capacity to shorten the time consuming supply chain. That allows to execute fast-track solutions thanks also to the versatile fleet recently upgraded and expanded. The main difference between Micoperi and all other contractors is that Micoperi both owns the construction vessels and the complementary vessels and barges, which allows Micoperi to be less reliant on the market and more reactive with the response.

Since the company's inception, Micoperi's portfolio has not only expanded beyond different market segments, but also in the breadth of offerings, now with tensioning equipment, mooring lines, and specialized engineering. What R&D projects does the company have in its pipeline to further enhance its set of value-added products and services?

Our R&D projects are mainly about sustainable engineering, that means, in our case, oriented toward the mitigation of the environmental impact during the offshore construction activities such as the development of pipelaying/tunnelling techniques at landfall and the enhancement of solutions of site remediation after the installation/decommissioning.

What are your personal leadership philosophies on chartering success for a company like Micoperi?

The important thing to remember is that there is no correct leadership philosophy. Different philosophies are appropriate in different situations and work environments. In a company like Micoperi the key to success is a good mix of being very much participative, aware of the importance of the delegation and always focused on the constant improvement of the company by managing the change.

A large, bright orange and yellow gas flare is visible in the upper left quadrant of the image. The background shows an industrial facility with various pipes, tanks, and structures under a clear blue sky. A large blue diagonal graphic element is overlaid on the image.

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UNIVERSAL FOR BUILDING MATERIAL AND CHEMICALS (UBMC)

UBMC is a group of companies in the chemical industries specialized in the paints & coatings markets under our main brand name of "SIPES".

SIPES was introduced to the Egyptian market in 1989. Only to become the leading manufacturer of paints, which is also available in the markets of Lebanon, Jordan, Saudi Arabia, Libya, Syria and Nigeria? Sipes is keen to become the leading paints manufacturing company in the Middle East.

it's our expanding research and development facilities, continuous personnel-training programs stand witness to our clear sense of purpose.

Sipes Seeks customer satisfaction as vital to the success in our markets.

Sipes working on state-of-the-art technological equipment to put together the best products that particularly suit the needs of our clients, and the environment in which they operate.



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Paints



MARINE
Paints & Coatings



INDUSTRIAL
Paints & Coatings



BUILDING
Materials



WOOD
Paints & Varnishes

UBMC Produce, market and sells Six major coating brands, Under the umbrella of UBMC group, there is the Technical Coating Department, which market and sells two brands; Transocean Coatings for the marine and protective coatings and SiTECH brand for floor and industrial coatings.



TRANSOCEAN COATINGS is a worldwide association of paint producers. Since 1959 Transocean coatings is active in the manufacture and supply protective and marine coating. Transocean has a network of manufactures spread over all the continents, producing its range of coatings. Transocean paints are manufactured in certified factories. Transocean coatings has activities in more than 60 countries like Australia, Argentina, China, Chile, Egypt, Germany, Greece, Iran, Malaysia, Netherlands, Saudi Arabia, Turkey, United Kingdom, Central America and many other countries.

The activities are concentrated on three product groups:

1- Marine

Transocean Coatings develops, manufactures and sells antifouling, anticorrosive and many more coatings for ships, offshore installations, and industrial facilities.



2-Yachts

Trans Ocean has a product range for protection yachts made out of different materials; metal (steel, aluminum), wood or Grassfire Reinforced Polyester.





3-Offshore and Onshore structures

Offshore structures, especially the splash zone areas face severe corrosive conditions. Maintenance of these structures brings several problems. In some areas of the world, the climate is very unpredictable implicating that in general thorough surface preparation is not possible and painting work can be interrupted unexpectedly. Getting it right from the start makes very much sense in the oil and gas market since access and window of opportunity is a major obstacle for maintenance painting.

Oil companies have therefore raised the standards on material protection and selection. For paints, prequalification standards exist which aim to deliver systems with at least 15 year lifetime. Accelerated cycle corrosion tests like ISO 20340 and Norsok M 501 are used by all major oil companies in addition to specific testing on immersion resistance and compatibility with cathodic protection. All the above makes clear that any paint company active in this market has to be dedicated to corrosion protection.



TRANSOCEAN COATINGS is able to take up this challenge and in fact since 1959, Transocean Coatings have been supplying the market with high quality paints combined with an excellent service that provide an excellent protection for the offshore and onshore structures like Platforms, pipes, refinery, storage tanks, Bridges, power plants and so on.



Si TECH is a new brand completely owned by UBMC, this brand includes a wide range of high quality product ranges for floor coatings like self-leveling epoxies, epoxy mortars, grouts, cracks fillers, adhesive mortars, water base epoxies and many other products which provide an excellent protection for the concrete floors and walls in different types of services like garage floors, floors with heavy loads, factories flooring, concrete surfaces subjected to chemicals, oils, water, and high abrasion. beside the flooring range.



Below is the flooring range of **Si TECH** brand:

- Sitech Floor Primer

• Description: Solvent free clear epoxy sealer and primer for concrete surfaces protection in a floor coating systems.

- Sitech Floor Clear Coat

• Description: Solvent free clear epoxy top coat, used as a finish layer for 3D flooring systems.

- Sitech Crack

• Description: Low viscosity, injectable, solvent free epoxy mortar for vertical and horizontal cracks filling.

- Sitech Epoxy Bond

• Description: Low viscosity, solvent free epoxy mortar for bonding of new made concrete with old concrete.

- Sitech Epoxy Fix

• Description: Solvent free epoxy mortar for used as a structural adhesive and mortar for Concrete elements Steel and Iron with the concrete.

- Sitech Floor Putty

• Description: Solvent free epoxy putty for concrete surface treatments and smoothing before the floor epoxy systems.

- Sitech Floor Mortar

• Description: Three component solvent free epoxy mortar for excellent abrasion resistance.

- Sitech Floor SL

• Description: Three component solvent free epoxy self-leveling provides a hard and smooth surface.

- Sitech Floor Coat

• Description: Solvent free epoxy used as a finish layer in epoxy flooring systems.

- Sitech Floor Metallic

• Description: Solvent free epoxy used as a finish layer in epoxy flooring systems providing excellent metallic effect floor system.

- Sitech Grout

• Description: Solvent free epoxy grouting to be used under equipment, heavy impact and vibratory machine, pumps, etc.

- Sitech ZR

• Description: One component epoxy primer containing zinc dust for excellent protection of steel and Iron in civil structures.

- Sitech ZR Extra

• Description: Two component epoxy zinc rich primer dust for excellent protection of steel and Iron in civil structures.

- Sitech PW

• Description: Solvent free epoxy, nontoxic paint used to protect concrete water tanks, laboratories, hospitals ...etc.

- Sitech WP

• Description: Solvent free water based nontoxic epoxy paint used to protect walls of laboratories, hospitals, schools ...etc.

- Sitech Quartz 5.11 & 5.12

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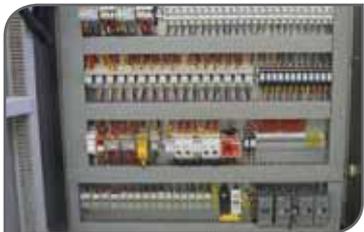
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What will 2020 look like for the oil and gas, energy, and petrochemical markets?



Here are 10 observations from ADI Analytics (OGF):

Crude oil markets are finally preparing for a “lower for longer” outlook.

Crude oil price averaged \$57/bbl in 2019 during which price volatility was quite low—within \$20—reflecting the increasing sentiment that the oil and gas industry was no longer growing. There has been talk of oil demand slowing for many years but, at 1.3 to 1.5 million B/D, actual growth has consistently surprised analysts. Oil producers, who never read the “slowing oil demand growth” memo, are now paying heed as investors are signaling an end to the party. US oil production growth will slow down by as much as 50% in 2020, even as some new offshore projects that have been commissioned recently pick up the slack coupled with the remarkably disciplined production cuts that OPEC and Russia have delivered in the past couple years.

Would the promise of newfound supply discipline suffice or will demand growth actually slow down as forecasted? How impactful will electric vehicles, fuel economy standards, mobility apps, and renewable fuels be? Where will new crude supply grow and how will that impact the quality mix? These and other questions will challenge crude markets even as the industry tries prudence and discipline.

Natural gas offers nothing to write home about.

The commodity that started the shale boom and transformed North American and global energy landscapes is now a victim of its own success. Capital spending by E&P companies focusing on natural gas is expected to continue declining in 2020 and substantially so at 25% relative to 2019. Even so, production will rise due to associated gas production from oil wells. Demand will also continue to rise but primarily through exports via LNG and pipelines.

Although there is little new to write home about, there are several very interesting near- and long-term questions on natural gas. Can innovation push natural gas demand in industrial, residential, and commercial sectors beyond incremental volumes? Will natural gas demand be halted by renewables in the long term and fugitive emissions in the short term? How much more US LNG will the world want? Finally, how do we make money in the natural gas value chain?

Shale and its flight to scale.

After oil prices collapsed the week of Thanksgiving in 2014, they have been stubbornly low for more than 5 years now, evaporating Wall Street's interest in funding new exploration or wells for the sake of growth. Equity investors' focus on profitability instead has forced shale operators to cut capex, opex, and now sales, general, and administrative (SG&A) expenses, which are about 50% lower with larger companies than smaller players. As a result, energy majors such as ExxonMobil and Chevron have increased their Permian production by more than 70% and 30%, respectively, in the past year even as they've sought out acquisitions. Acquisitions will, however, be difficult as Chevron discovered with Anadarko. There is no dearth of acquisition targets in shale today but quality continues to be scarce. On the other hand, quality shale producers demand high valuations that public equity or debt markets are often reluctant to support or reward as Oxy and Anadarko have

come to find out.

Private equity (PE) has aggressively funded a lot of shale growth in the past few years and PE-backed E&Ps have often accounted for the highest production growth over public E&P companies. However, poor valuations and shrinking buyer pools are forcing several PE companies to start preparing to hold on to their portfolio companies for longer duration than expected. Several oil- and gas-focused PE firms are now hiring geoscientists, reservoir engineers, production specialists, and ESG (environmental, social, and governance) experts to build deeper operating capabilities, which is often far more difficult than investors realize.

Therefore, unconventional oil and gas observers are concerned around several uncertainties and related questions. How will capital spending evolve through the next few years? What kind of production growth can be expected on a realistic basis? For plays outside the Permian, will there be sufficient midstream investments to support production growth investments? Finally, what happens to the long tail of smaller E&Ps floated with the assumption that there will be a steady stream of buyers waiting for them to sell?

Upstream offshore lives another day.

Evidence that shale is not the only game in town came again recently when Apache (and Total's) announcement of a significant oil discovery off the coast of Suriname drove its share price up 25%. This discovery builds on ExxonMobil's successful find in offshore Guyana, which has rapidly developed into a major offshore growth platform for the company.

If shale crashed and burned the offshore oil and gas projects party from the 2000s, the former is contributing to the latter's resurgence now. Cost-reduction strategies perfected in the craft of shale resource development are now being deployed to improve the cost competitiveness of offshore oil and gas projects. That, coupled with new entrepreneurial companies, is helping bring new offshore oil and gas projects to fruition.

Even so, longer-term concerns around climate change will continue to cloud billion-dollar investments in offshore oil and gas. Similarly, as the recent experience in Brazil has demonstrated, government auctions can fall significantly short, lacking sufficient incentives for developers to pursue new projects. Finally, investors have to grapple with environmental and safety concerns especially with projects designed with lower capital cost targets.



Midstream has built it, but will they keep coming?

“If you build it, they will come” was the commandment that worked for Kevin Costner in the Field of Dreams, and midstream companies so far. But midstream is wondering if they will keep coming. Midstream companies have invested significant capital—nearly \$40 billion by the top 25 midstream players in 2019 alone—building gathering lines, interstate pipelines, processing plants, fractionators, and storage capacity for oil, gas, natural gas liquids, and water to support the shale revolution. A lot of this was on demand from E&Ps and in recent years some of it was done quite prudently by diversifying risk through joint ventures with other midstream companies, acreage commitments with E&Ps, and private equity and other alternative financing mechanisms. The midstream shortages for production out of the Permian drove a lot of frenzied growth across the midstream value chain over the past 18 months. That coupled with growing crude oil exports supported by a nice differential between the price of West Texas Intermediate and Brent crude oils led to new investments in crude oil exports infrastructure. All this was expanding upon the extensive infrastructure built to support natural gas production and exports as well as other related midstream investments.

However, in an outlook where production growth is likely to slow down, and significant consolidation has altered the landscape of players in key plays, how will midstream companies renew transportation contracts is a key question. Changes in the taxation landscape has already forced several midstream companies to reconfigure themselves out of master limited partnerships (MLPs), impacting returns for some investors. Will the traditional, non-MLP structures incentivize new investments in midstream? Finally, consolidation and renewed value chain focus in midstream has created larger players who face growing scrutiny around ESG and related issues.

LNG races toward commoditization.

If you think 10 years is a short period of time, LNG is a good commodity to study. Ten years ago, LNG prices

were indexed predominantly to oil and there was barely a spot market. Today, LNG is rapidly headed toward commoditization, thanks in large part to shale gas in the US, followed by small measures of technology and business model innovation, rapid demand growth, and black swan events such as Fukushima, which expanded the LNG market almost overnight.

LNG pricing today is under a lot of pressure driven to a large extent by an oversupply in the market. We anticipate LNG supply and demand to balance in the next few years, but it is difficult to reconcile that expectation with the long list of new LNG export projects that have been announced not just within the US but globally. Gas discoveries have proliferated around the world, and LNG is the preferred gas monetization option driving up LNG export project announcements.

Having said that, LNG demand has continued to surprise analysts. China’s rapid adoption of LNG followed by promising uptake in other Asian and even some Middle Eastern and Latin American markets has occurred at a faster pace than anticipated. Lower LNG prices and spot markets have helped illustrate nicely the value of price-demand elasticity. Going forward, one has to keep this historical context in mind and be more optimistic about demand growth, which is often far more difficult to forecast than adding up new capacity announcements.

Refining and an upcoming sugar high.

After a few years of intense speculation around the International Maritime Organization’s (IMO) rule limiting sulfur in marine fuels starting 2020, refining markets enter the New Year with a lot of optimism. Diesel crack spreads at \$18/bbl are 35% higher than historical averages, while the discount on Canadian crude is 40% higher. In other words, refiners with the necessary processing complexity are relishing the prospect of higher margins driven by significantly cheaper crude oils and diesel fuels at their historical highs.

IMO may, however, turn out to be a short-term sugar high given how margin expectations driven by historical regulatory transitions have turned out. Eventually, refiners will have to begin contending with medium- to longer-term challenges associated with peak demand for hydrocarbon fuels, growing share of alternative fuels including ethanol and renewable diesel, and business model shifts to find new export markets or protect local markets for their refined products.

Petrochemicals' growth horizon clouded by plastic waste.

Petrochemicals are a bright spot of robust demand growth in the global hydrocarbon landscape otherwise dotted by peak demand concerns. Against this demand backdrop, cheap supply of NGLs—ethane, in particular—has repositioned the US on the lower end of the petrochemicals cost curve.

That cost competitiveness is likely only going to improve further in the next few years as Y-grade NGL fractionation and ethane recovery capacity increases. Even so, ethane rejection in North America will only increase further, reflecting the deep structural advantages North American petrochemical production will enjoy for decades to come.

As a result, US chemical majors have invested heavily in ethylene derivative capacity with emphasis on polyethylene destined for exports to Asia and Latin America. However, trade disputes with China and competing capacity investments in Asia and Middle East depressed petrochemical margins in 2019. Although a resolution

of the trade dispute with China has been claimed, there are lingering concerns about the long-term reliance on export markets.

In addition, and more significantly, growing consumer backlash against plastics and polymers—especially single-use applications—pose significant challenges. While demand is unlikely to be impacted, growing resistance to plastics in consumer markets does not bode well for a sector whose growth outlook is underpinned by rapidly growing middle class consumers.

Power markets advance with an all-of-the-above strategy.

No energy market is in as much flux today as global power markets. In the US, natural gas-fired power continues its seemingly inexorable march upward primarily at the expense of coal-fired power. This is notching up significant carbon emission reductions. For example, carbon dioxide emissions in 2019 fell by 10%, all due to replacement of coal-fired power plants with those powered by natural gas.





Globally, however, it's not such a straightforward picture with more of an all-of-the-above strategy when it comes to choice of technologies in the electric power sector. And these global trends should give cause for US gas and power stakeholders to think about what the future might look like.

In China, the country is on track to install almost 150 gigawatts of coal-fired power capacity over the next few years, and similar investments in coal for power generation are underway in other Asian economies. Even so, all of these economies along with those in Latin America continue to invest heavily in renewables and auction data show that renewables are as, if not, more competitive than gas-fired power. But some of these renewable power investments continue to be tied to incentives and subsidies whose sustainability is under growing uncertainty. For example, Mexico has recently initiated rules that will most impact private participation in renewable power. Finally, rapid innovation in renewables, batteries and energy storage, energy efficiency, and nuclear continue to advance a wide range of technologies in the power sector.

There's a lot more to innovation than digital.

It's difficult to drive past the Energy Corridor in Houston without noticing several billboards advertising the benefits of "digital" technologies including artificial intelligence, machine learning, Industrial Internet of Things, and data analytics. Some of the leading consulting firms now can't seem to publish anything that doesn't

extol the benefits of "digital." In fact, what can "digital" not do—from finding new oil to improving pipelines to reducing fugitive methane emissions? Reading these reports one can't but wonder about the miracle of the oil industry coming along so far all these decades without using "digital."

However, on a due diligence engagement, when our team asked operators, investors, and vendors, "Who's making money in digital," we found few good answers. Candid responses include "no one" and "conference producers." While digital has a good and important role to play, we feel confident in saying that its proponents are overstating its case as an innovation lever in the oil and gas landscape.

Instead, real and sustainable innovation that is delivering hard dollars in benefits is not quite getting its due. A short, nonexhaustive list includes advanced drilling and completion tools, oilfield electrification technologies, low-bleed valves and long-lasting compressor parts, renewable biofuels, CO₂ and hazardous gas adsorbents, micro-measurement devices, and sulfur-reduction catalysts. In addition, the industry has pursued a number of operational and business model innovations that deliver critical competitive advantages.



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West Nile Delta Campaign Delivering Energy to Egypt

By: Sherine Khedr, Fady El-dabi, Mohamed Nashaat, Ghulam Mohiuldin, Alaa Galal, Teddy Slim, Andrea Hughes, Lyndsay Morris, David Ramsay, Wael El-wakeel, Hussein Mubarak, Jeffrey Smith, and Robert Munger, BP Exploration Operating Co

Abstract
Giza Fayoum Completions was the second campaign of the West Nile Delta project. The campaign consisted of eight cased-hole gravel pack subsea wells. The Giza Fayoum campaign was sanctioned in August 2017 with an execution start date five months later. In this time, the well designs were finalized, downhole completion equipment manufactured, and the execution plan approved. A high rate water pack sand control technique was designed to deliver an estimated production rate of 120 MMscf/d / well. It was planned to deliver eight wells over a period of 5 months from Q1 2018 giving an average of two and a half weeks per well. Seven of the eight wells were cleaned up through a large bore completion landing string system. Each well was flowed to high rate temporary well test equipment installed on the DP semi-submersible rig to a gas rate of 65 MMscf/d, with PLT logs conducted.

This successful, fast-paced campaign is the result of applying lessons learned from the former campaign; Taurus Libra and identifying additional efficiencies that would improve performance. The design similarities between the two campaigns permitted the team to extend the learning curve and deliver superb performance on Giza Fayoum.

As for safety performance, the campaign was delivered without any lost time incident. A rigorous approach to continuous improvement resulted in reducing the completion time to 12 days per well (not including rig move, de-suspension and suspension activities). The optimized bean up procedures supported by PLT data made it possible to reduce greenhouse emissions by 20%. The sand control technique resulted in a significant reduction of total skins. Moreover, the team succeeded in delivering the wells safely, ahead of plan and under budget while adhering to BP's overarching

strategy of delivering safe, compliant and reliable wells. The efficiencies, safety culture and technology used during this campaign are now being set as the standard for future campaigns in Egypt and beyond.

Introduction

The eight well Giza Fayoum completion operation started on 16 December 2017 and was successfully delivered on 9 May 2018. These wells are BP's second batch campaign in the West Nile Delta (WND) project. The first campaign is Taurus Libra completions and was delivered at «best in basin» performance. Giza Fayoum completions was delivered at 30% better performance than Taurus Libra, which sets a new benchmark for best in basin performance. The Giza, Fayoum, Taurus and Libra completions all employ the same completion design and are collectively called WND Pliocene wells.

The WND development is located approximately 70 km offshore of the northern Egyptian coast, as shown in Fig. 1 (Tahirov et al 2019). It is a gas field with an approximate reservoir pressure between 2,700-3,200 psi and temperature between 45-55°C. The campaign consisted of eight cased-hole gravel pack subsea wells. A high rate water pack sand control technique was designed to deliver an estimated plateau production rate of 120 MMscf/d/well. There are 3 types of depositional environments targeted by the WND Pliocene wells: channel complexes, splays and levees. Channel complexes occur when the deposits are confined within channel boundaries. As time progresses, the sand and shale deposits alternate within the channel complex boundaries. Splays occur due to spillage of the deposits out of the channel boundaries. This spillage may either occur at the end of the channel (frontal splay) or off to a side of the channel (lateral splay). Splays have smaller thickness than channels but are larger laterally. A levee occurs when the sand deposits occur on the

banks of the feeder channel and the feeder channel is filled with shale. Levees are generally poorer quality reservoirs and the shale content in levees increases with distance from the feeder banks (Moore et al 2007).

Approximately 70% of the WND resources come from channel complexes and 30% come from splay sand levees. The levee and splay targets are composed of very thin bed pay reservoirs that consist of shale and sand sequences while the channel complexes are mainly dominated by thicker sand shale sequences. Although the permeability varied along the length of the reservoir, the average horizontal permeability of the reservoir targets is approximately 700 mD. The reservoir porosity was calculated to be an average of 30%, based on offset well cores. The WND Pliocene completions were designed as cased hole gravel packs (CHGP) to mitigate subsurface uncertainty regarding water contacts and difficulty in distinguishing reservoir from shale sections. The packing technique applied for the WND wells was a high rate water pack (HRWP). This technique was preferred over a cased hole slurry pack because it;

- Provides lower non-Darcy skin
- Could be performed using standard equipment
- Did not require complex fluid systems
- Could potentially fracture though thin shales which:
 - Creates more uniform production from the completed interval
 - Potentially accesses more thin beds that have been missed by the perforations
 - Potentially reduces screen erosion due to more uniform production (reduced risk of hotspotting).

All wells are tied back to an onshore facility and 7 out of the 8 wells were cleaned up to a temporary rig well test spread to eliminate the risk of handling the completion fluids in the facility. The wells were designed to be largely intervention free, yet the design provides for potential intervention work if required. The design has an upper completion stabbed into the lower completion which facilitates being able to run slickline / wireline tools to the bottom of the well during light interventions operation. The design also has a retrievable production packer which facilitates upper completion heavy intervention work.

Lower Completion

Retrieve the suspension plug

Giza Fayoum wells were drilled and temporarily abandoned with a 9-5/8" 47ppf liner across the reservoir section. The lessons learned, from Taurus Libra, were implemented to displace the wells to clean completion brine prior to setting the temporary suspension retrievable plug. Many problems occurred in previous campaign with respect to solids/mud settling above the plug that would prevent from proper latching to the plug and may cause difficulties to unset and

retrieve.

The Strategy was to retrieve the suspension plug, drift the liner and displace the well to clean filtered completion brine in one trip. This was done by running a string with the retrieval tool and a drift sub (to drift the 9 5/8" liner). Other lessons learned from Taurus Libra was no mechanical tools (riser brushes) were used during the completion operation to clean the drilling riser. The drilling riser was cleaned once with a riser brush at the end of the drilling campaign. During completion operations, the riser was cleaned using wellbore cleanout chemicals. That helped to avoid dropping and suspended solids in the riser on top of the temporary suspension plug.

On two occasions in Giza Fayoum, it was not possible to latch onto the plug because of debris wedged between the plug stem and the casing. In order to latch onto the plugs with debris around its stem, the retrieval tool was modified on the rig such that it has a shorter barrel. The modified retrieval tool was capable of latching on and releasing the plug on both occasions. As a lesson learned, the modified retrieval tool was sent offshore as part of the retrieval tool basket. Unfortunately, it was not possible to retrieve all the plugs on most of the wells. High overpulls would force the team to run to bottom with the plug and set it in the sump. Setting the plug set below the sump packer has no impact on well productivity or any future well interventions.

LC-Perforations

The strategy was to perforate the wells with 200psi underbalance at the bottom perforation and less than 400psi at the top perforation, with the sump packers set 10m below the bottom perforation. The objective was to create large perforation holes with high shot density, which maximizes the flow area open to flow (AOF) and reduce gas flux between the reservoir and the well bore Tubing Conveyed Perforating (TCP). Drill pipe deployment method was selected because the guns are too heavy to be deployed by wire line in one run (up to 160m of perforation guns). TCP permits performing underbalance perforation. Coil Tubing (CT) deployment was not considered due to additional time it takes to rig up and rig down.

The underbalance was achieved by displacing the drill pipe to diluted brine or drill water and reversing this fluid out of the well after successful gun detonation. Once the well was perforated and the underbalance brine (or drill water) reversed out, any influx was bullheaded back into the reservoir.

Fluid loss control pill (FLCP), engineered to minimize the formation damage, was used to control losses only if the loss rate was greater than 20bph and the loss rate is steady or on an increasing trend. The FLCP was only pumped in one well due to high loss rate. In Taurus Libra, this pill that was placed across the perforation, would be displaced slowly above the perforation interval then displaced out of at higher rates once

equivalent circulating density (ECD) permits. None of the other Giza Fayoum wells required the use of FLCP to control losses.

The TCP string was engineered to include downhole Multicycle tester and circulating valve, allow to circulate the tubing with underbalance cushion post setting the retrievable packer without string manipulation, retrievable packer to isolate the annulus pressure from the perforated interval, shock absorbers, emergency gun release and redundant firing heads.

A lesson learned from Taurus Libra was the risk added to load perforation boosters offshore to personnel and performance as well as puts undue pressure on logistics. There were a lot of gaps in the process that may have attributed to the low order detonation that occurred on one of the wells. Hence, in Giza Fayoum, the service provider loaded the charges and boosters onshore.

