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EGYPT PETROLEUM SHOW
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EXCLUSIVE INTERVIEW

MINISTER OF PETROLEUM AND MINERAL RESOURCES,
HIS EXCELLENCY ENG. **TAREK EL MOLLA**

EGYPT'S OIL AND GAS SECTOR IS ON **THE RIGHT TRACK**

FULL COVERAGE

EXPERTS DISCUSS HOW TO IMPROVE BROWNFIELD PERFORMANCE AT
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EDITOR'S LETTER

Our January 2020 issue is an extraordinary one. Egypt Oil & Gas newspaper successfully interviewed the Minister of Petroleum and Mineral Resources H.E Eng. Tarek El Molla, where he shared with us the sector's achievements of 2019, in addition to 2020's plan. El Molla also talked to us about the important role of the young professionals under the umbrella of the sector's Modernization Project and the ministry's efforts to empower youth.

The issue includes full coverages of many important events that took place during December 2019. Egypt Oil & Gas Technical Committee successfully hosted a new edition of its Upstream Technical Convention. The event mainly discussed new ways of improving brownfield performance in Egypt. The issue also includes the coverage of the Ministry of Petroleum's Annual Safety Day.

In the research and analysis section, we provide our readers with an analytical report that tracks the Mediterranean Sea, as Egypt's natural gas trove.



Last but definitely not least, Egypt Oil & Gas interviewed DNV GL's Vice President and Area Manager North Africa, Hesham El-Grawany, and SAPESCO's CEO, Said Riad.

Egypt Oil & Gas team wishes you a happy new year!

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EXPLORATION



EL MOLLA ANNOUNCES BID ROUND RESULTS

Tarek El Molla, the Minister of Petroleum and Mineral Resources, announced in December 2019 the results of the bid round launched in March 2019 by Ganoub El Wadi Petroleum Holding Company (Ganope).

Chevron won a concession in Block 1, while Shell won two concessions; the first is located in Block 3 and the other, which Shell won in collaboration with Mubadala Investment Company,

is located in Block 4. This rounds up the total area covered in the exploration phase to 10,000 square kilometers and minimum investments of \$326 million, which will increase to billions in case of commercial discoveries.

The minister indicated that the results are already positive at its current stage and will witness more demand from international oil companies (IOCs) in the future.

NEW PETROLEUM DISCOVERY ACHIEVED IN THE WESTERN DESERT

Borg El Arab Petroleum Company has made a new petroleum discovery in the ASH-2 area of Abu Senan concession in the Western Desert, with a production rate of 7,000 barrel of crude oil per day (bbl/d) and 10 million cubic feet per day (mmcf/d) of natural gas.

The announcement was made in a report which the Minister of Petroleum and Mineral Resources, Tarek El

Molla, received from Borg El Arab Petroleum Company, which explores the areas under the administration of the Egyptian General Petroleum Corporation (EGPC) and Kuwait Energy Egypt.

This comes in light of the Ministry of Petroleum and Mineral Resources' strategy to increase petroleum and natural gas reserves.

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 Q1 2019/20.

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.

According to the report, three new agreements were signed, two of which are 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.

Furthermore, six development agreements were signed in South Disouq, East Bahariya, Khaldia, West Kanayess, and North Salhia, with signature bonus of around \$2 million.

EGYPT IS BIDDING FOR NATURAL GAS EXPLORATION IN MEDITERRANEAN IN H1 2020

The Egyptian Natural Gas Holding Company (EGAS) intends to launch an international bid round for natural gas exploration in the Western Mediterranean region in H1 2020.

Additionally, EGAS is currently working on specifying the areas that will be included in the bid round, in addition to obtaining the needed approvals for that process.

It is worth mentioning that Eni's discovery of Zohr field is the main reason for the government's continuing efforts for launching new bid rounds. Moreover, Egypt has demarcated the borders with the neighboring countries for oil and natural gas exploration without any disputes.

AL SISI DISCUSSES CONTINUED EXPANSION OF E&P PLANS

President Abdel Fattah El Sisi directed the Minister of the Petroleum and Mineral Resources, Tarek El Molla, toward the continuous expansion of research, exploration and production (E&P) plans during his meeting with the Cabinet. He reviewed the ministry's strategy to meet the domestic market needs for petroleum products and reduce the gap between production and consumption, by setting a plan that includes current and long-term measures aimed at developing the system of trading petroleum products, as well as

expanding essential infrastructure projects to keep up with the growth of demand for petroleum products in the local market.

The president also confirmed the importance of focusing on oil and gas infrastructure projects to achieve the optimal economic benefit from natural resources, including in the endeavors to transform Egypt into a regional hub for oil and gas trading.

PRODUCTION



EL MOLLA: ZOHR'S PRODUCTION CAPACITY RECORDS 3 BCF/D

Zohr field's natural gas production capacity reached to 3 billion cubic feet per day (bcf/d), the Minister of Petroleum and Mineral Resources, Tarek El Molla, announced.

During an inspection tour in Zohr offshore field, the minister clarified that the economic and strategic success of the project contributed to the country's natural gas self-sufficiency, reducing the burden of its imports and resuming exports.

El Molla discussed the petroleum sector's strategy, which succeeded

in achieving these progresses pointing to the execution of the Modernization Project.

He added that the application of the country's economic reform program and the pricing indexation mechanism led to the decline of the local consumption rate of petroleum products from 39 million ton in 2015/2016 to 31 million ton in 2018/2019, in addition imports dropped from 16 million ton to 12 million ton.

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 million cubic feet per day (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 barrels per day (bbl/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, making the total production of natural gas reach 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 bbl/d of condensates.



EL MOLLA: EGYPT SEEKS TO INCREASE CRUDE OIL PRODUCTION

The Minister of the Petroleum and Mineral Resources, Tarek El Molla, said in the Upstream Technical Convention Conference, that Egypt aims to boost crude oil production.

He explained that this increase is to fill the gap of the local consumption through updating the systems and procedures, in addition to bidding and signing petroleum agreements to explore petroleum reservoirs.

The minister confirmed the importance of increasing brownfields' production, adding that Egypt has several distinguished sites in the Western

Desert and Suez Gulf which are rich with conventional and non-conventional hydrocarbons.

El Molla declared that there is an agreement upon establishing a technical committee from the petroleum sector with some of the international companies' heads and some of the experts in the industry to study how to improve the brownfields performance, provided that the committee is to present its recommendations by the end of Q1 2020.

EGYPT PARTICIPATES IN FIFTH SUMMIT OF GECF

The Minister of Petroleum and Mineral Resources, Tarek El Molla, stressed the cruciality of supporting cooperation endeavors among the African countries, which comes in line with the African Union vision 2063, in a speech on behalf of President Abdel Fattah El Sisi. This came during the Fifth Summit of Heads of State and Government of the Gas Exporting Countries Forum (GECF) on November 29, 2019. During the speech, he pointed out

that Egypt's economic and political stability played a major role in achieving unprecedented improvements in the oil and gas sector. During the last five years, 27 projects were implemented to develop natural gas fields, with investments of around \$21 billion. This led to increasing natural gas production to 7.2 billion cubic feet per day (bcf/d), especially after the discovery of Zohr field.

EGYPT GAS, GEORG FISHER, CORYS TO PRODUCE PE PIPES

Egypt Gas's Board of Directors accepted an agreement with the Swiss Georg Fisher Ltd and the UAE's Corys Building Materials to establish a joint venture (JV) specialized in producing polyethylene (PE) pipes.

The new JV will have a capital of around EGP 340 million, divided into

340,000 shares, with a nominal share value of EGP 1,000.

It is worth mentioning that Jordan's National Electric Power Company (NEPCO) and the Jordanian-Egyptian FAJR for Natural Gas Transmission and Supply Company have signed two gas supply deals. Under the first agreement, 4 million standard cubic feet per day

(mmscf/d) of natural gas will be provided to the Jordan Phosphate Mines Company

(JPMC). The second agreement was signed with Nuqul Group.

TOWN GAS TO DELIVER NATURAL GAS TO 300,000 HOUSING UNITS

Town Gas plans to deliver natural gas to around 300,000 new housing units by the end of next December.

The company managed to increase the number of housing units running on natural gas in 2019 by around 20,000 units after delivering it to around 280,000-285,000 housing units that fall under the company's scope of work.

Alexandria has the largest quota of natural gas delivery to housing units, with around 100,000 units. Meanwhile, Cairo and Giza acquire around 90,000 units in 2019.

It is worth mentioning that 2018 witnessed the highest rates of natural gas delivery to housing units compared to the previous year, reaching more than 1.3 million units.

BUTANE PRODUCTION INCREASES TO 140,000 TONS

The CEO of the Egyptian General Petroleum Corporation (EGPC), Abed Ezz El Regal, said that the rate of butane production has increased by 27,000 ton, reaching a total production of 140,000 tons per month.

He added that the rate of the country's butane consumption decreased by about 12,000 ton, recording 280,000

tons per month, down from 292,000 tons per month in 2018.

Ezz El Regal also said that the rate of butane imports declined to 140,000 tons per month in 2019, in comparison to 148,000 tons per month in 2018.

The petroleum sector produces crude oil, condensates, and butane of about 2.6 million ton per month, which fulfills the country's needs.

DIESEL CONSUMPTION INCREASES TO 1.1 MM TONS

Egypt's diesel consumption has increased to 1.1 million tons per month, a 0.1 million tons year-on-year increase, Abed Ezz El Regal, CEO of the Egyptian General Petroleum Corporation (EGPC), announced.

He added that diesel production increased by about approximately 580,000 tons per month compared to 2018's 550,000 tons per month.

Ezz El Regal pointed out that diesel covers approximately 50% of different sectors' consumption, whereas the Ministry of Petroleum and Mineral Resources covers the rest of the market's needs through foreign contracts. In addition, there has been an increase in production in the past four years, which lead to more production units in refineries, so as to double the annual produce of needed fuel for consumption.

INVESTMENTS



REFINING INVESTMENTS IN EGYPT RECORD \$4.7 B

Through the execution of five refining projects that are under implementation, the total value of refining investments in Egypt would reach \$4.7 billion.

These five projects are expected to be done in fiscal year (FY) 2022/23.

One of these projects is the expansion of Midor refinery to increase its production capacity from 4.6 million tons to reach 7.6 million tons yearly. Another project is the Hydrogen Cracking of Mazut Complex at the Assiut National Oil Processing

Company (ANOPC) to produce light derivatives with a capacity of 2.5 million tons of mazut.

Additionally, a Vapor Recovery Unit (VRU) at Suez Oil Processing company is under construction with a capacity of around 200,000 tons of Naphtha per year, and an Assiut oil refining project is to produce high-octane gasoline with a capacity of 660,000 tons per year. The fifth project is an asphalt production unit with a capacity of over 720,000 tons of mazut per year.

PETROJET SIGNS CONTRACT WORTH EGP 445 MM

Petrojet signed a contract for developing El-Nasr Petroleum Refinery in Suez with investments of EGP 455 million.

This will be done through developing three salt separators for the first time with an integrated work system aiming at refining 816 tons of the crude oil per day with an integrated plan to develop the petroleum sector's refinery.

The project comes in parallel with the ministry's approach to boost the

refineries' efficiency and increase the number and production of stations.

The upcoming period will witness similar development for other refineries through establishing new six salt separators for Assiut National Oil Processing Company (ANOPC), Suez Oil Processing Company (SOPC), Alexandria Petroleum company (APC), and Amreya Petroleum Refining Company (APRC).

EL MOLLA HIGHLIGHTS DIGITAL TRANSFORMATION AT CAIRO ICT

The Minister of Petroleum and Mineral Resources, Tarek El Molla, stressed during the Cairo International Communication and Technology Conference (Cairo ICT 2019), inaugurated by President Abdel Fattah El-Sisi under the slogan "Digitizing Egypt", that the ministry is interested in digital transformation.

El Molla added that digital transformation will attract international oil companies (IOCs), especially in the areas which face challenges and require large investments and advanced technologies.

El Molla also highlighted the importance of Egypt's E-Gate project to market the petroleum areas and exploration, which is in line with the global trend supporting digital transformation as well as introducing the investment opportunities to IOCs to search for oil and develop it.

The minister said that the sector's development and Modernization Project are based on a vision, which aims to improve operations and productivity through utilizing and analyzing data and modern technologies.

EGYPT INVESTS EGP 75 B IN ELECTRIC GRIDS

Mohamed Shaker, Minister of Electricity and Renewable Energy, announced that in 2020, Egypt will improve electric grids nationwide with over EGP 75 billion of investments.

Shaker noted that over 8,000 engineers have been trained at an annual program, which aims to train African engineers endorsed by the Electricity Ministry.

The minister affirmed that Egypt has electricity linkages with Jordan, Libya, and Sudan, adding that the country

probes exchanging electric power with Saudi Arabia at a capacity of around 3,000 megawatts (MW).

ERC RECEIVES \$76 MM BY THE END OF DECEMBER

The Deputy CFO of the Egyptian Refining Company (ERC), Aliaa Heikal, announced that her company targets to receive \$76 million from Japanese and Korean banks by the end of December 2019.

This is considered to be the last installment package of the loans that the company kept for establishing and developing Mostorod refinery with a cost of \$4.4 billion.

Heikal said that the financing packages implemented in this project are estimated with \$2.9 billion, which reached its highest range of implementation in September 2019.

She added that the expected annual production of high value-added petroleum products will reach 4.7 million tons, which will save more than 15 job opportunities.

The capital investments for this project will hit \$1.5 billion, contributing in the decline of diesel's imports by 40% a year.

COOPERATION AND AGREEMENTS



EGYPT SIGNS FOUR E&P AGREEMENTS WITH \$155 MM

The Ministry of Petroleum and Mineral Resources signed four agreements for oil and natural gas exploration and production (E&P) operations in the Western Desert, Gulf of Suez, and Nile Valley with minimum investment costs of \$155 million, in addition to a signature bonus for drilling 30 wells estimated with \$10.5 million.

The first agreement is with the EGPC and Eni's IEOC for E&P in the Southeast of Siwa in the Western Desert with investments that cost \$17 million and a signature bonus of \$1.2 million.

Another agreement was also signed EGPC and IEOC for E&P developments

in the West Razak concession in the Western Desert estimated by \$34 million and a signature bonus of \$5 million.

The third agreement is worth \$36 million which signed with EGPC and Merlon Elfayum for E&P in North Beni Suef concession, in addition to a signature bonus of \$2.3 million.

The fourth one was inked by EGPC for E&P operations in East Ras El Ush concession in the Gulf of Suez with investments worth \$68 million and a signature bonus of \$2 million.

EGYPT APPROVES NEW E&P PROJECTS IN THE MEDITERRANEAN

The Cabinet approved two new petroleum agreements that would allow the Egyptian Natural Gas Holding Company (EGAS), along with several numbers of national oil companies (NOCs) and international oil companies (IOCs) to explore and produce oil and natural gas in the Star onshore concession in the Mediterranean and the West Sherbeen offshore concession.

The Cabinet also agreed upon several decisions, including the approval of the

ministerial committee decision about settling investment disputes, which was held on December 9.

The Cabinet also approved the president's draft decision on allocating an area of approximately 58.11 acres of state-owned land in the area of the village of Ho - Nag Hammadi Center - in Qena Governorate, on behalf of the Ministry of Electricity and Renewable Energy, to be used for the construction of an electrical transformer station.

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. Moreover, El Molla reviewed the Modernization Project and its efforts to train and develop the sector's calibers to be successful leaders in the future.

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).

Furthermore, Lind mentioned that the Norwegian companies, such as Equinor ASA, are keen to work in Egypt's promising areas using its advanced technologies and human expertise

EGYPT, MOZAMBIQUE TO COOPERATE FOR NATURAL GAS

The African Cooperation Committee of the Federation of Egyptian Industries (FEI) searched with the Deputy Minister of Industry and Trade of Mozambique, Julio Pio, for the available cooperation between Egypt and Mozambique.

Pio confirmed that Mozambique is interested in all the projects related to natural gas, fertilizers, and petrochemical industries, in addition to the solar energy projects and agriculture and food industries investments.

He expects his country to become one of the biggest natural gas producing countries within the upcoming three years.

El Gebali said that Egypt prepares a visit to Mozambique in 2020 which will include members of the African Cooperation Committee of the FEI and a group of Egyptian businessmen in all fields, aiming at stimulating bilateral cooperation and increasing trade and investment.



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EXXONMOBIL ACQUIRES OFFSHORE EXPLORATION BLOCKS IN EGYPT

ExxonMobil announced that it acquired more than 1.7 million acres for exploration offshore operations in Egypt and the operations are scheduled to begin in 2020.

The company added that this acquisition includes acreage in the 1.2 million North Marakia offshore block, located approximately five miles offshore Egypt's

Northern Coast in the Herodotus basin. The remaining 543,000 acres are in the North East El Amriya Offshore block in the Nile Delta.

Operations are scheduled to begin in 2020 and will include the acquisition of seismic data. ExxonMobil holds 100% interest for operations in both blocks.

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

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. In addition, he

expressed that the company is looking forward to expanding its investments in Egypt.

For his part, El Sisi 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.

ROCKHOPPER PRODUCES 340 BOE/D FROM ABU SENNAN

Rockhopper Exploration plc is currently producing 340 barrels of oil equivalent per day (boe/d) from its existing ASH-1ST2 well at Abu Sennan concession. The well was completed, perforated, and tested, while the rig was released on December 10 with encouraging results. The well will be tested at stabilised rates once the rig has moved off site.

Production from the AR-C in well AJSE-1X has increased from approximately 200 boe/d to approximately 450 boe/d.

Operations are ongoing to complete the well as an AR-C reservoir water injector. Current production from Abu Sennan is approximately 5,100 boe/d, excluding production from ASH-2 which is awaiting final commissioning.

ASH-2, was spudded on October 21, reaching a total depth of 4,030 meters in the Alam El Bueib Formation.

RUSSIA TO START DRILLING EGYPTIAN OFFSHORE CONCESSIONS

The state-owned Russian company Zarubezhneft announced that it has joined the drilling of two exploratory offshore blocks in Egypt under a production sharing agreement (PSA). The company said that one of these two blocks is in southeast Ras El Ush and the other is East of Gabal El Zeit. Their resources are estimated to be more than 200 million barrels.

Zarubezhneft said in the Russia-Africa summit held in October 2019, that it intends to sign two agreements with Pacific Oil and South Valley Egyptian Petroleum Holding Company (Ganope). One of them is for exploration and production (E&P) operations in Ras El Ush and the other for sharing production with Ganope.

EGYPT, CHINA ESTABLISH PHOSPHATE COMPLEX WITH \$1 B

Misr Phosphate Company, the Chinese State Construction Engineering Corporation (CSCEC), and Chinese Wengfu Group signed a deal to establish

a phosphate acid production complex in Abu Tartur area in El Wadi El Gedid governorate, with \$824 million.

The total investment cost of the project is worth \$1 billion, producing one million ton of phosphoric acid per year. It will be held in Abu Tartur Mining on 560,000 cube meters. El Molla said that this project aims at achieving the greatest benefits from the Phosphate in Abu Tartur, which comes in line with vision of the President Abdel-Fattah Al Sisi for attracting investments in the mining

sector and rise its contribution in the gross domestic product (GDP).

Additionally, Al Ghazaly indicated that all the project's studies have been completed. The project will involve several productive units. It includes sulfuric acid production unit, phosphoric acid production, and concentration unit and acid purification unit.

EL MOLLA CONFERS FUTURE COOPERATION WITH BP

The Minister of the Petroleum and Mineral Resources, Tarek el Molla, met BP's new CEO, Bernard Looney, who will assume his position in 2020 instead of Bob Dudley, to discuss BP's activities in Egypt, the development of new natural gas projects, and the company's future plans.

The minister also discussed the available investment opportunities in Egypt as there are different attractive fields which help in supporting the cooperation between the Egyptian petroleum sector and BP in the coming phase. He added that the talks

included how to exchange expertise for better efficiency performance as well as middle management training.

Looney confirmed that BP is committed to expanding its operations in Egypt and pumping more investments, adding that the success of North Alexandria and Atoll fields push for more developments. He praised Egypt's role in establishing the East Mediterranean Gas Forum (EMGF), which contributed to boost the cooperation between its countries.

EGYPT, MUBADALA PETROLEUM DISCUSS INVESTMENT OPPORTUNITIES

The Former Minister of Investment and International Cooperation, Sahar Nasr, met the delegation of the Emirati Mubadala Investment company in Egypt, headed by the Chief Growth Officer of Mubadala Petroleum, Mansoor Al Hamed.

The meeting was about how Mubadala can increase its investments in the different fields of Egypt, which have reached \$7.2 billion so far. The investments mainly focused on the cooperation with the Italian company Eni in its investments in the offshore Shorouk Concession, where Zohr gas field is located.

Nasr pointed that there are a lot of investment opportunities available now in Egypt in all its sectors and fields.

Mansoor praised Egypt's investment climate, in addition to the facilities presented to the investors. He pointed that there is a direct orientation from the Emirati leadership to invest in Egypt and to identify the possible investment opportunities in all fields, especially in the renewable energy and infrastructure.

TCI SANMAR TO INCREASE INVESTMENTS IN EGYPT IN 2020

The Indian TCI Sanmar Chemicals SAE plans to boost its investments in Egypt by more than \$200 million in 2020. The company's Chairman PS Jayaraman praised Egyptian President, Abdel Fattah El Sisi's direction to create a great future for Egypt. In addition, he pointed out the company's current \$1.5-billion investments in Egypt.

It is worth mentioning that TCI Sanmar Chemicals has established a world-class capacity for producing petrochemicals in Egypt, believing that Egypt has easy and cost-effective access to raw materials. Production from its PVC factory is considered the largest in North Africa and the Middle East (MENA) region.

EGYPT SIGNS A \$690,000 DEAL TO CONDUCT A FEASIBILITY STUDY

The Minister of the Petroleum and Mineral Resources, Tarek El Molla, witnessed the signature of a grant deal between the Acting Deputy Director of the United States Trade and Development Agency (USTDA), Todd Abrajano, and the Chairman of the Egyptian Petrochemicals Holding Company (ECHEM), Saad Helal, to fund the feasibility study of a Polyacetal production project with \$690,000.

The project is considered to be the first of its kind in Egypt and Africa. Polyacetal is used in the automotive and consumer electronics industry and its production capacity is estimated to be nearly 50,000 tons per year. Through the ceremony, El Molla discussed with USTDA how to contribute in infrastructure and value-added projects in the petroleum sector.

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

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SAUDI ARABIA

Saudi Arabia's crude oil exports significantly increased by around 388,000 barrels per day (bbl/d), reaching 7.057 million barrels per day (mmbbl/d) in October, up from 6.669 mmbbl/d in September.

The increase in Saudi Arabia's crude oil exports in October has been considered the kingdom's best and highest level of exports attained since April 2019. It is worth noting that this spike happened after a two-year decline of the kingdom's crude oil exports. However, total oil exports, including crude oil and petroleum products, dropped by 56,000 bbl/d in October to 8.015 mmbbl/d, down from 8.071 mmbbl/d in September.

The Saudi-Kuwaiti five-year dispute over the Neutral Zone has finally come to an end after signing an agreement in December 2019. Under this agreement, the two jointly-run fields, Khafji and Wafra, will resume production, and they are expected to pump up to 0.5% of the world's oil supply. The two fields combined production of crude oil is around 500,000 bbl/d. The US oil company Chevron, which jointly operates the Wafra field with the Kuwait Gulf Oil Company (KGOC) on behalf of Saudi Arabia, has expected that the field would return to its full production capacity within 12 months.

The Saudi Arabian General Investment Authority (SAGIA) announced a number of new petrochemical investments worth more than \$2 billion. A memorandum of understanding (MoU) was inked during the meeting between the Saudi government and German chemical company, BASF, aiming at bolstering investment opportunities in Saudi Arabia.

Furthermore, SAGIA and the global leader SNF signed another MoU to establish a polyacrylamide plant with a capacity of 50,000 tons per annum in the Eastern Province city of Jubail.

Additionally, one more MoU was inked between the Saudi government and the Japanese Mitsui & Co., for an ammonia commercial production project in Jubail with an estimated production capacity of 1 million tons per year.

The last MoU was signed between SAGIA and Shell to evaluate and upgrade the manufacturing facility in Jubail Industrial City.

Saudi Aramco and Abu Dhabi National Oil Company (ADNOC) are planning to build a giant oil and petrochemicals refinery project in India worth approximately \$70 billion. The refinery is estimated to produce 1.2 mmbbl/d, and is planned to be located on the coast of the western state of Maharashtra at Roha in the Raigad district, about 100 kilometers (60 miles) south of Mumbai. Saudi Arabia announced that its investments in downstream oil and gas projects in India is part of the strategic partnership between the two countries.

Saudi Aramco awarded Arabian Pipes Company a contract for its supplement of oil country tubular goods (OCTG) steel pipes. The contract's timeline is set for a year and a half. The contract's value exceeds \$46.39 million. It is worth mentioning that the financial results of this contract should become evident from Q4 2020 until Q3 2021.

U. A. E

The Abu Dhabi National Oil Company (ADNOC) has awarded Italy's Eni and Thailand's PTT Exploration and Production (PTTEP) two offshore exploration blocks in a commercial bid round. PTTEP and Eni will hold a 100% stake in the exploration phase with investments for oil and gas exploration exceeding \$230 million. In case of any commercial discoveries, ADNOC will hold a 60% stake in the production phase. The offshore exploration blocks, offshore 1 and offshore 2, cover an area of more than 8,000 square kilometers. The concession agreements were signed by ADNOC CEO Sultan Ahmed Al Jaber, Eni CEO Claudio Descalzi and PTTEP President and CEO Phongsthorn Thavisin.

ADNOC inked an agreement with India's Reliance Industries Limited (RIL) for the development of an ethylene dichloride (EDC) facility in Ruwais, Abu Dhabi. The agreement stipulated that ADNOC and RIL will evaluate the potential of developing a facility to manufacture EDC adjacent to ADNOC's integrated refining and petrochemical site in Ruwais. Under this agreement, ADNOC would provide an access to the infrastructure and ethylene to the potential joint venture (JV). Meanwhile, RIL will provide operational expertise and entry to the Indian vinyls market. EDC is an integral unit to develop PVC, a polymer product that has a global demand particularly in the Indian vinyls market and it is essential in housing and agriculture sectors. Signing this agreement

entails strengthening the companies' existing relationship for more future collaboration in petrochemicals.

