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EGYPT

THE HEART OF THE EAST MEDITERRANEAN GAS

"EMGF WILL ACT AS A PLATFORM THAT BRINGS TOGETHER NATURAL GAS PRODUCERS AND CONSUMERS TO FORM A JOINT VISION AS WELL AS A REGULATED DIALOGUE OVER NATURAL GAS POLICIES TO UTILIZE THE REGION'S RESOURCES."

H.E. TAREK EL MOLLA

MINISTER OF PETROLEUM & MINERAL RESOURCES - ARAB REPUBLIC OF EGYPT

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EDITOR'S **LETTER**

Strengthen Regional Ties

On September 22,, the founding countries of the East Mediterranean Gas Forum (EMGF) have signed a charter to become an established international organization. This new organization is mainly aiming to contribute to the development of natural gas resources in the East Mediterranean region. Thus, our October issue is fully dedicated to discuss the latest development of the EMGF, in addition to the technical and strategic paths to maximize the utilization of natural gas.

Our industry insights section covers the hot topic of natural gas resources from different angles. From a technical perspective, two articles discuss natural infrastructure development. Another article highlights the future of energy gas hubs and moving towards a greener, more sustainable and environment-friendly industry. A fourth article takes a strategic direction by unveiling the making of a multilateral gas hub.

In the research and analysis section, we provide our readers with an analytical report about the Suez Canal & Egypt's liquefied natural gas (LNG) trade between 2015-2019.

We also covered Energy Egypt's first online webinar which discussed the latest updates on the prevalent debate on Spoolable Composite Pipeline (SCP) and Steel Pipelines (SP). The webinar was titled "The Economical Benefits of SCP vs Steel".

Finally, our politics section analyzes the Turkish movements in the East Mediterranean region.

Wish you an informative reading.

MAHINAZ EL BAZ Acting Editor-In-Chief - Research & Analysis Manager

EGYPT OIL&GAS NEWSPAPER

EGYPT'S LEADING OIL AND GAS MONTHLY PUBLICATION

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PRODUCTION

BAPETCO PRODUCES 114,000 BBLOE/D DURING FY 2019/20

The Head of Badr El-Din Petroleum Company (BAPETCO), Salah Abdel Karim, said that the production rates of his company during the fiscal year (FY) 2019/20 reached 114,000 barrels of oil equivalent per day (bbloe/d) including more than 38,000 bbl/d of crude oil and condensates as well as 423 million cubic feet of natural gas per day (mcf/d).

Abdel Karim's announcement came during the company's general assembly which was headed by the Minister of Petroleum and Mineral Resources, Tarek El Molla. The company made eight new discoveries with reserves estimated at 10.6 million bbloe, in addition to drilling 44 developing wells and repairing 115 others and an exploratory well. The company saved about $24 million through its expenditure reduction strategy.

BURULLUS GAS COMPANY TO DRILL 3 WELLS AT A COST OF $250 MM

Burullus Gas Company plans to drill three development wells at the West Delta Deep Marine (WDDM) project at a cost of $250 million.

Despite the pandemic, the company managed to complete the onshore construction works at El Maadeya Square, in addition to drilling and completing all of phase 9B wells of the WDDM project. With that, the project's production capacity could reach 500 million cubic feet per day (mmcf/d). Sherif Hasaballah, Head of the company, said that the company's sales of natural gas reached 309 mmcf/d, whereas condensate production recorded 8,000 barrels per day (bbl/d).

According to Hasaballah, several methods are currently being re-evaluated to better use the Rashid concession area after the results of the Monto well and will maintain production facilities from the Rashid offshore field.

GUPCO'S PRODUCTION AVERAGES AT 57,000 BBL DURING FY 2019/20

Gulf of Suez Petroleum Company (GUPCO) daily production has averaged at around 57,000 barrels (bbl) during fiscal year (FY) 2019/20, as the company was also able to cut 20% of production cost per barrel last June, Chairman Mohamed El-Meligy stated.

He added that the new addition of 5,000 bbl has increased the company's current production to nearly 61,000 bbl.

The company has also managed to drill three new development wells and one exploratory well in the Gulf of Suez. Not only that, but GUPCO also carried out well maintenance operations using digital wire unit technology for the first time in Egypt's petroleum sector.

The Minister of Petroleum and Mineral Resources, Tarek El Molla, called for expediting GUPCO's industrial wastewater treatment project, in partnership with the Ministry of Environment, in order to protect the marine environment. El-Meligy noted that the project is set to treat about 40,000 bbl of wastewater.

KHALDA'S OIL PRODUCTION AVERAGES AT 145,500 BBL/D DURING FY 2019/20

Chairman of Khalda Petroleum Company, Saeed Abdel Moniem, said that the company's oil and condensates production averaged at 145,500 barrels per day (bbl/d) during the fiscal year (FY) 2019/20. Meanwhile, butane production averaged at 1,600 bbl/d and natural gas' production reached 665 million cubic feet (mcf/d).

He added that the company spent $651 million and drilled 39 wells; 35 crude oil wells and four natural gas wells. Additionally, Abdel Moniem said that the company implemented 126 re-completion operations, 82 in oil fields, and eight in natural gas fields, in addition to completing the drilling of 19 exploratory wells and finalizing the analysis of high-quality 3D seismic data for an area of 2,920 km2. The chairman noted that the company had completed several projects including the extension of natural gas line bat/abris and updating Gad's natural fields.

BAPETCO EXCEEDS PRODUCTION PLANS BY 11%

Badr El-Din Petroleum Company's (BAPETCO) Badr 1 field production recorded 1.15 million barrels of oil (mmbbl) in the fiscal year (FY) 2019/20, an 11% increase from its initial plans.

Masoud stated that two exploratory wells and three development wells were drilled to add approximately 5.7 million barrels of oil equivalent (mmbbloe) to the confirmed reserves in the area, with investments reaching $21 million.

Currently, the company is implementing new projects to raise the efficiency of the Badr 1 facilities. The company plans to install two new gas compressors valued at $6.6 million, in addition to establishing a new warehouse in the region to increase storage capacity by about 33%.

As for Western Desert Operating Petroleum Company's (WEPCO) progress in FY 2019/20, Masoud stated that Al-Hamra Petroleum Port succeeded in receiving and distributing about 94 mmbbl at an average of 275,000 barrels per day (bbl/d), of which 36 mmbbl were received through the marine facilities and 58 mmbbl went to refineries through land. WEPCO also signed a deal with the Engineering for the Petroleum and Process Industries (Enppi) and Petrojet to establish two warehouses for storing crude oil at Al-Hamra Petroleum Port with investments worth $64 million aiming to increase the port's capacity from 1.5 mmbbl to 2.6 mmbl.

Additionally, Masoud added that WEPCO succeeded in operating an 8-kilometers (km) marine pipeline project in Al-Alamein and a buoy marine line with investments of about $100 million.

EXPLORATION

AL-SISI CALLS FOR BOOSTING COOPERATION WITH ENI

President Abdel Fattah Al-Sisi has called for boosting Egypt's cooperation with the Italian giant Eni and for removing any obstacles that may face the company's business.

This came during a meeting with Claudio Descalzi, CEO of Eni; Mostafa Madbouly, Prime Minister; and Tarek El Molla, Minister of Petroleum and Mineral Resources. The president commended Eni's collaboration with Egypt, expressing his support for the company's continued expansion in its investments in Egypt's exploration and production (E&P) activities. Al-Sisi praised Eni's meticulous commitment to implement its projects, stressing the state's interest to develop this vital sector.

For his part, Eni's CEO applauded Egypt's stance in supporting Italy during the pandemic as well as its success in implementing the precautionary measures in oil and gas production sites. Descalzi affirmed Egypt's importance as a partner to Eni on a global level and his keenness to develop the company's E&P activities in Egypt, especially in the western region and the Red Sea.

EL MOLLA EXPLORES E&P OPPORTUNITIES WITH NAFTOGAZ

The Minister of Petroleum and Mineral Resources, Tarek El Molla, discussed investment opportunities in oil and gas exploration and production (E&P) areas with the Ukrainian Naftogaz's Deputy CEO, Sergiy Pereloma.

During the meeting, the two parties showcased Naftogaz's current E&P operation in the Western Desert and South Egypt in addition to discussing boosting cooperation in the upcoming period. The Ukrainian company has expressed its interest in participating in the coming E&P bid rounds.

The Ukrainian side is looking forward to expanding the joint investment projects and developing the bilateral relationship between the two parties in the oil and gas sector to achieve mutual economic benefits. This aligns with Egypt's strategy to attract investments from international oil companies (IOCs) in the petroleum sector.

GASREG AWARDS NATURAL GAS LICENSES TO 15 COMPANIES

The Gas Regulatory Authority (GasReg) awarded 15 companies licenses to transport, distribute, ship, and supply natural gas.

Fourteen companies were granted distribution and supply licenses for a period of five years. The companies which obtained licenses in January are; the Egyptian Natural Gas Company (GASCO), Egypt Gas, the Egyptian Company for Natural Gas Distribution (Town Gas), Regas, Sinai Gas, Overseas Gas, the National Gas Company (Natgas), Cairo Gas, Fayoum Gas Company, and Maya Gas. Al-Nubaria Gas company was granted a supply license in January for a period of five years.

Other companies obtained their licenses back in January 2019 included; City Gas, Nile Valley Gas, Trans Gas, and Ribco Gas. GasReg also granted the Egyptian Natural Gas Holding Company (EGAS) a natural gas supply license for five years.

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MINISTER OF PETROLEUM & MINERAL RESOURCES - ARAB REPUBLIC OF EGYPT

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ENI, BP ACHIEVE NEW NATURAL GAS DISCOVERY IN EGYPT'S GREAT NOOROS AREA

Eni and BP have announced a new natural gas discovery in Great Nooros Area which is located in the Abu Madi West Development Lease, in the conventional waters of the Nile Delta, offshore Egypt.

The preliminary evaluation of the well results indicates that the Great Nooros Area gas in place can be estimated in excess of 4 trillion cubic feet (Tcf).

The company explained that the new discovery was achieved through the Nidoco NW-1 exploratory well discovered in July 2015. The Nidoco NW-1 exploratory well is located 16 meters of water depth, 5 km from the coast and 4 km north from the Nooros field.

The discovery includes gas-bearing sands with total thickness of 100 meters, of which 50 meters within the Pliocene sands of the Kafr-El-Sheik formations and 50 meters within the Messinian age sandstone of the Abu Madi formations. The new level of Abu Madi formations, which was not yet encountered in the Nooros field, unlocks high potential of the Great Nooros Area, with further extension of the gas potential to the North of the field.

Eni, together with its partner BP, which is the contractor member for this area, in coordination with the Egyptian petroleum sector, will start studying the development options of this new discovery and how to utilize such cooperation as well as the area's infrastructure.

Eni, through its subsidiary IEOC, holds a 75% stake in the license of Abu Madi West Development Lease, while BP holds the remaining 25% stake. The operator is Petrobel, a 50:50 joint venture between IEOC and the state company Egyptian General Petroleum Corporation (EGPC).

ENERGEAN EGYPT PRODUCTION RECORDS 38,000 BBLOE/D IN H1 2020

Energean's Abu Qir's production recorded 38,000 barrels of oil equivalent per day (bbloe/d) in H1 2020, exceeding 2020 guidance of 34,000 – 37,000 bbloe/d.

Despite not finding commercial hydrocarbons, Edison E&P requested a second exploration period at the North East Hap'y Offshore block. Currently, Edison and Eni are evaluating a large, Zohr-like structure for a potential well in the second exploration phase. Edison has also relinquished its North Thekah Offshore license. For the NEA field, Edison is currently assessing the Engineering, Procurement, Installation, and Commissioning (EPIC) contracts.

Per the statement, the company collected about $101 million from the Egyptian General Petroleum Company (EGPC). Egypt's net receivables have mounted to $212 million of which $131 million were overdue. Currently, EGPC holds $82 million of the overdue receivables balance as collateral for exploration financial commitments on the North Thekah, North East Hap'y and South Idku exploration licenses.

ABU SENNAN PRODUCTION REACHES 12,347 BBLOE/D DURING H1

United Oil and Gas (UOG) Company announced that Abu Sennan Concession gross production increased to 12,347 barrels of equivalents per day (bbloe/d) representing net production of 2,716 bbloe/d during H1 2020.

The company added that net production has reached to 1,709 bbloe/d in the first of March and jumped to a high of 3,142 bbloe/d in early June during the testing of El Salmiyah-5 (ES-5) well. Liekwise, the performance of Abu Sennan Concession have achieved exceptional results since the beginning of 2020.

UOG noted that after completion of ES-5 well's testing program, the well was producing 2,900 barrels of oil per day (bbl/d) and 9 million standard cubic feet (mmscf/d) on a controlled rate at the end of June. Regarding ASH 2 well, its net production reached 660 bbl/d.

The company elaborated that the production was increased as a result of successful drilling, development of infrastructure in addition to completing low capital expenditure gas pipeline project at Al Jahraa which led to additional gas production and flaring reduction.

Furthermore, the Independent reserves report by Gaffney Cline and Associates mentioned significant improvements of reserves at Abu Sennan. It stated that Abu Senna 2P reserves increased 12.5% to 13.5 million barrels of oil equivalent (mmboe) (15% gas) versus 12 mmboe at the end of 2019. It also said that the gross 1P reserves rose by 76% to 4.2 mmboe and gross 3P reserves increased by 46% to 28.6 mmboe from 2.4 mmboe and 19.6 mmboe respectively at the beginning of 2019, in addition to 0.73 mmboe gross 2C contingent resource.

The company pointed that these reserves did not include the successful El Salmiyah-5 well and expects additional reserves from this well in 2020 report.

Moreover, UOG is looking forward to developing ASH-3 well in late 2020/ early 2021, adding that it expects flaring reduction after installing gas pipeline at the ASH field delivering 1.5 mmscf/d of gas. The company stated that it is making discussions with Abu Sennan joint venture partners for further development and exploration.

ADES EGYPT REVENUES RECORD $39.2 MM IN H1 2020

Advanced Energy Systems (ADES) earned $39.2 million in revenues from its work in Egypt during H1 2020 against $43.6 million in H1 2019; indicating a 10% year-on-year (YoY) decrease.

Egypt's revenues contributed to 16% of the company's total revenues which mounted to $249.3 million against $219.9 million; denoting a 13% YoY increase. ADES currently conducts offshore drilling and workover services in Egypt focusing on shallow/ultra-shallow water and non-harsh environments. The company has one Mobile Offshore Production Unit (MOPU), Admarine I, in Egypt which is under contract with Petrozenima to process, store and offload crude oil.

SISI AUTHORIZES PETROLEUM MINISTER TO CONTRACT WITH NEPTUNE, EGPC FOR E&P RIGHTS IN GULF OF SUEZ

President Abdel Fattah Al-Sisi ratified Law No. 159 of 2019 authorizing the Minister of Petroleum and Mineral Resources to contract with the Egyptian General Petroleum Corporation (EGPC) and Neptune Energy.

The law indicates that Neptune would explore the Northwestern Al-Amal marine area in the Gulf of Suez for three years beginning since the day of signing, noting that an extension is allowed. Neptune is expected to perform a 3D seismic survey of 100 kilometers square (km^2) and drill one well during the first period. Additionally, EGPC will be paid a sum of $11 million as a signature bonus before working on the concession.

AL-SISI LICENSES MOP TO CONTRACT EGPC, APACHE

According to Egypt's official Gazette, President Abdel Fattah Al-Sisi ratified law no. 167 of 2019, allowing the Minister of Petroleum and Mineral Resources to contract with the Egyptian General Petroleum Corporation (EGPC) and Apache West Kanayes Corporation LDC to amend the commitment agreement to search for oil in West Kanayes concession in the Western Desert.

This law was issued according to the law no. 20 of 2005, which was updated by the law no. 121 of 2014.

NESR AQUIRES SAPESCO IN A $21 MM DEAL

National Energy Services Reunited (NESR) Corporation has acquired Egypt's Sahara Petroleum Company (Sapesco) for $21 million.

Sapesco received an issuance of 2,237,000 of NESR's shares at a $10 per share conversion rate. Not only that, but per the agreement, Sapesco will have a final earnout of up to $3 million in cash and provision of additional shares at year-end based on the collection of certain receivables.

In a previous statement, NESR stated that it will assume Sapesco's debt which is valued at $11 million in addition to "the remaining $10 million of long-term debt and approximately $8 million of short-term debt from an existing local credit facility."

UOG APPOINTS IMAN HILL AS INDEPENDENT NON-EXECUTIVE DIRECTOR

United Oil & Gas PLC (UOG) has appointed Iman Hill as an Independent Non-Executive Director.

Earlier, Hill was announced as the next Executive Director of the International Association of Oil & Gas Producers (IOGP) as well, where she will take on this role in December of 2020. Hill has been in the oil and gas industry for over 30 years and has experience in delivering successful exploration and production (E&P) projects at international oil companies (IOCs). Not only that, but she has previously worked in onshore and offshore projects in Egypt, the Mediterranean, the North Sea, and South America.

Hill most recently served as the CCOO at Energean. Previously, she has held several positions as Technical Director, General Manager UAE, and Country President for Egypt at Dana Gas. She held the position of Vice President of Production and Development at Sasol, as well as being the Non-Executive Directorships at both Outukumpo, Europe's largest steel manufacturer, and EMGS.

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DANA GAS, IPR NEGOTIATE EGYPT ASSETS SALE

Dana Gas is currently in negotiations with IPR Energy about the sale of its Egyptian assets ahead of a repayment of about $300 million in debt in October.

Dana Gas was aiming to yield over $500 million in the deal, however, the deal will most likely be done at a lesser amount.

SAUDI ARABIA

The world's largest oil company, Saudi Aramco, has discovered two new oil and gas fields in northern Saudi Arabia near Arar. The new Abraq al-Toloul oil field flows with a rate of 3,189 barrels per day (bbl/d) of Arab light crude oil, along with 3.5 million cubic feet (mcf) of natural gas. The second field, the Hadabat al Hajara gas field located in the al-Jof region, has a daily production rate of 16 mcf of natural gas, along with 1944 bbl/d of oil condensate. At present, Aramco is still trying to calculate the total amount of oil and gas in the newfound fields and is currently drilling wells to determine the areas and capacities.

Khurais oil field, the largest intelligent oil field in the world, has become Saudi Aramco's second facility to join the WEF Global Lighthouse Network. The reason for the oilfield's inauguration into the network is for its excellence in the adoption of the 4th Industrial Revolution (4IR). The Khurais oil facility has adopted and integrated cutting-edge technologies to drive improvements in efficiency, safety, and environmental performance. This is one of ten facilities added to the network in 2020, taking the total number to 54 worldwide. Previously, Saudi's Uthmaniyah Gas Plant was included in 2019, meaning Aramco is one of only nine companies represented in the WEF network by more than one facility.