An attempt was made to run the guns in doubles on the first well of Giza Fayoum. Two 6m gun sections were assembled in the service provider yard and mobilized as an assembly. The objective of running guns in double was to increase operational efficiency. Running the guns in double required using a spreader bar and tailing-in the double gun assembly, which slowed down the running process. An observation study was conducted by the performance toolpusher to compare whether it was faster to tail-in double gun sections or handle single gun sections normally. The results of the study indicated that the performance of running the guns in doubles was similar to running them in single sections but running the guns in double required a more complex process. Based on the lack of efficiency gain from running guns in doubles, the decision was made to revert to running in singles for the remainder of the Giza Fayoum wells (BP Egypt Gas Business Unit, 2018).

Post Perforation Cleanout

The post perforation run, in both campaigns, had typical wellbore cleanout tools such as magnets, scrapers, and circulation tools. The string also included a special scraper designed to dress off perforation burrs. In Giza Fayoum, however, this special scrapper was switched to a water melon mill after experiencing problems while running it across the perforated interval. The Giza Fayoum wells were completed with 9-5/8" 47ppf 13CrL80 liner across the reservoir. The API data sheet for the perforation charges indicated that the average burr height of each charge was 0.16". Due to the high shot phasing of the perforation guns used, the burrs would reduce the casing ID by 0.32". The scrapper had a bottom stabilizer with an outer diameter of 8.374". The diameter of the stabilizer was larger than the reduced 9 5/8" ID which prevented the scrapper from passing the restriction. After switching to water melon mill, it was possible to pass

through the remainder of the perforation intervals with no issues. The completion brine selected for the Pliocene development was CaCl₂/CaBr₂ based on lab testing to ensure minimal formation damage and cost efficiency.

A change implemented from the first to second phase of the Pliocene development was to only pump the post-perforation fluid loss control pill in the event the losses were in excess of a value that would perturb the subsequent operation. The driver behind this was the difficulty in achieving good acid diversion during the stimulation prior to the gravel packing operation. This new strategy allowed the FLCP to only be pumped in one out of eight Phase 2 wells.

Gravel Pack Design

The Giza Fayoum lower completion design followed the same strategy as Taurus Libra, but with a few improvements. The lower completion design is a cased hole gravel pack pumped using a high rate waterpack pumping technique. The improvements to the design included changes to the gravel pack pumping parameters and the stimulation fluid pumping schedule.

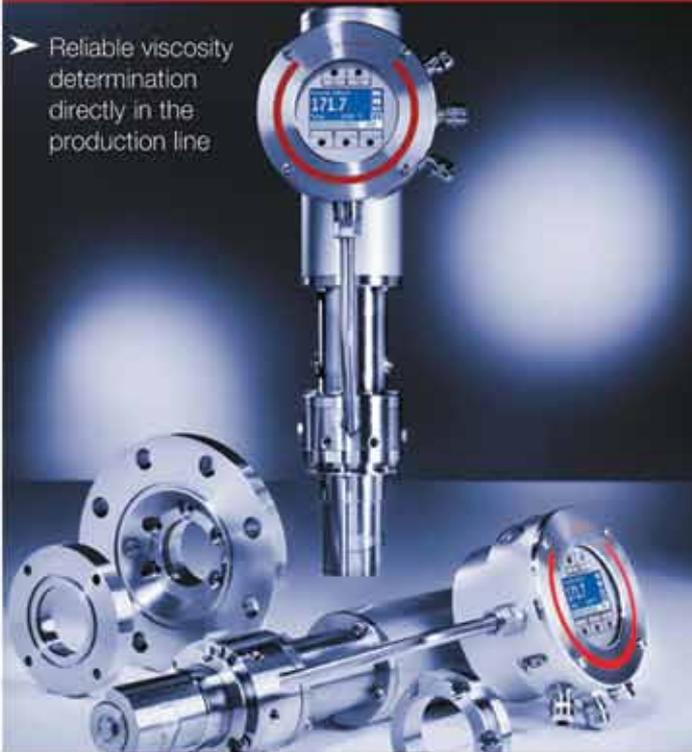
The surface rig up, which was used on Taurus Libra was optimized on Giza Fayoum. The Taurus Libra gravel pack surface layout includes two spinner type flowmeters used to measure the return flow rate of the gravel pack operation. Unfortunately, these flowmeters proved their inefficiencies while gravel pack pumping in three wells. Little debris caused the flow meters to give erratic readings. The recommendation was to use magnetic flow meters on upcoming gravel packing operations. As a lesson learned, in Giza Fayoum, a Magflow meter was used instead of the turbine flow meter. The Magflow meter is known to be more accurate and less prone to plugging. In addition, instead of placing both densometers on the rig floor, one densometer was placed on the port deck upstream of the gravel pack line and the other densometer remained in its original position on the rig floor. This allowed the team to accurately measure volume and other characteristics of the gravel pack line.

Another crucial lesson learned was to have two crews; one dedicated for rig up / rig down while the other one dedicated for pumping. This action was taken due to the inability to rig up the gravel pack pumping equipment and have sufficient time to pump the job then rig down the equipment in a 16 hours shift.

During the previous campaign, there was a clear correlation between the perforation packing factor and the skin, as shown in Fig. 2 (BP Egypt Gas Business Unit, 2017). The higher amount of proppant placed in the perforation tunnels (perforation packing factor), yielded lower skin. High perforation factors are achieved by pumping at pressures that are higher than the fracture pressure. The larger the difference between

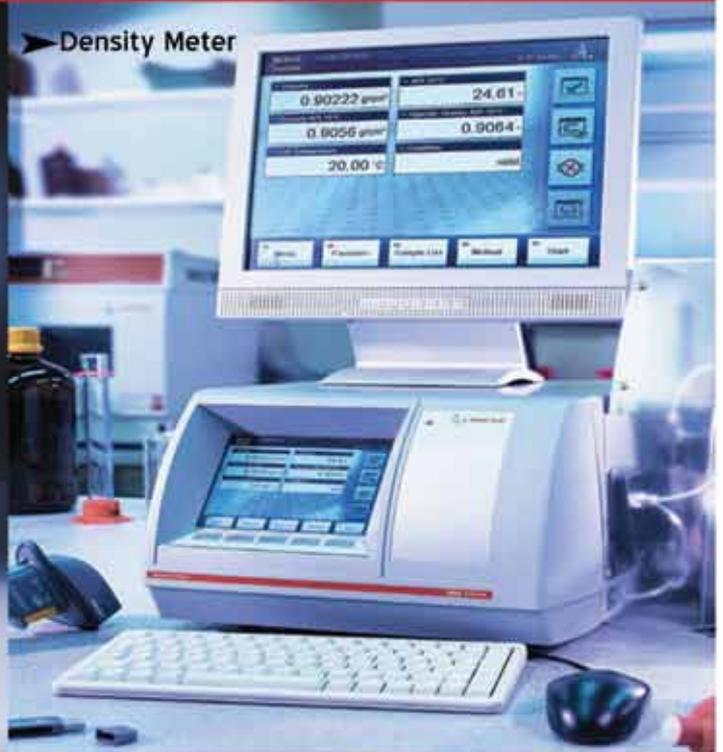


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fracture pressure and the bottomhole pressure, the more perforation packing that was achieved. A decision was made, during the Giza Fayoum campaign, to have all the gravel pack (GP) jobs pumped above fracture pressure, while maintaining a return rate of 4 to 6bpm (equivalent to an annular velocity of 2ft/s). The first well was pumped at around 80psi above fracture pressure, which achieved a perforation packing factor of 20lb/perf ft. The pumping pressure approach was pushed to be more aggressive. On one of the wells, a screen out was not achieved, while pumping at ~250psi above fracture pressure, which led to have the screen out induced after achieving a packing factor of 123lb/per ft. After this well, the aim was to limit the pumping pressures from 150psi to 200psi above the fracture pressure. This pressure allowed achieving a packing factor ranging from 70 to 100lb/perf ft. Although Fig. 2 shows that the perforation packing of Giza Fayoum was generally higher than on Taurus Libra, the total skin was equal or slightly higher. Discussions with the petroleum engineering team indicated that this is due to shorter flowback periods performed on Giza Fayoum. Once the Giza Fayoum wells clean up, it is expected that they will deliver better skin than Taurus Libra. Prior to gravel packing the well, an acid and de-emulsifier is bullheaded into the formation to stimulate and promote perforation packing. Downhole gauge data from the previous campaign showed that most of the acid was bullheaded into the upper section of the perforated interval and the diversion to the lower section only occurred when the de-emulsifier reached the perforations. Pressure data also showed that bullhead pressure increased slightly when de-emulsifier reached the formation. This increase in pressure is probably attributed to the higher surface tension of the de-emulsifier as compared to the acid. On Giza Fayoum, the team decided to benefit from this advantage. Instead of pumping the entire acid volume followed by the entire de-emulsifier volume, the team pumped a sequence that consisted of 50% of the acid volume, followed by 50% of the de-emulsifier, followed by 50% of the acid and then the remaining 50% of the de-emulsifier. Gauge data from the Giza Fayoum operation showed good acid diversion into all the zones when this technique was applied.

The application of both techniques, pumping gravel above fracture pressure and pumping with a newschedule for the acid and de-emulsifier prior to the gravel pack job, had proved success in reducing the total skin of each well, as shown in Fig. 3. The total skins calculated during the Flowback of each well has exceeded the expectations, as each well had a total skin that is below the SOR total skin value. The biggest Non-Productive Time (NPT) occurred on the last well when the gravel pack job was pumped at 16bpm. The pumping schedule was aggressive and only called to reduce the pump rate after placing sufficient proppant to achieve

50lb/perf ft. The bottomhole pressure on this well was approximately 270psi above the fracture pressure. During the operation, no screenout could be achieved. The service tool was moved to the reverse position and a reverse out of the drill string was performed. A large volume of proppant was recovered at surface indicating that there was a breach in the sand control screens. Instead of going straight to sidetracking and recompleting the well, an attempt was made to recover the lower completion. The lower completion was pulled to surface on the first attempt. Upon retrieving the service tool and inner string, damage to the washpipe or a «hot spot» was observed further confirming a breach in the screen. The next operation was to retrieve the lower completion. On the first run the retrievable GP packer was unset with a dedicated tool and the SOSJ (Shear Out Safety Joint) was sheared; retrieving the GP packer and FLCV. On the subsequent run an overshot with basket grapple was run in conjunction with a jar and accelerator to free the screens from the proppant. The remainder of the lower completion BHA was retrieved in one piece without the need for any further fishing runs. The screens were examined, and the top screen joint was eroded, as shown in Fig. 4. A wellbore cleanout was performed to remove any residual proppant in the wellbore, which was followed by a screen drift run to ensure no obstruction in the wellbore which could cause damage to the screens. Finally, the lower completion BHA was rerun and the gravel pack job pumped successfully at 14bpm, while remaining at 160psi above fracture pressure (BP Egypt Gas Business Unit, 2018).

Evaluation of the gamma ray log during the Production Logging Tool (PLT) operation and comparing it to the cased hole log gamma ray performed during cement evaluation showed a shift in the profile. It was later determined that conventional ceramic proppant has a gamma ray signature that can be identified in the logs. These logs provided a gravel pack evaluation tool that confirmed complete packs on all the wells.

Upper Completion & Subsea

Running the upper completion and well suspension had its share of time and cost optimization in Giza Fayoum. Running, landing and testing the tubing hanger inside the X-Tree has improved from 49 hrs on the last Taurus Libra Well to 37 hrs on the last Giza Fayoum – knowing that both have the same exact work scope. Part of time savings were for sure due to natural development of learning curve, however part of it as well was identifying opportunities of doing some steps ahead of time or simultaneously with other operations.

Before the start of Taurus Libra campaign, there were some concerns running tubing in stands using the dual derrick capability of the semi-submersible rig because it had never been done in the North Africa region. After holding discus-

sions with the rig crew, the operation team and the engineering team, the decision was made to rack back the tubing and run them in stands. However, the tubing order for this campaign was 11.3m long, and in order to use the rig racking systems the stands had to range from 38m to 42m long. Hence, the solution arose to manufacture 6m pup joints in country and make up to all tubing stands offline, using the Aux derrick, in order to use the rig racking system. A large number of pup joints were manufactured which put pressure on the shop in Egypt but, efficiently and safely, there were no delays associated with pup joint supply. As a lesson learned, to be able to efficiently use the dual derrick capability of the rig and the racking system, longer tubing joints, 12.5m long, were ordered for Giza Fayoum to allow racking back the tubing without the need for the additional pup joint.

During the previous campaign, sliding table and spider slips were used for the running of the upper completion. However, due to the rig movement, the sliding table kept on shifting which misaligned the spider and the top drive. A roughneck had to hold the slips in the fully extended position while running to prevent the coupling contacting then setting the slips. Also, this misalignment resulted in several rejected connection makeups. Hence, an action was needed to be taken to reduce the amount of rejected connections and to reduce the amount of personnel in the red zone. Rotary mounted slips (RMS) were used at the end of the campaign instead, which had a major impact on the upper completion efficiency. And, the lesson was transferred to Giza Fayoum which dictated to use RMS from the first well.

As a cost optimization plan for Giza Fayoum, limited backup equipment was ordered. This plan reduced inventory at the end of the project, which had a positive impact on the project savings. In addition, the original plan intended to use excess equipment from the high pressure high temperature (HPHT) at well completion that was previously completed before Giza Fayoum. In the previous campaign, the Subsea Test Tree, SSTT, was made up online to the tubing hanger which consumed more than 24 rig hours to connect all the control lines and function test the SSTT. On the first few Taurus Libra wells, it was impossible to prepare the SSTT on the Aux derrick then transfer it to the Mainside due to the lack of a transfer system. Hence, Midway through the project, the team worked on upgrading to install a transfer system. This allowed making up the SSTT, offline, on the AUX side and transfer it to the Main side which saved 1 day of online operation per well. In addition, a cumulative of 3hrs of rig time were saved by being able to test the X-Tree production and annulus valves, while doing other operations and combining the SSTT tests together with the well test package co-flexip hose.

The completion landing string has the most spend over all services offshore, so it was targeted for optimization when

three additional wells were added to the campaign. The landing string contract was negotiated as those additional three wells were not part of the contractor initial revenue calculations and the negotiation resulted in a 60% discount on additional wells with no compromise on safety, quality or scope.

Another cost efficiency was applied to Giza Fayoum with managing maintenance plans for SSTT. Batch completing 8 consecutive wells with only two sets of SSTT required special maintenance plan to ensure a backup is always available, if needed. BP subsea engineers together with SSTT contractor put a robust plan to achieve this target. Initially, the well operating conditions were assessed and deemed to allow stretching the planned maintenance for the SSTT to be every 6 wells instead of 4 wells as per contractor policy and eMoC was put in the system to cover that. Then, after the 6th well, when the primary tool was due for maintenance, the tool was kept offshore until the backup tool is tested in the rotary and assured that it is ready for the job, then logistics was optimized by having vessel ready offshore and trucks ready onshore, then, the due maintenance tool was sent to the contractor workshop. In the workshop, the contractor assigned additional service hand working two shifts to ensure smooth turnaround of the tool before the next completion. This plan was implemented successfully, and the costs associated with third back up tool were avoided.

Furthermore, the largest upper completion NPT event, happened in Giza Fayoum, was caused by poor weather conditions. There was some invisible lost time associated with the tubing running service equipment during at the beginning of the campaign. The issues related with this equipment were resolved by improving the service provider's equipment inspection and servicing activities (BP Egypt Gas Business Unit, 2018).

Well Testing & Flowback

Early in the WND project, during Taurus Libra, a challenge was raised by management as to the philosophy of the PLT and well test bean up sequencing. PLTs were planned, as per industry standard practice, where the well would be flowed to well test kit on the rig; the maximum flow rate achieved before shutting in the well and running the PLT string then re-starting the well and conducting the PLT logging runs.

From the 5th well in the campaign, the PLT and bean up philosophy changed to achieve 2 major goals: reduce operational timing & enhance efficiency and reduce flared Greenhouse Gas (GHG) emissions.

By challenging the status quo, the team was able to reduce operational time by approximately 40% with the reduction of the GHG emissions by almost 50%.

Upon the great delivery of Taurus Libra, the team saw more areas for improvements to find safe and efficient ways to deliver Giza Fayoum with less emission and less rig time. The

team has challenged the need for all sand management hold period for a short lived well operation. This challenge was worked with the Sand Management central team advisors to waive the prolonged hold period which reduced total flow-back time by 50% and reduced flared gas by 60% compared to Taurus Libra. Also working with the petrophysics and reservoir engineer, both PBU and PLT program was further simplified to go completely offline with no rig time associated, with this vital surveillance activities with a better data quality collected.

Total well saving compared to Taurus Libra campaign was USD 1.5 MM/well, making the total saving from the 7 wells in the campaign USD 10.5 MM.

The team comes back with another challenge, the possibility of cancelling the flowback of the last Giza Fayoum well, which allowed for integrity checks for Well test equipment before it goes to its biggest operational challenge, flowing back Raven wells, Third phase of the WND project. The team came up with the business value, saving 14 days of rig time, with no need to flare the gas. This allowed saving a substantial carbon emission. Also, it allowed the team to examine more creative way of predicting well performance by leveraging the previous 16 flowbacks that were done on similar geology and completion design. Similarly, full due diligence was done on this major decision to ensure that the permanent production facilities will be able to handle the well effluent without any slight risk on its service life. In fact, the well was tied in and brought on safely and efficiently, saving the environment a significant amount of CO₂ emissions. The well performance, during the start up, was almost matching the expected performance from the analogue well in the same channel and benchmarked skin values from the previous GF flowbacks. Hence, the decision of cancelling the flowback of the last well proved success in setting a new benchmark for efficient delivery of the upcoming wells.

Fig. 5 summarizes the performance of Giza Fayoum compared to Taurus Libra which proves how the lessons learned from Taurus Libra and the constant strive of the team achieved this successful performance.

Contingency Preparations

As with any well design, anticipation of issues while installing the completion can save rig time and therefore save on the overall cost of the well. The two mostly likely scenarios requiring contingency are a failed downhole isolation valve and production packer failure or mis-set.

In the event the downhole isolation valve installed in the lower completion failed to control losses or failed post gravel pack pressure test, a contingency intermediate completion could be run following a leak investigation and confirmation of leak source. The intermediate completion consists of

Magnum Disk (ceramic disk) to replace the functionality of the downhole isolation valve. This disk is then easily broken using wireline and leaves minimal debris in the wellbore. This contingency was utilized in one of the wells in the campaign.

The primary packer setting mechanism used hydrostatic pressure (full wellbore pressure) applied against the downhole isolation valve to rupture disks with a pre-set value. However, in the event the packer does not set using the hydrostatic method, a secondary hydraulic method could be used. In order to set the packer hydraulically, a slickline plug must be installed in the packer tailpipe. This contingency was not utilized in the campaign.

In the event of a mis-set packer, the inner mandrel is cut to allow for packer retrieval. The cutter on hand for the campaign was a wireline conveyed explosive cutter with a space out pup to allow for depth correlation to the nipple profile run in the packer tailpipe. This contingency was not utilized in the campaign.

People Performance

As mentioned before, Giza Fayoum was put on an accelerated program and ahead of the planned schedule. These wells were targeting relatively shallow Pliocene age reservoirs in Giza Fayoum fields. So, the challenge was operational efficiency and minimized skin from drilling and completion activities to ensure well productivity and profitability. Hence, BP engineering and operational teams worked together with a collective vision through recognizing Common Goals.

The challenge of adding additional wells made the cross-functional teams in BP to come together to deliver agile results. These wells needed fast-track planning in the middle of an active three rig drilling program. The contracting strategy has been an important lever to help reduce costs throughout the campaign. The interaction and collaboration between the supply chain and GWO teams continued through kick off and contract execution with several savings and avoidance opportunities actioned, including massive savings generated through the engagement of the supply chain team in the GWO cost reduction meetings. Regular cost reduction meetings from planning through to execution amassed an astounding amount of cumulative savings. Because of the multidisciplinary nature of these meetings, many initiatives were born then advanced purely from the collaborative approach as opportunities developed from innovative perspectives. As OneTeam, they successfully challenged costs and made the project economical with unpredicted cost savings. Reduced rig rates, optimized usage of BP Egypt equipment inventories, execution of wells in batch drilling and batch completion campaigns, optimization of the schedules of supporting vessels, and reduction in the worked backup equipment are all achievement made with the One



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An Interview With

MR. RANDALL C. NEELY, C.A., CFA

President and CEO, Director
TransGlobe Energy Corporation



Can we update our readers insight on the TransGlobe strategy in light of the current oil market?

Given the ongoing oil price volatility, TransGlobe is continually focused on strict capital discipline through operational cost controls and minimizing our exposure to financial leverage by remaining debt-averse. Despite market volatility, we have positioned ourselves as a nimble company with the ability to create value through a balanced portfolio of exploitation, development and exploration opportunities across our diversified onshore assets in Egypt and Canada. This approach has enabled us to build our production base, generate strong cash flows and provide a return to shareholders through a semi-annual dividend.

Where are the most promising areas / concessions the company is working in?

We are most excited about our low-risk development operations in Egypt and our newly discovered resource potential in the Cardium play in Alberta. In Egypt we are particularly focused on the continued expansion of our Eastern Desert Concessions. For the past year plus we have been working alongside the Egyptian General Petroleum Company ("EGPC") to develop a framework to extend the concessions and amend our licenses which will provide for the increased development and recovery of the oil in place in those legacy concessions through increased secondary as well as tertiary recovery approaches. We believe that some of the techniques utilized in our

Canadian operations, namely horizontal drilling and multi-stage completions will be directly applicable to certain areas within our concessions in the Eastern Desert.

TransGlobe has been working in Egypt for more than a decade, what are some attractions in the Egyptian petroleum sector?

The production and distribution of oil is an integral part of Egypt's economy and the country has developed a well-established service industry to support exploration and development operations, exemplified by an increasingly large and talented workforce. This presents an exciting opportunity for TransGlobe to operate within. Addition-

ally, we are very encouraged by the leadership within the Ministry and EGPC who continue to work towards a modernization of the industry which we believe will lead to a stronger and more investible operating environment once completed.

What is the amount of TransGlobe's 2019 allocated budget here in Egypt with reference to other countries? And how many wells do you plan to drill during the current calendar year?

Our 2020 capital program equates to \$37.1 million (before capitalized G&A), which includes \$23.7 million for Egypt and \$13.4 million (C\$17.4 million) for Canada. This plan is strategically aimed at maximizing free cash flow to direct at future value growth opportunities in Egypt and outside of Egypt. As a result of the recent de-risking of the area we refer to as South Harmattan, we can deploy capital in Canada, to achieve our production and cash flow goals in 2020 while we await finalization of our concession consolidation efforts in the Eastern Desert in Egypt.

What is the operational update on the South Ghazalat exploration?

Production was initiated at South Ghazalat on 24 December 2019 from the SGZ-6X well following the installation of production facilities at site. Initial oil production was in the range of a field estimated 800-1,000 bopd, however, the gas oil ratio rapidly increased to a level that interfered with the ability to separate oil from water in the facilities. This, combined with prudent management practices on the upper Bahariya reservoir completed in this well, has led to the well now being produced at a restricted field estimated 300-400 bopd. The lower Bahariya reservoir also tested oil in this well and remains a future recompletion target. We have a rig contracted to drill both a follow-up well in the 6X discovery pool as well as an exploration well in a prospect to the East of the existing discovery later this year.

What is the growth strategy of TransGlobe worldwide and in Egypt?

We are primarily focused on development and production with a core view of generating strong cash flows and long-term value accretion. By steering the bulk of the company's efforts towards stable production, we have been able to create a uniquely competitive position in the market. Given our strength in maximizing recoveries from under-loved and under-developed

assets, we look to capitalize on our core skillsets to improve field rejuvenation possibilities by looking to expand our operations in Egypt or similar regions through synergistic acquisitions. Through this approach we hope to triple our production output and more importantly cash flow in the medium term. Having said that, having a little exploration success along the way is always welcome.

Do you see your recent success in Canada having you refocus to a more Canadian centered business going forward?

We re-entered Canada in 2016 in order to diversify our portfolio of development assets and gain exposure to the increasing technological advancements in North American drilling and completion techniques. Our Canadian re-entry was part of the Company's ongoing strategy of portfolio diversification into countries with attractive netbacks to support growth. This decision inevitably played to our core strength of value creation through development drilling and reservoir management. Recently, we have had some success in our South Harmattan area. This success provides more balance to our portfolio but we still see the real prize in the portfolio in the potential resources that could be pursued in the Eastern Desert if the Company has both the right fiscal terms and adequate time; which are the key elements of the restructuring work being discussed with EGPC.

How will your plans change if the recent fall in oil prices turns into a prolonged return to low prices?

We have been able to weather unpredictable markets by maintaining control over our own operations and focusing on opportunities where we can operate most efficiently. Because we are the operator of all our Egyptian assets and the majority of our Canadian assets, we can react quickly if oil prices shift materially. We're not forced to push ahead when it isn't favorable to do so and we can therefore control our costs accordingly. We believe there is potential for much stronger oil prices in the not-to-distant future and the key to success is being in a position to capitalize on those prices when they occur. We are also optimistic that the current sell-off in oil prices due to the potential for lower Chinese demand will be short lived.

You have recently had some key people in your organization depart and have added

some new names, can you tell us a little about that transition?

After a 20+ year career with TransGlobe, Mr. Lloyd Herrick retired recently; Lloyd is one of the finest individuals I have ever worked with in my career. He was truly dedicated to our shareholders, our partners and loved by our employees, he will be dearly missed. In anticipation of Lloyd's retirement, we were fortunate enough to hire Mr. Geoff Probert last spring. Mr. Probert is a highly skilled professional Engineer with over 30 years of experience, much of which in North Africa including Egypt. Geoff has already made a valuable contribution to the Company assisting in the efforts of our consolidation and in particular advancing our understanding of the contingent resource potential within the Eastern Desert lands.

Finally, we would like to know about TransGlobe's ESG initiatives that you can share with us.

TransGlobe has been supporting the Ras Gharib hospital for many years, as a recipient of choice as suggested by our joint venture employees. Our production assets are close to city of Ras Gharib on the Gulf of Suez and a large number of our joint venture employees live in Ras Gharib and have a strong attachment to the hospital. In 2013, TransGlobe provided support to fund the establishment of the first intensive care unit at the hospital and we continue to support the unit with donations to fund the acquisition of specialist heart and lifesaving equipment on a regular basis. TransGlobe makes donations to the hospital whenever a significant HSE achievement is reached so that we are improving safety continually as well as supporting an essential local facility in Ras Gharib.

In addition to this, TransGlobe has 2 staff members on the CSR committee, which is a subcommittee of the Egypt Oil and Gas Technical Committee. Although only recently formed, this committee is already very active in liaising with other IOC's to share and align CSR activities across the industry.

