EGYPT OIL&GAS NEWSPAPER

Egypt's Leading Oil And Gas Monthly Publication - December 2019 - 56 Pages - Issue 156
www.egyptoil-gas.com

PURSUING EGYPT'S PETROLEUM PRODUCTION

OVER FY 2010/11-2018/19

EXCLUSIVE INTERVIEW

EXPLORING THE ROLE OF METHANEX AS A GLOBAL INDUSTRY LEADER

Interview with President and CEO at Methanex Corporation, **JOHN FLOREN**

EDITOR'S LETTER

Egypt Oil & Gas Group is proudly organizing a new edition of its Upstream Technical Convention Event in December. The event is discussing new ways of improving brownfield performance in Egypt. Thus, our December issue is tackling a variety of upstream and brownfield related topics.

The issue includes an overview about Egypt's production rates in the first 11 months of 2019.

Our industry insights highlight the fishbone technology that maximizes production recovery from old fields, decommissioning oil and gas fields in Egypt, and preventive maintenance in Egypt's exploration and production (E&P) activities.

In our politics section, we looked for the reasons and effects of the Venezuelan crisis. Moreover, the paper review section covers the Geo-Dynamic Field Modeling as a new workflow for brownfield rejuvenation.

In the research and analysis section, we provide our readers with an analytical report that tracks Egypt's petroleum production over fiscal year (FY) (2010/11-2018/19).

Last but definitely not least, Egypt Oil & Gas interviewed the President of Kuwait Energy Egypt, Kamel Al-Sawi, to discuss the company's leading role in Egypt's oil and gas industry, especially brownfield optimization in Egypt.

We additionally interviewed, John Floren, President and CEO at Methanex Corporation in conjunction with his visit to Egypt to attend the company's board of directors' meeting.

Egypt Oil & Gas gladly interviewed a third leader from one of the most important companies in the region, Dragon Oil's CEO, Ali Al Jarwan.

And as always, we wish you a happy and informative reading!

MAHINAZ EL BAZ

Acting Editor-In-Chief

Research & Analysis Manager

INSIDE THIS ISSUE

EGYPT OIL&GAS NEWSPAPER

Egypt's Leading Oil And Gas Monthly Publication

PROUDLY THE OFFICIAL PUBLICATION

EGYPS EGYPT PETROLEUM SHOW

PUBLISHER **MOHAMED FOUAD**

13D Sherif Salama Street - Lasilky Division - New Maadi, Cairo, Egypt

(+20) 2 25164776 (+20) 2 25172052 (+20) 2 27547569

(+20) 2 25172053

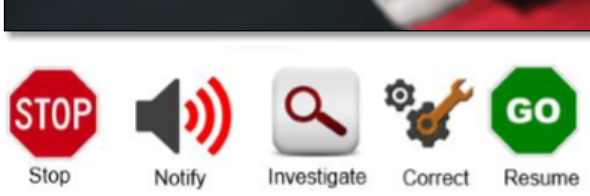
www.egyptoil-gas.com

info@egyptoil-gas.com

/EgyptOilandGas /EgyptOilandGas /Egypt-Oil-&-Gas /EgyptOilandGas /EgyptOilandGas

HALLIBURTON

SOMETIMES THE MOST IMPORTANT WORK YOU CAN DO IS…. STOP THE WORK



SWA is when the task on hand is actually stopped and the situation is addressed or escalated and work is resumed only after the unsafe condition, act or issue has been satisfactorily resolved.

SAFETY IS EVERYONE'S RESPONSIBILTY

ZERO

JOURNEY TO ZERO

NEW WELL IN 9B PHASE PUT ON PRODUCTION

The Ministry of Petroleum and Mineral Resources announced that Silva well in 9B Phase, in the West Delta Deep Marine (WDDM) concession, has been put on production.

A ministerial statement reported that in early November, Silva well will start to produce with an average rate of 60-80 million cubic meters per day (mmcm/d), after finalizing the evaluation of the third well.

In October 2019, the first and second wells, East Sfeir and East Swan, were put on production with an average of 170 mmcm/d.

Burullus Gas Company finalized linking the new well to production, aiming to register a total production rate of 240 mmcm/d from the three wells. The last three wells are planned to be put on production by next March, to produce an average of 170 mmcm/d, with the target of boosting the production rate of 9B Phase, which has investments of more than $500 million.

TWO NEW WELLS IN BALTIM BEGIN PRODUCTION WITH 190 MMCF/D

The exploration wells, Baltim Southwest-1 and Baltim Southwest-2, in the Nile Delta, began production with a capacity rate of about 190 million cubic feet per day (mmcf/d) and around 1,300 barrels of condensate per day. The first and second wells were put on production during September and October 2019. Drilling work for the third well as part of the development plan is currently underway.

This discovery was achieved in the Medgas concession within the development contract of South Baltim at a depth of 25 meters and at a distance of about 18 kilometers (km) away from Nidoko-11. The initial development plan for the field includes drilling and completing six wells and putting them on the production map through a new production line with a diameter of 26 inches and a length of 30 km.

GPC PUTS NES-16 WELL ON PRODUCTION

The General Petroleum Company (GPC) announced that it has discovered a new oil pay zone in Abu Rawash D and drilled well NES-16, pointing out that this step is considered a new step of its kind in the region.

GPC added that the NES-16 well started production with 2,000 oil barrels per day (b/d) in the Abu Sennan field, located in the Western Desert.

NES-16 well was drilled and completed to 1,652 meters of true vertical depth (TVD) in 21 days.

HOUSE OF REPRESENTATIVES APPROVES 11 EXPLORATION AGREEMENTS

The Energy and Environment Committee of Egypt's House of Representatives, chaired by Talaat El Sewedy, approved 11 projects, delegating the Minister of Petroleum and Mineral Resources, Tarek El Molla, to explore for oil in different regions.

The government submitted a draft law to license El Molla to contract with the Egyptian General Petroleum Corporation (EGPC) and Shell Egypt for oil exploration in West Fayoum. Additionally, another draft law authorized El Molla to deal with EGPC and Merlon El Fayoum Company for oil exploration in North Beni Suef.

Furthermore, the committee approved two agreements in the Gulf of Suez. The first agreement permitted El Molla to contract with EGPC and Neptune Energy Egypt B.V. for oil exploration in Northwest El Aml. The second agreement was with Ganoub El Wadi Petroleum Company (Ganope), Pacific Oil Limited, and ZNPV LTD for oil exploration in the Ras Elesh area.

Another project was approved to contract with EGPC and IEOC for oil exploration in Southeast Siwa. Moreover, the committee authorized the minister to deal with EGPC and Shell Egypt to explore for oil in the Abu Sennan area. Also, the committee permitted the minister to deal with EGPC and Apache to amend the exploration agreements of West Kalabsha and West Kanayes.

EGYPT ACHIEVES 60 DISCOVERIES DURING FY 2018/19

The Egyptian General Petroleum Corporation's (EGPC) Chairman, Abed Ezz El Regal, said that 60 new discoveries had been realized during the previous fiscal year (FY), adding that two new discoveries will be announced soon: the first will be for Eni in the Gulf of Suez, while the second will be for Petrogulf in Sinai.

During the House of Representatives' Planning and Budgeting Committee, Ezz El Regal clarified that there is an ambitious plan to develop and raise the efficiency of seven old refineries. He highlighted that the company established new firms like the Egyptian Refining Company (ERC) with a cost of $4.4 billion, aiming to produce 4.2 million tons per year. This is in addition to Assiut Company, which will start production in Q1 2020, and the Red Sea Company.

NOOROS-ABU MADI-EL GAMIL PIPELINE PROJECT SAVES $60,000

The Ministry of Petroleum and Mineral Resources managed to save nearly $60,000 that was spent on rent for a temporary treatment plant for the natural gas produced from Nooros field after finalizing the Nooros-Abu Madi-El Gamil pipeline project in May. The $300-million project transports around 700 million cubic feet per day (mmcf/d) of natural gas through two pipelines. The first one is from Nooros field to the gas treatment plant in Abu Madi and the second is from Abu Madi's plant to be treated in El Gamil plant, which then pumps natural gas into the national grid.

Additionally, the remaining production of Nooros field, estimated at around 400 mmcf/d of natural gas, has been treated at a temporary rented plant, bringing the total natural gas production to around 1.1 billion cubic feet per day (bcf/d).

EGAS TO BOOST LNG EXPORTS THROUGH IDKU

The Egyptian Natural Gas Holding Company (EGAS) planned to boost its liquefied natural gas (LNG) exports via Idku liquefaction plant in November to reach 1 billion cubic feet per day (bcf/d), up from 300 million cubic feet per day the month before.

The main reasons behind that increase is the completion of the maintenance of one of the plant's units, as well as the stability in worldwide LNG prices.

Moreover, LNG quantities exported through Idku are determined periodically based on contracted shipments, with regular pumping through the national gas network. Additionally, those quantities increased gradually after the increase in domestic production and the decline in consumption.

MINISTRY OF PETROLEUM TO BOOST PETROLEUM EXPORTS

The Ministry of Petroleum and Mineral Resources plans to boost petroleum exports to $8.5 billion by the end of fiscal year (FY) 2019/20, up from $7.7 billion in the previous FY.

The total quantities of crude oil, natural gas, petroleum products, and petrochemicals targeted for exports are around 17.7 million tons. The export value includes the crude oil share of foreign partners, with the average price of Gulf of Suez crude to be considered at $55 per barrel. The value of natural gas exports increased to 1.29 bcf/d in the current FY, as Egypt's production capacity of natural gas reached around 7 bcf/d.

EGPC, SONKER AMEND TRADING CATEGORIES OF DIESEL, BUTANE

The Minister of Petroleum and Mineral Resources, Tarek El Molla, witnessed the signing of a contract amending the trading categories of diesel and butane at Sonker's bulk terminal. The amended contract was signed by Abed Ezz El Regal, the Egyptian General Petroleum Corporation (EGPC) Chairman, and Osama El Sherif, Sonker's Managing Director, in the presence of representatives from the Administrative Control Authority.

Under the contract, the facilities will be able to receive and store diesel and butane, as well as receive giant carriers in the pier at Ain El Sokhna port. Amending the contract mainly targets achieving balance in the contract's terms under the framework of the ministry's infrastructure reinforcement policy and its ideal exploitation to contribute to meeting part of the country's needs of diesel and butane.

PETRO DISOUQ TO INCREASE NATURAL GAS SUPPLY TO NATIONAL GRID

Disouq Petroleum Company (Petro Disouq), the joint venture (JV) responsible for managing two natural gas fields, South Disouq and Ibn Younis at South Disouq concession, plans to increase natural gas supply to the national grid, according to Nasr Yassien, Operations General Manager and Board Member at Petro Disouq.

According to Yassien, these two fields have a production capacity of around 60 million cubic feet per day (mmcf/d) of natural gas and 200 barrels of condensates per day. The fields' experimental production commenced on November 8, 2019. The produced natural gas is planned to be fully directed to cover local demand through the national gas grid of the Egyptian Natural Gas Company (GASCO).

ACHIEVEMENTS IN PETROCHEMICALS INDUSTRY IN Q1 2019/20

According to a report received by the Minister of Petroleum and Mineral Resources, Tarek El Molla, the trial operation of the Hydrogen Cracking of Mazut Complex at the Egyptian Refining Company (ERC) commenced, with investments of around $4.3 million.

Moreover, 50 filling and services stations began operations across the Egyptian governorates. Additionally, the South Helwan-Byad El Arab mazut pipeline

was completed in July, El Mahala-Shawa petroleum products pipeline was completed in August, and El Tina-New Capital pipeline was finalized in July. Furthermore, natural gas was delivered to around 305,500 housing units, 178 commercial consumers and three factories, and 4,613 cars were converted to run on natural gas.

The consumption of petroleum products decreased by 5.7% compared to the same period a year before, reaching 7.5 million tons. Meanwhile, the consumption of natural gas represents around 63% of the total local consumption, yet it declined by 4.9% compared to the same period a year before.

Additionally, the export value of crude oil, liquefied natural gas (LNG), and petroleum and petrochemical products recorded around $2.42 billion, compared to $2.87 billion. Despite exports increasing by 2.1%, its value dropped by 15.7% because of the decline in the international prices of some products. On the other hand, the import value of crude oil and petroleum products reached $2.7 billion, with a decline of around 13%, despite the increase in imported quantities by 0.4%. This is due to the decline in the international prices of some products.

EGYPT DELIVERS NATURAL GAS TO 86 NEW AREAS

The Egyptian government plans to deliver natural gas to more than 86 new areas for the first time during the current fiscal year (FY) 2019/20.

Twenty-three new areas were provided with natural gas between July and the first week of November. Additionally, 444,000 residential units had been converted to operate on natural gas, with an implementation rate reaching 104% when compared with the target plan.

Since the initiative started and up until now, nearly 10.5 million residential units all over the country were converted to natural gas. Moreover, the government has started a pilot project with 20,000 prepaid natural gas meters in Alexandria's Bashayer El Khair project and El Asmarat District in Cairo, and it is estimated to be finalized by the end of December 2019. Moreover, it is planned to start production by January 2020, with an estimated capacity rate of about 500,000 meters in January-June 2020, which would be boosted to one million meters annually by July 2020.

HOUSE OF REPRESENTATIVES TO ASK FOR NATURAL GAS PRICE REDUCTION

The Industry and Energy Committee of the House of Representatives intends to ask the government to reduce natural gas prices for the energy-intensive factories. The committee plans to propose their suggestion on reducing natural gas prices to $4.5 per million thermal units (mtu) for the iron, steel, aluminum, copper, ceramics, and porcelain industries, down from the current price of $5.5 per mtu, during the upcoming meeting with Amr Nassar, the Minister of Trade and Industry.

It is worth mentioning that the Cabinet approved in October a reduction in natural gas prices to become $5.5 per mtu for iron, steel, aluminum, copper, ceramics, and porcelain industries and $6 per mtu for the cement industry. Additionally, the government reduced imported gas prices by 27%.

QATAR PETROLEUM: ERC'S REFINERY STARTS OPERATION

Qatar Petroleum (QP) announced in November that all units of the Egyptian Refining Company (ERC) refinery project are now successfully operating and would reach full production by the end of Q1 2020.

QP pointed out that this project is one of its largest investments in either an Arab or African country. The project aims to produce Euro V refined products, including diesel and jet fuel, for Egyptian consumption by processing 4.7 million tons of mainly atmospheric residue from the Cairo Oil Refinery Company.

It is worth mentioning that QP owns 38.1% of the Arabian Refinery Company, which owns two-thirds of ERC.

QALAA INVESTS $4.7 B IN ERC PROJECT

Egypt's Qalaa Holdings' Chairman, Ahmed Heikal, announced that the company has implemented investments in the Egyptian Refining Company's (ERC) project totaling $4.7 billion.

During the first session of Akhbar El Youm Economic Conference, Heikal stated that the ERC's project is considered one of the largest in the Egyptian market, as it has a production capacity of 4.4 million tons per year. Heikal added that his company targets pumping new investments worth EGP 25 billion during the coming three years, noting that Qalaa had pumped about EGP 60 billion during the past five years in the energy, cement, and food industries.

BUTAGASCO INAUGURATES EGP 2.6 MM WAREHOUSE

The Egyptian Company for Gas Transferring and Deliverance's (Butagasco) Chairman and Managing Director has inaugurated a gas-cylinders warehouse in Al Ayyat in Giza governorate on an area of about 1,500 square meters at a cost of nearly EGP 2.6 million.

Butagasco targets total sales of about 42,000 cylinders per month from the new warehouse.

There will be 179 warehouses owned by the firm after the inauguration of the warehouse distributed across the country's governorates to serve its citizens.

EGYPT'S GOVERNMENT ESTABLISHES GAS METERS FIRM

Egypt's Minister of State for Military Production, Mohamed Al-Assar, witnessed the signing of an agreement between the National Organization for Military Production's subsidiary, El Maasara for Engineering Industries, GAS Metro Industries, and El Sewedy Electrometer Group (EMG), aiming to establish a shareholding firm.

The new firm, El Maasara Gas Metro, will be specialized in producing gas meters.

EMG's Chairman, Emad El Sewedy, clarified that El Maasara Gas Metro will start its production by January 2020 with a production capacity of one million gas meters per year.

In the same context, GAS Metro Industries' Chairman, Ibrahim Abou El Enein, asserted that the new firm targets improving the gas-consumption measurement system, in addition to reducing consumption losses.

UNPRECEDENTED SUCCESS IN CAR CONVERSION TO NATURAL GAS

Converting cars to run on natural gas has achieved unprecedented results. A report received by the Minister of Petroleum and Mineral Resources, Tarek El Molla, clarified that around 17,125 cars were converted into gas-powered ones from July to October, in addition to selling around 192 million cubic feet (mmcf) of natural gas to dual-fueled vehicles.

Accordingly, natural gas filling companies are carrying out a comprehensive program to increase the number of natural gas filling stations across the country. Thus, two new stations were opened in September and start operating in November. In addition, four more stations are under construction to be operational by 2020.

Furthermore, the report pointed out the government's plan, through the formed committee, to convert around 147,000 new taxis to run on natural gas, as well as constructing 366 natural gas filling stations in three years starting from 2020.

ENPPI FOLLOWS UP ASORC'S NEW NAPHTHA COMPLEX

Enppi's Chairman and CEO, Ashraf Bahaa, visited the new Naphtha Complex of Assiut Oil Refining Company (ASORC) on November 21, 2019, to review the project and monitor the progress of the work of both Naphtha Complex (ISBL), utilities, and offsite (OSBL) projects.

Enppi was awarded these projects as the main engineering, procurement, and construction (EPC) contractor on a lump-sum turnkey (LSTK) basis.

The project, having a production capacity of 660,000 tons per year, aims to increase domestic production of gasoline and liquefied petroleum gas (LPG) in order to downsize the importation of these products and to maintain the foreign currency reserves. During the visit, Bahaa was interested in meeting the project team, motivating them to exert every possible effort to ensure the completion of the project within the target time frame, while maintaining the highest quality and Health, Safety, and Environment (HSE) standards.

ZAITOUN GREEN DISCUSSES CONSTRUCTING LNG STATION

Minister of Transport, Kamel El Wazir, met with a delegation from Zaitoun Green to discuss the construction of a liquefied natural gas (LNG) station for ships in Damietta port.

The delegation's meeting with the minister mainly discussed opportunities for cooperation in the field of maritime transport between the two parties.

During the meeting, the two parties discussed the study submitted by the delegation to construct the LNG facility in Damietta port. For his part, the minister stressed the importance of coordination with the Ministry of Petroleum and Mineral Resources to discuss this project.

SINGAPOREAN OIL, GAS COMPANIES EXPLORE COOPERATION WITH EGYPT

A delegation of representatives from nine Singaporean oil and gas companies visited Cairo from November 16-18, to discuss mutual cooperation opportunities in the Egyptian oil and gas sector.

The delegation held several meetings with the pioneering oil and gas companies in Egypt, discussing possible joint cooperation opportunities. Additionally, Egypt's Ministry of Petroleum and Mineral Resources welcomed the Singaporean delegation and held a roundtable to deliberate ways of cooperation reinforcement.

The delegation was headed by Sugumaran Devaraja, Regional Director for Dubai Overseas Centre at Enterprise Singapore, which is a governmental agency responsible for helping Singaporean companies to find business opportunities abroad. It is worth mentioning that Singapore is the world's fifth largest oil refining center and is considered a main center for oil trade with many specialized companies.

EL MOLLA, STEFF DISCUSS BOOSTING E&P ACTIVITIES IN EGYPT

The Minister of Petroleum and Mineral Resources, Tarek El Molla, has met Ian Steff, Assistant Secretary of Commerce for Global Markets and Director General of the US Foreign Commercial Service, to discuss the exploration and production (E&P) activities and projects of US companies in Egypt.

During the meeting, El Molla affirmed that Egypt's economic reforms and achieving self-sufficiency of natural gas helped attract more international oil companies (IOCs) to take part in the current E&P investments, fields development, and petrochemical projects. Furthermore, El Molla pointed out the participation of US companies in modernizing the sector in Egypt by preparing talents to be future leaders through providing practical programs in the headquarters of these companies in the US.

For his part, Steff stressed the commitment of the US to support the bilateral relationship between the two countries, as well as intensifying their partnerships to achieve mutual economic interests.

EL MOLLA PARTICIPATES IN THE US-EGYPT FUTURE PROSPERITY FORUM

The Minister of Petroleum and Mineral Resources, Tarek El Molla, stressed the importance of strengthening the bilateral relationship between Egypt and the US, during his participation in the US-Egypt Future Prosperity Forum.

The Forum was attended by Prime Minister Moustafa Madbouly, as well as the Minister of Planning, Monitoring and, Administrative Reform and the Minister of Communications and Information Technology. El Molla pointed out a signed memorandum of understanding (MoU) between Egypt and the US in July to exchange expertise in the energy sector, noting that after the MoU, the two countries launched the first strategic dialogue concerning energy.

This came during his keynote speech in the session 'Egypt's Oil and Gas: Major Successes and Thriving Opportunities.' During the session, El Molla highlighted Egypt's success in attracting many American companies, like ExxonMobile and Chevron, to work in exploration and production (E&P) activities, in addition to participating in modernizing the sector in Egypt.

EL MOLLA INAUGURATES CHEMICAL ENGINEERING CONFERENCE

The 10th International Conference on Chemical Engineering was held by the Egyptian Society of Chemical Engineers under the patronage of the Minister of Petroleum and Mineral Resources, Tarek El Molla.

Osama Kamal, the head of the conference and former minister of petroleum and mineral resources, welcomed El Molla to the conference. Kamal stressed the importance of the manufacturing industries and economic development under the current scientific, political, and economic developments occurring in the world. El Molla inaugurated the conference in the presence of experts from different industrial, scientific, and research entities, discussing the latest scientific and engineering techniques and developments in different fields.

During the conference, El Molla stressed the importance of the new technological trends in oil, natural gas, and petrochemicals industries in Egypt, in addition to highlighting the challenges of traditional, new, and renewable energy sources. Moreover, El Molla discussed with the attendees the importance of the small, medium, and manufacturing industries; maximizing the benefits from natural materials in Egypt's lands and water; and deliberating new directions in the chemical engineering field and consumption rationalization.

SDX ENERGY STARTS GAS PRODUCTION AT SOUTH DISOUQ CONCESSION

SDX Energy announced commencing production from its operated South Disouq concession in Egypt, of which it owns 55% of the working interest.
SDX added that natural gas has been flowing through the South Disouq Central Processing Facility (CPF) since November 7, pointing out that each of the four discovery wells have been hooked up to the CPF, tested during this period, and have produced at their expected rates of between 8 to 15 million standard cubic feet per day (mmscf/d).
Over the last three days, the CPF has been operating as expected, achieving an average gross production rate of 23 mmscf/d of natural gas and 120 barrels per day (b/d) of condensates, equivalent to approximately 24 mmscf/d.
These initial flow rates are in line with the company's expectations and testing will continue over the coming weeks, during which the company will gradually ramp up production with a view to achieve its targeted plateau gross production rate of 50 mmscf/d during Q1 2020.
All natural gas production will be sold to the Egyptian Natural Gas Holding Company (EGAS) at a fixed price of $2.85/mmcf, with the Egyptian government's entitlement share of gross production equating to approximately 51%.

EL MOLLA MEETS METHANEX'S BOARD OF DIRECTORS

The Minister of Petroleum and Mineral Resources, Tarek El Molla, met the Board of Directors of Methanex Corporation, the largest Canadian investor in Egypt, in the presence of the Ambassador of Canada to Egypt, Jess Dutton.
Attendees included Methanex Corporation's CEO John Floren, representatives from Methanex's Executive Leadership team, Methanex Egypt Managing Director, Mohamed Shindy, the Egyptian Petrochemicals Holding Company's (ECHEM) Chairman, Chemist Saad Helal, and the Egyptian Natural Gas Holding Company (EGAS) Chairman, Osama El-Bakly.
The minister stressed that the Board of Directors' first visit to Egypt reflects the positive investment climate in Egypt and the country's political and economic stability. El Molla pointed out that this project, which is considered the first Egyptian-Canadian project for methanol production in Egypt, is one of the projects that maximizes the added value of natural gas.
"We are proud of Methanex' partnership with the Egyptian petroleum sector companies ECHEM, EGAS, and [the Egyptian Natural Gas Company] Gasco. The oil and gas industry is one of the key pillars of Egypt's economy and future. Through working closely with our partners within the Ministry of Petroleum, we are proud to support the government's vision of maximizing the value of the country's oil and gas resources, through providing vital feedstock to a number of petrochemical industries that further contribute to Egypt's economic growth," said Shindy.

EGYPT INKS AGREEMENT WITH NOBLE ENERGY

On the sidelines of the Africa Investment Forum 2019, held under the patronage of Egyptian President Abdel Fattah El Sisi, the Minister of Investment and International Cooperation, Sahar Nasr, inked a financing agreement with Adam Boehler, the CEO of the US International Development Finance Corporation, in the presence of Prime Minister Mostafa Madbouly.
The agreement mainly aims at pumping investments of around $430 million.
The first accord stipulates that Noble Energy will pump natural gas through the East Mediterranean Gas Company's pipeline. The second one states that Noble will manufacture petroleum products in partnership with Egypt's Dolphinus Holdings.
For his part, Boehler stressed that the corporation looks forward to deepening the cooperation with Egypt during the next period, clarifying that it will provide funding for startups or help extend the scope of business companies.