Saudi Aramco has delayed its multi-billion-dollar petrochemical and liquified natural gas (LNG) projects to maintain cash flow for the paying of dividends. Aramco is scaling back plans to construct a $20 billion crude-to-chemicals plant at Yanbu in eastern Saudi Arabia. Furthermore, the company is currently reviewing initial plans made earlier in the year to buy 25% of Sempra Energy's Texas LNG terminal. The hesitation to proceed with these expensive plans comes with the obligation to pay out $75 billion annually in dividends. Aramco suspended a deal to build a $10 billion refining and petrochemicals complex in China. Despite this, Aramco said it was still committed to downstream investments in China.

IRAQ

Iraq is set to increase its oil export capacity to 6 million barrels of oil per day (mmbbl/d) up from the country's current levels of 3.8 mmbbl/d. Iraq has laid out ambitious plans for Iraq to target production capacity of 7 mmbbl/d, to stop gas flaring, and stop fuel imports from Iran by 2025. Furthermore, the country has also implemented nearly 80% of all gas projects that will help reduce gas flaring and imports from Tehran. However, there was less positive news in the form of Ar Ratawi refinery, the country's biggest gas project, which had been delayed due to a lack of financing.

Iraq announced that the ministry of oil is planning to raise the production capacity of Baiji refineries to 280,000 barrels of oil per day (bbl/d). This is not the only plan in place to increase production as the ministry is also seeking to increase production in Al-Qayyarah refinery. This project would see the construction of a new 70,000 bbl/d capacity unit. The production capacity of the northern refineries currently exceeds 75,000 bbl/d, and it is hoped that it will reach 120,000 bbl/d by the end of this year.

Iraq's federal government has requested that the Kurdistan Regional Government (KRG) cut its oil production by 120,000 bbl/d. At present, the semi-autonomous Kurdistan Region of Iraq's domestic oil consumption is at 30,000 bbl/d, according to Khaled al-Shawani, the KRG minister responsible for dealing with Baghdad. Negotiations are ongoing between the two parties to try and reach an agreement on lowering production. According to the Iraqi Oil Minister, Ihsan Abdul Jabbar, the KRG is still exporting oil without consulting the federal government.

Iraq's oil ministry has announced that oil revenues accounted for in excess of $3.49 billion after a total of 85.6 mmbbl were exported. The exports of crude oil for July from the oil fields in central and southern Iraq amounted to 82.7 mmbbl with revenues of $3.366 billion, while Kirkuk oil through the port of Ceyhan totaled 2.701 mmbbl with revenues amounting to $118.5 million. Iraq exports crude oil from its southern ports through the Arabian Gulf and from its northern fields through the Turkish port of Ceyhan.

NIGERIA

Nigeria's oil ministry is set to release its long-awaited oil and gas reform bill to the president in an effort to boost output and attract foreign investment. The decision to reform the outdated gas bill comes after the low oil prices and a shift towards renewable energy making it more difficult to attract foreign investment. International oil companies (IOCs) have voiced their concern over the lack of reform. A draft summary stated that the bill would streamline and reduce some oil and gas royalties. It also proposes to boost the amount of money companies pay to local communities and for environmental cleanups. It would also facilitate the dispute resolution process between companies and the government. The bill also included measures aimed at pushing companies to develop gas discoveries and a framework for gas tariffs and delivery.

The Nigerian National Petroleum Corporation (NNPC) has received a prepayment funding of around $1 billion to support the upstream operations of its subsidiary company, the Nigerian Petroleum Development Company (NPDC). Crude oil prepayment has enabled NNPC to pay NPDC's tax obligations to the federal government, equating to about $700 million. This will be utilized to fund NPDC's capital expenditures (Capex) and operating expenditures (Opex). The prepayment financing will be produced by future oil production of NPDC. This means structuring the finances in such a way that the purchaser of the crude, Eagle Export Funding Limited, will be enabled to raise financing in the domestic and international markets, to fund an upfront payment to NNPC under a Forward Sale Agreement (FSA).

Nigeria's state-owned oil company, NNPC, recorded a $14 million cost for fuel in June, months after it changed its pricing method in an effort to eliminate subsidies. The costs are deemed to be temporary payments to marketers, who buy imported fuel and then sell it on, and also for stocks they held when the subsidy was removed. Nigeria's gasoline prices have been kept at incredibly low levels for decades with current levels at $0.48 per liter.

NORWAY

Norway's government has released the official production figures for the Norwegian Continental Shelf in July, showing a 120,000-barrels-per-day (bbl/d) reduction compared to the reference production. The production figures for the Norwegian Continental Shelf in July stood at 1.739 million barrels per day (mmbbl/d), a figure that is 52,000 bbl/d lower than the level Norway committed to in the Organization of the Petroleum Exporting Countries and its allies (OPEC+) regulation period. In comparison, June's production figures showed an oil production cut of 1.543 mmbbl/d. This means that the cut in the Norwegian oil production in June was 316,000 bbl/d compared to the reference production, or 66,000 barrels more than the announced cuts.

Equinor plans to drill new wells at Martin Linge field to secure production as several of the plant's wells do not have the necessary barriers. The Norwegian state-run oil and gas company will drill three wells, in addition to the two remaining wells from the plan for development and operation for the field to produce as originally planned. For measure, the cost of drilling three new wells will total about $219.4 million. This comes after an in-depth analysis of the wells drilled at Martin Linge found that several wells do not have the necessary barriers.

Norwegian oil and gas company, Neptune Energy, has been issued a drilling permit in production license 586 located in the North Sea. The drilling permit pertains to well 6406/12-G-1 H and will be drilled from the West Phoenix drilling facility. This is expected to happen when it completes the drilling of observation well 6406/12-H-4 for Neptune Energy in production license 586. The drilling program for well 6406/12-G-1 H relates to the drilling of a wildcat well in production license 586. This is the seventh exploration well to be drilled in this license. Neptune Energy is the operator with an ownership interest of 30%.

Equinor has awarded oil and gas service company, Aibel, a front-end engineering and design contract (FEED) for modification of the Hammerfest liquefied natural gas (LNG) plant in connection with the Snøhvit Future project. The FEED contract is valued at $15.7 million and will contribute about 80 man-years for Aibel. The FEED work will cover two sub-projects under the Snøhvit Future development: onshore compression and Hammerfest LNG electrification. The first sub-project involves the construction of an onshore compression station at the Hammerfest LNG plant. As the pressure in the wells on the Snøhvit field decreases, there will be a need for pressure support to maintain plateau production at the plant. The second sub-project is related to replacing current gas turbines with power from shore with electric turbines.

LIBYA

Eastern Libyan commander Khalifa Haftar is set to permit the country's oil ports to reopen after an eight-month blockade There is a general consensus that it is high time to reopen the energy sector. The restarting of operations will also enable progress toward a much-needed overhaul of security arrangements for National Oil Company's (NOC) facilities, including the full withdrawal of foreign military personnel and equipment present at oil and gas sites without Libyan approval. Previously, Libya had an annual output of 1.2 million barrels a day (mmbbl/d) in 2019. Output plummeted to about 95,000 barrels per day (bbl/d) after the cessation of operations at fields and ports as a result of an illegal blockade.

Libya's NOC has showcased the investment opportunities that Libya can offer for UK companies to potentially pump billions of dollars in the Libyan oil and gas sector. UK companies will have the opportunity to win highly profitable business in the oil and gas sector in Libya if there is a level playing field. With this said, it would not be achievable without an end to the current closures of oil facilities and without the establishment of a stable Libyan government.

NOC has confirmed that the oil tanker, Valle Di Siviglia, has arrived at the eastern Libyan port of Brega. The tanker was requested by the NOC and it is reported that it will ship 30,000 tons of condensate stored in the port to free up adequate storage capacity to enable the continuation of natural gas production at its current levels of around 160 million cubic feet per day (mcf/d). The arrival of Valle Di Siviglia comes after the Tripoli-based and internationally recognized Government of National Accord (GNA) had announced an immediate ceasefire.

BRAZIL

Brazil's state-owned oil company, Petrobras, has announced it has reached an agreement with 3R Petroleum to sell its entire stake in eight onshore fields at Polo Rio Ventura. The fee for the onshore fields is expected to reach $94.2 million. So far, $3.8 million was paid on August 21 with a further $31.2 million to be paid when the transaction is complete. From the point of completion, $16 million will be paid in the coming 30 months and the final $43.2 million will be delivered in contingent payments.

France's oil major, Total, notified its partners on August 19 that the company will resign from its role of operator for five exploration blocks offshore Brazil. The five exploration blocks, located 120 kilometers offshore in the Foz do Amazon as Basin, are referenced as FZA-M-57, FZA-M-86, FZA-M-88, FZA-M-125, and FZA-M-127. Total has informed the National Agency of Petroleum, Natural Gas and Biofuels (ANP) of the decision, which opens up a six-month period during which a new operator will be appointed and to whom the operational activities will be handed over. In the meantime, Total will continue to monitor all regulatory processes on behalf of its partners Petrobras and BP.

Petrobras has put up for sale 26 onshore and shallow-water oil fields along with a small refinery, Clara Camarao, in the northeast of Brazil. The announcement of this sale is in line with the company's extensive divestment program. The assets in question are the Polo Potiguar oil fields, which produced roughly 23,000 bbl/d of oil in 2020 and 124,000 cubic meters per day of gas. The refinery in question has an installed capacity of 39,600 bbl/d. Petrobras is years into a drive to sell billions of dollars worth of non-core assets in a bid to reduce its hefty debt load and to realign its focus towards deepwater oil production.

THE UNFOLDING OF NATURAL GAS NEW ERA

EAST MEDITERRANEAN

EMGF'S FOUNDERS SIGN CHARTER, BECOME FORMALLY ESTABLISHED

The founding countries of the East Mediterranean Gas Forum (EMGF) have signed a charter on September 22 to become an established international organization contributing to the development of natural gas fields and maximizing the utilization of natural resources in the Mediterranean region.

The Minister of Petroleum and Mineral Resources, Tarek El Molla, said that this is a major breakthrough in the journey of establishing the forum, which aims at boosting cooperation and optimizing economic exploitation for the countries' reserves.

According to the charter, the EMGF will act as a platform that brings together natural gas producers and consumers to form a joint vision as well as a regulated dialogue over natural gas policies to utilize the region's resources.

Additionally, EMGF fully respects all the rights of its members, preserves their natural resources according to international law, and supports their efforts to invest in their reserves and infrastructure through effective cooperation with gas industry parties. The forum is open to new membership submissions.

EGYPT, CYPRUS CONFER ESTABLISHMENT OF MARINE PIPELINE

The Minister of Petroleum and Mineral Resources Tarek El Molla, alongside Natasa Pilides, the newly appointed Cypriot Energy Minister, discussed preparations for the establishment of a direct marine pipeline between the two countries.

The pipeline deal entailed the transfer of natural gas from the Aphrodite field in Cyprus and re-export it through Egypt. Both ministers affirmed that the deal is underway and currently coordination is underway between officials from both parties before implementing the project.

El Molla stated that Egypt aims to maximize the economic exploitation of its natural gas infrastructure through pipelines and liquefaction complexes.

The two ministers reviewed the procedures for turning the East Mediterranean Gas Forum (EMGF) to the level of an intergovernmental organization to reap the benefit from the abundant natural gas available in the Eastern Mediterranean region. Additionally, they reviewed the Gas Industry Advisory Committee (GIAC) results, as well as the high-level working group of the forum's country members.

OIL PIPELINE FROM IRAQ TO EGYPT, JORDAN GETS CONSIDERED

The Minister of Petroleum and Mineral Resources, Tarek El Molla, raised the subject of establishing a pipeline to transport crude oil from Iraq to Egypt and Jordan in a meeting with Prime Minister Mostafa Madbouly.

This recommendation emerged from the framework of enhancing cooperation between the three countries in the petroleum capabilities.

This came during a meeting between Madbouly and a number of Egyptian ministers to discuss the possible projects to boost cooperation between Egypt, Jordan and Iraq in line with the trilateral summit, which was held in Jordan in the attendance of the Egyptian President, Abdel Fattah Al-Sisi.

CHEVRON APPROVES $5 B TAKEOVER OF NOBLE ENERGY

US supermajor Chevron Corporation has agreed to acquire all of the outstanding shares of Noble Energy for a total of $5 billion for assets offshore Israel.

The strategic acquisition bolsters Chevron's upstream portfolio with low-cost, proven reserves, and attractive undeveloped resources. Noble Energy formerly held assets offshore Israel, meaning that Chevron's position in the Eastern Mediterranean will be improved. Furthermore, the acquisition of Noble Energy will enhance Chevron's strategic US assets with de-risked acreage in the DJ Basin and 92,000 largely contiguous and adjacent acres in the Permian Basin.

This transaction is expected to achieve run-rate operating and other cost synergies of $300 million. Coupled with this, Chevron expects there to be an accretive return on capital employed, free cash flow, and earnings per share one year after closing, at $40 Brent.

DISCOVERIES

NEW DISCOVERY OF NORTH HAMMAD TO PRODUCE 32 MMCF/D OF NATURAL GAS

The Ministry of Petroleum and Mineral Resources announced the new discovery of the North Hammad concession in the Delta. It is expected to initially produce natural gas at a rate of 32 million cubic feet per day (mmcf/d).

These results came after conducting several tests on the new well. Eni company, which is the operator of this concession, and its partners BP and Total will make a plan to link the well to the production line in cooperation with the Egyptian Natural Gas Holding Company (EGAS), using the existing infrastructure.

Such success reflects the strategy of the Ministry of Petroleum and Mineral Resources of expanding exploration activities in different offshore and onshore Egyptian areas to develop the oil and gas resources in cooperation with the major companies.

GPC MAKES NEW NATURAL GAS DISCOVERY IN ABU SENNAN

The General Petroleum Company (GPC) has made a new natural gas discovery in Abu Sennan concession producing 28 million cubic feet per day (mcf/d) in

addition to 1,180 barrels of condensates per day of API 64° when it is opened one inch.

Moreover, the well is producing about 15 mcf/d and about 1,100 b/d of condensates when it is opened 0.75 inches.

The initial evaluation for the Well storage reached 8 billion cubic feet equivalent (bcfe) to five billion exploitable reserves after conducting subsurface tests and compression measurements. Plans are currently prepared to develop and exploit the new discovery.

This came in the light of the Ministry of Petroleum and Mineral Resources strategy to intensify exploration operations in the different areas of the company to increase the production of petroleum products as well as exploit the company's assets and test the closed wells.

PRODUCTION

ZOHR'S DAILY PRODUCTION EXCEEDS 3 BCF

Zohr field's production capacity now exceeds 3 billion cubic feet per day (bcf/d), representing 40% of Egypt's total natural gas production.

The minister announced that the drilling of Zohr's southern wells has been completed and put on the production map to bring the total number of the field's production wells to 15. Zohr development project ran at a cost of $10.4 billion up until the end of June.

To improve production, Petro Shorouk completed its onshore treatment units which included; two sulfur recovery units and some modifications in the onshore treatment plant and the well-included desalination plant.

On the other hand, Petrobel's maximum production capacity of its affiliated fields, including Zohr, reached nearly 1 million barrels of oil equivalent per day (mmbbloe/d). Soon after developing its production fields in the Gulf of Suez, the company was able to produce about 1.1 bcf/d of natural gas, about 70,000 barrels per day (bbl/d) of crude, in addition to 12,000 bbl/d of condensate, and about 280 tons of butane per day. Petrobel's investments reached $720 million and managed to rationalize expenditures by more than $50 million.

EGYPT'S NATURAL GAS PRODUCTION CAPACITY REACHES 7.2 BCF/D

Egypt's natural gas production capacity reached 7.2 billion cubic feet per day (bcf/d) as a result of the efforts to confront the natural decline of wells during the past five years. During fiscal year (FY) 2019/20, Egypt drilled 12 exploration wells in the Mediterranean and the Nile Delta, which resulted in seven new discoveries.

As for the natural gas delivery project, Egypt connected 1.1 million housing units to the natural gas grid during the year, bringing the total number of connected units in the past seven years (2013-2020) to 5.6 million. About 42,300 cars have been converted to run on natural gas in FY 2019/20, bringing the total number of converted cars since the start of the project to 318,300 cars.

Egypt has also implemented several pipeline projects to support the national natural gas grid in light of its important role to transport and supply power stations with natural gas. Minister of Petroleum and Mineral Resources, Tarek El Molla, called for benefiting from Egypt's abundant resources and rationalizing imports of liquefied natural gas (LNG).

BP: EGYPT'S LNG EXPORTS REACH 4.5 BCM IN 2019

BP announced that the Egyptian Liquefied Natural Gas (LNG) exports increased 2.6 billion cubic meters (bcm) recording 4.5 bcm during 2019, while the imports decreased to 3.2 bcm by the end of 2018 after recording zero imports in 2019.

Egypt exported about 1.7 bcm to Europe, 2.7 bcm to Pacific and Asian countries in addition to 1 million cubic meter (mcm) to Kuwait and 1 mcm to UAE.

Meanwhile, natural gas consumption recorded 2.12 bcm in 2019 compared to 2.15 bcm at the end of 2018. In addition, natural gas production jumped 10.9% to 64.9 bcm at the end of 2019 compared to 58.6 bcm at the end of 2018. Natural gas proved reserves recorded 2.1 trillion cubic meters during the period between 2009 to 2019.

Moreover, Egypt's natural gas liquid production dropped 3.9% to 53,000 barrels per day (bbl/d) comparing to 55,000 bbl/d in 2018.

ATOLL'S NATURAL GAS PRODUCTION INCREASES BY 28% IN FY 2019/20

Atoll field's production increased by 28% from 250 million cubic feet of natural gas per day (mmcf/d) to 320 mmcf/d during fiscal year (FY) 2019/20. A review of the company's progress during FY 2019/20 shows that the company's daily natural gas production amounted to 411 mmcf in addition to 7,600 barrels of condensates.

The preparation for production, engineering designs, and manufacturing of the subsurface equipment have been completed and will be installed to wells Atoll-4 and Qatameya by the end of October. Production of the two wells is expected to reach 160 mmcf/d, with investments of about $280 million.

The company successfully added 10 mmbbl of crude and 24 billion cubic feet (bcf) to its reserves. While the company's investments reached $349 million, APC has managed to save $39 million by utilizing modern technologies in drilling, increasing equipment efficiency, and using alternative solutions.