We have additional plans to decrease our emissions in the Eastern Desert which will become viable once our consolidation efforts have been concluded. We look forward to discussing these with the industry, the public and our investors once we have concluded that consolidation.

Team behaviour between the two teams.

Continuous improvement tools employed to achieve such a performance were related to managing people; service providers, service hands, starting from Lessons learned sessions from Taurus Libra campaign, incorporating the findings in the planning process for Giza Fayoum, having the weekly engagement meetings with the service providers 6 months ahead of the execution while preparing a detailed action tracker to discuss on weekly basis on equipment and personal preparations. Also, CWOP exercise with all involved parties had generated an action tracker that assisted in developing updated work instructions that included lessons learned from previous campaign. Tools used to enhance performance: Weekly service provider meetings, CWOP, pre-phase meeting, workshop audits using self-verification and over sight verifications, after action review meetings. That is clearly reflected on safe delivery of 8 subsea CHGP completions with P10 to P50 performance time which is top quartile of the global industry benchmarking data and less than the Taurus Libra average timing.

The Taurus Libra completion operation was very rapid, and it was difficult keeping up with operation with the limited office personnel. Soft copy programs were issued last minute, and hard copy programs often arrived at the rig a day after completion operation would start. When executing a batch completion operation similar to Taurus Libra there should be two completion teams in the office, a team that supports current operation and a team that prepares the next well. Hence, in Giza Fayoum, Single point accountability (SPA) engineers were clearly identified prior to starting each well. This proved to facilitate rig / office communication and distribute the work load among the engineers.

Safety Performance

Taurus libra was the first deep water development operated by BP in Egypt. However, it proved its safety culture by being an LTI (Lost Time Incident) free project, with the rig completing 3 years LTI free. The safety record of the 9 wells only includes 3 recordable injuries, 1 restricted work case and 2 first aids (BP Egypt Gas Business Unit, 2017).

The safety performance of Giza Fayoum was similar to Taurus Libra. There was no LTI during the completion of the 8 wells and the safety record includes one restricted work case (RWTC) and 3 first aid cases and 2 low level loss of primary containment (LOPC) incidents (BP Egypt Gas Business Unit, 2018).

Campaign Performance

The original work-scope plan for the Giza Fayoum was to drill and complete 5 wells with a certain budget. However, a new plan emerged to add three more wells, while using the same allocated budget for only 5 wells. Giza Fayoum team

proved another success by drilling and completing 8 wells in 292 days vs planned 5 wells in 304 days, i.e. 12 days saving even though 3 wells added, while saving 10.2% of the budget. The campaign ended with 4 out of 9 wells achieving top quartile completions performance.

All Giza Fayoum wells, except two wells, were delivered below the AFE target. On the Giza Fayoum campaign, there was an initiative to focus on driving cost down and not only on efficiency. By applying the lessons learned and expertise gained from Taurus Libra, Giza Fayoum completions campaign was USD 8M cheaper, per well, than a Taurus Libra well, making the whole campaign USD 64m cheaper than Taurus Libra. In more details, Giza Fayoum CHGP completion cost is half CHGP completions BP delivered in 2008. Giza Fayoum well costs are 30+% less than typical BP Egypt OHGP costs and 30% less than Taurus Libra.

The lessons learned and experience were the key motivators to deliver this campaign at 30% better performance than Taurus Libra, which sets a new benchmark for best in basin performance. The average number of days per completion in Taurus Libra was 24 days. Even though Taurus Libra was delivered at best in basin performance, the team was confident that additional efficiency gains will materialize in Giza Fayoum and therefore set the days per completion P50 target at 21 days and the P10 target at 16 days. These targets included the following operations:

- HXT installation
- Wellbore Cleanout
- Perforation
- Post Perforation Cleanout
- Running Lower Completion and Gravel Packing
- Running Upper Completion
- Landing Upper Completion
- Setting Packer and Performing Wellbore Integrity Tests
- Flow Back
- Well Suspension

After delivering the fifth completion, new but unofficial targets were issued to improve the accuracy of the completion schedule and planning activities. The new P50 target was reduced to 17 days and the P10 target was reduced to 15 days. The last well, which had the eroded screens was delivered in a little over 17 days including the fishing, repeat wellbore cleanout and repeat lower completion operations. The average NPT during the completion operation was 20%, which was mainly driven by the event that occurred on the last well.

Conclusion

As mentioned previously, the performance of the eight Giza Fayoum completions surpassed that of the Taurus Libra completions. The top quartile of the global industry benchmarking data for subsea cased hole gravel packs is now dominated

by Giza Fayoum completions followed by Taurus Libra. The main contributor factor to this exceptional operational and engineering performance was the one team approach of the BP team, the rig crew and the service providers personnel. With this approach, the lessons learned from each phase in Taurus Libra operations, when added together, resulted in massive savings and a major success for delivering Gas to Egypt. All the learnings from the WND team have not just stayed in WND. The fruits of this labour were shared and adopted by the Atoll EPS project and will be the basis for future Egypt operations. As many from EgyptGWO and other functions move to support other regions, like Mauritania & Senegal, these learnings are spreading to the larger company as well.

Acknowledgment

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Nomenclature

<i>Bph</i>	= Barrels per hour
<i>Bpm</i>	= Barrels per minute
<i>CaCl₂/CaBr₂</i>	= Calcium Chloride/Calcium Bromide
<i>°C</i>	= Celsius
<i>Cr</i>	= Chrome
<i>Ft/s</i>	= Feet per second
<i>ID</i>	= Internal Diameter
<i>km</i>	= Kilometer
<i>m</i>	= meter
<i>mD</i>	= Milli Darcy
<i>MM</i>	= Million
<i>MMscf/d</i>	= Million Standard Cubic Feet per day
<i>MMscf/d / well</i>	= Million Standard Cubic Feet per day per well
<i>Q1</i>	= Quarter 1
<i>ppf</i>	= pounds per foot
<i>lb/perf ft</i>	= Pound per perforated foot
<i>psi</i>	= Pound-force per square inch

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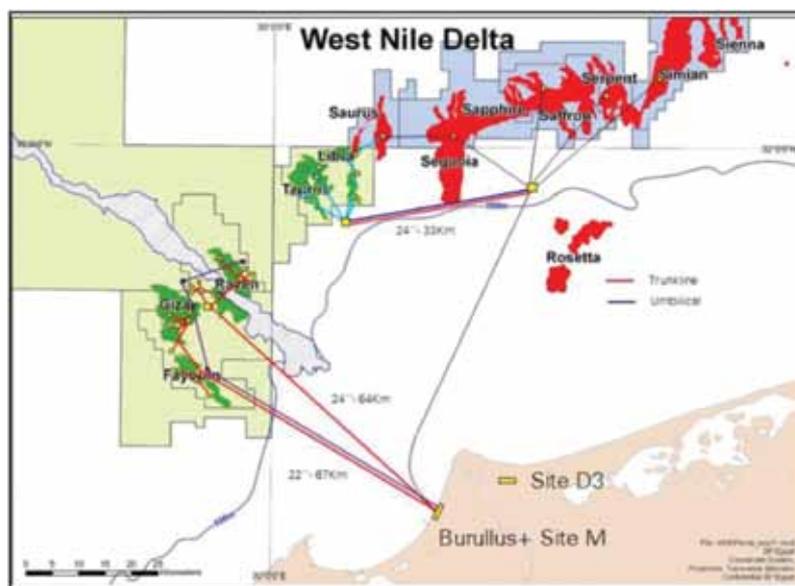


Figure 1—West Nile Delta Basemap (Tahirov et al 2019)

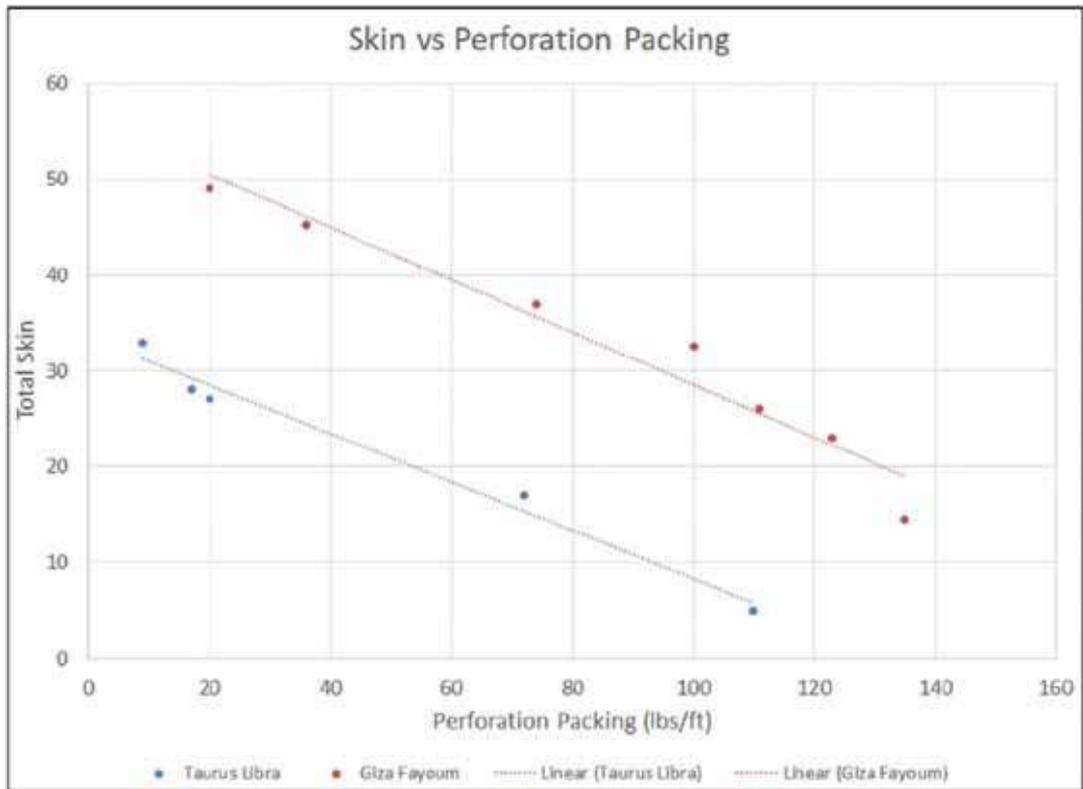


Figure 2—Skin vs Perforation Packing for Giza Fayoum and Taurus Libra

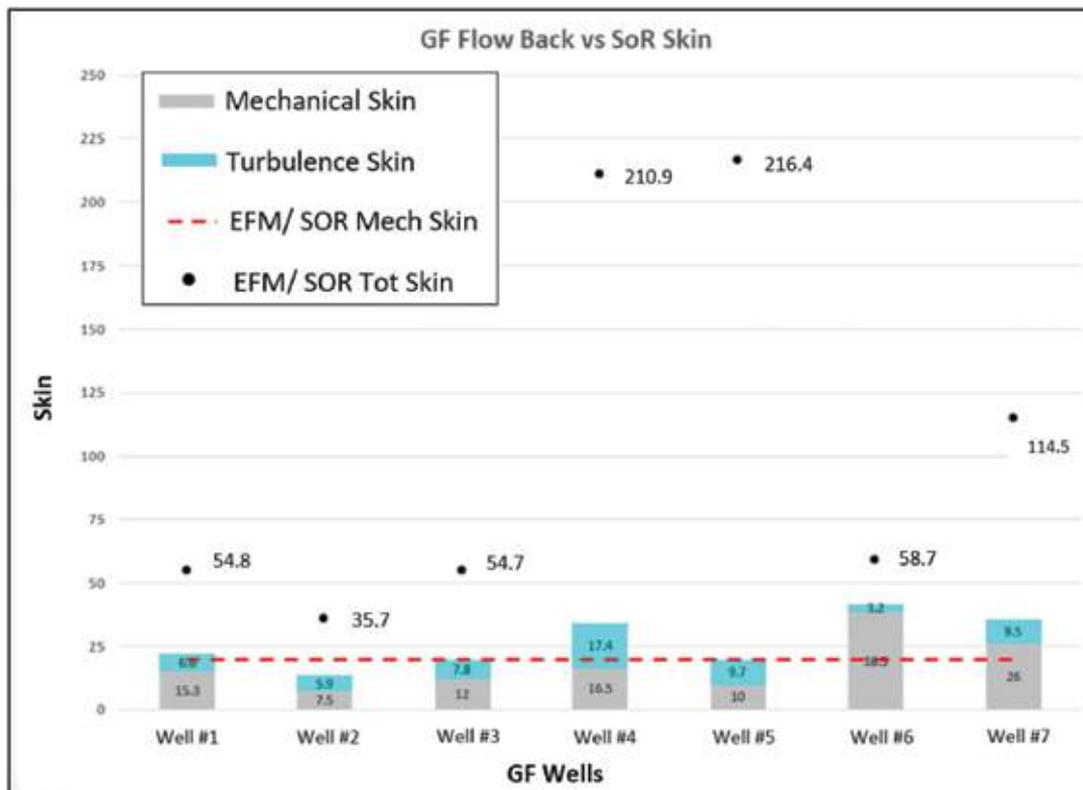


Figure 3—Giza Fayoum Flow Back vs SoR skins



Figure 4—Eroded Screen Mesh

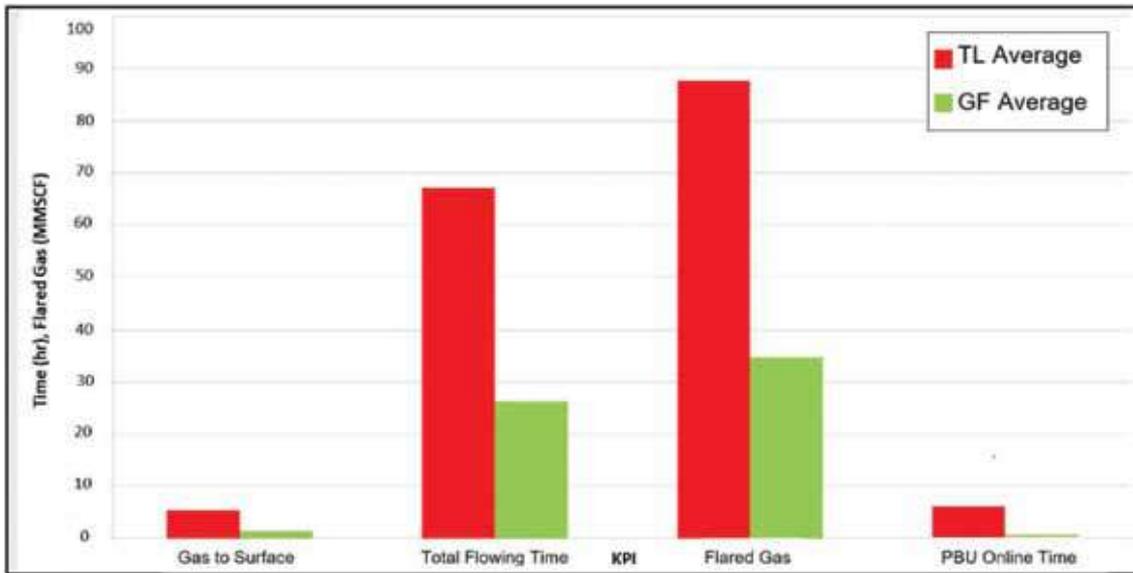
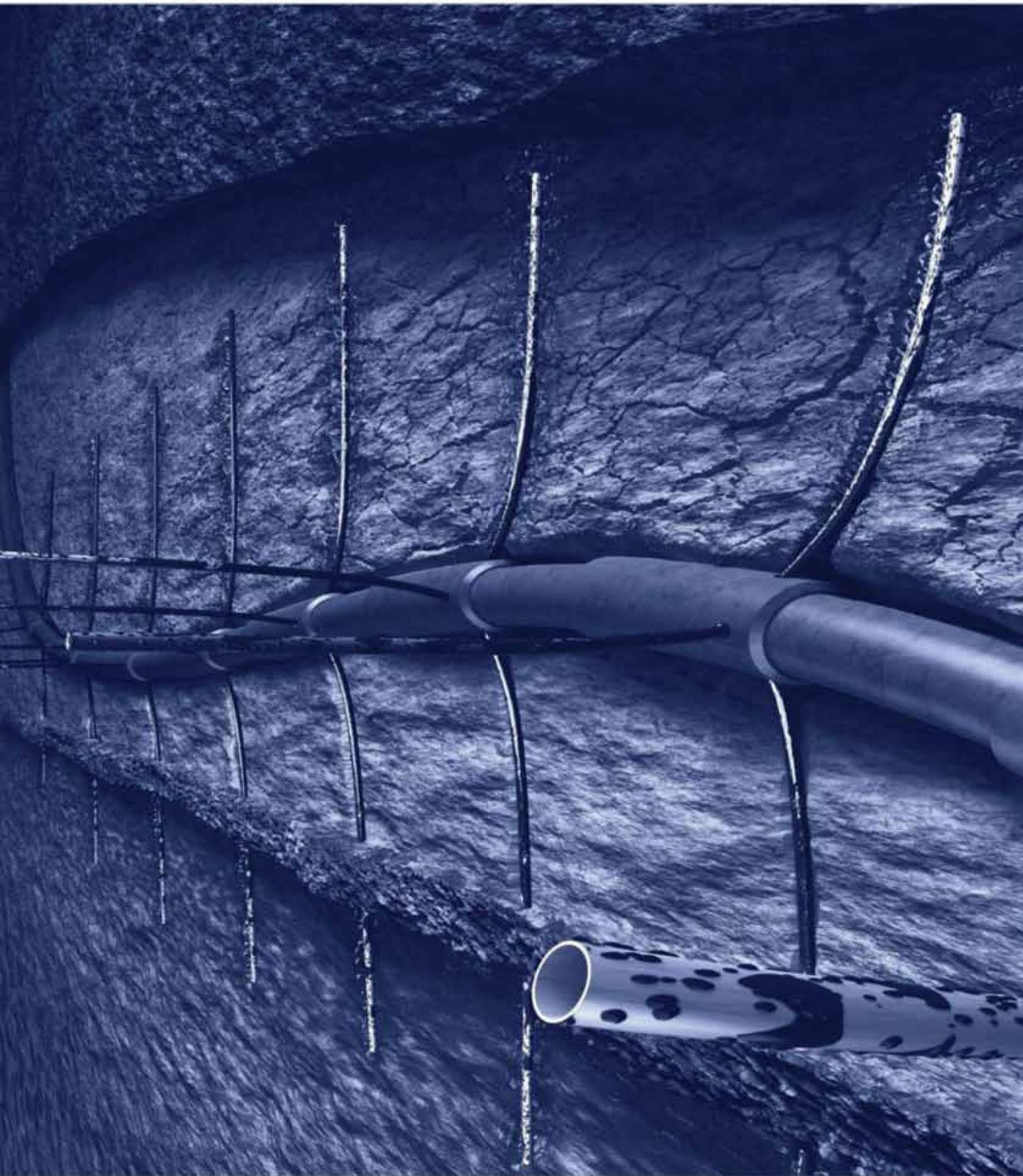


Figure 5—Well Testing & Flowback performance of Giza Fayoum and Taurus Libra





A Lateral Approach to Stimulation

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Running Sour Hydrocarbon Assets: Eni's Story of Experience

By: Luciano Scataglini, Eni; Luca Decarli, Eni Upstream

Abstract
Eni has more than 40 years' experience on developing and managing sour hydrocarbons Projects. That has allowed to build up in Eni a specific knowhow, which is continuously improving and updating through operational activities on assets with an high concentration of H₂S in the process fluids such as Karachaganak and Kashagan in Kazakhstan, COVA in Southern Italy and the more recent Zohr facilities in Egypt.

The Eni's acquired knowledge in running sour hydrocarbon assets, both offshore and onshore, has been founded on a robust risk based approach. Since the project start, risk assessments such as blowout study, Quantitative Risk Assessment, Emergency Escape Rescue Analysis, etc. results are considered the pillars for the proper design, construction, commissioning, start-up and operations phases. Specifically, SIMOPS/CONOPS methodologies and procedures and their applications in sour operational contexts are defined for managing sour hydrocarbons assets and activities.

Introduction

Hydrogen sulphide is a very toxic gas which, at low concentrations, may cause harm to people, ranging from loss of sense of smell to fatality.

H₂S is often associated with oil and gas and, for this reason, is a by-product that needs to be considered not only where its presence is confirmed, but also when there are uncertainties in the reservoir characteristics (e.g. in case of exploration drilling) and in its later appearance in the future field depletion.

Dealing with hydrogen sulphide poses several problems that may become real challenges:

- Very fast development of the toxic plume, which may take seconds to reach the plant boundary.
- As a consequence of the previous point, the need for a very short reaction time of personnel, escape time and distance to safety.
- A well structured emergency plan, which takes in due

account the respiratory protection devices of personnel in the field and the passive collective protection of people staying in living and office areas without PPEs or working in large work groups at a construction yard adjacent to live equipments.

- Possibility to carry out simultaneous or concurrent operations when high concentration levels of H₂S are expected.
- The role of pressure in determining and magnifying the toxic gas dispersion and consequent need for larger safety distances.

The problem outline

Despite Eni has been facing the problem of sour hydrocarbons since the seventies of last century in Italy, Libya and Congo (see Fig. 1), the area with the highest challenge has been, for sure, Kazakhstan and, in particular, the Kashagan Field. Six major international oil companies and the national oil company of Kazakhstan created a Consortium in order to express the best competencies and synergies in managing this unprecedented mix of unfavourable conditions: high H₂S concentration, high field and reinjection pressure, high environmental sensitivity (the Caspian Sea with its autochthonous species), very shallow waters (somewhere less than 1 m) and very harsh environment (down to -40°C in winter).

The Kashagan Field can be placed at the highest level of complexity as shown in Table 1.

Due to the high concentration of H₂S and associated plant pressure and the peculiar characteristics of this field, the Consortium decided to start with an Experimental Phase, to be run at a reduced rate in order to use the experience matured in this phase to proceed into the Full Field Development phase.

The numerous uncertainties associated with this field suggested to apply a risk-based approach since the early stage, even in deciding the most appropriate layout of each equipment and plant unit. The first decision was to design the offshore plant with an onshore-like shape, in order to locate

all hazardous equipment at a suitable distance from the safe areas and, if possible, on different islands.

But the problems were not just related to the reservoir characteristics; they were also associated with the asset value that, due to the presence of this unwanted substance, was affected by a number of constraints that required specific management, such as the following:

- The production of sulfur that, prior to the first two years of production, could not have been reinjected into the reservoir due to the insufficient level of depletion.
- The storage and allocation into the national and/or international market of the produced sulfur.
- The sour hydrocarbons process requiring special materials for piping and equipment.
- The lack of construction yards in the Caspian and its nature of closed basin that implied the problem of plant construction abroad and subsequent transportation to this peculiar location and, on the other hand, the problem of decommissioning of the plant itself. For this reason, it was decided to mount the plant on barges that were able to sail into the Caspian through the Russian rivers' route and, upon arrival, fixed on elevated piling structure.
- The need for a very peculiar emergency, evacuation and rescue system, based on IBEEV, Ice Breaking Vessels, and anchored flotels with accommodation areas fully protected against the ingress of H₂S and equipped with breathing air cascade system to allow people outside to wait for their turn to access the safe areas.

With the aim to find a solution to this amount of problems, it would have been necessary to start production as early as possible, in order to identify concerns and errors and correct/mitigate them when moving into the Full Field stage.

Early production means simultaneous operations. The design needed to take into account the simultaneity of drilling operations in the satellite drilling islands and the construction and commissioning of process plant on the main island.

The Risk-based approach

A QRA was applied in a holistic manner, complemented with extensive use of CFD analyses for toxic dispersions and explosions modelling since the FEED phase.

For each specific project phase dedicated QRA studies and Safety Cases were developed, in order to verify the risk acceptability for all the worker's categories. It was clear since the beginning that, without a QRA, it would not have been possible to properly design and manage an asset like this.

The main objective of the QRA was to keep the Individual Risk Per Annum (IRPA) below the upper limit of 1.0E-03.

On the other hand, being all activities carried out under SIMOPS, involving a large amount of people, another important target was to adopt a solution showing the lowest f-N curve, where N represents the number of casualties associ-

ated with a frequency "f". The f-N curves were used as "a theoretical tool for risk comparison purposes with the objective of reducing risk to ALARP".

The risk-based approach helped identify opportunities for risk reduction. For example, since the Gas Injection Unit was found to be one of the most hazardous item on the production island (due to very high pressure and H₂S concentration), the fact that this Unit could not be used in the first two years after start-up was a clear opportunity to concentrate in those two years the majority of SIMOPS where construction-workers would have been involved.

The use of corrosion resistant alloys in the pipework was another contributor to the overall risk reduction; carbon steel was adopted only where a full dehydration of formation fluids could be assured. In addition, the leak test of equipments and the dynamic commissioning of the whole plant was carried out on non-toxic fluids (sweet gas from the national network), further reducing the workers' exposure to sour gas. A very demanding procedure for leak testing was applied, guaranteeing a maximum fugacity of 5 Scf/y.

The modular configuration of the plant barges was another opportunity for risk reduction; each barge, in fact, was conceived as a "fire zone". A high toxic gas detection coverage was applied at each barge (98% of detection in case of 2 mm hole leak), such that in case of minor leak a toxic gas alarm would have been generated to direct people to the muster station. On the other hand, if the gas alarm were activated not only at one barge but at the near-by barge as well, an ESD with depressurization would have been started and, should the gas dispersion path be directed towards the accommodation and utility areas, the relevant HVAC system closure and breathing air bottle packs activation would have been initiated, in order to prevent the ingress of H₂S into the non-hazardous areas.

As stated above, a SIMOPS strategy was applied (Fig. 2). The aim of the SIMOPS Working Group, supporting the Operations organization, was to identify risks associated with the day-by-day planning and define compatible activities that could have been carried out and those that should have been stopped.

The QRA showed the following results:

- Generally, in case of blow-out, there is a time lapse between the first appearance of mud from the well under uncontrolled flow and the first drop of hydrocarbons coming out (in the order of several minutes) (Fig. 3, applied to a gas well)
- Generally, the time lapse between the alarm sound and a breathing apparatus donned and fully operational can be estimated as 60-75 seconds.
- In case of catastrophic release (e.g. pipe rupture), and a very high H₂S concentration at the point of release, the relevant gas cloud is travelling very fast and, for sure,

faster than 75 seconds.

• Hence, it can be concluded that: drillers and, in general, operators may have enough time to do the breathing apparatus in case of blowout, but they have not enough time to do the same in case of catastrophic process releases; nonetheless, the frequency of such releases is generally low, so that a detailed QRA has been applied in order to demonstrate that an event like this may be considered tolerable.