NTI, NORTH PETROLEUM SETTLE ON EAST GHAZALAT CONCESSION

Nostra Terra Incorporation (NTI), a wholly owned subsidiary of North Terra Oil and Gas Company plc, has settled on a conditional agreement with North Petroleum International Company SA regarding Egypt's East Ghazalat concession.
Under the agreement, NTI will transfer its 50% participating interest in the concession to North Petroleum, the concession's operator, with provision for the conclusion of the arbitration and no further cash calls or liabilities for any past losses, including the amounts for the payment of November and December 2015 cash calls and interest.
The agreement will be finalized under the condition of having the necessary formal approvals from the government. However, if these approvals were not granted by December 31, then North Petroleum will have the right to terminate the agreement provided that the obligatory termination notice is served on or before April 30, 2020.
It is worth mentioning that Nostra Terra is an oil and gas exploration and production (E&P) company with a portfolio of development and production assets in Texas, US.

ENI MIGHT CONSIDER DANA GAS'S EGYPTIAN PORTFOLIO

Eni has refuted statements regarding its lack of interest in Dana Gas's Egyptian portfolio.
Eni is not entirely ruling out a possible interest in the Egyptian assets of Dana Gas, unlike what earlier statements had reported, Eni's CEO Claudio Descalzi said.
On the sidelines of a conference, Descalzi clarified that he had not yet reached out for potential buyers. However, he said that any potential bid is unlikely, since Eni already has a lot of resources in the area.
"Never say never, but it is not a priority for us," he said. Earlier, the CEO told Bloomberg in an interview that Eni aims to mainly focus on "organic growth in Egypt."

EL SISI, DESCALZI DISCUSS ENI'S E&P ACTIVITIES IN EGYP

Egyptian President Abdel Fattah El Sisi met Eni CEO Claudio Descalzi to follow up on the progress achieved in Eni's exploration and production (E&P) activities in Egypt.
The meeting was in the presence of the Minister of Petroleum and Mineral Resources, Tarek El Molla, as well as a number of Eni officials.
During the meeting, Descalzi reviewed the advancements in the projects that Eni has been implementing in Egypt, including Zohr field. Moreover, the CEO praised the current cooperation with the Egyptian companies and government, stressing that Egypt is one of Eni's most important markets around the world. Additionally, he expressed that the company is looking forward to expanding its investments in Egypt.
For his part, El Sisi hailed the fruitful partnership with Eni and its activities in Egypt. Furthermore, the President looks forward to continuing Eni's activities in Egypt for more new discoveries, taking into consideration the promising opportunities in the Egyptian energy sector. Also, El Sisi directed the ministry of petroleum and its affiliates to continue cooperating with Eni and overcoming any obstacles, considering the defined timeframes for its projects in Egypt, particularly Zohr field.

EL MOLLA, LIND DISCUSS COOPERATION WAYS IN OIL, GAS

The Minister of Petroleum and Mineral Resources, Tarek El Molla, met the Norwegian Ambassador to Egypt, Lene Natasha Lind, to discuss possible cooperation in the oil and gas sector.
El Molla deliberated the system implemented and the procedures taken to achieve unprecedented results in the oil and gas sector. Additionally, the minister pointed out the increasing interest of the international oil companies (IOCs) to pump more investments in the Egyptian sector. Moreover, the minister highlighted the promising areas of exploration and production (E&P) in the Western Mediterranean and the Red Sea, in addition to the marine areas of the member countries of the East Mediterranean Gas Forum (EMGF) that have high natural gas potential.
Also, El Molla reviewed the Modernization Project and its efforts to train and develop the sector's calibers to be successful leaders in the future. For her part, Lind expressed her interest in participating in this regard.
The Norwegian ambassador mentioned the previous contribution of the Norwegian PGS in the 2D seismic project, as well as data processing and marketing for the Egyptian Natural Gas Holding Company (EGAS).

A CLOSER LOOK INTO UPSTREAM ACHIEVEMENTS

EGYPT

EGYPT WITNESSES 14 NEW DISCOVERIES IN Q1 2019/20

The Minister of Petroleum and Mineral Resources, Tarek El Molla, received a report stating the achievements in the exploration and production (E&P) activities in July-September of the current fiscal year (FY) 2019/20. According to the report, three new agreements were signed, two of which were for the Egyptian General Petroleum Corporation (EGPC) in Southeast Abu Sennan and Southeast Ras Qattara in the Western Desert, with minimum investments of around $4 million. This is in addition to another agreement for the General Petroleum Company (GPC) in the Kheir region in the Eastern Desert and the drilling of four wells. Furthermore, six development agreements were signed in South Disouq, East Bahariya, Khalda, West Kanayes, and North Salhia, with signature bonus of around $2 million.

Additionally, the report stated that 14 new discoveries, four natural gas and 10 crude oil, were made in the Western Desert, the Eastern Desert, the Gulf of Suez, the Nile Delta, and the Mediterranean Sea. As a result of putting natural gas development projects in Zohr field, Southwest Baltim, North Alexandria, and Phase B in Disouq on production, sold gas has increased by 6%, compared to the same period a year before, reaching 13 million tons. In addition, the production of crude oil, condensates, and butane reached around 8 million tons.

For Belayim Petroleum Company's (Petrobel) development project in Zohr field, production rates recorded around 2.7 billion cubic feet per day (bcf/d) in August through establishing and operating three facilitating units. The third phase is setting to increase production to 3 bcf/d. The development project of Petrobel in Southwest Baltim aims to establish needed facilities to take in the project's capacity of around 500 million cubic feet per day (mmcf/d) of natural gas through drilling six wells in the area. It is noteworthy that the project was completed in August and production commenced in September by linking Southwest Baltim-1 well on production with initial rates of around 70 mmcf/d of natural gas.

The production in the development projects in North Sinai commenced through linking the first well on production in July, with initial production rates of around 25 mmcf/d and the second well in August, with initial rates of around 20 mmcf/d. Moreover, Phase B in Disouq's development project aims to produce around 80 mmcf/d of natural gas by linking nine wells to production, with a cost of around $30 million.

It is worth mentioning that four new natural gas wells were put on production. The production rate of natural gas after adding new development projects and wells recorded around 489 mmcf/d initially. In addition, 54 new crude oil wells were put on production, with initial production rates of around 43.9 thousand barrels per day (b/d).

EGYPT PLANS TO DRILL 15 EXPLORATORY WELLS IN FY 2019/20

The Egyptian Natural Gas Holding Company (EGAS) announced in FY 2018/19 that it will launch a new international bid round during FY 2019/20 on the western part of the Mediterranean Sea to attract more foreign investments.

EGAS added that it plans to drill 15 exploratory wells in the Mediterranean Sea and Nile Delta with an estimated cost of about $422 million during the coming FY.

The annual report revealed that 12 natural gas development projects will be on stream, with an initial natural gas production of 2.046 million standard cubic feet per day (mmscf/d) and an average weighted added production of 1.464 mmscf/d with an estimated cost of $7.108 billion.

Also, 43 development wells will be on stream, with initial natural gas production of 399 mmscf/d and average weighted added production 262 mmscf/d. Accordingly, the total average weighted added production from new projects and development wells will be about 1726 mmscf/d in FY 2019/20.

EGAS REPORT: EGYPT EXPORTS 172.8 BCF LNG IN FY 2018/19

EGAS has issued its annual report for the FY 2018/19.

EGAS INTERNATIONAL BID ROUND:

The report revealed that the EGAS bid round in 2018 was for 16 blocks, which resulted in awarding five blocks. A positive result of this bid round was that ExxonMobil was back to exploring in Egypt and investing in new opportunities.

AGREEMENTS:

Thirty-three concession agreements had been signed between EGAS and major international oil companies (IOCs) for the period up to June 2019; 22 of those deals were signed with EGAS, while the others had been inked with the EGPC under EGAS supervision.

EXPLORATION:

During FY 2018/19, 15 new natural gas discoveries were announced (five in the Mediterranean Sea and 10 in the Western Desert) to add to actual reserves of about 817 billion standard cubic feet (bscf) of natural gas and 2.2 million barrels of condensates in the Mediterranean Sea and the Western Desert.

DEVELOPMENT AND PRODUCTION PROJECTS:

Seven development projects were put on stream with a total cost of $10.6 billion, with an initial rate of about 1,923 mmscf/d of sold gas, in addition to 2,980 b/d of condensates. Similarly, 56 wells were put on stream, with an initial rate of about 2,280 mmscf/d of sold gas and 20.75 million barrels per day (mmbbl/d) of condensates.

Moreover, total natural gas production reached 2.52 trillion standard cubic feet (tscf), while total sold gas stood at 2.33 tscf. Also, total condensates production reached 31.78 mmbbl, LPG production reached 1.2 million tons, propane production reached 561.2 million tons, and ethane/propane production reached 1261.9 million tons.

BALTIM'S THIRD WELL TO BE LINKED TO YEAR-END PRODUCTION

Italian giant, Eni, is working on linking the third well of Baltim field to production by the end of 2019. The third well is expected to add around 100 mmcf/d of natural gas and 650 barrels of condensates. After linking the third well to production, the field's production is anticipated to reach 290 mmcf/d of natural gas and 1,950 b/d of condensates. Baltim field includes six well of natural gas with an average production rate of around 75-100 mmcf/d of natural gas, bringing the total production of natural gas to 500 mmcf/d.

The Ministry of Petroleum and Mineral Resources stated that the exploration wells Baltim Southwest-1 and Baltim Southwest-2 began production with a rate of about 190 mmcf/d and about 1,300 b/d of condensates. This comes in line with the ministry's strategy to increase natural gas production rates through developing the discovered fields and putting them on the production map to enhance the country's ability to cover local needs. It is worth mentioning that Baltim field is located in Nile Delta and has an initial production rate of around 100 mmcf/d of natural gas.

EGYPT TO DEVELOP STILL-UNEXPLORED 2/3 OF ITS CONCESSION AREAS

Two-thirds of the concession areas in Egypt are still unexplored, according to Samir Raslan, Vice Chairman for Agreements and Exploration at EGAS.

During the 10th Mediterranean Offshore Conference and Exhibition (MOC 2019), Raslan reviewed the E&P areas in Egypt in the eastern and western Mediterranean, the Red Sea, and southern Egypt. He added that the Mediterranean Sea is a vital source for E&P of natural gas, based on the area's recent discoveries and its geological attributes, which has placed the Mediterranean Sea as one of the most attractive areas for investors. However, it needs further exploration as it contains a huge reservoir of gas that is yet to be discovered, according to Raslan.

Raslan explained that through the Ministry of Petroleum and Mineral Resources' Modernization Project, new non-traditional mechanisms have been developed and applied to encourage and increase investments in the research and development (R&D) and E&P of new areas.

According to Raslan, the coming period will see several projects for collecting geophysical data in Upper Egypt, using a new technology implemented for the first time in Africa and the Middle East. The new technology is planned to be implemented during the current FY, which aims to attract more investments and achieve new discoveries that enhance and maximize the production and reserves of Egypt's oil and gas.

EL SISI ISSUES NEW DECREE FOR OIL EXPLORATION IN THE WD

President Abdel Fattah El Sisi issued a presidential decree allowing El Molla to contract with the Egyptian National Petroleum for Exploration and Development Company (ENPEDCO) and EGPC to explore oil at Abu Sennan and Ras Qattara concessions in the Western Desert. The decree comes in light of the agreements signed by El Molla in September, which allow the two companies to invest at least $4 million to drill four exploration wells in the region.

NATURAL GAS SECTOR CONTRIBUTES TO ECONOMIC GROWTH IN Q1

Egypt's Minister of Planning, Hala El Saeed, said in a cabinet meeting that the sectors of telecommunications, construction, tourism, industry, natural gas, and the Suez Canal recorded the highest rates in economic growth during Q1 2019/20, noting that the Purchasing Managers' Index (PMI) witnessed a 49.5-point increase in September 2019.

El Saeed pointed out that economic growth stabilized during Q1 2019/20, representing 5.6%. It is estimated that global economic growth would retreat in 2019 to record 3%, while it would reach 3.4% in 2020, due to several factors, including changes in oil prices, El Saeed added.

MENA

ABU DHABI SEES BOOST IN OIL, GAS RESERVES

Abu Dhabi's Supreme Petroleum Council (SPC) approved the launch of a new pricing mechanism for the Abu Dhabi National Oil Company's (ADNOC) onshore crude oil and Murban. Furthermore, it announced an increase in oil and natural gas reserves, as well as new discoveries in Abu Dhabi. The new discoveries were estimated at around 7 billion barrels of crude oil and 58 trillion cubic feet (tcf) of natural gas. Moreover, the SPC revealed that Abu Dhabi's reserves reached around 105 billion barrels of crude oil and 273 tcf of natural gas.

As a result of the increase, the UAE now ranks sixth globally in terms of oil and natural gas reserves. Additionally, the UAE is considered the third largest producer in the Organization of Petroleum Exporting Countries (OPEC), pumping around 3 mmbbl/d.

Libya Pumps 1.25 mmbbl/d of Oil

Libya is generating 1.25 mmbbl/d of oil and plans to increase production to 1.5 mmbbl/d in 2020, according to the head of the state National Oil Corporation (NOC), Mustafa Sanalla. According to Sanalla, Libya wants to boost its oil production to 2.1 mmbbl/d by 2024. Nevertheless, he said that in order to meet this target, and also expand natural gas production to 3.5 bcf/d, $60 billion of investments are needed.

Sanalla further said that another $400 million are needed to repair 20 storage tanks at the eastern oil ports of Ras Lanuf and Es-Sider. The tanks were wrecked in 2018 in a clash between rival factions.

IRAN DISCOVERS FIELD WITH 53 B BARRELS OF CRUDE OIL

Iran has discovered a new oil field with proven reserves of around 53 billion barrels of crude oil, Iranian President Hassan Rouhani announced in November. Iran began the field's discovery in 2016, with initial reserves of around 31 billion barrels of crude oil; after that, around 22 billion barrels were added to the field's reserves. The new oil field is located in the Southwest of Iran in the Khuzestan province and covers an area of over 2,400 square kilometers (km^2).

The discovery of the oil field is supposed to boost Iran's reserves by about a third, according to Rouhani, adding that around 2.2 billion barrels of crude oil were added to the country's production capacity. Iran had estimated proven reserves of around 157 billion barrels of crude oil in January 2018. Thus, the country is considered the fourth largest global holder of crude oil and second largest reserves of natural gas, according to the US Energy Information Administration (EIA).

SDX ENERGY BEGINS DRILLING CAMPAIGN IN MOROCCO

SDX Energy has begun a drilling campaign in 12 wells in the Gharb Basin acreage in Morocco.

The first seven wells, located at Sebou and Gharb center, are lower-risk appraisal wells that target the prospects close to existing infrastructure. These wells can be tied in quickly with a low cost. The other two exploration wells target prospects similar to the discoveries made in Sebou and Gharb center. These two wells have higher risk because this part of the concession has not been tested yet. The final three wells target larger prospects in deeper and unproven horizons; thus, they are higher-risk exploration wells.

BAHRAIN SEEKS BOOST IN OIL, GAS PRODUCTION

The oil and gas sector in Bahrain needs to exert more efforts and to develop more projects, according to the Bahraini King, Hamad bin Isa Al Khalifa. The Bahraini king has urged the increase in oil and gas production in Bahrain to bolster the Kingdom's role as an economic hub and boost the industrial sector.

Al Khalifa's remarks came during his meeting with the Bahraini Oil Minister, Mohammed bin Khalifa Al Khalifa, accompanied by Tatweer Petroleum's CEO, James Eastlack, and General Manager – Exploration and Development, Yahya Al Ansari.

During the meeting, the oil minister updated the King on E&P activities, as well as the latest developments in drilling a number of experimental wells to extract oil in commercial quantities. Moreover, the King discussed with the officials plans to improve exploration and development in Bahrain.

QATAR'S LNG PRODUCTION TO REACH 126 MM TONS BY 2027

Qatar's liquefied natural gas (LNG) output is estimated to reach 126 million tons per year by 2027, Qatar Petroleum's chief executive Saad al-Kaabi said in November.

The country's current LNG production is around 77 million tons.

The increase in Qatar's LNG production potential is a direct result of the exploration work in the North field mega project, which showed that the natural gas reserves of the field exceeded 1,760 tcf.

DANA GAS GENERATES 31,800 BOE/D FROM IRAQ

Dana Gas's average production during the first nine months of 2019 increased by 8% to 67,100 barrels of oil equivalent per day (boe/d), driven mainly by a 23% increase in production in the Kurdistan Region of Iraq to 31,800 boe/d.

The company's net profits from operations has increased by 85% to $76 million, compared to $41 million in the first nine months of 2018. This increase in net profits was mainly due to increased production in the Kurdistan Region of Iraq, following the completion of the expansion of the development project in the region during Q3 2018.

Dana Gas's revenues for the first nine months of the current year increased by 2% to $357 billion, compared to $ 351 million, due to the higher production in the Kurdistan Region of Iraq, which added $32 million to the company's revenues.

Dana Gas CEO, Patrick Allman-Ward, said, "We look forward to increasing production by improving the gas processing lines in the Kurdistan Region of Iraq, which will enable us to produce and sell 250 mmcf/d by 2022."

SAUDI ARABIA

Saudi Aramco started taking bids from local and foreign investors in November, with a preliminary valuation between $1.6 trillion and $1.71 trillion. Currently, the valuation of the world's largest Initial Public Offering (IPO) is still below the $2 trillion targeted earlier in 2016 by Crown Prince Mohammed bin Salman. The highly anticipated stock offering may raise between $20 billion and $40 billion, following the release of its prospectus in November. The bulk of the funds raised will go to the government or the Public Investment Fund (PIF), potentially adding to the sovereign's already strong fiscal net asset position of 72.7% of GDP. Aramco does not plan to market its IPO in the US.

Saudi Aramco has signed several agreements at the Future Investment Initiative conference in Riyadh worth more than $2 billion. Aramco signed a $1-billion deal with Tubacex Group for investments in CRA pipe threading, weld overlay, and cladding manufacturing facilities in Saudi Arabia. The company signed a deal worth $230 million with Baker Hughes for the development of artificial intelligence and digital transformation. A memorandum of understanding (MoU) was signed between Aramco and APQ to form a joint venture (JV) worth $600 million. Aramco also signed a $200-million deal with Dassault Systems aimed at collaborating on data analytics, project management, and smart cities.

Saudi Arabia is planning to invest in downstream oil and gas projects in India as part of a strategic partnership between the two countries. India's Prime Minister Narendra Modi revealed his country's plans as he visited Riyadh to participate in an investor summit. During his visit, Modi planned to sign energy deals with Saudi Arabia to cooperate for India's strategic petroleum reserve. Saudi Aramco had been targeting a multi-billion-dollar deal to acquire a 20% stake in the petrochemical and refining business of Reliance Industries. Aramco previously signed a deal with Indian state-run companies for a 50% stake in a planned 1.2 million barrels per day (mmbbl/d) mega refinery on the country's west coast.

Saudi Aramco and Indonesia's Pertamina started negotiating the upgrade of Pertamina's Cilacap oil refinery. The two sides have been struggling to settle on a valuation for the project since last December. Thohir said that the government wants Pertamina to cooperate with Aramco on the Cilacap refinery upgrade; however, the company is open to alternative partners in case a deal is not reached with Aramco. Aramco and Pertamina decided to form a JV to upgrade the Cilacap refinery in Central Java province in 2016.

Saudi Aramco announced that it was joining the World Bank's (WB) initiative to reduce gas flaring to zero by 2030, noting that its flaring was already less than 1% of its total raw gas production in H1 2019. The WB's Zero Routine Flaring initiative aims to reduce wasteful burning of natural gas at production fields and to reduce emissions of hydrofluorocarbon (HFCs) industrial gases with a high potential to trap the earth's heat. Aramco's Senior Vice President for technical services, Ahmed Al Saadi, clarified that his company is also investing in advanced technologies to enable greater efficiency and lower emissions in transport, carbon-free hydrogen fuels, and carbon capture, utilization, and storage (CCUS).

Saudi Aramco posted a net income of $68 billion during the nine-month period ending on September 30. Moreover, the company's revenues and other income related to sales for the same period amounted to $244 billion. In an announcement of its intention to list shares on the Saudi stock exchange, Aramco also said that Saudi nationals subscribing to the listing will be eligible to receive bonus shares. It is worth noting that the Capital Market Authority (CMA) of Saudi Arabia permitted Saudi Aramco to launch its IPO on November 3, creating the most valuable listed firm worldwide.

Saudi Arabia's total crude oil output dropped by 0.660 million b/d in September to 9.129 million b/d. The country's crude oil exports fell in September by 3%, reaching 6.67 million b/d from 6.88 million b/d in August. Crude stocks fell by 20.27 million b/d to 152.48 million b/d in September, while domestic refinery crude throughput rose 0.010 million b/d to 2.584 million b/d in September.

UAE

The Abu Dhabi National Oil Company (ADNOC) has successfully drilled one of the longest wells in the world on the Umm Al Anbar artificial island. The well's length stretches more than 12,000 meters, which is longer than Abu Dhabi's corniche. ADNOC has been leveraging the use of artificial islands, which enabled the company to drill longer wells using cutting-edge techniques and technologies. The use of artificial islands has allowed ADNOC to minimize the impact of operations on the environment while at the same time maximizing the efficiency of operations.

ADNOC signed a 10-year contract with Honeywell to drive improved asset and machinery management across the company's upstream and downstream operations. Honeywell's asset monitoring and predictive analytics solutions via artificial intelligence are anticipated to significantly boost yearly savings through reduced unplanned maintenance, increased reliability, uptime, and safety. The contract is considered one of the largest predictive maintenance projects in the oil and gas industry and is part of ADNOC's flagship Centralized Predictive Analytics and Diagnostics (CPAD) program, in line with the company's 2030 Strategy and Oil & Gas 4.0 initiatives.

ADNOC operating company, ADNOC LNG, signed liquefied natural gas (LNG) supply agreements with subsidiaries of BP and Total. Through the signing of these agreements, BP and Total subsidiaries are mainly booking out the majority of LNG production of ADNOC LNG in Q1 2020. The agreements were signed by officials from BP, Total, and ADNOC LNG and were witnessed by Sultan Ahmed Al Jaber, UAE Minister of State and ADNOC CEO; Bob Dudley, BP CEO; and Patrick Pouyanné, Chairman and CEO of Total. It is worth noting that these agreements are considered milestones in ADNOC LNG's transition to a multi-customer marketing strategy that began in April. Since then, ADNOC LNG diversified its supply destinations through supplying 90% of its LNG molecules to more than eight countries across southern and southeast Asia instead of supplying only a single utility customer in Japan.

President and UAE Lead Country Manager of Exxon (Al-Khalij) Inc. Christian G. Lenoble announced that ExxonMobil has invested around $6.5 billion in Upper Zakum oilfield since its involvement in the offshore field in 2006, saying, "Upper Zakum is the second-largest offshore field in the world, and we are planning to participate in increasing its production to 1 million barrels per day by 2024. It is a target that involves significant technical challenges to be overcome by quality investments." Lenoble underscored the oil and gas giant's belief that the global demand for crude oil is set to continue over the next decade at least.

A subsidiary of ADNOC, ADNOC Drilling, said that it is expanding its fleet, in line with the company's 2030 Smart Growth Strategy. ADNOC acquired four new cutting-edge land rigs with a total value of over Dh 350 million, which will be added to the fleet in Q1 2020. ADNOC Drilling plans to acquire dozens of additional land, offshore, and island rigs by 2025. ADNOC's rig fleet has expanded more than three-fold in less than a decade, from 29 rigs in 2010 to the current 95 rigs. The next phase of expansion will further strengthen ADNOC Drilling's capabilities and reinforce its key role of supporting the ADNOC Group in capturing more value from every barrel of oil it produces.

Jaheziya, a leading regional training provider for safety and disaster management, has signed a ten-year memorandum of agreement (MoA) with ADNOC and Fujairah Oil Industry Zone (FOIZ). Jaheziya's Chairman, Ali Al Ahbabi, along with FOIZ's Director, Salem Al Hamoudi, and ADNOC's Executive Director of the Upstream Directorate, Abdulmunim Al Kindy, signed the agreement before the Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC 2019). The MoA mandated Jaheziya to establish, manage, and operate an integrated emergency response and management service center at FOIZ that will also serve the ADNOC Main Oil Terminal. Jaheziya aims to augment ADNOC's state-of-the-art firefighting system and existing emergency response capability with additional 52 firefighters and related supplies, including satellite equipment.

IRAQ

The Baeshiqa-2 exploration well in Iraq's Kurdistan region has achieved a hydrocarbons discovery in November. The upper part of Triassic Kurra Chine B reservoir has produced different rates of light oil and sour gas. Other Jurassic and Triassic zones are currently being tested, which will determine the next steps towards appraisal and commercial assessment. The Baeshiqa-2 well was spud in February 2019 and drilled at a total depth of 3,204 meters. DNO owns a 32% interest and operatorship of the Baeshiqa license. Other partners include ExxonMobil with 32%, Turkish Energy Company with 16%, and the Kurdistan Regional Government with 20%.