ADNOC announced that its Ruwais facility in Abu Dhabi will undergo maintenance in 2020. Ruwais' Derivatives and Conversion Parks are expected to become a global destination of choice for investors and manufacturers who wishes to establish a strategic presence in the UAE. It is considered a unique feedstock engine which can produce a full range of essential building blocks along the petrochemical value chain.

The Emirates National Oil Company (ENOC) announced signing a new evergreen aviation fuel supply agreement with Indian Oil Corporation (IOC). Under the agreement, the IOC will provide aviation fuel to ENOC's customers flying to and from 34 Indian airports. It is worth noting that ENOC and IOC have been sharing a strong partnership over the past two years, and the evergreen contract would further foster this partnership. Furthermore, the ENOC-IOC partnership includes as well a collaboration in the global marine lubricant sector. The two companies lead joint research and development (R&D) efforts to develop cylinder oil that is compliant with the International Maritime Organization's regulation capping the global fuel sulphur limit at 0.5%, effective from January 1, 2020.

QATAR

Qatar's liquefied natural gas (LNG) output is estimated to reach 126 million tons per year by 2027, Qatar Petroleum CEO Saad al-Kaabi announced during November 2019. The country's current LNG production

is around 77 million tons. The potential increase in Qatar's LNG production capacity represents a direct result of the exploration activities in the country's North field mega project, which showed that the natural gas reserves of the field exceeded 1,760 trillion cubic feet.



KUWAIT

Advanced Energy System International (ADES) announced that it has secured its first onshore deep drilling contracts under a lump sum turnkey project in Kuwait. The two contracts were awarded by Baker

Hughes, and are for ADES 180 and ADES 878. Both contracts are expected to commence in Q2 2020, with a two-year timeline and an option of extension for additional six months. Moreover, the two contracts will be implemented with similar daily rates to the existing fleet in Kuwait.

LIBYA

Total and Libya's National Oil Corporation (NOC) inked a new agreement, allowing Total's presence in the Waha concessions, located in the Sirte Basin in Libya. The deal stipulated that Total would provide its technologies and expertise to Libya's NOC in order to fast-track the development of the Waha concessions. This is going to be done through developing the North Gialo and NC 98 fields, which are anticipated to increase production by around 180,000 barrels of oil equivalent per day (boe/d). It is worth noting that Total will contribute with \$70 million at the outset, then add \$30 million when North Gialo comes on stream, and another \$30 million when NC 98 follows along.

Libya's NOC stated that Wintershall Dea is going to invest in exploring Libya's Sirte basin at its oil concession in Libya. Wintershall Dea, through its affiliate Wintershall Aktiengesellschaft (WIAG), renegotiated with Libya's NOC about a signed Memorandum of Understanding (MoU) in August 2010. Consequently, the two parties concluded the renegotiations by signing two exploration and production sharing agreements (EPSAs); one for Area 91,

extended until 2036 and for Area 107 until 2037. Under the agreement, WIAG is set to pay \$150 million for corporate social responsibility (CSR) and will carry out the exploration activities at its own cost and bear half of the development cost. Furthermore, NOC and WIAG has agreed on establishing a joint operating company (JOC) named Sarir Oil Operations Company (SOO), in which WIAG will be responsible for operations in the areas included in the contracts for a transitional 6-month period, after that SOO will be responsible for operations in both areas.

The Libyan National Army (LNA) announced that it had restored Libya's El Feel oil field from the armed groups of the Government of National Accord (GNA). Commander Khalifa Haftar of the LNA said that previous attacks on El Feel had halted the field's production, by around 70,000 barrels per day (bbl/d), where the GNA in Tripoli took over the field. It is worth noting that Libya's oil production has been repeatedly disrupted. However, its current production fluctuates around 1.25 million barrels per day (mmbbl/d). El Feel is operated by Mellitah Oil and Gas, a joint venture (JV) between the NOC and Italy's Eni.

IRAN

Iran targets to produce 680 million cubic meters per day of natural gas (mmcm/d) from its supergiant South Pars gas field. According to the Managing Director of Pars Oil and Gas Company (POGC), Mohammad Meshkinfam, Iran is currently producing 630 mmcm/d of natural gas from the offshore field. Pars's development projects in its phases 13, 14, and 22-24 are ongoing by domestic companies, in addition, the natural gas production from phase 14 would be initiated soon. The field's platform 14B was ready for production and would become operational once it becomes linked to a pipeline to deliver its produced natural gas to onshore processing facilities. Three other platforms would be loaded to their offshore spots in South Pars by the end of the current Iranian calendar year in March 2020.

Bijan Zangeneh, Iran's Oil Minister, announced investing around \$1.5 billion on the completion of the national gas grid in remote regions bordering Pakistan. The Iranian government has expressed its interest in the development of Sistan and Baluchestan province over the past years. Accordingly, the National Iranian Gas Company (NIG) declared that it has been working in creating a linkage between the southeastern province of Sistan

and Baluchestan and the national gas network. Hassan Torbati, NIG Managing Director, remarked that over 76% of the gas network is completed in the provincial capital of Zahedan, where some 31,000 households had now an access to the utility services. Torbati added that expanding the gas pipeline network in the sprawling province has become the flagship project of Iran's natural gas sector, noting that a total of 310 factories and industrial units across the province are projected to be linked to the gas network.

The National Iranian Oil Company (NIOC) plans to offer its crude oil and condensates with a considerable discount. NIOC is expected to sell condensates at \$6 per barrel, and light crude oil for \$7 less than Brent, on free on board (FOB) basis, and heavy crude for \$8.50 below Brent. Iran has made significant compromises other than lowering the price of oil amid the US sanctions, as it also plans to remove some of the buyer's requirements, and to lower the down payments while extending the timeline, from 50 days to 60 days, to fully pay for oil cargoes. Under the new terms, NIOC hopes this will help sell off 6 million barrels on the Iran Energy Exchange (IRENEX) every month.

BAHRAIN

Bahrain is set to receive an initial \$2 million with the production commencement at a newly discovered oil and gas field off the northern coast. According to the agreement between Tatweer Petroleum and Italian Eni, it will be subject to a 30 consecutive-day oil flow. This comes after the

Members of the Parliament (MPs) approved a Royal decree, allowing Bahrain's National Oil and Gas Authority (NOGA) to sign an oil exploration and production (E&P) agreement. This agreement stipulated that NOGA should receive \$1.5 million for every 10,000 barrels per day (bbl/d), \$3 million for each 40,000 bbl/d and \$6 million for 70,000 bbl/d.



EGYPT'S OIL AND GAS SECTOR IS ON **THE RIGHT TRACK**

AN INTERVIEW WITH THE MINISTER OF PETROLEUM AND MINERAL RESOURCES, H.E. ENG. TAREK EL MOLLA

The Ministry of Petroleum and Mineral Resources has always spared no effort to develop the Egyptian oil and gas sector. Accordingly, many breakthroughs were witnessed throughout 2019, under the umbrella of the Modernization Project. Accomplishing such a success encouraged major international oil companies (IOCs) to continue their business in Egypt and pump new investments.

Egypt Oil & Gas was honored to conduct an interview with H.E. the Minister of Petroleum and Mineral Resources, Eng. Tarek El Molla, sharing with us the sector's major achievements in 2019 and giving us a glimpse of his vision for 2020.



Q: YOUR EXCELLENCY HAVE ALWAYS CONSIDERED OUR FOREIGN PARTNERS AN INTEGRAL PART OF THE SECTOR. BASED ON YOUR VISION, WHAT WAS THE MINISTRY'S MECHANISM TO ATTRACT MORE FOREIGN INVESTMENTS IN 2019?

We, in the Ministry of Petroleum and Mineral Resources, have always considered retaining and attracting foreign investments as a main cornerstone in our strategy. Thus, our first priority was reducing their arrears. Accordingly, we managed to drop these arrears to around \$900 million by the end of June 2019. This is seen as an unprecedented level when we compare it to the \$1.2 billion achieved by the end of June 2018 and the \$6.3 billion in fiscal year (FY) 2011/12.

Hence, reaching such a significant level proves our commitment to our foreign partners, especially when we look at the lowest level previously reached in cutting down those arrears was around \$1.35 billion in June 2010.

Q: TO WHAT EXTENT IS LAUNCHING SEVERAL BID ROUNDS OVER 2019 HELPED THE MINISTRY ATTRACT MORE FOREIGN INVESTMENTS TO THE OIL AND GAS SECTOR?

Throughout 2019, we paid a great deal of attention to intensify the role of foreign investments in our sector. This was accomplished through launching several bid rounds which offered our foreign partners various investment opportunities.

February 2019 witnessed the results of the Egyptian General Petroleum Corporation (EGPC) and the Egyptian Natural Gas Holding Company (EGAS) bid rounds. These bid rounds covered 11 areas, with total signature bonuses of around \$104.5 million and total investments of \$744.5 million to drill 50 wells.

Also, Ganoub El Wadi Petroleum Company (Ganope) launched for the first time in March 2019 an international bid round for crude oil and natural gas exploration in the Red Sea, covering 10 blocks. Currently, this bid round is in the phase of reviewing submitted offers. We need to highlight that this bid round is one of the fruits of the demarcation agreement between Egypt and Saudi Arabia, as it enabled us to explore the area's untapped potential.

Furthermore, we launched the Egyptian Online Gateway bid round in November 2018, and the participating companies submitted their offers on February 10, 2019. We assigned this project to Schlumberger, and its contract is currently under preparation.

In recognition of our initiatives over 2019, we succeeded in making 55 new petroleum discoveries; with 40 crude oil and 15 natural gas discoveries in the Mediterranean, the Eastern Desert, the Western Desert, the Gulf of Suez, the Nile Delta, and Sinai.



“THE INCLUSION OF MAJOR COMPANIES IN THE RED SEA AND MEDITERRANEAN AREAS WILL MAKE A GREAT DIFFERENCE IN THE MARKET'S DYNAMICS IN 2020.”

Consequently, we managed to sign four new agreements with IOCs, with minimum investments of around \$24 million to drill four wells.

In addition to that, we issued the laws pertaining eight petroleum agreements, with total signature bonuses of around \$72.45 million and minimum investments of \$246.5 million to drill 47 wells, yet their signature procedures are still underway.

Also, we implemented all the necessary procedures related to 18 petroleum commitment agreements, with total signature bonuses of roughly \$209 million and minimum investments of \$2.18 billion to drill 103 wells. Besides, we inked 20 development leases in the Western Desert, with development bonuses of around \$10.3 million.

Q: LAST YEAR SAW A NOTICEABLE CHANGE IN EGYPT'S PRODUCTION MAP. CAN YOU GIVE US MORE DETAILS ABOUT THESE CHANGES? AND HOW DID THIS CHANGE HELP ACHIEVE CONSUMPTION RATIONALIZATION?

In 2019, the oil and gas sector achieved the highest production rate of crude oil, natural gas, and condensates by reaching around 1.9 million barrels per day (mmbbl/d). Natural gas production in particular boomed, touching an unparalleled level of around 7.2 billion cubic feet per day (bcf/d).

Moreover, we have to mention that our total production in 2019 increased by 7% compared to 2018, recording around 84.2 million tons. Crude oil and condensates production alone reached around 31.3 million tons, whereas natural gas production was approximately 51.9 million tons and around 1.2 million tons of butane were produced, other than the butane produced from refineries and investment companies.

Our local market was stable throughout 2019. This level of stability enabled us to cover all domestic needs for petroleum products and natural gas. Building on that, the total consumption reached approximately 30.2 million tons of petroleum products and 45.7 million tons of natural gas. We have to look as well at our petroleum imports, which reached around 11.7 million tons, with a cost of approximately \$6.8 billion.

Also, I would like to highlight that natural gas was used as a replacement for mazut in electricity stations. Thus, the country's total consumption of natural gas and petroleum products decreased by 3.1% compared to 2018's consumption level, which helped us achieve consumption rationalization.

Q: WHAT WAS THE MINISTRY'S STRATEGY TO ENSURE THAT PETROLEUM PRODUCTS AND NATURAL GAS ARE EASILY ACCESSED BY ALL CITIZENS?

Over the last year, the Ministry of Petroleum and Mineral Resources began implementing several projects to ensure that all citizens have access to natural gas and petroleum products. Therefore, the number of filling stations increased reaching 135, which raised the total number of stations over Egypt to 3,655. Moreover, the number of the newly-opened cylinders distribution centers reached 38, bringing the total number of centers to 3,060.

Regarding natural gas delivery, 2019 delivered it to over 1.2 million households, making the total number of natural gas-connected households across the country reach 10.7 million.

Additionally, around 2,013 commercial units and 56 factories were linked to the national grid. In this framework, we succeeded as well in converting around 42,813 cars to run on natural gas, boosting the total number of converted cars to 300,000.

Q: LAST YEAR SAW MANY PROJECTS TO INCREASE NATURAL GAS PRODUCTION, ESPECIALLY AFTER ACHIEVING SELF-SUFFICIENCY. CAN YOU PLEASE SHARE WITH US SOME OF THEM?

We succeeded in making 10 projects for the development of crude oil and natural gas fields. These projects resulted in adding 1.8 bcf/d of natural gas and 15,400 barrels per day (bbl/d) of crude oil and condensates.

There are significant projects implemented that we have to mention. We completed developing Zohr field, raising natural gas production from 2 bcf/d to 2.7 bcf/d. This was achieved by drilling 20 offshore wells and establishing onshore and offshore production facilities, in addition to an offshore platform. The 700 million cubic feet per day (mmcf/d) increase in natural gas production resulted from establishing and operating three onshore production and processing facilities, and putting three offshore wells and a third offshore production line on stream, with a cost of \$15.6 billion.

Moreover, we developed the second stage of the Giza-Fayoum fields in the North Alexandria and West Nile Delta fields to produce 700 mmcf/d of natural gas. To achieve this rate, eight new offshore wells were drilled, in addition to increasing the production capacity of Rashid plant to 500 mmcf/d instead of 440 mmcf/d with investments of about \$2.7 billion. The production of this project began in February 2019.

Another project was Southwest Baltim field, which was developed through the establishment of all needed facilities for an estimated amount of production of around 500 mmcf/d of natural gas. This required drilling five wells at Southwest Baltim, with investments of around \$363 million. The project commenced production in September 2019 by linking two wells to production, with initial natural gas rates of about 165 mmcf/d.

Adding to these projects, we completed the development of 9B Phase in the Western Delta fields to produce around 350 mmcf/d of natural gas and 3,000 bbl/d of condensates, with investments of \$775 million. This was planned to be implemented through drilling eight wells and linking them to the Burullus Company's offshore lines and processing facilities. In addition to that, the third and fourth wells were brought online in October and November, with a production of around 100 mmcf/d of natural gas, while the remaining wells are planned to be completed in March 2020.

Furthermore, we developed North Sinai field after completing its second phase, increasing natural gas production by 100 mmcf/d from four wells, with investments of around \$100 million. Three wells were linked to production during July–October with an initial production rate of about 60 mmcf/d of natural gas. The fourth one was put onstream in December, with a production rate of 25 mmcf/d of natural gas.

Moreover, we completed the development of South Disouq's Phase B, aiming at producing 100 mmcf/d of natural gas. This was planned to be achieved by completing 10 wells at Disouq and putting them on stream. In addition to that, six wells were linked to production, with initial rates of 50 mmcf/d of natural gas.

Moreover, we managed to develop South Disouq fields as well to produce 50 mmcf/d of natural gas by drilling and linking four wells to production at South Disouq and Ibn Yunis fields. For that purpose, an early production unit with a capacity of 60 mmcf/d was established, with a cost of \$49 million. We have to note that the field was put on stream on November 6, 2019, with initial production rates of around 45 mmcf/d of natural gas.

Another project implemented in 2019 was the Nidoco / El Gamil Pipeline. The pipeline targeted transporting about 700 mmcf/d of natural gas from Nidoco field to El Gamil treatment plant to increase the extraction rates of butane and condensates, as well as increasing the ability to process larger quantities of gas. The project's cost reached around \$300 million.

Q: LAST YEAR WAS A NOTICEABLE YEAR FOR CRUDE OIL PRODUCTION. WHAT WERE THE MAIN PROJECTS BEHIND THAT SUCCESS?

In 2019, we managed to establish a shipping carrier and a subsea pipeline at El Hamra-El Alamein Port. The project aimed at boosting the production capacity of maritime shipping to around a million bbl/d, with investments of \$90 million.

Additionally, we developed the Northwest October field in the Gulf of Suez. The project is supposed to absorb the anticipated increase in crude oil production, estimated at 3,200 bbl/d. This was planned to occur by establishing a marine platform, with investments reached about \$37 million. The project was planned to be operated by the end of December.

Q: THE MINISTRY OF PETROLEUM AND MINERAL RESOURCES PAYS GREAT ATTENTION TO PETROCHEMICAL PROJECTS. CAN YOU PLEASE ELABORATE ON THE REASONS BEHIND THAT?

The petrochemicals industry is an essential keystone for the success of our sector's strategy. Thus, we have created a well-organized agenda, comprising the implementation of several projects to develop this industry. The year 2019 was the year when the petrochemicals industry saw the construction of four projects begin. This included a project for the production of polypropylene at Sidi Kerir Petrochemicals Company (Sidpec), with a capacity of 450,000 tons per year to cover the domestic demand and export the surplus. The investment cost of the project was \$1.6 billion, and it is planned to be completed by the end of Q1 2022.

Another project is to produce 36,000 tons per year of rubber butadiene at the Egyptian Ethylene and Derivatives Company (Ethydco). This project depends on 20,000 tons per year of butadiene produced at Ethydco and Sidpec to maximize the value added, cover part of domestic demand, and export the surplus. The investment cost of the project was \$165 million, and it is planned to be completed in Q4 2021.

Additionally, a project to produce 205,000 cubic meters (m³) annually of Medium-Density Fiberboard (MDF) using agricultural waste commenced with an investment cost of EUR 210 million. The project's company was established in September 2019, under the name of "WOTECH Wood Technology Company" and it is planned to complete the project in Q2 2021.

Moreover, another project was included to produce 52,000 tons per year of urea formaldehyde and 26,000 tons per year of sulfonated naphthalene formaldehyde (SNF). The investment cost of the project was \$50 million and the production is planned to commence in Q2 2021.

I would like to mention another ongoing petrochemical project which is the construction of a refining and petrochemicals complex in El-Alamein. The complex will use 2.5 million tons per year of crude oil and condensates produced from the Western Desert. This complex's production will help meet the local market's needs and export the surplus. The estimated investment cost is about \$8.5 billion and it is planned to be done by the end of 2024.

Q: ACHIEVING A PROGRESS IN REFINING WAS A PRIORITY FOR THE MINISTRY IN 2019 AS WELL. CAN YOU PLEASE CLARIFY THE STEPS TAKEN FOR SUCH AN ADVANCEMENT?

In 2019, we managed to establish a mazut hydrogen cracking complex at the Egyptian Refining Company (ERC). This complex aims to transform mazut into a high-quality middle distillate with a capacity of 4.3 million tons per year. The \$4.3-billion-project has been completed, with the trials and production commencement in progress.

Furthermore, a group of refining projects are currently under-execution. This includes a high-octane benzene production unit at Assiut Refining Company to produce 800,000 million tons per year of high-octane benzene and fulfill the petroleum products' needs in Upper Egypt. The project has costed around \$450 million, and it is planned to be completed in April 2020.

Another project targeted increasing the Middle East Oil Refinery's (Midor) production capacity by 60%. The project's cost is estimated at \$2.3 billion and its mechanical operations are planned to be finished in Q1 2022.

Moreover, a mazut hydrogen cracking complex is planned to be established at Assiut National Oil Processing Company (ANOPC) in September 2022. The complex will have a production capacity of around 2.5 million tons per year of mazut to be transformed into high-valued petroleum products. Another project that we began



“ THE MIDDLE MANAGEMENT PROGRAM IS AN IMPORTANT ONGOING PROJECT WHICH COMES IN LINE WITH THE MINISTRY'S GOAL OF ACHIEVING SUSTAINABILITY. ”

as well as establishing aromatics extraction units to update the oils complex at Alexandria Petroleum Company and increase its production to 10,000-16,000 tons per year, as well as increasing the wax production to 1,000-2,000 tons. The project's necessary supplies are expected to be fulfilled in January 2020.

Furthermore, we began another project for the production of asphalt 60/70 at Suez Oil Processing Company (SOPC). Under this project, a vacuum distillation unit is established with a production capacity of 726,000 tons of mazut to produce about 396,000 ton of asphalt 70/60. The asphalt 60/70 will be directed to the local market. The project is expected to be finished in Q4 2021. Another project is aimed at establishing a Mazut Hydrogen Cracking and Benzene Production Complex at the Red Sea National Refinery and Petrochemicals Company. The project aims at exploiting the untapped capacities of the two refineries of Al Nasr Petroleum Company and SOPC, in addition to using the produced mazut to produce high-valued petroleum products. The project has a capacity of 2.5 million tons per year of mazut and 1 million tons per year of naphtha, and it is planned to be completed by the end of 2022.

Q: EGYPT HAS ALSO SEEN AN IMPROVEMENT IN INFRASTRUCTURE. CAN YOU PLEASE SHARE WITH US THE LATEST PROJECTS IMPLEMENTED FOR THAT PURPOSE?

Last year saw the execution of three new pipelines transporting crude oil and petroleum products, in addition, we managed to replace and renew a number of pipelines. These advancements brought the total length of pipelines to about 313 kilometers (km), with a total cost of EGP 1.2 billion.

Among these operated pipelines in 2019 was Ain Sokhna-Al-Hafayer-Wadi Hagul crude oil pipeline. This pipeline aims at maximizing the benefit of the national network of pipelines, which will contribute to turning Egypt into a regional oil and gas hub. The project began operating in January with a cost of EGP 153 million. Another one is the new South Helwan-Bayad El Arab mazut pipeline, which ensures to continuously feed power stations with the necessary fuel. The first phase was completed in June with a cost of EGP 65 million.

Moreover, another network from the Suez-Mostorod production pipeline was replaced and renewed to preserve the operational capacity of the petroleum pipeline network and to continuously deliver petroleum products to governorates. The first stage was implemented in June with a cost of EGP 193 million. Additionally, a network from Tebbin-Assuit pipeline was replaced and renewed to secure and raise the transportation rates of petroleum products from Tebbin to Assiut and Upper Egypt. The cost of the first stage is EGP 100 million and was completed in June 2019.

Adding to that is the replacement and renewal of the Mahala-Shawa petroleum pipeline to deliver petroleum products to the Delta. The project was completed in August 2019 with a cost of EGP 107.4 million. Ras Bakr-Ras Gharib-Assiut pipeline was also duplicated to raise the efficiency of butane transportation rates in Upper Egypt to 200,500-300,500 tons per day. The pipeline was planned to be operational by the end of December with a cost of EGP 362 million.

Another crucial indicator to highlight is that we implemented many projects to maintain the storage capacity. This included establishing four diesel and gasoline tanks, with a total capacity of 45,000 m³ at SOPC. The project was completed in June, with a cost of about EGP 70 million. Moreover, we established numerous storage facilities at the Arab Petroleum Pipelines Company (SUMED) to store diesel with a capacity of 105,000 m³ in Ain Sokhna port. The mazut facilities were inaugurated by the President Abdel Fattah El Sisi in November, with a total cost of about \$415 million. Furthermore, Sonker's bulk-liquids terminal in Ain Sokhna was executed as well to increase the storage capacity of strategic products through the construction of six tankers (diesel/butane) with a capacity of 250,000 m³, in addition to the establishment of two lines to transport butane and a line to transport diesel. The first warehouses were operated in September and the rest will be operated successively until Q2 2020, with a total cost of \$450 million.

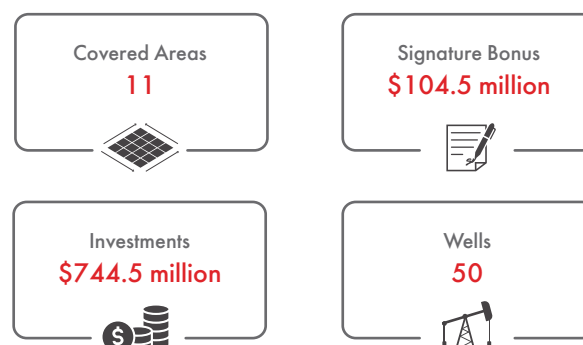
Q: WHAT IMPROVEMENTS DID EGYPT WITNESS IN EXPANDING THE NATIONAL GAS GRID?

Last year witnessed six natural gas transmission lines being operated with a total length of about 292 km and a total cost of around EGP 4.7 billion. This happened through the construction and installation of a 30-inch diameter line with a length of 3 km at the Egyptian Liquefied Natural Gas (ELNG) plant. It has been operating since February, with an investment cost of EGP 76 million.

Moreover, we rehabilitated the existing 29-km line in Rashid-Abu Homs in February 2019, with a cost of EGP 17.2 million. El-Tina-Abu-Sultan-the New Capital gas pipeline has a length of 165 km and a diameter of 42 inches. This project has supported the national gas grid by feeding the power stations in the New Capital and Beni Suef with natural gas. The project's investment cost is about EGP 3,335 million and was operated in July.

ACHIEVEMENTS 2019

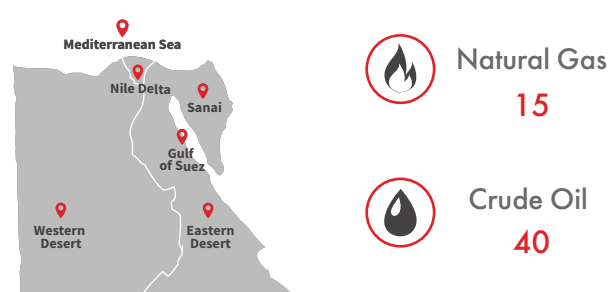
EGPC & EGAS Bid Round in February 2019



Ganope Bid Round in the Red Sea



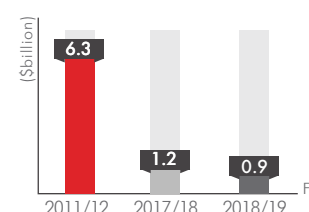
55 New Discoveries Achieved



20 Development Leases Signed



Arrears to IOCs



The highest petroleum production rate in history achieved at **1.9 mmboe/d.**



Natural gas average production rate recorded **7.2 bcf/d.**



Furthermore, the first and the second stages of the Sinai pipeline were rehabilitated as well through the establishment of a 36-inch pipeline, operated in November 2019, with a total investment cost of EGP 55 million. Moreover, Al-Wasiti-Beni Suef line, which started operating in December, feeds the Beni Suef power stations. The project's investment cost reached EGP 511 million.