At the end of all these technical considerations, it was decided:

- to separate the drilling islands from the production hub;
- to reduce as much as possible SIMOPs between drilling and production;
- to reduce the number of construction workers during construction/production SIMOPs (by limiting, for example, the SIMOPs at the final stage of construction, namely mechanical completion and commissioning).

A further risk reduction was achieved by applying a “zoning approach”. The plant was divided into “zones”:

- the Red Zone, where sour fluids were handled at a pressure > 100 bar or in case of enclosed process buildings;
- the Yellow Zone, where sour fluids were handled at a pressure < 100 bar;
- the Green Zone, where temporary refuge buildings with 2 hours pressurization capacity were located.

In the various zones the use of breathing apparatus during non-intrusive or intrusive maintenance was regulated as shown in Table 2.

A number of benefits derived from this “zoning” approach:

- a dedicate building (Red Zone) for each main rotating equipment allowed the maintenance of one unit (after depressurization and slight positive pressure inside) while the nearby one was still running. This arrangement reduced the Individual Risk for maintenance workers by preventing exposure to the living equipment. In general, this configuration impacted on CAPEX but reduced drastically the production deferment and consequent OPEX cost;
- the “Red Zone” qualification of some areas in the open allowed to eliminate the quite high contribution of small leaks (1-2” diameter holes) to the Individual Risk of maintenance workers, since in these areas they had to do the breathing apparatus all time. On the other hand, working under breathing apparatus required to stop the activity every one hour; for this reason, the number and extension of Red Zones in open air was reduced to a minimum;
- the availability of Operations & Maintenance philosophy since the FEED design phase was crucial, since it defines the number of workers present any time in the various plant locations and the expected exposure times.

In this way, even if the Location Specific Individual Risk was in excess of the upper limit of $1.0E-03$, the exposure time and shift optimization helped move the LSIR figure below the intolerability region.

Noticeable results

In this Section some noticeable results of the aforesaid risk-based approach are shown.

: In Fig. 4 an example of sensitivity analysis is displayed, which has been applied to an f-N curve in order to understand if the switch-off of a hazardous equipment could have been reduced the risk for a large construction workers group (more than 200 people) working in an area close to a live hydrocarbon plant.

The risk for this group of workers (Construction Workers) has been further reduced by physically isolating the live process areas and the not running ones. In fact, in the original design, even though a sufficient distance had been foreseen between the two trains, the blowdown header was common to both trains, so that some sour gas mixture could have been always present into the header running around.

Some examples of layouts that have been optimized in order to segregate, as much as possible, the live plant from the plant under construction, are presented in Fig. 5 and Fig. 6. Fig. 5 shows the contours of IRPA values; the most external contour refers to an IRPA of $1.0E-03$, which takes into account the effective exposure of construction workers located at Train under construction (2 shifts per day and 3 months per year), with the assumption that the wellhead area remains alive. The use of living barges berthed at a location close to the construction area prevents construction workers to come across the live plant to reach the accommodation barge (right side of the picture).

The plant in Fig. 6 is producing gas from a giant reservoir in the Mediterranean. Even in this case, a net segregation between the live plant (red contour) and the construction area (yellow contour) has been implemented. The adoption of an early production technology (EPF) able to remove sulfur from the gas stream allowed to start-up the plant before the four trains (T1 to T4) and the two Claus Units were commissioned; with this arrangement, during the construction of the production trains only the EPF Unit, the flare and the slug catchers (located at the northern part of the plant) were kept running, again preventing any interference between live plant and construction areas.

The extension of the plant units was established by applying a risk-based approach where the worst case scenario per each unit was identified. An example of this approach is shown in Fig. 7. As can be realized, the Construction Area may be affected, in case of major release, by a concentration of H_2S not exceeding the IDLH, so that all workers can evacuate by means of simple filter hoods, that they can easily carry on

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wherever they work, such as above scaffolds or in trenches.

The Assurance Process

A risk-based approach needs to be validated and kept alive and updated along the asset life. This is the reason why at any step of the project four main tools have been utilized: the “HSE Case”, the Pre-Start Up Review/Audit, the Start Up Verification Certificate and the Plant Statement of Fitness.

- A dedicated HSE Case was issued for Onshore, Offshore and Pipelines and for Construction, Commissioning and Normal Operations. It:

- describes how HSE issues are managed and demonstrates that the major accident hazards associated with the specific activity have been properly identified, assessed and controlled in a manner that reduces the risks to people, assets and the environment to a level that meets the Company’s risk tolerability criteria;

- details the management of risks, Safety and Environmental Critical Elements (SECE) and HSE Critical Tasks;
- demonstrates that there is adequate Escape, Evacuation and Rescue provision in place for all personnel in the event of a major accident;

- provides a demonstration, through a cost-benefit analysis, that all identified risk mitigation measures are sound, viable and not disproportionate to the implied benefits (in other words, that they are “safe if ALARP”).

- The Pre-Start Up Review and Audits are multidisciplinary tasks which purpose is to demonstrate that all steps of the journey to the readiness for Start Up, e.g. Pre-commissioning, Mechanical Completion, Commissioning and Hand-Over, are carried out in compliance with Company procedures, risk assessment results, Emergency Evacuation and Rescue arrangements and Written Scheme of Examination for Safety and Environmental Critical Elements.

- The Start Up Verification Certificate (SUVC) is a document that shall be signed off in order to sanction the introduction of hydrocarbons into the facilities. It:

- contains a list of systems that need to be commissioned and handed over to operations and prerequisites that need to be met;

- provides a mechanism for verification and sign off of completed scope, and for formally recording and risk assessing any outstanding scope of systems and pre-requisites;

- ensures that any decision to introduce hydrocarbons is taken with the full knowledge of completed scope and risks associated with any outstanding scope;

- integrates systems from multiple facilities (Onshore, Offshore, Wells and Pipelines) that need to be ready for an integrated Start Up event;

- provides Senior Management with a transparent and focused approach to Project & Start Up delivery.

- The Plant Statement of Fitness (SoF) has been introduced to make sure that the safe conditions for our oper-

ations achieved with the process of SUVC are preserved and there is no degradation of process safety aspects. The SoF is monitored via:

- the Pre-Start Up Safety Certificate, signed by Production, Maintenance and Project key persons prior to the hydrocarbon reintroduction after a major maintenance job, plant modification, ESD after an incident or a plant turnaround. The checklist includes the Safety and Environmental Critical Elements conditions related to the field functional units involved in the modification and/or maintenance job;

- the Process Safety Key Performance Indicators (KPIs) like: F&G or ESD overrides; SECE overdue maintenance (backlogs or referrals); number of alarms; critical documents updating; Management of Change (MoC) process; process leaks etc. The custodianship of these KPIs is assigned to the.

- Site Management who is in charge to justify deviations from the targeted KPIs.

Conclusions

The aim of this paper is to show how the results of a risk-based approach may be used for design and operations when the historical experience is missing due to the novel nature of an oil & gas venture. It also shows how the anticipated partial start-up of an asset may contribute to an early tune-up of design premises based on practical outcomes of the early operational stages.

It is also clear that the execution of risk assessment studies shall not be the last, but possibly the first step of any project and operation, particularly when there are some important changes or modifications: it is quite evident that revamping and expansion of brownfields are a more and more common practice; so, it is essential to be ready to assess a possible increase of risk by applying robust methodologies and sound assurance processes.

On the other hand, dealing with sour hydrocarbons is more and more frequent, and a consolidated experience on managing the challenges arising when handling this kind of substance is fundamental, especially when considering that the experience matured till now in the risk assessment methodology is based on the assumption that hydrocarbons may ignite and, since the ignition probability is very low, all the outcomes of the risk assessment are manageable. Unfortunately, as soon as H₂S escapes, it is immediately dangerous and the only way to reduce its impairment frequency is reducing exposure and erecting passive barriers. As a matter of fact, indeed, the most recent idea developed in our Company to reduce the impact of sour gas is the adoption of a wall suitably designed to deflect the gas jet at a very short distance from the source.

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Figure 1—Eni road-map into the historical experience on sour gas fields management

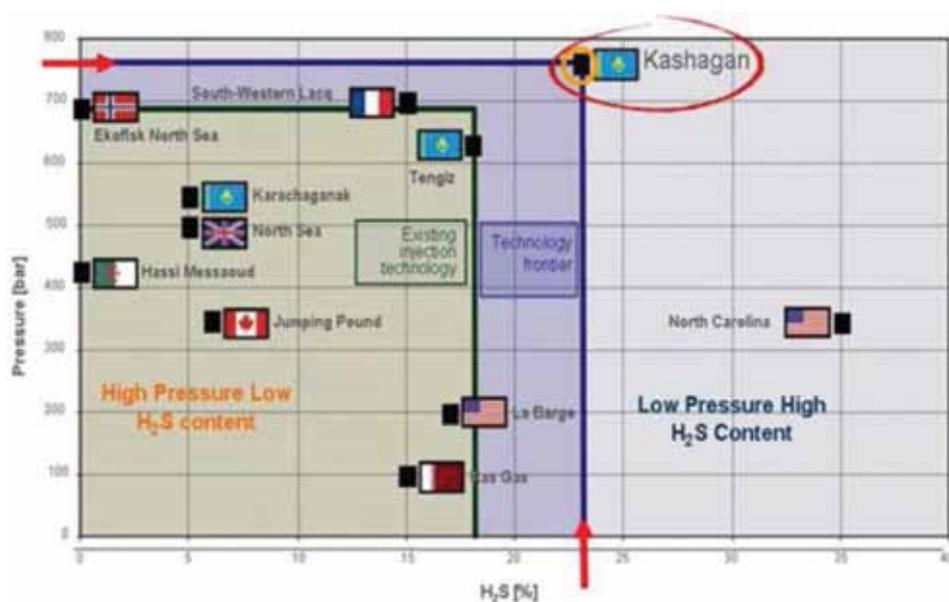


Table 1—Kashagan H₂S & Pressure – Reinjection vs. Other Fields Worldwide

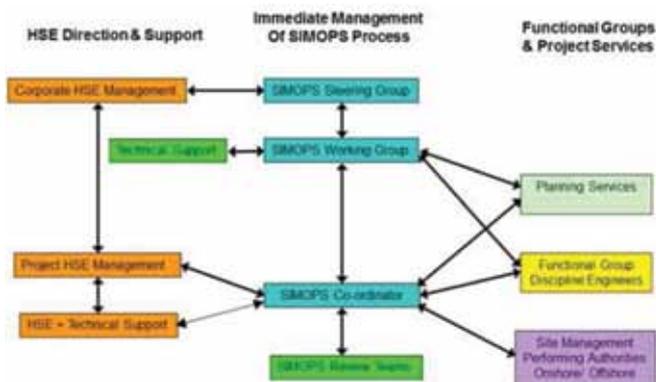


Figure 2—SIMOPs Organizational Interfaces

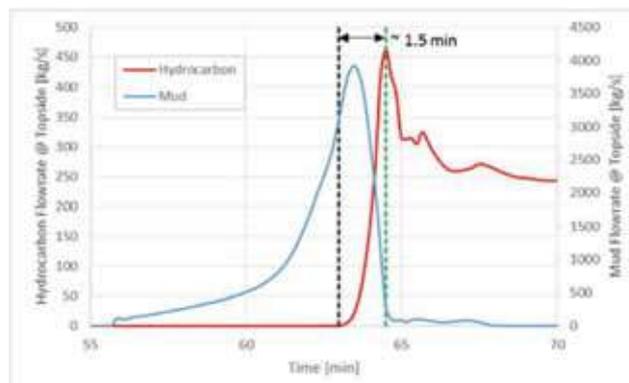


Figure 3—Times to react to a blow-out scenario

Breathing Apparatus Principle		Green Zone	Yellow zone	Red Zone
Activity	non-Intrusive	Not Required	Carry	Wear
	Intrusive	Not Required	Wear	Wear

Table 2—Zoning

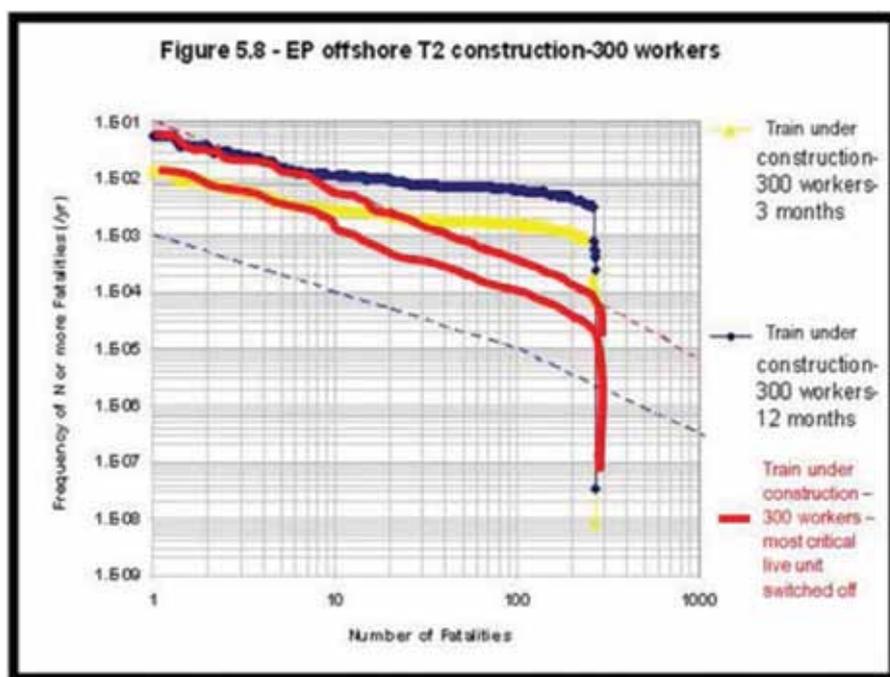


Figure 4—Train under construction vs Live Plant

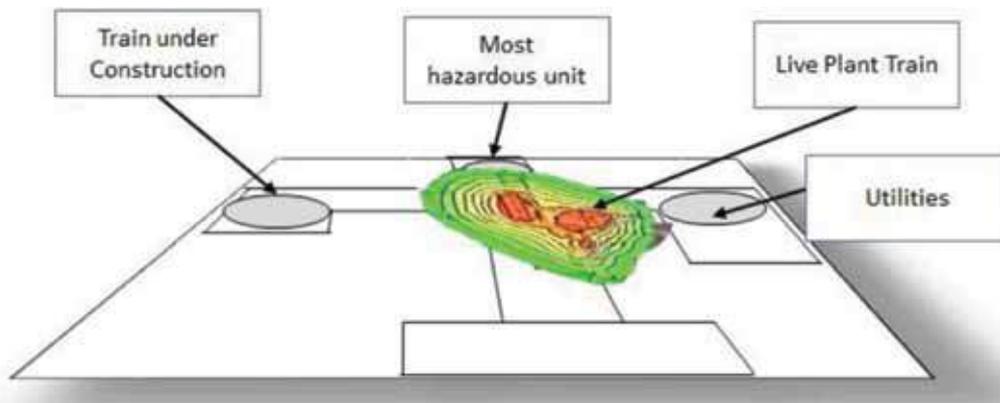


Figure 5—Example of a Large Offshore Complex

- Introduction of an EPF (skid mounted Early Production Facility) in order to secure the schedule (Start Up within December 2017), because of:
 - Reduced engineering, procurement (supply chain), construction and commissioning time (EPF delivery time from PO: 11 months)
 - Integration of the EPF into the ongoing project making use of the early facilities utilities to supply the inlet/outlet facilities
 - Exploitation of synergies (power and gas dewpointing) with the close Gas Plant (see violet contour)

Figure 6—Example of a Large Onshore Asset

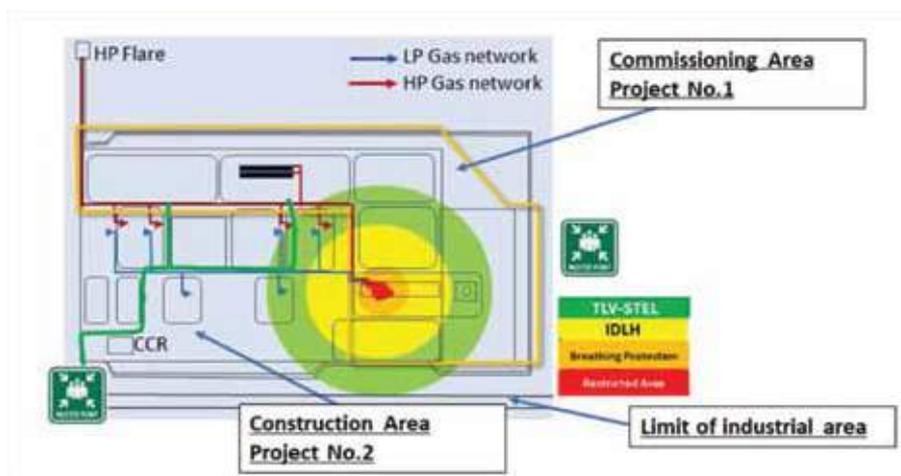


Figure 7—Risk-based approach for area segregation



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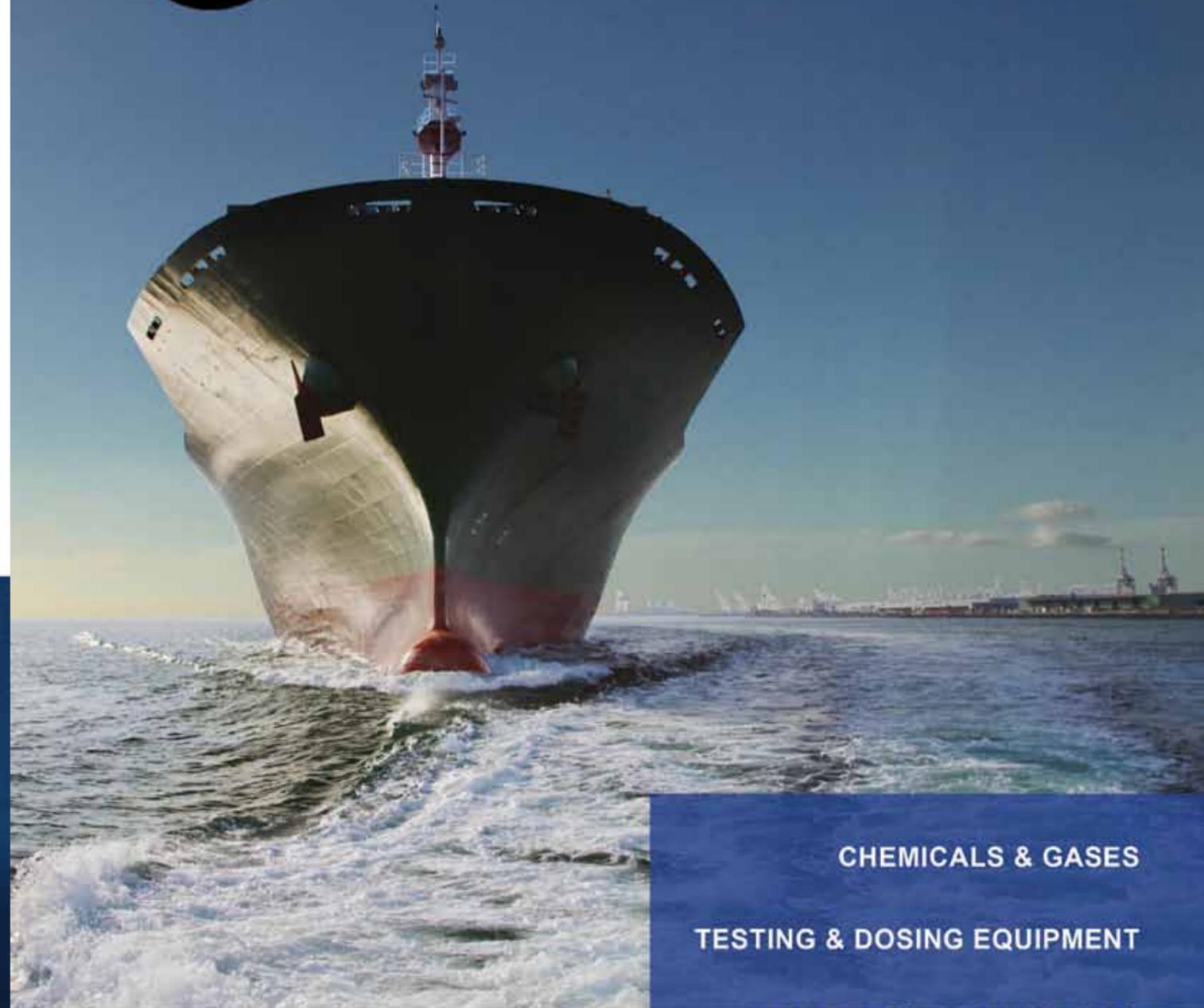


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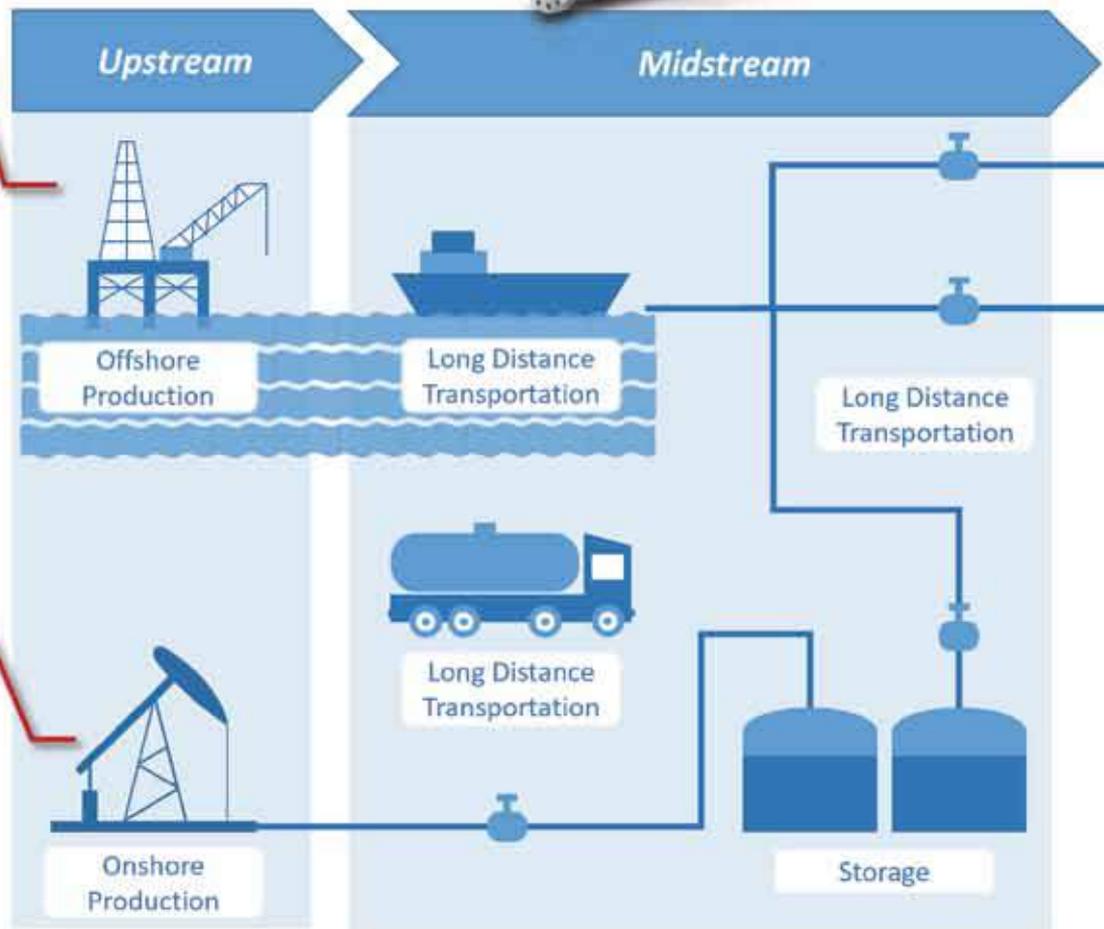
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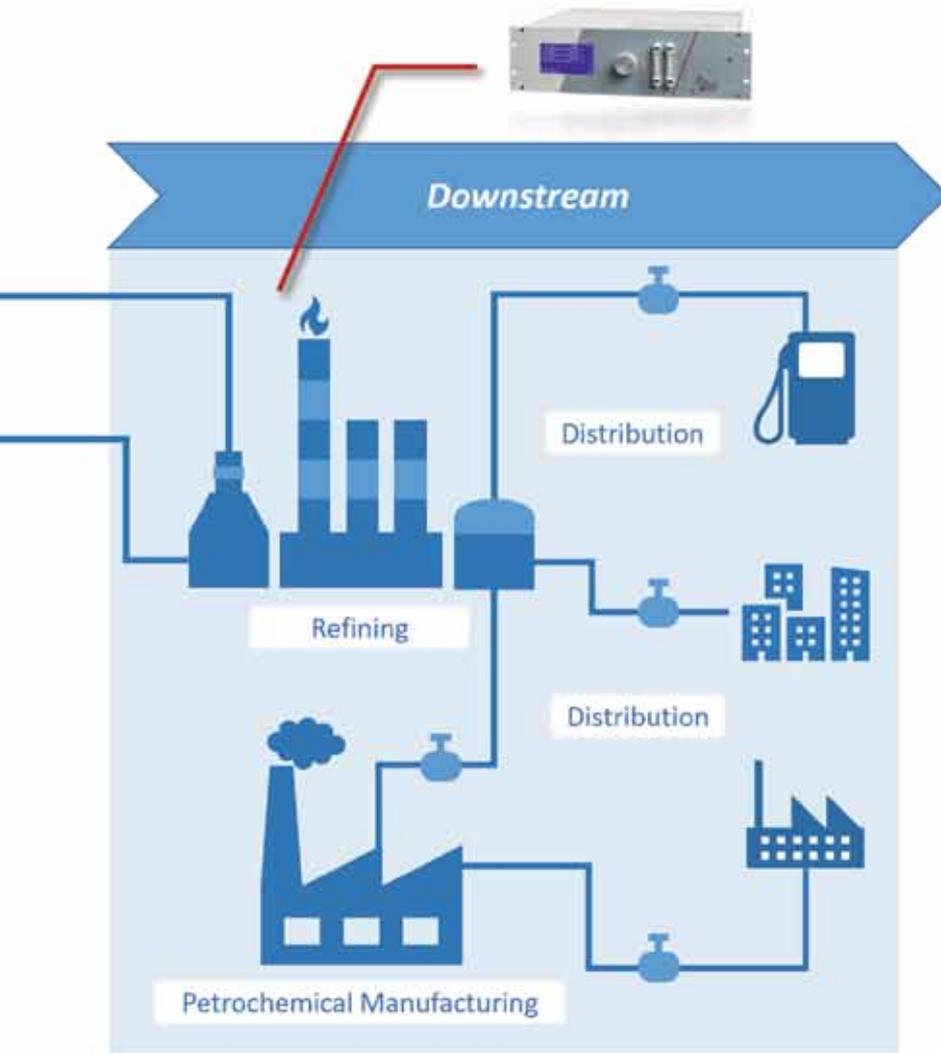
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Oil and Gas Industry: A Cornerstone in Climate Change

Climate change risks continued to dominate the results of the annual Global Risks Perception Survey (GRPS) for the fourth year (2017-2020). According to the Global Risks Report 2020, four of the top five risks by likelihood criteria, and three by impact are environmental risks. Extreme weather was the risk of greatest concern, but the survey showed increasing worries regarding environmental policy failure. As “failure of climate-change mitigation and adaptation” jumped back to number one in terms of impact in 2020. The accelerating pace of biodiversity loss is a particular concern, as it affects health and socioeconomic development, with implications for well-being, productivity, and even regional security.