Dana Gas's average production during the first nine months of 2019 increased by 8% to 67,100 barrels of oil equivalent per day (boe/d), driven mainly by a 23% increase in production in the Kurdistan Region of Iraq to 31,800 boe/d. The company's net profit from operations has increased by 85% to $76 million compared to $41 million in the first nine months of 2018.

The International Monetary Fund (IMF) has declared Iraq's oil production and oil fields unaffected from the nationwide protests. According to the IMF, regional geopolitical tensions have created uncertainty for oil prices, where short-lived spikes in prices often occur. Despite the country's vast oil wealth, many Iraqis are living in poverty. Protesters took to the streets in early October. Iraq is OPEC's second-biggest member despite the country's economic hardship, poor public services, unemployment, and corruption.

IRAN

Iran discovered a new oil field with proven reserves of around 53 billion barrels of crude oil, Iranian President Hassan Rouhani announced in November. The new oil field is located in the Southwest of Iran in the Khuzestan province and covers an area of over 2,400 square kilometers. The discovery of the oil field is supposed to boost Iran's reserves by about a third, adding around 2.2 billion barrels of crude oil to the country's production capacity. Iran had estimated proven reserves of around 157 barrels of crude oil in January 2018. Thus, the country is considered the fourth largest global holder of crude oil and the world's second largest reserves of natural gas.

Iran introduced gasoline rationing and price hikes of at least 50%, leading to unrest. The price of a liter of gasoline was increased by 5,000 rials, reaching 15,000 rials, and the monthly ration for each private car was set at 60 liters. Additional purchases would cost 30,000 rials per liter. This abrupt decision to raise gasoline prices as the country's economy worsens under US sanctions and domestic corruption has angered many Iranians, prompting protests in at least five cities. The elite Revolutionary Guards warned against anti-government protests and declared that decisive action would be taken. Iran had one of the world's cheapest fuel prices due to heavy subsidies and the fall of its currency.

LEBANON

Lebanon's Ministry of Energy and Water announced that the country will be holding a bid round to buy 180,000 tons of diesel oil. The deadline for offers is December 5. The ministry said that cargoes are expected to arrive to oil facilities in Tripoli and Al-Zahrani.

The Ministry of Energy and Water in Lebanon will launch a tender for gasoline in December, according to the Minister of Energy, Nada Boustani. Boustani said that the tender would supply about 10% of the country's needs as Lebanon seeks 150,000 tons of 95 octane gasoline. The deadline for the offers is December 2. The tender aims to stave off potential supply shortages brought on by the country's worsening economic conditions, although a state tender for gasoline is unusual in import-dependent Lebanon, where fuel is typically procured by private companies. According to Boustani, private investors have been seeking to increase petrol pump prices to compensate for the increasing price of dollars in the black market.

LIBYA

Libya is generating 1.25 million barrels per day (mmbbl/d) of oil and plans to increase production to 1.5 mmbbl/d in 2020. Libya wants to boost its oil production to 2.1 mmbbl/d by 2024. Nevertheless, in order to meet this target and also expand natural gas production to 3.5 billion cubic feet per day (bcf/d), $60 billion of investments are needed. Another $400 million are needed to repair 20 storage tanks at the eastern oil ports of Ras Lanuf and Es-Sider. The tanks were wrecked in 2018 in a clash between rival factions. In October, the government said it had allocated 1.5 billion Libyan dinars ($1.1 billion) for the state National Oil Corporation (NOC) to maintain oil production in 2019-2020.

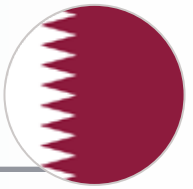
Libya's NOC announced in November the completion of its operational tests for the second development phase of Faregh field. This will raise the natural gas production capacity of the field to 250 million cubic feet (mmcf), in addition to the production of about 10,000 b/d of condensates from seven wells. The company also said that in the coming days an eighth well will enter the production line, which will add natural gas production of 30 mmcf and about 5,000 b/d of condensates once the leakage failure in the well is fixed.

Libya's state-run NOC announced that its October revenues grew by 21% month-on-month (MoM) to stand at $2.2 billion from $1.8 billion. NOC attributed the increase in revenues to the improvement of sales in crude oil, hydrocarbons, petroleum, and petrochemical derivatives, as well as taxes and royalties from concession contracts. NOC's Chairman, Mustafa Sanallah, noted that despite the deteriorating security situation in the country, NOC was able to achieve a rise in October revenues by increasing sales and maintaining production operations, adding, "these revenues are vital to the Libyan people, and our continued supply of oil will undoubtedly contribute to the stability of the international market."

BAHRAIN

The first liquefied natural gas (LNG) regasification terminal in Bahrain is expected to commence operations by the end of 2019. The date specified to start up the terminal has been delayed at least twice, and the last date announced is in Q3 2019. The terminal will house a floating storage unit (FSU), an offshore LNG receiving jetty and breakwater, a regasification platform, subsea gas pipelines from the platform to shore, an onshore gas receiving facility, and an onshore nitrogen production facility.

QATAR



Qatar University's (QU) Gas Processing Center (GPC) signed a framework agreement with Rosneft's International Center for Research and Development. In light of the agreement, GPC and Rosneft will share their oil and gas expertise, know-how, and technology designs through research activities and training programs. Both parties will work together to develop effective research projects with international organizations and research centers to evaluate current studies and provide consultations to the oil and gas industry. The agreement was signed by Dean of QU's College of Engineering (CENG), Khalid Kamal Naji, and Director General of Rosneft International Center for Research and Development QSTP, Murad Bagliev, in the presence of Russian ambassador Nurmakhmad Kholov, CENG deans, GPC Director, and a number of representatives from QU and Rosneft.

Qatar Petroleum (QP) has announced the signing of a 10-year liquefied petroleum gas (LPG) with Wanhua Chemical Group (Wanhua). The agreement is for the sale of approximately 800,000 metric tons per year of LPG, commencing in January 2020. Wanhua, a petrochemical producer headquartered in Yantai in the Shandong province of North East China, is one of the world's largest polyurethane producers and one of China's largest users and importers of LPG.

Qatar's production capacity of condensate is projected to increase to 800,000-900,000 barrels per day (b/d), up from 700,000 b/d after 2024. The boost in condensate production capacity comes from Qatar's plans to expand liquefied natural gas (LNG) by 40%, according to Fereidun Fesharaki, chairman of consultancy FGE. As a result of the production increase, Qatar's condensate exports could rise to 500,000 b/d, up from 350,000-400,000 b/d. Fesharaki mentioned that Qatar's Barzan project is expected to commence in 2020, adding 300,000 b/d of condensates.

ALGERIA

Algerian state energy firm Sonatrach has renewed its gas export deal with France's Engie. The contract is medium to long term. The announcement came a few days after Kamel Eddine Chikhi was appointed as Soantrach's new chief executive. Sonatrach has already renewed natural gas export contracts this year with Enel, Galp Energia, Eni, Botas, Naturgy, and Edison. It was previously debated whether Engie's deal would be renewed or not, as the country's domestic demand and stagnant output have made it hard for Sonatrach to maintain Algerian export levels. Energy sales is the basis of Algeria's foreign currency, although it has been decreasing since oil prices dropped in 2014.

Algeria's house of parliament passed a new energy law to make its oil and gas investment more attractive to international oil companies (IOCs). The new law's legislation still needs approval by the upper house of parliament, aiming to boost Algeria's energy production capacity by bringing IOCs to work with state producer Sonatrach. The new law introduces new types of contracts such as production sharing, participation, and risk services that will encourage foreign companies to partner with Sonatrach in oil and gas projects, replacing old concession contracts. Furthermore, the law provides tax incentives to simplify the whole structure of fiscal terms and remove bureaucratic obstacles by reducing administrative procedures for investors.

OMAN

Tethys Oil AB will acquire a 20% interest in the exploration and production (E&P) license in Biyaq Oil Field Services covering Block 56 in onshore Oman. Tethys Oil will pay Biyaq $9.5 million for the interest, of which a large proportion is expected to be recoverable from future production in the event of a commercial discovery. Eleven wells have been drilled in Block 56, but none have been confirmed to be commercial. Three of these wells were successfully drilled by the current operator and a work program to test the three wells is currently being prepared.

Masirah Oil Limited, the owner of the Block 50 concession off Oman's eastern seaboard, has awarded a drilling rig contract to Foresight Offshore Drilling Limited. The contract is anticipated to commence in December and will be valid for a minimum of 30 days. The Foresight Driller IXjackup will be used to drill one appraisal well in the offshore concession to determine the potential of the Yumna field. Masirah Oil has the right to retain rigs for extended well testing and to drill additional wells. It is worth noting that Masirah Oil owns a 100% interest in Oman's Block 50.

Shell Oman Marketing Company and Al Tasnim Group inked a strategic agreement for selling and supplying petroleum products. The agreement was signed by Mohammed Al Kindi, National Sales Manager - Fleet Solutions and Commercial Fuels at Shell Oman, and Dhiren Khimji, Director - Corporate Services, in the presence of top management officials from both companies. It is worth observing that signing the agreement marks a new cooperative beginning between the two companies. Moreover, by capitalizing on major investments in infrastructure projects and maturing industrial and logistical hubs in Muscat, Sohar, Duqm, and Salalah, Shell Oman focuses on seizing available opportunities driven by increasing consumer demand.

Omani oil field services firm Gulf Energy SAOC inaugurated its first manufacturing facility for cementing casing accessories in the Sultanate, supporting operations in Petroleum Development Oman (PDO). The inauguration was held under the auspices of Salim Al Aufi, Under-Secretary of the Ministry of Oil and Gas, marking the completion of another milestone outlined in the ministry's agenda, which was unveiled in 2013. This will bolster the Omani economy by creating more jobs and training opportunities, saving costs, and enabling custom-made solutions and adequate lead-time delivery of goods and services. The center is located in Nizwa in an area of over 9,600 square meters, of which 1,400 square meters are allocated for workshops.

KUWAIT

National Bank of Kuwait (NBK) and Kuwait Finance House (KFH) arranged a five-year loan and Murabaha facility at $1.2 billion for Kuwait Petroleum Corporation (KPC). The facility comprises $692 million as a conventional tranche and $461 million as a Murabaha tranche. The main aim of arranging the facility is to finance the daily general purposes of KPC. It is worth noting that this facility comes in line with the company's 2040 strategy to be a global integrated, full-pledged oil and gas hub.

Kuwait's Burgan Company for Well Drilling, Trading, and Maintenance has reported an 84.6% year-on-year (YoY) profit decline during Q2 2019/20. The company's profit declined to KWD 149,870 in September, compared to KWD 973,400 in 2018. In the first six months of fiscal year (FY) 2019/20, the Kuwait-listed firm's profit dropped 66.9% YoY to KWD 622,400. Meanwhile, Kuwaiti oil production increased by 16,000 barrels per day (b/d) in October, reaching 2.674 million b/d, compared to 2.658 million b/d in the previous month.

PURSUING EGYPT'S PETROLEUM PRODUCTION OVER FY (2010/11-2018/19)

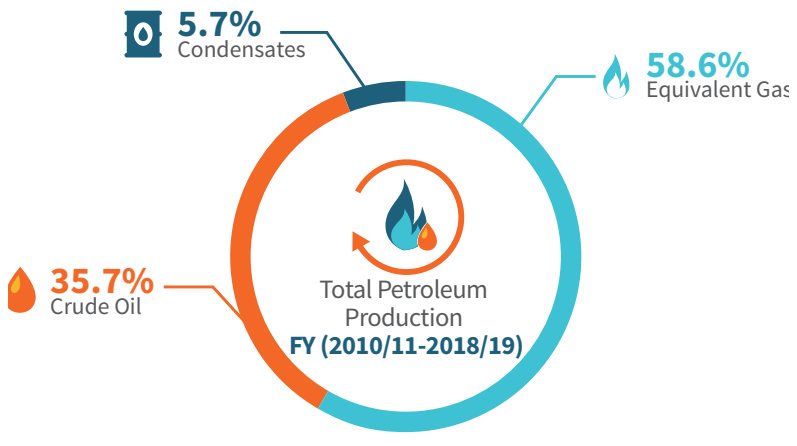
BY **AMINA HUSSIEN, REHAM GAMAL AND TASNEEM MADI**

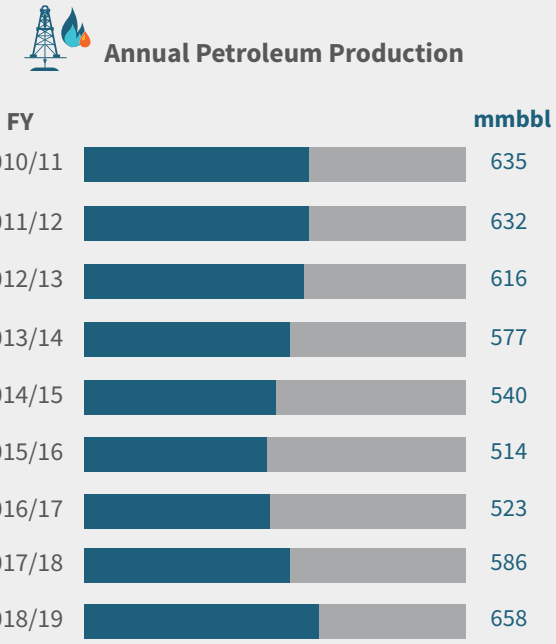
Egypt is a hydrocarbon production pioneer, as it is one of the oldest energy producers in the Middle East and North Africa (MENA) region. Having first pumped crude oil in 1910, Egypt has now become the largest crude oil producer in the African continent that is not part of the Organization of the Petroleum Exporting Countries (OPEC), according to the Energy Information Administration's (EIA) Country Analysis Brief: Egypt 2018. In addition, the African country is also an active member of the Organization of Arab Petroleum Exporting Countries (OAPEC) since 1973.

As Egypt is known for its significant natural gas discoveries, equivalent gas represents the largest production in the oil and gas sector in Egypt. In fact, in terms of petroleum production in Egypt, natural gas represents 58.6% of the total petroleum production, while crude oil represents 35.7%, and condensates 5.7%, according to the data by Egyptian General Petroleum Corporation (EGPC) and the Egyptian Natural Gas Holding Company (EGAS).

PETROLEUM PRODUCTION OVER FY (2010/11-2018/19)

The Egyptian petroleum production from Fiscal Year (FY) (2010/11- 2018/19) reached a total of 5,282 million barrels (mmbbl). This production reached its peak in FY 2018/19, with approximately 658 mmbbl. On the other hand, production reached its lowest level of 514 mmbbl in FY 2015/16, which was mainly a result of the decrease in natural gas production levels the same year, according to the data by EGPC and EGAS.





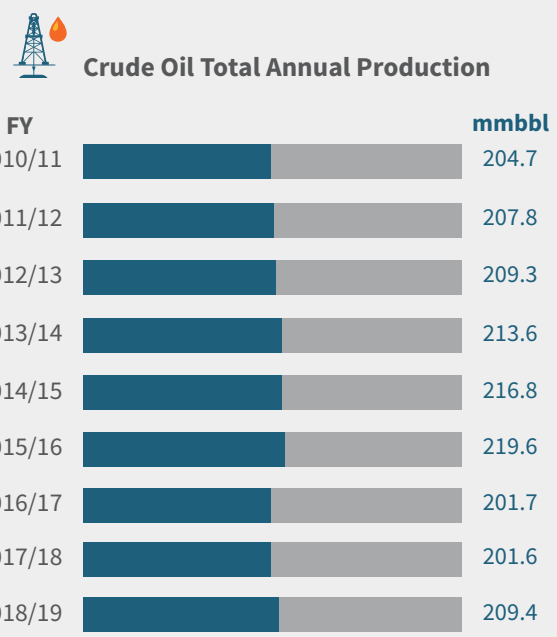
CRUDE OIL PRODUCTION

Egypt has a long history as an oil-producing country. Exploration first started in 1860, which led to the country's first crude discovery, the Gemsa field, nearly around 140 years ago, according to the Ministry of Petroleum and Mineral Resources' (MoP) official website.

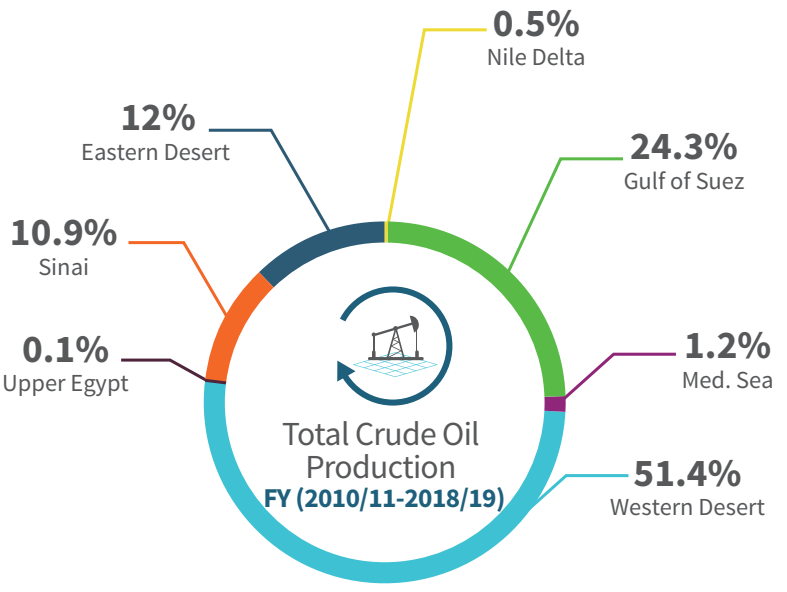
Over the period from FY 2010/11-2018/19, the total crude oil production recorded 1,884.6 mmbbl, according to EGPC's data. Egypt's crude oil production is further supported by the developed infrastructure, low production costs and relatively large volumes of both onshore and offshore fields.

On average, Egypt produces 209.4 mmbbl annually. In fact, FY 2015/16 recorded the highest level of production over FY 2010/11-2018/19, with 219.6 mmbbl. On the other hand, the lowest production level was recorded in FY 2017/18, with 201.6 mmbbl.

The remarkable decline in the production between FY 2015/16-2017/18, with 8.2%, stemmed from a combination of factors: the decrease of atmospheric pressure, the increase of sand movement and the increase of water produced from the wells, which is caused by an aging reservoir, as stated by the Ministry of Planning, Monitoring, and Administrative Reform's (MPMAR) annual reports. A report by EGPC also explained that the delay of development projects hampered the output.



The Western Desert and the Gulf of Suez have the lion's share in the Egyptian crude oil production, while the remainder comes from the Eastern Desert and Sinai. Additionally, the Mediterranean, the Nile Delta, and Upper Egypt combined do not exceed 2% of country's total annual production.



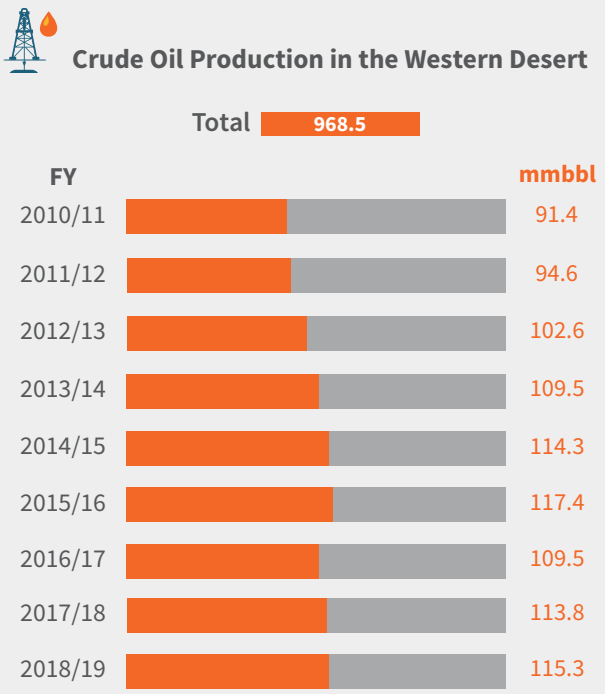
THE WESTERN DESERT

The Western Desert's crude oil production recorded an annual average of 107.6 mmbbl and represented 51.4% of the country's total crude production over the stated nine-year-period, according to EGPC's data.

The Western Desert covers approximately 67% of Egypt's total area, which is about one million square miles. The coastal basins of Matruh, Shushan, Alamein, and Natrun are located in the northern half of the Western Desert.

IOCs are paying more attention to the promising potential of the Western Desert. In the past few years, the Western Desert witnessed a series of major oil discoveries, including new fields in Faghur, Shushan, Alamein, and Matruh basins.

Over the course of the past nine FYs, the Western Desert produced a total of 968.5 mmbbl of crude oil. The crude production from the region hit a peak of 117.4 mmbbl in FY 2015/16, while the lowest level was 91.4 mmbbl in FY 2010/11, according to EGPC's data.



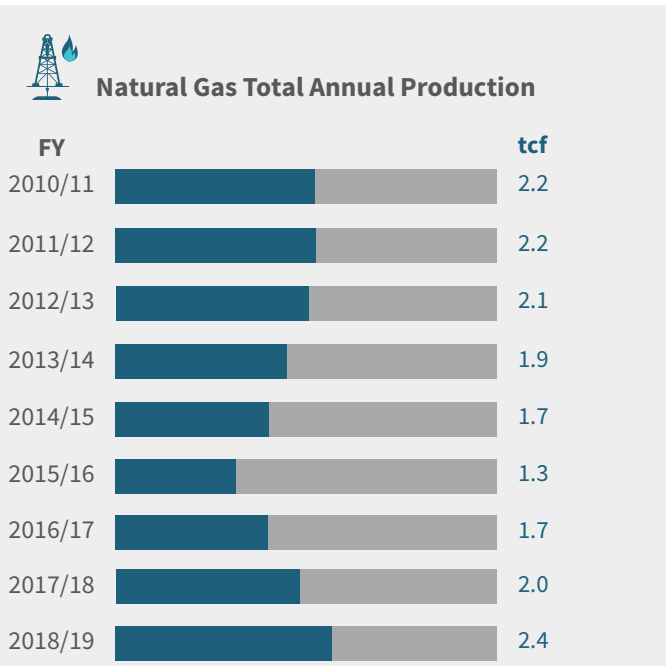
NATURAL GAS PRODUCTION

Natural gas exploration activities started in the early 60's when a number of natural gas discoveries were made mainly in the Mediterranean, the Western Desert, and the Nile Delta. In 1967, Abu Madi was marked as the first natural gas field discovered onshore the northeastern portion of the Nile Delta Cone. This was followed by an outstanding number of discoveries that contributed to boosting the production rates of natural gas.

Over the referred period, the Egyptian natural gas production recorded 17.6 trillion cubic feet (tcf), producing on average 1.96 tcf annually. The production

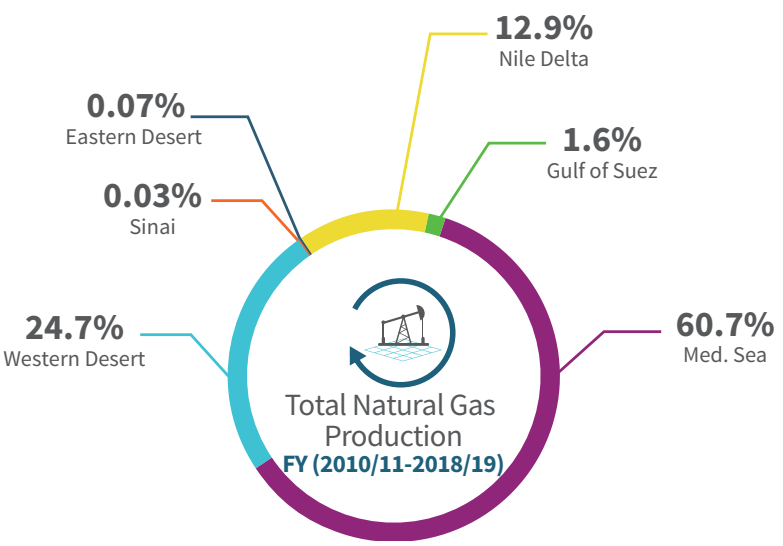
witnessed a decline until it reached its lowest level of 1.3 tcf in FY 2015/16, stated by EGPC and EGAS.

Yet, gas production has undoubtedly recovered since 2016, thanks to the government's efforts to clear its debts and improve the terms offered to IOCs. This has encouraged IOCs to invest in Egypt's upstream sector again and to fast-track field developments, in addition to the development of the giant Zohr field, which was discovered in 2015. Hence, the production followed an increasing trend starting from FY 2016/17 to reach its highest level of 2.4 tcf in FY 2018/19, explained by EGPC and EGAS.



The Egyptian natural gas production comes from six regions: the Mediterranean Sea, the Western Desert, the Nile Delta, Sinai, the Eastern Desert, and the Gulf of Suez. However, these regions contribute relatively different quantities.

The Mediterranean Sea, the Western Desert and the Nile Delta are regarded as the areas with the highest natural gas production. Over the aforementioned period, the three regions together contributed 17.3 tcf, representing 98% of the total natural gas produced. On the other hand, Sinai, the Gulf of Suez and the Eastern Desert together produced the remaining 2%, according to EGPC's and EGAS's data.