NATURAL GAS VEHICLES

NATURAL GAS VEHICLES TO SAVE CITIZEN EGP 1,200 MONTHLY

The Minister of Petroleum and Mineral Resources, Tarek El Molla, said that natural gas usage as fuel will save about EGP 1,200 monthly for each citizen who uses an average 10 liters of gasoline 92 per month.

People can save about EGP 825 monthly if they are using 10 liters of gasoline 80. El Molla elaborated that the price of natural gas per cubic meter is EGP 3.5, while the price of gasoline 80 price is EGP 6.25 per liter and gasoline 92 price is EGP 7.5 per liter. El Molla added that this action will allow citizens to redeem the cost of conversion in a period of three to six months. Regarding payment facilities, the minister said that there are several installation payments with zero deposit and interest.

MOP: NATURAL GAS OPTIMUM FOR ALL VEHICLES

The Ministry of Petroleum and Mineral Resources has released a report detailing the benefits of Compressed Natural Gas (CNG) as the best fuel for all vehicles. The report includes a guide for converting cars to run on natural gas, indicating that it only takes two to four hours to convert vehicles depending on its model. Per the statement, the petroleum sector added the car conversion program with conversions available for cars with an engine capacity of more than 2500 cc, as well as cars equipped with a turbocharger.

The ministry stated that utilizing natural gas as fuel is very safe as the gas cylinder automatically closes to prevent any gas leakage. Not only that, but the cylinder is made of special steel to withstand high pressure and is manufactured according to international standards (ISO Standard 11349).

EGYPT TO CONVERT 300 PUBLIC BUSES TO RUN ON NATURAL GAS

The Head of Public Transportation Authority, Rezk Ali, said that the authority is going to sign contracts to convert 300 buses running on diesel to run on natural gas in cooperation with the Military Factory 200 after the success of converting the first bus. The cost of conversion stands at EGP 500,00 per bus so the total cost will reach EGP 150 million in the first phase. The target is to convert its fleet of more than 3,500 diesel-run buses.

PROCESS SAFETY MANAGEMENT
IN THE OIL & GAS AND PETROCHEMICALS SECTOR

Just weeks before COVID-19 emerged as a global pandemic, in February 2020, Methanex Egypt and the Egyptian General Petroleum Corporation (EGPC), signed a Memorandum of Understanding (MoU), in the presence of H.E. Eng. Tarek El-Molla Minister of Petroleum and Mineral Resources, enabling collaboration between the company and the ministry to embed the culture of Process Safety Management (PSM) within the Egyptian oil, gas and petrochemicals sector, in alignment with the ministry's Modernization Program.

Despite the global pandemic, the signatories of the MoU forged ahead with the execution of the ambitious roadmap, and the meetings of the Process Safety Management Steering Committee, comprising members from the Ministry of Petroleum, the Egyptian Petrochemicals Holding Company (ECHEM), EGPC, Egyptian Natural Gas Holding Company (EGAS) and Ganoub El Wadi Petroleum Holding Company (Ganope), continued regardless. Egypt Oil and Gas met with Mr. Mohamed Shindy, Methanex Egypt's CEO and Mr. Mourad Hassan, Methanex Egypt's Responsible Care (HSEQ) Manager to understand more about PSM, the significance of the recently signed MoU and the progress of the Egyptian PSM Steering Committee.

"PSM is a set of interrelated principles for managing the hazards associated with process industries. These principles are designed to reduce the frequency and potential severity of process incidents that could result from the accidental release of hazardous fluids (oil, gases, chemicals) and other energy sources," Hassan explained.

The goal of PSM is to ensure mitigations are in place to prevent accidents that can cause serious harm to people, environment and assets. "The impact of a PSM event is significant for the working teams, society, corporations and governments. The potential loss resulting from such an event is not only financial, but the people impact, the environmental damage, the legal cases and the overhaul work is great – I can tell you that having lived through a number of those situations myself," Hassan said. Examples of historic PSM events offshore and onshore include Piper Alpha offshore platform explosion and oil spill in the North Sea, Exxon Valdez oil spill in Alaska, Texas City explosion in the USA, Esso Longford gas explosion in Australia, Bhopal gas release in India, etc. In many of those incidents, the impact and damage were irreversible.

According to Shindy, the company has been on its own journey of embedding PSM within its organization globally and in Egypt. "We wanted to share the lessons we learnt on our journey with the wider sector, so we reached out to Chemist Saad Helal, the Chairman of ECHEM in 2018, with the proposal to partner in launching the first PSM workshop and conference. His enthusiasm matched ours – there was clear need to start a wide dialogue about this critical topic," Shindy says. The success of the first workshop led to the second conference taking place in September 2019, encouraged by the minister who highlighted the need for all companies to follow PSM during last year's Safety Week.

The events brought together hundreds of participants from across the Egyptian petrochemical, oil and gas sector companies, in addition to world-renowned speakers who introduced PSM, shared case studies and started a wide discussion about the topic. The next natural step was the creation of a PSM Steering Committee to take the discussion to a deeper level, and to enable the implementation of a three-year roadmap towards the adoption of PSM within all the companies operating under the umbrella of the Ministry of Petroleum and Mineral Resources' holding companies aimed at institutionalizing PSM within the industry in accordance with the ministry's Modernization Program and international best practices, guidelines and standards. This was formalized during the Egypt Petroleum Show (EGYPS 2020) conference, through the signing of the MoU between Methanex Egypt and EGPC.

"The MoU is a truly crowning achievement of two years' worth of collaborative work between multiple organizations who formed the founding core for creating an Industry PSM Committee and is part of our strong commitment to PSM," Shindy said.

The MoU enables the development of a plan to identify the status of the MoP companies' PSM maturity, the PSM program procedures based on the US Center for Chemical Process Safety (CCPS) and a Hazard Management program set of guidelines, including but not limited to; Safety Case, Process Safety Major Accident Prevention Policy, etc. The committee will also identify PSM Key Performance Indicators for companies' performance management. In addition, it will suggest a PSM organizational structure to be applied at the Ministry of Petroleum and Mineral Resources and its affiliated companies including roles and responsibilities for the job profiles and a competency framework. The committee will also lead the communication within the industry in the form of workshops, conferences, publications, etc.

One significant mandate has been the creation of the PSM technical sub-committee under the leadership of the Egyptian Process Safety Management Steering Committee. This sub-committee's role is the implementation of the recommendations from the Egyptian Process Safety Management Steering Committee through a formal mandate. This committee will utilize the support of the Ministry of Petroleum's Capacity Building candidates in a meaningful manner to enhance their skills and progress their development. The role includes the execution of the PSM Road Map, thorough company PSM baseline review, development of PSM procedures (e.g. Management of Change, PSM Roles & Responsibilities, Organization Capability, Risk Management, Key Performance Indicator and PSM Performance Management, etc.) and Major Hazard Management guidelines.

The meetings of the PSM committee continued to take place online as scheduled over the past seven months despite the challenges of COVID-19, thanks to the dedication of the committee members and their commitment to expediting the journey towards safer processes within the sector, ensuring adherence to the timeline proposed within the MoU.

methanex
the power of agility

THE EGYPTIAN PSM
STEERING COMMITTEE MEMBERS ARE:

- **Osama Nour El Din** – HSE Undersecretary for the Minister of Petroleum and Mineral Resources – MOP
- **Gamal Fathy Mohamed** – HSE Chairman Assistant – EGPC
- **Osama Abdou Ahmed Hassanin** – HSE General Manager – EGPC
- **Mohamed Mahmoud Zaki** – Executive Vice President, Operations – ECHEM
- **Salah El Din Riad** – Q&HSE Chairman Assistant – ECHEM
- **Ahmed Ali Hassan Akrab** – Safety General Manager – ECHEM
- **Mohamed Shindy** – Managing Director – Methanex Egypt
- **Manal El Jesri** – Public Affairs Manager – Methanex Egypt
- **Amr Moawad Hassan** - PSM Consultant – Methanex Egypt
- **Mourad Maged Hassan** – Responsible Care (QHSE & PSM) Manager – Methanex Egypt
- **Sameh Sayed Abdel Razek** – Occupational Health & Safety Chairman Assistant – EGAS
- **Emad Kilany** – HSE Assistant General Manager – EGAS
- **Mohamed Sayed Suliman** – HSE General Manager – Ganope

MARIDIVE IS REORGANIZING IN RESPONSE TO THE NEW NORM

In Order to cope with the current oil industry challenges that are due to the reduced economic activity, driven by the change of the demand and supply pattern; Maridive Group is undergoing a major revamp both with regard to Organization Structure along with the overall Company Culture.

Maridive will adopt parallel approaches in response to the evolving market conditions and will focus on the following key areas.

RIGHT SIZED ORGANIZATION

Establish significantly leaner and more responsive structure, adapted to the new industry normal, and strategically aligned with the pioneered Maridive performance vision.

TRANSFORMATION

Internal Processes Transformation to match the current industry challenges to drive operational efficiency, enhance service delivery to our business partners and support growth.

EFFICIENCY

Adopt innovative approaches in order drive the overall efficiency gains in Cost of Service Delivery, Base Cost and People Productivity.

GROWTH

Growing Market Share while prioritizing focused growth in lower risk and expanding markets.

While we are going through those major changes in the company culture, we are confident that our overall performance shall rapidly improve with those measures being implemented.

A DETAILED REVIEW FOR THE SUEZ CANAL & EGYPT'S LNG TRADE (2015-2019)

BY AMINA HUSSEIN, REHAM GAMAL, AND TASNEEM MADI

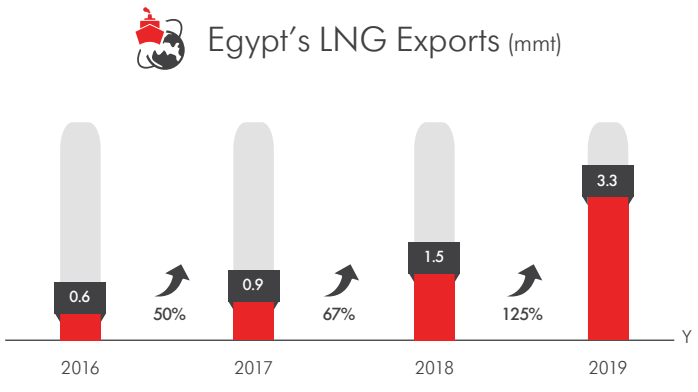
Egypt has reclaimed its position as the hydrocarbons regional hub, especially when it comes to natural gas. In fact, the country has converted from being a natural gas net importer to being a net exporter in 2018. This phenomenon happened as a result of the major natural gas discoveries that increased natural gas production levels. The major developments in natural gas production were combined with the exceptional infrastructure that paved the country's path to become a regional natural gas hub. Egypt has one of the largest liquified natural gas (LNG) infrastructures in the region, which include two liquefaction plants located in Idku and Damietta.

On the other hand, Egypt has one of the most important navigation canals in the world that plays a significant role in the international trade of LNG, the Suez Canal. Over the past five years, from 2015 to 2019, the Suez Canal witnessed the flow of 132.84 million tons (mmt) of LNG through both of its bounds, according to the Suez Canal Authority (SCA) data.

Hence, this report presents Egypt's position as a natural gas regional hub by shedding the light on both the country's LNG exports and flows through the Suez Canal over the period between 2015 and 2019.

1. EGYPT'S LNG EXPORTS

Egypt's annual average LNG exports reached about 1.25 mmt, during the period from 2015 to 2019, while its total LNG exports over the same period were recorded at 6.25 mmt. There was no LNG amount exported in 2015, according to BP's Annual Statistical Review of World Energy 2020. In 2014, the country completely halted exports, turning into a net natural gas importer in fiscal year (FY) 2015/16, due to upstream underinvestment and increasing demand.However, in August 2015, the discovery of the giant Zohr gas field by Italy's Eni brought a decisive turning point to the country's status in the natural gas market. Egypt was able to halt its LNG imports and further started to export, according to BNP Paribas' study on Egypt's oil and gas industry in 2017.



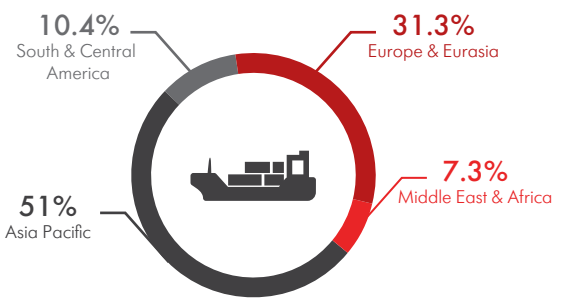
Egypt's LNG exports have been experiencing increasing rates on an annual basis. It is worth mentioning that LNG exports increased from 1.47 mmt in 2018 to more than double the amount exported, reaching about 3.5 mmt in 2019, due to the

increasing output from gas fields that are connected to the national grid. Thus, the highest amount of exports was in 2019; with the highest contribution of 53% from Egypt's total LNG exported along the years, according to BP's Annual Statistical Review of World Energy 2020.

A. LNG EXPORTS PER REGION

Asia Pacific acquired the largest amount of Egypt's LNG exports over the period from 2015 to 2019 with a total of 3.63 mmt LNG imports. The European continent, along with the Eurasia region, came second with total LNG imports from Egypt amounted at 2.22 mmt. The Egyptian LNG exports to the Middle East and African countries recorded a total of 0.518 mmt, while South and Central America imported a total of 0.74 mmt of the Egyptian LNG.

Egypt's LNG Exports per Region over (2015-2019)

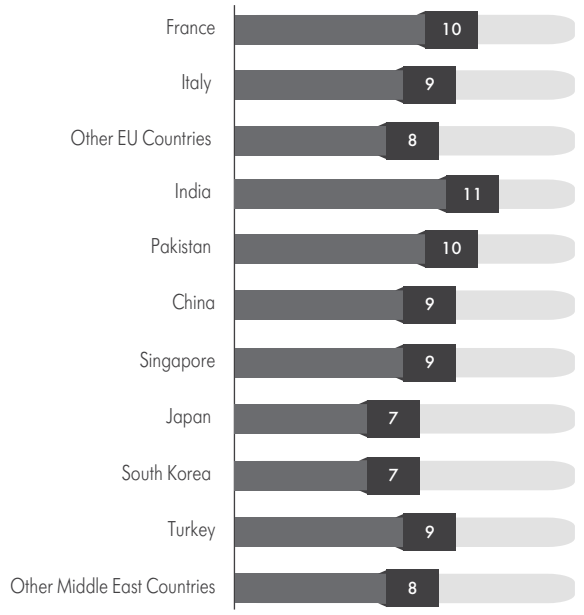


B. LNG EXPORTS PER COUNTRY

Egypt exports LNG to about 14 countries in Europe, Middle East, Africa, and Asia Pacific. Pakistan and India are considered Egypt's top LNG importers during the mentioned period. Pakistan's LNG imports from Egypt reached 0.66 mmt and India's LNG imports from Egypt were recorded at 0.735 mmt. While Taiwan, Thailand and other Asian Pacific countries received the lowest amount of LNG from Egypt of 0.147 mmt, 0.147 mmt and 0.0735 mmt respectively, according to BP's Annual Statistical Review of World Energy reports.

France, Italy, Turkey and other European countries received about 2.35 mmt of Egypt's LNG export. On the other hand, Kuwait and UAE received about 0.51 mmt of the country's total LNG exports, according to BP's Annual Statistical Review reports.

Egypt's LNG Exports per Country over (2015-2019) (%)



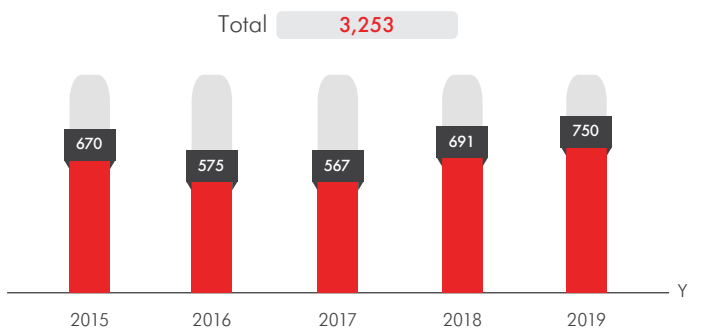
2. LNG CROSSING VESSELS IN SUEZ CANAL

The Suez Canal, that links the Red Sea to the Mediterranean Sea, is a critical checkpoint due to the large amounts of hydrocarbons that flow through it. The Suez Canal is considered Egypt's strategic path for LNG shipments to Europe and North America, according to a report by the US Energy Information Administration (EIA).

According to the SCA, the number of LNG ships in 2015 represented 3.83% of the total ships passing through the Canal, which increased to 3.97% in 2019.

Over the period between 2015 and 2019, the LNG vessels crossing the Suez Canal witnessed an increasing trend, with a total of 3,253 vessels. In 2016, the number of vessels slightly decreased, however, it continued to increase until reaching 750 in 2019.

LNG Crossing Vessels through the Suez Canal

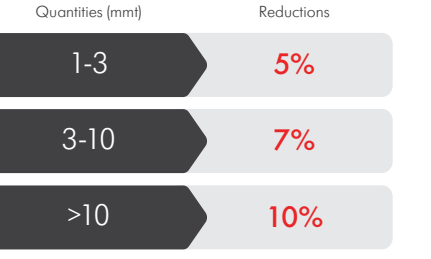


It is noteworthy that the number of crossing vessels remarkably increased from 691 vessels in 2018 to 567 vessels in 2017, according to SCA's annual reports. This was a result of the incentives provided by the SCA to the vessel's owners. For instance, in late 2017, the SCA granted LNG vessel's owners and operators discounts in order to encourage more vessels to transit within the Canal. The grant was concerned with LNG tankers operating between the American Gulf, the Arabian Gulf zone, India and its Eastern ports, according to SCA's Navigation Circular No. 7/2017.

In 2019, the SCA set an incentive called the 'Quantity Incentives'. Under this incentive, customers of LNG carriers are granted discounts for transporting additional quantities of LNG through the Canal. Several reductions shall be granted for the clients for each carrier's round-trip, according to SCA's Navigation Circular No. 1/2019. Consequently, the number of LNG vessels jumped by 9% in 2019, stated in SCA's annual reports.

It is worth mentioning that the mentioned rebates shall be calculated from Suez Canal normal tolls after deducting the rebate of 25%, which is granted by Circular No. 2/2015. Moreover, It is not allowed to benefit from both the Quantities Incentive discount as well as the discount granted by Circular No. 7/2017 at the same time.