Historically, one of the main reasons for the increasing of climate change phenomenon is due to the excessive use of fossil fuels since the first industrial revolution, however, climate change also represents a major threat to the Oil and Gas (O&G) industry. As climate change has far-reaching impacts on the industry, putting the operations, reliability, and growth of the sector at risk. As the O&G infrastructure is characterized with a long lifetime span; thus, posing an extra challenge to the industry supply chain, from upstream to downstream.

The questions currently posed, especially after setting the international sustainable development agenda, which has adopted encouraging the expansion of renewable energy uses, how can the O&G industry contribute to achieving global goals to reduce emissions? How can it also work to reduce the risks to this industry due to climate change? On the other hand, what is the negative impact facing the sector due to Paris Agreement, and how to reduce it?

The energy industry is the cornerstone of any development strategy. Consequently, the negative impact that affect this industry are directly reflected on the rest of the development axes. Hence, dealing with these risks must contain a set of factors that work to reduce their negative effects to the lowest possible level, on one hand, and the need to comply with international agreements on climate change and sustainable development in ways that achieve the compatibility of the O&G sector with these obligations, on the other hand.

In the prelude to the 1992 United Nations Framework Convention on Climate Change (UNFCCC), the O&G industry was united in its opposition to binding climate targets. All major companies took the position that action on global warming could be damaging to their economic

interests since the industry earns its livelihood from oil, gas and coal, which are the main sources of emissions of Greenhouse Gases (GHG). Ten years later, the position of many companies has changed completely. Major European multinational companies such as British Petroleum and Shell supported Kyoto Protocol, set ambitious goals to reduce their own GHG emissions, and invested in renewable energy. Despite the important role played by the oil companies in particular, and large corporations in general, the O&G industry is the key of the global energy sector, as their processes have significant effects on all the productive sectors of the economy and population. Crude oil and oil products still have the largest share in gross inland energy consumption, in addition it is the principal energy source for electricity generation and the main source for thermal power.

Impact of Climate Change on the O&G Sector:

According to the findings of the EU-CIRCLE project, climate change is anticipated to contribute to the faster aging and degradation of the industry infrastructure processes, from the oil extraction and upstream to the storage, refining and distribution processes, reducing lifecycle, service level, and leading to major disasters. Extreme temperatures, winds, hurricanes, droughts, flash flooding, storm surges, and forest fires are expected to increase globally, with potentially severe off-site consequences through toxic-release, oil spillages, fire, or explosion scenarios. So, actions should be taken to ensure the resilience of the infrastructure, investments, safety of people and the environment.

Thus, a holistic approach is required to make resilience-based informed decisions on the infrastructure growth and sustainability under extreme weather events (EWE) that are projected to be exacerbated under climate change, the objective is to:

1. Introduce a state-of-the-art review of Climate Change impacts to the O&G industry, as well as, mitigation and adaptation measures;
2. Identify the level of exposure of the industry to EWE and assess the infrastructure's vulnerability to Climate change, through the development of a hazard threshold matrix, based on a consistent approach for capturing the critical event parameters;
3. Explore the sector's dependencies and interdependencies with other critical sectors;
4. Set the basis for implementing an impact assessment

framework for related studies;

5. Provide recommendations for future research activities and industry uptakes.

Impact of O&G Industry on changing the climate:

While O&G industry have enabled industrialization and human development, their use has also contributed to global warming. After the adoption of the Sustainable Development Goals 2030, O&G industry has to comply, through long-term plans, to be a low carbon-emitting sector whenever possible, without negatively affecting other sustainable development goals. As energy is considered to be the most important source of GHG emissions, where electricity generation represents about 25% of total global emissions, while transportation and industrial sectors account for 36%, of which 75% is from energy generation. For that reason, a group of international actors such as IFC, UNDP and IPIECA, set a road map for helping implement some of the elements that will be needed to reduce emissions from O&G industry:

1. In the short-medium term, natural gas can serve as an effective transition fuel, helping countries to switch from coal-fired power to a cleaner alternative while, in parallel, the industry continues and increases its efforts to manage the methane emissions associated with natural gas production.
2. In the Long term, given the industry's global leadership in petroleum geology, resource extraction and pipeline transmission, the industry has a vital role in testing the feasibility of large-scale Carbon Capture and Storage (CCS). Indeed, the oil and gas industry may be the only sector with the pre-requisite expertise and global scale of operations to develop and implement large-scale CCS within a public-private partnership framework.
3. Plan strategically for a low GHG emission future. One of the main objectives of Paris Agreement is to encourage governments to develop comprehensive national strategies that can significantly reduce GHG emissions. The transformation will be a process that requires long-term planning. The long operational lifespan of O&G infrastructure means that prospective investments should be considered in light of emissions scenarios decades ahead.
4. Business strategies will need to harmonize with national strategies, including the NDCs to 2030 and the Long-Term Low Greenhouse Gas Emission Development Strategies

to 2050, as called for in Paris Agreement. With that in mind, companies could consider their current resources, infrastructure investments, future fossil fuel demand, technology, and research and development. All of this helps to identify strategies that take into account the transition of the global energy system.

How can the Egyptian and Arab O&G Sector Cope with Climate Change Impact?

The O&G industry is a cornerstone in achieving the required sustainable development. Hence, O&G industry strategy toward climate change must be in line with the sustainable development goals, while not losing the aspirations of development objectives and targets. following is a set of procedures that are recommended to precisely establish compliance plans for reducing emissions:

1. The need to make a greenhouse gas inventory at the firms' level, whether producing fossil fuels or using it, that includes the energy used, industrial processes, and other sources of emission. The objective is to determine the areas where reduction is possible and the mechanisms for implementation.
2. Devising a set of mechanisms that help the decision-maker in setting appropriate plans for emission reduction procedures, both direct and indirect. In this context, DCARBON for Environmental Consultancy and Sustainable Development designed the first Digital Decision Support Tool in Egypt to calculate GHG emissions from all its sources.
3. Setting a set of practical solutions that contribute to reducing GHG emissions from the O&G industry, such as reuse of flame gases, periodic review of supply lines and repair of leaks that may occur during production, including compressed air instead of natural gas to operate control devices.
4. Coordination with financing bodies, whether local or international, or related initiatives to provide additional funding sources (sustainable financing) with a view to financing the required reduction procedures through its various mechanisms for this purpose.
5. On the other hand, it is necessary to coordinate with the authorities concerned with assessing the risks of climate change in order to provide possible protection against the risks of severe weather events that affect production areas.

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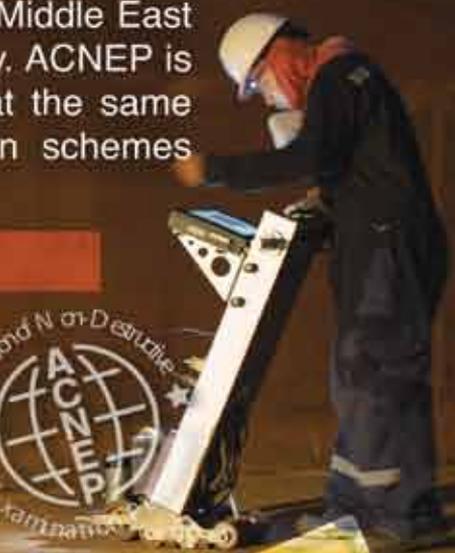
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The High Pressure Expander Process Technology for LNG Applications

By: Yijun Liu, Fritz Pierre, Jr., and Ananda Krishna Nagavarapu, ExxonMobil Upstream Research Company

Abstract
Recent focus of the LNG industry has been on developing technologies to decrease capital investment and increase operational efficiency to reduce overall cost of supply. Pursuing this target, a novel, compact, and high efficiency expander-based liquefaction technology has been developed to monetize gas assets.

The technology uses a single phase methane refrigerant stream operating at distinguishingly high pressures followed by a single phase nitrogen refrigerant stream. Such a configuration dramatically improves energy efficiency (by 10 - 25 %) and train production capacity (by 100 - 150%) compared to other expanderbased technologies, while maintaining process simplicity, lower equipment count, and lighter weight relative to mixed-refrigerant based liquefaction processes. Furthermore, integrating with a front-end heavy hydrocarbon removal unit, the technology also enables standardized liquefaction train design for a wide range of gas composition around a nominal train capacity. The standard design is well suited for parallel train configurations and phased development philosophy to drive design and execution efficiency. In addition to CAPEX savings, the weight and footprint savings are beneficial in locations where space is at a premium.

While the technology platform is broadly applicable for both offshore and onshore opportunities, this paper will focus on a recent offshore LNG project which showcased the technology's significant benefit in CAPEX, weight, footprint, personnel safety, insensitivity to ocean motion, refrigerant handling and many other operation advantages. It even enabled production capacity increase from 3.5 to 4.6 on the same circular hull floating facility, proving itself as a game changer to reduce cost of supply of this liquefaction project.

Introduction

Natural gas liquefaction can require elaborate and expensive

surface facilities. Furthermore, the larger size, weight, complexity, and footprint and higher equipment count present significant executional and operational challenges. Pursuing technologies to mitigate these challenges, there has been a focus on developing a novel expander-based liquefaction technology to decrease capital investment and increase operational efficiency to reduce overall LNG cost of supply. This proprietary technology uses a single phase methane refrigerant stream followed by a single phase nitrogen refrigerant stream, or alternatively, a recycled vaporizing LNG stream in lieu of a conventional heavier hydrocarbon refrigerant stream such as ethane and propane. The technology employs a significantly higher operating pressure (~200 bara) within the methane refrigerant stream in order to achieve the super cooling needed to efficiently produce LNG. The elevated operating pressure allows for this liquefaction process to have a specific power similar to that of commercially available single mixed refrigerant technologies, while 10 to 25% more efficient than other expander-based technologies (F. Pierre, Jr., et al., 2018). The higher pressure operation also results in smaller refrigerant line size and smaller refrigerant compressor casing. As such, a single train capacity can be more than double that of other expander-based technologies (up to 4 million tons per year) without needing parallel equipment. This technology also has several advantages compared to mixed refrigerant (MR) technologies. The single composition refrigerants used in this technology simplify operation and eliminate the need for refrigerant storage, make-up, and component fractionation equipment. Additionally, in floating applications, the single phase of the refrigerant allows the process to be less susceptible to motion in floating applications.

Similarly, in FLNG applications, the logistical systems for refrigerant offloading systems, in-hull storage, and carriers are eliminated, and the reduced hydrocarbon inventory (no heavy hydrocarbon refrigerants) also simplifies spacing

considerations for safety. The reduced equipment count and weights, decreased footprint, and smaller piping size can facilitate modularization, resulting in not only a significant CAPEX reduction, but also opportunity in maximizing LNG production per plot space in locations where space is at a premium.

Finally, this technology also allows for the use of a simple front-end scrubber solely to remove components that would freeze at cryogenic conditions, which in turn enables development of a standardized design capable of processing a wide range of gas composition. This novel process leverages current advances in turbo-machinery enabling high pressure operation of this equipment. It is applicable for both offshore and onshore opportunities and presents significant execution and operational benefits.

Technology Description

Figure 1 shows an illustration of the novel liquefaction technology using two closed refrigeration loops, the primary cooling loop and the sub-cooling loop. The technology comprises eight main process equipment, including two refrigerant compressor casings, three turboexpander-compressors, a single brazed aluminum heat exchanger (BAHX) cold box, a printed circuit heat exchanger (PCHE), and a hydraulic turbine (F. Pierre, Jr., et al., 2018). Prior to entering liquefaction section, the feed gas is preconditioned to remove carbon dioxide, sulfur compounds, and water. The sweetened and dry feed gas is then further treated to remove the heavy hydrocarbons which would freeze during liquefaction. It is preferable to remove the heavy hydrocarbons upstream of the main cryogenic heat exchanger in order to maximize the production capacity and increase process flexibility.

The treated feed gas is liquefied by exchanging heat with the cold methane refrigerant of the primary cooling loop, and then sub-cooled to a temperature below -140°C by exchanging heat with the cold nitrogen refrigerant of the sub-cooling loop. In most applications, the feed gas is liquefied at greater than 60 bara, a pressure above its critical point for improved process efficiency. The pressurized LNG is letdown to a pressure sufficiently above its bubble point using a single phase hydraulic turbine. Similar to other liquefaction technologies, this hydraulic turbine is not required by the technology but is employed to improve process efficiency by approximately 3 to 5%, depending on the liquefaction pressure that the process operates at.

Primary Cooling Loop

The primary cooling loop is charged mostly with gas enriched in methane at a molar concentration typically greater than 90%. The primary cooling loop refrigerant gas may be primarily and preferentially sourced directly from the treated feed gas and optionally from LNG boil off gas. The

concentration of ethane or heavier hydrocarbons in primary cooling loop is controlled, such that no liquids form within the whole loop. The primary cooling loop refrigerant is discharged from the methane compressor at an approximate pressure of 200 bara. This elevated discharge pressure is one of the distinguishing characteristics of the technology to achieve high efficiency. The high pressure methane refrigerant is firstly cooled by an ambient cooling heat exchanger and then is further cooled within the printed circuit heat exchanger by the refrigerant gas leaving BAHX. The cooled high pressure methane refrigerant is isentropically expanded within two expanders configured in series to a pressure between 30 bara to 45 bara, to form the cold gaseous methane refrigerant with a temperature in the range of -75 to -95°C . The selection of this operation point depends on the desired refrigeration balance between the primary cooling loop and the sub-cooling loop.

Approximately 85% to 80% of the cold methane refrigerant is used to liquefy the feed gas within the BAHX cores of the cold box. The remaining portion of the cold methane refrigerant assists in cooling the compressed nitrogen refrigerant of the sub-cooling loop. For the majority of operating conditions, the warm methane refrigerant exiting the cold box is at a temperature sufficiently below the ambient temperature. This available cooling capacity is used to further cool the high pressure methane refrigerant within the PCHE as described previously. The warm methane refrigerant is then compressed subsequently via the compressors of the medium pressure turboexpander-compressor and the high pressure turboexpander-compressor.

Finally, the methane refrigerant is sent to the gas turbine driven methane compressor where it is compressed in two stages to form the high pressure methane refrigerant, thus completing the primary cooling loop cycle.

The turboexpander-compressors of the primary cooling loop can be arranged in the post-boost configuration as shown in Figure 1, where the turboexpander compressors are placed upstream of the gas turbine driven compressors. Alternatively, the turboexpander-compressors can also be arranged in the preboost configuration, but such a configuration suffers slightly lower polytropic efficiency compared to the former configuration (Fritz Pierre Jr., et al., 2018).

The optimal configurations can be decided based on overall optimization of compression efficiency and equipment selections of primary cooling loop. The feasibility of high pressure turboexpander-compressor, in both the post-boost and pre-boost configurations, was examined by several turbo-machinery vendors. The vendors concluded that the equipment falls within their existing design methods, machinery design configuration, and manufacturing techniques (F. Pierre, Jr., et al., 2018).

Sub-Cooling Loop

The sub-cooling loop uses gas enriched in nitrogen as a refrigerant. The gaseous refrigerant has a molar concentration of nitrogen at 95 mol% or higher, which can be typically supplied and made up by an air separation plant at most gas processing facilities. The nitrogen refrigerant is discharged from the nitrogen compressor at a pressure near to the maximum operating pressure of the cold box, typically below 110 bara. Unlike the primary cooling loop, the operating conditions of the sub-cooling loop fall within that of conventional nitrogen expander-based cycles. The compressed nitrogen refrigerant is cooled by an ambient cooling heat exchanger.

Within the cold box, the compressed nitrogen refrigerant is then cooled to -70°C

to -90°C by exchanging heat with a portion of the cold methane refrigerant and the cold expanded nitrogen refrigerant. The cooled compressed nitrogen refrigerant is isentropically expanded within the nitrogen turboexpander-compressor to provide the cold expanded nitrogen refrigerant at a temperature of at least 1°C colder than the desired LNG temperature at the outlet of BAHX. The cold expanded nitrogen refrigerant is used to sub-cool the liquefied feed gas and subsequently cool the compressed nitrogen refrigerant as noted previously, all within the BAHX cores of the cold box. The warm nitrogen refrigerant exiting the cold box is first recompressed using the compressor of the nitrogen turboexpander-compressor and then sent to the gas turbine driven nitrogen compressor where it is compressed in two stages to form the compressed nitrogen refrigerant, thus completing the sub-cooling loop cycle.

As Figure 1 shows, the nitrogen turboexpander-compressor is arranged in the post-boost configuration in order to mirror the configuration of the primary cooling loop's turboexpander-compressors. While the pre-boost configuration is the usual arrangement for typical nitrogen expander-based cycles, either configurations can be used for sub-cooling loop without a significant change to overall process performance. Thus, the choice is a matter of preference and/or layout considerations.

Figure 1 shows the preferred compressor arrangement where a single gas turbine is used to drive both the primary cooling loop compressor and the sub-cooling loop compressor. Both compressors rotate at the same speed set by the desired discharge pressure of the primary cooling loop compressor. Alternatively, the technology has the flexibility to balance the power between the primary cooling loop and the sub-cooling loop such that a first gas turbine can be used to drive the

primary cooling loop compressor and a second identical gas turbine, of equal power rating as the first, used to drive the sub-cooling loop compressor.

Although this configuration increases gas turbine count, it provides flexibility to optimize each compressor speed independently.

Enhanced Configurations

To increase the production capacity for given amount of turbine power, a preferred option is to add auxiliary power by incorporating feed compression in the manner shown in Figure 2. Compressing the feed gas both increases the efficiency of the liquefaction process and reduces the amount of heat required to be transferred per unit flow of feed gas to the refrigerants, in order to produce LNG. The amount of production increase available by feed compression is limited by the maximum operating pressure of the BAHX cores.

The use of BAHX cores at a maximum operating pressure of 110 bara has been recently validated. One company¹ currently offers BAHX cores with a design pressure in excess of 160 barg. If limiting BAHX operating pressure to 110 bara, approximately 10% of auxiliary power via feed compression will enable this technology to produce the same amount of LNG for a given gas turbine driver choice as the most used MRliquefaction technology in LNG industry (F. Pierre, Jr., et al., 2018).

Another alternate configuration that can increase production without having to deal with the limits of the BAHX operating pressure is shown in Figure 3, where a feed compression and expansion step is included to add auxiliary power and cooling to the process. A high pressure turboexpander-compressor, similar to the high pressure turboexpander-compressor used in the primary cooling loop, is placed downstream the motordriven feed compressor. An intercooler (not shown in figure) can be placed in between the feed compressor and the compressor of the turboexpander-compressor to reduce required power of the motor. The second high pressure turboexpander-compressor illustrated in Figure 3 is in the pre-boost configuration and can be alternatively configured in post-boost configuration as those in primary cooling loop.

Even though the two high pressure turboexpander-compressors are different machines, their overall design are similar. Compared to the scheme in Figure 2, the feed compression and expansion step can further increase production by upto ~25% while allowing the use of conventional BAHX cores operating at 110bar or lower.

Furthermore, the feed compressor can also serve as a key lever in standardizing design for a wide range of gas compositions (F. Pierre, Jr., et al., 2019).

Technology Advantages

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Expander-based technologies attract attention largely due to their process simplicity, safe and easy to operate compared to mixed refrigerant technologies. Due to its low equipment count for a single train and simple configuration, expander-based technologies can also be effectively modularized, to facilitate simpler installation and improve project execution efficiency. For floating applications, their insensitivity to oceanic motions is also advantageous compared to mixed refrigerant processes. However, despite these advantages, traditional expander-based technologies generally suffer from low efficiencies, which can be as much as 20% to 35% lower than the industrial leading MR based dual cycle technologies.

In contrast, this novel liquefaction technology distinguishes itself with much higher efficiency (10–25%) compared to other expander-based technologies, while maintaining all advantages of expander-based technologies. Figure 4 shows the specific power of the technology is about the same with that of a single mixed refrigerant (SMR) technology with 2 to 3 cooling stages.

Additionally, this technology directly sources and makes up its primary refrigerant from the feed gas, eliminating not only the fractionation scope to generate MR make-up components, but also the need for refrigerant transport, handling, and storage. Additionally, a simple front-end scrubber can be used for a wide range of gas composition, with the sole purpose of removing heavy hydrocarbons that would freeze in cryogenic conditions, instead of generating the MR components. Finally, the reduced hydrocarbon inventory significantly reduces safety concerns, thus allowing for a more compact layout. Therefore, the combination of high efficiency, simplicity, safety, and single-phase refrigerants make this process well suited for a wider range of applications including floating LNG projects.

Wide Range of Single Train Capacity

Both conventional expander-based and SMR processes typically have narrow range of train capacities.

This limitation is driven by the relatively lower efficiencies of the expander-based processes (which restrict capacity to under 2 million tons per annum (MTA)). Similarly, for SMR processes, the relatively larger volumetric flow rates of the MR vapor entering the compression train often limits a single train capacity to 2 MTA or lower (J.D. Bukowski et al., 2013).

By contrast, the train capacity of this novel liquefaction process spans a much wider range. Without needing parallel equipment, a single train capacity can range from 0.5 to 4 MTA, which is more than double that of other expander-based and SMR technologies (Figure 4). At a production capacity of 4 MTA, the compressor casing size for both the

primary cooling loop compressor and the sub-cooling loop compressor are well below the maximum available casing size for two stages of compression.

Different from other liquefaction technologies, the primary cooling loop refrigerant is not cooled within the MCHE prior to expansion. In addition, unlike all MR based processes, none of cooling loops involves condensation of hydrocarbon vapor inside MCHE. Both of these factors make this process one of lowest UA/MTA among all liquefaction technologies. A single cold box with up to eight BAHX cores, at currently available core sizes, will be able to provide the required MCHE service for a 4 MTA production train. One of the other remarkable characteristics of this novel technology is the requirement of small pipe diameters of the refrigerant cooling loops due to the symmetric design of dual loops and high operation pressure. On an equivalent production basis, this technology has a maximum pipe diameter that is approximately 30% less than that of the other technologies, making its train capacity unlikely to be constrained by piping or nozzle size.

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making its train capacity unlikely to be constrained by piping or nozzle size.

Liquefaction Processes Compression for a Floating LNG Application

Recently, a process selection study, for a floating LNG project was conducted, for a topside facility that was originally targeted to produce 3.5 MTA LNG. The project selected an aeroderivative gas turbine for its light weight and high efficiency as the main engines to provide power demand for liquefaction. The driver is inlet air cooled to provide a site rated power of about 55 MW. Sea water is the heat sink medium that cools process fluids to about 21°C. After pre-conditioning, the dry, sweet feed gas has an approximate composition of 95% methane and 5% nitrogen. There was no requirement for heavy hydrocarbon removal.

Due to the high nitrogen content an end flash system is required. The LNG stream exiting the hydraulic turbine was designed to be at temperature of -148°C and pressure of 7.5 bara. The LNG stream is introduced to the end flash column, where a nitrogen enriched overhead gas is separated and the remaining subcooled LNG is rundown to LNG storage.

Different from onshore facilities, floating LNG applications typically face more varied challenges and design constraints. For example, plot space is at a high premium, the equipment weight typically restricts the allowable train size. Handling of flammable component inventory affects spacing consideration, and operation during wave-induced hull motions can be challenging. Therefore, the ideal liquefaction process for floating LNG applications must be compact and light weight, support compact modular design, intrinsically safer by reducing or eliminating high hazard hydrocarbon inventory on the topside, and insensitive to hull motion. In addition, due to the challenging work environment, a simpler process is preferable.

Larger propane inventories required for the propane pre-cooled MR based process has restricted its use in floating applications. The industry has been turning to alternative processes such as expander-based cycles and SMR processes for their simplicity or dual mixed refrigerant (DMR) processes for their higher efficiency and higher train capacity without the need for propane inventory. As such, in this paper, the proprietary High Pressure Expander Process is compared with a dual N₂ expander cycle (N₂XP) and a dual mixed refrigerant (DMR) technology for a floating LNG application.

It should be noted that an SMR process was also included for evaluation. While marinization studies confirmed viability of the SMR process, the module weight limits train capacity to 1.36 MTA which makes the process less attractive to reach the target 3.5 MTA output. In contrast, the novel process showed clear weight advantage, rendering a

lower module weight (5350 metric tons for 1.75 MTA train) than the SMR (6200 metric tons for 1.36 MTA train) despite higher LNG production rate. When comparing on an equivalent production basis, the module weight of this novel technology is more than 30% lighter than SMR.

Figure 5 provides a simplified illustration of the dual N₂ expander cycle that was evaluated for this study. The treated feed gas is equally split between three N₂XP trains. Each N₂XP train, driven by one inlet air cooled aeroderivative gas turbine, is comprised within one liquefaction module. The pressurized LNG stream from the three liquefaction modules are combined and then directed to a separate module where the hydraulic turbine reduces the pressure of the LNG stream to 7.5 bara. Different from SMR discussed earlier, the train capacity of N₂XP is primarily limited by the low efficiency. Therefore, a third aeroderivative gas turbine is required to generate the total power needed to produce 3.5 MTA of LNG. However, its process simplicity and safety keeps this process in play for more detailed evaluation.