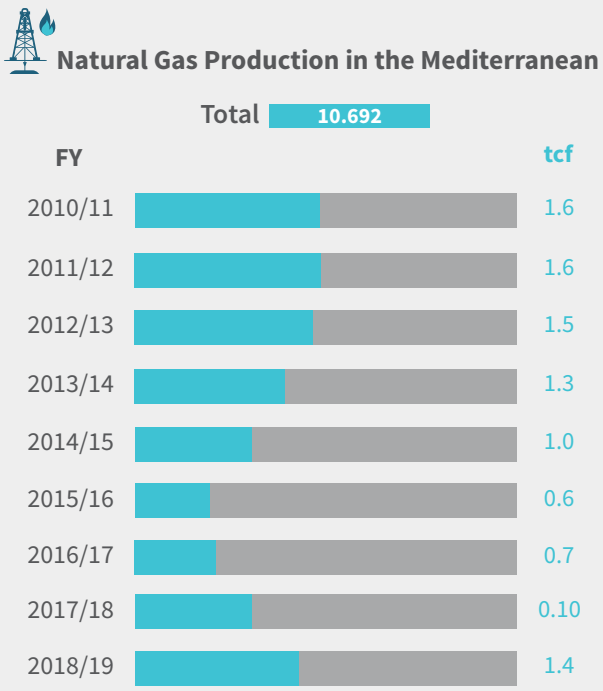
THE MEDITERRANEAN SEA

Most of Egypt's natural gas production comes from offshore fields located on the Mediterranean Sea where it takes over the highest share of more than 60% of the total production. Over the mentioned eight-year-period, the region contributed 10.7 tcf, producing on average 1.18 tcf annually, according to EGPC's and EGAS's data.

The region's natural gas production saw a steep decline over the period from FY 2012/13 - 2015/16, reaching the lowest level of 0.65 tcf in FY 2015/16. However, in light of the Zohr field developments, the Mediterranean's production trend started to slightly rise in FY 2016/17 by 8%, stated by EGPC and EGAS.

Furthermore, the production considerably increased in the region in FY 2017/18 by 40%, as the first production unit of Zohr field came on stream with 800 million standard cubic feet per day (mmscf/d) in December 2017, according to Eni's website.

In September 2018, the fifth production unit of the field contributed 2 billion cubic feet per day (bcf/d), resulting in a huge jump in the Mediterranean's production level in FY 2018/19 by 43%, recording 1.4 tcf of natural gas, explained by EGPC and EGAS.

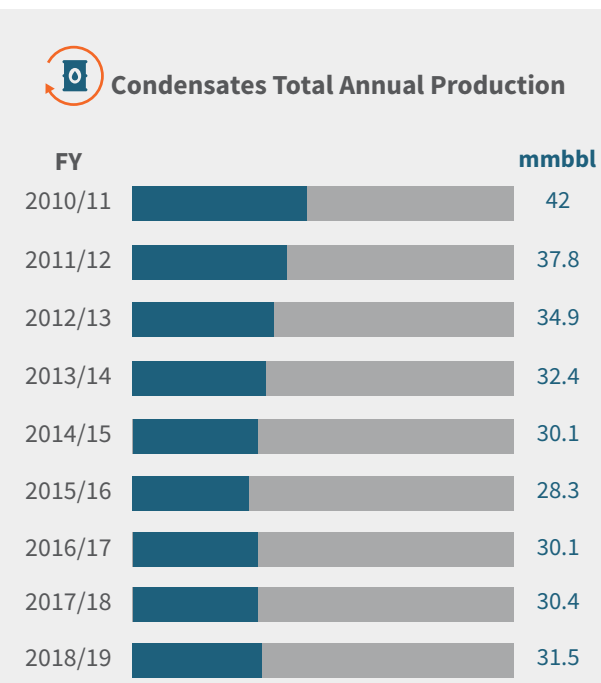


CONDENSATES PRODUCTION

Egypt's first production of condensates was from the Abu Madi, Abu Qir and Abu Gharadig fields in the late 1970s. Condensates production increased at an average rate of 10% per annum throughout the 1980s and 1990s. The production of condensates has primarily increased in recent years because of a number of new major gas and condensates projects starting up in the Nile Delta and Mediterranean region, according to Wood Mackenzie Country Overview, 2018.

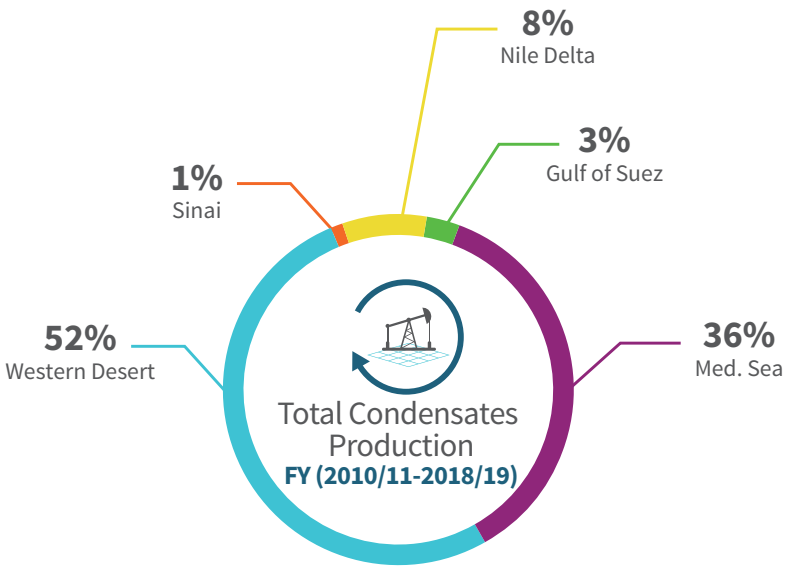
Condensate production recorded its highest level of 42 mmbbl in FY 2010/11. On the other hand, condensate production reached its lowest level of 28.345 mmbbl in FY 2015/16; FY 2014/15 and FY 2016/17 also experienced low levels of condensate production. The total production of condensate over the period of FYs (FY 2010/11-FY 2015/16) has shown a decreasing trend, explained by EGPC and EGAS.

Yet, the trend started to increase again to reach 31.5 mmbbl in FY 2018/19. The production of condensates grew by 6% in FY 2016/17 compared to the decline by 6% in FY 2015/16. The average total condensate production over the overall mentioned period amounted to 33.1 mmbbl/y, according to EGPC's and EGAS's data.



Condensate production areas are mainly concentrated in the Western Desert, Mediterranean Sea, and the Nile Delta. Condensates and natural gas liquids production has increased over the past decade as a result of the increase of natural gas production, partially offsetting declines in crude oil production, stated by EIA's 's Country Analysis Brief: Egypt 2019.

The Western Desert covered nearly 52% of the total production share during the mentioned period of FY 2010/11-FY 2018/19. The Mediterranean Sea region came next, contributing to 36% of the total production share. The Eastern Desert and Upper Egypt can be considered as the only condensates non-producer areas as per to their small production percentages, according to EGPC's and EGAS' data.



THE WESTERN DESERT

According to EGPC and EGAS, the Western Desert is the largest producer for condensates in FY 2018/19. The Western Desert production reached 15.68 mmbbl in FY 2018/19, compared to a lower amount of 15.37 mmbbl in FY 2017/18. The total production in the Western Desert reached 140.68 mmbbl since FY 2010/11.

It is notable that condensate production was at its peak in FY 2010/11 at 21 mmbbl/y, representing the highest record achieved by the Western Desert. As an overall, the presented period shows a declining trend in condensate production in the area, which continued until the end of this period, reaching its least amount 15.36 mmbbl in FY 2017/18.

Condensate production in the Western Desert faced a relative decline in FY 2012/13. The decline in FY 2012/13 was followed by a rate of increase of 5% in FY 2014/15. Nonetheless, the increase in 2015 was not persistent enough that it declined back intensely in 2016, according to EGPC's and EGAS's data.

Condensates Production in the Western Desert

Total 140.68

FY	mmbbl
2010/11	21
2011/12	19.4
2012/13	17.2
2013/14	16.6
2014/15	17.4
2015/16	16.9
2016/17	16.8
2017/18	15.4
2018/19	15.7

Egypt's MoP has launched in 2016 a project to modernize the petroleum sector through seven pillars, paving the way for Egypt to become a regional oil and gas hub in the future. The project was named the Modernization Project.

The period from 2016-2018 witnessed several achievements and discoveries. The Modernization Project compensated the natural decline of crude oil of 100,000 barrels (bbl) in 2018. Moreover, Egypt achieved the highest production rate of crude oil and natural gas in its history in June 2019, with 1.9 million barrels of oil equivalent per day (mmboe/d). Egypt's natural gas production hit a record of 7.2 bcf in September 2019.

Furthermore, a group of agreements took place on the sidelines of the project. In fact, a Memorandum of Understanding (MoU) was signed with Halliburton on March 4th, 2019, another one was signed by the MoP in February 2018 for Bapetco's modernization according to Egyptian Petroleum Show (EGYPS) 2018. Another agreement was signed with ESLSCA University in June 2019.

Most of the agreements aim to maximize the production assets, develop productive fields, improve the projects' economies, raise the level of performance, and apply governance standards. As per to all efforts done, the MoP has more and more to provide and improve the sector's performance and development.

EXPLORING THE ROLE OF METHANEX AS A GLOBAL INDUSTRY LEADER

AN INTERVIEW WITH **JOHN FLOREN,** PRESIDENT AND CEO AT METHANEX CORPORATION

In recognition of the vital role played by Methanex Corporation worldwide as the world's major producer and supplier of methanol, Egypt Oil & Gas seized the opportunity of his visit to Egypt and conducted an interview with John Floren, President and CEO at Methanex Corporation.

WHAT IS METHANEX'S STRATEGY TO MAINTAIN ITS POSITION AS THE WORLD'S LARGEST PRODUCER AND SUPPLIER OF METHANOL?

Our strategy is simple and clearly defined – global leadership, operational excellence, and low cost. We are focused on maintaining and enhancing our position as the major producer and supplier in the global methanol industry, improving our ability to cost-effectively deliver methanol to customers, and supporting both traditional and energy-related global methanol demand growth. As we strive towards this vision, our ability to attract, retain, and develop a global team of talented and engaged leaders is critical to our success.

We strive to achieve operational excellence in all aspects of our business, from manufacturing and supply chain processes to corporate governance practices and financial management. Our goal is to be the preferred supplier to every one of our customers, which we achieve by safely and reliably delivering the methanol they need. Our strategically positioned production sites and extensive global supply chain enable us to achieve this. The Power of Agility® is our key differentiator. It is how our global team of over 1,400 employees safely and reliably delivers on our brand promise every day by quickly adapting and responding to our customers' needs and creating and capitalizing on opportunities in the marketplace.

A low-cost structure is an important competitive advantage in a commodity industry and is a key part of our strategy. Our approach to major business decisions is guided by a drive to improve our cost structure, expand margins and create value for our customers and shareholders.

METHANOL IS CONSIDERED AN ESSENTIAL FEEDSTOCK FOR MANY INDUSTRIES. WHAT IS METHANEX DOING TO ENABLE A MORE SOLID FUTURE FOR METHANOL GLOBALLY?

As the world leader in methanol, we are dedicated to exploring new and exciting applications for methanol to provide solutions for the world's energy needs. Methanol is a clean-burning, bio-degradable fuel that is increasingly used as an environmentally-friendly and economic alternative fuel to power vehicles, ships, and other industrial applications. We are working closely with industry stakeholders to identify, develop, and support potential emerging applications for methanol including automotive fuel blending, marine fuel, and methanol-to-power.

We have been working with partners in China to pilot the use of high-level blends of methanol as an automotive fuel, and we are pleased to see significant interest as seven cities have added taxis to their fleet that operate on 100% methanol fuel; we estimate that there are over 19,000 taxis capable of operating on 100% methanol that are running today.

Our shipping fleet has ten time-chartered vessels that can run on methanol and by the end of the year, 40% of our fleet will be capable of running on methanol.

As well, there is growing interest in clean-burning fuels in China to replace coal and we are excited to see growing demand for methanol as a fuel for industrial boilers and kilns.

We expect that as the shift to clean-burning fuel continues, these and other emerging energy applications for methanol will become more widespread.

I AM AWARE THAT METHANEX FOLLOWS THE BEST ENVIRONMENTAL AND SAFETY PRACTICES IN ALL ASPECTS OF METHANOL PRODUCTION AND DISTRIBUTION. WHAT DOES THIS MEAN TO YOU PERSONALLY?

It means that I am part of an organization that cares for the community it works in, its employees, customers, stakeholders, and the environment. We are committed to making a positive impact on the communities and environments in which we live and

work and to acting responsibly in everything we do. It means that safety is not just a slogan that we associate our brand with but rather a strong commitment that is inherent within our processes and day-to-day practices.

HOW VIABLE IS METHANOL AS AN ALTERNATIVE FUEL?

Across the world, methanol is emerging as a clean, sustainable, and attractive alternative fuel for powering vehicles and ships, cooking food, and heating homes. As a clean-burning fuel, methanol can be blended directly into gasoline to produce a high-octane and efficient fuel with lower gas emissions than conventional gasoline. It can be blended with gasoline in low-quantities and used in existing road vehicles, or it can be used in high-proportion blends such as M85-M100 in flex-fuel or dedicated methanol-fueled vehicles. Technology is also being commercialized to use methanol as a diesel substitute. Methanex is working with partners worldwide to promote methanol as a clean, sustainable road fuel.

In China, methanol-gasoline blending has grown rapidly due to methanol's favorable economics, clean-burning benefits and energy security benefits. China's federal and provincial governments have implemented programs and fuel-blending standards in many provinces to promote methanol as a fuel. Some countries in Europe are also using gasoline blended with small quantities of methanol. Other countries, including Australia and Israel, have completed commercialization activities to support the commercialization of methanol fuels.

WITH AN EYE ON THE REGULATIONS ON MARINE FUEL, WHY IS METHANOL CONSIDERED THE SOLUTION FOR THE SHIPPING INDUSTRY?

Methanol is a safe, clean-burning marine fuel that cost-effectively meets the shipping industry's increasingly stringent emissions regulations. New environmental regulations from the International Maritime Organization (IMO) and other governing bodies are requiring ships to decrease emissions of sulphur oxides (SOx) and nitrogen oxides (NOx) by January 1, 2020.

With its clean-burning qualities, methanol reduces and eliminates smog-contributing emissions, helping improve air quality and reducing related human health issues. Interest in methanol as an alternative marine fuel is growing globally and methanol-powered dual fuel engine technology has been successfully used in a number of vessels around the world, including 11 tankers chartered by Methanex's wholly-owned subsidiary Waterfront Shipping by the end of 2019.

THE DAMIETTA FACILITY IS A JOINT VENTURE OF METHANEX TOGETHER WITH EGYPTIAN GOVERNMENT PARTNERS. PLEASE SHARE WITH US SOME INSIGHTS ABOUT THE EXPERIENCE OF PARTNERING WITH THE EGYPTIAN ENERGY SECTOR.

We are very proud of our successful partnership with the Egyptian Ministry of Petroleum and Mineral Resources. Methanex Corporation owns a 50% stake in our joint venture, with a 17% stake for APICORP while the remaining 33% is owned by Egyptian Ministry of Petroleum companies: the Egyptian Petrochemicals Holding Company (ECHEM) owns 12 %, the Egyptian Natural Gas Holding Company (EGAS) holds 12%, and the Egyptian natural Gas Company (Gasco) owns 9%. As the only methanol production business in the country, this means that our joint venture substantially provides most of the country's methanol needs. In addition, last year we signed an agreement with the Suez Methanol Derivates Company, an ECHEM affiliate. Their plant will be built next to our plant in Damietta, and through this partnership we will be providing them with methanol feedstock and utilities for the production of formaldehyde products. All of this helps us to support H.E. the Minister of Petroleum's vision to maximize the value of the country's oil and gas resources, through setting up a chain of synergetic petrochemicals industries that further contribute to Egypt's economic growth.

Of equal importance is our exports – about 85% of our production is exported via ships to various destinations around the world, mainly in Europe – providing USD revenues that further contribute to the country's economy.

CAN YOU COMMENT ON THE SIGNIFICANCE OF METHANEX'S LOCATION IN TERMS OF ACCESS TO MARKETS?

Methanex in Egypt operates a state-of-the-art methanol production facility located in Damietta, Egypt, on the Mediterranean Sea that is among the most energy efficient methanol plants in the world with a production capacity of 1.3 million tons of methanol per year. Our position within the Damietta Port enables easy access for our methanol transportation vessels carrying our product to various locations around the world, and particularly Europe, and to the fleet of methanol transportation trucks carrying our production to domestic customers.

CONGRATULATIONS ON WINNING THE INTERNATIONAL COUNCIL FOR SMALL BUSINESS (ICSB) HUMANE ENTREPRENEURSHIP AWARD FOR THE COMPANY'S CONTRIBUTIONS TO THE ENRICHMENT OF MICRO-, SMALL-, AND MEDIUM-SIZED ENTERPRISE (MSME) CULTURE IN DAMIETTA. PLEASE TELL US ABOUT YOUR EXPERIENCE RECEIVING THE AWARD AT THE UNITED NATIONS (UN).

Earlier this year, I traveled to New York to attend the MSMEs Day at the UN, upon the invitation of the ICSB. The invitation came in recognition of Methanex Egypt's contributions to the development of MSMEs in Damietta, as part of our two-year partnership with the International Labour Organization (ILO). I was extremely proud to receive the ICSB's award for Humane Entrepreneurship, an award given to companies that successfully attain business excellence, while also making a positive impact on their communities through addressing economic growth and social inclusion while meeting at least one of the 17 UN Sustainable Development Goals (SDGs). Our Social Responsibility project in Damietta enables Methanex Egypt to support the UN SDG agenda through addressing SDG #8 on economic growth and decent work. Through our partnership with the ILO in Egypt, we aim to create decent employment opportunities for youth in Damietta, focusing on employment creation through promoting entrepreneurship and facilitating job matching processes.

CAN YOU SHARE SOME HIGHLIGHTS OF YOUR SOCIAL RESPONSIBILITY PROGRAM?

We care deeply about people and the environment in which we live, work, and play, and we believe our business must have a positive impact on people's lives. This is the driver behind our commitment to acting responsibly in everything we do.

Since the start of our operations, we have invested in various health and education projects. In delivering these projects, we work closely with community leaders and grassroots NGOs to ensure our community investment projects address the real needs of our neighboring communities. As I mentioned before, we are aligned with Egypt's Vision 2030 and the UN's SDGs 2030 and these form the framing structure of our social responsibility work in Damietta. In addition, we support education through a partnership with Misr El Kheir foundation that enables us to support the educational expenses of 10 top thanawiya amma (National Egyptian High School Diploma) students. To date, we have 53 students enrolled in this program. In the past, our social responsibility work included significant donations to Damietta hospitals, including Kafr El battikh general hospital and the National Cancer Institute in Damietta.

HOW IMPORTANT IS RESPONSIBLE CARE® IN IMPLEMENTING THE COMPANY'S STRATEGY?

Our Responsible Care Program is founded on the Responsible Care Ethic and Principles for Sustainability, a sustainability initiative recognized by the UN and adopted by the global chemical industry. Our commitment to Responsible Care and sustainability compels us to work for the improvement of people's lives and the environment, while striving to do no harm. It also compels us to be accountable and responsive to the public, especially our local communities, who have the right to understand the risks and benefits of what we do and to take preventative action to protect health and the environment. We constantly innovate for safer products and processes that conserve resources and provide enhanced value. And in doing so, we engage with our business partners to ensure the stewardship and security of our products, services, and raw materials throughout their life cycles.

We also work with our partners and all stakeholders to promote awareness of Responsible Care and inspire others to commit to these principles. As a reflection of this commitment, last year we championed, along with our partner ECHEM the petrochemicals holding company, the first Process Safety Management (PSM) workshop to share the company's own journey towards safer processes, assets, and operations, as part of our commitment to Responsible Care, and to safety within the petrochemicals sector in Egypt. PSM is a set of interrelated approaches to managing hazards associated with the process industries and is intended to reduce the frequency and severity of incidents resulting from releases of chemicals and other energy sources. These approaches are composed of organizational and operational procedures, design guidance, audit programs, and a host of other methods that prevent accidents that can cause serious harm to people and the environment. The second conference was held in September of this year and was attended by over 300 of the top leaders of the oil, gas, and petrochemicals sector in Egypt.

ENHANCING AND EXPANDING: GLOBAL POSITION

AN INTERVIEW WITH DRAGON OIL'S CEO, ALI AL JARWAN

DRAGON OIL HAD ALLOCATED A BUDGET OF AROUND $500 MILLION FOR ACQUISITIONS IN 2019. CAN YOU TELL US MORE ABOUT THESE DEALS?

Yes, this was previously announced in 2018; however, during 2019, Dragon Oil closed the GUPCO deal from BP at $850 million.

FROM YOUR POINT OF VIEW, HOW WILL GUPCO'S ACQUISITION DEAL HELP ENHANCE DRAGON OIL'S GLOBAL POSITION AND INVESTMENTS IN OTHER COUNTRIES, INCLUDING TURKMENISTAN, IRAQ, AND AFGHANISTAN?

GUPCO's acquisition was a good test for our capabilities, both technical and financial. GUPCO is important for Dragon Oil in order to operate in Egypt and look for more opportunities. Dragon Oil is also committed to focusing on operational excellence and feasible investment to improve production.

WHAT IS DRAGON OIL'S STRATEGY TO ACHIEVE A PRODUCTION RATE OF AROUND 300,000 BARRELS PER DAY (B/D) BY 2026, ESPECIALLY AFTER THE COMPLETION OF THE ACQUISITION TRANSACTION?

Now with production from GUPCO expected at an average of 75,000 b/d, together with similar production in Turkmenistan and improved production in Iraq, Dragon Oil production will be over 150,000 b/d, which is half way from achieving the target production of 300,000 b/d by 2026.

AFTER ACQUIRING BP'S STAKES IN GUPCO, HOW DOES DRAGON OIL PLAN TO DEVELOP GUPCO'S CURRENT PRODUCTION RATE OF 63,000 B/D TO REACH 75,000 B/D BY 2021? WHAT ARE THE TECHNICAL METHODS DRAGON OIL WILL DEPEND ON TO MAINTAIN THIS LEVEL OF PRODUCTION?

Dragon Oil, jointly with EGPC, will increase the number of rigs, together with special focus on well intervention. Technology and innovation will be utilized through the integrated teams and the international experience in artificial intelligence and 3D seismic.

ARE THERE ANY NEW EXPLORATION AND PRODUCTION (E&P) ACTIVITIES IN THE EAST ZEIT BAY CONCESSION AREA THAT YOU WOULD LIKE TO SHARE WITH US?

We are completing our commitment, where we drilled the first well and shot the seismic survey, and now we are looking forward to drilling the second well.

WOULD YOU SAY THAT, AS DRAGON OIL PUSHES ITS ACTIVITIES IN THE GULF OF SUEZ REGION, GUPCO HAS THE POTENTIAL TO SUCCEED IN EAST ZEIT BAY AS THE COMPANY'S PRIMARY ASSET IN EGYPT?

GUPCO represents the petroleum legacy of Egypt and has spare capacity in its surface facilities, pipeline, and storage. Any new additional fields can be connected to GUPCO, where feasible.

BASED ON THE STRONG RELATIONS BETWEEN EGYPT AND THE UAE, DOES DRAGON OIL HAVE ANY OTHER FUTURE INVESTMENT PLANS IN EGYPT?

We learned about Egypt's new legislations to stimulate more investment in oil and gas and more production of oil and gas and improve the natural economy. This is very interesting to Dragon Oil, being a 100% UAE company that can operate professionally and safely within the collaborative atmosphere between Egypt's and the UAE's governments.

DO YOU THINK THE NATURE OF THE OIL AND GAS INDUSTRY IS COLLABORATIVE OR COMPETITIVE? AND FOR THE INDUSTRY'S GREATER GOOD, CAN SUCH COLLABORATION MANIFEST THROUGH MERGERS AND ACQUISITIONS?

The classical roots of the E&P industry are collaborative since all operations are done by service companies, vendors, and contractors engaged in production operations, drilling, maintenance, or projects engaging high-standard manufacturers. All of this is planned, supervised, and managed by the operating companies under the guidelines and approval of the host government. Such culture will continue, however, with higher agility and adaptation to the new best practices and innovative technology, so companies continue to be competitive.

DISCOVERING KUWAIT ENERGY'S ENDEAVOR TO OPTIMIZE BROWNFIELDS

KAMEL AL-SAWI

PRESIDENT OF KUWAIT ENERGY EGYPT

Egypt Oil & Gas spoke with Kamel Al-Sawi, the President of Kuwait Energy Egypt to know more about the company's latest developments, with a focus on brownfield optimization in Egypt.

LAST YEAR, THE COMPANY'S THEN INTERIM CEO MET WITH THE MINISTER OF PETROLEUM AND MINERAL RESOURCES, TAREK EL MOLLA, AND DISCUSSED EXPANSION PLANS IN EGYPT. WHAT HAS BEEN THE MAJOR DEVELOPMENTS ACROSS YOUR PORTFOLIO IN EGYPT SINCE THIS MEETING? IN YOUR OPINION, HOW WILL BECOMING PART OF UNITED ENERGY GROUP BOOST KUWAIT ENERGY'S PRESENCE IN EGYPT?