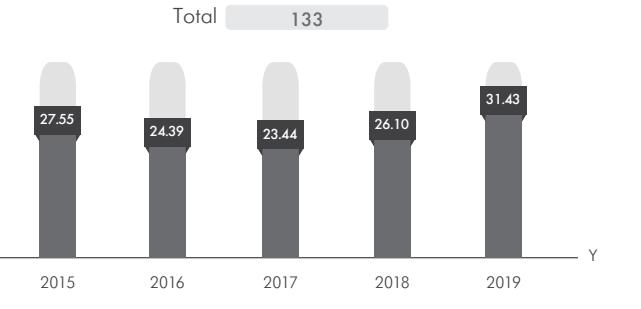
LNG Quantities Incentive's Reductions



3. LNG FLOWS THROUGH THE SUEZ CANAL

The Suez Canal has LNG flows in the northbound and southbound directions, representing a significant amount of global LNG trade. The total LNG flows from both directions grew by 14% in 2019 compared to those in 2015. In parallel with the decline in number of crossing vessels, LNG flows declined in 2016 by 11%, yet they started to increase from 2017 until reaching about 31 mmt in 2019, stated in SCA's annual reports.

Total LNG Flows in the Suez Canal (mmt)



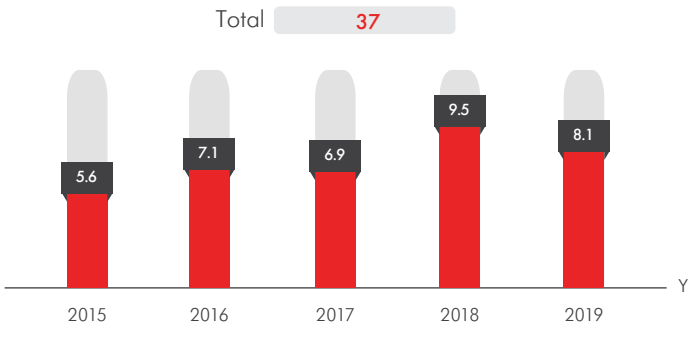
The northbound LNG flows come mostly from Qatar and are exported to European markets. On the other hand, the southbound LNG primarily flows from the United States (US), Algeria, France, and is generally exported to Egypt, Jordan and Japan, according to SCA's annual reports.

It is worth recalling that, from 2015 to 2019, Egypt's LNG flows represented around 7% of the total LNG flows through the Canal. Meanwhile, Egypt's LNG exports through the Canal recorded 4 mmt, representing 63% of the country's total LNG exports.

A. LNG MOVEMENTS THROUGH SOUTHBOUND

Over the period between 2015 and 2019, the southbound LNG flows totaled 37 mmt, and they remarkably rose by 45% in 2019 compared to those in 2015. Over the referred period, the LNG flows fluctuated until they jumped by 38% to hit 9.5 mmt in 2018 then cut down by 15% to record 8.1 mmt in 2019, explained in SCA's Annual reports.

Southbound LNG Flows (mmt)



The majority of LNG tonnage passing through the Canal's southbound comes mainly from America. As over the period between 2015 and 2019, the total LNG from America recorded 9.18 mmt. Over the referred period, the American continent as an exporting region had a share of 24.7% in LNG cargoes moving from South to North, according to SCA's annual reports.

The North Mediterranean region, on contrast, is the exporting region with the least exported volumes of LNG through the southbound. As from 2015 to 2019, the total tonnage of LNG coming from the North Mediterranean was recorded at 1.96 mmt, according to SCA's annual reports.

From the American continent, the US was the largest exporting country with 6.5 mmt, straightway followed by Algeria with about 6 mmt then France with 4.5 mmt, all representing 46% of the southbound LNG exports.

Main Southbound Cargo by Origin Region over (2015-2019)

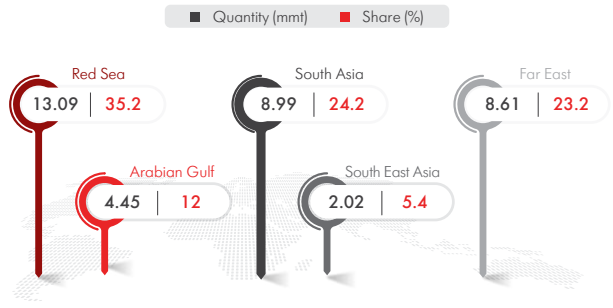
	Quantity (mmt)	Share (%)
East & Southeast Med.	3.85	10.4
North Med.	1.96	5.3
West & Southwest Med.	7.38	19.9
North, West Europe & UK	11.27	30.3
Baltic Sea	0.22	0.6
America	9.18	24.7
Other	3.31	8.9

As for destination regions, the Red Sea region is the largest receiver of the South LNG, as it received approximately 13 mmt of LNG between 2015 and 2019, with an annual average of 3.72 mmt. Over the mentioned period, the Red Sea region had a 35.2% share in the total tonnage received by the Northern areas according to SCA's annual reports.

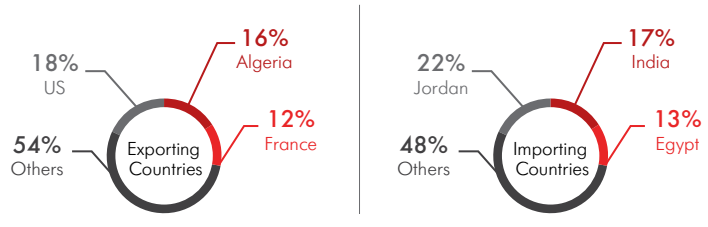
This is reflected in terms of the largest importing countries, which include Jordan, India, and Egypt with LNG imports of about 8, 6 and 5 mmt, respectively. These numbers contribute over 50% of the southbound LNG imports, according to SCA's annual reports.

On the other hand, over the referred period, South East Asian countries received only a total of 2.02 mmt of the LNG tonnage passing through the Canal's southbound, with 5.4% of the total tonnage passing through the bound, according to SCA's annual reports.

Main Southbound Cargo by Destination Region over (2015-2019)



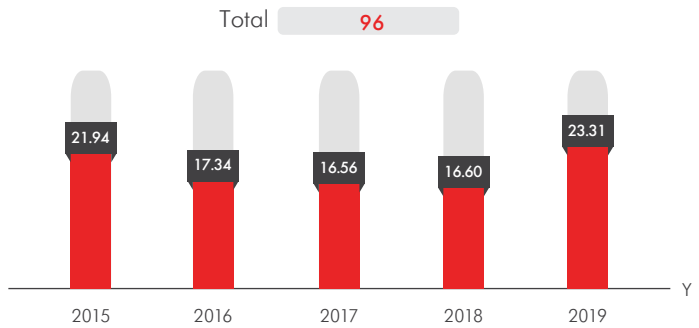
Largest Southbound Exporting & Importing Countries over (2015-2019)



B. LNG FLOWS THROUGH NORTHBOUND

From 2015 to 2019, the northbound LNG flows amounted to 96 mmt, where they increased by 6% in 2019 compared to those in 2015. Over the referred period, the LNG flows saw a declining trend. Nevertheless, the LNG flows slightly increased in 2018 to about 17 mmt. This was followed by a significant jump of 40% in 2019, reaching about 23 mmt representing the highest LNG flows, according to SCA's annual reports

Northbound LNG Flows (mmt)



The Arabian Gulf dominates the LNG exports flow through the northbound of the Suez Canal. The total volume of LNG from the Arabian Gulf, over the period between 2015 and 2019, recorded 95.35 mmt, which represents 99.6% of the total LNG moving from North to South, according to SCA's annual reports.

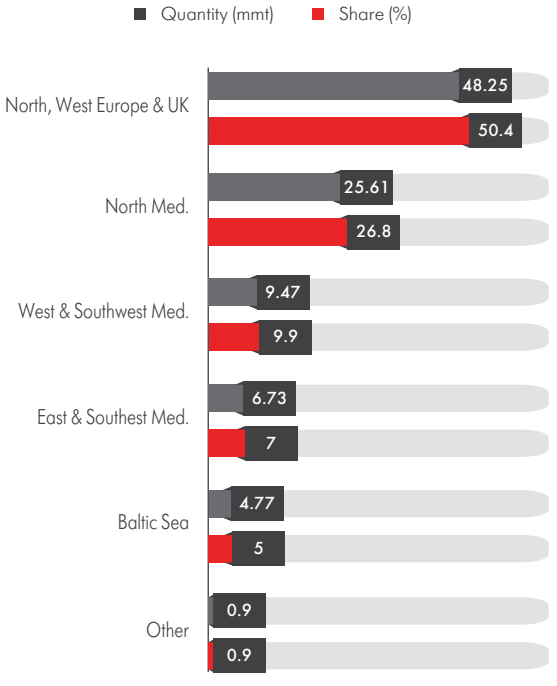
Over the referred period, Qatar got the lion's share from the exporting countries, contributing about 95 mmt of LNG flows.

Northern Europe, Western Europe and the UK represent the main destination for LNG cargoes in the South with a total tonnage of 48.25 mmt received from the northbound between 2015 and 2019. The UK was determined to be the largest importing country with LNG imports of 258 mmt. Italy came second with imports of 23 mmt, while Spain came third at 13 mmt, explained in SCA's annual reports.

Main Northbound Cargo by Origin Region over (2015-2019)

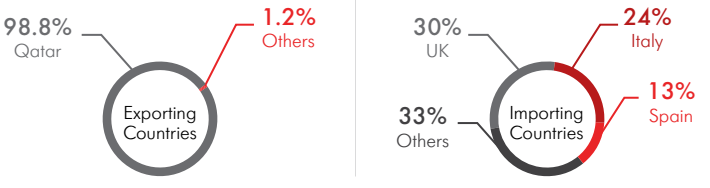
	Red Sea	Arabian Gulf	Other
Quantity (mmt)	0.28	95.35	0.11
Share (%)	0.3	99.6	0.1

Main Northbound Cargo by Destination Region over (2015-2019)



On the other hand, the Baltic Sea region has received only a total of 4.77 mmt remarking a share of 5% in total LNG cargoes moving from North to South, according to SCA's annual reports.

Largest Southbound Exporting & Importing Countries over (2015-2019)



Egypt is moving with steady steps towards being a regional natural gas hub. This is reflected in the country's increasing growth rate of LNG exports and LNG trade expansion through the Suez Canal. The Egyptian LNG exports jumped from zero to 3.3 mmt over the period 2015 and 2019, according to BP's data.

On the other hand, the Suez Canal significantly participates in the growth of the Egyptian natural gas trade, by strengthening Egypt's global position and supporting the MoP's modernization project to convert Egypt to a regional energy hub.

The expansion of the canal in 2015 increased the traffic in terms of number of ships and quantities of transported goods, which was reflected in the LNG trade flows. Between 2015 and 2019, the number of LNG ships increased by 11.9 % from 670 to 750. While the net tonnage of LNG ships witnessed an increase of 16% from 72.996 mmt in 2015 to 84.699 mmt in 2019, according to the SCA data.

ENERGY EGYPT HIGHLIGHTS ADVANTAGES OF SPOOLABLE COMPOSITE PIPELINE

BY JACK BECKFORD

Energy Egypt held its first online webinar on September 24 to discuss the latest updates on the prevalent debate on Spoolable Composite Pipeline (SCP) and Steel Pipelines (SP). The Webinar titled "The Economical Benefits of SCP vs Steel", was organized by Energy Egypt and Shawcor, giving industry experts' insight into the matter.

The webinar was moderated by Aidan McKay, General Manager of Energy Egypt. The esteemed speakers at the webinar were Amr Tawfiq, Maintenance General Manager at Petradora & West Bakr; Marco Arams, International Field Operations Manager at Shawcor Composite Solution; Khaled Marmour, Shawcor's Regional Sales Manager; and Jonathan Gibson, VP for Business Development.

The application of these pipes can be found at oilfields and are used for: oil and gas gathering lines, water injection, and wastewater. Due to the inert layer of High Density Polyethylene (HDPE), the SCPs can handle all types of materials.

The webinar provided an insight into the undeniable benefits of SCP and how this technology is saving money and enhancing performance compared to SP. The four main areas of discussion were: product characteristics, reducing product ownership, the installation process, and cost benefits. The West Bakr case study helped to elucidate the clear benefits of Shawcor's product.

"ONE OF THE THINGS THAT MIGHT BE OF INTEREST TO YOU IN EGYPT IS THAT WE HAVE A TYPE OF QUICKSAND IN THE WESTERN AND EASTERN DESERT, WHICH WILL BE SUITABLE FOR YOUR PRODUCT"

AIDAN MCKAY
GENERAL MANAGER **- ENERGY EGYPT**

PRODUCT OVERVIEW

Firstly, a composite material is defined as one that combines two different materials to make a new product with superior performance. In the case of SCP, HDPE in outer jackets are known to be inert, have good chemical resistance, high tolerance levels of hydrogen sulfide, and are flexible.

Khaled Mamour explained that the HDPE is combined with a reinforcement layer (usually aramid steel or fiberglass) to result in a pipe with superior performance with regards to handling temperature, pressure, and corrosive substances. These pipes are known as reinforced thermoplastic pipes (RTP) required to meet API-15S standard and generally require fewer connections than SP.

In terms of the SCP connections, there are two options: Hydraulic Compression (HC) and Manual Threaded Compression (MTC). Both fittings use corrosion-resistant fitted metal in conjunction with corrosion-resistant alloy.

Mamour stated that SPCs are most commonly used at oil fields in the form of gathering lines. However, their applicability is very diverse, and they can also be used for water and gas distribution, including fuel and gas lift lines and zero-flaring.

THE INSTALLATION PROCESS

According to Marco Armas, a SCP "can be installed 20-30% faster, which will save money on the installation and reduce the time until first oil production." Armas uses the example of a Shawcor project in Bolivia whereby an SP installation that would have taken six months was completed in just 40 days with the SCP technology.

An SCP installation can be achieved with less manpower and less equipment than an SP project. The example Armas gives is 1.8 km of 4" pipeline can be shipped on a single truck with only one excavator required for the installation. What's more, the figures show that only 4 people are needed for the installation of an SCP compared to 10 for a SP flowline installation. Another two huge benefits for SCP installation is that X-Ray inspection is not required and the pipe can be brought to the surface without the use of steel risers.

There are myriad environments to deploy the pipeline, with Shawcor's pipes present in the Arctic, deserts, wetlands, and even the jungle, showcasing their versatility.

Some of the most popular installation techniques include trenching, surface lines, and boring. All these methods are more environmentally friendly than the installation techniques of SP lines and help to reduce product ownership.

PROJECT COST SAVINGS

Due to a smaller required workforce, less equipment, and a shorter installation period, the total project cost works out much lower than SP projects. To this extent, overall SCP project cost can be reduced by up to 20-25% in comparison to SP projects.

In terms of installation costs, they are found to be 30% lower due to smaller crew sizes, less equipment is used, and project deployment is significantly quicker. Although SCP may require a larger upfront investment, Armas insists that "once you consider the total project cost there are significant savings when using SCP."

What's more, the operating cost savings are significant due to the corrosion-resistant SCPs. Armas elaborated that this removes the requirement for corrosion inhibitors and furthermore there is no need for cathodic protection installation or maintenance. Empirical evidence suggests that for a 20 km gathering system, one saves between $20,000 - $40,000 on chemical costs annually (depending on the chemical type and batch frequency).

Liner Material Influence (LMI) also plays a crucial role in reducing operational expenditure (Opex). An HDPE liner has a smoother surface and a lower friction factor compared to steel. Armas attests "SCP is installed to provide increased resistance to the buildup of deposits such as paraffin waxes or scales on the pipe internal surface that can reduce flow and increase pressure drop." As the SP corrodes, it is possible that between 50-100% of the pressure is lost. This does not occur with SCP.

CASE STUDY

The West Bakr Oilfields, under the leadership of Amr Tawfiq, are an example of the successes of the SCP technology. Shawcor has three oil fields (K, M, and H), which started production in 1980.

The existing gathering network, which consisted of internally bare carbon steel, is poorly protected by corrosion inhibitor chemicals. As a result, the flowlines suffered from corrosion-induced failures such as spills and increased downtown caused by pipe repairs. Following a full failure analysis on corroded bare carbon steel, it was found that corrosion potential was high due to high levels of water exposure. As a result, the decision was taken to modernize and install new SCP flowlines.

The positive impact of the SCP installation has been evident for all to see: as of date, there have been no recorded direct environmental impacts with no further oil spills. This is another huge benefit of the SCP in that one can reduce product ownership cost and simultaneously protect the environment.

Economically speaking, there has been a positive cost impact after no more production losses and downtime. The project was completed within budget and project startup was completed within four months of the contract being signed. Empirical data shows that the project now saves $50,000 per year, representing a 30-40% decrease in project cost when compared to carbon SP.

Khaled Marmour summed up the webinar by saying: "Shawcor's SCP is a very good solution for complete avoidance of corrosion and its impact on carbon SP. It is cost-efficient for installation, with less equipment and less manpower needed, no requirement for corrosion inhibitors, and can be re-used under certain conditions." He added that Shawcor "has a background with major national oil companies, providing existing installation in Egypt with West Bakr, as well as being a trained and equipped installer in Egypt with local support from Energy Egypt and global support through Shawcor."

"THE CHALLENGES FACED IN WEST BAKR WERE DEALT WITH BY PROFESSIONAL EXECUTION, PROPER INSTALLATION EQUIPMENT AND TOOLS, AND SAFE INSTALLATION"

AMR TAWFIK
MAINTENANCE GENERAL MANAGER
PETRODARA & WEST BAKR

"COMPOSITE PIPE IS INSTALLED TO PROVIDE INCREASED RESISTANCE TO THE BUILDUP OF DEPOSITS SUCH AS PARAFFIN WAXES OR SCALES ON THE PIPE INTERNAL SURFACE THAT CAN REDUCE FLOW AND INCREASE PRESSURE DROP"

MARCO ARMAS
INTERNATIONAL FIELD OPERATIONS MANAGER
SHAWCOR COMPOSITE SOLUTIONS

ENHANCING INFRASTRUCTURE FOR DEEP WATER GAS PIPELINES

BY RANA AL KADY

With natural gas becoming a topic of increasing interest, it is only expected that the infrastructure is revised and/or enhanced to further develop new projects. In fact, the Ministry of Petroleum and Mineral Resources (MoP) aims to expand the capacity of national gas grid over the coming years. Already, Egypt has successfully managed to increase the total grid length by 4,820 km over the course of 23 years. However, with Egypt striving further to be the region's natural gas hub, it is important to ensure that the technical elements of pipelines – especially deep water pipelines – are at their prime capacities too.