Finally, we doubled the Idku-Abu Homs pipeline, with a length of 30 km and a diameter of 42 inches, to transport the natural gas produced from Idku fields to support the national gas grid. The investment cost of the project amounted to EGP 716 million, and it was planned to start operating by the end of December.

Q: IN ADDITION TO THE MINISTRY'S EFFORTS TO CONNECT MORE HOUSEHOLDS TO THE NATIONAL GAS GRID, WHAT ABOUT ITS ELECTRICITY STATIONS?

We are in the second phase of establishing an electricity station at Ethydc. The project aims to create a linkage to the national electricity grid. This is going to happen through a transformer station, either to export the surplus or to cover the deficit in the case of turbine failure. This station has costed around \$25 million and started operating in March 2019.

Q: EGYPT HAS A MYRIAD OF ADVANTAGES THAT WILL ALLOW IT TO TURN INTO A REGIONAL ENERGY HUB. WHAT WERE THE MINISTRY'S STRIDES TO ACHIEVE THIS TARGET?

Egypt has a clear roadmap to turn into a regional energy hub. This vision is pursued under the Modernization Project. Last year, we implemented several steps for that purpose. These steps included preparing a strategy by a specialized team, which was approved by the Steering Committee of the Modernization Project.

The East Mediterranean Gas Forum (EMGF) was also established, comprising the East Mediterranean countries with the most natural gas potential. The forum, headquartered in Cairo, aims at bolstering cooperation among the member countries, creating a systematic dialogue on natural gas and forming consistent policies within its framework. In addition to that, the forum will focus on creating a governmental cooperation to prepare a joint strategy based on a unified vision for the future of natural gas in the region.

Furthermore, in January 2019, a number of memoranda of understanding (MoUs) were signed between Egyptian and Jordanian natural gas companies, allowing the participation of the Egyptian petroleum companies in implementing projects for natural gas delivery in Jordan. We also completed a project in Ain Sokhna (SUMED Company) for trading and storing petroleum products, which includes the construction of a maritime platform for the regasification unit and petroleum products tankers. Last but not least, we completed El Hamra Port development project to receive ships with greater capacity than the current ones.

In fact, we believe in Egypt's leading role as a regional energy hub to benefit all countries in the region. Egypt's chief role will be an essential pillar for cooperation among countries and it will contribute to achieving economic benefits, in addition to being a means for prevailing peace in the region.

Q: REGARDING THE MODERNIZATION PROJECT, 2019 MARKS A YEAR WITH MANY MILESTONES ACHIEVED. COULD YOU PLEASE TELL US MORE ABOUT THESE SUCCESSES?

In 2016, the Egyptian oil and gas sector began the implementation of the Modernization Project to achieve a comprehensive change in the sector and increase its contributions to the development of Egypt. In the context of bolstering the Egyptian sector, many strategies were implemented under the umbrella of the Modernization Project.

These strategies included the implementation of Egypt's Upstream Gateway project to market the Egyptian investment opportunities. This will happen through setting a new framework for the sector to cope with global changes, taking into consideration separating the sector's policies, organizational, and executive roles. Moreover, we prepared a draft for the sector companies' governance which is currently under review.

Additionally, we started the implementation of different programs, in coordination with IOCs, to prepare young leaders for the future of the sector. These programs are divided into three groups; two of them were completed, which are the administrative group with 140 trainees, and a practical group with 230 trainees. Currently, the training of the most distinguished group is underway; out of this group, the training of 100 trainees is done.

“ AS WE GO, WE SEE MORE AND MORE YOUNGER GENERATION TAKING THE LEAD AND BEING EMPOWERED TO BECOME THE NEXT LEADERS OF THE SECTOR. ”





“ WE ARE GOING TO FOCUS ON DEVELOPING THE PRODUCTION OF CRUDE OIL AS IT IS THE NUMBER ONE CHALLENGE FOR US. ”

Moreover, we prepared a plan to develop the occupational health and safety departments in the sector's companies, in addition to completing the first phase of a program developing the skills of 70 participants in the same field, and the second stage is under preparation.

When it comes to leadership positions, we have set a new plan containing the best practices of competency management and development; a mechanism that has been established to evaluate and select candidates according to this plan

On the other hand, we implemented many procedures to improve energy efficiency in refineries, production facilities and natural gas transmission networks.

Besides, we completed the first phase of the Enterprise Resources Planning (ERP) system in EGPC and began the implementation of the second phase to electronically exchange data and information. We are working on implementing the ERP system in all the sector's holding companies. This system will help automate our daily production data and reports for a number of major crude oil and natural gas production companies at EGPC.

Q: EMPOWERING THE SECTOR'S YOUNG PROFESSIONALS IS NOT A ONE-TIME PROGRAM, IT IS A LONG-TERM PROJECT. WHAT IS YOUR OPINION ON THAT?

The ministry is continuing to implement its strategies, grooming up the sector's middle management and youth through initiating several programs to prepare them, helping them develop their career path, as well as empowering them to takeover more responsibilities in the future. Therefore, it is very important to strengthen the sector's capacity building; as we want to see more younger generation taking the lead and being empowered to become the next leaders of the sector.

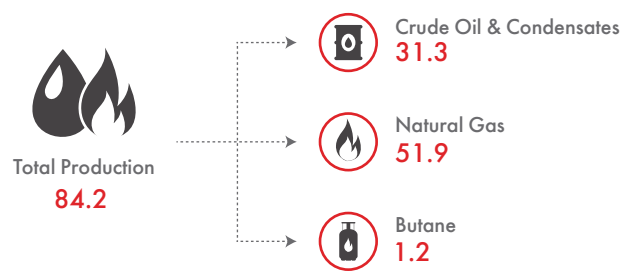
One of the most remarkable programs in the sector is the middle-management program. The selection of this program's participants was mainly based on transparency and providing equal opportunities. Out of 711 applicants, around 462 were selected after passing oral and written tests. Those 462 participants were divided into three groups, and a group of 117 participants was selected to be prepared, in accordance with IOCs including Total, Shell, ExxonMobil, BP, Schlumberger. We need to highlight that the second batch of the program will be announced soon.

BASED ON YOUR PLAN, HOW WILL THIS PROGRAM HELP BRIGHTEN THE FUTURE OF YOUNG PROFESSIONALS?

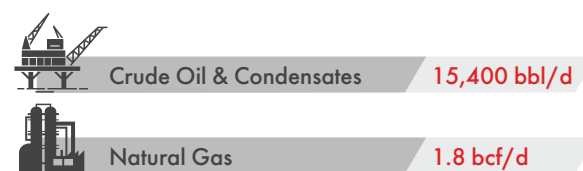
Executing such beneficial training programs for our young professionals, in collaboration with IOCs, will provide them with an opportunity to acquire required soft skills, hard skills, business skills, leadership skills, and expertise. This will play a major role in generating more conscious leaders. Accordingly, this will be reflected positively on the future of our sector, enabling us to achieve all our targets and visions.

ACHIEVEMENTS 2019

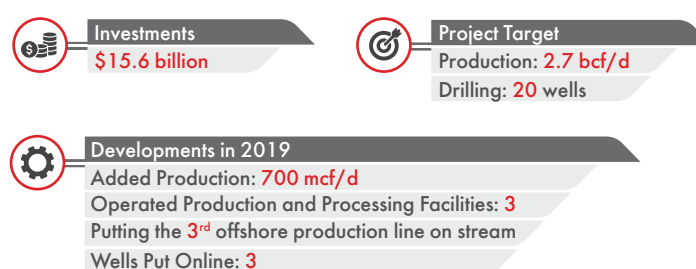
Petroleum Production (mmt)



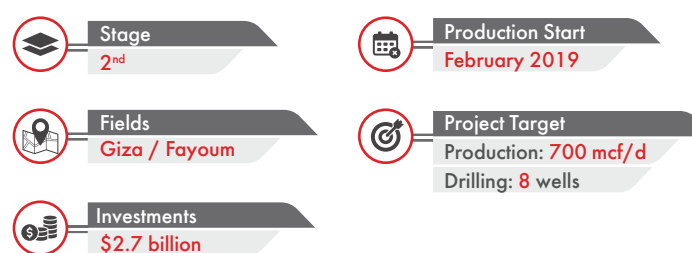
10 Development Projects for Crude Oil & Natural Gas



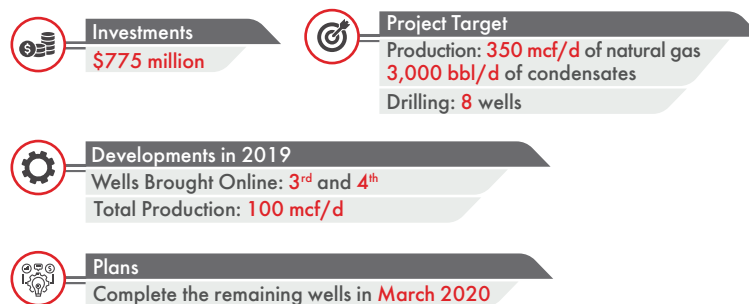
Development of the **Zohr** Field



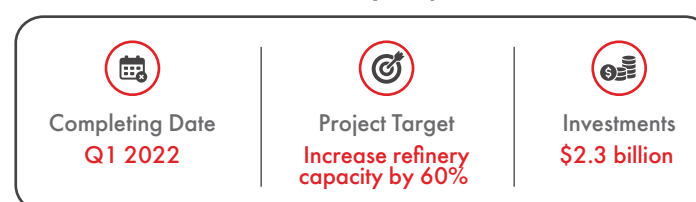
Development of **West Nile Delta** Fields



Development of **9B** Phase in the **WDDM**



Midor Refinery Expansion



Moreover, I want to mention that these programs are considered to be ongoing, as they come in line with the ministry's goal of achieving sustainability. And when it comes to sustainability, we have to pay a great deal of attention to the organizations' restructure. For that purpose, the ministry has prepared a memorandum and plans to announce it during Q1 2020.

Q: MINERAL RESOURCES IS AN INTEGRAL SEGMENT IN THE MINISTRY'S STRATEGY. WHAT WERE THE MAIN ACHIEVEMENTS WITNESSED IN 2019?

Last year, we succeeded in executing several reforms in the mining sector. In May 2019, an agreement licensing the exploitation of phosphate ore in Abu Tartur in the Western Desert was signed between the Egyptian Mineral Resources Authority (EMRA) and Egypt Phosphate Company. This agreement covers an area of 220 square kilometers (km²), and it is considered the culmination of the ministry's plans to develop mineral wealth, optimize the use of phosphate ore, maximize the value added of natural resources, and achieve an effective contribution to the development of societies through establishing new industrial zones and increasing investment opportunities.

Moreover, we evaluated the offers submitted for the general contractor auction to implement a project for phosphoric acid with a production capacity of a million tons per year by the Valley Company for Phosphate Industries and Fertilizers, with investments of approximately \$1 billion by a turnkey system in addition to funding. After evaluating offers, the results came in favor of the Egypt-China alliance and a letter of intent was signed, in which the Bank of Alexandria has been authorized to lead the banking alliance funding the project.

Finally, law number 145 of the year 2019 was issued on August 7, 2019 to amend some of the provisions of the mineral resources law number 298 of the year 2014. The law amendments aimed at setting clear constraints and rules for the exploitation of mineral resources in Egypt; including quarries, mines, and navigators to achieve ideal exploitation rate. Additionally, these amendments target unifying the governing rules of this vital field. Moreover, they granted the EMRA and the competent authorities the right to negotiate with licensees on the application of rental values, royalties for licensing exploration and exploitation, as well as the right of issuing licenses for mining ores, navigators, exploration and exploitations.

COULD YOU PLEASE PROVIDE US WITH A GLIMPSE OF THE MINISTRY'S VISION IN 2020?

In 2020, our strategy is to focus on finalizing the implementation of all plans that we could not complete in 2019. With an eye on IOCs' vital role in our sector, we succeeded in the inclusion of major companies in the Red Sea and Mediterranean areas. Moreover, this year will witness a noticeable presence for major IOCs such as ExxonMobil and Chevron, which will make a great difference in the market's dynamics.

In 2020, major IOCs will focus on offshore regions which needs more investments, advanced technologies, and with high-risks. Meanwhile, mid-size companies will concentrate on onshore activities that do not require large investments, advanced technologies, and is considered less-risky areas.

We have reached self-sufficiency in natural gas production, which enabled us to export it, but with the decrease in the international prices of liquefied natural gas (LNG); exporting has become challenging. Thus, in 2020, we are going to concentrate on managing this issue.

ACHIEVEMENTS 2019



Natural Gas Delivery


Residential Units
1.2 million


Factories
56


Commercial Units
2,013


6 Natural Gas
Transmission
Lines Operated


Total Cost
EGP 4.7 billion


Total Length
292 km



Car Services & Supply Stations

Added in 2019
135

Country's Total
3,655



Cylinders Distribution Centers

Added in 2019
38

Country's Total
3,060



3 Training Programs

Administrative
Group
140 Trainees

Practical
Group
230 Trainees

The Most
Distinguished
Group
100 Trainees

Furthermore, we plan to develop the production of crude oil in 2020 as it is our number one challenge. Yet, the decrease in oil consumption in Egypt has helped easing the challenge's intensity. This decline has resulted from implementing the pricing indexation mechanism and lifting the subsidies off of the petroleum products. Hence, in 2020, we will work on reaching targeted production rates to narrow the gap between production and consumption.

Finally, I need to stress that we are working hard on turning Egypt into a regional energy hub. We target to announce the EMGF as an organization and we are really looking forward to seeing it up and running during Q1 2020.





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



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Sessions

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THE MEDITERRANEAN SEA: EGYPT'S NATURAL GAS TROVE

BY AMINA HUSSIEEN, REHAM GAMAL & TASNEEM MADI

The Mediterranean Sea has the lion's share in Egypt's total natural gas production. In fact, on average, the region's offshore fields produce more than 50% of Egypt's production. When Egypt turned from natural gas exporter to importer in 2016, the Mediterranean's largest natural gas discovery, Zohr, changed the rules of the game in favor of Egypt. The discovery helped Egypt maintain self-sufficiency of natural gas in September 2018. Furthermore, the developments in the region supported the country to resume exports with trial quantities to Jordan in October 2018, according to a report entitled "Petroleum Sector in a Year" published by Egypt Oil and Gas in cooperation with the Ministry of Petroleum and Mineral Resources (MoP).

The Mediterranean Sea witnessed remarkable changes and updates during Fiscal Years (FYs) 2017/18 and 2018/19 concerning different aspects, such as bid rounds, discoveries, and production.

BID ROUNDS

In May 2018, the Egyptian Natural Gas Holding Company (EGAS) announced an international bid round. The company offered a total of 16 blocks in the bid round, of which, 13 blocks are located in the Mediterranean Sea, according to EGAS annual report 2017/18.

EGAS INTERNATIONAL BID ROUND IN 2018



The bid round results were announced in February 2019, on the sidelines of the Egypt Petroleum Show (EGYPS 2019). The bid round resulted in the awarding of five blocks, of which; three are located in the Mediterranean Sea, stated in EGAS annual report 2018/19.

The bid round witnessed the entrance of Exxon Mobil in Egyptian upstream activities for the first time as it was awarded North East Amereya Offshore, according to EGAS annual report 2018/19.

The signature bonus of the three concessions totaled \$23 million. In addition, the total financial commitments recorded \$529 million to drill nine wells, according to the MoP's website.

EGAS BID ROUND RESULTS IN 2019

ExxonMobil			
Concession	Signature Bonus (\$ million)	Financial Commitment (\$ million)	Exploratory Wells
North East Amereya Offshore	10	220	4

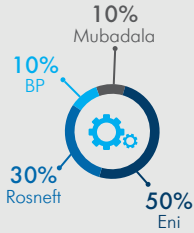






Shell and Petronas			
Concession	Signature Bonus (\$ million)	Financial Commitment (\$ million)	Exploratory Wells
Sidi Gaber Offshore	10	180	3
North Al Fanar Offshore	3	129	2

ACTIVE AGREEMENTS

Seven agreements are still active, in the Mediterranean, since signature data to June 2019. The seven agreements cover a total area of 16,099 km², of which 13,573 km² is allocated area used for exploration activities. The oldest agreement to take place was the Shorouk Offshore Concession, where the giant Zohr was discovered by Eni. The agreement has been in effect since January 2014. Nevertheless, the most recent agreement was the Nour Offshore Concession, which has been in effect since August 2018, according to EGAS data.



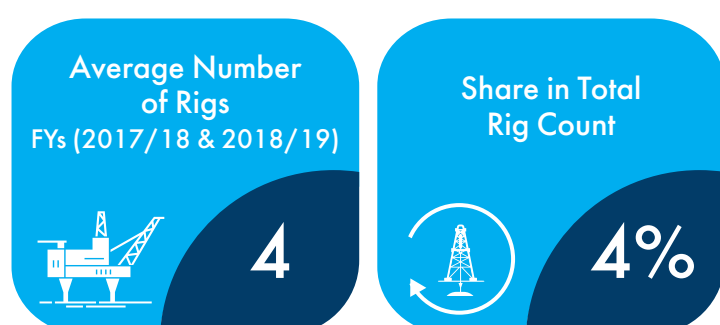
ACTIVE AGREEMENTS IN THE MEDITERRANEAN SEA TO JUNE 2019

Concession	Operators	Total Area (km ²)	Exploration Area (km ²)	Effective Date		
Shorouk Offshore	North Thekah Offshore	North El Tabia Offshore	North Ras El Esh	North El Hammad Offshore	Northeast Hapy Offshore	Nour Offshore
	100% Edison 	100% BP 	50% BP  50% Eni	37.5% BP  25% Total 37.5% Eni	30% BP  70% Eni	20% Mubadala  15% Tharwa 25% BP 40% Eni
3,752	3,750	2,084	1,389	1,927	2,458	739
2,351.4	2,625	2,084	1,389	1,927	2,458	739
Jan. 2014	Feb. 2014	Dec. 2016	Dec. 2016	Dec. 2016	Jan. 2017	Aug. 2018

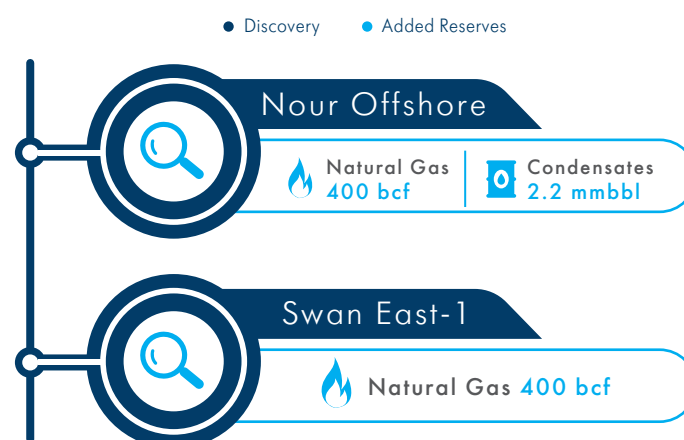
DRILLING ACTIVITIES

The average number of drilling rigs in the Mediterranean Sea in FY 2017/18 and 2018/19 was almost the same with approximately four rigs working in the region. The Mediterranean has a 4% share in Egypt's total drilling rigs in the two referred years, according to Egyptian General Petroleum Corporation (EGPC) data.

THE MEDITERRANEAN SEA'S RIG COUNT



5 DISCOVERIES IN THE MEDITERRANEAN SEA IN FY 2018/19



NATURAL GAS AND CONDENSATES PRODUCTION

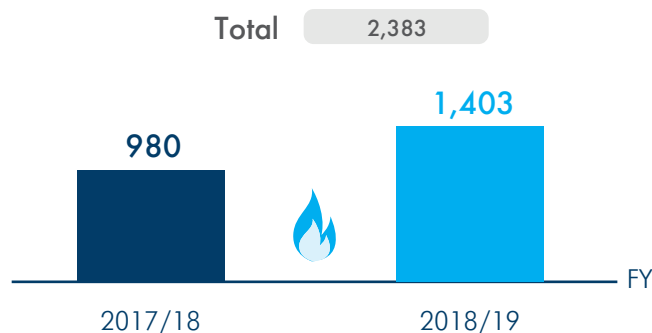
In FY 2018/19, the drilling activities in the Mediterranean resulted in achieving five natural gas discoveries, representing around 34% of natural gas discoveries that year, according to EGAS annual report FY 2018/19. This development marked a significant increase in exploration activities, especially when compared to FY 2017/18, in which no discoveries were announced in the region.

The five new discoveries added reserves of 598 billion cubic feet (bcf) of natural gas, and 2.2 million barrels (mmbbl) of condensates. Among the five discoveries, two were considered significant discoveries. The first discovery, Nour offshore, operated by Eni, added reserves of 400 bcf of natural gas and 2.2 mmbbl of condensates. Furthermore, the second discovery was announced in Swan East-1 in El Burullus in West Delta Deep Marine (WDDM). Swan East-1 added reserves of 114 bcf of natural gas, according to EGAS annual report 2018/19.

Most of Egypt's natural gas production comes from offshore fields located in the Mediterranean Sea. Over the past two FYs, the Mediterranean's production of natural gas accounted for 2.4 trillion cubic feet (tcf), representing the area with the highest share of 53.8% of Egypt's natural gas production. The Nile Delta and the Western Desert's production came next, while the Gulf of Suez, the Eastern Desert and Sinai contributed by fewer natural gas productions, according to EGPC and EGAS.

In light of the Zohr field developments, the Mediterranean's production considerably witnessed a jump in FY 2018/19 by 43% to produce on average 82 billion cubic feet per meter (bcf/m) of natural gas, mentioned by EGPC and EGAS.

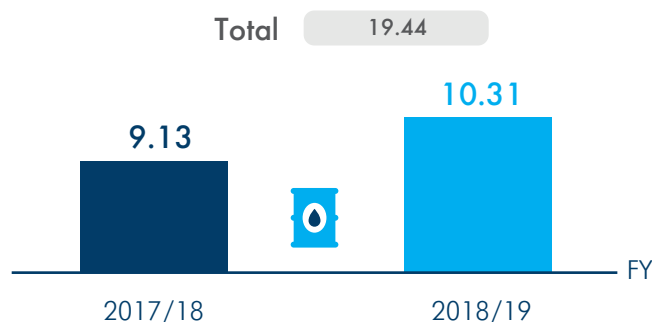
THE MEDITERRANEAN SEA'S NATURAL GAS PRODUCTION (BCF)



The Mediterranean Sea is considered the second largest condensates producing area following the Western Desert. Over the two FYs 2017/18 and 2018/19, the Mediterranean's condensates production recorded about 19 mmbbl, representing 31% of condensates produced all over Egypt. Sinai's condensates production contributed almost equally to that of the Mediterranean. On the other hand, the Nile Delta, the Gulf of Suez, and the Eastern Desert shared by lower condensates production rates, respectively, according to EGPC and EGAS.

During FY 2018/19, the Mediterranean's production of condensates saw an increase of about 13%, contributing 0.86 million barrels per meter (mmbbl/m) on average, according to EGPC and EGAS. This increase was mainly a result of the increase in Zohr's condensate production, which, in April 2019, increased by 14.29%, reaching around 0.029 million barrels per day (mmbbl/d).

THE MEDITERRANEAN SEA'S CONDENSATES PRODUCTION (MMBBL)



MAIN NATURAL GAS FIELDS

Egypt has a long history of natural gas discoveries especially in the Mediterranean Sea as it started in 1969 with the discovery of Abu Qir field. This discovery was followed by discovering other significant fields which contributed to the area's production of natural gas and condensates. Consequently, many projects were implemented to develop and increase production of these fields.

1. ABU QIR

Abu Qir concession is located offshore in the Idku Bay, 20 km Northeast of Alexandria. The concession consists of three gas and condensates fields which are: Abu Qir, North Abu Qir, and West Abu Qir. It was acquired by Edison in 2009 following an international tender of \$1.4 million. Since then, Edison has doubled hydrocarbon production in this area by implementing a scheduled investment plan, until it sold its assets to Energean Oil and Gas, according to Edison's website.

NORTH ABU QIR



Initial production
in July 2017
35-70 mcf/d

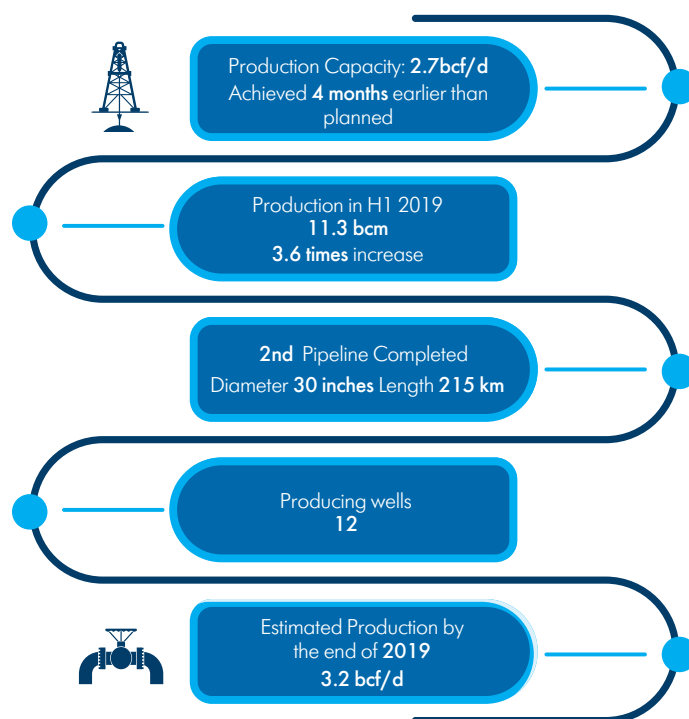


Investment cost
\$25 million

2. ZOHR

By the end of August 2015, Eni announced that it made one of the most supergiant gas discoveries in the deep waters of Egypt. Zohr field is the largest gas discovery ever made in the Mediterranean Sea with conservative estimated reserves of 30 tcf. The discovery of well Zohr 1X NFW is at 4,757 feet of water depth (1,450 meters) in the Shorouk Block, stated in Eni's published press release, August 2015.