As has been declared earlier this year, the total share capital of parent company KEC plc had been acquired by a major Chinese company, United Energy Group (UEG), which is publicly listed the company in Hong Kong's stock exchange market. UEG acquired major BP's upstream asset in Pakistan, for a total consideration of approximately $750 million, and it is considered as the biggest foreign investor in the Pakistani oil sector. They almost invested $2 billion and succeeded to boost the production drastically from 17,000 barrels of oil equivalent per day (boe/d) to 98,000 boe/d. Being backed up by a strong investor like UEG, this gives us a great confidence to achieve our expansion targets in Egypt. This was even clear by the outstanding increase in our development and exploration activities post the completion of the acquisition and the increase in production from all of our assets. UEG is thinking very highly about the booming Egyptian oil and gas sector, especially after the reformation that the sector witnessed under the direction and guidance of H.E Eng. Tarek El Molla, Minister of Petroleum and Mineral Resources and the economic stability that Egypt is witnessing under the wise and strong leadership of our President, Abdel Fattah El Sisi, that reproduced a very competitive investment environment.

CAN YOU PLEASE TALK US THROUGH THE COMPANY'S LATEST BROWNFIELD ACTIVITIES IN EGYPT?

I think Kuwait Energy company has presented a model of managing the brownfields. We continue to deliver value out of our operated field "Area(A)" in cooperation with General Petroleum Company (GPC), where we succeeded to boost the production of the field to around 9000 barrels of oil per day (b/d) at a time, and now it is stabilized around 8500 b/d. We had two discoveries, South Kheir and West Al-Khalig, during 2018 and one recent discovery during November 2019, which raised the total discoveries from the field since inception to six. This is considered a major success in a brownfield producing since 1958. Also, we continue our development activities by drilling more development wells to increase production, and we have commenced two water injection projects that proved successful results despite the doubts at the beginning of the execution.

WHEN IT COMES TO BROWNFIELDS, WHAT DO YOU THINK ARE THE BEST WAYS TO MAXIMIZE PRODUCTION WHILE MINIMIZING OPERATING EXPENSES?

I think the best way to increase production and optimize expenses is to adopt a model that forestalls the decline in production while optimizing CAPEX and OPEX by enabling new technologies, thorough analysis of the old data in the light of the recent advancement in reservoir characterizations and seismic interpretations, and, finally, to keep in mind that every barrel counts in the brownfields.

HOW CAN PRE-EXISTING INFRASTRUCTURE HELP IN OPTIMIZING BROWNFIELD EFFICIENCY? AND WHAT DO YOU THINK OF THE INFRASTRUCTURE IN EGYPT?

For sure the pre-existing infrastructure helps in optimizing brownfield efficiency as it is reflecting directly to better economics of the projects as it represents a major cost element of any development plan for the brownfields. I think Egypt is blessed by very good infrastructure whether in the Eastern desert, the Western Desert, the Nile Delta or the Mediterranean. This even secured a leading position for Egypt in the region to be a regional energy hub.

BESIDES INFRASTRUCTURE, HOW CAN BROWNFIELDS LEVERAGE THE EGYPTIAN PETROLEUM SECTOR FROM THE FINANCIAL AND TECHNICAL PERSPECTIVES?

As I indicated above, the analysis of the available old data of the brownfields in the light of the new techniques can reveal a big potential out of these assets. Our operated field is a tangible example of this, where we succeeded to boost the production from this field from 1200 b/d at inception to approximately 8500 b/d, and produced approximately 26 million barrels in almost ten years and had 6 discoveries so far. This gives you an indication of the role that the brownfields can play to leverage the Egyptian petroleum sector from the financial and technical perspectives.

KUWAIT ENERGY WAS AWARDED IN EGYPS 2019 FOR ITS DEVELOPMENT WORKS OF MATURE FIELDS, IN THE FRAMEWORK OF APPLYING HSE RULES. WHY DO YOU THINK HEALTH, SAFETY, AND ENVIRONMENT (HSE) IS ESPECIALLY IMPORTANT WITHIN BROWNFIELDS?

HSE should be a top priority whether in the brown or new fields, but it is more important in the brownfields because you are most likely faced by a bunch of issues related to facilities and flow lines integrity, produced water management, access roads to the field and to the wells, standard firefighting facilities, etc. All these concerns should be in the heart of our priorities while our efforts to unlock the remaining potential of the brownfields. Sometimes the efforts of the companies to adapt high HSE standards are hindered by the cost of the related projects. At Kuwait energy, we have proved that small actions at low cost can lead you to the required standard and in the meantime reflect better economics for the fields.

CAN YOU PLEASE SHARE WITH US KUWAIT ENERGY'S NEWEST MODELS FOR TAPPING INTO A FIELD'S RESERVOIRS?

As the efficiency in production and enhancing recovery becomes an increasingly important issue in the oil field, we are adapting models based on our realization that in data, we own a major source of important facts and information. Integration of data from multiple sources, such as drilling, formation evaluation, well testing, reservoir engineering, reservoir modeling, wellbore modeling, artificial lift, surface facilities, etc., can result in cohesive workflows to minimize NPT in drilling, enhance completion design, build data-driven reservoir models, and, in short, change the way analysis, modeling, and optimization is performed in the upstream oil and gas industry.

WHAT DO YOU THINK ARE THE LATEST BROWNFIELD TECHNOLOGIES THAT EGYPTIAN PETROLEUM MUST ADOPT?

I think digitalization, enhanced oil recovery, and data-driven analytics to come up with the best way to optimize drilling, production, and enhance subsurface realization became a must.

WHAT DO YOU THINK ARE THE BEST FISCAL TERMS THAT COULD ATTRACT INVESTMENTS TO BROWNFIELDS?

There are no specific fiscal terms that can apply to all the brownfields. We should have a flexibility and transparency to set up the model that can suit each field on the basis of a win-win situation. Also, the most important thing is to be dynamic and ready to adapt when needed for the benefit of all parties.

WHAT ARE OTHER WAYS TO INCREASE BROWNFIELD INVESTMENTS IN THE EGYPTIAN PETROLEUM SECTOR?

I think there should be a database for all the brownfields in Egypt with the challenges that are facing each with certain economic cut-offs for the government, and it is very necessary to give the investors the chance to present new techniques and business models to overcome these challenges and unlock the potential of these brownfields.

KUWAIT ENERGY RECENTLY SIGNED AN AGREEMENT WITH THE MINISTRY OF PETROLEUM AND MINERAL RESOURCES TO TRAIN YOUNG OIL AND GAS PROFESSIONALS. WHAT ARE THE LATEST PRACTICES THE COMPANY CAN OFFER THE NEW GENERATION?

We are really happy being part of this modernization program and it gives us more confidence in the oil sector. We are great believers that "it is all about people." An effective people development strategy is key for success and being able to react to changing business conditions and be more competitive. We are giving them the chance to live our business model, which focuses more on people, and offered them training opportunities through our designed program "4 Tiers Emerging Leaders Programme" to help them to be the future leaders.

WHAT ARE THE COMPANY'S FUTURE PLANS?

As I indicated earlier, we are focusing on unlocking the potential of our existing assets and maximizing their value through increasing reserves and production and optimizing expenditures. Also, we are fine-tuned to expand in Egypt through new bid rounds or merger and acquisition activities.

THE DECOMMISSIONING OF OIL AND GAS FIELDS IN EGYPT: LEGAL ASPECTS

BY **DINA EL-BEHIRY**

The oil and sector does not concentrate only on exploration and production (E&P) activities, but also post-E&P activities. Decommissioning of oil and gas fields means the activities related to the abandonment of petroleum production wells and the removal of onshore and offshore installations. “During the decommissioning phase, the sites should be restored to their original condition, berms flattened, excavations filled, and all equipment, fencing, wires, cables, and debris should be collected,” Fakhry Abdelkhalik, Green Plus Environmental Solutions CEO, said.

Decommissioning is considered a non-profit activity, yet it inevitably needs to be performed by the concessionaire, either international oil companies (IOCs) or national oil companies (NOCs). "When a field comes to the end of its life, it is essential [to ensure] that the wells are plugged and abandoned in a safe manner. This will stop the accidental discharge of hydrocarbons into the environment," Paul Main, Upstream Analyst at Wood Mackenzie said, clarifying that "If an offshore structure is just left, the physical integrity of the structure can degrade to a point in which hydrocarbons or other production related chemicals may be discharged to the environment."

For such reasons, decommissioning of oil and gas fields must be carried out in an efficient manner, "it should be planned as the field enters its end of life phase as the Cessation of Production approaches," Main said, adding that "as Cessation of Production approaches, wells can be plugged and abandoned in phased yet safe manner. Once the wells are abandoned, then the removal of offshore facilities can commence."

Thus, the concessionaire is obliged to carryout decommissioning under the terms of the concession and/or the applicable regulations. However, "the lack of commitment by companies to implement proper decommissioning by removing all pollutants in the site and restoring everything to its origin, leads to the deterioration of the environment in the project area and prevents any future investments in it," Abdelkhalik commented. Hence, there is an essential need for a comprehensive legislation system to clarify the scope, procedures, and financing methods of decommissioning to perform it efficiently and smoothly.

DECOMMISSIONING IN EGYPT

According to the paper 'The Decommissioning of Oil and Gas Fields: Egyptian Law and Policy' published in the Journal of World Energy Law and Business, Oxford Academic in 2019, Egypt controls its oil and gas resources through Production Sharing Agreements (PSAs). The PSAs are inked by the Ministry of Petroleum and Mineral Resources (MoP), a relevant IOC as a contractor, and a relevant NOC which could be the Egyptian General Petroleum Corporation (EGPC) or the Egyptian Natural Gas Holding Company (EGAS) or the Ganoub El Wadi Petroleum Holding Company (Ganope). According to the terms of the PSA, the contractor has the right to exclusively explore for oil and gas in the rewarded concession, as well as decommissioning the field after the end of the project's life. However, when reaching the decommissioning phase, there is a need to have a regulatory framework to ensure efficient performance.

With an eye on decommissioning in Egypt, "there is no clear regulations related to the soil and the underground pollution, even there is no limits for the pollutants measurements," Abdelkhalik commented, illustrating that "the competent authorities have the right to inspect the site at any phase, in addition to enforcing [concessionaires] to remove any source of pollution at the site and restore the site to its origin."

In Egypt, the Mines and Quarries Law No. 66 of 1953, along with its executive regulations; the Petroleum Law and the Environment Law No. 4 of 1994 are applied to upstream projects, with no contradiction with the terms of the signed PSAs. However, neither the Petroleum Law nor the Environment Law includes any specific rules for controlling the decommissioning process. "I think that we need in Egypt to get a great attention to the soil and underground pollution and update the environmental regulations to include comprehensive articles related to that issue," Abdelkhalik noted. Accordingly, the terms of the PSAs are used as a regulator to not only control the E&P activities, but also regulate the decommissioning process. It is worth noting that the mechanism followed to implement and control decommissioning varies, according to the NOC's PSA.

DIFFERENT MECHANISMS

EGPC did not implement a specific mechanism for the implementation of decommissioning of oil and gas fields since the agreements signed in the early 1960s. Under these agreements, the IOCs were mandated to submit a decommissioning program only in the case of permanent abandonment of oil wells in their operating fields. Consequently, such agreements formed a limited reference for decommissioning, with no clear regulatory framework.

However, by 2015, EGPC implemented a new mechanism for decommissioning. According to this mechanism, the contractor was committed to restore the contract area to its original state likewise the time of its awarding. But this language was criticized by IOCs because it entailed significant expenditure to carry out decommissioning relevant activities. In addition, this obligation might be imposed at the time of relinquishment, which means that the contractor might not obtain a full cost recovery.

To face these concerns, EGPC adopted another system through issuing Article 5 of the current model forming PSA and publishing it in conjunction with the 2018 bid round. This Article states that 'By the time of such relinquishment [this means voluntary relinquishment] or the expiry date of the concession period, contractor shall ensure that all environmental regulations in the country have been followed, in accordance with accepted petroleum industry practices,' according to the paper. Yet, this language did not reflect any real commitment by the contractor; the essence of which is to comply with relevant Egyptian environmental regulations. Consequently, decommissioning regulatory arrangement is still a grey area.

Thus, it has become apparent that there is a lack of legislation for decommissioning of oil and gas projects in the context of PSAs granted by EGPC. As a method to minimize possible distortions in awarded areas, Abdelkhalik suggested that "before carrying out any activity in the location, photos should be captured as an evidence for the current situation of the site, in addition to taking photos for the site after finalizing operations and after [completing] decommissioning as an evidence for the site's state."

For decommissioning of oil and gas fields under Ganope's PSAs, Ganope PSA model stated that at the relinquishment time, contractor is committed to restore the concession area to its original state, in a condition demanded by Ganope upon relinquishment. However, this language of decommissioning is still generic and it imposes an uncapped liability on the contractor, as it would not be able to assess the decommissioning obligations that might be levied by Ganope at the time of relinquishment of the contract area.

When it comes to EGAS, its PSAs decommissioning model is more comprehensive because of some of its well-regulated elements. For example, the first element of a successful decommissioning model is that it is the contractor who is obliged to restore the original state of the contract area at the time of relinquishment of all or any part of the area, in accordance with good petroleum industry practices. The second element is that the contractor is committed to submit a decommissioning plan including intended decommissioning procedures and expected costs to be discussed and approved by EGAS. Thirdly, establishing a cost recovery mechanism to enable the contractor to recover decommissioning costs properly is crucial. It is important to have a bank account approved by EGAS and the contractor to manage the funds directed to the decommissioning program. Additionally, the contractor needs to submit estimated costs of decommissioning once signing the development lease. According to EGAS's PSA model, the decommissioning of developed oil and gas fields will occur during the last five years prior to the end of the development lease, to be undertaken by the contractor and EGAS or by a third party as agreed to by EGAS and the contractor.

REGULATORY FRAMEWORK IS THE WAY OUT

Based on the above-mentioned details, Egypt has no comprehensive legislative tools to regulate the procedures of decommissioning of oil and gas fields. Instead, decommissioning procedures are controlled by different models implemented by the NOCs. As a result of implementing different models, conflicts might be created in the future between NOCs and IOCs. Thus, clear regulations are needed to cope with the expansion of the upstream sector in Egypt, as "having regulations such as [the Convention for the Protection of the Marine Environment of the North-East Atlantic] OSPAR will help all involved [structures] in the installation and the removal of offshore facilities to [meet] the expectations on them," Main said.

Another point to consider is that whilst decommissioning represents a cost at the end of the field's production life, "safe decommissioning of offshore facilities must be done in order that the structures do not become hazardous and hydrocarbons not discharged to the environment. That is why timely, planned and phased decommissioning programs should be put in place," Main explained, noting that performing proper decommissioning can contribute to lowering the capital expenditure (CAPEX) of new projects that may be implemented in same areas of production in the future, "there are instances that topsides and jackets of platforms [might be] in a good state and could be re-used on new projects." As an outcome, this will help create "a growing decommissioning market to build localized expertise. Both in offshore engineering and removal as well as onshore disposal in an environmentally safe manner," Main pointed out.

In conclusion, decommissioning of oil and gas fields is crucial to complete the oil and gas production cycle efficiently. Thus, it is important to reinforce carrying out decommissioning through establishing an obvious regulatory framework, with clear rules directed to controlling decommissioning of oil and gas fields.

THE FISHBONE TECHNOLOGY:
TO USE OR NOT TO USE?

BY **MAI EL GHANDOUR**

New technologies in the oil and gas industry enable operators to capitalize on new opportunities. Horizontal drilling, for instance, is opening up reserves in fields that were not previously economically viable, which is further helping operators to gain higher recovery from old fields. However, with every new technology comes a risk and all technologies must be tested first in order to secure a place into the future. The fishbone technology was pioneered by Shell, where it was tested in the Western Desert. But now that Shell is selling its Western Desert assets, should the fishbone technology stand the test of time and be leveraged by other operators?

WHAT IS THE FISHBONE TECHNOLOGY?

The fishbone technology, developed by Fishbones, a well-known Norwegian well stimulation technology company, is a series of multilateral segments that fall into a horizontal well. They are called so because they look like the skeleton of a fish. A fishbone stimulation system is ideally used in onshore low permeability tight gas reservoirs to increase well productivity and access difficult geological formations and unconventional reservoirs.

The technology offers an alternative solution that is relatively safer and more cost-effective. Fishbones stimulation technologies are field proven in sandstone, carbonate and coal bed methane formations. The technology is designed to improve reservoir stimulation, delivering the accuracy of cemented and perforated technologies, the operational efficiency of open hole slotted liners, and the productivity of fracturing.

In essence, the fishbone technology is used for multi-hole wells with a fishbone trajectory so it would not be necessary to construct separate wells for each horizontal shaft. That way, it lessens the drilling costs while reaching each horizontal stratum that bears oil and increasing the injection capacity of the well as a whole. Since wells are drilled in a variety of geological formations, there are two types of fishbone operations - jetting and drilling.

Fishbones jetting operations are simple – spaced out at even intervals of the strata where tubes with small diameters (needles) jet out simultaneously to penetrate the reservoir. At full extension, achievable penetration is typically about 12 meters (m), with the number of laterals deployed tailored according to each well. Fishbones jetting can be used with acid for jetting of carbonates or non-reactive fluids for other formations.

On the other hand, fishbones drilling operations are simple and fast – completed within only a few hours. They are also spaced out at even intervals and deployed at depth. Penetration is typically 10.8 m, with three laterals drilled from each fishbones drilling sub.

Drilling Supervisor at Badr El Din Petroleum Company (Bapetco), Mamdouh Zakaria, explained to Egypt Oil &Gas that “Fishbone technology has mainly two applications; either using jetting force or using small drillbit heads. The former is the one utilized in limestone applications along with the use of acid pumping. Generally, fishbone technique has proven to be successful in terms of improved productivity of reservoir and improved ultimate recovery and reduced water production.”

ECONOMIC AND PRODUCTION VIABILITY

Over the last decade, tight oil development has been powered by technological leaps, among which is horizontal well drilling. To reach wells within thin layers of formation, thousands of feet under the ground, a wide scale application of new horizontal drilling techniques is frequently tested, making the market more competitive.

In a case study by Manshad, A.K. et al. (2019) on the economic and productivity of different horizontal drilling scenarios applied in the Middle East oil fields, the fishbone structure increased production by 393%, whereas the drilling cost was only 130% more than that of a conventional horizontal well.

The case study further explored other simulation models in an attempt to find out which can have the optimum production. It was concluded that the fishbone technology is the most suitable for a fishbone well with four branches, covering the maximum contact between well and reservoir. There are several variables to identify the best scenario for optimizing the productivity of multilateral wells, which include length of main hole,

length of sidetrack, space between sidetracks, number of sidetracks, and the angle between sidetracks and main hole. Using this data, the fishbone performance can be evaluated. This specific evaluation showed that there is a significant difference between horizontal wells and fishbone wells, which indicates that by increasing contact area between wellbore and reservoir formation, the total production rate of fishbone well is increased significantly compared to the conventional horizontal well.

"In the current economics of the oil and gas industry, cost efficiency comes second only to health, safety, and environment (HSE). Cost is now the driving factor in all operations and particularly in brownfields. However, that does not mean we should avoid new technologies. In more than one case, new technologies are utilized for the sake of cost saving. In Bapetco, we are open to trying new technologies and new designs, with proper cost management," Zakaria added.

HITTING THE EGYPTIAN MARKET

As Shell continues to embrace new technologies, the international oil company (IOC) has pioneered the use of fishbone technology in the Western Desert last February. The Bed 9-G well was successfully drilled and completed using the state-of-the-art technology, yielding significantly higher rates than previously expected.

Senior Geologist and Geo-Modeler at Bapetco, Sherif Shafik, who was a part of the team that worked with and implemented the fishbone technology with Shell, told Egypt Oil & Gas (EOG) that it all started out as a way to open new doors and opportunities for operations in Egypt, in regards to applying the best operational and cost-effective methods in the industry. If the technology is proven successful, that would mean the entire supply chain in the oil and gas industry would be altered.

Zakaria, who was also a part of the team to run this application in a horizontal limestone reservoir, said that Bapetco has applied the fishbone technology in one well so far. "Despite all operational difficulties, I think [fishbones] should be used more in Egypt. The well production jumped to 150% of estimated production with little to 0% of water production compared to offset wells which had high water oil ratio of around 40-50%."

According to Shafik, there is no direct contact in Egypt with the mother company. Instead, on behalf of Fishbone company, O&G Quest does seminars and workshops to showcase the latest stimulation techniques. O&G Quest approached Shell to apply this technology in Egypt as Shell had previously applied it with Petroleum Development Oman (PDO).

O&G Quest's Chairman, Osama Kamel, explained to EOG that his company is the local arm of Fishbones. The mutual relations extended since 2015. "The technology has been introduced to the market with combined technical marketing efforts to both IOC's operating in Egypt as well as the joint ventures (JVs) who have challenges that Fishbones can solve. One successful job was performed for Bapetco/Shell in 2018," Kamel said.

It was planned that Shell would start drilling the Obaiyed H18 well – the first endeavor in Egypt to unlock tight gas in deep hard rock, proving that the fishbone stimulation is feasible. Without the need to frac the tight reservoirs, the long reach horizontal well should increase productivity by enhancing well contact area to reservoir. This promises to unlock the tight gas potential of Obaiyed field that contains a significant volume of gas in tight clastic (sandstone) reservoirs through deploying long-reach horizontal completion at lower cost.

According to Shafik, the fishbone entails very expensive resources. However, when it comes to cost efficiency there are many variables to consider. Both frac and fishbone are relatively expensive, although in comparison to frac, fishbone remains more cost efficient. For instance, when Apache used frac, the cost was estimated at EGP 5 million; however, Shell's total cost of fishbone drilling in the Western Desert came close to EGP 3 million, Shafik added.

"But it is still too early to judge whether fishbone is economical or not. We do not have the full picture of the technology yet, as this takes time," the geologist claimed.

"It is always nice to apply a new technology. New technologies benefit the whole oil and gas sector because they affect production and costs," Shafik said, explaining that "new technologies are always expensive in the beginning, but when it becomes more widespread and received by more suppliers, this technology becomes more accessible. Thus, prices become bound to decrease."

In addition, Shafik clarified that any new technology is a risk, and as an industry leader, Shell takes those risks and always welcomes new technologies. According to Shafik, the Ministry of Petroleum and Mineral Resources (MoP) was keen to learn the technology's results to base their decision on whether it should start applying fishbone as well or not.

FLEEING THE EGYPTIAN MARKET?

On October 20, Shell Egypt revealed its plan to sell its onshore upstream assets in the Western Desert to focus on offshore gas growth. It became unclear whether the fishbone technology would still be applied by new potential buyers or not.

Shell's portfolio in the Western Desert includes stakes in 19 oil and gas assets including the Badr El Din and Obaiyed areas, as well as the North East Abu El Gharadig, West Sitra, Bed 1 gas, and West Alam El Shawish concessions

Khaled Kacem, Shell Egypt Country Chairman, said in a press statement, "Any sale is contingent on finding an appropriate buyer, commercial negotiations, and required approvals. We anticipate the start of active engagement with potential buyers in Q4 2019. During the divestment process we remain committed to ensure continued safe and reliable operations and will keep our stakeholders regularly informed."

Kacem announced that the company is looking for a capable buyer that will bring new investment and growth into the Western Desert and build on the company's successful partnership with the Egyptian General Petroleum Corporation (EGPC).

Since the company's key strategy is "More Upstream, Profitable Downstream", it is common that Shell defers some of projects, notably in unconventional oil. However, the IOC supports growth potential that sustains strong operational performance and continued investment, while continuing to unlock unconventional oil and gas resources. The company seeks portfolio opportunities that offer more potential through either increased oil price exposure or through securing additional scope for recovery from appraisal or the application of new technology.

Thus, the future of fishbone is still ambiguous, especially that these negotiations with buyers are still confidential during this time. However, Egypt has many potential areas with reservoirs that can definitely benefit from the fishbone stimulation model.

POTENTIAL AREAS

It is worth noting that Shell's horizontal well at the Obaiyed concession development well OBA D-41 ST was previously drilled and completed with a result of 26.2 million standard cubic feet per day (mmscf/d).

"It is well known that in the Western Desert as well as in other areas in Egypt, there are tight formations and thin layers that requires careful controlled stimulation to avoid getting in contact with unwanted elements such as water. So, the future of the technology is secured and bright since it is so far the most effective solution in the industry for the mentioned challenges," O&G Quest's Chairman ensured.

A multidisciplinary approach to help understand productivity enhancement of low permeability reservoirs in the Western Desert of Egypt was explained in a paper titled Multistage Horizontal Well Hydraulic Fracturing Stimulation Using Coiled Tubing to Produce Marginal Reserves from Brownfield: Case Histories and Lessons Learned by Hassan A. et al (2019). According to the paper, primary well production from the horizontal well was enhanced from 37 to 70% of recoverable reserve and the recovery factor was doubled.

It was clear that a single horizontal well with approximately 3,000 feet (ft) lateral could replace three vertical wells in terms of production and ultimate recovery. The productivity of the horizontal is better than that of the vertical because of the large productive area and the dense development represented in multistage fracturing treatments. The chances of missing the sand were also low compared to the vertical wells (two vertical wells are necessary to develop the same area).