GENERAL OVERVIEW OF THE CONVENTIONAL INFRASTRUCTURE

Before assessing the ways in which deep water pipelines could be improved, it is important to consider the technical elements of the existing typical infrastructure available for natural gas pipelines.In the oil and gas industry, there are various metal and non-metal pipe materials used to transport natural gas as well as other petroleum products. Typically, metal pipes consist of steel (or more specifically, black steel), copper, brass, or even Corrugated Stainless Steel Tubing (CSST). However, copper is not usually allowed due to the high hydrogen sulfide level that could eventually ruin the interior lining of the pipe. As for non-metal materials, typically, Polyethylene (PE) pipelines are used for natural gas applications as they are corrosion resistant as well as abrasion resistant. One of the main weaknesses of PE pipelines is that the material could deteriorate when exposed to sunlight, giving it an advantage in deep water applications.

At the moment, there are several challenges in the infrastructure design of natural gas pipelines, especially deep water pipelines. This is due to the high external pressures surrounding the pipelines. Usually, deep water pipelines consist of extra material to create a thicker pipe lining as a result of increasing pressure levels the deeper the pipeline is located. Also, the tension capacity puts a limit on the depth that the pipelines could be laid underwater. In fact, conventional steel pipelines can only be placed at a maximum of a 3,000m depth. Additionally, there is a concern of pipeline freezing or delayed flow of natural gas through pipelines with a surrounding water temperature below 0f Celcius. Additionally, from an environmental perspective, there is a huge concern over the potential for natural gas leakage at low sea levels, which would be difficult to avoid and even more complicated to repair in the case of an accident. These are some examples of the challenges faced with conventional deep water pipeline infrastructure.

ENHANCING INFRASTRUCTURE

It is essential to consider that the deep water gas pipelines could be improved from a technical perspective through the application of new and innovative technologies. For example, the application of reinforced thermoplastic composite pipelines is becoming more and more common among deep water projects. In fact, these reinforced thermoplastic composite pipelines are considered to be a high performance material incorporated within the material mix rather than used as an epoxy between pipe sections; this further strengthens the pipe and prevents collapses from occurring.

Consequently, one of the more impressive solutions is that of diverless technologies. Diverless technologies offer a remote solution for quick access

and repairing of abrupt issues or leakages in the deep water pipelines. In fact, especially in the time of the COVID-19 pandemic when there is a shortage of staff available onsite, and in time of unexpected emergencies call for quick and efficient solutions. The added benefit of such technologies is that smart fittings are designed to continue operations while any issues are fixed. This is instead of shutting down all operations to solve an unexpected issue (or simply just carrying out preventative maintenance), which would have been both uneconomical and time-consuming.

As suggested by Dr.Mohamed Gaber, Senior Process and Pipeline Design Engineer at Petroject, "The main design challenge is related to the high external pressure that may cause collapse of the pipeline. This potential failure mode is normally dealt with by increasing the pipe wall thickness, but at ultra-deep water depths this may require a very thick walled pipe that becomes very costly, difficult to manufacture and hard to install due to its weight." In finding a solution for this technical blunder, Gaber noted that, "One approach to overcome this is to improve some of the parameters that determine the collapse resistance by an improved manufacturing process."

While there are new and innovative technologies for deep water pipeline applications that are constantly being developed, the actual construction and implementation processes remain similar to conventional methods. However, smart technologies such as flexible risers, cassions, diverless remote technology, and other subsea equipment have been modified to carry out the same functions, but at optimal levels of efficiency and at reduced timings.

CASE STUDY

One of the most recent and impressive engineering developments was the invention of using 3D honeycomb lattices. The honeycomb shaped lattices are created through the process of 3D printing using a variation of materials. These lattices are built in layers of thin plates stacked on top of each other. In fact, this material has an added advantage over the conventional steel plates in that the strength to weight ratio of the 3D honeycomb lattices is much higher than that of conventional steel. Additionally, as opposed to prefabricated steel plates, honeycomb lattices could be designed and altered to meet the necessary technical specifications of each pipelines. These 3D honeycomb lattices are more economical solutions especially when they offer the option to repair old and worn pipelines rather than replace the pipeline in its entirety. Finally, the lifetime of the material supersedes that of conventional metal lining in addition to also being anti-corrosive and anti-crushing (i.e. able to withstand high pressures without being crushed or crumbling).

In fact, Gaber noted that, "When it comes to improvement; the additional manufacturing and testing requirements include [having] tighter tolerances for line pipes suitable for deep-water installations. Also deep-water installation capabilities of Pipe lay Barges for the laying of pipeline in the deep-water to ultra-deep waters along with new evolving testing and commissioning philosophies [are other forms of solutions]."

To conclude, there are multiple ways in which the deep water gas pipelines could be even further improved and adapted in Egypt. With new technologies in material development, riser compactness and overall infrastructure development, Egypt's aim to become a regional gas hub becomes increasingly easier to achieve. With the ongoing pandemic and its potential for a second wave, smart and remote technologies are becoming more widespread with higher demands. Experts believe that, even after the end of the pandemic, smart technologies will still have a crucial role in the oil and gas industry as a result of the technologies' increasing technical efficiencies and reduced time consuming activities. These are the ways in which the change in deep water pipeline infrastructure have been developed and would be adapted in many future applications in the region.

THE MAKING OF **A MULTILATERAL GAS HUB**

BY MAI EL GHANDOUR

It is often said that multilateralism is key to advance regional as well as global energy goals. When the East Mediterranean gas saga began to unfold a decade ago, a regional accord had to be struck and multilateral agreements were necessary in order for a gas hub to be conceived. An increasing number of cooperation opportunities were put on the table; from pipelines to "pipedreams".

Although seemingly progressive at first glance, most export options whether pipelines or liquefied natural gas (LNG) facilities in Egypt or its neighboring countries have continuously fallen flat throughout the years. Nonetheless, many multilayered deals still aspire to foster a new era of economic and political stability in the region.

But is multilateralism elongating the road to become a hub? Minister of Petroleum and Mineral Resources, Tarek El Molla, asserted that the multilateral nature of gas export arrangements does not happen overnight. In fact, he insisted during an energy conference in the United Arab Emirates (UAE), last September, that Egypt's export plans are actually still on track.

WHY EGYPT?

When it comes to choosing a strategic natural gas hub, Mohamed Hanafy, Director of Oil & Gas at Arab Engineering & Distribution Company, told Egypt Oil & Gas (EOG), "Geographically speaking, there is no doubt that Egypt has been blessed with a key strategic central location that facilitates exports in all directions and towards all continents almost equidistantly. In terms of gas export, it means shorter pipelines and simpler infrastructure investments are needed to convey the gas to the Middle East, Europe and Asia."

Apart from the geographic location, another factor makes Egypt readily capable of becoming a central regional gas hub. According to Hanafy, with significant reserves, Zohr is one of the key resources for establishing a gas hub in Egypt, leveraging Egypt's position to provide consistent natural gas supplies to address the region's demand.

Echoing the same sentiment, Aboud Zahr, Managing Director at DEP Levant Oil & Gas, remarked to EOG that "Due to the available oil and gas infrastructure and networks in Egypt any potential hub in the East Med shall be built around Egypt. This fact reduces the amount of investments and at the same time the risk which international oil major will have to take."

However, Mona Sukkarieh, energy and political risk consultant and co-founder of Middle East Strategic Perspectives, told EOG, "Beyond Egypt, and up until this point, the nature of these deep-water discoveries in the Eastern Mediterranean, size of the local markets and limited infrastructure did not grant the countries with this newly-found resource wealth the autonomy they would have wished for to fully exploit and export these resources."

LNG INFRASTRUCTURE

Egypt has two LNG plants; the first one is in Idku plant owned by the Egyptian LNG, and includes two liquefaction units. The second one is in Damietta and includes one liquefaction unit. "Leveraging existing infrastructure in Egypt appears to be, at this stage, the optimal option to facilitate the monetization of the region's offshore gas resources," Sukkarieh added.

The bulk of Egypt's gas exports is LNG from its Idku terminal. Damietta, on the other hand, has an annual capacity of up to five million tonnes and can store 130,000 tonnes of LNG, governmental websites show. The two plants have a combined capacity of 19 billion cubic meters per year (bcm/y).

"I believe the existing infrastructure for gas processing and liquefaction acts as a strong core for this mega project to build on. Egypt benefits from a network of pipelines and the presence of existing liquefaction facilities in several coastal cities that can readily be integrated as part of the masterplan to establish a gas hub in the region," Hanafy stated.

A NETWORK OF PIPELINES

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. "Multiple infrastructure elements are readily present and can be used as part of the gas hub master plan," Hanafy said, explaining that the presence of Sumed pipeline establishes critical gas transfer capabilities across the country. "The presence of the Arab Gas Pipeline plays a similar key role with international exports," he noted.

Through Egypt's network of pipelines, the country began to export natural gas to Jordan on February 19, the Jordanian state-funded Al-Mamlaka (The Kingdom) TV channel reported. This happened through the most significant pipeline, the Arab Gas Pipeline, which extends natural gas exports from Al-Arish to Jordan and further plans to extend exports to Syria and Lebanon. The Arab Gas Pipeline also connects to Israel via the underwater Arish-Ashkelon pipeline, which Egypt once used to export gas to Israel. Now, however, Egypt will import natural gas from the 22 trillion cubic feet (tcf) offshore Leviathan and later the smaller Tamar field via that pipeline, El Molla declared in an interview during the World Energy Congress on September 10, 2019.

In a so-called $19.5 billion landmark agreement last January, Egyptian private company Dolphinus Holding began importing 200 million cubic feet of natural gas per day (mmcf/d) from Tamar and Leviathan gas fields, Israeli Energy Minister Yuval Steinitz stated at that time. An annual of 2.1 billion cubic meters (bcm) will be imported from Leviathan alone, rising to 4.7 bcm a year by H2 2022. The agreement stipulates that Egypt will continue to take in a total of 85 bcm Israeli gas over the next 15 years.

Since Egypt announced in 2018 that it had achieved self-sufficiency in natural gas, this only means that any imported natural gas will be redirected towards the global markets. It could also expedite Egypt's LNG exports in the coming years.

MAJOR PLAYERS IN THE EAST MED ARENA

The gas pool of the East Mediterranean is largely dominated by three major players; Shell, Noble Energy Inc. and Israel's Delek Drilling LP, who continue to hammer out potential deals to utilize the LNG plants in Egypt's Idku. According to statements by the company, Noble Energy has executed multiple agreements to support delivery of natural gas from the Leviathan and Tamar fields, offshore Israel, into Egypt.

It is important to note that the Arish-Ashkelon pipeline, which carries Israel's natural gas to Egypt, is owned by the East Mediterranean Gas Company (EMG), whereas Noble and Delek partnered up with Egypt's East Gas Company last year in a venture called EMED to buy a 39% stake in EMG to facilitate export deals.

Meanwhile, just a few months after testing the East Mediterranean waters, US major Chevron announced its $5 billion takeover of Noble Energy, enabling its expansion plans in the region. Once the takeover is completed, a total of five offshore Mediterranean blocks will be a handy addition to Chevron's global portfolio.

Chevron's plans include the construction of a 340-kilometer (km) pipeline from Cyprus' Aphrodite to the Shell-operated 7.2 million tons per year liquefied natural gas (LNG) export terminal at Idku.

Shell could use Aphrodite's production, and perhaps the Leviathan's as the pipeline would inevitably pass through Israeli waters, to increase the flow to its idle LNG plant. The international oil company (IOC) has long supplied natural gas to ELNG, but since mid-March, it has exported one cargo and will remain shut until mid-October, Egypt Oil & Gas reported at the occasion, citing an Oil Ministry's press release.

THE PIPEDREAM TAKES TWO

The pipeline project was even sought by the EU; approximately 129 bcm of natural gas will go through the liquefaction plants in Egypt and then get re-exported to the European market. "In the first phase, gas shall be pumped to the existing LNG plants in Idku and Damiatta and re-exported as LNG to Europe till their maximum liquefaction capacity is exhausted," Zahr said.

"As a second stage, one of the East Med countries, like Cyprus, shall generate electricity from its own produced gas and sell it to neighboring countries like Lebanon, Syria, Jordan and others," the managing director further suggested.

Zahr noted that, except for Egypt, there is no existing infrastructure in the East Med. Developing expensive infrastructure coupled with the high cost of the offshore produced gas will make new projects not viable, like for example the previous East Med pipeline to Europe. Sukkarieh also thinks that It is important in this regard for Egypt to pursue sector reforms and reconsider pricing schemes to encourage the import and reexport of natural gas from neighboring countries via its large gas infrastructure.

"Undoubtedly additional infrastructure, mainly pipelines, will be needed to link to these producing countries' gas supplies and to branch out exports to the consuming countries," Hanafy advised.

OTHER AGREEMENTS

On August 5, El Molla discussed via video conference with Cypriot Minister of Energy Natasa Pilides the establishment of a direct sea pipeline between the two countries. According to a statement by the Egyptian Ministry of Petroleum and Mineral Resources, the two ministers confirmed the ongoing coordination between the officials of the two countries to follow up on the measures needed to start implementing the project. The Cyprus gas is expected to arrive in Egypt in 2024-25.

Egypt and Cyprus signed an agreement in September 2018 to establish a marine pipeline project. However, ever since, experts speculated the feasibility and viability of such a project.

DEMARCATION

On August 9, Egypt and Greece have signed an agreement to create a joint exclusive economic zone in the oil-and-gas-rich East Mediterranean. "This agreement allows both countries to move forward in maximizing the utilization of the resources available in the exclusive economic zone, especially promising oil and gas reserves," Foreign Minister Sameh Shoukry said during the presser. The agreement will also help Egypt launch more bid rounds in the natural gas rich area, Oil Ministry Spokesperson Hamdy Abdel Aziz said.

This is the third maritime demarcation agreement that Egypt signed as it had previously signed an agreement with Cyprus in 2013, and another in 2016 with Saudi Arabia. The signing of the agreement with Cyprus allowed Egypt to discover Zohr, which helped Egypt become self-sufficient in natural gas and a net exporter.

Jenik Radon, Adjunct Professor at Colombia University, explained to Egypt Oil & Gas that "demarcation agreements do the necessary and simple obvious: they bring clarity, certainty and therefore stability to a situation. It is really simple: if you do not know what you own or control, there is no way to move forward with certainty and the consequence will be endless disputes. With demarcation agreements, everyone wins. That being said clear non-ambiguous demarcation agreements with [other] neighboring countries is now also needed."

SECURING THE FUTURE

A commentary piece by Simone Tagliapietra, Adjunct Professor of Global Energy Fundamentals at the Johns Hopkins University, published by the Italian Institute for International Political Studies, endorsed Egypt as the center piece of the natural gas hub in the Mediterranean. It stated that "all in all, the plan of creating an eastern Mediterranean gas market based on the existing LNG infrastructure in Egypt does look like the most logical course, as it would present economic and commercial benefits for all regional players involved – and as it would also avoid unnecessary geopolitical tensions."

Speaking about Egypt's crown jewel, its LNG liquefaction capacity in Idku and Damietta, Hanafy stated that in addition to complimentary and related projects that will support this gas hub, it creates numerous potential businesses opportunities in the construction and operation phases. All of which are expected to yield significant economic benefits to Egypt and establish Egypt as a regional leader in gas export.

Sukkarieh concluded that, "A collaborative regional approach geared toward capitalizing on existing infrastructure, creating synergies to bring upstream costs down, and reviewing certain aspects of domestic regulatory frameworks to help make exports viable may be needed for a chance to improve the competitiveness of these offshore resources. Improving prospects for monetization is key for attracting investors and encouraging future exploration activity."

NATURAL GAS:
THE DOORWAY TO GREEN ENERGY

BY JASMINE SHAHEEN

Recently, several oil companies have announced their plans to turn their oil business green in the upcoming years. The transition, for the oil and gas industry, from the currently normalized way of work to an environmentally friendly industry, is not easy, nor is it going to be smooth. However, going green should be on the horizon, especially after 175 countries, Egypt included, have signed the Paris Agreement Act. The Paris Agreement Act addresses climate change and deals with the problem of greenhouse gas (GHG) emissions. The oil and gas industry should align with the United Nations' (UN) sustainable plan; which poses the question: could natural gas be the stepping-stone of a better green future?

THE OPTIMUM FOSSIL FUEL

It sounds far-fetched, but it could be a step towards a more sustainable, eco-friendly energy future. Despite being a fossil fuel, natural gas has the least combustion level of global warming emissions among other fossil fuels such as coal or oil. When combusted efficiently in power plants, natural gas releases about 50% - 60% less carbon dioxide (CO2) compared with emissions from a typical new coal plant. Mohamed Abdalla Elbadrawy, Process and Production Operation Team Leader, commended that the nature of natural gas as it is not as harmful as other fossil fuels and cleaner as well, "making it an ideal bridge to a renewable energy powered future."

While natural gas is not 100% environmentally friendly, it remains the closest energy source to bridge the gap between fossil fuels and green energy in the oil and gas industry. There are several environmental points taken in favor of natural gas; for one thing, it is utilized to help to combat smog formation in poor ground level air quality areas.

An Environmental Engineer told Egypt Oil & Gas (EOG) that "compared with some other fossil fuels, natural gas emits the least amount of carbon dioxide into the air when combusted, making natural gas the cleanest burning fossil fuel of all." Compared to other fossil fuels, natural gas emits 117,000 British Thermal Units (Btu), while coal and oil emit 164,000 Btu, and 208,000 Btu, respectively. The International Energy Association (IEA) shows that "on average, coal-to-gas switching reduces emissions by 50% when producing electricity and by 33% when providing heat." Natural gas' emissions of Carbon Monoxide, Nitrogen Oxide, and other harmful emissions are considerably low compared to others. Thus, proving that natural gas greatly contributes to reducing the release of emissions into the atmosphere.

A BUMP IN THE ROAD

Despite providing a better alternative - environmentally and financially - to other fossil fuels, it is not just sunshine and rainbows when it comes to natural gas. The biggest issue affecting the environment when it comes to natural gas' operations is fugitive gas; also known as methane gas. A study, published by the Proceedings of the National Academy of Sciences of the United States of America titled 'greater focus needed on methane leakage from natural gas infrastructure,' found that any methane leakage in natural gas plants have to be kept below 3.2%. So that these plants can have lower life cycle emissions than new coal plants in a timeframe of 20 years or fewer.

Another study titled 'capturing fugitive methane emissions from natural gas compressor buildings' has shown that when it comes to natural gas operations, methane emissions could leak through pipelines and compressor stations. One of our source told us that as about 90% of natural gas is methane (CH4). In case of a methane leak, "the gas control room immediately shuts down operations until the leaked gas is contained." The problem is real, but it does not have to be a dead end. Abdelrahman Mostafa, an Environmental Specialist at Bioenergy Association for Sustainable Development, suggested several solutions to the issue including an automatic weld size (AWS) gauge stating that it can create a reliable, safe sealed pressure measurement system.