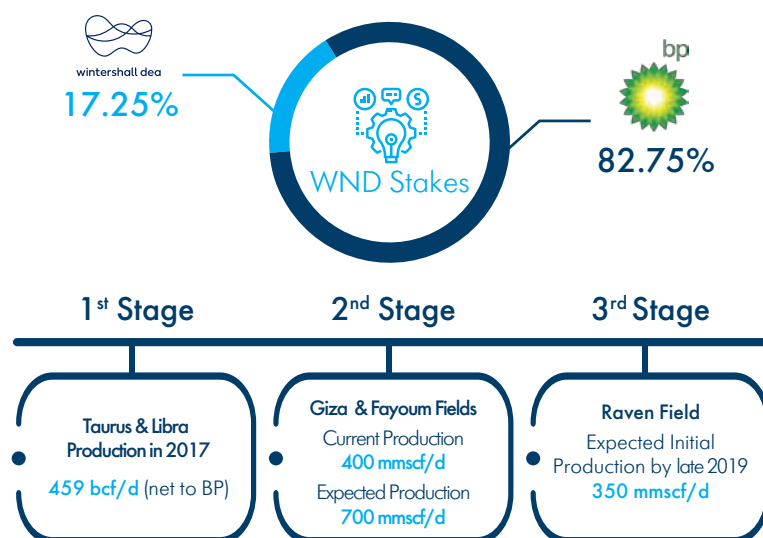
ZOHR FIELD UPDATES IN 2019



3. WEST NILE DELTA PROJECT

West Nile Delta (WND) Project includes a total of five gas fields across the North Alexandria and West Mediterranean Deepwater offshore concession blocks. The project was set to be completed in three stages instead so that the delivery of natural gas production commitments to Egypt will be accelerated, according to BP's website.

WEST NILE DELTA PROJECT

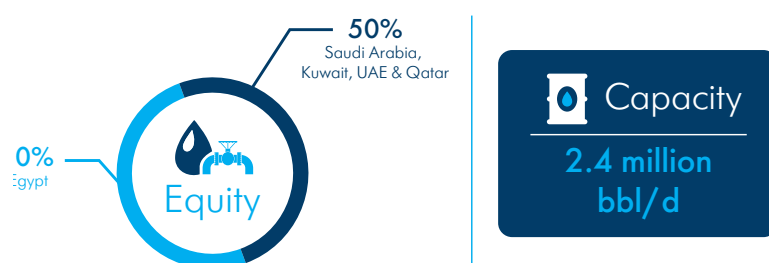


4. WEST DELTA DEEP MARINE

Since the 1990s, Shell has discovered 18 natural gas fields in the WDDM concession in the Mediterranean Sea. The fields are located at water depths ranging from 700 meters to 850 meters and about 90 km to 120 km away from the shore, according to a Global Portfolio Data Book 2014 by Shell.



SUMED PIPELINE IN 2019



5. ATOLL

Atoll offshore field was discovered in March 2015 and is located in the North Damietta area. Currently, the Atoll development is led by BP, but operated by the Pharaonic Petroleum Company (PhPC). PhPC is a joint venture between BP, Eni and EGAS.

Atoll field is a significant discovery, with a reservoir of 1.5 tcf. The field's first phase started producing 350 million cubic feet per day (mmscf/d) in February 2018, less than three years after its discovery and seven months forward ahead of its schedule, according to BP's website.

NATURAL GAS INFRASTRUCTURE

SUMED PIPELINE

The SUMED Pipeline lies between the Gulf of Suez and the Mediterranean Sea, and transports around 115 million tons (mmt) of crude oil, according to the MoP's website. The system is managed by the Petroleum Pipelines Company (PPC).

The Arab Petroleum Pipelines Company (SUMED) signed a cooperation agreement in February 2019, with Saudi Aramco Products Trading Company's (ATC) to secure 222,000 cubic meters (m³) storage capacities for high quality Euro Standard diesel.

Moreover, Aramco and Saudi Basic Industries Corporation (SABIC) signed a \$2 billion agreement with PPC to establish petrochemical projects in the Mediterranean region, stated by Abdullah bin Mahfouz, Vice Chairman of Saudi-Egyptian Business Council in a business forum in February 2019.

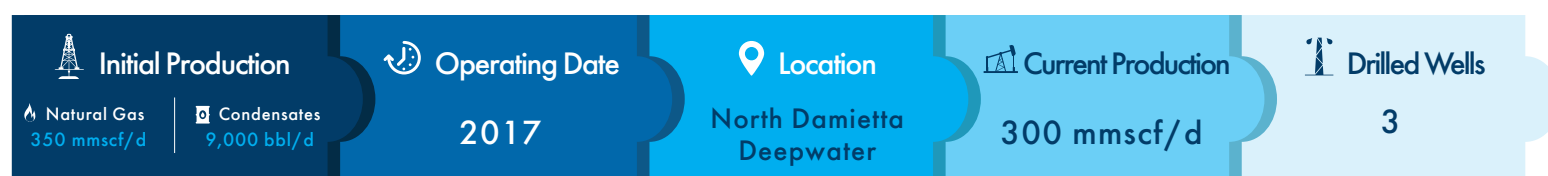
EAST MEDITERRANEAN GAS PIPELINE (EMG)

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

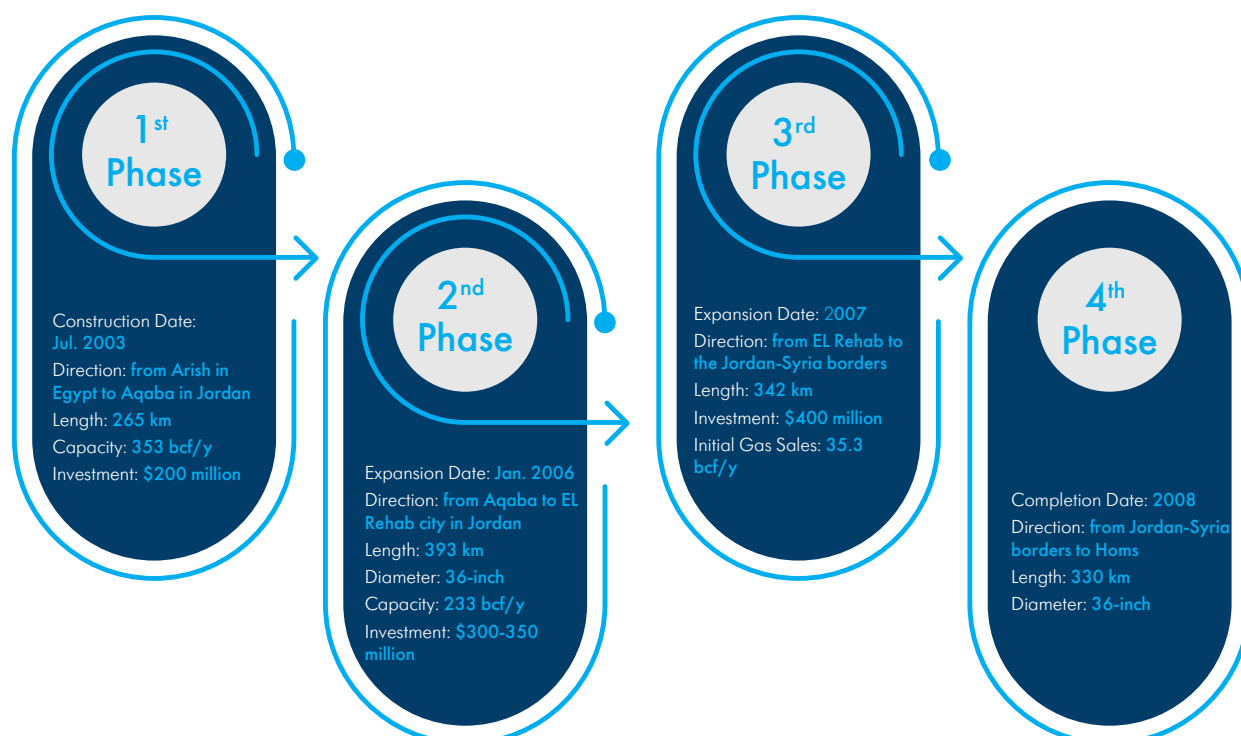
ARAB GAS PIPELINE

The Arab Gas Pipeline (AGP) runs from the South of El Arish, which links in Northern Sinai to the North of Jordan. The AGP is a model for strategic Arab Cooperation projects, as it connects Egypt to Jordan, Syria, and Lebanon as well as other countries in Africa, Asia, and even Europe (in future phases). The project has four phases:

ATOLL FIELD



ARAB GAS PIPELINE PHASES



EXPORTING FACILITIES

Egypt has two Liquefied Natural Gas (LNG) exporting facilities on the Mediterranean Coast. The two facilities are controlled by the Spanish Egyptian Gas Company (SEGAS) and the Egyptian Liquefied Natural Gas Company (ELNG).

SEGAS







Damietta plant, operated by SEGAS, act as an LNG tolling facility. Gas supplies were initially provided by the Tensah field and Ha'py Development Area operated by BP and Eni through the national gas grid, according to EGAS's website. Damietta LNG plant is expected to open before the end of this year, rather than during Q3. Damietta will start exporting 500 mmcf/d of LNG, before increasing exports to 700 mcf in 2020, as stated by Eng. Tarek El Molla in an interview at the World Energy Congress in September 2019.

ELNG

Egyptian LNG (ELNG) acts as a tolling facility with the upstream suppliers paying a tariff for the liquefaction service. ELNG is Egypt's largest LNG, a joint venture between EGPC, EGAS and foreign shareholders, such as Royal Dutch Shell, PETRONAS and Engie. ELNG was established when EGPC and Edison signed an agreement with Shell to develop an integrated LNG export project in Egypt in 2001. ELNG has two natural gas liquefaction trains with a combined capacity to produce 7.2 million tons per year (mmt/y) of LNG, according to the Ministry of Transportation's website.

It is worth mentioning that Shell shipped 12 LNG cargoes from the Idku plant in 2018 and ramps up production from the WDDM Phase 9B project. Shell's stake in Idku LNG terminal helped it to commercialize gas supply in Egypt's 2018 bid round, according to the IGU's World LNG report, in 2019.

LNG EXPORTING FACILITIES

	Location	Capacity (bcf/y)	Operating Year	Operation Status
 SEGAS	 Damietta	 264.8	 2004	 Idle
 Idku	Idku	353	2001	Operating

MAIN OPERATORS

Many International Oil Companies (IOCs) are granted concessions in the Mediterranean region. Among these IOCs, Eni was most famous for discovering the giant Zohr in 2015.

ENI

Eni has been operating in Egypt since 1954 through its subsidiary, the International Egyptian Oil Company (IEOC). It is one of the largest IOCs in Egypt and the global petroleum market.

As a result of the EGAS 2015 international bid round, Eni signed two new concession agreements for the North El Hammad and North Ras El Esh, located in the shallow waters in Egyptian Mediterranean Sea. Eni is also operating in three concessions in the Mediterranean Sea: Al Shorouk, North Leil, and Karawan concessions in the west of Zohr field, according to Eni's website.

Nour New Field Wildcat (NFW), in Nour North Sinai concession, a new discovery announced by Eni in March 2019, according to the company's website. EGAS was a partner for Eni in the concession, where Eni holds 40% stake, BP holds a 25% stake, Mubadala Petroleum holds a 20% stake and Tharwa Petroleum Company holds a 15% stake of the contractor's share.

BP

Egypt is BP's largest country in Africa in terms of net production of natural gas. BP has been supporting the development of the country's natural gas market since the 1960s.

The company is working on three concession areas in the Mediterranean Sea; North Al-Maks area in the west of Zohr field, North El-Taneen, and Al-Tabya area in the south of Zohr field. Moreover, BP holds 100% interest in the Atoll concession.

DANA GAS

Dana Gas has been operating in Egypt through its subsidiary, Dana Gas Egypt (DGE) since 2007, mainly focused on providing natural gas. Since entering Egypt, it has become the country's fifth largest gas producer, explained in Dana Gas's website.

The company was awarded Block 6 North El-Arish exploration concession area in 2014, which was its first offshore Concession Area in Egypt, containing significant growth potential, according to Dana Gas's website.

The company confirmed its decision to sell its assets in Egypt to focus on development and increasing production from resources in the Kurdistan Region of Iraq (KRI), which contains more than 90% of the Company's 2P reserves, according to the company's press release in July 2019. It is worth noting that Dana

Gas produced about 56% of its energy output, or 35,200 barrels of oil equivalent per day (boe/d) in Egypt, according to a company's press release published in September 2019.

EDISON

Edison became one of the prominent gas players in Egypt by Idku's the first LNG train development in 2001. Edison has been operating in Abu Qir since 2009, for more than 10 years. Edison currently operates nine concessions. The company held a 100% operated share in the Abu Qir concession. In July 2019, Edison announced selling its assets to Energean Oil and Gas, as explained on Edison's website.

SHELL

Shell is one of the main operating companies in Egypt which started its operations in 1911. Shell is working on new offshore activities, including WDDM Phase 9B project. The WDDM Phase 9B project includes eight new development wells, as mentioned by Khaled Kacem, Shell Egypt Country Chair on Shell's website in October 2019. In addition, in November 2019, Silva well in Phase 9B of the WDDM concession area in the Mediterranean added initial production of 60-80 mmcf/d. The Silva well was discovered and operated by Burullus Gas Company, a joint operating firm of EGPC and Shell, according to a Ministerial statement.

Over the past few years, exploration and drilling activities have stimulated natural gas production rates in the Mediterranean region. This helped Egypt to achieve self-sufficiency and even resume natural gas exports. EGAS announced the 2020 International Bid Round to exploit for natural gas and crude oil covering 11 Blocks in Egypt's Western Mediterranean.

Regionally, the East Mediterranean is regarded as a rich area in natural gas reserves. This accordingly has been strengthened in October 2018, when Egypt, Cyprus, Greece, Jordan, Palestine, Israel, and Italy formed the East Mediterranean Gas Forum (EMGF). The EMGF aims to accelerate the economic exploitation of existing natural gas reserves and benefit from existing infrastructure. With this regard, Egypt has signed many pipeline expansion contracts over the last couple of years. For instance, in September 2018, Egypt and Cyprus signed an agreement to build a Mediterranean pipeline which extends from Aphrodite to a liquefaction terminal in Egypt; the pipeline will then export to different markets, as stated on the MoP's website.

The second half of January 2020 is expected to witness the next EMGF meeting to be held in Cairo. This will encourage further upstream activities and enhance cooperation to promote the utilization of natural gas reserves in the Mediterranean region, explained in the MoP's website.



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- Pre-sulphiding (DMDS Injection)
- Video inspection and assessment

- Process Services
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- Air Drying & Dehydration
- Nitrogen Services
- Chemical Cleaning
- Heat Exchanger Cleaning

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- PPL Air/ N2 Drying
- PPL Pigging
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SPECIALIZED SUPPLIES & SERVICES

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- RO Desalination Plants
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- Filtration / Water injection Systems

EXPERTS DISCUSS HOW TO IMPROVE BROWNFIELD PERFORMANCE AT EOG 3RD UPSTREAM TECHNICAL CONVENTION

Egypt Oil & Gas (EOG) and the EOG Technical Committee held the Improving Brownfields Performance Upstream Technical Convention on December 8-10 at the Sky Executive Resort in Cairo. The convention took place under the patronage of H.E Eng. Tarek El Molla, the Minister of Petroleum and Mineral Resources.

The event, which takes place annually in line with the Egyptian oil and gas sector's Modernization Project, brings together professionals from private and public entities to discuss enhancing performance and boosting oil and gas output.

The convention, which had four strategic panels and four technical workshops, started with a video introducing the EOG Technical Committee, its subcommittees, activities as well as committee members.

EL MOLLA HIGHLIGHTS SECTORIAL EFFORTS

Expressing his satisfaction with the third technical convention, El Molla stated the significance of discussing brownfields as "the majority of Egypt's fields are mature, and the ministry needs to work hard in order to maximize oil production."

The minister mentioned the gap between oil supply and demand, which the ministry faces while importing refined products or crude oil for local refineries. "What we are really striving for is to close this gap of oil, not only to stop the decline, but also to increase the production," El Molla noted.

The minister further addressed the importance of safety, shedding light on safety week which the ministry celebrated few days ahead of the convention. El Molla stated that a week earlier, the Ministry of Petroleum and Mineral Resources agreed with its partners to create a new reform committee that will have itself and its subsidiaries; the Egyptian General Petroleum Corporation (EGPC), the Egyptian Natural Gas Holding Company (EGAS), and Ganoub El Wadi Petroleum Holding Company (Ganope) on one side and the EOG Technical Committee on the other side.

El Molla expressed his hope to have a united oil and gas industry in Egypt, as national oil companies (NOCs), international oil companies (IOCs) and service companies work together for the success of the Egyptian oil and gas sector. The minister added that coming together with partners will help the ministry to improve performance and add value to the Egyptian economy. "Hence, with the creation of this committee, we agreed that by the end of Q1 2020 we will have to prioritize the work with the initiatives and with clear implementation plans," he explained.

El Molla expressed his pleasure with the event's Young Professionals Day, saying "the future belongs to the youth and to the young generations whom the oil and gas sector

needs to give the opportunity to demonstrate and talk."

EOG EMBRACES UPSTREAM CONVENTION

Welcoming attendees and presenters, Mohamed Fouad, EOG's Managing Director and the Technical Committee Co-Chairman, noted that the minister's strategy "coupled with a robust action plan, has transformed the energy sector and will inevitably transform Egypt into a regional oil and gas hub."

"The establishment of EOG Technical Committee has been throughout the years working so hard in line with the minister's strategy to be able to provide all the support it can to achieve an ongoing sustainable sector," he added.

Fouad expressed his insights into the three-day convention to boost competitiveness as well as business models, to develop health, safety and environment (HSE) culture and behavior, and to highlight brownfield technologies.

According to Fouad, "among the most exciting continuous developments of 2019 is the establishment of the East Mediterranean Gas Forum (EMGF). One of the main purposes of the forum is to accelerate the economic exploitation of existing natural gas reserves, benefit from existing infrastructure and encourage the private sector to facilitate exportation of future gas discoveries." The EMGF establishment comes in line with the Modernization Project, which has its pillars "incorporated throughout the entire oil and gas sector, leading the way for other sectors to follow suit," Fouad stated.

Fouad shared some of EOG's Research and Analysis (R&A) achievements in 2019 stating that the R&A team launched its premium report, tackling the energy sector and offering in depth analysis. The R&A team, aligning with the ministry, further published a report about the petroleum sector in 2018 to be distributed in EGPS 2019. Moreover, the team published a report on the EMGF overlooking the involved countries.

TECHNICAL COMMITTEE GARNERS ITS EFFORTS

Thomas Maher, President and Chief Operating Officer (COO) of APEX Energy and the EOG Technical Committee Chairman, stated in his opening speech, on behalf of the EOG Committee, that the committee has been working hard over the past 11 months in order to develop a program for the convention and benefit its attendees. "This started back in February with the formation of a subcommittee to draft a white paper



on improving brownfields performance. The paper was completed in July with a peer review process with the government's partners to follow," Maher noted.

In cooperation with the ministry's technical office, the committee aimed through the convention's program to "use the findings of the white paper to focus attention on developing Egypt's brownfields, particularly the onshore oil fields," Maher added. "Along with the white paper prepared to underpin the convention is the technical committee's efforts to address the challenges," Maher stated, promising to exert additional efforts in 2020's convention.

Praising the technical workshops, Maher stated that this year's convention program had the best submitted abstracts. Maher further expressed his excitement by "the quality of the operational excellence awards that would be given out [during the event]," adding that the committee received 18 submissions for the awards.

Maher mentioned the updates related to Egypt's natural gas production that largely increased in less than three years to reach 7.2 billion cubic feet per day (bcf/d).

AN OVERVIEW OF THE ENERGY MIX

In his speech, keynote speaker, Nathan Meehan, President of Gaffney, Cline & Associates, discussed the energy mix forecast.

"Growing global energy demand is going to require more oil and gas, and it is going to require oil and gas with relatively low carbon intensity," Meehan said, explaining that carbon intensity is related to the amount of carbon dioxide (CO₂) emissions associated with the different stages of producing and treating oil.

Meehan stated that the importance of carbon intensity and the world's concern about it is that it could cause dramatic effects if the world did not change its ways. "The need to decarbonize energy system is beyond dispute," he noted.

"The World Health Organization (WHO) identified air pollution, primarily indoor air pollution, as the number one source of avoidable death in the world," Meehan stated, adding that around four million people die annually because of indoor air pollution, which is more than the deaths from AIDs, Tuberculosis, and Malaria combined.

Discussing CO₂ emission levels in different countries around the globe, Meehan explained that although Egypt's CO₂ emissions are considered small compared to a country like China, the North African country's CO₂ emissions have been increasing over the past 20 years.

"CO₂ emissions [in the US] have been going down because natural gas production is going up," Meehan noted, adding that unconventional resources is the reason why natural gas production is going up.

Meehan further discussed the growth income per capita as well as the annual energy use per capita. Despite the decreasing number of people without access to electricity, "there are [still] over a billion people around the world without access to electricity," he stated, as the number of people who have access in Sub-Saharan Africa have not been decreasing. Hence, around three billion people have been depending on biomass.

Additionally, his speech discussed the increasing labor productivity in Egypt over years. Meehan further tracked the oil production for Egypt and Oman, highlighting opportunities to boost output. He noted that production in North America has been increasing thanks to shale oil, adding that he came to Egypt to share his experience in horizontal wells.

Meehan presented his expectations for the future, anticipating that digital oilfield and artificial intelligence will have a big role. Widespread instrumentation; stacked horizontal wells; as well as improvement in tools for sand control, cleanout, sidetracks, selective simulation and shutoff are also among the technologies that need to be leveraged more often. His thoughts further included having smaller, more nimble operators chasing the larger corporations for efficiency gains; as well as greater opportunities for service companies to bring advanced technologies for mature fields.

UPSTREAM ROUNDUP

The Upstream Convention's panels made it possible for industry leaders to review crucial topics in the oil and gas industry focusing on enhancing the competitiveness and business models, as well as promoting brownfields technologies.

Meanwhile, the technical workshops presented along the first and second days of the convention highlighted prominent updates on value creation from brownfields; applied technologies' innovations; brownfields infrastructure management; and HSE culture and behavior.

The third day of the convention was designed to empower young professionals, under the name of 'Young Professionals Day'. The day focused on young professionals' success stories and technical presentations; and promoted career start up and enhancement via a dynamic panel. The convention hosted a very special guest, Michael Graziano, Founder of Global Degree, on the third day.

Platinum sponsors included Apex, TransGlobe Energy Corporation, Chevron and Royal Dutch Shell. Gold sponsors were ENAP, IPR Energy Group and Wintershall Dea. Silver sponsors included Maridive Group, Sahara Petroleum Services Company (Sapesco), and Shawcor, while Schlumberger was the bronze sponsor. The technical workshops sponsor was Kuwait Energy; and the delegate bag and name tag sponsor was Baker Hughes, a GE company (BHGE). Dragon Oil was the operational excellence award sponsor, while Halliburton was strategic panels sponsor. Wood Mackenzie was also present at the event as EOG's official research partner.

Before kicking off the panels, Fouad and Maher presented to El Molla an appreciation award recognizing five achievements of the ministry in 2019. The achievements included increasing natural gas production and liquefied natural gas (LNG) exports, the implementation and advancement of the Modernization Project, the establishment of the EMGF, two oil discoveries in mature fields in the Gulf of Suez, and a global recognition of the Egyptian oil and industry as a solid destination for foreign direct investments (FDI).

EOG further offered the Operational Excellence Awards



THE FUTURE BELONGS TO THE YOUTH AND TO THE YOUNG GENERATIONS TO WHOM THE OIL AND GAS SECTOR NEEDS TO GIVE THE OPPORTUNITY TO DEMONSTRATE AND TALK.

H.E. ENG. TAREK EL MOLLA

Minister of Petroleum and Mineral Resources, Arab Republic of Egypt

for nominees in recognition of business transformation excellence. The HSE recognition awards were given to APEX Energy for the APEX 3D seismic acquisition in Sabkha Terrain; West Bakr Petroleum Company for oil spill prevention using condition "B" & "C" GRE lined tubing; the Egyptian Drilling Company (EDC) for Ramadan Road Safety Campaign; and OSCO Oil Company for the utilization of surplus electric power of sister company to run OSCO field. Meanwhile, the operational excellence awards recognized Gulf of Suez Petroleum Company (GUPCO) for mature offshore heavy oil field development while utilizing pioneer intervention method; West Bakr Petroleum Company for achieving record production from brownfields after 39 years; Kuwait Energy for gas plant at Abu-Sennan field; and IPR Energy Group for Yidma/Alamein concession success story.



STRATEGIC PANELS

ENHANCE COMPETITIVENESS AND BUSINESS MODELS

MODERATOR

MR. THOMAS MAHER President & COO Apex Energy

In the presence of the Minister of Petroleum and Mineral Resources, Tarek El Molla, the Upstream Technical Convention's kick-off panel saw four major experts in the oil and gas sector giving insights into enhancing competitiveness and business models in one of the sector's puzzles, which is brownfields.

The panel was moderated by Thomas Maher, President and COO at Apex Energy, and Chairman of the EOG Technical Committee. Panelists included representatives from two major international oil companies (IOCs) operating in Egypt; Randy Neely, TransGlobe CEO; and Tawfik Diab, Cheiron Chairman, in addition to a representative from the Ministry of Petroleum and Mineral Resources Ashraf Farag, First Undersecretary for Agreements and Exploration, and Ian Thom, Research Director Middle East at Wood Mackenzie.

IMPROVING BROWNFIELDS PRODUCTION

Before the discussion, Thom delivered a presentation on improving brownfields production, as well as showcased some case studies on brownfields redevelopment.

During his presentation, Thom clarified that the global upstream capital expenditure (CAPEX) increased in 2004, yet, between 2015 and 2016, the world entered a surviving urgent stage, and moved to a stage of stabilization in 2016. Afterwards, companies began planning for their future by paying attention to the capital efficiency of resources in order to be able to fulfill long-term demand and remain competitive.

When it comes to the upstream in Egypt and the Middle East and North Africa (MENA), Thom explained that production activities were held up in the region since 2014. However, "Saudi Arabia, UAE, Iraq and Kuwait are committed to long-term oil projects and continue to invest," Thom said, adding that "Egypt is ranked the sixth for regional upstream CAPEX."

Focusing on Egypt's upstream CAPEX, Thom referred to the decline in oil investments by 15-20% per annum since 2014. However, Zohr field was the game-changer discovery, attracting more investments between 2016-2019. "The massive impact the big offshore gas project had [helped] Egypt maintain its position among the top investors in the region," Thom commented.

With an eye on the oil and gas production in Egypt, Thom said, "we look at production since the year [at which] the field started production. So, you can see how much oil production comes from fields started up many years ago," adding that "mature fields have a large [segment in] shaping oil production." It is worth mentioning that around 40% of oil production comes from mature fields; hence, production needs to be sustained to avoid any change that may occur. Thom pointed out that when Egypt is compared with other countries in the region, it is found that "one of the core indicators [in Egypt] is the large number of companies that are active in the country."