Khalda and Umbarka fields are two mature fields located in the Egyptian Western Desert that can leverage the fishbone technology. They are characterized by their low, depleted reservoir pressure and laminated shaley sands (Upper Bahariya formation), in addition to their significant hydrocarbon reserves. However, because of their relatively low permeability and thin layers, it is very difficult to produce economically from this formation. Single-stage hydraulic fracturing treatments in vertically drilled wells resulted in a production of 25 to 40 barrels per day (b/d) per well, which is uneconomic for field developments.

The Baharyia formation is another common reservoir in the Western Desert of Egypt. It is characterized as a heterogeneous reservoir with low sand quality. It is comprised of fine-grained sandstone, thin, laminated, sand-poor parasequences with shale interbeds. The heterogeneity and low permeability of the Upper Baharyia reservoirs are the primary challenges to maintaining economic well productivity.

O&G Quest's Chairman declared that other than their work with Shell, they are expecting another job in the near future. "We have been recently in a dialogue with two to three IOCs and JVs regarding the application of the fishbones technology, to stimulate challenging formations that couldn't be stimulated by the traditional hydraulic frac method," he said.

"O&G Quest is keen on introducing strategic niche technologies that can increase production. [These technologies] are more environmentally friendly, more efficient, and more accurate than traditional technologies. Such technologies are related to reservoir stimulation, completion, subsea, and drilling," Kamal said.

In conclusion, there are many mature fields in Egypt that are yet to be tapped into. Meanwhile, Shafik concluded that "in recent years, drilling has been revolutionized. Instead of drilling a well in two to three months, we now drill in 20 to 30 days maximum. Thus, anything that speeds up the production is always welcomed."

PREVENTATIVE MAINTENANCE IN THE E&P SECTOR IN EGYPT

BY **RANA AL KADY**

While maintenance is a topic heavily discussed in the oil and gas field, it is important to distinguish between the different types of maintenance. In the oil and gas field, there are three main types of maintenance that could be applied in Exploration and Production (E&P) activities: reactive maintenance, predictive maintenance, and preventative maintenance.

GENERAL OVERVIEW OF THE E&P PROJECTS IN EGYPT

Firstly, reactive maintenance often refers to the procedure that takes place when a piece of equipment or machinery is forced to 'run to failure'; this means that the equipment will remain in operation until it becomes no longer functional. Secondly, predictive maintenance refers to the scheduled maintenance. In fact, each maintenance procedure is scheduled based on the condition of the equipment or machinery. Finally, preventative maintenance – arguably the most important of all three maintenance types – typically refers to the maintenance procedures implemented to ensure that any and all equipment or machinery are periodically checked, cleaned, and fixed to avoid any future inconveniences that could negatively impact operations.

In an industry where over 80% of oil and gas plants apply preventative maintenance schemes, it is important to ensure that those schemes are efficiently implemented. Also, when such schemes are periodically improved, the number of inconveniences is limited while the lifetime of the equipment and machinery maintained is extended.

EVOLUTION OF MAINTENANCE PROCEDURES IN E&P

In the E&P sector, preventative maintenance is commonly applied, and has been for the longest time, as a result of learning from mistakes made from lack of maintenance or attention given to various equipment or machinery. Despite preventative maintenance being an ordinary strategy that is typically applied in most E&P companies, these strategies originated and developed exponentially over the course of the last century.

In the E&P sector, over the last century, the equipment that required maintenance typically included pneumatic switches, transmitters, valves, and pumps. At the time, the equipment was run to failure until it required replacement of a piece or the system as a whole. This method left little to no room for preventative maintenance procedures. The idea was that because the equipment at the time was simple, it was easier to replace than fix – and the cost was nearly the same. However, as equipment became more complex and costly, maintenance procedures needed to be developed.

After the industrial evolution took place, complex and more efficient technologies were created and integrated in the E&P sector to enhance the search and extraction processes. This step paved the way for the implementation of better maintenance procedures. Classical maintenance then evolved to clean fix relevant equipment and machinery with no regard to the equipment's lifetime, reliability, or availability. In other words, maintenance would be carried out at one fixed time for all equipment, and no backup would become necessary until the equipment failed.

Later on, classical maintenance evolved to become predictive and preventative maintenance. While predictive and preventative maintenance are two of the most efficient strategies for maintenance procedures, another type of maintenance was later developed called innovative maintenance. Innovative maintenance was mainly established to respond to more advanced and sophisticated E&P processes (i.e. computer-based systems). Innovative maintenance can be categorized into two types: intelligent maintenance and condition-based predictive maintenance.

On one hand, intelligent maintenance uses data acquired from machinery or equipment to predict any failures that may occur within the system and prevent them accordingly. On the other hand, condition-based predictive maintenance covers scheduled maintenance based on the equipment's current condition. It can be noted that the type of maintenance implemented in a company is highly dependent upon the equipment or machinery type, the relevant services, the usage frequency, and, most importantly, the company's ability to place maintenance as a top priority.

PREVENTATIVE MAINTENANCE: A CONCEPT

In the E&P sector, preventative maintenance is a concept that is not only acknowledged, but absolutely necessary in its application. While some companies may see preventative maintenance as a necessity for all operations, others view the strategy as a financial burden or even a complete waste of time. However, after carrying out a collective analysis of the pros and cons of the implementation of preventative maintenance, it is clear that the pros outweigh the cons by far.

For example, it could be argued that one of the cons of carrying out preventative maintenance is that breakdowns tend to happen at inconvenient timings, so preventative maintenance can only be a waste of time. Another argument is that, in the short term, preventative maintenance results in a reduction of the total output due to halting machinery to carry out maintenance procedures. With regards to labor workers, preventative maintenance can seem to be labor-intensive and also increases chances of accidents as a result of the extra exposure to dangerous machinery.

Financially, many argue that the increased implementation of preventative maintenance procedures is costly (upfront) as a set of certified staff are constantly required to carry out the relevant procedures. These are some of the cons of preventative maintenance as viewed by E&P companies. According to Eng. Ahmed Farouk Ibrahim, HSE Manager at Orascom Construction, "Proper administration of preventative maintenance systems is crucial to ensure its effective application." Eng. Ahmed Farouk Ibrahim also continued to mention that, "Preventative maintenance costs should be calculated in terms of the long run and not upfront costs. In fact, a pump worth a few thousand EGP could fail when not properly maintained and end up costing millions if the entire system is affected."

On the other hand, there are multiple pros to carrying out preventative maintenance in the E&P sector. For instance, in the long run, by regularly checking the equipment, the risk of failure decreases. Also, by following a coordinated schedule, the days in which maintenance takes place could be properly scheduled to minimize production losses. By doing so, important days where all equipment must be running will not be disturbed. Additionally, by keeping equipment intact through preventative maintenance, the life of the equipment is more likely to be extended; this not only cuts cost by not replacing equipment too soon, but also increases efficiency of the working parts to maximize output as much as possible. In fact, when machinery is not properly cleaned and maintained, it takes more energy for that piece of machinery to operate, hiking the energy costs of the company. For such reasons, it is essential to ensure that preventative maintenance measures are implemented in all sectors as the pros outweigh the cons by a landslide.

CASE STUDY: AVOIDING OBSTACLES

As per a case study conducted by the United States (US) Department of Energy, the oil and gas industry has deeply benefited from the implementation of preventative maintenance. In fact, the US Department of Energy has conducted a study in which it was found that the Return on Investment (ROI) of a company that implements preventative maintenance is 10 times higher than that of a company that does not. Additionally, it was estimated that maintenance costs and downtime reduced by 30% and 75% respectively. This means that the cost of hiring maintenance staff, limiting production, and causing minor inconveniences for maintenance procedure could be compensated in the long run. Not only this, but it was found that the implementation of preventative maintenance could result in the increase of production by 20% to 25% as opposed to negatively impacting production outputs. These statistics offer an optimistic approach to viewing preventative maintenance in the oil and gas sector.

In conclusion, there are always efficient ways in which preventative maintenance could be improved. For instance, other than the fact that preventative maintenance ensures better efficiency and outputs over the long run, without proper involvement and perseverance, this would not be possible. In other words, this is achieved by regularly carrying out workshops and/or sessions to further educate staff and ensure that their knowledge on maintenance procedures is constantly updated. Furthermore, by constantly evaluating the carried out preventative maintenance procedures, the company can gather further information about procedures that are working well and procedures that are inefficient and need improvement. Finally, communication is key. It is important to establish a clear network with staff at all levels to keep everyone updated about routine maintenance (to minimize inconvenience in all departments) and about any improvements that could be made. In conclusion, preventative maintenance is an integral part of the oil and gas industry and could be further improved in its methods to maximize productivity.

METHANEX CELEBRATES SUCCESSFUL PARTNERSHIP WITH EGYPT

BY THE PYRAMIDS OF GIZA

BY **DINA EL-BEHIRY AND MAI EL GHANDOUR**

At the foot of the Great Pyramids of Giza, Methanex Egypt and the Canadian Embassy hosted a one-of-a-kind dinner reception on November 18 to mark Methanex Corporation's board of directors first visit to Egypt since the company's methanol plant started production in 2011. The event, held at the Sound and Light Plateau, celebrated Methanex Egypt's successful partnerships in the country.

During their visit, Methanex Board of Directors met with HE Minister of Petroleum and Mineral Resources, Tarek El Molla, and visited Methanex Egypt's state-of-the-art methanol production facility in Damietta, which is among the most energy efficient methanol plants in the world. As the largest Canadian investor in Egypt, Methanex Board of Directors' visit underscored the country's outstanding story of economic and energy reform.

The event kicked off with a cocktail reception for the company's partners, followed by speeches from Methanex Egypt Managing Director, Mohamed Shindy, and the Canadian Ambassador to Egypt, Jess Dutton. After the brief yet impactful speeches, the audience was spellbound by the marvelous Sound and Light Show in addition to an unforgettable performance by singer Nesma Mahgoub.

Shindy kicked off his speech with an inspirational anecdote on how to find true meaning and essence in everything one does. The company's Managing Director reflected on what the meaning and point behind Methanex's work could be. "I think what we have created here in Egypt as a company is absolutely magnificent. It has created significant value for the company. It created significant value for our partners, and it created significant value for the community — for everybody, whether contractors, lawyers, bankers, our friends at Egyptian Petrochemicals Holding Company (ECHEM) and Egyptian Natural Gas Holding Company (EGAS), and the ministry," he said.

Shindy highlighted the meeting with the minister, who had expressed his total support for the company. According to Shindy, the minister deemed Methanex to be one of the most successful ventures with a very bright future that adds real value to the country. "I hope we can continue to add meaning and to have meaning in Egypt; and I am sure we will, because I am very proud of the company I work for. It does not take short cuts and does things the proper way. So, that makes me very proud," Shindy concluded.

This was followed by the Canadian Ambassador, Jess Dutton's keynote speech. In his address, the Ambassador pointed out that this event is very significant for him as a Canadian ambassador for a number of reasons. The first of which is generating value for shareholders, which has been a great return of investment for Methanex.

Secondly, he mentioned "the partnership [Methanex has with their] local partners and the incredible contribution that Methanex is making to Egypt and the people of Egypt."

Furthermore, Dutton praised the positive economic reforms that the Egyptian government has been undertaking over the past few years, specifically in the oil and gas sector.

Dutton stressed that, as a Canadian ambassador, he keeps an eye on Canada's strong reputation in Egypt, clarifying that "Canada has an incredible reputation in Egypt and a lot of it is because of companies like Methanex."

Additionally, the ambassador agreed with what Shindy had mentioned about "creating value and meaning — a leading employer creating high-quality jobs, [as well as] transferring very important technologies that are critical to Egypt's development. And, of course, giving back to the community." Dutton further expressed his admiration for Methanex's Corporate Social Responsibility (CSR) programs, saying, "I am really proud that Methanex has the largest CSR program of any Canadian company in the history of Egypt. When you are talking about a country that is thousands of years old, that is very significant."

Moreover, Dutton highlighted Methanex's ability to "partner with local partners that have been supported through our development programs, to help amplify some of the work that we had done to create jobs for young people, to support the community where we are active in Damietta thanks to the incredible Canadian values, and thanks to the culture of this company, giving back to the communities where it operates."

The ambassador then thanked the board of directors and the executives for convening their board meeting in Egypt. "It really adds great value to the overall Canada-Egypt relationship. I have been here for two years. Over the two years, Methanex makes incredible contributions to this country. I think the professionalism and dynamism of this company in the world, and under the leadership of Shindy here in Egypt, is just fabulous."

FURTHER COOPERATION WITH THE MINISTRY

Earlier that same day, Methanex's Board of Directors had met with El Molla, in the presence of Dutton. The meeting was also attended by Methanex Corporation's CEO, John Floren; representatives from Methanex's Executive

Leadership team; Methanex Egypt Managing Director, Mohamed Shindy; the ECHEM Chairman, Chemist Saad Helal; and the EGAS Chairman, Osama El-Bakly.

During the meeting, Floren updated the minister on the company's robust performance over the past few years. The only methanol production plant in the country, Methanex Egypt, started production in 2011 and has a production capacity of 1.3 million tons (MT) per year. Methanol produced in the company's plant in Damietta is either exported or sold domestically and is a main feedstock that enables a wide array of methanol-dependent industries, including construction products, plastics, and formaldehyde.

Shindy also briefed the minister on the company's social investment program in Damietta. In February 2019, the company signed a two-year partnership agreement with the International Labor Organization (ILO) to extend the successful 'Decent Jobs for Egypt's Young People' to Damietta, through a $1,000,000 donation to the ILO. The project aims to support entrepreneurship and employability through addressing the key challenges of youth unemployment and underemployment to deliver 500 jobs over the two-year duration of the project.

The minister stressed that the board of directors' first visit to Egypt reflects the positive investment climate in Egypt and the country's political and economic stability. Additionally, El Molla pointed out that Damietta's methanol plant, which is considered the first Egyptian-Canadian project for methanol production, is one of the projects that maximizes the added value of natural gas. As methanol is one of the fundamental resources in the petrochemical industry, the minister said that the ministry's strategy aims to implement petrochemical projects that attract investments and achieve the optimal economic use for Egypt's natural gas resources.

The Egyptian Methanex Methanol Company S.A.E. is the Egyptian joint venture (JV) operation of Methanex Corporation, a Vancouver-based, publicly traded company and the world's largest producer and supplier of methanol to major international markets. Methanex holds a 50% interest in the JV, together with state partners in Egypt, such as Egyptian Petrochemical Holding Company (ECHEM), Egyptian Natural Gas Holding Company (EGAS), Egyptian National Gas Company (GASCO), and the Arab Petroleum Investments Corporation (APICORP).

SCHLUMBERGER EVENT RAISES BREAST CANCER AWARENESS

BY **DINA EL-BEHIRY**

During Breast Cancer Awareness month, Schlumberger held its annual breast cancer awareness event in collaboration with the As-Salam International Hospital on October 30, at Schlumberger Egypt Center of Efficiency.

The session was opened by Heba El Karrar, Commercial and Marketing Analyst at Schlumberger Egypt and East Mediterranean Region. El Karrar referred to her keynote speech at last year's event about a breast cancer fighter who, unfortunately, lost her battle. She noted that "the lesson learnt at that time was that we really need to take care of our health," adding that "this disease can be easily controlled if it is diagnosed early." El Karrar stressed that the main aim of the event was "to focus on today's instructions and raise awareness by spreading the word."

The event began with a breast cancer awareness session presented by Dr. Tamer Manie, consultant of Surgical Oncology at the As-Salam International Hospital, the National Cancer Institute in Cairo and Fellow of the National Cancer Institute in Rome. He discussed the causes and risk factors of breast cancer, signs of breast cancer, importance of early detection, genetic testing, new surgical options, and common myths about breast cancer.

Dr. Manie started by differentiating between normal and carcinogenic cells. "A normal cell divides in an organized and systematic way and stops at a certain point; however, a carcinogenic cell's division is uncontrollable, unorganized, and unstoppable, leading to a tumor," Dr. Manie said. He noted that breast cancer accounts for 25-33% of all female cancer cases, adding that 50-years-old is the median age of diagnosis and the lifetime risk for women being diagnosed with breast cancer is currently one in eight.

Despite 90% of cancer causes being unknown, and the other 10% being genetic, there are some known factors that increase the risk of breast cancer. These factors include "gender and age as women are 100 times more likely to get breast cancer than men, and as risk of diagnosis increases as you age; a family history of breast cancer; and having had breast cancer before," Dr. Manie clarified. He also mentioned "prolonged hormone exposure especially to estrogen from early menarche or late menopause, nulliparity, having the first child after the age of 30, taking hormone replacement therapy, and oral contraceptive pills. Other factors are an unhealthy diet, obesity, and alcohol consumption."

On the other hand, some factors that help decrease the risk of breast cancer include full-term pregnancy at a young age, multiple pregnancies, breast feeding, regular exercise, and maintaining a healthy diet.

Dr. Manie also mentioned signs that require medical attention if they occur. These include having a breast mass, skin dimpling, and nipple retraction. Other serious signs are peau d'orange where the breast skin resembles an orange peel and bloody nipple discharge. Pain is not a clear sign of breast cancer, as 80% of it is not painful.

"Any tumor has four stages: the first is the easiest to cure, and the fourth is the hardest," Dr. Manie said. Therefore, early detection is very important as it could mean a higher cure rate and less treatment.

Early detection has two methods: self-examination and imaging. "Self-examination is very important as it familiarizes us with our body, making changes easier to notice," Dr. Manie explained. As for imaging, there are two techniques. Mammography starts at the age of 40 if there is no family history of breast cancer or 10 years younger than the family member's age at diagnosis. The other method is the magnetic response imaging (MRI) which is used for young women with high risk starting from the age of 25.

Genetic testing, however, is done if there are two breast cancer cases, at least one of which before the age 50, on one side of the family or when a close relative has a gene mutation or has cancer in both breasts. It is also done if a first- or second-degree relative is diagnosed at the age of 45 and older or if a male relative has breast cancer.

"If the genetic testing result is positive, this means a higher risk of breast cancer. Then, there are three options," Manie explained. The first is risk reduction surgeries, including prophylactic mastectomy, which reduces breast cancer risk by more than 90% in BRCA mutation carriers by removing the ovaries which reduces breast cancer risk by 50%.

The second is surveillance, which requires clinical examination every 6-12 months from the age of 25, in addition to annual breast screenings using MRI from 25-29 years old, then doing annual breast MRI and mammography every 6 months from 30-75 years old.

The third option is chemoprevention, which means taking treatments like Tamoxifen, Raloxifene, and Aromatase inhibitors.

When it comes to surgical options, the first is breast-conserving surgery, which in some cases can lead to breast distortion. To avoid such distortion, an oncoplastic breast surgery is done. The second option is mastectomy. Yet by doing a modified radical mastectomy, the breast is completely removed, leading to patient disappointment and depression breast distortion. Skin-sparing mastectomy and nipple-sparing mastectomy are used to improve the cosmetic outcomes.

Dr. Manie also discussed some breast cancer myths. These include believing that a biopsy will spread tumors, "when it actually helps identify the tumor type and its treatment," Dr. Manie clarified. He also mentioned the belief that deodorants cause breast cancer has no scientific proof. And, also that choosing a mastectomy instead of breast conserving surgery may reduce the risk of breast cancer appearing again is not true.

Concluding the session, Dr. Manie noted that breast cancer is a curable disease when detected at an early stage.

The event continued with interactive activities. These included the attendees writing advice or resolutions for fighting and overcoming breast cancer, which were considered Schlumberger's main message of the day. Attendees also solved a puzzle, forming messages to those fighting breast cancers. The main message was motivating them towards "CURE". Other messages included "Overcome through Courage & Strength" and to "Fight like a Girl".

To sum up, detecting breast cancer at an early stage is the golden solution to overcoming this disease.

HALLIBURTON CONTRIBUTES TO SPREADING BREAST CANCER AWARENESS

In honor of Breast Cancer Awareness Month, Halliburton employees around the world celebrated "Wear it Pink Day." During that day, the employees shared photos and stories of their support in the fight against breast cancer.

Colby Fuser, Halliburton Vice President for Egypt and Libya, noted that Halliburton was always concerned to have an impactful role in the community. Launching these initiatives demonstrates that firsthand Halliburton supports important causes and is committed to improving the lives of people in the communities where they live and work.

Women Sharing Excellence (WSE) in Egypt, the first chapter in the Middle East and North Africa (MENA) region, has started its first year with a busy agenda of leadership, mentoring, and networking events aiming to promote the diversity and inclusion in the oil and gas industry in Egypt and the MENA region.

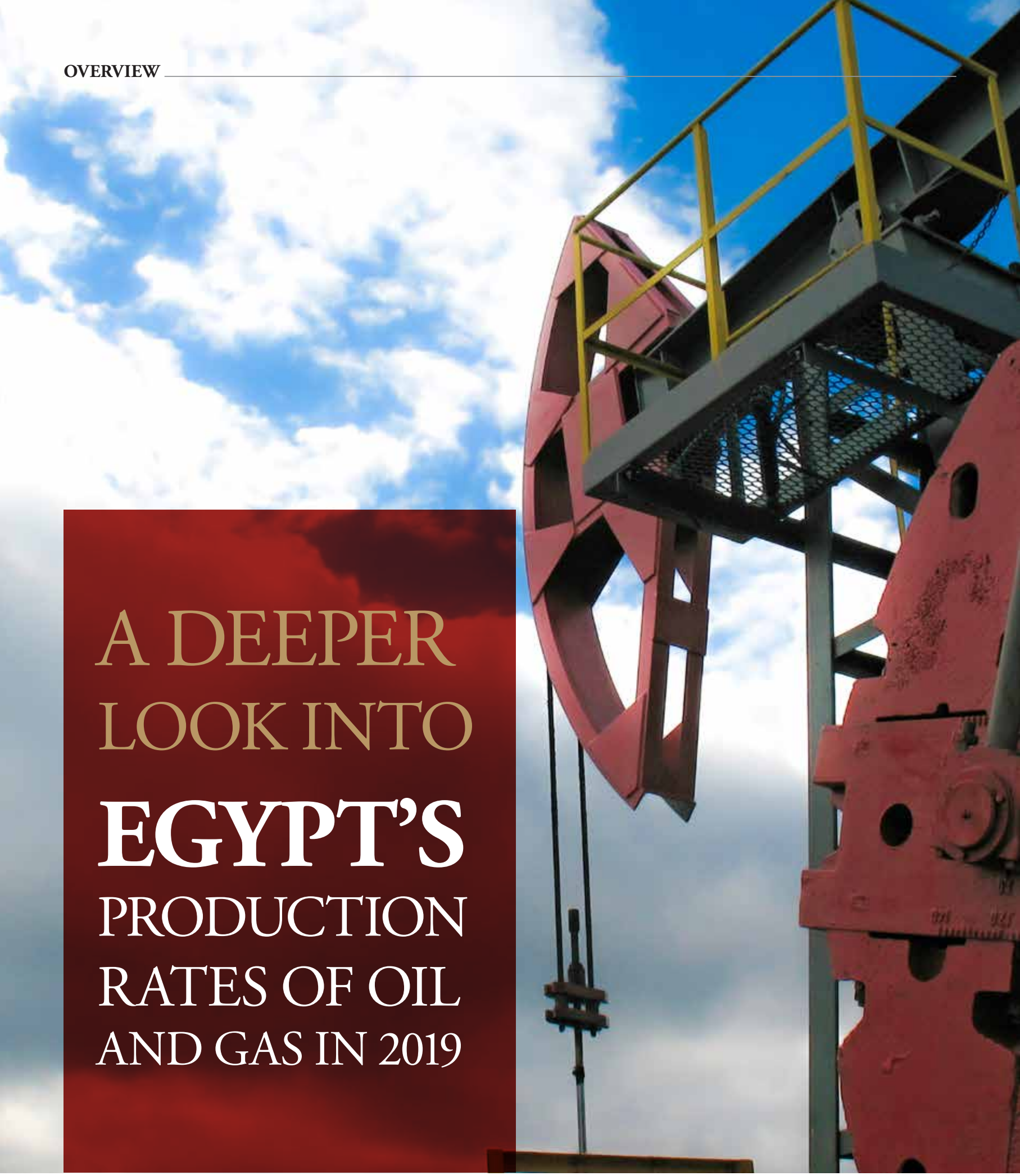
As part of the Corporate Social Responsibility (CSR) policy of Halliburton WSE, and in light of Breast Cancer Awareness month, Halliburton held two seminars on October 21, at Halliburton's premises in Cairo.

Baheya Foundation for Early Detection and Treatment for Breast Cancer accepted the invitation presented by Fuser to organize these two seminars aiming to raise awareness on breast cancer as well as highlighting the importance of early detection under the title 'Early Detection Awareness.'

The first seminar was presented to the female employees as well as the wives of the employees of Halliburton. The second one was for women from more than nine national and international oil companies.

It is worth mentioning that Halliburton is an American multinational corporation, which has operations in more than 70 countries and own hundreds of subsidiaries, affiliates, branches, brands, and divisions worldwide.

Baheya Foundation is a non-profit charity that treats women with breast cancer. The treatment is free and covers all stages, including early detection of the disease, surgeries, chemotherapy, radiation, psychological therapy, clinical nutrition, and therapeutic therapy.



A DEEPER LOOK INTO EGYPT'S PRODUCTION RATES OF OIL AND GAS IN 2019

BY **DINA EL-BEHIRY**

An increase in production rates comes as a sign of success for the oil and gas sector in Egypt. The total production of crude oil and natural gas recorded around 6.8 million tons in June 2019, up from 6.1 million tons in June 2018. In July 2019, crude oil production reached around 675,000 barrels per day (b/d). It is also worth keeping in mind that the Ministry of Petroleum and Mineral Resources spares no effort in maintaining a minimum crude oil production rate of around 670,000 b/d; it also targets raising the daily production of crude oil to 720,000 b/d by the end of fiscal year (FY) 2019/20.