Figure 6 provides a simplified illustration of the dual mixed refrigerant (DMR) technology. A single DMR train is allocated among three liquefaction modules to produce 3.5 MTA LNG. The first liquefaction module contains the cold spiral wound heat exchanger (SWHE), the first inlet air cooled aeroderivative gas turbine driving the cold mixed refrigerant low pressure compressor and the cold mixed refrigerant high pressure separator. The second liquefaction module contains the second inlet air cooled aeroderivative gas turbine driving the cold mixed refrigerant medium pressure and high pressure compressor, the warm mixed refrigerant low pressure compressor and the warm mixed refrigerant high pressure compressor. The third liquefaction module contains the warm spiral wound heat exchanger. The pressurized LNG stream exits the first liquefaction module and is directed to a separate module where LNG stream is expanded in a hydraulic turbine. The liquid hydrocarbons needed to make the warm and cold mixed refrigerants were imported to the floating LNG and the refrigerant storage tanks were placed in the floating LNG haul. Unlike N₂XP process, DMR is highly efficient and requires only two gas turbines to produce target 3.5 MTA LNG within a single train. However, due to its process complexity and equipment weight, the DMR technology could not be fabricated in less than three liquefaction modules, while keeping each module within typical maximum weight limits.

For the proposed novel liquefaction technology, the configuration with feed compression as illustrated in Figure 2 was used. The treated feed gas is compressed to 110 bara and then cooled to a temperature of about 21°C. The compressed gas is then evenly split between two identical trains. Each train, driven by one inlet air cooled aeroderivative gas

turbine, is comprised within one liquefaction module. The pressurized LNG stream from the two liquefaction modules are combined and then directed to a separate module where a valve reduces the pressure of the pressurized LNG stream to 69 bara prior to the inlet of the hydraulic turbine. It should be noted that a single liquefaction train, driven by two aeroderivative gas turbines, was considered for this project. However, the two liquefaction train option was ultimately chosen due to higher availability and turndown capability. This option also allows for the fabrication of a whole liquefaction train within one module, thereby enabling an “LNG-in-box” concept for efficient execution.

Table 1 provides summary of the results from the comparison study. It is observed from Table 1 that the proposed novel liquefaction technology shows significant CAPEX savings when compared to the other technologies for the current floating LNG project. The cost for its corresponding liquefaction modules is approximately two thirds the cost for that of the other two technologies. The individual liquefaction module weight for the N2XP technology is the lowest. However, the need for a third liquefaction train is the reason for its higher cost. For the DMR process, the significant weight of the Spiral Wound Heat Exchangers (SWHEs) results in the need for a third liquefaction module, thus a higher cost. Additionally, the higher equipment cost and increased construction cost associated with having to integrate between the liquefaction modules also contribute to higher CAPEX number for DMR technology.

The most significant advantage of this novel liquefaction technology is the requirement of only two liquefaction modules compared to the three liquefaction modules for the other technologies. While the current technology does require the use of a 12 MW motor driven compressor, the layout and weight of these systems are small enough to be easily placed within one of the other modules, such as the acid gas removal module or the end flash module. In addition, unlike the DMR process, there is no requirement of a separate module for liquid refrigerant import and storage, which is additional saving in plot space and weight on the topside.

The benefit of this footprint reduction goes beyond the CAPEX reduction shown in Table 1. Figure 7a and 7b shows the topside layout for the FLNG using the 3.5MTA DMR liquefaction trains and the FLNG using the 3.5 MTA liquefaction trains employing this novel. The topside footprint for the DMR FLNG is completely utilized due the requirement of a third liquefaction module and a refrigerant storage module.

In contrast, the FLNG Design using the novel process still has sufficient available topside space to enable addition of a third liquefaction module in the same circular hull. Figure 7c shows the topside layout for a 4.6MTA FLNG comprising three liquefaction trains and no water/glycol chilling module. Without inlet air chilling of the gas turbines, the production capacity for each of the high pressure expander based liquefaction trains is reduced from 1.75 MTA to 1.53 MTA. As a result, the increase in the total production capacity (3.5 to 4.6 MTA) of the FLNG project impacts project economics by adding 1 basis point to the DCFR.

Conclusions

A novel, high pressure, high-efficiency, expander-based liquefaction technology is being developed. This technology has an efficiency similar to that of advanced SMR technologies, capacities comparable to DMR technologies, while maintaining the process simplicity associated with typical expander-based technologies.

In particular, its process simplicity, low equipment count, compact layout, and low weight over a wide range of liquefaction train size (0.5 – 4.0 MTA) provide several advantages including versatility, scalability and opportunities for modularization. These advantages were recently verified and quantified in a floating LNG study. Not only the savings in CAPEX are significant enough to positively affect project economics, the reduced footprint also allows for an additional liquefaction train resulting in increased production from the same floating vessel. Finally, the technology allows for a standard concept over a wide range of feed gas compositions, thus making it well suited for onshore and offshore projects (F. Pierre, Jr., et al., 2019).

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ما هي الميزة والقدرة التنافسية التي تتمتع بها شركة التمساح عن باقي الشركات المنافسة؟

نملك ثلاث ميزات تنافسية أولها أن شركة التمساح تتبع هيئة قناة السويس وهو اسم كبير ترغب أي شركة في التعامل معها أما الميزة الثانية فهي أننا نملك الخبرة الكبيرة الكافية في هذا المجال والتي تمتد منذ عام ١٩٦١ ولنا أعمال سابقة إضافة إلى الميزة الثالثة وهي تميز كوادرننا البشرية في بناء السفن وتشغيل الوحدات البحرية وعمليات الفطس.

ما هي الخطط التوسعية المستقبلية للشركة؟

هي استكمال المستهدف من تحديث للبنية التحتية وتدريب وتأهيل الموارد البشرية بحيث تتناسب مع حجم الأعمال والفرص المتزايدة كما أننا منفتحين ومستعدين لأي فرص استثمارية وخاصة فيما يتعلق بقطاع البترول ونتعهد بتلبية كل احتياجاته.

وماذا عن تطوير وتأهيل العنصر البشري داخل الشركة؟

يعمل بالشركة ١٥٠٠ عامل ما بين مهندسين وإداريين وفنيين وعمال والتمساح لبناء السفن كما ذكرت تتبع كيان كبير وهو هيئة قناة السويس وبتوجيهات سيادة الفريق أسامة ربيع رئيس الهيئة و السيد المهندس نصر عبدالعزيز مدير إدارة الشركات تتمثل في أن الثروة الحقيقية لكل شركات القناة هي العنصر البشري والهيئة تستقطب أعلى الكوادر البشرية كفاءة للعمل فلا بد وأن يكونوا حاصلين على شهادات كمثال CSO' ISM' ISO' IMCA 'SCO' etc... وأن تكون الاطعمه مؤهلة للعمل على سفن DPII إضافة إلى تدريبهم بعد التعيين في الأكاديميات أو الجامعات والجديد الآن أن الشركة تنظم دورات في الماجستير المهني ومتاح ذلك لكل أصحاب المؤهلات العليا وكل ذلك بهدف زيادة القدرة على المنافسة في السوق.

هل لنا أن نتعرف على حجم أعمال الشركة وإيراداتها عن عام ٢٠١٩؟

الشركة العام الماضي حققت حجم أعمال ١٤ مليون جنيه بزيادة ٢٠٪ عن العام الماضي كما أن المستهدف في العام الجاري ٢٠٢٠ تحقيق ٦٠٠ مليون

وما هو حجم الأعمال مع شركات البترول؟

يبلغ حجم الأعمال الموجه لخدمة قطاع البترول ٧٠٪ من إجمالي حجم أعمال وإيرادات الشركة ويجب هنا أن نوضح أن ذلك هو ما أحدث طفرة في حجم أعمال شركة التمساح لبناء السفن التي أدركت متطلبات وإحتياجات قطاع البترول وعملت على تلبيتها وهو تحدي كبير.

أحمد فاضل ٢٠١٧ وأحدث السفن هي السفينة أمان في عام ٢٠١٨ واللذان تعملان مع شركة بترول ونحن نقوم بتأجير وتشغيل وصيانة تلك السفن لشركات البترول وهناك خدمات أخرى مثل الفطس واللحام.

قامت الشركة في الفترة الأخيرة بتحديث وتطوير بنيتها التحتية لتتماشى مع حجم الأعمال نريد القاء الضوء على ذلك؟

الخطة طويلة الأجل تقضي بتقسيم الساحة المفتوحة إلى أربع ورش رئيسية تم بناء إحداهم وجاري بناء الأخرى الآن على أن يتم استكمال بناء الورشتين الأخرتين فيما بعد بحيث لا يرتبط التشغيل بالعوامل الجوية وتصبح تلك الورش مثل الترسانات الكبيرة، هذا على مستوى البنية التحتية كمنشآت أما فيما يتعلق بالمعدات فقد تم تحديثها وتم شراء ٢٠ ماكينة CNC إلى جانب الماكينة التي تمتلكها الشركة وسيعمل ذلك على تسريع وتيرة البناء والصيانة.

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قسم هندسة بحرية وعمارة سفن عام ١٩٩١

تعمينت في إدارة التحركات بهيئة قناة السويس عام ١٩٩٣

حاصل على شهادة كبير مهندسين بحريين ٢٠٠٦

حاصل على الماجستير المهني ٢٠١٥

وحاليا أعد رسالة الدكتوراه المهنية



المهندس محمد سعيد رئيس مجلس إدارة التمساح لبناء السفن: خدمات قطاع البترول أحدثت طفرة في حجم أعمال الشركة ومستعدين لتلبية احتياجاته



لشركات البترول أو تأجير لنشآت كما أن هناك بعض الأنشطة الفرعية بنفس الحجم منها أنشطة الفطس واللحام تحت الماء وأنشطة التكرير وكلها أنشطة فرعية.

ومتى بدأت الشركة تكثيف العمل مع قطاع البترول؟

منذ عام ٢٠١١ ومع تزايد مطالب قطاع البترول وإحتياجها للسفن الـ DPII بدأنا بشراء السفينة بحرا والتي تعمل مع شركة بترول خليج السويس "جابكو" وكلا من السفينة

خدمات قطاع البترول أحدثت طفرة في حجم أعمال وإيرادات شركة التمساح لبناء السفن حيث بلغ حجم أعمال الشركة مع القطاع ٧٠٪ من إجمالي حجم أعمالها خلال العام الماضي والتي وصل إلى ١٤ مليون جنيه. مجلة بتروليم توداي أردات التعرف على المزيد فكان هذا الحوار الذي أجرته مع المهندس محمد سعيد رئيس مجلس إدارة الشركة.

رئيسيين مستثمرين حتى الآن وتم تطويرهم وتحديثهم وفقا لإحتياجات السوق هما بناء الوحدات البحرية وصيانتها وإصلاحها وتقديم خدمات تشغيل سواءا كانت وحدات بحرية أو ورش عائمة أو وحدات DPII المتقدمة

في البداية نريد التعرف على الخدمات والأنشطة التي تقدمها شركة التمساح لبناء السفن بصفة عامة؟

شركة التمساح لبناء السفن إحدى الشركات التابعة لهيئة قناة السويس وتم إنشائها عام ١٩٦١ وبدأت بنشاطين



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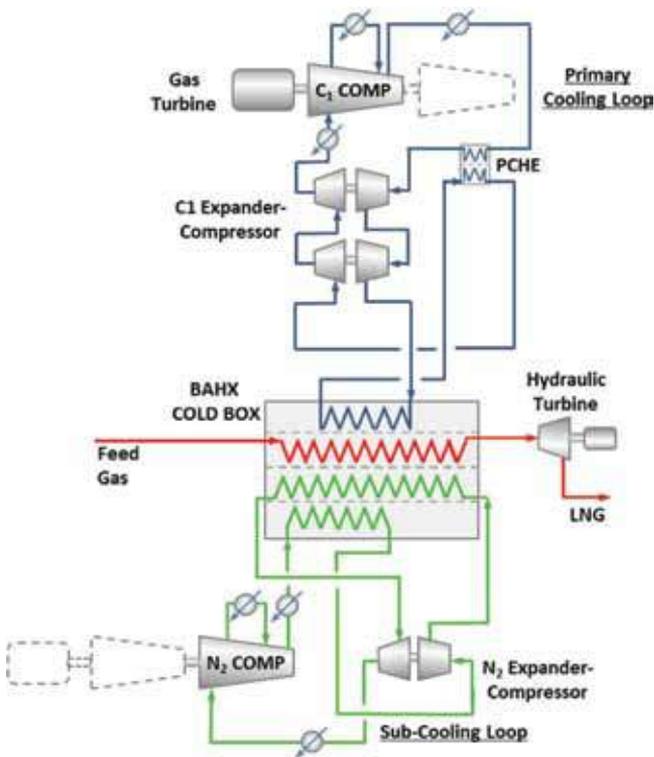


Figure 1—High Pressure Expander Process Technology

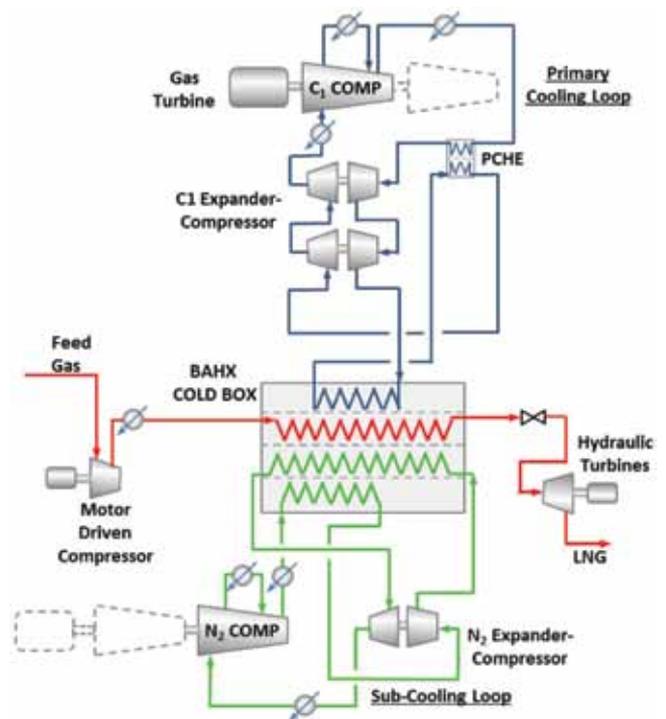


Figure 2—High Pressure Expander Process Technology with Feed Compression

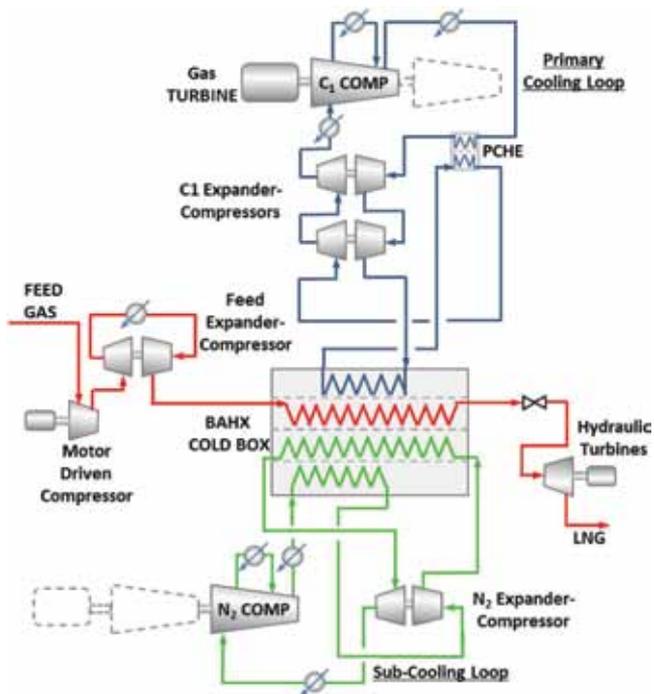


Figure 3—High Pressure Expander Process Technology with Feed Compression & Expansion

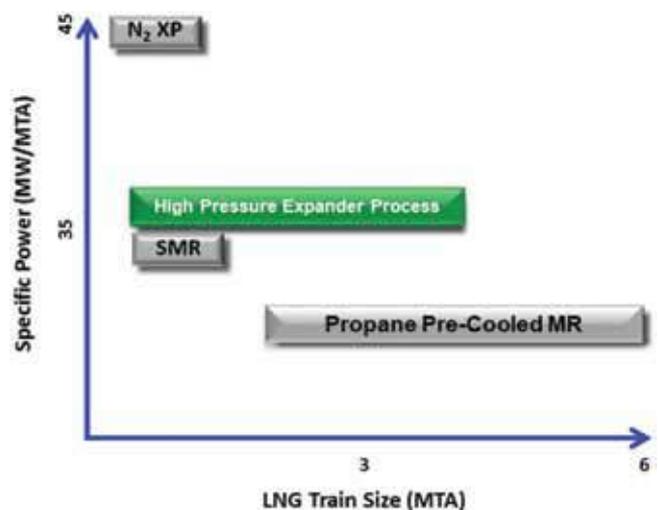


Figure 4—Application Space of LNG Technologies

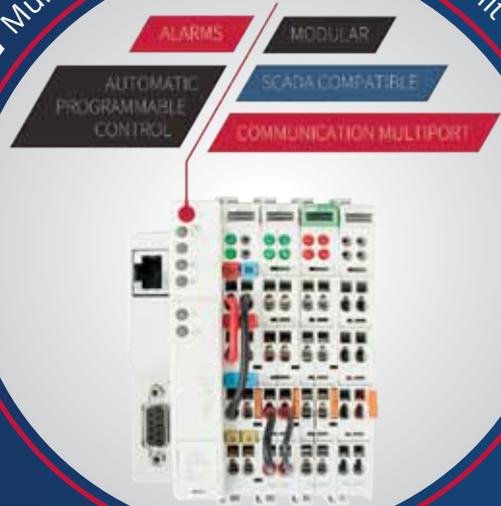


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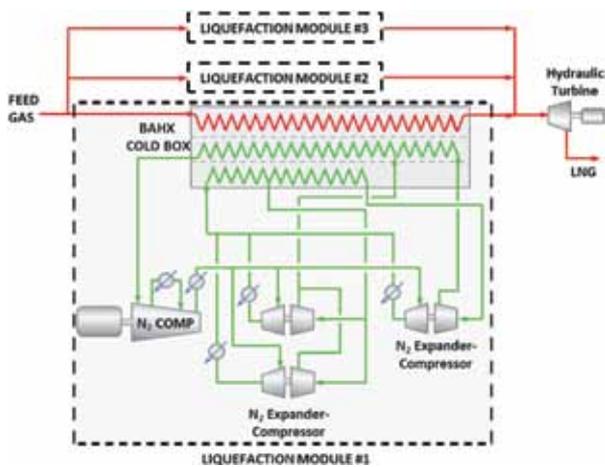


Figure 5—Simplified Illustration of the Dual N₂ Expander Cycle Technology

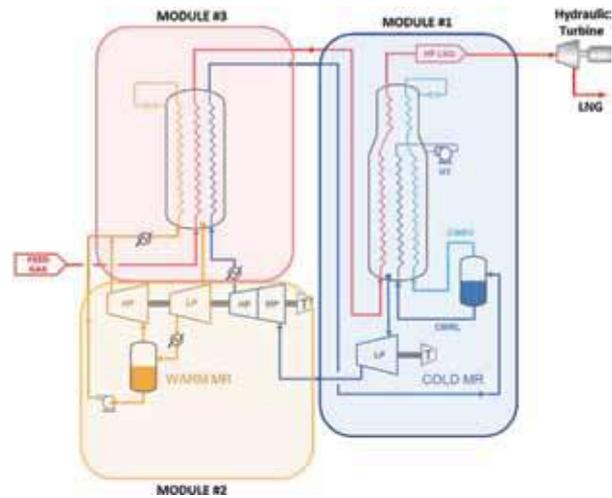


Figure 6—Simplified Illustration of the Dual Mixed Refrigerant Technology

Table 1—Summarized Results from the Liquefaction Process Comparison for a FLNG Project

	N ₂ XP	DMR	High Pressure Expander Process
Capacity, MTA	3.5	3.5	3.5
Trains	3 X 33%	1 X 100%	2 X 50%
Modules	3	3	2
Aeroderivative gas turbine (inlet air cooled)	3	2	2
Feed Gas Compressor	-	-	12 MW
Main Exchanger	BAHX	SWHE	BAHX
Refrigerant Import	Not Required	C2 & C4	Not Required
Largest Line Size	36 in	64 in	32 in
Total Liquefaction Module Weight	12,800 mt	13,300 mt ¹	11,200 mt ²
Relative CAPEX	156%	149%	100%

¹ Includes refrigerant import module, but not weight of storage tanks

² Includes feed gas compressor and aftercooler equipment and associated bulks weights

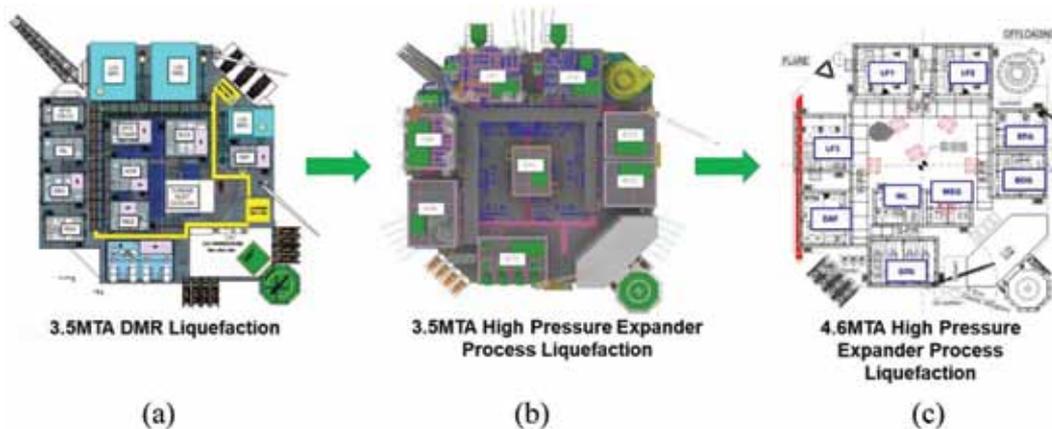


Figure 7—Increased Production from the Same Cylindrical Hull FLNG Design using the Novel High Pressure Expander Based Liquefaction Process



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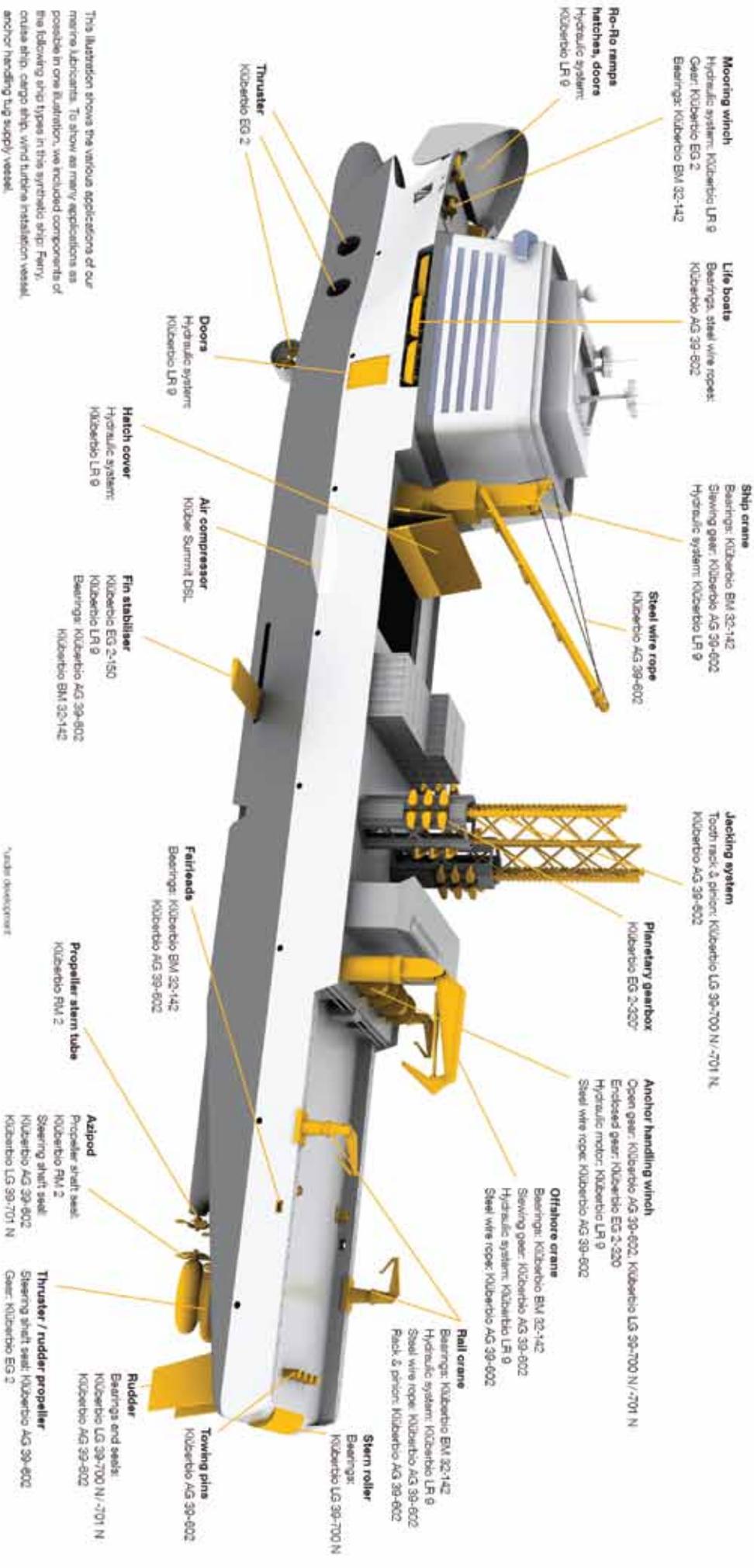
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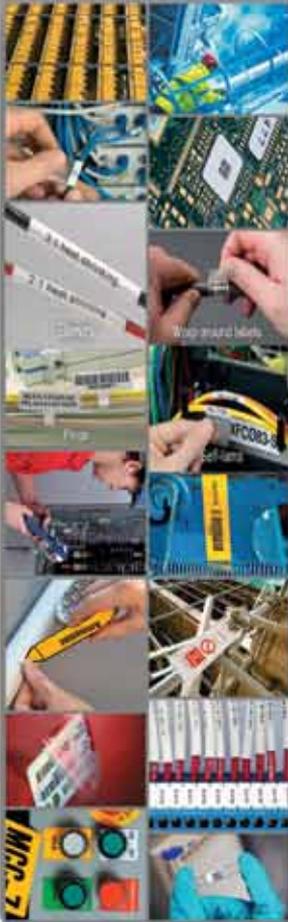
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Industry leading patented features to help reduce injuries caused by dropped objects. This new dedicated square drive torque wrench is ideal for working at height, improving both operator and job site safety.