UNTAPPED POTENTIALS

It is no secret that Egypt's discoveries in the natural gas arena have been exponentially large, beginning with Zohr to the most recent arena, in the Great Nooros Area. Egypt has already been capitalizing on its abundance of natural gas findings, exploring several projects including the largely popularized natural gas-based car conversion project. Having such a large amount of natural gas, the state is currently discussing exporting electricity to Europe and Africa.

What makes natural gas so attractive as a bridge fuel to cleaner energy is that natural gas is not costly and cheaper than other fossil fuel, Elbadrawy noted. In addition to that, its infrastructure takes less time to build compared to coal or nuclear plants; so it is time-saving and cost-effective. Being economical, a small quantity of natural gas can generate a large volume of electricity, Elbadrawy noted.

THE NEXT BIG THING

Speaking of its infrastructure, recent developments show that natural gas infrastructure and facilities could be used for manufacturing renewable natural gas (RNG). RNG is essentially defined as a "biogas that is refined, injected into natural gas pipelines as nearly pure methane, and then burned to make electricity, heat homes, or fuel vehicles." RNG is not only interchangeable with conventional natural gas, but it can also be produced with the already existing facilities of natural gas and would not require consumers to do anything differently. By utilizing livestock and landfills to produce RNG, we create a new path for renewable fuels, in addition to limiting methane leakage into the atmosphere. The existing natural gas facilities in Egypt would, in a way, push for change towards a better, cleaner environment as well as putting fugitive gas into good use.

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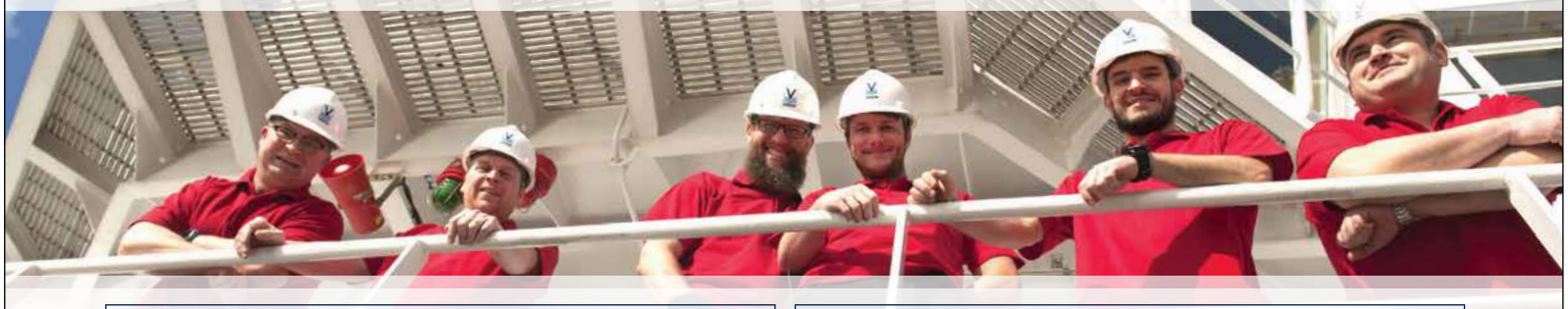

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SMART PIPELINES PIGGING: A STEP-IN TOWARDS INTEGRATED SAFETY

BY FATMA AHMED

Pipelines are considered the best way to transport large amounts of oil and natural gas across various distances. Also, pipelines are the safest mean in terms of its impact on the environment and human health. This fact should be taken into consideration when it comes to petroleum sector.

PIPELINES SAFETY

However, a number of processes should be followed to avoid any possible incidents that may occur because of neglect of pipelines. Proactive inspections should be done for pipelines on a regular basis to detect any possible problems before happening. Operators should use high-tech inspection tools while inspecting pipelines such as an ultrasound, Magnetic Resonance Imaging (MRI) and digital analysis.

Additionally, pipeline operators have to implement preventative maintenance if there is any initiated problems from recovering pipes with protective coating or replacing the damaged part with another. Also, operators should monitor pipes continuously, as per daily schedules.

Another issue that should be considered is the design and construction of pipeline, in terms of its quality. For example, this means ensuring that type of steel used is that of a good quality and must be certified. After construction, they have to be tested to ensure that there are no leaks. Moreover, operators should be ready for any emergency by preparing emergency plans and train their employees to be ready for any potential incident.

Even though regulations have been endorsed years ago to ensure the commitment of operators to construct pipelines under specific standards as well as monitor and repair them periodically, pipeline incidents still happen. New technologies have emerged to help facilitate this issue. For example, the pigging technique, which is considered one of the most important methods to audit pipelines as well as keep them clean.

PIGGING COMES TO LIGHT

Pipelines Pigging refers to the insertion of a device inside either new or existing pipelines for inspection, cleaning, maintenance and testing operations. The origin of calling such a process "pigging" remains unconfirmed.

Some experts referred "Pig" term as an acronym for "Pipeline Inspection Gauge". Others said that the term is attributed to the distinct squealing sound resulted from sending leather-bound tools inside pipelines in the past (which resembles the sounds of pigs). Another sources suggested that it was called so after opening a pig trap, which is a toll in a pile of mud, in the same way pigs do.

Piggings are used during the phase of testing pipelines hydrostatically to check their capability of meeting the Maximum Allowable Operating pressure by filling pipelines with water, then withdrawing it. Also, it is used to remove any construction ruins, as well as dry and clean pipelines.

Earlier, the main purpose of pigging was to clean the pipelines. Basic pig was created by pushing bails of rags wrapped with barbed wire inside the interior walls of pipelines. Nowadays, bullet-shaped mechanical pigs made of rubber or foam are used to remove paraffin and any debris inside the walls of pipelines. Then, operators started to analyze the ruins that are removed from the pipeline. After that, digitalized pigs are used to recover the internal system's information.

DIGITIZING PIGGING

Lately, developed technologies are interfering in most of the industries, especially in the petroleum sector. Smart pigs are known to be large machines pulled by powerful technology inside pipelines, which provide data that can be collected and analyzed while the pigs travel through the system. This data is used in inspecting the pipelines and helps in preventative maintenance operations.

Mohamed Kamal Gaber, a Senior Process and Pipelines Design Engineer in Petrojet, stated to Egypt Oil and Gas (EOG) that as the pigging travels through pipelines, "it sends signals for welding defects if exist with its position and coordinates very precisely."

Furthermore, smart pigs can assure that the transmission of liquid does not stop to guarantee pipelines safety. Also, it has the capability to detect any problems that can lead to explosions before they happen.

Smart pigs use many nondestructive solutions. Magnetic Flux Leakage (MFL) is one solution, which measures the strength of the pipelines and identify if there is any erosion by testing the thickness of its wall. Additionally, Electromagnetic Acoustic Transduction (EMAT), which produces ultrasonic waves inside the pipeline and demonstrate if there are any leaks, cracking or corrosion by analyzing such waves.

Moreover, the Internal Navigation System (otherwise referred to as the Global Positioning System) is another solution, which works with satellite communication to track the latitude, longitude and elevation of the pipeline system accurately. Also, this system can monitor any sudden anomaly, leak or cracking and locate it immediately.

Amr Saleh, a Corrosion Engineer at DNV-GL told EOG "it [Smart pigging] is considered as a great tool belong to safety management system that can be used to ensure risk or threat is identified and mitigated through suitable repair."

PIGGABLE PIPELINES

Not all pipelines can be pigged. Piggable pipelines should be constructed from certain materials including stainless steel, steel, plastic, High Density Ploy Ethylene (HDPE), Polyvinyl Chloride (PVC), duplex stainless steel, cast Iron, Glass Fiber Reinforced Plastic (GRP) and Ductile Iron Pipes (DICL).

Besides that, some measurements of pipelines have to be considered, including internal diameters' size, number and type of valves, rate of pressure inside the pipelines, temperature, flow rate, end connections, types of its bends, in addition to other factors. Also, any pipeline should be tested and analyzed by a specialist in this field before pigging.

On the other hand, pipelines with small diameters or older long pipelines are not capable of bein pigged.

IT IS WORTH DESPITE CHALLENGES

Smart Pigging is worth being implemented and applied within oil and gas industry because of its advantages headed by its ability to clean and examine the pipeline without stopping the flow of internal liquid. Additionally, it allows the operators to inspect the entire pipeline without a need to send an inspector down its length. In addition, this technology is cost-efficient for companies as it can clean and audit simultaneously.

Saleh said that "the cost of applying pigging either for cleaning or inspection is extremely less than the cost of consequences of pipeline leakage or incident due to pipeline degradation."

However, pipelines pigging is not free of challenges. Pigging tools are not faultless as they are machines. They still have limited experience in detecting problems and may miss some of the smallest factors. Also, these tools may be damaged inside pipeline, which could be costly for operators to repair and extract. Another issue is that, sometimes, the materials that are used in pigging equipment may cause damage and shatter pipes, which leads to high fatal risks.

Besides that, using pipelines pigging devices needs extensive knowledge, expertise and skills. So, companies should take extra precautions while implementing pigging services.

THE EGYPTIAN CASE

Saleh said that Pipeline pigging is widely used in oil and gas operator's companies in Egypt for various internal activities. "I see many companies in Egypt incorporated pipelines pigging as a part of PIMS (Pipeline Integrity Management System) which should comply with applicable laws, and regulations in Egypt and/or the international standards", Saleh added.

The Corrosion Engineer recommended Internal Corrosion Direct Assessment (ICDA) method that aims to make the pipeline safer. ICDA considered a study to assess the condition of pipeline, especially the non-piggable pipelines, through four steps including: pre-assessment, indirect inspection, detailed examination and post Assessment, Saleh explained.

Saleh, also, suggested using drones as a patrol to discover any other activities are carried out near the pipeline right away and report back for immediate action and interference.

From another side, Gaber said that in Egypt, while implementing pipelines design, pigging trapes should be included. "However some clients, due to lack of fund, request to postpone installing the traps. [owners] could be postponing this phase of project till the production profits could cover the cost of installing pig traps for the pipeline", Gaber elaborated.

Additionally, Gaber suggested using surge vessels which could be supplied for oil pipelines to stabilize pressure along the pipeline as a safe guard.

For a safer future in Egypt, Gaber suggested allocating a regulation to commit all companies to not design nor construct pipelines without minimally having separated ESD system. This system automatically interfere within suitable time margin to stop production if operation team did not respond immediately for leakage coincident.

EASTERN MEDITERRANEAN VENUE FOR PROSPERITY, NOT FOR DANGEROUS GAMES

BY **IHAB SHAARAWY**

The hydrocarbon resources of the Eastern Mediterranean region have greatly increased in importance in recent years. The new natural gas discoveries can have a significant impact on the politics of global energy security.

The new discoveries were also promoted as a tool to foster a new era of economic and political stability in the region.

However, competition over natural gas discoveries in the Eastern Mediterranean has combined with bitter regional rivalries to fuel tensions between energy-thirsty Turkey and its neighbors.

The dispute over natural gas discoveries has not only revived the long-standing disputes between Greece and Turkey over the partition of Cyprus and the Aegean Sea continental shelf, but it has also threatened to stoke tensions with other countries in the eastern Mediterranean basin and involve organizations such as the European Union (EU) and NATO.

The Turkish move to embark on a new round of exploration activity in the East Mediterranean last month asserted the Turkish expansionary policy and dampened expectations for a quick resolution of conflicting claims to potential natural gas resources in the region.

THE MAGNIFICENT FIND

The discovery of the supergiant Zohr gas field off Egypt in 2015 kick started interest in the region. The largest gas discovery ever made in the Mediterranean started production in December 2017, allowing Egypt to achieve self-sufficiency in natural gas and marked a new phase of exploration activities, leading to the discovery of other important fields in the country's offshore waters.

However, Zohr was not the first significant discovery in the region as Israel struck reserves in 2009, followed by the larger Leviathan field in 2010, which slashed Israel's reliance on highly polluting coal for electricity.

The significance of these discoveries can be clearer in light of the new change in the geo-economy of the production and consumption of energy in the past five years as natural gas tends to be a more dominant source of energy in terms of both supply and demand.

The International Energy Agency (IEA) expects global demand for natural gas to rise until 2040 as it represents a bridging fuel in the transition to decarbonized energy markets given its environmental advantages.

The new discoveries of natural gas resources in the eastern Mediterranean have even forged some unlikely alliances. The East Mediterranean Gas Forum (EMGF), which can be described as "the Organization of the Petroleum Exporting Countries (OPEC) of Mediterranean gas" was formally established this year.

The Cairo-based forum brings together Egypt, Israel, the Palestinian Authority, Jordan, Greece, Cyprus and Italy, with the aim of establishing the region as a major energy hub. France has asked to join, while the US has requested to become a permanent observer.

The geographical proximity between the Egyptian fields and other fields off the shores of Israel and Cyprus can provide a competitive regional gas-export infrastructure based on the Egyptian liquefied natural gas (LNG) export facilities.

For their part, Israel, Cyprus and Greece signed an inter-governmental agreement for the East Med gas pipeline that will run from Israel through Cyprus and Greece to Europe.

The discovery of natural gas has also led to a phenomenon of demarcation of the maritime areas in the region, with the multiplication of declarations of Exclusive Economic Zones (EEZs) by the producer states.

One common result of all these developments was the exclusion of Turkey from the eastern Mediterranean natural gas market as natural gas from the eastern Mediterranean can reach Europe, bypassing Turkey and Russia's pipelines.

The Turkey-Shaped Elephant in The Room

Although there have been no big gas discoveries in Turkey's part of the eastern Mediterranean, it has sent ships into the coastal waters of Cyprus to drill for natural gas.

In response, Cyprus and Greece issued an arrest warrant for any Turkish drill ships obstructing their operations, and the two countries have called on the EU to punish Turkey for its provocations.

Turkey and Greece have an old dispute over maritime boundaries as the Turkish coastline is dotted with Greek islands that Athens believes give Greece territorial rights that Ankara argues they violate its own maritime claims.

Ankara claims that islands should only have limited exclusive economic zones. However, Turkey's stance is complicated by its refusal to sign the UN Convention on the Law of the Sea, which should be called on to resolve such disputes.

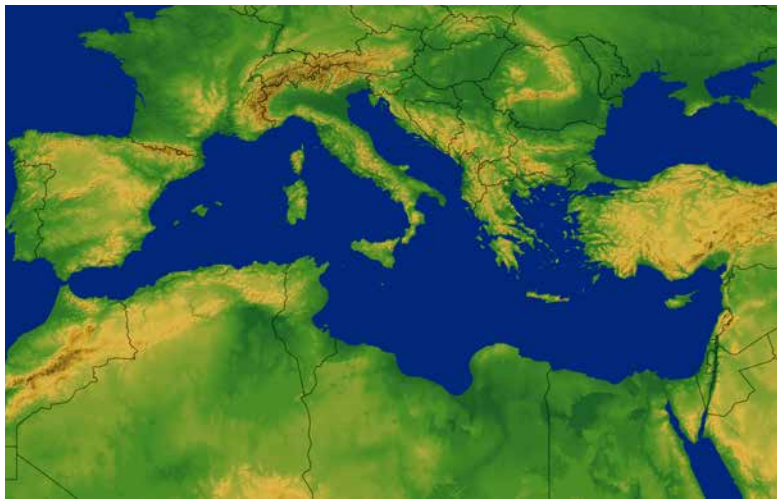
RUBBING SALT INTO OLD WOUNDS

While gas exploration can be seen as the cause for the current tension, the roots of the problem seem to lie much deeper. It is also more than a revival of a long-standing conflict between Greece and Turkey. The current tension can be clearly seen in the context of the geo-strategic rivalry that pits President Recep Tayyip Erdogan's Turkey against several other players in a battleground that extends from Libya across the waters of the Eastern Mediterranean to Syria and Iraq.

Turkey's Islamist-based foreign policy under Erdogan has left Ankara's ties with neighbors and allies in shambles.

Erdogan's policies aimed at the Arab world following the Arab Spring, which were mostly concentrated on support for the Muslim Brotherhood, left him with no friends from Arab regimes except for Qatar, a country that suffers isolation too in its region.

These policies were also the reason for the strained relations between Cairo and Ankara that have



been deteriorated since the ouster of former Islamist President Mohamed Morsi, who was a close ally of Erdogan.

The tensions between the two countries even escalated in the past months due to not only Ankara's violation of the territorial waters of Greece and Cyprus, two close allies of Egypt, but also for its military intervention in war-torn Libya and its violation of Iraq's sovereignty as well.

Conflict further heightened after Egypt and Greece signed a maritime demarcation deal in August establishing an exclusive economic zone between the two countries, sparking an angry response from Turkey.

Ankara deserved the same angry response from Cairo, EU and US after the signature of an illegal maritime border agreement between Turkey and Libyan Tripoli-based government last January.

The Turkish occupation of large swaths of Syria, engaging in regular strikes in northern Iraq, leading thousands of mercenaries in Libya, and supporting Muslim Brotherhood-linked politicians in Yemen, helped Ankara to lose more friends.

A LONG LIST OF PROVOCATIONS

Many fear that the latest dispute in Eastern Mediterranean could lead to direct military confrontation between Turkey and Greece, as the two NATO members and their allies square up over control of the seas.

Such fears will just be added to a lengthy and complex list of problems Turkey has caused for NATO under the rule of Erdogan.

Turkey's breaches of NATO principles also included equipping itself with Russian S-400 anti-aircraft batteries and conducting a strategy of ethnic cleansing to the Kurds in northern Syria, and supporting terrorist militias in Syria.

However, the transatlantic organization still draws a big question mark by failing to punish Turkey for any of these breaches and thus it is thought that the East Mediterranean crisis can in no way find a solution within NATO.

In the absence of clear US action to deter Erdogan, Germany has sought to mediate between Greece and Turkey, with France taking the side of the Greeks.

As Europe currently seems not to have a real strategy to contain Turkey, France emerges as a main opponent to Ankara not only in the eastern Mediterranean but also on Turkey's NATO membership, migrants' issue, and Libya. It has strongly supported initiatives by Egypt, Greece, and Cyprus against Turkey. France also asked to become a member of the EMGF and is going to sell military equipment to Greece.

A CONFLICT THAT NO ONE CAN AFFORD

Despite the high tensions in the region and the ongoing military build-ups, many analysts refute the idea that Turkey can really go to war. After all US and NATO cannot under any circumstances allow such conflict to happen between transatlantic allies.

However, a look inside Turkey can support another rhetoric that Turkey is using the issue in Eastern Mediterranean to offer a distraction from other domestic problems.

Perhaps Erdogan is striving to hide his difficulties in domestic politics, underlined by the loss of major cities and especially Istanbul during the 2019 municipal elections, as well as the weak economy indicators.