When it comes to natural gas, the oil and gas sector recorded a production level of around 6.6 billion cubic feet per day (bcf/d) during Q4 2018, which is due to doubling the production level of Zohr field. Upon adding the production from the West Nile Delta Project Phase 2, that number reached 6.8 bcf/d of natural gas in February 2019. In April, natural gas production increased by 300 million standard cubic feet per day (mmscf/d), to around 6.9 bcf/d. By the end of June, a ministry official declared that natural gas production reached 7 bcf/d, and that the ministry is aiming for 8 bcf/d by the end of FY 2019/20. Building on that, the Ministry of Petroleum and Mineral Resources is currently finishing all petroleum projects on time, if not earlier, to stop importing petroleum products by 2022 and to achieve self-sufficiency. Hence, Egypt is one of the countries enriched by having several production areas. Here is a closer look at these production areas during 2019.

THE MEDITERRANEAN SEA

Egypt's giant Zohr field successfully produced a total of 12.2 billion cubic meters (bcm) of natural gas in 2018. In March 2019, Zohr's natural gas production recorded over 2 bcf/d, with plans to exceed 3 bcf/d by the end of 2019.

In order to increase the production rate, Eni completed the sixth processing unit of Zohr in March, bringing the field's production of natural gas up to 2.3 bcf/d. In April, Eni began the implementation of the seventh natural gas processing unit, with a capacity of 400 mmscf/d, boosting the field's natural gas production to 2.7 bcf/d by the end of July. In May, Eni finished the establishment of natural gas processing units, hiking Zohr's processing capacity to 3.2 bcf/d. Consequently, H1 2019 saw a surge in Zohr's natural gas production, reaching a total of 11.3 bcm.

NILE DELTA

The Ministry of Petroleum and Mineral Resources connected the first well at the South-Western Baltim gas field to the national grid, which is expected to produce 100 mmscf/d of natural gas after being linked to Abu Madi plant. After that, Enppi announced in October that the first well was put into production at an initial rate of 100 mmscf/d of natural gas. The field's natural gas production will upsurge to 500 mmscf/d after five new wells have been drilled by Q2 2020.

WEST DELTA DEEP MARINE (WDDM)

In September, Rashid Petroleum (Rashpetco) and Burullus Gas Company successfully completed drilling the remaining from a total of six wells in 9B Phase. The six wells are expected to produce 390 mmcm/d of natural gas in Q1 2020.

Additionally, Shell witnessed an increase in its natural gas output from Rashid and Burullus fields in September, reaching 290 mmcf/d up from 220 mmcf/d during August. Also, Shell linked 80 mmcf/d of natural gas from the second well of the Burullus field (9B Phase) to the production. The company aims to raise natural gas production to 320 mmcf/d by the end of the FY.

Furthermore, the Chairman of Rashpetco and Burullus Gas Company, Sabry El Sharkawy, declared in October that three new wells will be linked to production, with a total capacity rate of 220 mmcf/d of natural gas before the end of 2019. Additionally, the last three wells from 9B Phase will also be linked to production next March, with a total capacity of 170 mmcf/d of natural gas. It is noteworthy that Burullus successfully extracted oil from Sapphire East DB well, with a natural gas capacity rate of approximately 60 mmcf/d. This is considered the second newest well to have been added to the natural gas production during October after Swan East well, which has a capacity of 100 mmcf/d.

THE WESTERN DESERT

The Western Desert contributes around 60% of Egypt's production of crude oil. In FY 2018/19, Agiba Petroleum Company successfully raised its crude oil production rates to 44,000 b/d and around 18.4 mmcf/d of natural gas thanks to the Meleiha field. The first well in the field produced 2,000 b/d of crude oil, which later increased to 4,500 b/d after the second well was connected to the national grid.

Additionally, Qarun Petroleum Company managed to increase its production capacity of crude oil and condensates, reaching 28,000 b/d during April. The company is working to boost its crude oil and condensates output to 45,000 b/d by the end of 2020.

Another success story was achieved by Eni, which announced in July that production from its South-West Meleiha development lease has commenced. Production was expected to reach approximately 7,000 barrels of oil equivalent per day (boe/d) in September.

Khalda Petroleum Company revealed in September that it achieved its highest daily crude oil production rate of more than 141,000 barrels last April and its highest annual crude oil production rate of more than 49 million barrels. During FY 2018/19, Khalda increased its production rates to 162,000 b/d of crude oil and condensates, about 752 mmcf of natural gas, and about 1,700 barrels of butane.

Furthermore, Badr Eldin Petroleum Company (BAPETCO) announced in September that it brought 39 new oil wells online in FY 2018/19, with a production rate estimated at 6,700 b/d of crude oil and 23 mmcm/d of natural gas. In addition, BAPETCO increased the number of its rigs to seven and dug 53 wells, increasing production to over 124,000 boe/d.

GULF OF SUEZ

In January, Suez Oil Company's (SUCO) production of crude oil and natural gas reached around 23,500 boe/d from its four fields in the Gulf of Suez and onshore Nile Delta fields. The company had plans to boost the crude oil and natural gas production of the four fields— Desouq, Ras Badran, El Zeit Guf, and Ras Fanar— to reach 38,000 boe/d. It is worth mentioning that SUCO has been developing Desouq field to link 12 wells to the production map and increase natural gas production to 140 mmscf/d by the end of next year.

One of the most remarkable deals in October was Dragon Oil's full acquisition of BP's stakes in the Gulf of Suez Oil Company (GUPCO). The deal will help boost Dragon Oil's crude oil production to around 150,000 b/d, as part of the company's strategy to reach 300,000 b/d by 2026. Besides, this will help enhance GUPCO's current level of crude oil production to reach 75,000 b/d by 2021, from 60,000 b/d.

In FY 2018/19, Belayim Petroleum Company (Petrobel) produced a total of 358,000 boe/d, with 1.475 bcf/d of natural gas, 70,000 b/d of oil, 14,000 b/d of condensates, and about 274 tons per day of butane. The company managed to produce 803,000 boe/d, for the first time, during July.

THE RED SEA

The production rate of GUPCO's Ras Shouqair field has reached 61,700 b/d of crude oil in FY 2019/20, according to Khaled Hemdan, GUPCO's Chairman. Moreover, the company plans to increase the field's crude oil production capacity to around 73,000 b/d.

NORTH SINAI

NSCO Investments completed the development of its first well in North Sinai offshore natural gas concession during July. NSCO's first well in the Kamos area had an initial natural gas production rate of around 25 mmscf/d. Additionally, NSCO completed drilling its second natural gas field at Kamos concession (KM-1) in September, with a natural gas production capacity of 20 mmcf/d, raising the company's average daily output of natural gas to 75 mmcf/d, compared to 25 mmcf/d during the first six months of 2019.

NORTH ALEXANDRIA

The petroleum sector has been preparing to initiate production in Raven field in September. The field has an estimated maximum natural gas production capacity between 850 and 900 mmcf/d. Additionally, the field will produce from 20,000 to 25,000 barrels of condensates per day.

In conclusion, accomplishing such impressive production rates will help attract more investments to Egypt, especially after cutting the international oil companies' (IOCs) arrears to $900 million at the end of June. Furthermore, this is considered an indicator that Egypt is on the right track to enhance its global position.

GDFM: A NEW WORKFLOW FOR BROWNFIELD REJUVENATION

PREPARED **BY DINA EL-BEHIRY**

Exploration and production (E&P) activities in the oil and gas industry have been witnessing major technological leaps since the early 1990s. These leaps were helped along by the increase in computer processing capacity and speed and the availability of 3D visualization software. Both factors have allowed for large-scale data analysis, dynamic simulation, nodal analysis, and uncertainties assessments. Moreover, 3D seismic has led to the construction of more detailed geological models. However, after a long time of production, numerous oil fields become brownfields. Accordingly, the classic models applied to study the early-phase production in oil fields would not necessarily be successful in brownfields.

Thus, models were adjusted to be suitable for brownfield rejuvenation. One of these approaches is the Reserved Geo-Dynamic Field Modeling (GDFM), discussed in paper "A Reserved Geo-Dynamic Approach for Brownfield Rejuvenation" by Mahmoud Ibrahim, Geoscience Manager, and Gregor Hollmann, Development Manager at Wintershall (now Wintershall Dea). The paper was published by the Society of Petroleum Engineers (SPE) Reservoir Evaluation and Engineering in 2018.

BROWNFIELD FEATURES

The distinction between mature fields and brownfields needs to be kept in mind. A field is considered mature when production level declines by more than 50% of the plateau rate, and an incremental oil recovery (IOR) method was deployed to improve secondary reserves. However, a brownfield is a mature field with a production rate that is 35-40% less than the plateau rate and has depleted primary and secondary reserves. Moreover, brownfields rely on implementing enhanced oil recovery (EOR) to improve recovery within the field or within individual reservoir units.

Brownfield data acquisition changes through the field's lifetime in terms of type and quantity. Based on that, static data acquisition reaches the apex (quantity and technical quality) during the plateau phase and then declines to satisfy correlation purposes during drilling stages. On the other hand, dynamic data acquisition grows and is recorded until the last day of the field.

There are some challenges to be faced while attempting to expand the reserves and production of brownfields. These challenges include narrow economics, as revamping brownfields mainly targets increasing hydrocarbon production and lower economic limits by shrinking decommissioning costs. In addition, brownfields are characterized by having enormous amounts of data throughout the levels of the field's production, which is called the "data tsunami" phenomenon. This phenomenon exacerbates the identification of key influential factors of brownfield modeling. Another challenge is that the industry's traditional silos, coupled with a skills shortage, negatively affect the expected results of brownfield analysis.

GDFM CONCEPT

GDFM is a combined model that does not split data into static and dynamic to optimize the operational directives of brownfields for further development. Since dynamic data improves in quantity and granularity over the field's lifetime, it makes understanding the reservoir easier. Therefore, GDFM begins with dynamic data. It is worth noting that GDFM does not have a specific direction for implementation, such as top-down and down-top; it instead works simultaneously.

The main goal of GDFM is to establish a reasonable model that follows approved processes for data evaluation and is standardized by full data integration to maximize the data value. There are four criteria for a reasonable model: contains few adjustable elements, shows minimal contradiction to existing data, explains most existing observations, and gives predictions about future observations that can disprove the model if they do not eventuate.

GDFM PROCESS

The GDFM process begins with data integration, in which all static and dynamic data are collected, standardized, and quality-checked. Thus, the model is built through sharing and integrating the dynamic and static data. The process implementation requires working in cooperation with a brownfield evaluation team.

GDFM consists of many phases. Phase zero is scoping, in which several questions about brownfield study must be considered. These questions include: what is the purpose of the study? What is the current production break-even price? Is there sufficient data or is additional data acquisition advisable? Is a full-field model mandatory? Is there enough constraint guiding the porosity transform?

The most essential phase is phase one, which is intensive sharing. During which, all disciplines are engaged for a macroscopic field diagnosis that indicates the field's key issues and key potentials. Moreover, this phase includes assessing the field's status, integrating well cross-sections, calibrating the permeability transform dynamically, and identifying the compartmentalization, flow units, and well test reviews. The main deliverables of this phase are the validated model-input parameters for history matching and determining the field's complexity.

Phase two is the population of the geo-dynamic model. In this phase, all static and dynamic data with geometric relevance is integrated. The final phase is history matching, dynamic simulation, and strategy definition. It is worth noting that the field's rejuvenation does not have a separate phase, instead it unfolds from the GDFM.

For instance, a field in Germany was classified as a brownfield as its production level shrank to less than 25%. A high-resolution 3D of the field was acquired to resolve the field's complex pattern. The seismic interpretation did not only use seismic and abundant well data, but also integrated the data calibrated in phase one. Hence, seismic integration enabled the introduction of field facts into structural mapping, as these facts are not always obvious in the seismic data. The implementation of the GDFM on this brownfield resulted in saving around 30% of the time budget.

GDFM PITFALLS

After many decades of data collection and production, uncertainty remains, which is related to the dynamic behavior of individual faults, water saturation, and relative permeabilities. However, combining available data leads to establishing the GDFM, which is the best option for studying brownfields.

When the model is implemented, the identification of the required and unrequired data has to be considered. Neglecting important data may result in false prediction and considering unrequired data will mean extra cost, time, and effort.

INDUSTRY METHODS OF BROWNFIELD EVALUATION

Several work flows were recorded in literature, studying field data integration, risk assessment, and field modeling. The majority of these work flows focus mainly on static modeling and history matching. However, they gave little attention to integrated brownfield studies.

Commonly, the direction to study brownfields still leans towards static or dynamic modeling as distinctive categories and not as a single entity, whereas, GDFM deals with data as an integrated entity. Some other studies have tried to close the gap, such as an integrated approach presented in 2015 to define fan-reservoir architecture by including seismic attributes into the geological modeling.

CONCLUDING REMARKS

Although brownfields are in an advanced level of production, they still have large opportunities for evaluation because of existing infrastructure and facilities. Hence, smart brownfield management has the potential to remove the economic limit and increase the level of production and reserves. For that purpose, GDFM is a common work flow for brownfield rejuvenation, which takes a reversed approach by beginning with history matching and using dynamic/static data at a very early phase. Consequently, the GDFM maximizes the value of available data to best study brownfields.

FUGRO

R/V KOBI RUEGG

The Kobi Ruegg is a multi-purpose vessel suited for high resolution geophysical surveys and seafloor mapping. Measuring 59 metres in length, the vessel is ready for rapid deployment to locations throughout Egypt, the Mediterranean and Black Sea.

Onboard instrumentation includes shallow and deepwater multibeam systems, a range of sub-bottom profilers and a HiPAP long range positioning system. Other systems that can be mobilised to meet project requirements include Fugro's Hugin-based Echo Surveyor VII autonomous underwater vehicle (AUV), ROVs, High Res Seismic and a range of geotechnical equipment. Fugro's StarfixTM Differential Global Positioning System (DGPS) is employed for accurate positioning.

Surveys are tailored to meet client needs. Typical fieldwork involves projects for the energy and government sectors, as well as for engineering firms.

The vessel is particularly suited for the following project types:

- Drilling Site Surveys
- Pre Engineering Surveys for field development
- As-built pipeline surveys
- Geohazard and SEEP surveys
- SEZ Surveys
- Cable Route surveys
- 2D seismic multi-channel surveys
- ROV inspection surveys
- Shipwreck and aircraft searches

AUV being deployed off back of vessel.

WWW.FUGRO.COM

THE EFFECTS OF THE OIL CURSE ON VENEZUELA

BY **MAI EL GHANDOUR AND TASNEEM MADI**

How can a country with the largest oil resources on the planet end up with the worst economic depression and humanitarian crisis in history?

Instead of contributing to economic growth, the presence of oil wealth in less-developed countries can sometimes lead to political conflict, corruption, and, in extreme cases, civil war. Venezuela, which is home to 300.88 billion barrels of proved oil reserves, is currently in the grip of a major crisis. Despite having the world's largest oil reserves, Venezuela suffers from a deep recession and hyper-inflation.

Experts say that this is the result of the oil curse, which is when a country is entirely dependent on a single commodity that its economy is bound to crash at any given time.

EFFECT OF OIL AND GAS SECTOR ON VENEZUELA'S ECONOMY

Venezuela has the largest amount of proven crude oil reserves, standing at 25.5% of total OPEC countries' shares by the end of 2018. In 2018, the total value of Venezuela's exports reached $34,996 million, where the petroleum sector represented about 99.1% (recording $34,674 million) of that value. Thus, proven crude oil reserves recorded 302,809 million barrels (mmbbl), and proven natural gas reserves recorded 5,674 billion cubic meter (bcm) in 2018.

The capital expenditure by the state-owned company Petròleos de Venezuela, S.A. (PDVSA) in 2002 and 2003 decreased as 19,000 employees were fired from the company during the Venezuelan General Strike, which led to inflation. Moreover, the country's economy was severely affected due to Venezuela's heavy dependency on the oil industry, where the gross domestic product (GDP) decreased by 45%. Venezuelan output has been in free-fall for years and PDVSA became unable to boost production.

The bulk of Venezuela's oil, which is estimated at 1.2 trillion barrels, is heavy oil that is expensive to extract. Thus, only a small fraction of that amount can be extracted with the current technology and prices.

Accordingly, this led to a decrease in the activities made by foreign partners and international oil service companies. Venezuela has tried to attract foreign investment capital, but after winning the 2006 reelection, President Chavez began nationalizing the country's resources and assets. As a result, Venezuela must now rely on state-owned oil companies to do most of the heavy-lifting. However, the companies do not have enough capital to counter the natural decline of legacy wells, let alone grow production.

SOCIAL CHANGE

Social change is inevitable in a country with massive amounts of oil, but more often than not, it can be an adverse one. When the Venezuelan government became heavily reliant on oil revenue, it was at the expense of other industries. Today, this inefficient production has seen a country so rich in energy resources have trouble keeping the lights on.

Shortages in other resources, such as food and medicine, have created a humanitarian crisis. "It is common to find people scavenging for food at garbage dumps and everywhere people are eating off garbage cans," said an anonymous person who spoke to NBC News. "People are starving. You see misery everywhere."

Gustavo Arnavat, Senior Advisor at the Center for Strategic & International Studies, told NBC News that these conditions "have produced a political and constitutional crisis that is precipitating the complete collapse of the state."

There is an extreme disparity between the rich and poor, despite the fact that late President Hugo Chavez was elected in 1999 on the promise that he would share Venezuela's immense oil wealth equally among its people. The deteriorating economic situation in Venezuela has led to the largest mass exodus in Latin America, where around 2.3 million citizens have migrated to seek a better life.

INTERNATIONAL REACTION

Twelve countries established the "Lima Group" (Brazil, Canada, Argentina, Peru, Colombia, Chile, Costa Rica, Guatemala, Honduras, Panama, and Paraguay) in 2017 to help resolve the Venezuelan crisis.

The United States (US) imposed sanctions on Venezuela's most important global business, which is producing and selling crude oil, as US refineries had been Venezuela's top customer. In January 2019, Donald Trump's administration issued new sanctions on PDVSA that effectively blocked Nicolás Maduro's regime from exporting crude to the US.

A series of conspiracy theories emerged, linking Trump's strategy to the US attempting to seize Venezuela's oil wealth. The US claims that Gulf countries play a more significant role in global supply than Venezuela. The US also claims that it has enough hydrocarbons due to fossil fuel abundance; this decreased US oil imports from Venezuela by about 90.2%. Another additional claim is the leakage of investments in the Venezuelan oil industry and the politicization of the running of PDVSA to finance projects that serve private, and not national, interests. Therefore, Venezuela's dependence on the US for oil is greater, not the other way around. The US has decreased its dependence on Venezuelan oil from 17% to 13%, the Wilson Center website stated on June 5, 2019.

It is worth noting that China and Russia have been paying great attention to Venezuelan hydrocarbons over the last two decades, and their presence in Latin America is worrisome to the US.

IS VENEZUELA'S OIL MARKET COLLAPSING?

Fitch Solutions' Head of Oil and Gas Analysis, Joseph Gatdula, mentioned that Venezuela's oil industry might not collapse. Gatdula believes that Venezuela will be able to sustain between 300,000 and 500,000 barrels per day (b/d) of exports with the support and help of Russia and China.

However, the director of Apex Consulting Ltd, Muktadir Ur Rahman, thinks that although Venezuela's oil market might not face complete collapse this year, there will be severe deficits in the country's production in the future. He added that international oil companies (IOCs) could improve Venezuela's production in the Orinoco basin back to its pre-crisis level.

Ironically, it was Juan Perez Alfonso, Venezuela's oil minister in the 1960s and a co-founder of OPEC, who first warned his nation of the oil curse. In 1975, he was quoted saying, "I call petroleum the devil's excrement. It brings trouble...Look at this — waste, corruption, consumption, our public services falling apart. And debt, debt we shall have for years."

This is the oil curse.

تحت رعاية فخامة الرئيس عبد الفتاح السيسي رئيس جمهورية مصر العربية
HELD UNDER THE PATRONAGE OF HIS EXCELLENCY ABDEL FATTAH EL SISI, PRESIDENT OF THE ARAB REPUBLIC OF EGYPT

EGYPS
EGYPT PETROLEUM SHOW

SUPPORTED BY

وزارة البترول والثروة المعدنية
Ministry of Petroleum & Mineral Resources

11-13 FEBRUARY 2020 | EGYPT INTERNATIONAL EXHIBITION CENTER

BE A PART OF EGYPT, NORTH AFRICA & THE MEDITERRANEAN'S MOST IMPORTANT OIL & GAS CONFERENCE

BOOK YOUR ALL ACCESS CONFERENCE PASS AND BECOME A MEMBER OF THE EGYPS PETROLEUM CLUB

EGYPS 2020 CONFERENCES IN NUMBERS

- **1,600+** Conference Delegates
- **270+** Expert Speakers
- **36** Technical Conference Sessions
- **10** Strategic Conference Sessions
- **7** Women in Energy Sessions
- **6** HSE in Energy Sessions
- **6** Finance and Investment Sessions
- **4** CEO Strategic Roundtables
- **2** Award Ceremonies Women in Energy & HSE Excellence in Energy
- **2** Days of E-poster Presentations

3 EASY WAYS TO REGISTER www.egyps.com/confreg egyps.delegate@dmgevents.com +971 4 248 3214

SUPPORTED BY
EGPC EGAS Egchem

DIAMOND SPONSORS
Apache bp DragonOil eni ExxonMobil Kuwait Energy TOTAL

GOLD SPONSORS
ArcelorMittal Baker Hughes CHEIRON PETRONAS Schlumberger

SILVER SPONSORS
EDISON HALLIBURTON MCDERMOTT Schneider Electric subsea 7

BRONZE SPONSORS
BECHTEL PETROJET TechnipFMC

ORGANISED BY
dmg events

www.egyps.com

SEAHARVEST

REPAIRED OVER 10,000 CASES IN EGYPT

UNRIVALLED REPAIR AND STRUCTURAL RE-ENFORCEMENT SOLUTIONS

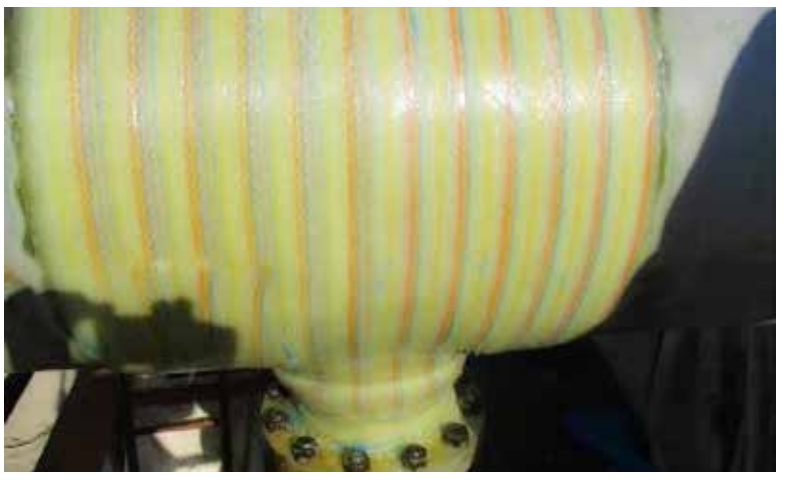
As a leading provider of engineered composite repair solutions, SEAHARVEST, through partnership with multinational ICR (UK), supports clients with a wide range of pipework, pipeline, caisson, and structural integrity challenges. Our range of Technowrap™ technology offers complete repair and structural re-enforcement solutions which are safe, flexible, practical and cost-effective.

SEAHARVEST does not just provide a range of high-tech products. We offer a complete engineered service and with decades of experience, we deliver bespoke, fully engineered composite repair solutions for customers around the world.

Internationally recognized and accredited, Technowrap™ provides exceptional strength; and with SEAHARVEST's adaptable range of products, we deliver a long-term alternative to steel replacement. Our light weight, non-corrosive systems and resins can be applied to live systems with no impact on production and are proven in challenging environments.

A wide range of Technowrap™ fully engineered composite repair systems provide solutions to splash zone, caissons and risers, pipework, structure, and decks.

Innovation is at the heart of the composite repair team, ensuring SEAHARVEST, through partnership with ICR, remains at the forefront of composite repair technological advances. Technowrap™ composite repairs are internationally recognized and qualified to both ISO 24817 and ASME PCC-2 Article 4.1. They are also Lloyds Register Type Approved, ABS Design & Manufacturing Approved, and DNV Type Examination Approved.



BALANCING BETWEEN GOVERNMENT AND IOCS UNDER PRODUCTION SHARING AGREEMENTS

Upstream petroleum contracts and agreements along with their associated fiscal regimes are the keystone of the relationships between the host countries (HC) and international oil companies (IOCs). These agreements are the tools for implementing the particular petroleum policy decided by each HC. The terms directly reflect the conditions under which the IOCs accept to invest in upstream petroleum projects. Governments strive for capitals and technologies to develop the petroleum sector, while the IOCs look for the proper investment opportunities that suit their corporate strategies and risk reward profiles.