Continuing his presentation, Thom mentioned a UK case study, where "the UK had a real crisis in 2014 as the production had fallen by two-thirds," he said, adding that

after this crisis, the government changed its strategies to deal with such an issue and maximize its economic recovery. Accordingly, the country created new regulator with new powers to drive stewardship, regulation and collaboration.

Thom brought up another case study in Oman. "In Oman, there has been a huge focus on enhanced oil recovery (EOR)," Thom said, noting that "if you look at the production between Egypt and Oman, I think Oman has extended and maintained its [Petroleum Development] PDO. It is looking to generate 25% of its production from EOR and with that comes some challenges." Moreover, Thom stressed that providing companies with a suitable framework and business models are essential to ensure success in brownfield redevelopment.

COMPETITIVENESS REINFORCEMENT

Following the presentation, Maher initiated the discussion by asking Farag about his opinion on reinforcing competitiveness as a vital way for stirring up investment opportunities to develop the Egyptian oil and gas sector. Farag stressed that the Ministry of Petroleum and Mineral Resources, under El Molla's leadership, spares no effort in implementing development strategies to promote the oil and gas sector in Egypt. He continued illustrating that one of the strategies Egypt has implemented is the economic reform program. "The economic reforms, supported by the Egyptian President Abdel Fattah El Sisi, has started [its] influence on the dynamics and the business development of our sector. Additionally, this is vital for attracting more global investments," Farag clarified.

Farag pointed out that the ministry began its promotion plans from 2016, bolstering opportunities in the Egyptian oil and gas sector, asserting that "the Ministry of Petroleum plays a central role in attracting investments by presenting Egypt's opportunities in international conferences and forums." Farag praised the presence of IOCs in Egypt, bringing their new technologies to help the Egyptian sector achieve its goals. Building on that, Farag mentioned the ministry's endeavors to attract IOCs including the huge decline in arrears in a record time of two years, the regional projects initiated in the Mediterranean Sea, the Red Sea, and the Western Desert, in addition to implementing a new gas pricing formula.

BEST OPERATING PRACTICES IN BROWNFIELDS

Speaking of the best practices to operate Egyptian brownfields, Neely commented that the deployment of new technologies is the dominating trend in our world today. He clarified that these technologies can improve the ability of the Egyptian sector in operating brownfields.



THE MINISTRY ESTABLISHED AN OPEN DIALOGUE WITH OPERATORS, SERVICE SECTOR, [THE EGYPTIAN GENERAL PETROLEUM CORPORATION] EGPC, AND EGYPTIAN HOLDING COMPANIES TO [ADOPT] A STRATEGY TO REVERSE THE PRODUCTION DECLINE.

GEO. ASHRAF FARAG

First Undersecretary For Agreements & Exploration - Ministry Of Petroleum and Mineral Resources



[IN CHEIRON,] WE HAVE A FOCUSED APPROACH. SO, WE HAVE TO KNOW WHAT WE ARE DOING... TO REMAIN MORE COMPETITIVE THAN ANYONE ELSE.

MR. TAWFIK DIAB

Chairman - Cheiron



IF WE HAVE THE RIGHT
FRAMEWORK AND THE
RIGHT TIMELINE, THE
OPPORTUNITY IS THERE.

MR. RANDY NEELY
CEO - TransGlobe Energy



SAUDI ARABIA, UAE,
IRAQ AND KUWAIT ARE
COMMITTED TO LONG-
TERM OIL PROJECTS AND
CONTINUE TO INVEST....
EGYPT IS RANKED THE SIXTH
FOR REGIONAL UPSTREAM
CAPEX.

MR. IAN THOM
Research Director Middle
East - Wood Mackenzie

Furthermore, Neely pointed out that "from a commercial perspective, we also look at new ways that enhance production, enhance development, something for us that we look at," illustrating that "it all goes back to economics, fiscal regimes, and whether we can employ technology to make that work better for us or not." Neely stressed the impact of new technologies on improving brownfields production.

ADOPTING APPROPRIATE BUSINESS MODELS FOR BROWNFIELDS REJUVENATION

Speaking about Cheiron as an IOC operating in the Mediterranean, the Gulf of Suez, and the Western Desert with many successes and discoveries in the recent years, Maher asked Diab about the main elements considered in the selection of an appropriate business model. Answering this, Diab agreed with what Thom mentioned in his presentation about the importance of investments in enhancing competitiveness, as well as highlighting Egypt's position in the world map. Diab remarked that "I think the key process is just to focus on our home. What we do is that we focus on the mature oil fields of the Gulf of Suez."

Additionally, Diab stressed on an important criterion while selecting a business model, which is "to make sure that you have specific competencies that fit [this business model]," adding that the business framework has to cope with the selected business model to achieve the targeted results. Supporting his opinion, Diab mentioned an example about Colombia, which suffered in 2003 from a low production capacity of around 600,000 barrels per day (b/d). Within five years, the country's production boosted to around a million b/d.

Moreover, Diab agreed with what Farag mentioned on the importance of technology, saying "the implement of technologies and Artificial Intelligence (AI) is critical. The oil and gas sector has been left behind in the application of AI, the application of big data, data science and machine learning. This is something that is applied in many areas and on many factors. I think if you incorporate this with the business model, it is going to be critical for the sector."

DRIVERS TO BOLSTER COMPETITIVENESS

Asking about the main drivers to bolster competitiveness, especially in brownfields, Thom explained that these drivers will mainly depend on what we need to address and develop. However, these drivers are mainly about technical progress, collaboration, having an access to infrastructure, benchmarking, and sharing best practices.

Additionally, Thom stressed the importance of having business models with an appropriate framework for the business success, especially in brownfields. Investing in brownfields means facing new risks and challenges that do not exist during early stages of production. Hence, a suitable framework and business models have a great impact on the sector's success.

CHEIRON'S MAIN STRIDES TO MANAGE BROWNFIELDS

With an eye on Cheiron's recent strides to manage and unlock brownfields' potential, Diab clarified that "[in Cheiron,] we have a focused approach. So, we have to know what we are doing... to remain more competitive than anyone else." Furthermore, Diab agreed with what Farag mentioned on the cruciality of attracting more investments to optimize production.

Additionally, Diab pointed out that Cheiron focuses on investing in stirring up production in the Gulf of Suez's mature fields, noting that "I think we are in an area where we are building our expertise and competencies." Furthermore, Diab referred to Cheiron's investments in the Western Desert, in collaboration with the North Bahariya Petroleum Company (Norptco), in addition to its activities in the shallow Mediterranean, where Cheiron works mainly in West Burullus.

MAXIMIZING RESOURCES DEVELOPMENT

Maher discussed the different endeavors of TransGlobe to maximize developing and recovering resources in the West Bakr, West Gharib, and North West Gharib. Neely commented that through the application of the right techniques, the company managed to adopt unconventional approaches, which resulted in achieving a 10% recovery of the reservoir. "So, we are talking about [achieving] around 25-26 million potential reserves," Neely added, highlighting TransGlobe's strategy to boost their production in West Bakr to reach 9,000 b/d.

Neely stressed on the vital role of implementing the new technologies to increase the company's production and reserves, noting that "if we have the right framework and the right timeline, the opportunity is there."

SUSTAINING COMPETITIVENESS AND BUSINESS MODELS

Speaking of the Ministry of Petroleum's planned bid rounds, Farag noted that "nowadays, we are preparing a strategy as the Ministry of Petroleum wants to prioritize the next bid rounds."

Closing out the panel discussion, Maher stressed the importance of sustaining competitive business models to enhance production, particularly from brownfields. Farag commented on the ministry's process to improve the Egyptian sector, "this process is based on transparency and consultation with our partners," explaining that "the ministry established an open dialogue with operators, service sector, [the Egyptian General Petroleum Corporation] EGPC, and Egyptian holding companies to [adopt] a strategy to reverse the production decline."

STRATEGIC PANELS

ENHANCING FOCUS ON BROWNFIELDS TECHNOLOGY

MODERATOR

ENG. MOHAMED FOUAD Managing Director Egypt Oil & Gas

As the Technical Upstream Convention held various panels on brownfield efficiency, industry experts came to be a part of edifying discussions. The second panel of the first day, which was moderated by Mohamed Fouad, Managing Director of Egypt Oil & Gas, was dedicated to enhancing focus on brownfield technology.

Panelists included the Egyptian General Petroleum Corporation's (EGPC) CEO, Abed Ezz El Regal; Senior Vice President of Halliburton, Ahmed Kenawi; the Vice President and General Manager of Apache, David Chi; and the President of Gaffney, Cline & Associates, Nathan Meehan. As Fouad introduced the panelists, he emphasized the need to discuss technology as it is one of the most important aspects in terms of production optimization when it comes to brownfields.

TECHNOLOGY AS A KEY ENABLER FOR THE SECTOR

According to Ezz El Regal, drilling is opening the door for many new opportunities on the horizon and many new technologies to be used in the ground. One of those opportunities that he stressed on is the digitalization of all drilling activities, explaining that with the latest data, it is inevitable to have better management, better efficiency, and higher economic return. This will also pave the way for big projects, utilizing the best technologies for different locations and leveraging seismic surveys accordingly, he said.

To make this in an economic way, the needed personnel should be developed for such technology, and to make use of the latest updates, training and evaluation are required. Through seismic, drilling, and development, the new technology is not limited to reservoir management, Ezz El Regal elaborated, adding that "the best utilization of the existing facilities and infrastructure [will facilitate maximizing production]."

Moreover, the CEO suggested that in order for such technologies to thrive, the government must sit together with international oil companies (IOCs) to discuss the best fiscal regime before proceeding with such technology. "I think, together with our partners, we can hire more people for research in companies," Ezz El Regal noted, mentioning that this will help in flourishing Egypt's future.

TECHNOLOGY VS COST EFFICIENCY

Nevertheless, it is important to note that there was a general consensus by the panel that technology does not necessarily mean high cost. As a matter of fact, Kenawi said, "the latest technology is meant to improve cost efficiency. I am very intrigued when we talk about technology; in my opinion, the key is how you can use the technology to lower the cost per barrel equivalent. The key is to bring technology that can increase your production or lower the cost. So, if we put a lot of budgets in increasing the reliability of the tool, then you can increase the efficiency and you can make a better lower cost per barrels of oil equivalent (boe), or you can increase as well the production."

Kenawi also mentioned that the need to collaborate is a fundamental thing that Halliburton discovered; as collaboration will eventually either lead to production increase or cost efficiency. Collaboration can come in many ways, he said; for instance, there should be a need to collaborate with the operator, as well as a need to collaborate with the governmental bodies. "It is a very huge span of things, that if you do not collaborate and bring only the technology to apply it, it will fail," Kenawi said.

MATURE FIELD OPTIMIZATION

Chi focused on the brownfield solutions that can be introduced to the table. "Basically, trying to enhance recovery really changes the picture of oil production for Egypt," he said, explaining that from the government to service providers to operators, all sectors should be working together towards a common goal.

On the other hand, Meehan shared his opinion regarding mature field optimization and the risk it can bring along with it. "If you look at the risk reward range of opportunities, clearly the highest risk reward is in the exploration world, and mature fields tend to relatively [have] high risk and high reward," Meehan thought.



THE BEST UTILIZATION OF THE EXISTING FACILITIES AND INFRASTRUCTURE [WILL FACILITATE MAXIMIZING PRODUCTION].

ENG. ABED EZZ EL REGAL
CEO - EGPC



BASICALLY, TRYING TO ENHANCE RECOVERY REALLY CHANGES THE PICTURE OF OIL PRODUCTION FOR EGYPT.

ENG. DAVID CHI
Vice-President & General Manager – Apache





THE LATEST TECHNOLOGY IS MEANT TO IMPROVE COST EFFICIENCY. THE KEY IS TO BRING TECHNOLOGY THAT CAN INCREASE YOUR PRODUCTION OR LOWER THE COST.

ENG. AHMED KENAWI
Senior Vice-President - Halliburton



IF YOU LOOK AT THE RISK REWARD RANGE OF OPPORTUNITIES, CLEARLY THE HIGHEST RISK REWARD IS IN THE EXPLORATION WORLD, AND MATURE FIELDS TEND TO RELATIVELY HIGH RISK AND HIGH REWARD.

DR. NATHAN MEEHAN
President - Gaffney, Cline & Associates

Meehan recounted a previous debate he had on how the budget of large mature field projects should be allocated. What he came up with was that large capital spending on mature fields is almost always justifiable, as it rarely ever fails. According to Meehan, any effort or capital spent on mature field optimization is never lost because the field's production always exceeds its level. Thus, one has to put the work in and analyze the process carefully to achieve targeted results, he said.

"The one thing I can assure you from any industrial manufacturer process is that the more you make of the same thing, the lower your well costs," Meehan remarked.

"You can always be faster when you look at the kind of analysis that you can optimize via frac, which is almost always integral to optimizing old fields. The blocking attack, as we say in American football, of mature field optimization is how you get the most out of your assets," Meehan explained.

IMPROVING EGYPT'S TECHNOLOGICAL ENVIRONMENT

Ezz El Regal weighed in on the technological environment in Egypt and how it can be improved, saying that it all starts with having a robust education system which will be a continuous source of information for not just students, but engineers as well. "All of this should be transferred from academic study with technology application," he said, stressing that this is not solely restricted for academia, but for research as well.

These research centers should develop human resources with a diverse set of skills, Ezz El Regal added. He also said that this should be supported and backed up by the Ministry of Petroleum and Mineral Resources, headed by the minister himself, in addition to the ministry's partners and IOCs. "There is always a continuous dialogue between us, foreign partners and IOCs," he said.

Besides, the technical and economic model should be ever-changing as the oil sector has continuous nature to evolve. Ezz El Regal further elaborated, saying that this changes the mood from one investment to another.

Ezz El Regal stressed that with Egypt's qualified human resources, coupled with technology innovations, "I think the potential is here," he said, adding that "we just need to look at the tendering process." According to the CEO, targeting human resources is a way to talk to different people and let them actively participate in bid round. Thus, "we should empower them to make the right decision," he added.

As technology is another enabler, he further said that it is not just about technology but how to run your business, analyses, and how to make resources economic.

Chi, on the other hand, noted that improving safety and efficiency should come as a top priority for service providers in Egypt as well as operators. "You need to look at value creation," he pointed out, indicating that it is one

way to improve safety and efficiency, and thus, improve the whole technological environment.

Chi also added that working with IOCs will facilitate operations, especially in the upstream as it depends on diverse roles. "If we work with IOCs [for opportunities], I think we have a lot to do with them and all of us will win," he added, noting that there is a need to go in a full collaboration with IOCs, where one can work hand in hand with an operator.

BROWNFIELDS WITHIN THE MARKET

Speaking of technological evolution, Kenawi shared his insights on today's evolving technologies, saying that one can look sideways and see the different kinds of advancements everywhere; one technology can go up to 100 feet (ft) in depth one way while another can go 50 ft in depth the other way as there are a lot of new technologies in the Electric Submersible Pump (ESP).

Kenawi also recommended that we should apply the technology needed for a specific challenge, which might not necessarily be a new technology. "You need to understand what is the challenge exactly and you can apply the technology," he said, giving an example of the unconventional in the US, which accounts for 10% of the global market and require a very specific kind of technology.

Nevertheless, there should also be an endeavor to reduce the amount of equipment on the challenge/site, Kenawi said. Although this is not a new technology, but it can either lead to creating a new opportunity or a new challenge. "I think we are in a very good era that the technology now is focused again on either increasing production or lowering cost. And Egypt has a fundamental, very good reservoir in the brownfield," he said.

ON THE UPSTREAM MODERNIZATION PROJECT

"Working with IOCs, different cultures, different technologies, all this is collectively going to help have a transparent technology, better solution, and better vision for the existing [facilities] to transfer the success story and to avoid failure," Ezz El Regal concluded.

Giving one last piece of advice to the audience, Meehan said, "taking risks sometimes is going to involve some failures, but if you do not have a system that encourages that, then you do not have successes to go on."

Chi said, "You have to analyze and prioritize each project," emphasizing that with digital capabilities, operators should seize the chance to keep on expanding day by day.

STRATEGIC PANELS

IMPROVE PRODUCTION AND COST EFFICIENCY

MODERATOR

ENG. IMAN HILL Chief Operating Officer - Energean

The first strategic panel discussion on the second day of the third Technical Upstream Convention saw four oil and gas experts discussing how to improve production and achieve cost efficiency.

The panel featured some of the most prominent figures in the oil and gas industry giving their views on the topic. Osama El Bakly, Chairman of the Egyptian Natural Gas Holding Company (EGAS), as well as representatives from three of the largest International Oil Companies (IOCs) operating in Egypt were in attendance to give their views. The representatives included Khaled Kacem, Vice President, Country Chairman and Managing Director at Shell Egypt; Sameh Sabry, Senior Vice President and Managing Director of Egypt at Wintershall Dea; and Jeroen Regtien, CEO of Scimitar.

Moderating the discussion was Iman Hill, Chief Operating Officer (COO) of Energean. Hill led the panel noting that brownfields represent around 65% of global production, adding that it is a global challenge to optimize brownfields. Hill highlighted the importance of "chasing diminishing resources, and asset integrity investments to ensure that people and then environment are kept safe," emphasizing the significance of "the smart deployment of technology and the ruthless procedure cost efficiencies in order to keep mature assets or brownfields as economic for as long as possible."

MODERNIZATION, BROWNFIELDS OPTIMIZATION

The panel kicked off mentioning the Ministry of Petroleum and Mineral Resources' Modernization Project. "One of the Modernization Project pillars is working on upstream, which means boosting production of brownfields," El Bakly noted, adding that brownfields have been a point of global interest and that Egypt managed to double production with a new asset.

"It is not very difficult to identify where you can optimize brownfields," Sabry stated, adding that by examining the full value chain of brownfields, operators could identify the main issue needing the adjustment of the declining production.

"The beauty in Egypt's oil industry is that it has a very widespread data, it has assets, and it has diversity of everything," El Bakly stated, explaining that when operators need to optimize operations and costs as well as boost production to reach recovery, the necessary means are available.

Some technological applications need to be expanded in Egyptian brownfields, as the oil and gas sector "needs to adopt more of the technologies that are not fully implemented in Egypt like horizontal drilling and fracture stimulation," Sabry explained, adding that "adjusting the production decline is one of the key challenges of course." Sabry pointed out that enhancing brownfields performance is further affected by cost optimization policies as well as overburdening the brownfields.

Kacem agreed noting that "increasing production and reducing costs is indeed important for all the investing companies." According to Kacem, Shell believes that developing and creating upstream projects are important to the development of the oil and gas market.

Meanwhile, Regtien compared mid-life brownfields with end-of-life brownfields, "In mid-life brownfields you still have the opportunity to invest significantly, really increase production and extend the field's life." Regtien explained that the technologies are available around and operators need to challenge everything from commercial practices and strategies without losing all the experience earned from past projects.

El Bakly disagreed stating that "there is nothing called 'dry' in our industry." He emphasized that Egypt is "leaving every field with existing hydrocarbon, but it is looking for optimized technical solutions" to face this challenge. However, El Bakly explained that not every technology is applicable in the Egyptian oil and gas sector and operators need to choose the technology that best suits their needs.



THE BEAUTY IN EGYPT'S OIL INDUSTRY IS THAT IT HAS A VERY WIDE-SPREAD DATA, IT HAS ASSETS, AND IT HAS DIVERSITY OF EVERYTHING.

ENG. OSAMA EL-BAKLY
Chairman - EGAS



ASSET INTEGRITY IS IMPORTANT AND IT IS NOT ONLY TO AVOID INTERRUPTING PRODUCTION, BUT ALSO AS IN EGYPT'S FACILITIES IN BROWNFIELDS, FAILING EQUIPMENT CAN LEAD TO SERIOUS HSE PROBLEMS.

MR. SAMEH SABRY
Senior Vice President- Managing Director Egypt - Wintershall Dea





THIS INITIATIVE IS IN FACT THE TRANSFORMATION PROGRAM THAT IS CALLED 'FIT FOR THE FUTURE', WHICH IS AIMED AT OPERATING ASSETS MORE SAFELY, LIVELY AND COST EFFECTIVELY.



ENG. KHALED KACEM

VP Egypt, Country Chairman and Managing Director - Shell Egypt



SOMETIMES ONE NEEDS TO TAKE A STEP BACK AND LOOK AT IT MORE REALISTICALLY AND MAKE MORE OF AN INTEGRATED PLAN THAT REALLY ALLOWS THE COUNTRY TO OPTIMIZE THE VALUE OF OVERDEVELOPMENT.



ENG. JEROEN REGTIEN

CEO - Scimitar

INTEGRATION, HSE SIGNIFICANT FOR OPTIMIZING BROWNFIELDS

During the panels, the four industry leaders spotted light on the importance of integration and HSE in boosting brownfields performance. "Egypt is very operational and that is one of the strengths of Egypt, but sometimes one needs to take a step back and look at it more realistically and make more of an integrated plan that really allows the country to optimize the value of overdevelopment," Regtien stated.

Kacem mentioned operational excellence, shedding light on safety, adding that the operators "never jeopardized safety and asset integrity."

Meanwhile, Sabry talked about failure of running assets, explaining that having operation failure is not the only threat for the oil and gas field, but from an HSE perspective, it is unacceptable. Sabry also added that it affects efficiency and production, noting that integration and HSE are other leverages used to optimize brownfields.

Sabry emphasized that "asset integrity is important and it is not only to avoid interrupting production, but also failing equipment can lead to serious HSE problems," stressing that HSE is the ultimate priority for everyone in the oil and gas industry.

SUCCESS STORIES

The distinguished panelists reviewed successful projects of brownfields optimization implemented in Egypt. Kacem shared with the audience an initiative launched by Shell in 2015. "This initiative is in fact the transformation program that is called Fit for the Future, which is aimed at operating assets more safely, lively and cost effectively." The initiative has standardized working methods and recognize the available opportunities based on benchmarks and comparisons with competitors.

Badr El Din Petroleum Company (Bapetco) "managed to realize and sustain significant cost reduction improvement," Kacem explained as an example of the initiative implementation in Egypt. Kacem also added that "in 2019, Bapetco suffered from zero days of nonproductive time, compared to almost 70 days in 2018." Kacem further gave an example of Shell's success in Egypt via the Phase 9B of the West Delta Deep Marine (WDDM), which produced natural gas five months ahead of schedule.

Regtien discussed the Issaran field in the Egyptian Eastern Desert, in which Scimitar used the campaign approach in the second phase, followed by drilling in the third phase. Regtien mentioned attention given to details, systematic approach and dealing with progressive opportunities.

REQUIREMENTS OF BROWNFIELDS OPTIMIZATION IN THE FUTURE

Towards the end of the strategic panel, the four prominent figures expressed their views on what the future of brownfields need. Regtien noted the need to have campaigns, explaining that campaigns give operators "leverage in procurement, in contact, it gives them operational efficiencies." Regtien also mentioned that his company was able to decrease cost by 40% after half a year of adopting it. Regtien further stated that the oil and gas operators need to challenge the status quo and to ask questions.

"In order to be able to [achieve sustainability], the oil and gas sector has to continue to reduce unit operated costs, increase availability, but enhance wells, reservoirs and facilities management," Kacem noted, adding that it is important to spread the culture of discipline, action orientation, accountability, as well as competitiveness.

El Bakly declared that Egypt has a lot of oil and gas potential and what is needed is "the involvement of all individuals, all companies, and all sides because this is how it could [help] develop the good future of the industry" adding that it further needs "to work on the skills of the new generation," he said, stressing on the importance of empowering young professionals. EGAS aims to double production through exploration and development to face the declining production while working on extensive developing plans, according to El Bakly.

"It is very important that the fiscal regime in Egypt would recognize the particularities of brownfields," Sabry concluded. Studying suitable technologies and the involvement of all parties would help the North African country optimize its brownfields, reduce costs and comply with regulations to ensure the safety of people and assets.



STRATEGIC PANELS

OPTIMIZING HUMAN CAPACITY

MODERATOR

ENG. COLBY FUSER Vice President, Egypt and Libya - Halliburton

The last panel of the second day of the Upstream Technical Convention witnessed a discussion between four prominent figures of the industry discussing the steps taken by the Ministry of Petroleum and Mineral Resources, in cooperation with international oil companies (IOCs) to maximize the efficiency of human capital. The panel was moderated by Colby Fuser, Vice President at Halliburton, Egypt and Libya.

Panelists included Osama Mobarez, Undersecretary for Technical Office at the Ministry of Petroleum and Mineral Resources; Hesham El Amroussy, Chairman and Managing director at ExxonMobil Egypt; Karim Badawi, Managing Director Egypt and East Mediterranean at Schlumberger; and Hussam Abuseif, Director and General Manager Egypt, Sudan and S. Sudan at Baker Hughes.

MIDDLE MANAGEMENT PROGRAM

Fuser started the discussion by praising the Egyptian talents. "Optimizing the human capacity at the oil and gas sector is not new to Egypt," Fuser said, adding that "everybody who is working around oil and gas business has worked around a boss or a leader or someone who has been very influential in the business who has come from Egypt."

The panelists started talking about the several cooperative agreements that the ministry signed with a number of IOCs to train young and middle management talents to prepare them for the future as a part of the ministry's Modernization Project. Mobarez explained that "the middle management program was initiated by a request from H.E Eng. Tarek El Molla," who wanted to have an apt tool to discover talents.

According to Mobarez, the sector faced a challenge as the gap between top leaders and young generation widened. As a result, the ministry has been working on several tracks in the Modernization Project to face those challenges by devising a succession plan for the CEOs and top management of the sector with a very strong database of competence. Mobarez continued referring to the initiatives and programs the ministry is working on in the third pillar of the Modernization Project especially the middle management program, which he mentioned that "fortunately all the panelists including the moderator have been supporting."

Badawi agreed stating that "human capacity is at the forefront to enable all the changes the sector wants to

bring about in the industry to make it the leading industry in Egypt."

Building on what Mobarez said, El Amroussy clarified that in order to decrease the gap between leaders and professionals, the sector "needs professionals who value the fundamental business principles. That is an easy key when the sector talks about safety, integrity, transparency, and doing the right things, the right way every day," adding that the sector needs professionals with leadership skills. He highlighted the importance of developing the professionals' understanding of technological trends and preparing them to challenge the status quo and biases. According to El Amroussy, the industry "needs leaders who can create an environment where everyone feels empowered to take reasonable business risks, empowered and safe to make mistakes, but learn and move on."