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FLANGE FACING



Regular flange face maintenance will help to keep your plant running efficiently, safely and more environmentally friendly. Unlike expensive leak-sealing techniques, flange facing is a more permanent solution which is still cheaper than replacing a flange.

Flange Facing Machining Solutions provides an extensive range of cost effective services and can restore flange faces from 0 to 156 inches in diameter. Our innovative machines are also light weight and portable allowing them to get the job done in even the trickiest of locations. Finally, flange facing can complete most jobs during scheduled down time reducing any unnecessary delays.

Why is Flange Facing Required?

Flanges continuously experience damage due to turbulent flow and impacts with other components during construction, installation, or cuts from gasket leaks.

Flange facing cuts the flanges to give them a spiral grooved finish. This finish allows flanges to be less liable to any leakages as gases and liquids are forced to travel in a long spiral path rather than across the flange face.

Flange facing is considered to be one of the most important repair jobs during plant shutdowns or maintenance.

Which Industry Requires Flange Facing?

Industries like oil and gas, petrochemicals, pharmaceutical production, pipelines and power generation require flange facing more often than other industries.

What is the Difference Between Internal Diameter (ID) and Outside Diameter (OD) Mounting?

Flange facing machines can be mounted in two ways i.e. ID and OD mounting. In ID mounting, clamp legs inside of the machine are placed inside the flange.



Before Facing

After Facing



In OD, the clamp legs are pushing inwards with the machine externally mounted around the flange.

What are the Applications of Flange Facing?

- Re-facing of main inlet steam flanges.
- Repairing heat exchanger nozzle flange.
- For sealing and weld prep, facing and beveling of the pipe is required.
- Repairing flat face raised face and phonographic finish flanges.
- Repairing piston rod mating flanges.
- Boiler feed pump flanges.
- Re-machining the gasket seal on tube sheets.
- Cutting new grooves or repairing ring grooves.
- Vessel and plate weld prep.
- Re-facing ship hatch sealing surfaces.
- Re-machining bearing surface of rotary cranes.
- Re-surfacing large pump base housings.
- Re-facing valve flanges and repairing heat exchangers.
- Flange milling wind tower section
- Ship thruster mount facing, drilling, and milling.



Shotec S.A.E. is a trading and engineering company providing technical equipment and consulting to the following industries (Oil & Gas, Chemicals, Petrochemicals, Fertilizers, Water & Waste Water, Electricity & Power, Food & Beverage, Pharmaceutical, Paper & Pulp, General Industries, Automotive and Steel Industries).

Shotec works in close cooperation with numerous European suppliers to further ensure top quality solutions and premium engineering. With professionalism and dedication we do our business and with integrity and trust we got the contentment of our clients.

In 1997, Shotec was founded as a private company in Germany and started its activities serving the Egyptian market by supplying technical equipment and consulting for the Chemical, Petrochemical, Oil and Gas industry in cooperation with a group of European principals including suppliers and manufacturers.

In 2000, Shotec Egypt has been founded and built a strong relationship with customers and earned the trust of its German suppliers and manufacturers.

In 2006, Together with the EGPC "Egyptian General Petroleum Corporation", Enppi, Petrojet and RuhrPumpen GmbH and Shotec GmbH, we established the joint venture sister company "RuhrPumpen Egypt" for the production and service of API centrifugal pumps in Egypt with a share of 15 % from our Shotec GmbH Company in Germany.

In 2009, Shotec established SHOTEC GULF in Qatar.

2013, We established our own workshop, authorized service center and warehouse in 6th October City.

In 2015, SHOTEC S.A.E has successfully obtained the quality management certification ISO9001 as well as the Health and Safety certificate OHSAS18001 covering the Supply of Design & Engineering for packages and systems as well as sales and after sales for engineering equipment including pumps, valves, piping, electrics and control.

2019 – Heat Transfer Business

Shotec has developed a team of engineers for Heat transfer equipment and successfully established business partnerships with new principals for Process Heat Exchangers for Petrochemicals and Refineries, Air Coolers as well as Cooling Towers for different applications.



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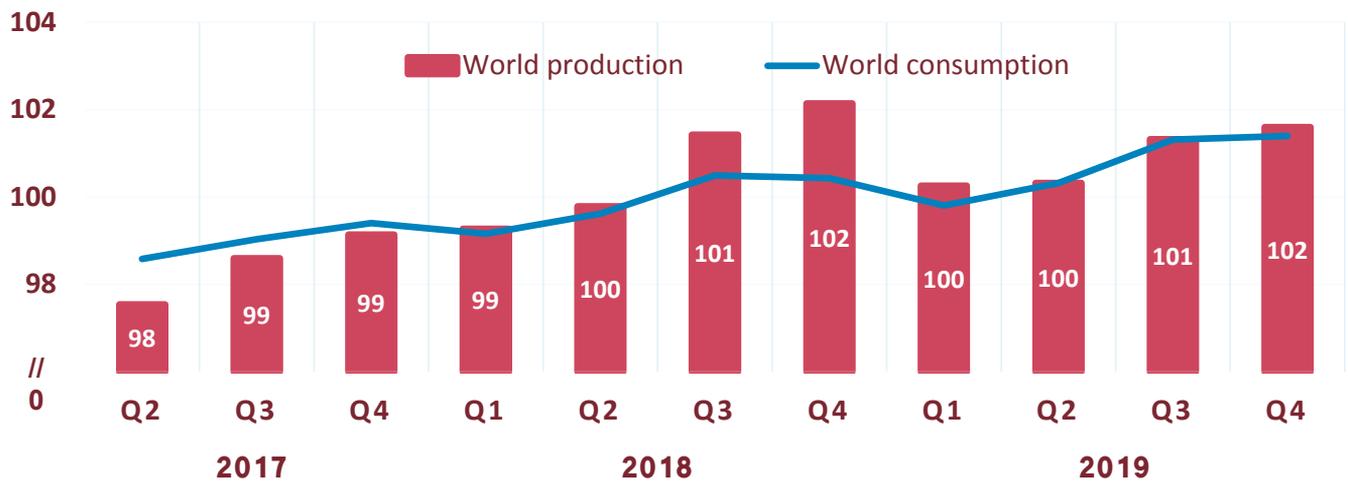
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شركة التعاون للبترول

INDUSTRY AT A GLANCE

by: Ali Ibrahim

World liquid fuels production and consumption balance

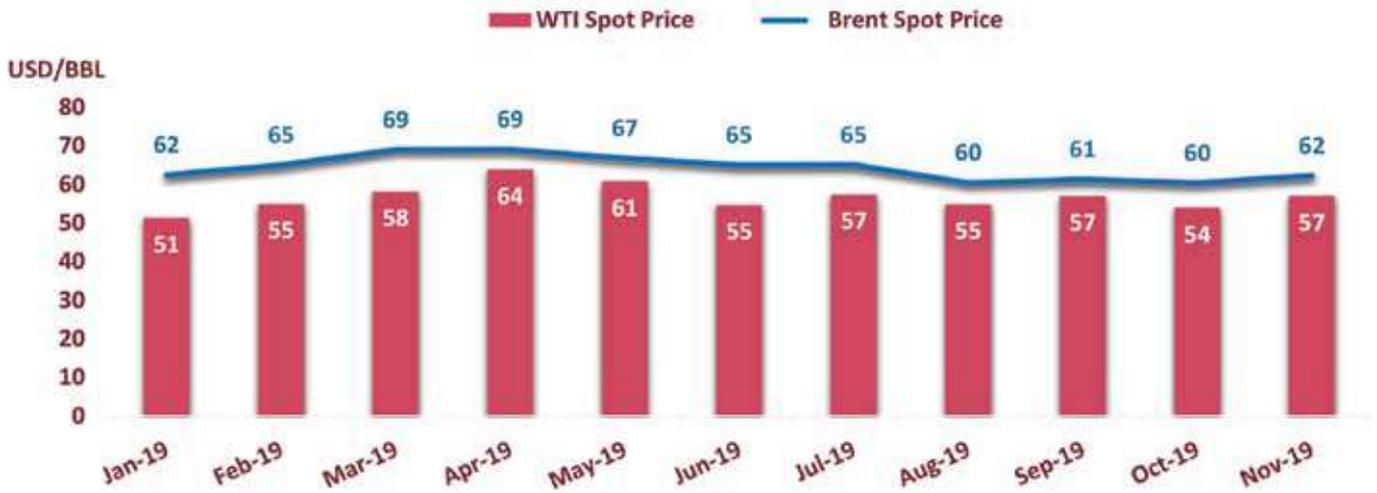
million barrels per day



OPEC Crude Oil Production



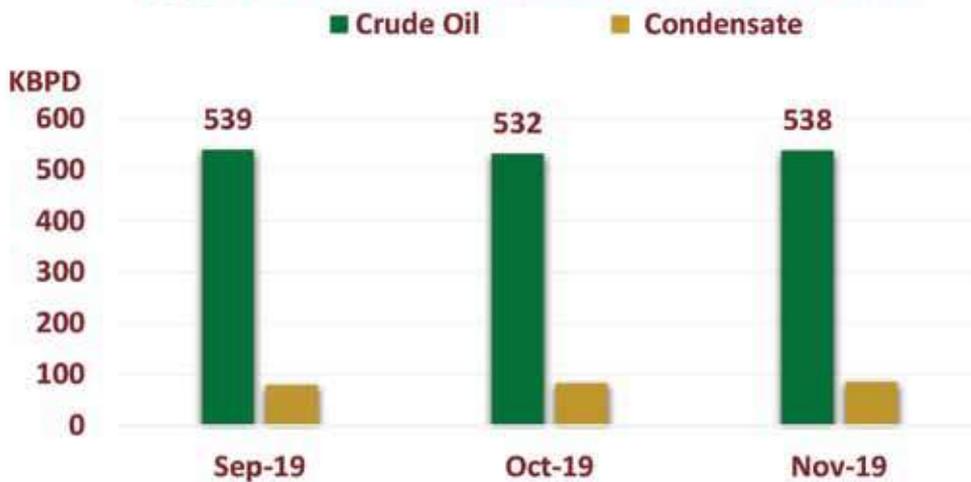
Crude Oil Prices



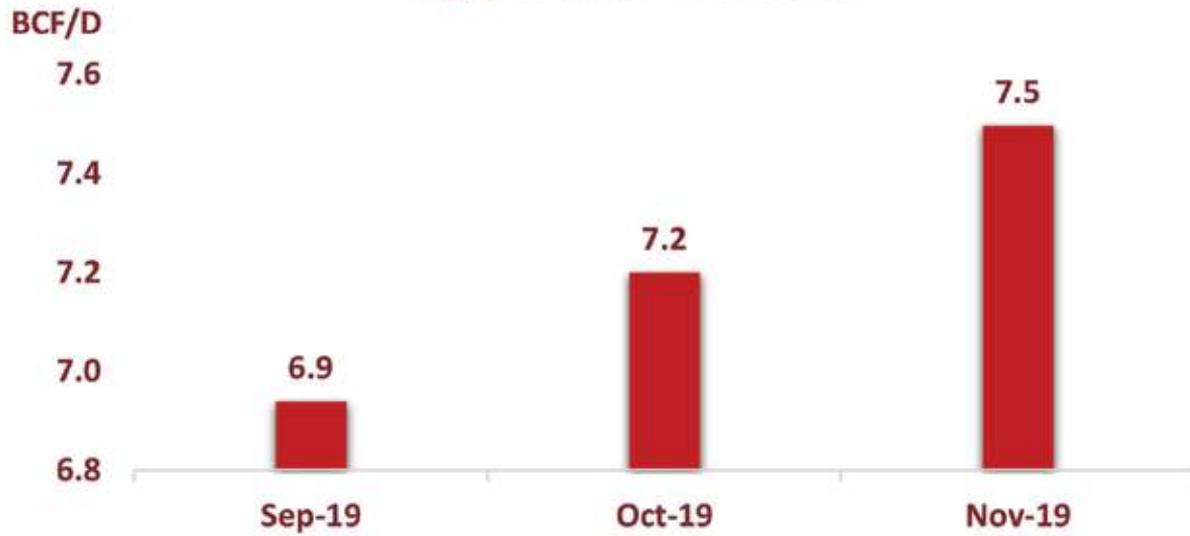
NYMEX Natural Gas Prices USD/Million BTU



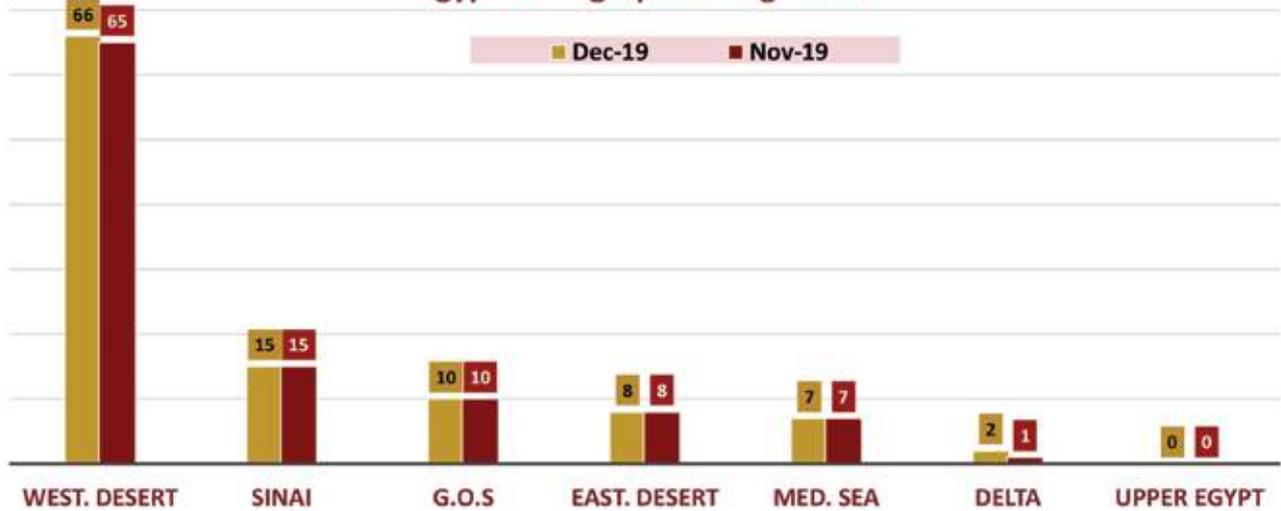
Egypt's Oil and Condensate Production



Egypt's Gas Production



Egypt's Geographical Rig Count





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فى نهاية عام ٢٠١٨ بالتعاون والتنسيق مع قيادات الهيئة المصرية العامة للبترول وبإشراف من وزارة البترول .

وفى عام ٢٠١٧ وصل حجم إيرادات الشركة إلى حوالى (٣٨,١) مليون ليقفز إلى حوالى (٦٥,١) مليون فى ٢٠١٨ ويصل إلى حوالى (٩٥,٩٥) مليون بنهاية ٢٠١٩ وتهدف الشركة تحقيق إيرادات تصل حوالى (١٣٠) مليون فى نهاية ٢٠٢٠ .

ماهو سر نجاح الشركة وتزايد حجم الاعمال ؟

ويعتبر سر هذا النجاح والطفرة هو تبنى الشركة سياسة تسويقية فاعلة قائمة على « طرق الابواب » والتواصل مع العملاء مباشرةً والذهاب اليهم والسعى جاهداً لتحقيق رغباته ومتطلباته بالخبرة الموجودة والتخصص والجودة المطلوبة .

العنصر البشري حجر الزاوية للنهوض بأي شركة أو مؤسسة فماذا عن الاهتمام به داخل الشركة ؟

تسير الشركة بخطة واضحة نحو الاستثمار فى الأصول البشرية بالشركة وتنمية مهاراتهم وثقلها بالتدريب والتأهيل العلمى حيث وصل حجم العمالة فى الشركة إلى حوالى (٥٥٠) موظف وعامل منهم حوالى (٦٠) إدارى (محاسبين - محامين - تخصصات متنوعة) وحوالى (٤٩٠) فنى ما بين عامل ومهندس تم تدريبهم وتأهيلهم ببرامج تدريبية متخصصة (فنية - وسلامة وصحة مهنية) وذلك بالتعاون مع مراكز التدريب المعتمدة فى قطاع البترول . وتم خفض متوسط سن العمالة ليصل ٣٥ سنة بضع دماء جديدة فى الشركة لمواكبة متطلبات زيادة حجم النشاط .

حدثنا عن خطط التطوير داخل الشركة سواء فيما يتعلق بالمعدات والعاملين ؟

مؤخراً تم إعادة تأهيل جميع معدات المصنوع وتنفيذ الصيانات الضرورية وأدخل المعدات المطلوب ليواكب متطلبات لانتاج المطلوبة وتم تأهيل الشركة بشهادات الجودة (الإيزو 9001 - الإيزو 14001 - OHSAS 18001) وجرى حالياً تأهيل الشركة بشهادة (Q1) والخاصة بشركات الإنتاج والتى تؤهل منتجات الشركة لدخول السوق الاتحاد الأوربي والولايات المتحدة الأمريكية ،

• وتم تزويد المصنوع بنظام أطفاء يتوافق مع متطلبات جهات الحماية المدنية .

• الأستثمار فى رأس المال البشرى لدى الشركة وأستكمال تطويرة وتدريبية .

• جذب خبرات جديدة تضاف إلى رأس المال البشرى .

• إدخال أنشطة جديدة الى أنشطة الشركة بالتعاون مع الشركات الشقيقة لتقديم خدمات متكاملة لأرضاء العملاء ومنها :

• نشاط توريد العمالة provision of man power, Technical manpower

• صيانة صمامات (Pressure Safety Shutdown) (Valves) أثناء عمليات (Shutdown).

• أنظمة التشغيل والتحكم عن بعد فى الصمامات (Actuator)

• ROPE ACCESS SERVICES

• وأصب أن أوضح أن استراتيجية الشركة فى كافة المجالات تنبثق من الرؤية الاستراتيجية لوزارة البترول والهيئة المصرية العامة للبترول ، فى السعى نحو توفير متطلبات القطاع من إنتاج الصمامات والخدمات المتنوعة ، وتحقيق الاهداف للشركة والقطاع .

• وأود أن أشكر حضراتكم على تخصيص هذا الوقت والمساحة لتعريف عملائكم بالشركة المصرية للصمامات (إيفاكو) وأهم ملامح التطوير والانجاز بالشركة (مؤخراً) .

هل تعمل الشركة خارج مصر وماهى المشروعات الخارجية ؟

ولتتسق استراتيجية الشركة مع التوجه الاستراتيجي لوزارة البترول والهيئة المصرية العامة للبترول فى غزو الاسواق الاقليمية فتم التواصل الي أطر قانونية (مذكرات تفاهم) مع (وزارة النفط العراقية) وجرى تفعيل ذلك على أرض الواقع خلال ٢٠٢٠ بأذن الله، ويتم حالياً مباحثات مع (الجانب الليبي - الكويتي - السعودي) لوضع الأطر القانونية للتعاون.

دشنت الشركة فى الفترة الماضية استراتيجية تسويقية لتنمية حجم الأعمال؟ ماهي ملامح تلك الاستراتيجية؟ ولكل شركة رؤية مستقبلية وخطط توسعية هل تلقي لنا الضوء على رؤية شركتكم؟

واستراتيجية الشركة فى الفترة القادمة قائمة على المحاور الآتية:

• الحفاظ على العملاء الحاليين والتوسع فى النشاط الحالى والسعى لجذب شركاء نجاح جدد محليا وأقليمياً .

• غزو قطاعات داخلية جديدة مثل (الصرف الصحى - المياة)



لقاء خاص مع المهندس:

أحمد الختام

رئيس مجلس إدارة الشركة المصرية للصمامات (إيفاكو)



نود في البداية التعرف على النشاط الشركة والخدمات والمنتجات التي تقدمها؟

أولاً: دغوني أعطى لحضراتكم نبذة عن نشأت الشركة تأسست الشركة المصرية للصمامات (إيفاكو) بقرار من وزير الأستثمار والتعاون الدولي رقم (٤١) لسنة ١٩٨٢ كشركة مساهمة مصرية ، وهي إحدى شركات التابعة للهيئة المصرية العامة للبترول وهي متخصصة في مجال إنتاج وصيانة الصمامات المستخدمة في قطاع البترول والصناعات الكيماوية ومحطات القوى طبقاً للمواصفة القياسية الأمريكية API STD فضلاً عن توفر الخبرة الفنية الأستشارية في هذا المجال التي أتاح لنا إنتاج وصيانة الصمامات على مستوى عالي من الجودة.

وتعتبر الشركة الآن أحد الركائز الداعمة لقطاع البترول والقطاعات الوطنية الأخرى (الكهرباء - الحديد والصلب) الأخرى ويقو مصنع الشركة في المنطقة الصناعية (3A) بمدينة العاشر من رمضان على مساحة ٢٥٣٠٠٠ والمبنى الإداري للشركة بالنزاه الجديدة ويبلغ عدد العاملين بالشركة (٥٥٠) بين موظف وعامل .

ويجدر الأشار ان الشركة في بداياتها تخطط السوق المحلي وقامت بالتصدير للأتحاد الأوربي والولايات المتحدة الأمريكية . و حالياً تقوم الشركة بتوفير الإحتياجات الأساسية من إنتاج وصيانة كافة أنواع الصمامات لكبرى الشركات الشقيقة مثل (بتروليل (حقل ظهر) - جابكو - خالدة - غاز شرق) تحت شعار الشركة (خبرة - تخصص - جودة) .

من المستحق على الشركة لصالح الجهات الإدارية وبعض البنوك الوطنية حيث بلغ إجمالي حجم ديون الشركة في بداية عام ٢٠١٧ لجميع الجهات (٢٩٥) مليون جنية مصرى ، وبعد تولي شرف مسئولية إدارة الشركة في فبراير / ٢٠١٧ تم التفاوض مع جميع الجهات المدينة لها الشركة وجدولة الديون وتم الانتهاء من سدادها جميعاً

هل لنا أن نتعرف على حجم أعمال الشركة قبل تولي سيادتكم منصب رئيس مجلس الإدارة وحجم أعمالها الان ؟

وبالأشارة الى حجم أعمال الشركة يجدر الأشارة بأن الشركة وخلال فترة يناير ٢٠١١ ونظراً للظروف الوطنية و مابعدھا قد واجهت مشاكل صعبة على مستوى السيولة المالية وتوقفت عن سداد الكثير



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Oilfield Services (Free Zone)



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- CST Wellhead Agency.
- Load test for elevators & handling tools.
- Manpower Supply .
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- Pre-heating & Welding services.
- Pressure Test Services
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- Brine filtration services (POD type).
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Load test

The API specification 8C determines the importance of performing a proof load test for handling tools equipment in the same manner as in actual service and with the same area of the contact I the load bearing surfaces

performing such load test is avoiding any suddenly cracks might happen while using handling tools with full capacity at rigs site, as the mentioned test is done at a workshop.

Testing elevators & handling tools loading capabilities up to 750 tons – Certifying the accepted tools- load test equipment has been adapted to test different types of devices as slings and shackles with different types and sizes.



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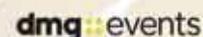
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الإمارات تكتشف حقل غاز طبيعي بمخزون ٨٠ تريليون قدم مكعب



أعلنت شركة بترول أبوظبي الوطنية "أدنوك"، اكتشاف حقل للغاز الطبيعي في المنطقة الواقعة بين جبل علي وسيح السديرة، بمخزون يقدر بـ ٨٠ تريليون قدم مكعب. وشهد الشيخ محمد بن راشد آل مكتوم نائب رئيس الدولة رئيس مجلس الوزراء حاكم دبي، والشيخ محمد بن زايد آل نهيان ولي عهد أبوظبي نائب القائد الأعلى للقوات المسلحة، توقيع اتفاقية للتعاون الاستراتيجي بين "أدنوك" و "هيئة دبي للتجهيزات" تهدف إلى تطوير موارد الغاز في المنطقة الواقعة بين إمارتي أبوظبي ودبي، وذلك ضمن المشروع المشترك الذي أطلق عليه اسم "مشروع جبل علي"، حسبما ذكرت وكالة الأنباء الإماراتية "وام". وتأتي الاتفاقية في أعقاب اكتشاف مخزون ضخم من موارد الغاز الطبيعي في منطقة مشتركة واقعة بين إمارتي أبوظبي ودبي، تغطي مساحة ٥ آلاف كيلومتر مربع.

اقتصاد أدنوك تتوقع تشغيل مجمع البتروكيماويات "بروج ٤" بحلول ٢٠٢٥

تتوقع شركة بترول أبوظبي الوطنية "أدنوك" الإماراتية تشغيل مجمع البتروكيماويات "بروج ٤" خلال عام ٢٠٢٥، وفقا لتصريحات عبد العزيز عبد الله الهاجري، الرئيس التنفيذي لدائرة معالجة الغاز والتكرير والبتروكيماويات في الشركة.

وقال الهاجري، في مقابلة صحفية إن وحدة البولي بروبيلين الخامسة الجديدة التي تبلغ قيمتها ٥٠٠ مليون دولار قيد التنفيذ، وسيكتمل المشروع نهاية عام ٢٠٢١، ما سيزيد قدرة البولي بروبيلين بنسبة ٣٠٪ ويسهم بنمو حصة "أدنوك" في السوق العالمية، وستتمكن هذه الزيادة من تحقيق الاستفادة من فرص السوق.

وتابع: "نتطلع لمزيد من التكامل في مجمع الرويس كمرکز عالمي للتكرير والبتروكيماويات خلال عام ٢٠٢٠، والتوسع المستمر في وجودنا العالمي مع شركاء دوليين متشابهين في التفكير، ما يدعم الطموح الوطني الأوسع لأبوظبي لتصبح مركزاً عالمياً لتحويل البولييمرات مع استمرار أدنوك في التطور لتصبح لاعبا دوليا رائدا في مجال التكرير والبتروكيماويات".

وأوضح أنه ومع نهاية عام وانطلاقة عام جديد، نفخر بالإعلان عن تقدم قوي في دمج أعمالنا في المراحل النهائية عبر سلسلة القيمة، وفي الاستفادة من البنية التحتية الحالية، بدعم من الشركاء الدوليين.

وأكد أهمية الشراكات والاستثمارات التي شكلت معالم بارزة في رحلة النمو وتوزيع محفظة أدنوك بأكملها في اتجاه التكرير والبتروكيماويات، مؤكداً الالتزام بتعزيز موقع الرويس كمرکز عالمي للتكرير والبتروكيماويات، ومواصلة دعم الطموح لتصبح "أدنوك" شركة عالمية متكاملة للطاقة.