But what is at stake in the eastern Mediterranean cannot be left for the imprudent attitude of the self-styled sultan who uses blackmail to threaten the region's geopolitical status quo that has governed the Mediterranean for decades. It is time for the world to make it clear to Turkey that it has to comply with the international law or risk exposing itself to more isolation and most likely painful sanctions.

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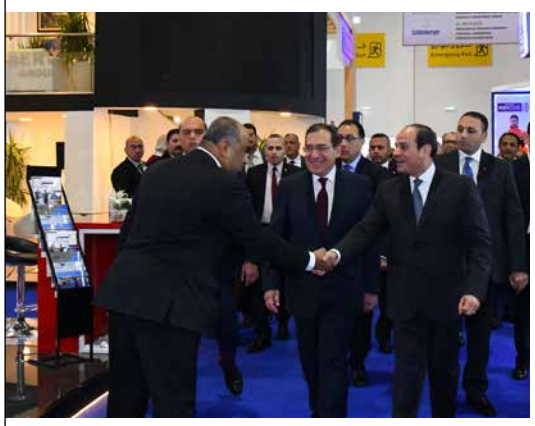

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THE EMGF: NAVIGATING CHOPPY WATERS

BY JACK BECKFORD

With the Eastern Mediterranean home to over 70 trillion cubic feet (tcf) of gas discovered since 2009, its commercial potential is undeniable. As large swathes of these reserves are located offshore, production costs are naturally higher. Thus, the challenge that faces Eastern Mediterranean gas producers is identifying markets where gas extraction can be commercially viable.

In general, gas value chains tend to originate around a large resource that can be commercially connected to a major market, making the large infrastructure investments feasible. However, with regards to the Eastern Mediterranean gas, due to the relatively inaccessible gas reserves, a way to attract the initial infrastructure investment is by means of enhanced regional cooperation.

However, energy cooperation amongst Arab states is still in its infancy. Despite the Middle East and North Africa (MENA) region being rich in gas reserves, according to a 2017 study by the World Bank, only 10% of the gas exported by the MENA countries is presently traded within the region.

In terms of energy cooperation in the MENA region, the Pan-Arab Regional Energy Trade Platform (PA-RETP). Launched by the World Bank in 2016 as a collaboration platform for implementing the building blocks to scale-up economic energy trade in the MENA Region.

However, fast forward to 2019, attitudes towards cooperation have changed further. Since the inauguration of the East Mediterranean Gas Forum (EMGF), there has been a gradual increase in the region's gas trade. Thanks to the EMGF, many countries in the Eastern Mediterranean have progressed from merely satiating domestic demand to bilateral trade. The next step is now the creation of a regional gas hub.

THE EAST MEDITERRANEAN GAS FORUM

Set up in January 2019, the EMFG was created to act as a regional gas market, cut infrastructure costs, and to offer competitive prices. The EMGF is a group comprising Cyprus, Egypt, Greece, Israel, Italy, Jordan, and Palestine. Gamal Qalyoubi, professor of oil and energy at AUC, viewed the establishment of the EMGF in Cairo as "a new entity for natural gas similar to the Organization of the Petroleum Exporting Countries (OPEC)".

It was established following a wave of sizable natural gas discoveries in the East Mediterranean region, which started a conversation as to how much economic development could be achieved through regional cooperation and harnessing the region's potential resources. In the lead up to the forum's inauguration, there was also a wave of bilateral trade deals including one in September 2018 when Companies operating in both Israel and Egypt bought a 39% stake in the EMG pipeline. Also in September 2018, there was a wave of talks between Cyprus and Egypt to construct a pipeline connecting Cyprus' Aphrodite gas field to Egypt's liquefied natural gas (LNG) facilities. Ultimately, the desire to facilitate cooperation in a region blighted by a lack of cooperation led to the formation of this forum.

With an emphasis on cooperation, the EMGF promotes inclusivity and assists consuming countries by "securing their needs and allowing their participation with the transitory countries in the development of gas policies in the region, thus enabling the establishment of a sustainable partnership between the actors at all stages of the gas industry," according to a statement by Egypt's petroleum ministry. This is in line with the deliberate choice of the word "forum", which suggests a more flexible structure in terms of trading, marketing policy, and new memberships.

Despite facilitating cooperation, the core aims of the forum can be boiled down to accelerating economic exploitation of existing natural gas reserves, benefiting from pre-existing infrastructure, and encouraging private sector investment to facilitate the exploitation of future natural gas discoveries.

COOPERATION IS THE KEY TO SUCCESS

The main form of collaboration is by means of forums. These allow other countries, regional or international organizations, observers, as well as the private sector to join and participate in their regulatory bodies as part of the permanent natural gas industry advisory group. The forums are held in Cairo, which re-affirms Egypt's position as a leading center for natural gas trade and the region's energy hub.

As of date, there have been three EMGF ministerial forums which have tackled a range of topics:

In July 2019, the EMGF ministers decided on the organization's governing rules and procedures and committed to achieving the goal of enhancing regional cooperation in the energy sector to make the best out of the available resources. In doing so, this approval has paved the way for a more sustainable regional natural gas market.

In January 2020, Egypt's oil and gas minister, Tarek El Molla, confirmed the fruitful cooperation between the EMGF and the US, the European Union, and the World Bank and welcomed their support. Due to the overwhelming success so far of the forum, France officially asked to join the East Mediterranean Natural Gas Forum. Furthermore, the US asked to join the forum as a permanent observer. This international recognition is testament to the forum heading in the right direction. As Greece's energy minister, Yiorgos Lakkotrypis, said at the forum, "international success is proof for the mutual vision of the forum's members to enhance prosperity in the East Mediterranean."

Most significantly, on September 22 the founding countries of the EMGF signed a charter to become an established international organization. This is another major step in establishing the forum. The signing of the charter comes amid tensions in the Eastern Mediterranean region over Turkey's hunt for gas in the region in violation of the territorial waters of Greece and Cyprus.

As per the charter, the EMGF will act as a platform that brings together natural gas producers and consumers to form a joint vision, as well as providing a regulated dialogue over natural gas policies to utilize the region's resources.

Outside of the forums, and since the inauguration, the Eastern Mediterranean has witnessed a substantial rise in bilateral trade and cooperation. The organization has facilitated the development plans of Aphrodite Field and the steps taken for establishing a pipeline to transfer natural gas from Cyprus to Idku's natural gas liquefaction plant.

Furthermore, through the EMGF the idea of the Israel–Europe gas pipeline has been facilitated. In July 2020 Israel's cabinet approved a multinational accord to lay a pipeline that will facilitate the export to Europe of natural gas found in Israeli and Cypriot waters. The $6 billion plan is for a 1,900-kilometer corridor that will link known and yet-to-be-discovered gas fields in the Eastern Mediterranean basin. The project is expected to be completed by 2025.

PRE-EXISTING INFRASTRUCTURE

A transition toward regional self-sufficiency will require more efficient use of existing infrastructure and spare capacity, such as gas pipelines and LNG export plants, and LNG import terminals. Luckily for the East Mediterranean, it is already blessed with a large amount of pre-existing LNG infrastructure.

However, most of the region's infrastructure is built to accommodate LNG imports. Egypt is the only country in the region with exporting facilities and is home to two world-class LNG export terminals:

First and foremost, the LNG terminals are managed by the Spanish Egyptian Gas Company (SEGAS) and the Egyptian Liquefied Natural Gas Company (ELNG). The first terminal is located in Damietta. This plant functions as a tolling facility, with a current capacity of 264.8 billion cubic feet per year (bcf/y) of LNG. The plant's natural gas supplies are provided by the Temsah fields, Ha'py Development Area, in addition to Scarab and Saffron fields in the West Delta. The terminal had been idle but Eni company signed in March 2020 several agreements with the Egyptian General Petroleum Corporation (EGPC), the Egyptian Natural Gas Holding Company (EGAS), and the Spanish company Naturgy to restart operations by June 2020. The current deadline has been postponed due to the coronavirus outbreak.

Secondly, the Idku terminal is located east of Alexandria and was established in 2001. This project came to fruition when the Egyptian General Petroleum Corporation (EGPC) and Edison signed an agreement with Shell to develop an integrated LNG export project in Egypt. The project is a two-train LNG terminal on the Mediterranean Coast with an LNG capacity of 353 bcf/y of LNG, aiming to export Egyptian LNG (ELNG) to Europe and the US. The ELNG also acts as a tolling facility with natural gas suppliers paying a tariff for the liquefaction service, according to EGAS' website. The Idku facility resumed its operations as soon as Shell started to export natural gas from the offshore Burullus and Rosetta fields. In February 2019, LNG exports from the Idku facility increased to 800 mcf/d, according to an interview with Tarek El Molla.

In terms of existing import infrastructure, there is a plethora of potential that could be unified through the EMGF. However, if the East Mediterranean is to become an exporting hub, more exporting infrastructure will be needed. Egypt seems the obvious place to develop a gas hub, with a likely option on the north shore of Egypt due to its transportation, processing, and export infrastructure to handle supplies from neighboring countries.

OPPORTUNITIES AND CHALLENGES FOR THE EMGF

Whilst it is undeniable that the recent gas discoveries present a major opportunity for the EMGF to consolidate the resource base and provide sufficient scale to export gas to neighboring countries and to Europe, some difficulties are facing the EMGF.

According to Alexander Huurdeman, a senior gas specialist at the World Bank, the expansion of trade faces economic challenges from two directions: with regards to supply, there is the issue of low-cost pipeline imports from the east with a growing supply of liquefied natural gas (LNG). As for demand, Europe's gas demand is softening as it pushes for a carbon-neutral energy system by 2050. According to a World Bank report 2020, break-even prices of eastern Mediterranean gas at the wellhead need to be in the range of $1.5–3 per million British thermal units to justify further investments.

Despite these obstacles, there are many indicators signaling the future success of the EMGF as an exporting entity. There is a desire for the European Union (EU) to wean itself off Russian gas. Accordingly, the EU is encouraging the formation of new delivery routes such as the East Med gas pipeline. The $6.7 billion project has been confirmed as the Project of Common Interest (PCI) by the European government and is expected to be completed in 2025-2026, to transform the region into a crucial energy hub.

Furthermore, the United States of America is an avid observer of the forum, asserting its enduring support to develop the natural gas discovery operations in the East Mediterranean region. Furthermore, this rhetoric has been backed up by action; America has committed to investing in the EMGF directly by pledging the latest technology at 17 Eastern Mediterranean refineries working under the umbrella of the US Energy Agency.

Also, one must not forget there remains huge undiscovered gas potential which offers an enticing prospect for private investment to turn the region into an exporting hub.

Despite there being a long way to go before the EMGF transforms into an energy hub, the expanded economic ties and the enhanced energy security of the region are seen to be fostering stability in a historically tumultuous region.

A DEEPER UNDERSTANDING OF THE OFFSHORE NILE DELTA: ORGANIC GEOCHEMISTRY OF CONDENSATES AND NATURAL GASES

BY JACK BECKFORD

The natural gas potential for Egypt in the offshore East-Mediterranean region is undeniable and accounts for about 60% of Egypt's 223 billion cubic feet (bcf) of proven natural gas reserves and nearly six million barrels of natural gas liquids, according to data from a recent study . One of the most prolific concessions is the West Delta Deep Marine (WDDM) concession with extensive commercial production. Despite years of gas and condensate discoveries that have been achieved in the deep ultramarine Nile Delta Basin of northern Egypt, the genetic origin and formation mechanisms of these hydrocarbons still remain largely unidentified.

The paper "Organic geochemistry of condensates and natural gases in the northwest Nile Delta offshore Egypt" written by Waleed el Diasty, academic at Mansoura University, and Mohammad Hamad, member of the Exploration Department at the Egyptian Petroleum Research Institute, addresses this issue by analyzing 20 condensate and 34 natural gas samples from Miocene–Pliocene sandstone reservoirs. From the study, it inferred their origin, degree of thermal maturity, and extent of alteration.

However, several issues concerning the offshore Nile Delta need to be examined to reveal the full potential of this already prolific basin. In order to achieve this, the review will identify the origin of gas and condensates by inferring the lithology, organic facies, depositional paleoenvironment, age, and level of thermal maturity of the corresponding source rocks using biomarker and isotopic data and multivariate statistical methods.

GEOLOGIC MAKE-UP OF DELTA

The Nile Delta Basin on the northeastern margin of the African Platform is an integrated tectonic province in the Eastern Mediterranean characterized by complex active subduction-collision tectonics. The stratigraphic succession recorded from subsurface drilling of the Nile Delta province is dominated by clastic sequences of clay, shale, and sandstone with a few calcareous interbeds overlying a pre-Miocene sequence. The Nile Delta stratigraphic column reflects deltaic to littoral and shallow marine environments.

In terms of previous condensate discoveries, the breakthrough discoveries in the eastern and western offshore sub-basins of the Nile Delta region contained mixed-light oil and gas charges from different source rocks. However, despite some discoveries in the Delta taking place up to 20 years ago, knowledge of the source rocks for these hydrocarbons is still in its infancy. Organic-rich shales from the Sidi Salem and the Kafr El Sheikh formations are believed to be major source rocks. However, the degree of maturation of the organic content in these formations is not well known. In the eastern Nile Delta, north of the hinge zone, the Oligo-Miocene shales and marls are believed to be the prime source units of condensates and natural gases.

FIELDWORK METHODOLOGY AND SAMPLING

The database used in the study consisted of 20 condensate and 34 natural gas samples from 22 different wells located in the center and west offshore Nile Delta Basin. To accumulate varied and representative data, the depth intervals range from 1,273 meters to 4,464 meters throughout reservoir age spans from Early Miocene to Pliocene.

All the molecular compositions of gases were analyzed by gas chromatography (GC) using an HP 6890N. Stable isotope compositions of natural gas samples were performed using a combustion interface and IRMS or isotope ratio mass spectrometer.

With regards to the hydrogen isotope composition, this was calculated by the reduction of water from combustion with zinc metal followed by dual-inlet isotope ratio mass spectrometry. Carbon isotopic compositions were referenced to PeeDee Belemnite (PDB) and hydrogen isotopic compositions are referenced to Standard Mean Ocean Water (SMOW) calibrated by the National Bureau of Standards (NBS) stable isotope standards.

Once the condensates were obtained and weighed, the samples were then diluted to one-hundredth of the original solution with hexane. The next stage in the process involved flushing the sample with hexane to remove the saturated hydrocarbon fraction, followed by methylene chloride elution to remove the aromatic hydrocarbon fraction. Finally, the saturated cuts were treated with a molecular sieve which removes n-alkanes from saturates to increase the signals of diagnostic biomarkers.

RESULTS AND FURTHER STUDY

The main findings of the study pertained to source-related biomarkers, age and maturity-related biomarkers, oil chemometrics, molecular and isotopic compositions, genetic origins of gases, and the maturity of gases:

Source-related biomarkers, including low or absent C30 n-propylcholestanes, high Pr/Ph, high Ts/Tm and high hopane/sterane ratios, revealed that the analyzed condensates originated from the clay-rich non-marine source rock. These source units were deposited in an offshore deltaic setting where local variations and the merging of marine and terrigenous units occurred over time.

The results from the age and maturity-diagnostic molecular data were conclusive. It revealed that these hydrocarbons originated from at least two pods of active Upper Cretaceous and Oligocene or younger source rocks, the presence of bicadinanes, and high C26 24-norcholestane indices.

Principal component analysis (PCA) and Hierarchical cluster analysis (HCA) statistical analysis were used for 12 source-related parameters and stable isotope compositions to identify six genetic families. Geochemical characterization of the families shows that they were, on the whole, the same but differed in terms of organic matter precursors, depositional paleoenvironment, and thermal maturation of microbial degradation.

In terms of Molecular and stable isotopic data, the analyzed gases revealed mixed thermogenic and microbial origins in which the biogenic component reached up to around 70%. These gases were derived from Type-II or Type-II/III kerogens with varying maturity between 1.0% and 1.5% vitrinite reflectance (a measure of the percentage of incident light reflected from the surface of vitrinite particles in sedimentary rocks) that extends from late primary cracking to the early oil cracking stage. The altered gas samples formed by secondary cracking in the wet gas stage.

Lastly, one of the most significant findings of the paper was that heavy hydrocarbon gas carbon isotope signatures and molecular compositions indicated that the shallower gas accumulations are severely bio-degraded, unlike the deeper hydrocarbon reservoirs. The co-occurrence of unaltered gas with biodegraded condensates may indicate different microbial communities during the initial stages of alteration where condensates were preferentially attacked.

THE PHILOSOPHY OF ENERGY CONSUMPTION, ECONOMIC GROWTH

There is no doubt that energy consumption reflects the economic growth rate and determine the different development activities of any country in the world. Consequently, it is so important to find and create new resources for producing the required energy for running the economy in a proper manner.

One of the most conventional, reliable and non-renewable energy sources is oil and gas, which have become the most important input in all economic and industrial activities on earth. So, oil and gas production volumes, prices, and investments are determinants for economic enhancement and development plans for governments.

The most serious challenges related to the oil and gas usage as principal sources of energy are; the environmental negative effect that is associated with this type of energy and its depletive nature. Still, oil and gas can be considered the cheapest, reliable and viable sources of energy.

I think for achieving the optimum exploitation of energy, it should be used for developing new high economic value products. On the other hand, the usage of oil and gas as fuel for combustion has been considered the lowest beneficial utilization strategy. So, it is essential to create new strategies for dealing with non-renewable energy consumption to be in an optimum way with the minimum negative environmental impact.

I see that we are in need for developing a new methodology for ensuring the different energy sources and keeping our energy consumption in optimum, economic, safe, and clean way. This methodology will be directed in two tracks, the first is working on increasing the dependence on the new applicable sources of energy like solar energy, wind and water energy. The second track will be the creation of new systems for getting high mechanical and electrical power with oil and gas energy consumption minimization.

The international earth climate summit conference and other global environmental organizations are working for developing new strategies for dealing with the steady rise in earth temperature as a result of the excessive use of traditional energy resources in human activities. This shall avert the occurrence of environmental disasters threatening human existence on the surface of the earth.

The foundational basis of the approach is to improve energy consumption, depend more on renewable energy sources, and minimize environmental impact.