El Amroussy praised one of the successful training programs designed by the oil and gas committee in the American Chamber of Commerce (AmCham) targeting the empowerment of the middle management, covering the gap between academia from one end and practical business from the other end. He also mentioned that the panelists were involved in developing this program and that the outcomes were impressive.

Abuseif commented on the leadership components that came out of the middle management program, expressing his beliefs that leadership is built through experience. He stated that the program was structured like a project in which a leader is responsible for a candidate and shadows him to be exposed to a different way of decision-making in the sector.

IOCS PARTNERSHIP

El Amroussy pointed out to other successful training programs, mentioning that ExxonMobil Egypt introduced the Youth Engagement Program in 2019, in which it has been trying to connect with high-school students.

The discussion revolved around the role of IOCs in the



THE MIDDLE MANAGEMENT PROGRAM IS ONE ELEMENT, BUT MOP HAS DIFFERENT SEGMENTS OF THE POPULATION OF THE SECTOR: IT HAS YOUNGER PEOPLE, THE MIDDLE MANAGEMENT AND ALSO OLDER PEOPLE.

MR. OSAMA MOBAREZ

Undersecretary for Technical Office
Ministry of Petroleum



HUMAN CAPACITY IS THE FOREFRONT TO ENABLE ALL THE CHANGES THE SECTOR WANTS TO BRING ABOUT IN THE INDUSTRY TO MAKE IT THE LEAD INDUSTRY IN EGYPT.

ENG. KARIM BADAWI

Managing Director Egypt & East
Mediterranean Schlumberger





THE INDUSTRY NEEDS LEADERS WHO CAN CREATE ENVIRONMENT WHERE EVERYONE FEELS EMPOWERED TO TAKE REASONABLE BUSINESS RISKS, EMPOWERED AND SAFE TO MAKE MISTAKES, BUT LEARN AND MOVE ON.

ENG. HESHAM EL AMROUSSY
Chairman and Managing Director
ExxonMobil Egypt



SOMETHING WAS VERY INTERESTING TO US FROM A GLOBAL PERSPECTIVE, WHICH IS THE TRANSPARENCY AND THE SELECTION CRITERIA IN THIS PROGRAM.

ENG. HUSSAM ABUSEIF
Director & General Manager Egypt,
Sudan, and S. Sudan – Baker Hughes

training programs. Badawi agreed with Mobarez and El Amroussy on the importance of developing human capital in regards to the needs of the industry. He shared Schlumberger's role in the middle management program, saying "Schlumberger was involved in close collaboration with Mobarez and the ministry in developing the middle management foundation whereby we had the honor of having 120 middle managers who have been selected from the industry to have and share knowledge in terms of ethics, compliance, soft skills and how safety has to be at the forefront and in terms of priorities, decision-making and enabling a safe environment for our stakeholders within the sector."

Baker Hughes has also been involved highly in the development programs. Abuseif praised the selection process of the candidates, saying that "something was very interesting to us from a global perspective, which is the transparency and the selection criteria in this program," adding that "this gave the partners a lot of confidence in moving on in the program." Meanwhile, Mobarez highlighted that the transparency of the selection process was critical to the ministry, on that account, all the selection steps are done online.

Abuseif tackled some of the program's elements of success, such as the selection process, the timing of the program, and its alignment with what the industry needs. He added that the program is developing the right segment from the middle sector, becoming sustainable with the changes happening in Egypt. Additionally, the program has been handling aspects like integrity, compliance, and interaction with different venues and channels, increasing its efficiency.

SUSTAINABILITY

Abuseif mentioned that there are some learnt lessons out of the program and some points that need to be refined in order to sustain this success. Mobarez agreed with him and added that the middle management program was not the only project the ministry is working on in order to sustain the human capital's development.

Mobarez pointed out that the development programs are done for the first time, and therefore, are experimental from the side of the ministry and the participating companies. He clarified that the programs evolved to be efficient, but as Abuseif mentioned, there are some lessons learnt, and the ministry is trying to digest those lessons and plan for the next phase of the middle management program.

The Ministry of Petroleum and Mineral Resources is keen to sustain the success of the middle management program. Mobarez expressed that this should not be a one-time program as the oil and gas sector needs to give the opportunity to as many individuals as possible. He continued explaining that "the middle management program is one element, but the ministry has different segments of the population of the sector: it has younger people, the middle management and also older people. So, what it is working on is programs for all those different segments and hopefully, within the following weeks, it will be developing the next batch."

Talking about the sustainability programs, Badawi explained that the sector needs to look from a business aspect and context, adding that "when the sector looks in terms of infrastructure support and the leadership support, the middle management program is not a word exercise or sets of slides. It is a structure and there is a follow up on it, and hence, it provides the framework to make sure that this is not an individual initiative that is dependent on one specific company, it is an initiative which is engrained in the DNA of the oil and gas sector."

The program has evolved since its first batch and this was due to the adaptability of change from the candidates' side and the companies' side, according to Badawi, who noted that the adaptability of change and the program's benefits will sustain the success of the program.

WHAT IS NEXT?

About future plans, El Amroussy stated that ExxonMobil plans to continue supporting the youth engagement programs in 2020. Introducing the sector to potential employees is one of the elements of preparing youth from an early stage to work in the sector. According to El Amroussy, establishing a knowledge transfer system is important and having a sustainable mechanism of transferring knowledge is endured by the oil and gas sector programs and the AmCham training programs.

Mobarez supported El Amroussy's view on transferring knowledge, commenting that "one of the main objectives of these programs is not just to develop those people, but also for them to be change agents and advocates of modernization within their companies." He added that this is one way to sustain the continuity of the development programs. Mobarez also went through the future programs the ministry is going to make, which include all the segments of the human capital in the industry. In addition, the plan includes a program for the line managers, but is still in progress as part of the succession plan.

Moreover, Abuseif suggested that universities need to start teaching technologies like artificial intelligence and analytics rather than the normal mechanical or electrical engineering as they became the new requirements for developing the sector.

The future plan of the ministry also has a focus on HSE standards. Mobarez explained the safety challenges, which are the culture and the leadership. He explained that "one of the highlights of the middle management development is HSE practices and leadership." Thus, the ministry is trying to do its part regarding HSE. HSE is starting to be an integral position in Egypt thanks to El Molla. Mobarez further noted that "no one can have a leading position on top management position unless he gets into an HSE position first." He concluded that the ministry is taking strides in HSE, leadership, and culture.

TECHNICAL WORKSHOP

VALUE CREATION FROM BROWNFIELDS



CHAIR BY:

ENG. JEFF EDELMAN, Deputy Country Manager and JV General Manager - TransGlobe Energy

DR. RAND AL-OBAIDY MUSTAFA, N. AFRICA BD MANAGER AND SENIOR RE - Gaffney, Cline & Associates

The first day of the convention was concluded by a technical workshop about the technologies and new scientific tools that create material value in brownfields along with some successful case studies.

RTA IN FIELD DEVELOPMENT

Mohamed Gallab, Reservoir Engineer and Department Head at Khalda Petroleum Company (Apache), made a presentation about the use of modern production analysis, especially Rate Transient Analysis (RTA) in multi-layer stratigraphic reservoirs. Gallab started the presentation with an explanation of the challenging nature of a field with stratigraphic style. He stressed that it is very important for the project's economics to have good estimation of the oil reserves in the Western Desert. Gallab clarified that "analytical approaches are primary reservoir engineering techniques for understanding reservoir characteristics which create additional value."

Using the traditional method of volumetrics and geological mapping of the reservoir showed uncertain data in a particular field in the Western Desert. "The classical Material Balance (MBAL) method is considered to be broken down temporally, so modern production analysis came to fill the gap and treats the shortage of the previous conventional methods," Gallab added. He stated that modern production analysis is used to evaluate reserves with greater reliability as the data resulted is accurate. In addition, it is used to monitor production performance and also characterize the reservoir in terms of damage areas, pressure, and rate which can be obtained with minimal cost using modern production analysis.

Moving to the actual case study conducted using RTA, which is the discovery Well-1X, Gallab focused on the AEB-3A3 reservoir, which is a thin sandstone reservoir. The reservoir produced 1,000 barrels of oil per day (b/d) and a drained volume of half a million stock tank barrels. The analysis showed a deviation from the harmony line which is an indication of flux, an excellent match on reservoir productivity index and abundance of static pressure points post drilling Well-9, and Well-11. Analyzing the reserves of wells

and 1.5 million barrel of oil (mmbbl) are the fruits of using RTA analysis. The presentation went through the benefits of using RTA like determining the reserves and being able to formulate a strategy to develop reservoirs. Gallab added that if analytical solutions like RTA and Pressure Transient Analysis (PTA) are combined together, they can provide good characterization for the reservoir and improve the quality of results.

FROM CONCEPT TO EXECUTION

Ahmed Fouad, Subsurface Manager at Schlumberger, made a presentation about the integrated exploitation philosophy on behalf of Claudie Fonseca, APS IOR, EOR expert-Western Hemisphere at Schlumberger. Fouad said that the team in Latin America was able to "increase production by 25% in the fields," and enhance the recovery of those fields. The project targeted at increasing the reserves, he added "if we are seeking sustainment, we need to ensure that we keep getting more reserves."

Fouad tackled a case study from Ecuador in a field called Block 61 which consists of 14 fields. Before the study, the Original Oil In Place (OOIP) was 3.5 billion barrels and after the study, it increased to 5.3 billion barrels, Fouad stated. "The recovery factor was assumed to be 20%, but after applying the new technology, now we have only 12%," Fouad clarified. The team integrated 14 fields in terms of study. Integration and collaboration between the models used were crucial to know the changes "in oil water contact and how this is impacted the volumetric in the block," according to Fouad.

Fouad added that the "exploitation philosophy is to tackle the business problems that you have" and to try to develop a technology where you can make the injection without any connectivity, bringing new pipelines into the project.





The team started studying different driving forces in different reservoirs, taking into consideration the reservoir compartmentalization, stratigraphic nature and the wellbore conditions, in order to be able to deliver the Enhanced Oil Recovery (EOR) promise.

The team used analytical and numerical tools to study the field initial conditions and to weigh the possibility of using water injection to increase the recovery.

He explained that horizontal development was a key in recovering reservoirs along with water injection, which was the long plan for solving problems in some layers. "As a result we increased the production by 20,000 barrels," Fouad stated.

Fouad concluded that using analytical tools helps in integrating technologies, having flat production from the wells, and also increase its reserves.

WEST BAKR DEVELOPMENT

The third presentation was given by Mahmoud Tolba, Petroleum Engineering General Manager at West Bakr Petroleum Company. Tolba discussed in his presentation how "the company doubled the production of West Bakr after four decades of production." Tolba explained that the company's integrated plan was set in 2016 and they have reached their goals of doubling the production and reducing the operating cost in 2018. Tolba illustrated that the plan depended on five pillars: unlocking oil potential, freeing water disposal constraints, freeing oil handling constraints, tracking and analyzing well failures, and selecting durable Artificial Lift Systems (ALS).

Tolba tackled the results of the plan by specifying the target handling capacity in the two main oil and water treating facilities; K and H. According to Tolba, "the company has doubled the handling capacity of K station and it reached up to 30,000 BPF," and its past capacity was 15,000 BPF. In addition, the targeted capacity in 2020 is 45,000 BPF. Similarly, the handling capacity of H facility has increased from 7,500 BPF to 15,000 BPF and the targeted handling capacity in 2020 is 25,000 BPF. Moreover, the water disposal capacity has been upgraded as well. Regarding water disposal wells, Tolba mentioned that "instead of drilling a new exposure well, we have used the P&A wells and this saved a lot of money actually, more than 50%." Tolba showed that impact of the inter-track software in identifying the root cause of failure and assisting in its analysis. Tolba added that using Progressive Cavity Pump (PCP) has increased well production and reduced the actual cost per barrel from \$8.9 in 2014 to \$6.7 in 2019.

Tolba concluded by stating that the "West Bakr team has succeeded in increasing the production by 30% in the Fiscal Year (FY) 2018/19."

FAULT INTERPRETATION DOUBLE FIELD PRODUCTION

The fourth presentation was carried out by Said Faramawy, Geology and Geophysics (G&G) Coordinator at Eni. The presentation tackled increasing production in brownfield in Northern and Western Deserts and in Bahariya reservoir. The workshop was entitled How a New Fault Interpretation Led To Double Field Production.

The project started with analyzing the data of production in which Faramawy stated that, "the team found a mismatch between the OOIP has been calculated in last reservoir case study and cumulative production especially in lower Bahariya." Faramawy clarified that this mismatch could be due to lack of allocation or underestimation of OOIP and the two reasons have been re-evaluated.

Faramawy explained how seismic re-interpretation and re-mapping of performed for Upper and Lower Bahariya added new wells and opened new oil areas. Faramawy added that the ordering of the drilling campaign is a key of the case's success. "The campaign was done in six months during 2018, and 2019 with eight infill wells that had been drilled with total rate of 2,500 barrels," Faramawy confirmed. "The wells production varies from 130 [barrels of oil per day] bbl/d to 600 bbl/d," which depends on the location of the wells, Faramawy explained. He added that the wells are located in Lower Bahariya except for one well with low production that is located in Upper Bahariya.



Faramawy concluded by highlighting the importance of detailed analysis and new fault interpretation that paved the way for increasing production in brownfields.

HILAL REDEVELOPMENT SUCCESS STORY

The last presentation was delivered by Mahmoud El Ghalid, Senior Reservoir Engineer at GUPCO. The presentation was about re-accessing and re-developing Hilal field in the Southern Gulf of Suez. After going through the historical background of the field, El Ghalid showed the field's development phases which ended with securing the wells to keep the platform safe in 2007. "The problem at that time was how to re-initiate the production from the platform and how to access the remaining reserves," El Ghalid added.

The team depended on a re-development plan to decide which way they will choose to re-access the reserves of the field. The company used field structure and mapping, Petrophysical Parameters Analysis and Pressure, Volume, Temperature (PVT) data for correlating the fluid properties for the three productive zones of Hilal field.

Reassessing the volume of reserves in the field was essential to determine a way of re-accessing the field, so the benchmarking technique was used, El-Ghalid explained. "The benchmarking technique's objective is mainly to give us which formation has the most value," as El Ghalid clarified. It relies on a relationship between a term called static complexity score and the associated recovery factor of this score. The score was calculated for the productive zones of Hilal field; El-Ghalid illustrated in detail the score of each zone. After defining the field's potential, "the team concluded that they have estimated 14.1 million barrel of oil that needs to be produced," El Ghalid added.

According to El Ghalid, to produce this estimated number after collecting different data on different levels, the company needs to choose between repairing the platforms with a cost of \$148 million or drilling new platforms with a cost of \$185 million. El Ghalid concluded that the company has chosen to drill new platforms, although it is more expensive "due to structural integrity of the current existing wells that has impaired fatigue resulted by high deflections of conductors experienced over the last 10 years."



TECHNICAL WORKSHOP

INNOVATIONS IN APPLIED TECHNOLOGIES



CHAIRMAN BY: ENG. COLBY FUSER, Vice President, Egypt and Libya – Halliburton

The second day of the convention included a workshop with five presentations on Innovations in Applied Technologies and was chaired by Colby Fuser, Vice President – Egypt and Libya at Halliburton.

LOW SALINITY WATER TREATMENT

Moustafa Oraby, Petroleum Engineering Professor at the American University in Cairo (AUC), introduced a presentation, entitled Increasing Brownfields Oil Recovery and Solving their Reservoir Characterization Challenges with a Simple Low Salinity Water Treatment.

Oraby explained that the AUC team conducted research that aims to solve challenges using low salinity (LoSal) water injection. "Low salinity water injection is not something new, people thought about it for some time," Oraby noted, adding that it brings values of "increasing production, but increasing the production comes with some kind of challenges to the reservoir. Operators are actually injecting water that has different properties than the formation water. That mix will generate a huge challenge for both the new drilled wells" and the existing reserves.

Yet, using acids or alkaline would maintain the salinity of the LoSal water, attain a high recovery factor, reduce resistivity, and boost the Sigma of the LoSal to the exact level of the original water. Hence, treated LoSal water could be applied on several fields in Egypt to boost the hydrocarbon recovery, Oraby pointed out.

ADVANCED CT LOGGING SYSTEM

Amr El-Farran, Engineering Lead at Halliburton, carried out a presentation entitled Advanced Coiled Tubing Logging System Succeeded with Providing Downhole Logging Data in Sour, Black Oil, and Highly Deviated Wellbores.

El-Farran's presentation tackled a case study completed by the Gulf of Suez Petroleum Company (GUPCO) for logging or coiled tubing, addressing production from Kareem and Asl reservoirs.

The company faced several challenges, according to El-Farran, including conventional e-line inaccessibility, heavy oil producers, sour environment, logging with Production Logging Tool (PLT), Reservoir Monitoring Tool (RMT), requiring perforation, and expected scale accumulation within the wellbore.

The solutions followed to tackle these challenges included; performing conventional coiled tubing work along with logging applications, as well as adopting advanced coiled tubing in order to allow the deployment of logging tools with surface readout and control, El-Farran explained.

"The company has performed this campaign with 27 runs of the coiled tubing, and six conventional clean outs with the same oil," adding that they spent over 20 days in sour wells running six PLT, three RMT, and 12 perforation runs.

"With the running time, the company was able to increase the efficiency of operations running two perforating runs per day," due to easy-to-connect tools, El-Farran noted. "The company saved 34% of the budget of this project, and was able to add 2000 barrels of oil per day (b/d) to this platform," he added.

ACTIVATING FIELD-WIDE INTELLIGENCE

The third presentation of the workshop was conducted by Jose Isamberth, Senior Petroleum Engineer at Weatherford, under the title of Activate Field-wide Intelligence to Maximize Production.

Isamberth's presentation tackled the role played by integrating brownfields in optimizing production, explaining that "integration is the key for success. Industry leaders need to develop more power users. They need to maintain a continuity of the identified tasks and processes," he noted.





The presenter further discussed cloud computing and analytics that are now a reality in the oil and gas industry.

Isamberth discussed having an integrated approach for well data, reservoir fluid data, network facility data, production data, well test database, real-time data, and simulation output forecast.

Isamberth presented a real case scenario of remote station debottlenecking, stating the objectives as identifying potential output gain through opening up healthy wells with developed station pressure limits, as well as recognizing the choked back healthy wells. This results in analyzing potential output gain under the debottlenecking condition, having healthy choked back wells opened for surveillance, and carrying out slugging studies to locate the low station pressure source. The real case scenario proved that the usage of Asset Integrity Management (AIM) model helped in reducing debottleneck and boosting output gain by over 2.5%, and the method improve asset revenue objectives.

AUTOMATED DRILLING PERFORMANCE

Ahmed Hussein, Drilling Engineer at Khalda Petroleum Company, gave a presentation on Automated Drilling Performance Optimization in Khalda Petroleum Company.

The presentation's main objective is to "represent the application of automated drilling technologies to optimize the drilling performance in the Western Desert of Egypt," Hussein stated.

Hussein discussed real-time drilling Rate of Penetration (ROP) explaining that the main target is achieving higher ROP. Moreover, he explained that "operational efficiency software and workflow focused on gauging the rig activity and optimizing the drilling practices."

Further discussing the pilot project, Hussein noted that it proved to boost drilling performance with on-bottom ROP by at least 24% while alleviating serious drilling dynamics to maintain bit and Beta Hydroxy Acid (BHA) life. Moreover, it leads to seven days well delivery reduction compared to the offset well.

INVENTIVE HYDRAULIC FRACTURING PROPPANT PLACEMENT

The final presentation entitled Inventive Hydraulic Fracturing Proppant Placement Halting Flowback Problem: Case Study, Sinai, Egypt was made by Mostafa Kortam from Belayiem Petroleum Company (Petrobel).

The presentation was divided into three sections, starting with problem identification and deviation from ideality. Kortam discussed the difficulty of having dissatisfactory results from fracturing as it could damage reservoir permeability due to polymer leak-off as well as saturation changes. It could further decrease relative permeability changes generated by phase changes.

The second section of the presentation reviewed proppant flowback and its implications including; fracture conductivity loss, extended clean up period, required workover, productivity loss, and damaged lifting pumps.

During the third section, Kortam pointed out that the new application in which the proppant mixture consists of 10% by weight of angular proppant and 90% by weight of spherical proppant, is characterized as bauxite material. The "new application is considered an image changer for optimum fracturing performance," Kortam noted, as the new modified proppant type would fit all sandstone nature in any reservoir fluid.

The five technical presentations were rich with data, studies and innovative technologies that would help optimize Egypt's brownfields in the near future.



DR. MOUSTAFA ORABY
Petroleum Engineering Professor
at the American University in
Cairo (AUC).



OPERATORS ARE ACTUALLY INJECTING WATER THAT HAS DIFFERENT PROPERTIES THAN THE FORMATION WATER. THAT MIX WILL GENERATE A HUGE CHALLENGE FOR BOTH THE NEW DRILLED WELLS.



JOSE ISAMBERT
Senior Petroleum Engineer at
Weatherford.



INTEGRATION IS THE KEY FOR SUCCESS. INDUSTRY LEADERS NEED TO DEVELOP MORE POWER USERS. THEY NEED TO MAINTAIN A CONTINUITY OF THE IDENTIFIED TASKS AND PROCESSES.



AMR EL-FARRAN
Engineering Lead at Halliburton.



THE COMPANY HAS PERFORMED THIS CAMPAIGN WITH 27 RUNS OF THE COILED TUBING, AND SIX CONVENTIONAL CLEAN OUTS WITH THE SAME OIL.



TECHNICAL WORKSHOP

BROWNFIELDS INFRASTRUCTURE MANAGEMENT



Proceeding with the second day's presentations, attendees were provided with another workshop, discussing infrastructure management in brownfields. The workshop was chaired by Ismail El Kholy, Oil and Gas Consultant, and Dalia Tawfeek, Egypt Country Manager at Wild Well.

WATER FLOOD OPTIMIZATION

Mahmoud Elwan, Senior Production Technology Engineer at Qarun Petroleum Company (QPC), delivered a presentation on Waterflood Surface Facility Optimizations Yield Improved Water Injection Quality and OPEX Cost Reductions at Qarun Petroleum Company.

Elwan explained that "in brownfields, you are close to reach and gain each barrel inside the reservoir. So, in order for this [to happen], we are targeting the most efficient way for water flood optimization." He clarified that this can be hindered because of several waterflood (WF) deficiencies, including extremely high oil-in-water content (OIW) and suspended solid (SS) in the injection water, out-of-service equipment or poor operating conditions, a decline in water injection rate as a result of well integrity issues, and downhole plugging because of poor water injection quality.

Accordingly, he stated that the main objective of QPC's WF optimization plan is to improve the injected water's quality and remove facility constraints. He added that "we need to increase the maximum recovery by looking at the conformance." During the conformance, injection targets to sweep bypassed oil and divert water to the sweet spots to enhance efficiency and maximize the recovery factor.

UPGRADING GABAL EL ZEIT BROWNFIELDS

Mohamed Gaber, Process Piping and Pipeline Design Engineer at Petrojet, made a presentation on Gabal El Zeit Brownfields Upgrading Bi-Directional Pipeline Project.

Gaber remarked that the redevelopment plan of Gabal El Zeit area began after the Minister of Petroleum and Mineral Resources, Tarek El Molla, visited it, and accordingly, he proposed the bi-directional pipeline as a solution for the area's production sustainability.

Gaber noted that Ganoub El Wadi Petroleum Company (Ganope) is directing Suez Oil Company (SUOC), Petrogulf, and East Zeit Petroleum Company (Zeitco) in operating Gabal El Zeit area. For redevelopment, a meeting was held and attended by SUOC, Petrogulf, Zeitco, and Petrojet, under the supervision of Ganope. The meeting resulted in assigning the engineering, procurement, and construction (EPC) work to Petrojet. Meanwhile, the operations and maintenance activities will be done either for SUOC or Zeitco.

Gaber stated that "this project is a fast-track project" as the engineering activities were done in two months, while the construction work was completed in around seven months. Concluding his presentation, Gaber stressed that "brownfields upgrading projects are truly worthy for maximizing and maintaining production assets."

DIGITALIZATION INTEGRITY MANAGEMENT

A third presentation on Successful Digitalization of Integrity Management in the UK Continental Shelf was introduced by Euan Fowler, Subsea Integrity Engineer at Xodus Group.

Fowler stated that "Xodus entered the UK Continental Shelf (UKCS) integrity management market in 2015. As a sign of success since we have captured integrity management (IM) contracts, we are responsible for significant infrastructure list."

Fowler illustrated that before handling the UKCS, the area witnessed many failing systems. Thus, "the problem was that a lot of IM systems were standalone for different parts of the pipeline system," he said.





Afterwards, Fowler mentioned the software Xodus created, saying; "it is a software to examine the asset management integrity network, creating links between isolated activities into one place." He added that this system is the single source for all subsea risks.

Fowler stressed that the system managed to achieve many successes despite being the company's first developed solution. Moreover, he emphasized that one of the main lessons learnt from implementing that system is that linking and tracking activities in a single system can be effective and saves exorbitant amount of time.

THE POWER OF BIG DATA ANALYTICS

Haidy Eissa made a presentation entitled Towards Digitalizing the Energy Sector: The Power of Predictive Big Data Analytics in the O&G Industry. Eissa clarified that "the energy industry is coming for a strategic transformation of operations and business models through digital technologies and integrated data flows in a process known as digitalization," adding that "digitalization is one the main drivers in reshaping the global energy."

She explained that "big data is simply a term that defines massive datasets streaming in real-time at enormous speeds," Eissa said, explaining that "big data analytics uses machine learning, artificial intelligence, statistics and database systems to build a model that analyzes these massive streams of datasets and then reveals the underlying trends, patterns, and associations, within these massive datasets."

For the oil and gas sector's digital transformation, Eissa indicated that "recently, the oil and gas has become a data intensive industry," stating that "big data analytics is a relatively new technology in the energy industry." Afterwards, Eissa explained that big data analytics have a transformational impact in our industry, as "it can help in optimizing production, maximizing uptime, reducing costs, improving HSE, and having smarter business decision making."

Among the applications of big data analytics in the oil and gas industry is production forecasting. Big data analytics help in providing deeper insights of future production under current and simulated conditions, which can be implemented in brownfields

to help in making reliable investment decisions. Another application is predictive maintenance, which helps in predicting equipment's potential failure and its remaining lifespan, in addition to optimizing equipment settings to maximize its performance.

Furthermore, Eissa provided some recommendations for a successful implementation of big data analytics, saying that "transition cannot happen overnight, it should happen slowly to allow top management and engineers to perceive the total scope of the change."