Production Sharing Agreement (PSA) is the most common type of petroleum fiscal regimes. All exploration and production (E&P) activities in Egypt are under this type of agreement.

PSA contains a number of terms ranging from regulatory, financial, production sharing, cost recovery, and taxes, as well as legal and organizational aspects. However, despite the conflict of goals between governments and contractors, the fiscal terms are considered the key provision which determines the interest of both the state and the investor. The objective of balancing between the HC and IOC and attaining the maximum economic efficiency is a complex issue.

Signature bonus is a one-off payment made to the government when the contract is signed. It grants the right to conduct petroleum operation under the PSA. Signature bonus is frequently used to determine winning bids when companies want to be awarded a contract. It may range from $0.5 to $50 million. The signature bonus tends to be minimal for fields where the geological data is relatively poor or nonexistent, and so exploration cost becomes high. Conversely, signature bonuses are high where there is sufficient geological data and thus, have a higher chance that exploration will be successful.

Signature and production bonuses are common features in the Egyptian PSAs and most of the resource-rich developing countries like Angola, Gabon, and Nigeria.

Signature bonus does not depend on whether the IOC makes commercial discoveries or not and hence, it has a negative impact on the economics of the field which is particularly discouraging to smaller companies. Companies prefer to spend their limited exploration funds on data acquisition, and this is also consistent with most government objective. However, signature bonus is prefered because it involves no risk and ensures early revenue for the government.

Production bonuses are more acceptable to IOCs than signature bonus as they also provide the government with a fixed amount of revenue at a certain point in time. Many

investors believe that, like a signature bonus, production bonuses also have regressive impact on the project as they are not focused on profitability.

In an attempt by the Egyptian Ministry of Petroleum and Mineral Resources to attract investments and cope with the developments in the field of petroleum contracts, the new model of the PSA was issued without the signature bonus conditions. This new amendment was applied in the last bid round in the Red Sea frontier blocks.

Such modifications will in turn attract more investors in these promising areas, which require huge investments and therefore more E&P operations, which will have an economic return to the country.

HANY SHAKER
General Manager for feasibility studies and project evaluation, Egyptian General Petroleum Corporation (EGPC)

HSE CULTURE IN THE EGYPTIAN PETROLEUM SECTOR

Health, Safety, and Environment (HSE) are separate issues, each with its own technology, but they are often combined in the same functional groups within oil companies.

The aim of HSE is to evaluate and manage safety culture among the employees of the oil and gas sector. In order to improve safety, not only psychological and personal factors, but also organizational and environmental factors should be carefully investigated, the actual problem identified, and appropriate solving methodologies implemented. Ultimately, incidents' rates should be reduced.

Individual unsafe behaviors and pervasive organization defects lie behind the majority of hazards. Although many DO and DO NOTS have been anticipated in HSE policies, people still have a negative perception. This determines the system of multiple defenses that an organization makes and maintains to guard its employees against injuries .

The HSE culture consists of common knowledge, values, norms, ideas, and attitudes related to HSE that characterize a group of colleagues and their behavior. It is the end result of these combined efforts that determine an organization's health and safety program.

HSE culture is the number one priority in the oil and gas sector as a way to formulate, address, and contribute to the reasonable applicable reduction of related accidents, fatalities, losses (of both time and property), and occupational health.

After the accident that took place in the oil production site, south of Matrouh in the Western Desert, which led to the death of four employees, building a safety culture in the Egyptian petroleum sector has become an imperative and no longer a luxury.

The best approach to HSE in the oil and gas industry is prevention. Advanced maps and spatial analysis reveal vulnerabilities that can be addressed before an alarm rings. Knowing where people and assets are located and their real-time status help minimize risks. Mapping a path to preparedness with plans for evacuations, containment, and mitigation can save lives and property should an emergency arise.

Creating an effective safety culture is an ongoing process and is a large commitment on behalf of the entire company. However, any efforts result in a positive attitude toward safety and a reduction in accidents and incidents.

One important characteristic of all culture, HSE culture included, is that it is a result of the interaction between people and environment, between people and machine, and more importantly, between people and people. Culture is not something you think about every day or the whole time. Culture is supposed to be something almost physical – it is in your hands and your heart; almost like an instinct. That is when culture works best; when you just do the right things without thinking about it.

Finally, we can say that changing the HSE culture at an organization is a challenging task that must begin by identifying a group's existing culture through its employees' behavior and beliefs. It is also fundamental to implement an HSEMS (Health, Safety and Environmental Management System) which defines the principles by which operations are conducted and risks are controlled in the whole industry

MOHAMED EL HAYTHEM, M.PHIL., DBA, MBA
General Manager, Foreign Companies' Control, Egyptian General Petroleum Corporation (EGPC)

THE ROAD TO SUSTAINABILITY IS BEST TRAVELED TOGETHER

Sustainability at Shell means providing cleaner energy solutions in a responsible manner – in a way that balances short- and long-term interests, and that integrates economic, environmental, and social considerations into decision-making. Shell aims to be a good neighbor wherever the company works by contributing to the Shell-being of communities. Shell works closely to manage the social impacts of their business activities, address any concerns about their operations, and enhance the benefits that Shell is able to bring.

Shell is committed to support the communities where the company operates through constructive initiatives that promote the socio-economic development of these communities in an innovative, productive, and sustainable manner. A large part of Shell's commitment to support local communities is investing in community projects so that local people may benefit from social and economic development. Local community needs and priorities determine the company's social investment program focus areas. To ensure that Shell has a clear focus, Shell has three global social investment themes: access to energy; science, technology, engineering and mathematics (STEM) education; and community skills and enterprise development.

Shell strives to assist the government in its Egypt Vision 2030 program, which includes providing skills development. Over the years, the company's joint ventures have created thousands of jobs and continue to provide development opportunities. Shell is very proud of their partnerships during its 100-year history in Egypt. A great demonstration of what Shell has achieved working with partners is through Shell Egypt and the UN World Food Programme (WFP) partnership. Through this partnership, Shell supports marginalized communities in Egypt's Matrouh governorate through a full portfolio of initiatives that enhance education. Such initiatives include upgrading schools' infrastructure, introducing technology in education, providing teacher training and measuring drop-out rates. These steps enhance the quality of life for vulnerable communities in the governorate through enhancing access to education, providing livelihood support to women, and physically improving the educational environment.

According to Joanne Cochrane, VP Social Performance Manager for Shell International, "Being a good neighbor is good for business. Social performance is how Shell manages the impact of our business on the local community. Shell does this by working to deliver benefits such as jobs and business opportunities, and most importantly, communicating and listening to what local people have to say."

She further explained that the partnership with WFP for delivering the Community Schools project in Matrouh is expected to result in an increase in school attendance, hence, combat drop-out rates, child labor, and early marriage in Negeila communities, impacting 500 girls and boys in community schools and 2,500 family members. In addition to enhanced education through technology in 17 community schools, women empowering in income-generating activities are encouraged along with other benefits.

As part of social responsibility, Shell Egypt has developed a number of social investment and development programs focusing mainly on human capital development of the Egyptian youth, especially enterprise development, which is delivered through Shell's Intilaaqah Egypt program, as well as other capacity building programs, including Shell's Nxplorers program, which is a global education program that encourages young people to explore real-world issues, equipping them with tools and methodologies needed to create innovative solutions.

Shell Intilaaqah Egypt has helped train thousands of young entrepreneurs across Egypt to either start their own businesses or expand and grow existing businesses. To date, the Intilaaqah program has provided training to over 9,000 young Egyptians and supported the creation of around 850 start-up companies. Shell is pleased that one of these supported entrepreneurs by Shell Egypt, Baramoda, was this year's top prize winner in the Food and Agriculture category of the of the global Shell competition for innovation in entrepreneurship - the Top Ten Innovators.

As for the capacity building programs, they entail workshop-based sessions aimed at delivering today's practical business skills to students through lectures and trainings conducted by Shell's staff and other training moderators.

Skills such as problem-solving and critical thinking are increasingly important to enable people to adapt to a rapidly changing world. This drives a need for more development of these skills, known as the "STEM habits of mind", in universities in many countries, including Egypt. In 2017, Shell launched its NXplorers program in Egypt to address this. A wide range of challenges emerged with participants exploring issues such as how energy access can be improved in rural parts of Egypt, in addition to how the quality of data reporting can be improved in our organization.

"BEING A GOOD NEIGHBOR IS GOOD FOR BUSINESS. SOCIAL PERFORMANCE IS HOW SHELL MANAGES THE IMPACT OF OUR BUSINESS ON THE LOCAL COMMUNITY. SHELL DOES THIS BY WORKING TO DELIVER BENEFITS SUCH AS JOBS AND BUSINESS OPPORTUNITIES, AND MOST IMPORTANTLY, COMMUNICATING AND LISTENING TO WHAT LOCAL PEOPLE HAVE TO SAY."

JOANNE COCHRANE,
VP SOCIAL PERFORMANCE MANAGER FOR SHELL INTERNATIONAL

The Egyptian team representing Zewail University won the first place in the global shell competition Imagine the Future

Over the course of the NXplorers workshop, teams were taught how to further define and explore certain issues. The teams were shown how to use scenario planning to consider different possible futures in relation to their problem. They were encouraged to evaluate and rationalize the feasibility of various solutions, including examining the intended and unintended consequences.

Shell is also proud to have launched Shell Imagine the Future scenario-planning competition in Egypt. The student competition's objective is to train students on how to build scenarios for the future; ones that can help them explore what the future might look like (year 2050) and the likely changes of living in it, tackling various aspects of life. Students are equipped with scenario planning, critical and systems thinking tools that enhance their vision to transfer their views over the energy future, by presenting scenarios and alternative views to face the current challenges of providing more efficient and cleaner energy in Egyptian cities by 2050.

During its second edition this year, 57 teams from 15 Egyptian universities participated in the local competition. Shell proudly announced that the Egyptian team representing Zewail University won the first place in the global competition that took place in Singapore in July 2019.

Cochrane is also excited about the potential of this program, saying "Shell are training employees in Shell to deliver the NXplorers program." Shell's vision is for Egypt to be the hub for delivering this program for the whole Middle East region.

Another example where Shell supports education in Egypt is the sponsorship of the Al Amal Programme since its foundation in 2007. The Al Amal Program for geo-science graduates was initiated by the Egyptian Geophysical Society and later sponsored by Shell and other International Oil Companies (IOCs). In 2018, 426 students graduated from the program.

Shell is hugely proud of the successful partnerships in Egypt. With all their partners, Shell continues to work hard to help the government reach its targets and ambitions for the Egyptian energy industry. Together Shell shares the same ambitions, performance, progress and people. Together – in partnership – Shell continues to be successful in this changing world.

FUNDAMENTALS OF SLICKLINE OPERATIONS

From December 22nd to December 26th 2019

The course consists of theoretical & practical sessions with state of the art teaching techniques including presentation, real tools and operations.
Participants will have access to real Slickline unit and will run real Slickline operation through our training well.
The course will be 60% in classroom and 40% practical including access to training well.

WHO SHOULD ATTEND

Technicians, supervisors or engineers with little or no prior knowledge of Slickline.

DURATION:

5 DAYS ,FROM DECEMBER 22ND TO DECEMBER 26TH 2019.

STI - SAHARA Technical Institute - Zahraa El-Maadi, Industrial Area, Cairo, 11742, Egypt
Tel.: +202 2519 4800 Fax.: +202 2519 4900 **www.sahara-sti.com**

EGYPT OIL&GAS RESEARCH & ANALYSIS

Annual Inflation Headline CPI

SEPT 2019	OCT 2019
4.80%	**3.20%**

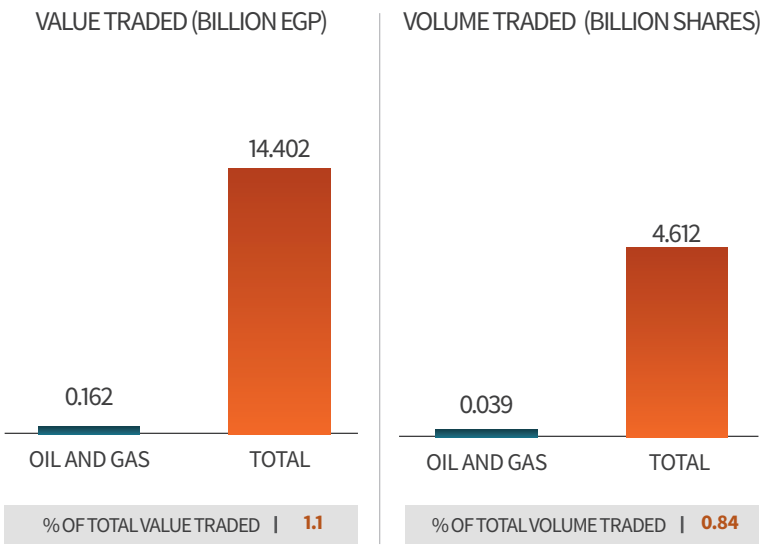
Net International Reserves ($ billion)

SEPT 2019	OCT 2019
45.12	**45.25**

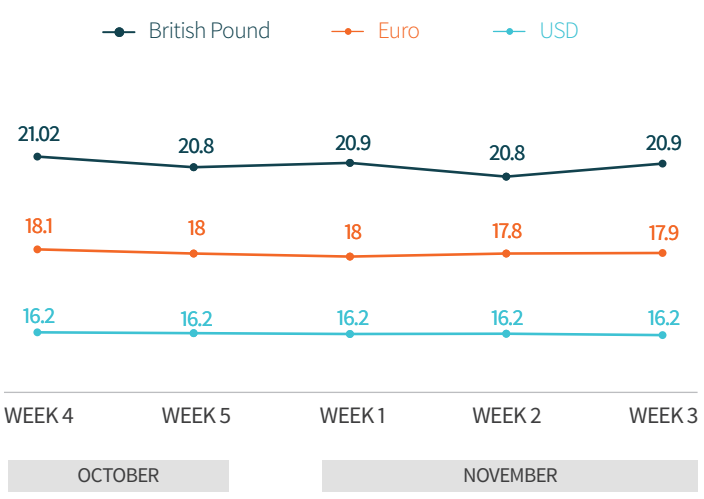
Non-Oil Private Sector PMI (Points)

SEPT 2019	OCT 2019
49.5	**49.2**

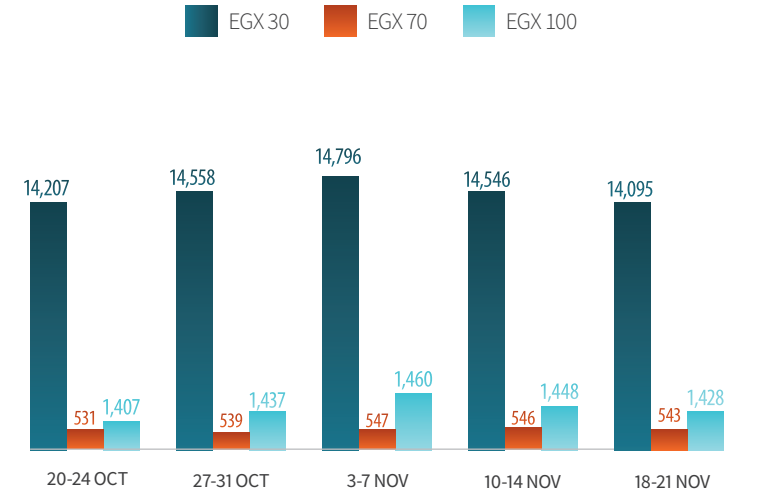
Value and Volume of Shares Traded for Petroleum Sector in October 2019



Exchange Rates



Capital Market Indicators



Performance of Petroleum Companies in the Egyptian Exchange in October 2019

National Drilling

CURRENCY	CLOSE PRICE
USD	**4.96**

YTD PRICE CHANGE (%) ▲ **9.01**

Alexandria Mineral Oils Co.

CURRENCY	CLOSE PRICE
EGP	**4.48**

YTD PRICE CHANGE (%) ▼ **28.21**

Egypt Gas

CURRENCY	CLOSE PRICE
EGP	**56.94**

YTD PRICE CHANGE (%) ▼ **22.19**

Sidi Kerir Petrochemicals

CURRENCY	CLOSE PRICE
EGP	**11.56**

YTD PRICE CHANGE (%) ▼ **32.48**

Source of Raw Data: CBE, CAPMAS, Egyptian Exchange, Emirates NDB

Natural Gas Delivery in Q1 2019/20

4,613 Cars converted to natural gas in **September 2019**.

Natural gas delivered to

- **21** Areas
- **306,000** Households
- Implementation Rate of **102%**

"Fit for the Future" program reduced Shell's costs by **20%**, and increased production by **20%**, since **2015**.

GPC ANNOUNCED CRUDE OIL DISCOVERY IN NOVEMBER

- Well: NES-16
- Initial Production: 2,000 bbl/d
- Location: Abu Sennan Fields (Western Desert)

NATURAL GAS EXPORTS IN FY 2018/19

Exported Cargos	45
Total Exports	172.8 bcf
Exporting Plant	Idku Liquefaction Plant

SHELL TO START WORK ON 3 CONCESSIONS IN H2 2020

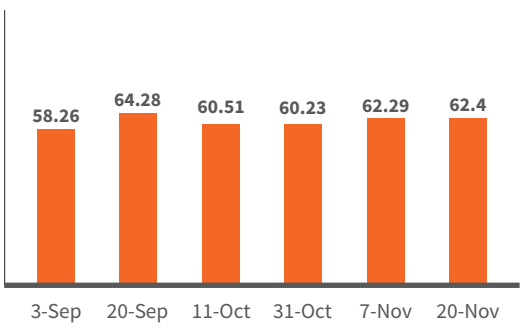
- West Fayoum — Number of wells 6
- South East Horus — Number of wells 5
- South Abu Sennan — Number of wells 3

TOWN GAS PERFORMANCE IN CAIRO IN 2019

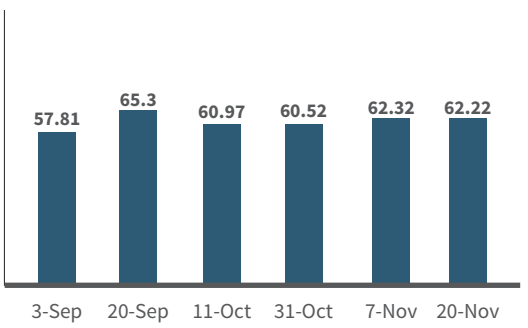
Converted **66,000 units** to run by natural gas

Accomplishment rate of **111%**

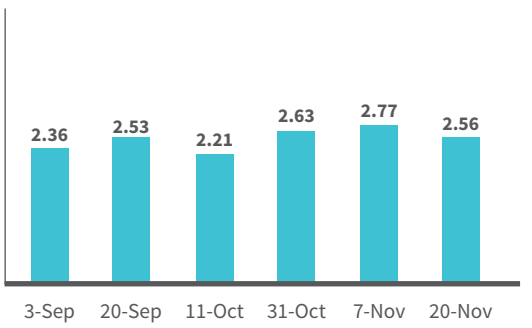
BRENT PRICES



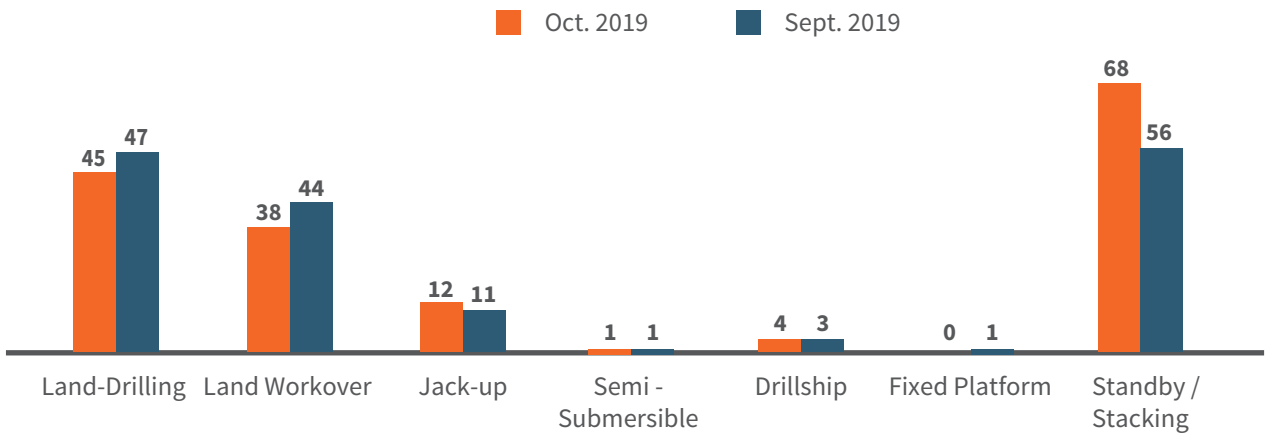
OPEC BASKET PRICES



NATURAL GAS PRICES



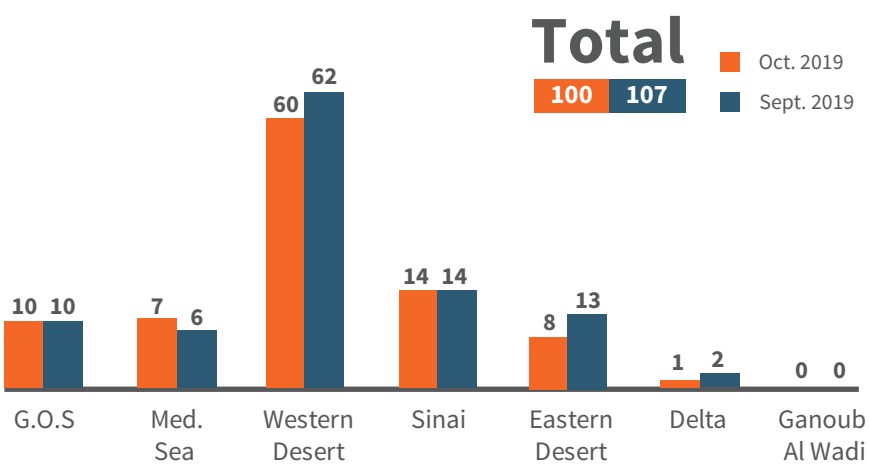
EGYPT RIG COUNT PER TYPE Oct. 2019



Total

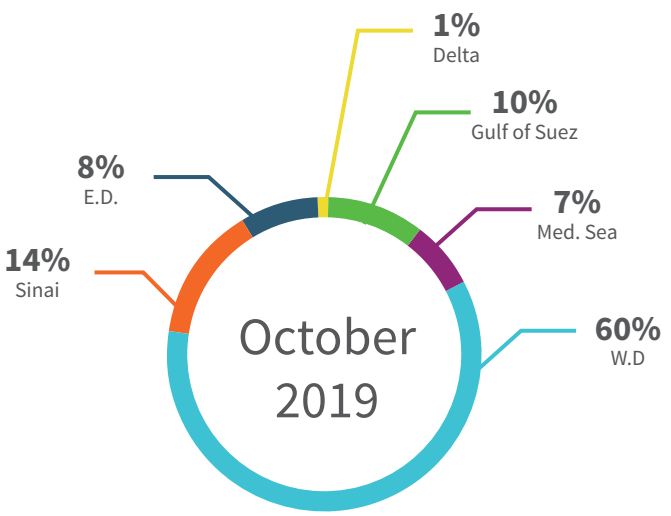
168	163

EGYPT RIG COUNT PER AREA Oct. 2019



The difference between the total of rigs per area and per type is due to the Stand By / Stacking number.

Distribution of Rigs



Egypt Production Oct. 2019

Total

531,516	B/D
6.445	BCF/D
6288	MCF/D
83,541	B/D

Numbers are calculated per day on average.

	CRUDE OIL	GAS	SOLD GAS	CONDENSATES
MEDITERRANEAN SEA	419	4.070	3971	33,365
EASTERN DESERT	66,387	0.010	10	61
WESTERN DESERT	291,323	1.177	1149	36,579
GULF OF SUEZ	124,097	0.086	84	2,059
DELTA	161	1.101	1074	10,976
SINAI	48,935	0	0	502
UPPER EGYPT	194	0	0	0

Drilling Update Oct. 2019

REGION	COMPANY	WELL	WELL TYPE	RIG	DEPTH	WELL INVESTMENTS
EASTERN DESERT	GPC	HNW-6	Development	ST-9	5,414	1.127 M$
		HH 83/2C	Development	ADMARINE-3	9,394	5.534 M$
DELTA	SUCO	DSQ 1-6	Development	EDC-1	7,841	2.100 M$
MEDITERRANEAN	PETROBEL	ZOHR 5 BIS HOR	Development	SAIPEM 10K	53,775	24.79 M$
WESTERN DESERT	PETROSILAH	SILAH 2-1 ST-2	Development	ECDC-1	7,350	1.010 M$
	BAPETCO	BED3 C9-11	Development	EDC-72	11,680	2.300 M$
	AGIBA	SWM-A-2-2	Development	EDC-41	16,500	6.010 M$
	GPC	NES-T-1X	EXP	EDC-16	8,809	2.886 M$
	KHALDA	MENES- 11	EXP	EDC-61	2,865	1.100 M$
		PTAH- 19	EXP	EDC-11	12,615	1.850 M$

SHAPING THE ENERGY FUTURE THROUGH **INNOVATION**

www.shell.com/innovation