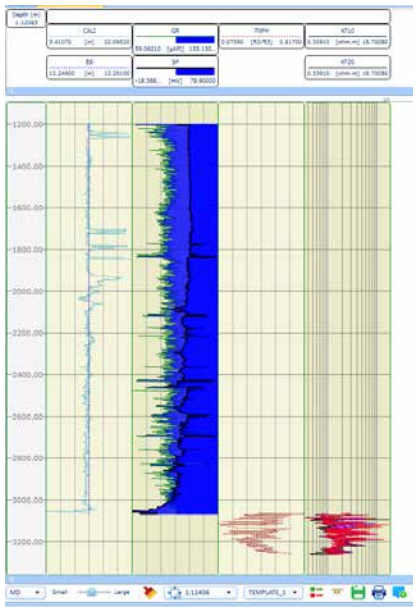
Mohsen Ahmed Farhan
Drilling Department Head
General Petroleum Company (GPC)

EGAS CENTRALIZES AND INCREASES ACCESS TO 25 TB OF DATA

PROSOURCE E&P DATA MANAGEMENT AND DELIVERY SYSTEM ENHANCES DATA SECURITY, DIGITIZATION, AND ACCESSIBILITY

COMBINING WIDELY DISTRIBUTED MULTIPLE DATA SOURCES

Egyptian Natural Gas Holding Company (EGAS) is an entity mandated to manage the natural gas activities in the country and issue exploration licenses in the Mediterranean Sea, onshore Nile Delta, and in the North Sinai region. EGAS has more than 25 TB of subsurface and regulatory data for more than 700 wells. However, a single database did not exist for managing, storing, and archiving data.



ProSource Front Office web interface log viewer.

Because the data was housed in multiple disparate sources or formats, data access and security were top concerns for EGAS. Personnel had to perform multiple searches and use multiple logins, passwords, and workflows to access the data. Multiple versions of the data also existed, consuming huge disk space and time for verification. To overcome these issues, EGAS chose Schlumberger to provide a solution for centralizing its data.

MAXIMIZING VALUE OF E&P DATA

EGAS needed to revisit its methodology and procedures for log data archival, storage, loading, and validation to meet user demands. After discussing possible solutions, a plan was developed to centralize the log information and optimize data transfer to its core applications using the ProSource E&P data management and delivery system.

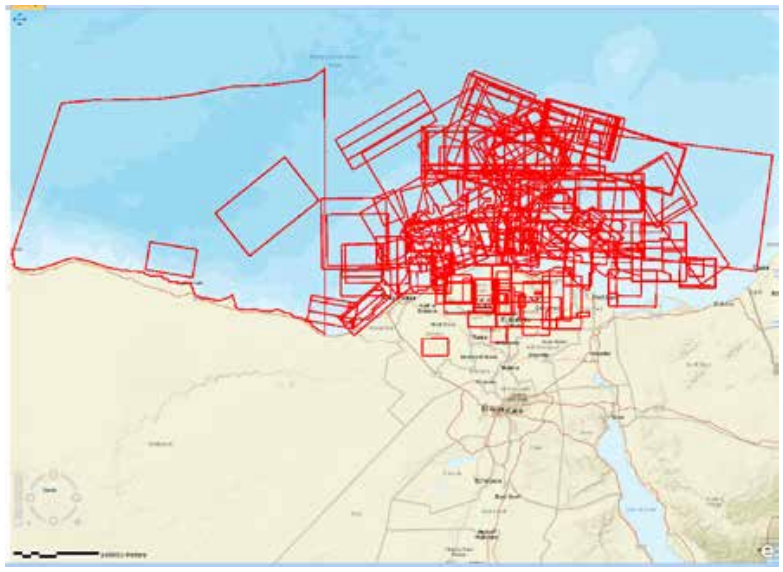
EGAS's information management personnel needed to collect, find, edit, manage, and transfer data quickly and easily, while subsurface personnel needed to access a complete set of quality-assured, approved reference and interpretive data through a single point of access. The ProSource system helped meet the needs of these users by providing a centralized database to accommodate different types of EGAS data standardized workflows for managing and handling the data through a single interface reduced time to search and find required data increased data quality, leading to better decision making with reduced risk capability to import data to different E&P applications ability to export data to standard format files data preservation with security and disaster recovery.

The unified ProSource system enabled a wide variety of information, including well log and seismic data, to be consolidated and integrated into a common repository in which comparisons and modifications could be made and the likelihood of data duplication reduced. The common utilities and workflows in the ProSource system enhanced usability and user efficiency. The Seabed* E&P open data model and database was also used with the ProSource system to build the structure for an integrated working environment.

ProSource Front Office interface, table view, and GIS view for well data.

IMPROVED ACCESS TO A COMPLEX DATA ENVIRONMENT

The powerful combination of the ProSource system and the Seabed database helped EGAS team to manage the entire life cycle of E&P data—from original format to trusted and assured corporate master reference sources use powerful analysis tools to review, compare, join, merge, and update data in the ProSource system and other repositories



ProSource Front Office map view for 3D seismic data.

increase data security through comprehensive entitlements functionality cross-reference available information quickly across multiple data stores.

With this deployment, EGAS benefited from having multiple means to query and view data from ProSource system data stores and other federated repositories to support visualization of key data types in specific workflows.

The ProSource system was extended to connect to ArcMap® to enable EGAS teams to edit the concessions, add legends, and perform other drawings on different layers. The layers can then be populated to the ProSource system and used in different data viewers.

As a result, storage of bulk data directly in the database enabled consistent data handling, security, and backup and recovery, while the use of industry standard GIS technolgies, including Esri® ArcGis®, provided unprecedented integration with an enterprise GIS.

This approach to data integration and the ProSource system enabled a broader range of EGAS internal disciplines to contribute to the corporate data store, which enhanced data availability and provided significant time saved on searching for information through optimized and comprehensive data storage, preserving corporate investment effective corporate workflows reduced administration costs and data delivery time to different E&P applications improved user experience through better visualization in ProSource Front Office.

It is now easier and faster to access rights and privileges and achieve limited access to secure data.

CHALLENGE

Decrease time-consuming activities in data preparation for internal use and license rounds data sales and review.

SOLUTION

Implement ProSource* E&P data management and delivery system to provide a single, secure database for 25 TB of E&P data to streamline data access and maximize data value.

RESULTS

Improved access to data through the ProSource system increased EGAS's ability to:

- manage the entire life cycle of E&P data
- use powerful analysis tools for reviewing, comparing, joining, merging, and updating data
- secure data
- cross-reference available information quickly

ILLEGAL TAPPING: A MAJOR RISK FOR SAFETY, ENVIRONMENT IN EGYPT

On July 15, a major fire broke out after an oil pipeline leaked next to a busy highway in Cairo, injuring 17 people. The leak was probably ignited by a car, although the immediate cause of the incident remains unconfirmed. However, some report the incident to be related to 'third-party interference'.

Third-party or external interference is associated with unwanted external interventions breaching the integrity of the pipeline. This could be unintentional (e.g. due to unintended excavation works on or near the pipeline) or deliberate. In the latter case, the intent is primarily to steal oil or oil products for personal gain.

"Leaks of petroleum pipelines caused by intentional third-party intervention are not uncommon in Egypt."

In November 2019, thieves attempted to siphon off gasoline from a pipeline in Beheira. The illegal tap and the prospect of obtaining valuable gasoline caused people to rush to the site. The leak was ignited by an unknown source and the subsequent fire killed seven people.

THEFT OF OIL PRODUCTS – A GLOBAL PROBLEM

Stealing 'black gold' from pipelines is not a purely Egyptian phenomenon. When it comes to theft of oil and oil products, Mexico and Nigeria are notorious. But there are other countries like Indonesia and China where stealing is manifest and rampant. Siphoning fuel off pipelines powers entire economies, but has also led to major shortages and price hikes in these countries.

For more organized thefts, two methods are used. In hot tapping, an illegal secondary pipeline is attached to a high-pressure primary pipeline belonging to a multinational corporation. In cold tapping, a portion of a pipeline is destroyed, and a secondary pipeline is attached to the shut-in primary pipeline at a remote location. Oil is diverted from the primary pipeline into mobile oil bunkering facilities that are attached to the secondary pipeline. Without a robust security management system in place, it may take some time for these taps to be detected, leading to large financial losses.

This illegal tapping constitutes a major risk for safety and environment.

SIGNIFICANCE OF EXTERNAL INTERFERENCE

Together with corrosion, external intervention leads to more than half of the leaks of oil and gas transmission pipelines. Other causes are ground movements (e.g. landslides), material defects, and shortcomings associated with poor construction, together contributing about 30% of the leaks. Incidents caused by external interference and ground movement are characterised by potentially severe consequences due to larger hole sizes than those found for corrosion as a primary cause.

HOW CAN YOU PREVENT EXTERNAL INTERFERENCE?

Pipeline integrity management should not only cover design and construction, material degradation due to corrosion and safe and responsible operations of pipelines – third-party interference including that of a malicious nature - should be addressed too.

"A pipeline security management system can help manage the risk of external pipeline interference."

The focus should be on minimizing pipeline interferences, e.g. by establishing secure pipeline corridors and preventing trespassing of these passages. Locations along pipelines susceptible to illegal tapping should be identified and guarded. It is also possible to deploy remote real-time monitoring technologies that would indicate external interference.

HOW DNV GL CAN HELP

DNV GL can help manage the integrity of your pipeline system. Our pipeline software solutions, like Synergi Pipeline and Synergi Life, can help you manage your pipelines throughout their lifecycle phases. As for external interference, DNV GL can help develop and implement a tailored risk-based security management system specific to the threats to which your pipelines are exposed.

CONTACT US TO LEARN MORE:

HISHAM EL GRAWANY
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Email: hisham.el-grawany@dnvgl.com

EGYPT OIL&GAS
RESEARCH & ANALYSIS

Annual Inflation Headline CPI (%)

JULY 2020	AUGUST 2020
4.2	3.4

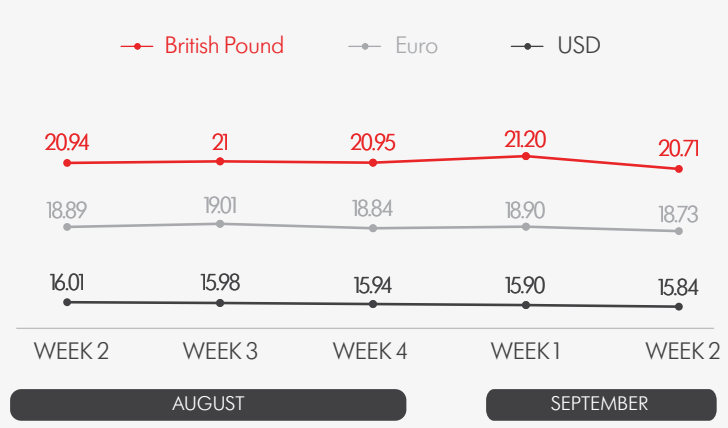
Net International Reserves ($ billion)

JULY 2020	AUGUST 2020
38.31	38.37

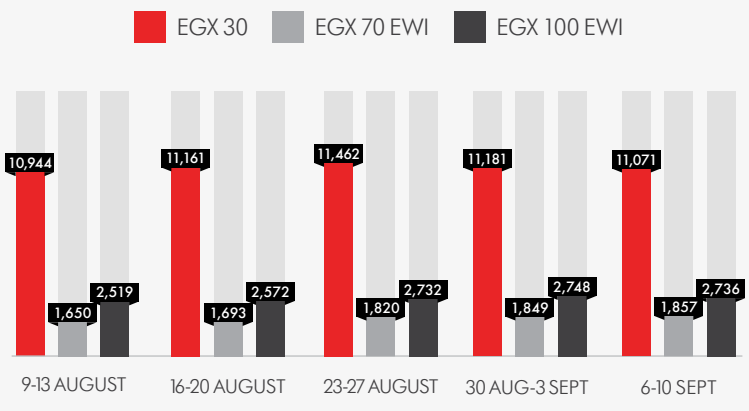
Non-Oil Private Sector PMI (Points)

JULY 2020	AUGUST 2020
49.6	49.4

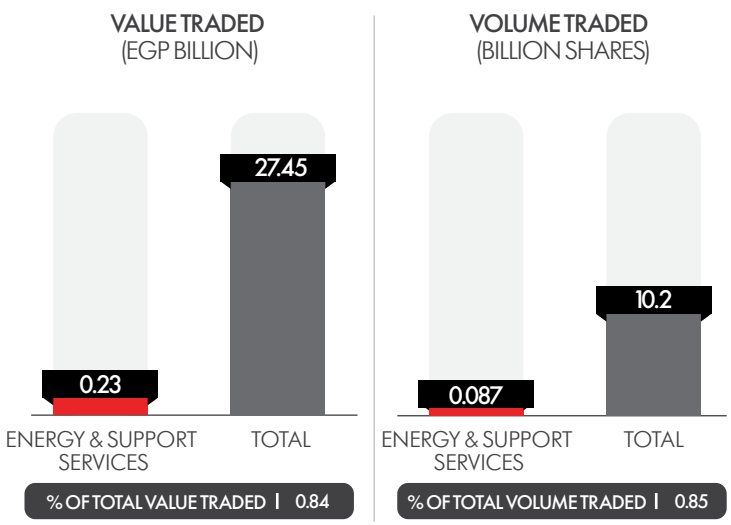
Exchange Rates



Capital Market Indicators



Performance of Petroleum Companies in the Egyptian Exchange in August 2020



National Drilling

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
USD	4.96	0

Alexandria Mineral Oils Co.

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	2.83	▼ 22.04

Egypt Gas

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	59.87	▲ 7.87

Sidi Kerir Petrochemicals

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	8.04	▼ 10.47

Source of Raw Data: CBE, CAPMAS, Egyptian Exchange, HIS Markit

NATURAL GAS FIELDS' DEVELOPMENT IN FY 2019/20

ZOHR

Natural Gas Production
> 3 bcf/d | 40% of Egypt's Production

Production Wells
15

Total Costs*
$10.4 billion

*Since the beginning of the project until June 2020

ATOLL

Natural Gas Production

28% ↑

320 mmcf/d

A NEW NATURAL GAS DISCOVERY IN NOOROS

Date	September
Well	Nidoco NW-1
Companies	Eni & BP
Water Depth	16 meters
Estimated Reservoir	> 4 tcf

HIGH-OCTANE GASOLINE COMPLEX TO BE FINALIZED BY Q4 2020

Location	Cost	Production Capacity
Assuit	$450 million	660,000 t/y of naphtha

PETROLEUM SECTOR OVER THE PAST 6 YEARS

EGP 1.16 trillion
Investments

5 million
Residential Units Connected to Natural Gas

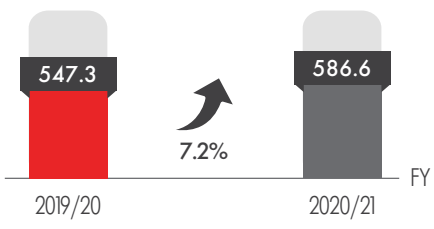
ASORC REFINERY'S PRODUCTION IN FY 2019/20

Butane 19%

Jet Fuel 40%

PETROLEUM SECTOR'S PLANS IN FY 2020/21

INCREASING PRODUCTION AT CURRENT PRICES (EGP BILLION)



EXPORTS

Crude Oil | Natural Gas | Petroleum Products | Petrochemicals

32 mmt

FINALIZING SONKER'S LIQUID BULK TERMINAL PROJECT

3rd basin of Al Sokhna Port
Location

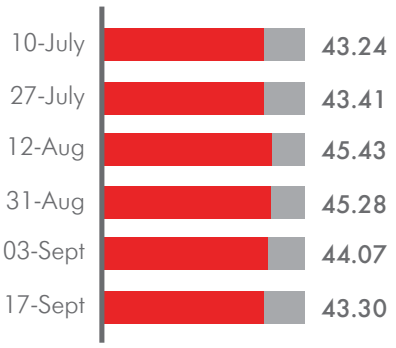
$235 million
Investments

100,000 m³ of diesel | 150,000 m³ of butane
Capacity

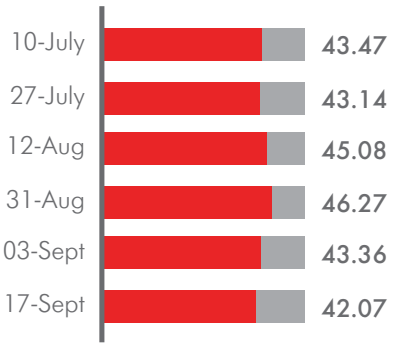
3
Pipelines

INTERNATIONAL OIL PRICES

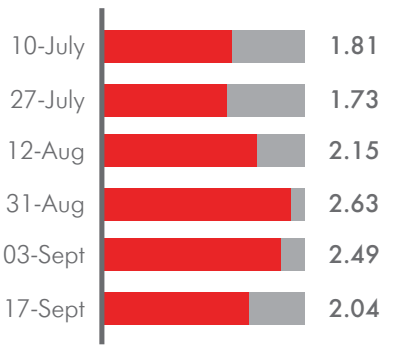
BRENT PRICES ($/bbl)



OPEC BASKET PRICES ($/bbl)



NATURAL GAS PRICES ($/mmBtu)



UNDER THE HIGH PATRONAGE OF **H.E. TAREK EL MOLLA**
MINISTER OF PETROLEUM & MINERAL RESOURCES - ARAB REPUBLIC OF EGYPT

INCREASING INVESTMENTS IN EGYPT'S BROWNFIELDS OPPORTUNITIES

18TH OCTOBER 10:30AM — **VIRTUAL ROUNDTABLE**

AN OPEN DISCUSSION WITH

H.E. TAREK EL MOLLA

Minister of Petroleum & Mineral Resources - Arab Republic of Egypt

DISCUSSION TOPICS

OPTIMUM BROWNFIELD REVIVAL STRATEGIES.
TECHNOLOGY'S ROLE IN BOOSTING PRODUCTION OF BROWNFIELDS.
THE ECONOMIC BARRIERS OF USING BROWNFIELDS.

DAVID CHI
VICE-PRESIDENT & GENERAL MANAGER
APACHE

TAMEER NASSER
DIRECTOR & GENERAL MANAGER EGYPT AND SUDAN
BAKER HUGHES

DAVE THOMAS
CEO
CHEIRON

TAYEB HUWAIR
COO
DRAGON OIL

COLBY FUSER
VICE PRESIDENT, EGYPT AND LIBYA
HALLIBURTON

KAMEL EL SAWI
PRESIDENT
KUWAIT ENERGY EGYPT

KARIM BADAWI
MANAGING DIRECTOR EGYPT & EAST MEDITERRANEAN
SCHLUMBERGER

KHALED KACEM
VP EGYPT, COUNTRY CHAIRMAN AND MANAGING DIRECTOR
SHELL EGYPT

CRAIG ROBERTSON
COUNTRY MANAGER & DIRECTOR
TRANSGLOBE ENERGY

SAMEH SABRY
SENIOR VICE PRESIDENT-MANAGING DIRECTOR EGYPT
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