WELL INTEGRITY MANAGEMENT

Mahmoud Radwan, Subsurface Operations Section Head at Amal Petroleum Company (AMAPETCO) delivered the workshop's final presentation on Managing the Operational Challenges in Corroded Wells through Well Integrity Management System.

Radwan explained that "operational and organizational challenges of hydrocarbons throughout the well life-cycle. We have one goal which is to keep the hydrocarbons in the pipe." Since AMAPETCO has a history in dealing with downhole corrosion problem, the company nominated a taskforce team in 2013 to create and implement the Well Integrity Management System (WIMS). The WIMS aims to cover all the information of the system's components, starting from downhole components to wellhead components.

Furthermore, Radwan illustrated that "corrosion rate increases with these terms: pressure, temperature, flowrate, angle of deviation, water cut, diameter, water chemistry, carbon dioxide, and hydrogen sulfide." Accordingly, a six-pillar framework was created to improve the WIMS. These pillars are policy, organizing, planning and implementation, measuring performance, reviewing performance, and auditing.

Concluding his presentation, Radwan noted that "corrosion occurs as a consequence of poor design and changes in the process or in the fluid composition," stressing that "WIMS should have the highest priority and attention in any exploration and production (E&P) company."



TECHNICAL WORKSHOP

HS&E CULTURE AND BEHAVIOR



CHAired BY:

ENG. MAHMOUD SHAWKAT, Oil & Gas Consultant

GEO. SAMIR ABDEL MOATY, Country Manager, Egypt - Rockhopper Exploration

The third workshop on the second day of the Upstream Technical Convention, entitled HS&E Culture and Behavior, was chaired by Mahmoud Shawkat, Oil and Gas Consultant, and Samir Abdel Moaty, Country Manager, Egypt at Rockhopper Exploration, and it offered five presentations on Health, Safety and Environment (HSE).

Radwa Mourad Taman, Senior Chemical Engineer in the Operation Department at Gulf of Suez Petroleum (GUPCO), gave a presentation titled Separation of Oil in Water Emulsions using Integrated Membrane Technique. "The problem nowadays is that some petroleum companies – especially the oil companies – are suffering from the wastewater that accompanied the last final stage in the treating of this water, and that this water contains more than 15 parts per million (PPM) oil in water emulsions," explained Taman.

The presentation's objective included three stages; the first stage is preparing antifouling and antibacterial microfiltration membrane to separate the oil wastewater emulsions. The second stage is preparing the Reverse Osmosis membrane to reduce the salinity of the water so it can be re-injected to the wellheads as well; "it is like a double-advantaged project" commented Taman. The final stage is saving the environment from the oil quantity that is drained in sea water every year. During her presentation, she illustrated the different membrane types and that in order to separate oil in water emulsions; one should use micro filtration or ultra-filtrations membranes. Finally, she presented the cost calculations for this method, which turned out to be cost-effective.

The second presentation in the HS&E Culture and Behavior workshop was on Surge Analysis for Fire Protection System, and was presented by Mohamed El-Mehy, Senior Safety and Loss Prevention Engineer at Engineering for the Petroleum and Process Industries (ENPPI). "It is a transient positive pressure rise wave, that can easily exceed 50 barg, that propagates along the piping network of a firefighting system and bounces back, referred to as the scientific term Water Hammer," El-Mehy defined his topic. He then proceeded to illustrate the causes of surge pressure wave in fire water network, which include sudden change in fire water flow direction or velocity when quick valve closure or opening occurs, or when single or multiple fire water pumps start up or shut down. El-Mehy also presented a case study of Assil and Karam Gas Development Project in the BED 3-Areas, Western Desert in Egypt, which is owned by Badr El Din Petroleum Company (BAPETCO). He concluded his presentation by asserting that the surge analysis study in the brownfields "is essential to eliminate or reduce any risk that may lead harm to personnel or damage to assets or environment."

The third presentation was presented by Helge Hoeft, Area Manager Process Engineer at ILF Consulting Engineers, where he introduced Advancing Process Safety and Integrity Management Through Digitalization. He began by examining some incidents that "really changed the industry significantly," which included The Langford, Australia Gas Plant Explosion in 1998 that resulted in the death of two people and made a staggering \$1.3 billion damage to Australia's economy. He defined Process Safety and Integrity Management (PSIM) in a very simple manner of "keeping it in the pipes, as long as we have everything in the pipes, then we are fine. That should be the key-target to us."

Hoeft then illustrated the design and operating envelopes. "The key to all of this is that all personnel on an asset need to understand these envelopes. If there is only one person on the facility who does not understand the envelopes or does not understand the consequences of leaving these envelopes; you are already at risk," noted Hoeft. He then introduced how to implement digitization in PSIM, concluding that digitization probably will not prevent another Langford, "but the likelihood of that happening again is

probably minimal because data is everywhere and everybody has access to the data."

The fourth presentation, titled Health and Safety in Brownfields, was presented by Ammar Hussein, Manager Director at Perform Safely (PERSAFE) UK. He explained the difference between HSE in brownfields and green-fields and presented several case studies including one on Pryor Trust Fatal Gas Well Blowout and one on Fire in Pittsburg. "When the investigation was done, they have found that the main problem is that they have not done the flow check," explained Hussein on the aforementioned case study. He later on presented few ideas to reduce incidents occurring in brownfields. Such ideas include; creating emergency response plan that would be revised regularly and measuring the safety performance especially because "you cannot improve what you cannot measure," Hussein commented. He suggested that companies should proactively approach how they measure safety through audits, inspections, and questionnaire. Finally, he presented a Safety Performance Measuring Model and concluded that "the low safety performance in one department affects the others."

The fifth and final presentation on HS&E Culture and Behavior, titled An Innovative and Cost-Effective Solution to Gas Flaring in East Abu-Sennan, was presented by Mohamed Atwa, Senior Production Technology Manager in Kuwait Energy Egypt. During his presentation, Atwa discussed the details regarding the development and maximization of asset value, such as eliminating gas flaring to save the environment, capturing and processing associated gas as by-product, and increasing total field throughput and achieving production goals. He began by explaining how they initiated the project through screening the most optimum solution for their project. "We screened oil alternative for gas utilization or monetization techniques available," he said, explaining that it turned out to be better for gas sale. He then spoke of the challenges that faced them during the project; these challenges varied from time-management, getting permits, and integrity related issues. "We have managed to increase our oil production –the main target of this project– by 1,700 barrels per day (b/d)," Atwa shared the results of their project and he then added "we have managed to extract about 180 b/d." He concluded his presentation by encouraging other oil companies to benefit from this project and to look for alternatives instead of focusing on conventional methods.





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



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EOG UPSTREAM CONVENTION PAVES THE WAY FOR FUTURE LEADERS

WHAT ARE WE DOING TO PREPARE OUR STUDENTS FOR THE REAL WORLD?

The third of the EOG Upstream Convention, held on December 10, was dedicated for the youth under the name of Young Professionals Day.

Kelly Bone, the CEO of Wolfpack Holdings and the organizer of the day, started the welcome and kick off session with success stories of young attendees, as she said that developing the youth is her passion. "One thing that I absolutely love to do is to ensure that whenever I am in front of people speaking, I give you an experience to remember," she said.

The session was full of entertainment, participation, and motivational speeches from role models seeking to encourage the youth to learn how to succeed and follow their dreams and goals.

"My commitment to you is that you will leave today having an experience, you will leave having an idea on your purposes," Kelly said.

During the session, Kelly shared a glimpse of last year's Young Professionals Day and its success, saying that 2019 witnessed an increase in registration. Through last year's Young Professionals Day, the effective habits that anyone should have to be successful was a theme explored, where Kelly had elaborated on the power of time in addition to the importance of mindset.

According to Bone, when you think big, your aim will be high and then you can do what you once thought was impossible.

Kelly praised the Minister of Petroleum and Mineral Resources, Tarek El Molla, for receiving the letters sent to him from young professionals in last year's Young Professionals Day, adding that he responded saying that in order to develop young people and move forward, Health, Safety, and Environment (HSE), digitalization, modernization, and innovation should lead the way.

Then Kelly Bone invited Creig Robertson, Country Manager of TransGlobe, to talk about his experience in 2018 who said that "the young professionals energized me with their optimism."

According to Robertson, the one thing that changed his career is a personal development plan, adding that "once you achieve your goal, you will update it again and you will keep moving forward."

He ended his speech advising the young professional to "drive on enthusiasm to achieve your targets, because you will enjoy it."

After that, Bone called Moustafa Oraby, Professor of Petroleum Engineering, to share his experiences with the youth. He started his speech saying, "never stop learning because when you learn, you will get opportunities," emphasizing that there is always a link between higher education and the industry.

"Go for the best, learn as much as you can especially at this time of the industry. We are looking for new technology, new ideas, new hopes and that actually comes with learning," Oraby added. According to the professor, this will help the youth to know more about the industry and its challenges.

Oraby ended his speech advising the youth to "change your mindset, look at the bigger picture, look out of the box and make sure that you are actually up to the challenge," he concluded.

EGYPS WOMEN IN ENERGY

The second session of the third day provided a space for young professional entrepreneurs to share their success stories, in addition to announcing EGYPS Women in Energy nominees. The session unfolded the success stories of three different women working in the petroleum career.

ADDING VALUE TO YOUR WORKPLACE

Heba Aboelnasr, an Automotive Lubes Territory Manager at ExxonMobil Egypt, started the stream of success stories, saying that she wanted to highlight in her presentation how much anyone can add value to wherever he/she is. "You do not have to be like a typical in-the-box definition to add value to where you are," she added.

Aboelnasr said that her life motto is derived from her favorite quote from the book Grit: The Power of Passion and Perseverance by Angela Duckworth. "Grit is passion and sustained persistence applied towards long-term achievement, with no concern for rewards or recognition along the way. Grit is when you commit your goals that can take months, years or even decades," she quoted. Accordingly, she said that she thinks "if you have grit or passion in whatever you are doing, you can reach there."

According to Aboelnasr, she started her career as a fuel's delivery planner, where she faced challenges at that time because she was working all the time without any vacations, in addition to that, she was the only woman working with eight men.

Subsequently, Aboelnasr was assigned to be a Process Improvement Advisor, then Business Continuity Advisor, then Zone Process Advisor, and Europe Pricing Advisor in Brussels, reaching to be Egypt's Automotive Lubes Territory Manager at ExxonMobil.

Aboelnasr talked about the importance of the people around her and how her managers and family supported her in every step of the way. She emphasized her husband's role, who was very appreciative of her career. "You should act as a team even in your home, to cooperate in making everyone successful," Aboelnasr said.

She gave some tips to the youth at the end of her presentation saying, "you just need to always build the right network where you work," adding that "you need to be in a good relationship with everyone."

ADVANCING IN THE PETROLEUM SECTOR

Radwa Mourad Taman, the second nominee presented her success journey. She is a senior chemical engineer at Gulf of Suez Petroleum Company (GUPCO).

Taman said that her dream was to be a chemical engineer and she worked hard to achieve this, alongside studying for her master's degree. She started to develop her skills, and advancing as an Integrity Engineer at GUPCO, where she also got to be a part of many international conferences. She obtained two certificates for basic corrosion and internal corrosion for pipelines.

"I was nominated to be a board member in the Egyptian Engineers Syndicate after the 2016 elections," she said. "I did not forget my career progress in GUPCO and I participated in the Modernization Program," she added. Also, Taman was a part of Zohr's employees career achievement by giving them sessions about analytical chemistry.

According to the chemical engineer, she began to search for how to connect renewable energy resources and how to save oil and gas consumption in Egypt.





Taman thanked her supportive family and her supportive peers saying that “they helped me really very much to achieve my career, to improve myself until now.”

Taman concluded her speech by advising the youth saying, “Please do not forget your academic career” and “do not put a ceiling to your dreams, just plan it well and you will achieve what you want.”

BREAKING THE STEREOTYPE

The last nominee shared her success story with the young professionals was Rim Magdi, who works as a Wireline Evaluation and Perforations Field Professional at Halliburton.

Magdi said that it was hard to start her career because her family refused her to be a field engineer. She convinced them by claiming it was only a trial. Little did they know she would succeed.

She joined Halliburton where she worked at Bakr 122 well in Bakr Concession, which she loved so much, and felt it is her place.

According to Magdi, she faced some challenges throughout her career journey, where she worked and studied abroad as a single, young Egyptian female. She worked in harsh job conditions and supervised technicians and rig crews at a young age, saying that she “was supposed to lead crews whose oil field experiences exceeds my age,” hoping that she would be earning customer’s trust.

She also declared that she returned to work as a technical engineer as it is her passion and then joined Society of Petroleum Engineer (SPE) in 2018. She was a Public Relations (PR) representative and in 2019, she was selected to be the Deputy Technical Manager of Egypt Young Professional’s Chapter.

The field professional said that these events allowed her to grow and collaborate with other leaders in the industry. “I think we are building very good calibers as leaders for the industry,” she commented.

Magdi ended her presentation by advising the youth that “the responsibility of youth is to look for the new technology and to chase what is next.” She added, “because when you broaden your aspect, you are widening the pillar of your pyramid, and the wider the pyramid is, the higher it will go.”

CAREER STARTUP

As the third day offered a myriad of future potentials in the oil and gas industry, a few presented their success stories and inspired other fellow engineers during Career Start-up challenges and Milestones – Practical Stories to Share presentations.

First, Hosny Diab, Exploration Geologist at Schlumberger, shared his progress and achievements in the workforce, detailing how he always tries to develop himself by always learning. “I spent 981 days looking for a job after I left Shell,” said Diab, while elaborating on the struggles he faced through that tough time and the toll it has taken onto his personal life. One of the key ideas to take from his presentation is to always be hopeful, patient and to believe in yourself and your skills. He clarified that it is also important not to lose one’s track while job hunting. He concluded with a very clear message that even through dark times, one should never lose hope and one should never stop giving back.

The second speaker was Kareem Moussa, Account Coordinator at Baker Hughes, who presented his own five key elements to success which are, taking initiative, be ready to learn, be your own evaluator, show do not tell, and to be passionate. “Regardless of where you are coming from, or the years of experience, be always ready to learn. If you want to excel in your career, you have to be willing to learn,” Moussa advised. He concluded his presentation by asserting on the idea of following one’s passion as it is what keeps one going.

The third and final speaker was Sara Fakhry, Geologist at Trident Petroleum Egypt, who spoke about the struggles she faced as a woman in the energy field, and how she was told that she “cannot fit in the department” as it is a heavily male-dominated industry. Furthermore, she elaborated on how she transformed into ‘Ms. Geologist’, someone who knows her way around the field and managed to earn the respect of those who once belittled her. She also credited Al Amal Program, Egyptian Geophysical Society (EGS), for fostering her passion for Geology. “The greatest challenge I faced was to find me a fitting pair of shoes in the field” noted Fakhry, while shedding light on the rooted prejudice that extends to the lack of appropriate equipment for women in the field. She concluded her presentation by echoing Moussa’s ideas that one should always strive to develop oneself and to always find and follow one’s passion.

YOUNG PROFESSIONALS TECHNICAL PRESENTATIONS

The Young Professionals Day continued to provide the youth attendees with not only successful young professional examples who managed to start their careers despite challenges, but also featured remarkable models of fresh young professionals who accomplished breakthroughs early on in their promising careers. In a session entitled Young Professionals Technical Presentations, two young professionals brought up their innovative ideas and researches, giving a glimpse of how they envision reshaping and promoting the future of the oil and gas sector.

Mohamed Elshawaf, Non-Technical Deputy Manager at Society of Petroleum Engineers (SPE), Young Professionals Committee, delivered the first presentation on Consequence of Graphene Oxide Nanoparticles on Heavy Oil Recovery.





Elshawaf graduated from Faculty of Petroleum and Mining Engineering, Petroleum Engineering Department, Suez University. He stated that his paper was presented in six different conferences. Accordingly, he won the first place in the Middle East and North Africa paper contest at the Annual Technical symposium and Exhibition (ATS&E) in April 2018 in Saudi Arabia. Additionally, the US's Annual Technical Conference and Exhibition (ATCE) awarded Elshawaf in the SPE international paper contest in September 2018.

In his presentation, Elshawaf pointed out the challenges that engineers might face while producing heavy oil, which forms 70% of the world's reserves. He noted that the main challenge of heavy oil production is its viscosity and heavy components, which can be reduced through the high temperature effect and the aqua-thermolysis reaction. Furthermore, Elshawaf specified the main difference between his research and the previous ones made on this topic, clarifying that previous researches used the nanometals to improve the recovery of heavy oil but none of them addressed the usage of Graphene Oxide Nanoparticles. Elshawaf indicated that implementing the Graphene Oxide Nanoparticles, in his experimental workpaper, resulted in achieving a grave change in the viscosity, dropping its original values to 40-60%. Not only that, but his research proved that improving heavy oil recovery through Graphene Oxide will create a new era in the thermal recovery of heavy oil.

The second presentation was about Enhanced Reservoir Characterized by Use of Thin Section Analysis by Chahenaze Ellamey, Petroleum Engineering and Gas Technology Teaching Assistant at the British University in Egypt (BUE). Ellamey won the best paper award in SPE Student Chapters at the Mediterranean Offshore Conference (MOC 2019). Her paper was prepared under the supervision of Attia Mahmoud, Dean of Energy and Environmental Engineering and Supervisor of Petroleum Engineering and Gas Technology Department at the BUE.

During her presentation, Ellamey clarified that her research mainly aims to perform petrophysical reservoir characterization and mineralogical reservoir characterization by using Petrographic Image Analysis (PIA) and 2D thin sections.

Afterwards, Ellamey explained how she combined both petroleum engineering and geology to gather quantitative data from the former and qualitative data from the latter, respectively.

Ellamey remarked that through her experiment, she succeeded in gaining quantitative data from geology, which in turns would help in the petroleum field. Consequently, she succeeded in achieving the research main objectives.

YOUNG PROFESSIONALS' SUCCESS STORIES

The third day of the convention also introduced us to Shell's young professionals' success story, with their challenges and milestones.

The session kicked off with Ahmed El Gabry, Deputy Communication Manager and Social Performance Manager at Shell Egypt, talking about Shell Intilaaqah Egypt Program which was launched in January 2004. The program aims to empower young professionals to become the leaders of tomorrow, pushing them forward to become business owners. "Imagine, waiting in a queue, waiting for a job that does not come. What can you do? What is your role to gain more experience to form a startup?" El Gabry said.

"Shell Intilaaqah is one of our streams in the social investments," noted El Gabry, encouraging that one should invest and reinforce youth's knowledge and skills. He went on to explain and detail the purpose of Intilaaqah, saying "Intilaaqah has many tracks, the one we call the Mainstream is whenever you have an idea, we take that bright idea and we start to develop it through the main methods and techniques. The second one is related to energy, which we do in collaboration with the American University in Cairo (AUC), and the third one is Shell Business, which is the oil change hubs that can be run solely with our brand name."

Furthermore, Shell celebrated their Top Ten Innovators (TTI), which is a global competition that highlights and rewards businesses that demonstrate excellence in innovation as well as giving entrepreneurs a chance to shine on a global platform. There are three categories included in the competition; Food and Agriculture, Energy

and Mobility, and Sustainable Future, where over 98 projects were submitted from all over the world. Moussa Khalil, CEO of Baramoda and the winner of the Food and Agriculture Category, gave an encouraging and interesting speech where he presented his winning project; Baramoda.

Baramoda is essentially the utilization of recycled agricultural waste to produce a bio-organic compost. As the first company in the Middle East to adopt a specialized product according to the type of land and crop, Baramoda is specialized in manufacturing organic fertilizers via technology. "We have integrated technology with agriculture as technology will prevail all in the next few years," Khalil said, explaining how the company's software would replace an agricultural engineer, as it would be responsible for analyzing each land to customize and manufacture fertilizers according to its needs. This way, Baramoda would not only be building a commercial brand, but building relationships with its clients and farmers as well. It is without a doubt that Baramoda is a revolutionary and eco-friendly company that will take the market by storm. The company is an effective, clean source of organic fertilizers that may soon enough replace artificial chemicals.

A DYNAMIC DISCUSSION ON CAREER START UP & ENHANCEMENT

The third day of the Technical Upstream Convention has witnessed an interesting Dynamic Panel Session on Career Startup and Enhancement. The panel was moderated by Colby Fuser, Vice President at Halliburton in Egypt and Libya. Fuser introduced the panelists, which included: Ahmed El-Banbi, Professor at AUC; Ola Balbaa, Drilling Engineer at BP; Eman Shahin, Engineer at Transglobe; Salma Maarouf, Communication and Change Management Senior Specialist at the Ministry of Petroleum and Mineral Resources; Enas Shabana, Communications Section Head at the Ministry of Petroleum and Mineral Resources; and Alaa Adel Hagar from the Ministry of Petroleum and Mineral Resources.

Fuser entertained the idea of being a professional in the field by saying, "There are many things that define a career, and there are many things that define a career that has multiple starts". Fuser brilliantly managed to lead the conversation into a direction of exploration among the panelists and understanding among the audience.

Balbaa began by talking about the barriers she had to overcome throughout her career as a woman in the field. Beginning her career in the academic field, then shifting her focus to being in the field has been very challenging, especially as a woman working among 150 men in the field. Balbaa's career was not linear; it had its ups and downs, but one of the things that Balbaa embraced through her transition from the academic sphere and into the actual field is mentorship. "You need coaching, you need someone to guide you," Balbaa noted during the panel. "As an operator company, you are the leader or the boss on the rig, and that is another challenge. People from very diverse backgrounds, accepting you as a young female bossing them was quite a challenge," she added. She commended the resilience one must have in order to reach their goals, reflecting on her choice to contribute to the industry outside of the academic field. She concluded her talk with a powerful piece of advice to all the young professionals out there, especially women, by saying "Ask the questions, raise the questions, take a seat at the table and do not stand aside." Balbaa also added that in moments of doubt, one should always remember they have great strength and competency that allowed them to be in the industry in the first place, and most importantly is that one should always believe in themselves.

Consequently, Shahin continued by discussing her role as a female petroleum engineer at the Gulf of Suez Petroleum Company (GUPCO), along with its respective pros and cons. One of the pros of being a female engineer is that "you will be noticed if you are a hard worker. Show dedication and commitment, you will be recognized and appreciated from your team leaders and managers." Shahin believes that her self-motivation could only go so far, and recognized the effect of what good leadership can do when combined with motivation. Shahin noted that "it is all about the mindset you are dealing with, even if there is someone who is not accepting you as a female or so, you can change this, you can prove with your work that you are deserving for the place



you are". She spoke about her journey in the Society of Petroleum Engineers (SPE) and how it helped her establish herself as a person not just as an engineer. "SPE is a great opportunity to anyone who needs to develop his/herself outside of work," Shahin said. Shahin recommended to enroll in SPE as its core value is to empower and help others; it is a platform that will inspire you and lead you to inspire others.

Hagar began by discussing the human capital management program. "The main asset in any entity is the manpower" he said. Hagar also mentioned the challenges previously faced to find talent, as there was no database to acquire talent from. Moreover, Hagar elaborated on the making of a unified comprehensive database. Before the database, there was no structured data in any company, and it took 18 months to fill the database with various talents. However, a database that covers such a wide range of the sector's human capital is not an easy task to accomplish. One of the challenges the Ministry of Petroleum and Mineral Resources faced was the lack of frequent updates; that led the Ministry of Petroleum and Mineral Resources to start a dialogue with the sector's companies in order to have a unified comprehensive database.

The panel continued with Maarouf discussing how being a part of the Modernization Project has improved her development in her career. "Being in the ministry itself is a blessing. I got to see the strategic perspective of how the industry is working and not only focusing on the daily tasks, and I got to learn about the technical aspects of the oil and gas industry, and this for me was very new back then," Maarouf said. She also noted that even though the concept of communication and change management is new, it remains vital in the oil and gas sector. Maarouf noted the importance of creating a fully developed communication strategy, and raising awareness about the expected changes that will take over the sector. One of the things that her team has integrated was the development of an online feedback system to collect feedback and concerns regarding other projects from as many employees as possible. As humans, we are constantly changing, and careers are not that different; "Change is inevitable, and we all have to embrace this in order to grow," Maarouf said, in regards to her decision to leave ENNPI and join the Modernization Project.

El-Banbi went on to explain that the main reason behind his shift from the practical field to the academic field was his passion for teaching. El-Banbi mentioned that, even as an Operation Manager, he would teach one or two industry courses every year. He explained that academia is a step further in his career that would hopefully result in research that would impact the industry in Egypt. Moreover, he offered an important piece of advice, which was not only aimed towards the young professionals, but to the whole industry; stating that "there is no end to learning, and there is no end to contribution." Furthermore, he weighed in on some of the issues facing the young professionals, stating that "they want to do a lot of things very quickly, and everybody knows the grass is always greener on the other side, so let me tell you it is not." El-Banbi concluded that progress takes time and effort to succeed.

Finally, Shabana examined the challenges that faced the Modernization Project, by stating that "whenever there is change, there are challenges." The main challenge Shabana mentioned was that of a cultural challenge. Shabana mentioned that she has faced some difficulties as a 28-year-old young woman leading a process of change. Shabana also highlighted some of the tasks they have achieved such as developing a communication strategy for the whole sector, which, at the time, was a novel idea to the people in the industry. In fact, Shabana and her team "were learning and executing at the same time". Shabana did not forget to give credit where it is due, as she expressed her gratitude for the Minister of Petroleum and Mineral Resources, Tarek El Molla, for supporting and evolving the communication team in such a large-scale project.

YOUNG PROFESSIONALS RECEIVE COACHING SESSION

The Young Professionals Day was concluded with a closing session, presented by Kelly Bone, Founder and CEO of Wolfpack Holdings. Bone kicked off the session by showing last year's Young Professionals Day inspirational video titled Go Hunt Your Dreams which generated a surge of power and excitement among the youth throughout the session.

Furthermore, Bone asked Abdelrahman Fathy, a graduate from Al Azhar University, about his university experience. Fathy expressed his admiration of Bone's career path which he knew it when he first met Bone in July. He stated that the main lesson he learnt is that "passion is the keyword. Never listen to anybody who say you cannot do it because you can actually do whatever you want."

Afterwards, the session continued with a presentation on Seven Lessons for Intreprenurship by Michael Graziano, Founder of Global Degree Academy. Graziano had the chance to visit around 176 countries all over the world, stressing that he came to Egypt to transfer his experience and inspire the youth.