عقوبات أمريكية جديدة على ٤ شركات نقلت وسهلت بيع البترول الإيراني

أدرجت وزارة الخزانة الأمريكية، ٤ شركات بتروكيماوية وبتروولية دولية، قامت بنقل ما يعادل قيمته مئات ملايين الدولارات من الصادرات من شركة النفط الإيرانية الوطنية (NIOC)، و"الذي يساعد على تمويل الحرس الثوري الإيراني، ووكلائه الإرهابيين"، حسبما ورد في بيان للوزارة.

وقال وزير الخزانة الأمريكي ستيفن منوشين، إن "قطاعي البتروكيماويات والنفط في إيران يشكلان مصدر تمويل رئيسي للأنشطة الإرهابية للنظام الإيراني على مستوى العالم، ويسهلان من استخدامه المستمر للعنف ضد شعبه".

وشملت العقوبات الأمريكية الجديدة شركة تريليانس للبتروكيماويات المحدودة، وهي شركة وساطة مقرها هونغ كونغ ولها فروع في إيران والإمارات العربية المتحدة والصين وألمانيا، بالإضافة على شركة Sage Energy في هونغ كونغ وشانغهاي، وشركة Beneathco DMCC في دبي.

و بموجب العقوبات الجديدة سيتم حظر جميع ممتلكات ومصالح الشركات في الولايات المتحدة، كما تحظر العقوبات على الأشخاص والمؤسسات الخاضعة للولاية القضائية للولايات المتحدة التعامل مع تلك الشركات.

انخفاض أرباح شل ٢٣٪ في ٢٠١٩

تخفص رويال داتش شل وتيرة برنامجها الضخم لإعادة شراء أسهم الشركة البالغة قيمته ٢٥ مليار دولار بعد أن تسبب انخفاض أسعار النفط والغاز الطبيعي في تراجع أرباح الشركة بواقع النصف في الثلاثة أشهر الأخيرة من ٢٠١٩، مما دفع أسهمها للانخفاض لأدنى مستوى منذ يوليو ٢٠١٧.

ويقول محللون إن شل بصدد شراء أسهم بنحو مليار دولار في الربع الأول من ٢٠٢٠، انخفاضاً من ٢,٧٥ مليار دولار فصلياً منذ يوليو ٢٠١٨ مما يعني أنها ستفوت على الأرباح هدفها باستكمال البرنامج بحلول نهاية ٢٠٢٠.

وانخفضت أرباح شل الرئيسية في الربع الأخير من ٢٠١٩ بواقع النصف إلى ٢,٩ مليار دولار من ٥,٧ مليار دولار في نفس الفترة من ٢٠١٨، وهو أدنى مستوى فيما يزيد عن ثلاث سنوات، في الوقت الذي تسبب فيه تراجع أسعار النفط والغاز في أن تتكد الشركة تكاليف قيمتها ١,٦٥ مليار دولار من حقول غاز تابعة لها في الولايات المتحدة.

كما انخفض معدل تحقيق التدفقات النقدية، معيار رئيسي لعمليات الشركة التي شهدت تخفيضات كبيرة في التكاليف في السنوات القليلة الماضية، بشدة إلى ١٠,٢ مليار دولار من ٢٢ مليار دولار قبل عام.

وانخفض صافي الدخل العائد للمساهمين، بناء على التكلفة الحالية للإمدادات وباستثناء بنود محددة، ٤٨ بالمئة إلى ٢,٩ مليار دولار وهو ما يقل عن توقعات عند ٢,٢ مليار دولار في مسح لأراء محللين قدمته الشركة.



زيادة إنتاج بي.بي من النفط الصخري بأمريكا أكثر من مثليه في ٢٠١٩

زاد إنتاج بي.بي من النفط الصخري بالولايات المتحدة أكثر من مثليه في ٢٠١٩ مقارنة بالعام السابق، إذ كثفت الشركة الإنتاج في أعقاب الاستحواذ بقيمة ١٠,٥ مليار دولار على أصول بي.بي.إتش.بي أواخر ٢٠١٨.

وارتفع إنتاج النفط بقطاع بي.بي للنفط الصخري، المعروف باسم بي.بي.إكس إنرجي، إلى ١٢٤ ألف برميل يوميا في ٢٠١٩ من ٥٥ ألف برميل يوميا قبل عام. وزاد إنتاج الغاز الطبيعي إلى ٢١٧٥ مليون قدم مكعبة قياسية يوميا من ١٧٠٥ مليون قدم مكعبة قياسية يوميا.

وارتفع الإنفاق الرأسمالي في بي.بي.إكس إلى ١,٩٤ مليار دولار في ٢٠١٩، أي ما يعادل نحو ١٢ بالمئة من إجمالي نفقات بي.بي الرأسمالية، من ١,١٥ مليار دولار في العام السابق.

وقال المدير المالي برايان جيلفاري إن بي.بي.أتمت إلى حد كبير بيع بعض المحافظ من أصول في قطاع النفط الصخري تنتج في الأغلب غازا طبيعيا، والتي طرحتها للبيع عقب صفقة بي.بي.إتش.بي.

وشغلت بي.بي.إكس في المتوسط ١٢ منصة حفر في ثلاثة أحواض في ٢٠١٩، بواقع أربع منصات في حوض هابنسفييل وست في إيجل فورد وثلاث في الحوض البرمي.

مصدران: الكويت والسعودية تبدأ العمل لاستئناف إنتاج النفط من المنطقة المقسومة

إنتاج حوالي عشرة آلاف برميل من حقل الخفجي حول نهاية فبراير مضيها أنها "كمية كافية لاختبار كل المنشآت وكفاءتها التشغيلية".

وقال المسؤول إن الحقل سيضخ نحو ٦٠ ألف برميل بحلول أغسطس آب.

وتابع المسؤول أنه سيبدأ الإنتاج من حقل الوفرة بواقع عشرة آلاف برميل يوميا في أواخر مارس ومن المتوقع أن يزيد الإنتاج إلى ٨٠ ألف برميل يوميا من الحقل بعد ستة أشهر من بدء الإنتاج التجريبي.

وأضاف المسؤول أن من المتوقع أن يصل الإنتاج من حقل الخفجي إلى ١٧٥ ألف برميل يوميا ومن حقل الوفرة إلى ١٤٥ ألف بعد مرور سنة من بدء الإنتاج التجريبي.

قال مصدران في قطاع النفط إن الكويت والسعودية بدأتا الأعمال التحضيرية لاستئناف إنتاج النفط الخام من حقل الخفجي الذي يشارك البلدان في تشغيله بإنتاج تجريبي قرب نهاية فبراير.

واتفقت الكويت والسعودية وهما عضوان في مجلس التعاون الخليجي العام الماضي على إنهاء خلاف مستمر منذ خمسة أعوام بشأن المنطقة المعروفة بالمنطقة المقسومة مما يتيح استئناف الإنتاج في حقلين يشارك البلدان في إدارتهما يمكن أن يضخا ما يصل إلى ٠,٥ بالمئة من إمدادات النفط العالمية. وذكر مسؤول نفطي بالكويت لوكالة رويترز طالبا عدم نشر اسمه أنه سيبدأ

اعتماد الموازنة التخطيطية للشركة العامة للبترول

برنامج عمل لحفر ٤٠ بئراً استكشافياً وتمويماً جديداً في حقولها المختلفة باستثمارات ٢٦ مليار جنيهه بالإضافة إلى إصلاح وإعادة تكملة ٢٢ بئراً آخرًا ليلوغ هذا الهدف ، كما تعتمزم حفر ٣٦ بئراً تمويماً وإصلاح ٢٤ بئراً أخرى في إطار برنامج عمل مشترك مع عدد من الشركات الأجنبية في مناطق اتفاقيات المشاركة ، مضيفاً أنها ستواصل تنفيذ خطة تطوير البنية الأساسية وتسهيلات الإنتاج بالحقول باستثمارات تبلغ حوالي ٥ مليار جنيهه خلال العام متضمنة إنشاء وإحلال خطوط نقل الإنتاج البترولى وزيادة الطاقة الاستيعابية لموانئ شحن البترول وتطويرها وزيادة كفاءتها التشغيلية لاستيعاب الإنتاج ، كما سيتم تنفيذ برامج صيانة متكاملة للأصول والبنية الأساسية ومحطات المعالجة للحفاظ على كفاءتها وطاقاتها التشغيلية ، كما أشار لاستمرار الشركة العامة في مشروعات استرجاع غاز الشعلة.



التي تؤهلها لتحقيق ذلك خلال الفترة المقبلة. واستعرض المهندس نبيل عبدالصاقد رئيس الشركة العامة للبترول خطة العمل التي تتضمن أكثر من محور لضمان بلوغ أهداف زيادة الإنتاج وتعظيم الاحتياطي والتشغيل الآمن وحماية البيئة وأن هذه المحاور مستمدة من برامج مشروع تطوير وتحديث قطاع البترول، موضحاً أنه من المخطط الوصول بإجمالى إنتاجها إلى حوالى ١٠٦ ألف برميل مكافئ يومياً من حقولها المختلفة ونصيبها من إنتاج مناطق المشاركة ، لافتاً إلى أنها ستستفد

رأس المهندس طارق الملا وزير البترول والثروة المعدنية أعمال الجمعية العامة للشركة العامة للبترول لاعتماد موازنتها التخطيطية للعام المالى ٢٠٢٠/٢٠٢١، وخلال الجمعية وجه الوزير بالاستمرار فى تنفيذ برنامج تطوير التسهيلات الإنتاجية والبنية الأساسية ، وشدد على سرعة إنجاز المشروعات الاستكشافية والتنموية فى حقول الشركة والالتزام بالجدول الزمنى للمساهمة فى تحقيق خطط القطاع لزيادة الإنتاج ، خاصة من الزيت الخام ، كما شدد على أهمية توفير بيئة عمل آمنة وتحقيق أعلى درجات السلامة و التوافق البيئى بمناطق الإنتاج ، مطالباً كذلك بالتركيز على استكشاف فرص ومشروعات جديدة تحقق نقلة نوعية ملموسة للشركة وتسهم في إضافة المزيد من الإنتاج والاحتياطيات ، معرباً عن ثقته الكاملة فى أن الشركة العامة للبترول لديها من القدرات والكوادر المؤهلة والعناصر الشابة المتميزة

إعلان الاجتماع الوزارى الثالث لمنتدى غاز شرق المتوسط (EMGF)

الأعضاء المؤسسين لمنتدى غاز شرق المتوسط. كما حضر الاجتماع أيضاً ممثلو الاتحاد الأوروبي والبنك الدولي. كما انضم للاجتماع ممثلى الولايات المتحدة الأمريكية وفرنسا كضيوف. شهد الاجتماع الخطوة الرئيسية فى إطلاق الإطار التأسيسى لمنتدى غاز شرق المتوسط ، مما يؤكد على الانتهاء من مناقشته. والإطار التأسيسى يرتقى بالمنتدى إلى مستوى منظمة دولية حكومية ، مقرها فى القاهرة. إن النجاح فى الانتهاء من الإطار التأسيسى فى وقت قياسي، إمتد إلى ١٢ شهراً ، وحماسة الأعضاء فى الاسراع بإنشاء أجهزته وتنفيذ فعالياته، يعرب عن إيمانهم العميق بأهميته. وسيقوم الأعضاء المؤسسين لمنتدى غاز شرق المتوسط والذين هم أيضاً أعضاء فى الاتحاد الأوروبى، بتقديم الإطار التأسيسى الموقع بالأحرف الأولى إلى المفوضية الأوروبية لمراجعتها. وسيتم توقيع الإطار التأسيسى من قبل الأعضاء المؤسسين بمجرد ضمان التوافق مع قانون الاتحاد الأوروبى .

غاز شرق المتوسط. حضر الاجتماع وزراء الطاقة القبرصى واليونانى والإسرائيلى والمسئول الفلسطينى عن الطاقة ، ووكيلة وزارة التنمية الاقتصادية الإيطالية وممثل وزيرة الطاقة الأردنية ، بصفتهم رؤساء وفود

انعقد الاجتماع الوزارى الثالث لمنتدى غاز شرق المتوسط (EMGF) فى القاهرة ، مصر فى برئاسة معالى المهندس طارق الملا ، وزير البترول والثروة المعدنية لجمهورية مصر العربية ، باعتباره الرئيس الحالى للاجتماع الوزارى لمنتدى



اتفاقيتين جديدتين مع اكسون موبيل للبحث عن البترول والغاز بالبحر المتوسط



وقع المهندس طارق الملا وزير البترول والثروة المعدنية اتفاقيتين جديدتين للبحث عن البترول والغاز الطبيعي وإنتاجهما بمنطقة البحر المتوسط مع شركتي إيجاس واكسون موبيل باستثمارات حدها الأدنى ٢٢٢ مليون دولار ومنح توقيع حوالى ١٧ مليون دولار لحفر ٧ آبار.

وقع الاتفاقيتين مع وزير البترول المهندس أسامة البقلى رئيس شركة إيجاس ودون بابجلى نائب رئيس شركة اكسون موبيل للاستكشاف والشركات الجديدة بحضور الجيولوجى أشرف فرج وكيل أول وزارة البترول للاتفاقيات والاستكشاف والدكتور سمير رسلان نائب رئيس إيجاس للاتفاقيات والاستكشاف ودوروثى شيا القائم بأعمال السفير الأمريكى.

الاتفاقية الأولى بمنطقة شمال شرق العامرية البحرية بالبحر المتوسط باستثمارات حدها الأدنى ٢٢٠ مليون دولار ومنحة توقيع ١٠ مليون دولار لحفر ٤ آبار والاتفاقية الثانية بمنطقة شمال

للتجارات التى حققها قطاع البترول خلال الفترة الماضية ، مشيراً إلى أن الشركة حافظت على تواجدها وعملياتها فى مصر من خلال أنشطة النقل والتسويق والتوزيع للوقود وزيوت السيارات لأكثر من قرن ، وأن اكسون موبيل معروفة بسرعة الأداء والتزامها بالأمن فى كافة عملياتها وكانت دائماً شريك استراتيجى لقطاع البترول.

مراقيا البحرية بالبحر المتوسط باستثمارات حدها الأدنى ١١٢ مليون دولار ومنحة توقيع ٧ مليون دولار لحفر ٢ آبار.

وأكد الملا عقب التوقيع أن عودة شركة اكسون موبيل أحد أكبر الشركات العالمية العاملة فى صناعة البترول والغاز للعمل فى مجال البحث والاستكشاف فى مصر بعد غياب فترة طويلة يمثل قيمة مضافة

البترول توقع ٩ اتفاقيات للبحث عن البترول والغاز باستثمارات أكثر من ٤٥٢ مليون دولار بمنطقة البحر المتوسط والصحراء الغربية

الاتفاقية الخامسة تعديل بمنطقة غرب كنائس بالصحراء الغربية مع هيئة البترول وشركة أباتشى باستثمارات حدها الأدنى حوالى ٥,٥ مليون دولار ومنحة توقيع ٤ مليون دولار لحفر بئرين.

الاتفاقية السادسة تعديل بمنطقة غرب كلابشة بالصحراء الغربية مع هيئة البترول وشركة أباتشى باستثمارات حدها الأدنى حوالى ٢٠,٨ مليون دولار ومنحة توقيع ٦ مليون دولار لحفر ٨ آبار.

الاتفاقية السابعة بمنطقة امتياز الفنار البحرية بالبحر المتوسط مع شركة إيجاس وشركتي شل وبتروناس باستثمارات حدها الأدنى حوالى ١٢٩ مليون دولار ومنحة توقيع ٢ مليون دولار لحفر بئرين. الاتفاقية الثامنة بمنطقة امتياز شمال سيدى جابر البحرية بالبحر المتوسط مع شركة إيجاس وشركتي شل وبتروناس باستثمارات حدها الأدنى حوالى ١٨٠ مليون دولار ومنحة توقيع ١٠ مليون دولار لحفر ٣ آبار.

الاتفاقية التاسعة تعديل سعر الغاز بمنطقة امتياز البرج البحرية بالبحر المتوسط مع شركة إيجاس وشركتي شل وبي بي .



توقيع ٢٢ مليون دولار لحفر ٥ آبار. الاتفاقية الثانية بمنطقة أبو سنان بالصحراء الغربية مع هيئة البترول وشركة شل باستثمارات حدها الأدنى حوالى ٧,٨ مليون دولار ومنحة توقيع ٢ مليون دولار لحفر ٢ آبار.

الاتفاقية الثالثة بمنطقة غرب الفيوم بالصحراء الغربية مع هيئة البترول وشركة شل باستثمارات حدها الأدنى حوالى ٢٤,٧ مليون دولار ومنحة توقيع ٢٧ مليون دولار لحفر ٦ آبار.

الاتفاقية الرابعة بمنطقة بدر -٢ وبدر -١٧ بالصحراء الغربية مع هيئة البترول وشركة شل باستثمارات حدها الأدنى حوالى ٦٠ مليون دولار ومنحة توقيع ١٠ مليون دولار لحفر ٩ آبار.

شهد وزير البترول توقيع ٩ اتفاقيات بترولية للبحث عن البترول والغاز الطبيعي وإنتاجهما بمنطقة البحر المتوسط والصحراء الغربية باستثمارات حدها الأدنى حوالى ٤٥٢,٢ مليون دولار ومنح توقيع حوالى ٨٤ مليون دولار وتشمل حفر ٢٨ بئراً بحضور جيولوجى اشرف فرج وكيل اول وزارة البترول للاتفاقيات والاستكشاف والمهندس عابد عز الرجال الرئيس التنفيذى لهيئة البترول والمهندس أسامة البقلى رئيس الشركة القابضة للغازات الطبيعية "إيجاس" ، والمهندس ديفيد تشى نائب الرئيس الاقليمى والمدير العام لشركة اباتشى مصر والمهندس هشام مكاوى الرئيس الإقليمى لشركة بي بي بشمال إفريقيا والمهندس كريم علاء رئيس بي بي مصر ، والمهندس خالد قاسم رئيس شركة شل مصر والمهندس شاهريزال شاهارى المدير التنفيذى لشركة بتروناس مصر ونائبي هيئة البترول وايجاس للبحث والاستكشاف .

الاتفاقية الأولى بمنطقة شرق حورس بالصحراء الغربية مع هيئة البترول وشركة شل باستثمارات حدها الأدنى حوالى ٢٤,٥ مليون دولار ومنحة

الرئيس يوجه بالاستمرار في تحديث وتطوير قطاع البترول



وجّه الرئيس عبدالفتاح السيسي بالاستمرار في تحديث قطاع البترول من خلال تطوير صناعة البتروكيماويات ذات القيمة المضافة لتواكب متغيرات السوق العالمية، وتكثيف العمل خلال الفترة المقبلة بغرض تحقيق الاستفادة الاقتصادية القصوى من كل الإمكانيات والثروات الطبيعية لصالح التنمية، وبما يصب في مساعي تحويل مصر لمركز إقليمي لتجارة وتداول البترول والغاز في المنطقة.

جاء ذلك خلال اجتماع الرئيس مع الدكتور مصطفى مدبولي، رئيس مجلس الوزراء، والمهندس شريف إسماعيل، مساعد رئيس الجمهورية للمشروعات القومية والاستراتيجية، والمهندس طارق الملا، وزير البترول والثروة المعدنية، ووجه الرئيس بمواصلة تطوير الخدمات التي تقدمها الوزارة للمواطنين، خاصة توصيل الغاز الطبيعي للمدن الجديدة ووحدات الإسكان الاجتماعي على مستوى الجمهورية، وكذا التوسع في نظام العدادات الذكية، مع مراعاة أقصى ضوابط السلامة والبيئة في هذا الصدد.

وقال السفير بسام راضي، المتحدث الرسمي باسم رئاسة الجمهورية، إن الاجتماع تناول محاور استراتيجية قطاع البترول وأهم الإنجازات التي تحققت على مستوى القطاع خلال الفترة الأخيرة،

وعرض «الملا» الموقف التنفيذي لمشروعات التكسير والبتروكيماويات على مستوى الجمهورية، مؤكداً الأهمية الاستراتيجية لتلك المشروعات في مواكبة خطط الدولة وخدمة أهدافها التنموية عن طريق توفير فرص جديدة للاستثمار، وتعظيم استغلال البنية التحتية من موانئ وطرق ومرافق، وتوطين تكنولوجيات حديثة في مصر، وإقامة قاعدة صناعية جديدة.

موضحاً أن وزير البترول استعرض خلال الاجتماع إنجازات قطاع البترول خلال الفترة الأخيرة، منوهاً إلى تطور الإنتاج الكلي للزيت الخام والغاز، فضلاً عن تحقيق أعلى معدل سنوي لتوصيل الغاز الطبيعي للمنازل خلال عام ٢٠١٩، وكذلك الوصول إلى أعلى معدل استثمارات في قطاع البترول خلال الأربع السنوات الماضية، وزيادة مساهمة القطاع في الناتج المحلي الإجمالي خلال العام المالي ٢٠١٨/٢٠١٩.

مجلس الوزراء توافق على بدء إجراءات تطبيق الهيكل التنظيمي الجديد لقطاع البترول

(مايو ٢٠١٧-ديسمبر ٢٠١٩)، والثالثة مرحلة التنفيذ (يناير ٢٠٢٠-يونيو ٢٠٢١). وأشار المهندس طارق الملا إلى أن رؤية قطاع البترول تهدف إلى تحقيق الاستفادة الاقتصادية المثلى من كافة الامكانيات والثروات الطبيعية، للمساهمة في التنمية المستدامة لمصر، وتحويل مصر لمركز إقليمي لتجارة وتداول البترول والغاز، وأن يصبح قطاع البترول نموذجاً يحتذى به لباقي قطاعات الدولة في التحديث والتطوير.

من أجل زيادة مساهمته في التنمية الشاملة لمصر، من خلال العمل بشكل أكثر كفاءة، وجذب المزيد من الاستثمارات، وتطوير الكوادر البشرية وتحسين كفاءتهم من خلال الخطط التدريبية. وأوضح وزير البترول أنه تم البدء في اتخاذ الإجراءات اللازمة لتنفيذ مشروع تطوير وتحديث قطاع البترول على ثلاثة مراحل، الأولى الدراسة التشخيصية (يونيو-أكتوبر ٢٠١٦)، والثانية مرحلة الخطط التفصيلية وبدء التنفيذ

وافق مجلس الوزراء الأسبوعي برئاسة الدكتور مصطفى مدبولي، رئيس مجلس الوزراء، على بدء الإجراءات التنفيذية اللازمة لتطبيق الهيكل التنظيمي الجديد لقطاع البترول، والإعلان عن تنفيذه مع بداية عام ٢٠٢٠.

واستعرض المهندس طارق الملا، وزير البترول والثروة المعدنية، "خطة إعادة هيكلة قطاع البترول"، والتي تهدف إلى إحداث تطوير وتغيير شامل في مختلف أنشطة قطاع البترول،

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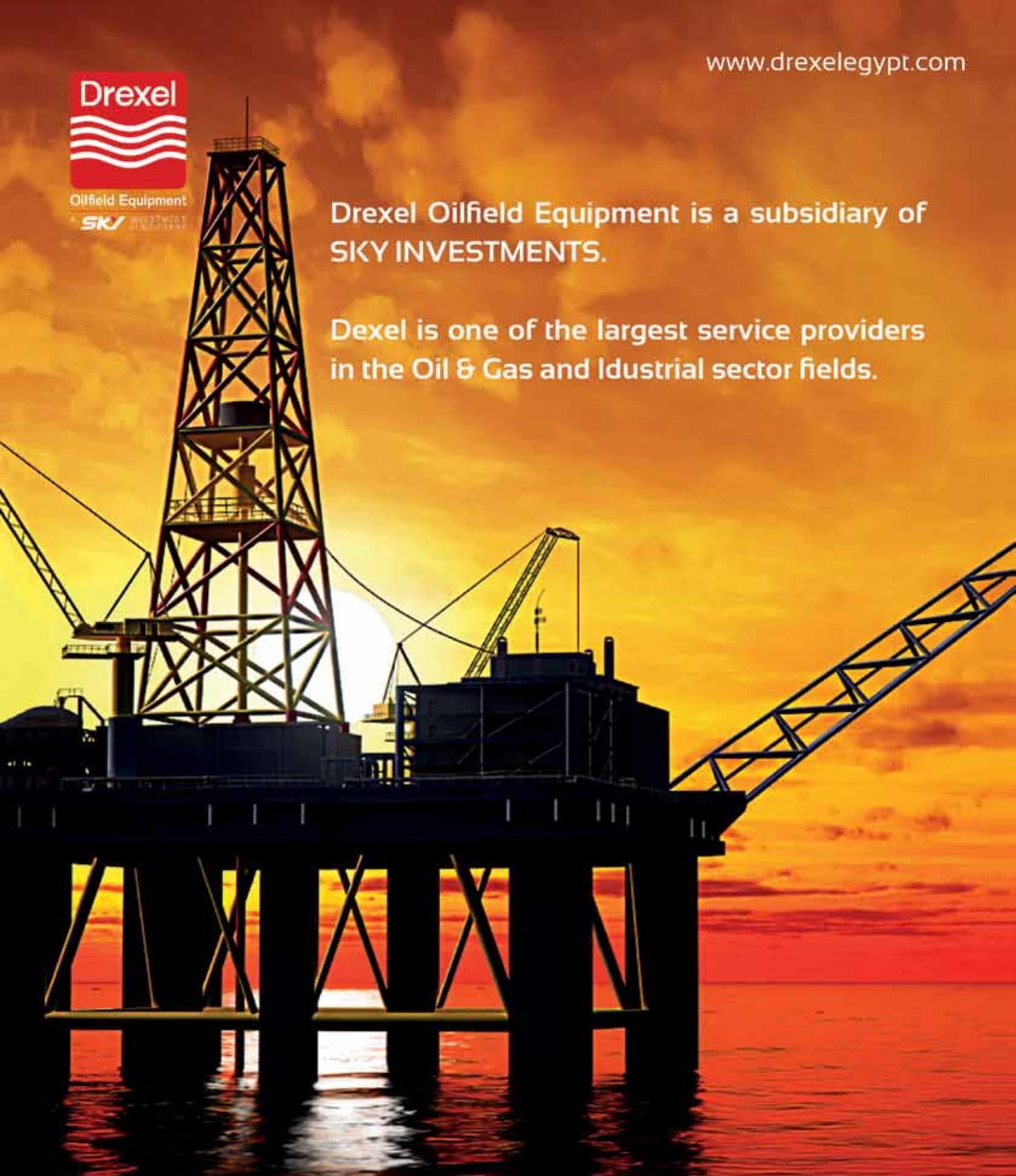
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