Starting his presentation, Graziano clarified the difference between entrepreneur and intrapreneur, "entrepreneur is creating your own business, intrapreneur is creating projects within a business." Before diving into the seven lessons of intreprenurship, Graziano described ideas as the core of intrapreneurship, noting that "the human mind is really good at creating ideas, but it is not that good at holding them," adding that "what you can do is use your mind and full creativity as an engine to be spitting out new ideas, knowing that it is a scientific process; trial and error."

Furthermore, Graziano elaborated the aforementioned seven lessons of intreprenurship, and how can anyone in the energy sector benefit from implementing them. These lessons are making a proper plan, seeking mentorship, creating for others, it is not about now, always be learning, building real relationship, and leading by example. Drawing on these seven elements, it is important to remember that everything takes time, and transferring any new idea from abstract into reality takes time as well. Graziano stated that ideas do not have an expiration date, yet they exist in the present and will exist in the future as well. Accordingly, he stressed on considering the impact a single idea could have because "legacy trumps all; it is about the collective [not the individual]."

Concluding his presentation, Graziano delivered two messages to young professionals and top management of the industry. "To all the young people here in the room, I want you to know that your seniors are watching, and as they grow older and more established, they stop listening and start watching. So, you need to lead by example, and be the one that naturally rises up, and become the change you want to see in the company," Graziano advised the young professionals. Then, he addressed the top management, saying "I want to challenge you to be a good manager not a good leader," explaining that a successful manager will have the ability to observe and recognize those who can acquire leadership positions, in addition, successful managers would be able to support their leaders to enhance their full potential and achieve their goals.



SPURRING A REGIONAL GAS HUB

AN INTERVIEW WITH
HISHAM EL-GRAWANY,
DNV GL'S VICE PRESIDENT AND AREA
MANAGER NORTH AFRICA



What are DNV GL's newest ideas presented to the oil and gas industry in North Africa?

DNV GL has been setting the oil and gas industry benchmark for safety, integrity, and performance for more than 40 years. Our vision is to introduce a safe and sustainable future; an ethos which presents innovative new ideas to the global market, especially in the oil and gas industry. The latest ideas revolve around applying digital technology to improve the efficiency of our projects around the world, including asset integrity management software, verification and certification digital project management tools, and remote inspection and process safety management tools.

In North Africa, DNV GL is applying new standards and best practices in cooperation with stakeholders from around the world, addressing industry challenges. Our reputation for setting standards and best practices, collectively known as service documents, is among the top three strongest attributes of our brand, according to our 2018 Brand Survey. We are also participating in the Egyptian Ministry of Petroleum's vision of building professional leadership through a capacity building program in the domain of Process Safety Management systems.

How do the global trends affect the company's plans in its operating areas?

Roughly 70% of DNV GL's business is energy related. We have an equal footing in the fossil and renewable worlds and understand that the energy future is a critical exercise for ourselves and our customers. That is why we have decided to independently forecast what the world's energy future will look like and how the transition towards a more sustainable energy mix will unfold. Our annual Energy Transition Outlook (ETO) report is available for free download on our corporate website, www.dnvgl.com/eto.

Egypt's insatiable appetite for natural gas will ensure its return to import of gas in the next six to seven years, according to an analysis of its ongoing projects, new fields, and increasing gas demand. Egypt's government has a vision for the future, which involve

securing enough oil and natural gas supplies through expanding upstream activities and diversification of resources, to reaching natural gas self-sufficiency and achieving the added value through the petrochemical industry.

The vision further includes turning Egypt into a regional energy hub on several levels; electricity, oil and gas, and other energy resources, meeting the demands of the domestic market for petroleum and petrochemical products and mineral resources, as well as achieving the target of the national economy growth rates. When the Egyptian Minister for Petroleum and Mineral Resources announced plans for transforming Egypt into a regional hub for oil and gas trading, it has been followed by strategical efforts affecting the oil and gas business in Egypt for international oil companies (IOCs), national oil companies (NOCs), and services companies. In short, transforming Egypt into a regional trading hub by achieving the optimum value-added through natural resources is a national and industry goal.

As for DNV GL, the core model we use to produce our Energy Transition Outlook reports also guides our own business; it informs the direction for our research and development activities so we can be ready to best serve the industries we are active in the longer term as well as at present. We are proud and excited about supporting Egypt's ambition to become a regional energy hub, and we are ready to serve our clients as their trusted partner in building confidence in the development of Egypt's oil and gas infrastructure.

Could you please share with us DNV GL's latest activities in Egypt?

In Egypt, DNV GL is engaged in most of the mega projects. For example, we were chosen as the marine warranty survey providers for many deepwater projects in Egypt. We were also engaged as the inspection and construction monitoring body for refineries under construction. Furthermore, we are very excited that our extensive global expertise in deepwater projects was mobilized to support Egypt when we were appointed as Independent Verification Body (IVB) for many deepwater projects. I can also mention that DNV GL was provided risk-based

inspection services to evaluate the risk assessment of existing refineries.

What do you think are the company's biggest achievements in Egypt?

DNV GL has made long-term agreements with Egyptian oil and gas stakeholders, including being part of the capacity building program launched by the Ministry of Petroleum and Mineral Resources, which reflects strong commitment to this valuable partnership.

We have leveraged this partnership role not only for supporting the different companies in executing their projects and facing challenges in a safe, sustainable manner, but also in supporting the whole oil and gas sector in Egypt through building capacities and qualifications, in line with the sector's growth plan.

What efforts do DNV GL make to develop its human resources and their leadership skills?

We attract, retain, and further develop competent personnel who are committed to DNV GL's purpose, vision and values. Since 1864, our purpose has been to safeguard life, property, and the environment, and DNV GL colleagues are people who have a genuine passion for doing just that. While the company promotes and provide opportunities for flexibility in tasks, services, work location, and career paths, we also encourage employees to take responsibility for their own development.

DNV GL has documented and described the general competence and training requirements for employees and the roles and responsibilities in connection with this. In addition, there are specific requirements for each business area, which have to be taken into account, such as industry certifications and other requirements to qualifications. We ensure that employees and contractors have a competence level appropriate for performing their allocated tasks through customizing individual development plans, which are established by the unit line manager as a means to ensure acceptable capacity and competence levels in the unit while at the same time supporting the development of the employees.



DNV GL has adopted the 70:20:10 model to learning, whereby 70% of learning occurs through daily work and on-the-job experience; 20% through dialogue with colleagues, mentoring, tutoring, and/or coaching (learning from others); and the final 10% from formal training, such as courses.

What are DNV GL's most efficient and practical methods and solutions that support Egypt's transition into a regional energy hub?

From project initiation to decommissioning, DNV GL supports customers around the world in enhancing safety, increasing efficiency and managing risk in projects and operations. We are involved in the development and operations of oil and gas infrastructure in every hydrocarbon-producing country in the world. We also have world-learning expertise in the renewables segment, helping the industry address challenges and opportunities in achieving an optimal energy mix in practice. DNV GL has been a world-leading third-party classification body since it was established in 1864, and is now a one-stop shop for both advisory and third party for classification, certification, verification and inspection services across the whole oil and gas value chain.

DNV GL has been focusing on the Eastern Mediterranean region for a long time, not only in the upstream segment but also in the downstream and midstream segments. We expect gas trade forecasts to support a demand for new pipelines, including those for cross-border transmission. In addition, new liquefied natural gas (LNG) terminals of varying scale are in the works. Further, we expect that as more LNG terminals and pipelines are built, the application and oversight of regulations will become increasingly important. Refineries will also play an important role in the new infrastructure, bringing along specific challenges associated with process safety management. At the same time, there will be increased costs for replacement and refurbishment of older infrastructure in the Middle East and North Africa (MENA) region until at least 2050.

In this context, DNV GL has a very important role to play, and we do this as either the independent third party or a second party technical or risk management advisor

to ensure that oil and gas investments and operations are designed and executed in accordance with the requirements and standards which apply. But beyond compliance, our focus is also on ensuring optimal performance – our combination of deep expertise and digital solutions helps us bring that to the table in Egypt in an integrated way. We can support in technical aspects as well as helping with assessing and managing risks associated with any asset or process.

The unique aspect of DNV GL is that it can combine more than 150 years of deep technical experience with industry-leading research into new technologies and its position as the industry's partner for setting standards to support Egypt's energy journey. We are also owned by a foundation and therefore have the advantage of being a truly independent organization. We have a substantial local footprint in Egypt which is very well-connected to our global network of experts, which means we are bringing the most innovative solutions to the challenges at every stage of this journey.

From your point of view, why would you recommend Egypt for investors?

Egypt's oil and gas sector has undergone active transformation over the past few years, and the country is expected to significantly boost its growth and attract new investments in the medium for a long-term future of sustainability. The government's transparency in the financial sectors, implemented since 2016, is very much appreciated worldwide.

Lately, Egypt has been preparing to become an energy regional hub. Its oil and gas industry shows comprehensive development in terms of upstream, midstream, and downstream operations. As a global technical advisor and market leader, DNV GL is focused on maintaining its partnership role with industry stakeholders here in Egypt, including investors. Our due diligence services provide investors with world-leading expertise in ensuring investments are made based on sound data and assessments which are backed by deep technical knowledge.

With this kind of growth, DNV GL as a partner for success can play this partnership role not only for supporting the different companies in executing their projects and facing their challenges, but also in supporting the whole oil and gas sector in Egypt through building capacities and qualifications.



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SAFER, SMARTER, GREENER

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EXPLORING EGYPT'S GOLDEN ERA:

AN INTERVIEW WITH SAPESCO'S CEO SAID RIAD



Which areas have the greatest potential for new discoveries?

After all the discoveries in the Mediterranean, we are moving to the Red Sea. This area is a virgin area after many years of being ignored. Aramco has made many discoveries on the Saudi Arabia side, and we are hoping for the same on the Egyptian side. The last bid round announced by Ganoub El Wadi Petroleum Holding Company (Ganope) is marketing this area. We believe the next era of oil and gas will be in the Red Sea.

We know for a fact that Egypt is moving into another era of success in oil and gas in the next few years.

How is the private sector responding to recent framework changes?

Egypt has pushed through different reforms to attract key players, and it is paying off. We have faced many obstacles during the last few years, until this revolution in the oilfield business started in 2016. The political and social revolutions Egypt went through, the fall in oil prices and the tough competition forced many companies to think about leaving. At the same time, we were suffering from increased expenses in our operations.

There has been a revolution of challenging old ideas, thanks to the Minister of Petroleum and Mineral Resources Tarek El Molla, who came in with a new mindset. He pushed through this revolution in oil and gas and managed to make the idea of Egypt as an energy hub attractive. This is not only for oil and gas, but also for electricity and petrochemicals. At the end of 2016, we started to see new developments that brought hope. What happened in the last few years we call the golden era for the oil and gas business in Egypt.

Why is Egypt so well positioned to become a regional energy hub?

Egypt is in a privileged geographical position. And, thanks to the discoveries in the Mediterranean, such as Zohr, the Raven and West Nile Delta fields, we now know for a fact that Egypt has enough reserves to be an energy hub, not only for Africa but in the global arena. The ministry has a five-year plan – from 2016 to 2021 – to transform the Egyptian market into an energy hub.

We have a very aggressive plan for petrochemicals. There is a talk of investments of \$7 billion in petrochemical facilities in Port Said, Sokhna, and Alexandria. This would not happen without the recent discoveries.

In 2011, our petrochemical factories were running at a 50% capacity because we did not have enough gas or energy to run them. Now, after all that has happened in recent years, we have almost reached an 80% capacity.

What was your engagement in Zohr's development?

We have a division called SAPESCO Industrial Services (SIS), which is responsible for the commissioning and pre-commissioning of new projects. This service line was almost shut down before the Zohr project; but Zohr literally saved this business. This was a mega-project for us. We got around 50% of the pre-commissioning for the gas facilities, which was from three major companies – Petrobel, Eni and even Schlumberger.

After Zohr's success, we are moving to the West Nile Delta, working on a BP project that is very similar to what we did in Zohr. We are also engaged in another gas field with Agiba Petroleum Company. Our reputation in commissioning, pre-commissioning, shutdowns, new structures and gas facilities is well known. Whatever the requirements are, SAPESCO can handle them.

What room is left for local players in Egypt's "golden era"?

As an example, something amazing happened in 2016. Egypt was suffering from lack of gas, and Shell's Obaiyed field in the Western Desert had a very bad situation in their gas facility. This gas facility was full of scales and they did not know how to manage it. This was an almost \$1-billion-facility. The manufacturer advised them to shut it down and build another facility, which would take five years and another \$1 billion.

Badr El Din Petroleum Company (BAPETCO), Shell's operating joint venture, sent us some of these scales.

We worked with Shell's labs in the Netherlands and with a team that came to visit us and they confirmed our in-house research and development (R&D) found the right solution. We have now a patent on this chemical solution. We had many setbacks, but we managed to overcome all this and we managed to remove the scales and restore the facility to its original condition.

Shell deemed this project one of 2016's most five important operational projects worldwide. We even received appreciation from the previous petroleum

minister, Sherif Ismail, as a local company that managed to deliver this solution to one of the most important companies worldwide.

How have you been building on BAPETCO's success?

We really got this business lined up after this mega-project. We started to concentrate on promoting this business to invest more in R&D, and now we have seven types of chemicals for different types of scales. We have managed to save many wells because we have a solution for every scale. Texas A&M approved our chemicals and gave us a patent under our name.

How competitive is the chemical solutions segment in Egypt?

For the scale removal business, we do not have any competitors worldwide. We are unique in this business. The last five years proved that we have something that nobody else has.

What is your outlook for the coming years?

On SAPESCO's level, we are focusing on introducing new services and technology to the Petroleum industry. Capitalizing on the Egyptian strategic vision of developing the oil production in the Red Sea and optimizing production cost in general, a "New Technology Leader" alliance has been established between Shawcor and SAPESCO.

Our activities will revolve around replacing defected carbon steel pipe lines by Spoolable

Composite pipes, as well as laying the SCP products transfer lines for the new oil and gas facilities.

SCP saves 30 – 40% of installation cost and 20% of the time needed to first oil.

West Bakr Petroleum Company is the first project in Egypt, where a 26 km, 4 inches CS pipeline will be replaced by SCP.

On the country level, I see amazing potential. We are moving ahead more than we expected. This will be reflected in many aspects. The market will be expanding, and all the companies will have more market share. Egypt will see huge investments in many areas, and huge investments will mean business for everyone.



TransGlobe Energy
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GROWTH WITH ENERGY

BROWNFIELDS UNDER CONCESSION AGREEMENTS FROM A LEGAL VIEW

LINKS & GAINS
ATTORNEYS AT LAW

BY MOHAMED AGAMY

Managing Partner at Links & Gain

There is no doubt that Egypt has successfully become the most attractive country for oil and gas investments, where the petroleum sector initiated many recent concessions and joint ventures with big international oil and gas companies.

The accomplishments of these successful developments are due to the government's vision, particularly for the petroleum sector; focusing to make Egypt's energy industry as a top destination for investments. In addition to that, the new laws and regulations enhance the longstanding legislations to encourage investors for doing business in Egypt, with guidance for mitigating legal risks and visibility on expanding in the upcoming years.

Successful investments require a strong build-up with a balanced legal framework to sustain the profitability of exploration and production. The concession for both parties' entails the Egyptian government as the concession holder, on one side, and the foreign oil and gas investors who are acting as a contractor, on the other side. The concession grants the adapted model of agreement by virtue of law.

The latest concession agreement model reveals that inclusion of legal safeguards protect foreign investors and their assets. This is done through granting the agreement the force of law, adding a stabilization clause, and mutually adapting the agreement through renegotiation. However, this requires going through the commercial aspects and the huge diversity of the cost-recovery methods in order to comply with other

environmental laws and liabilities under the concession condition scheme.

However, these types of concession agreements – even after the new model and the improvements in the terms and conditions – might require a second eye for reviewing; particularly when it comes to the less profitable model of the brownfield concessions. Brownfields could be considered as high-risk concessions or a very costly operation as a business model in comparison to greenfields.

THE POTENTIAL OF BROWNFIELDS

Brownfield projects have been linked to environmental economic projects, but in the oil and gas sector, brownfield is defined as an oil or gas accumulation that has matured to a production plateau or even progressed to a stage of declining production. Brownfields are projects of expansion with services on an existing facility; in other words, a modified or an upgraded project. By opposition, greenfields are the common definition to describe a new project. The foreign contractors pursue to outspread the most commercial producing life of the field using cost-effective and low-risk technologies. The drilling options are endeavored in the brownfields by stimulation or refracturing operations, completing additional zones,

and installing artificial lift equipment, which are few technologies commonly applied in this regard.

While the greenfield projects are considered much easier for execution and commissioning rather than the brownfield projects, brownfields constitute a major challenge to the oil and gas industry. Nevertheless, the oil industry is continuously pursuing the constructing and commissioning of more and more brownfield projects.

HIGHLIGHTS ON BROWNFIELDS' ECONOMICAL VALUE

Brownfields will play a great role to Egypt's economic growth. This will lead to a better cost management, lower cost, and higher profit. However, major exploration and development projects over the past years are expanding on the business map of the oil and gas sector. In order to maximize the economic value, different models that consider environmental, social, and economic aspects should be integrated by both the government as well as the oil and gas investors to provide a full sustainability assessment in line with Egypt's Vision 2030 and the global sustainable development goals.



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MINISTRY OF PETROLEUM FEATURES DIGITALIZATION AS A VITAL WAY FOR ENHANCING SAFETY AT ANNUAL SAFETY DAY

BY DINA EL BEHIRY & MAI EL GHANDOUR

The Ministry of Petroleum and Mineral Resources brought together distinguished oil and gas leaders on December 5 at Dusit Thani Hotel to take part in the Annual Safety Day 2019. Convening such a prominent event, for the fourth consecutive year, mainly aimed at highlighting initiatives carried out to indulge safety culture more among the sector's workers, as well as increasing awareness on the importance of implementing the health, safety, and environment (HSE) basic rules to avoid risks.

The Safety Day highlighted the sector's digital transformation and its great impact on enhancing the HSE standards for better levels of safety, which comes in line with the ministry's Modernization Project. It is worth mentioning that the 2019 Annual Safety Day was sponsored by Eni/IEOC, and was empowered by the Egyptian General Petroleum Corporation (EGPC), the Egyptian Natural Gas Holding Company (EGAS), Ganoub El Wadi Petroleum Company (Ganope), and the Egyptian Petrochemicals Holding Company (ECHM).

Inaugurating the Safety Day, Luca De Caro, Eni/leoc General Manager, said "the event is reflecting the strong commitment of the Minister of Petroleum and the leaders of the Egyptian oil and gas sector towards safety in Egypt."

Caro remarked that Eni's partnership with the Egyptian oil and gas sector has begun since 1950s, highlighting that, "one of the secrets of our partnership [success] is not only based on oil and gas production, but mainly on the common understanding of evolving this partnership for business sustainability." And as a sign of success, Caro mentioned Zohr field, stressing that "we faced huge challenges with a very good HSE performance," adding that "I can clearly say that with our partnership here in Egypt, all challenges become good opportunities."

Speaking about digitalization, Caro mentioned that Eni entered its digitalization journey several years ago. Furthermore, Caro stressed "[digitalization affects] the way we think about our world. It is more of a technological change that would enable us to act in a more integrated, faster, and safer way [to achieve our goals] with a significant reduction in both time

and risk." Concluding his word, Caro asserted that "safety is an absolute priority and precisely in the HSE field, [and] digitalization is essential for improving our performance."

Another opening speech was delivered by Karim Badawi, Managing Director- Egypt and East Mediterranean at Schlumberger, saying "we are very proud of the collaboration with the oil and gas sector in Egypt in providing the energy needs in Egypt. Schlumberger has a vision of being a performance partner of choice to our partners to deliver safety and sustain the energy needs of Egypt," Badawi said. He praised the significant impacts of the Modernization Project, which "provides a very unique platform to all of us in the sector to collaborate and share our best practices."

Moreover, Badawi stressed the importance of developing talents because "safety cannot be done without humans and safety is actually for humans." He also mentioned the training programs implemented by the ministry, especially those programs which focus on HSE itself. Additionally, Badawi supported the minister's declaration on considering HSE as a major step in any career path, indicating that "within Schlumberger, like any other company, you will actually see that HSE president is coming from operations. [This] is going to be a fundamental part of his career path development."

Furthermore, Badawi noted that digitalization is critical when it comes to learning from the past to ensure that "we do not expose our people to risks that can be mitigated or to repeated injuries." Badawi stressed that "we need to leverage the digital platforms to better ensure that we minimize the risks of driving, which is huge in Egypt like any other country around the world," mentioning his company's participation in hosting the

first day of the safety week, delivering better tools for safer driving experiences.

Ending his speech, Badawi said "as an industry, we [need to] ensure that safety is not a one week or one day event. It is something that is actually an integrated part of how we behave, how we act, how we plan, and how we move."

Continuing the event, Colby Fuser, Egypt and East Mediterranean Managing Director at Halliburton, clarified during his speech that Halliburton has spent many years in Egypt as an execution company, and "whenever you execute every single day, you have to be able to execute with a mindset that I want to go work safely and come home safely."

Moreover, he highlighted Halliburton's participation in the safety week with its Control of Work (CoW). Furthermore, Fuser remarked the vital importance of digitalization as "digitalization means we do things smarter, [and] we do things different."

At the end, Fuser emphasized that "safety definitely does not end today. It is very important for us to realize [that] safety is a daily thing."

Walid Lotfy, Petrojet Chairman, noted during his opening speech that despite witnessing many noticeable achievements in the HSE field, "at the same time, we must remark that we faced a number of failures which became lessons to learn how to avoid such mistakes in the future."

Additionally, Lotfy pointed out the cruciality of reinforcing the sense of responsibility in all employees to encourage them on reporting all ongoing positive and negative HSE procedures to enable the company to improve its performance.



Concluding his speech, Lotfy highlighted the vital importance of cognizant leadership which "mainly contributes to consolidating safety culture to guarantee reaching our targets, which is avoiding accidents and enabling all employees to perform their assigned tasks safely and returning back to their families safely as well."

The Minister of Petroleum and Mineral Resources, Tarek El Molla, delivered a keynote speech as well. During which, El Molla agreed with what was mentioned during previous speeches that "we are not talking about a safety day or a safety week. It is just a sign for the importance of safety, in addition, we have to ensure that our message and the awareness we have are transmitted to all employees at our companies."

Additionally, El Molla asserted that the Egyptian oil and gas sector is unified. "So, we need to speak the same language, we need to share the same targets, and we need to follow the same means and values to achieve these targets," the minister added.

El Molla indicated that despite holding three previous events on safety to spread awareness, yet "what we did was not enough because accidents, injuries, and deaths are still continuing. Thus, we have to exert more efforts."

To face these incidents, El Molla mentioned a safety committee will be formed for the sector's governance, which is responsible for issuing regulations and rules according to international standards. Moreover, El Molla stressed that training and developing human calibers turned out to be a necessity to get rid of the recent dominant belief that HSE positions are repellant. "We have already begun a big project which includes over 70 young professionals. The participants were selected carefully, and they managed to finalize phases one and two," El Molla noted.

Additionally, El Molla mentioned the training program carried out in 2018, in collaboration with Eni, which resulted in sending 72 participants to Italy for intensive programs through our joint ventures (JVs); Agiba Petroleum Company and Belayim Petroleum Company (Petrobel).

El Molla stressed on replying to those calling for a nationalized sector, saying "we need to develop our sector in Egypt; hence, we need advanced technologies, knowledge transfer and investments," adding that "our foreign partners do not aim at reaping the country's wealth, they only require returns on their investments."

Moreover, El Molla noted that a new element evaluating HSE will be added to the quarter-evaluation of each employee, explaining that "I did not want to add this

element before giving an opportunity for spreading awareness on safety," adding that "we cannot let such incidents happen without accountability."

When it comes to digitalization, El Molla illustrated that "we cannot speak about the sector's digital transformation without having a proper safety base. Thus, we need more efforts to increase awareness on safety." As a sign of success, El Molla mentioned Zohr field which included 15,000 employees and was implemented with zero accidents.

"Our main target is achieving our strategy successfully," El Molla remarked, stressing that all companies need to stick to their HSE plans and training programs, as "we cannot be a successful sector unless we fully commit to safety rules in our business."

SCHLUMBERGER'S SAFETY DRIVING WORKSHOP

The Safety Day reaped the accomplishments of the whole safety week, which were made by two international oil companies (IOCs) and one national oil company (NOC). Earlier that week, Schlumberger, Halliburton, and Petrojet held a series of workshops at the Sky Resort, in light of health, safety, and environment (HSE) week, where each company tackled a different HSE topic.

"The oil and gas industry in Egypt, led by the Ministry of Petroleum, recognizes that a safe industry is a successful industry," Alex Tang, Schlumberger's HSE Manager, said while presenting her company's achievements. According to Tang, since last year's memorandum of understanding (MoU) that was signed between Schlumberger and the Ministry of Petroleum and Mineral Resources, several initiatives were made to promote HSE leadership and awareness in the Egyptian oil and gas industry.

A great example of putting this MoU into action, is the fact that "all of us as leaders are gathered together this week to collaborate on how we can improve the safety of the industry," Tang said, adding that this offers a fantastic opportunity for industry teamwork and cooperation.

She pointed out that Sunday's workshop was about safety driving, as Schlumberger regards driving as one of the highest risks. Driving safety workshop started with an overview of how Schlumberger manages driving, reviewing the seven elements of the driving policy and discussing each one with a focus on the technology that has been implemented to manage journeys and influence drivers' behavior, Tang recapped.



WE CANNOT SPEAK ABOUT THE SECTOR'S DIGITAL TRANSFORMATION WITHOUT HAVING A PROPER SAFETY BASE. THUS, WE NEED MORE EFFORTS TO INCREASE AWARENESS ON SAFETY.

H.E. ENG. TAREK EL MOLLA
Minister of Petroleum and Mineral Resources - Arab Republic of Egypt

One of the hot topics that were shared at the Sky Resort was the seatbelt convincer. During 2020, Schlumberger plans to lend its seatbelt convincer throughout the year, so that seatbelt culture and awareness can be improved further, according to Tang. The workshop session had a very good turnout, where there were over 150 delegates from more than 30 companies and attendants. Split into 15 roundtables, a diverse group of upstream and downstream executive men and women sat together from all the companies in Egypt's oil and gas industry. The discussions were "thought-provoking conversation-starters to encourage brainstorming and asking further questions. The level of collaboration and teamwork was exceptional," Tang said.

To conclude the workshop, Tang said that the teams came up with so many ideas on good driving habits, safe behaviors, standardized training programs,



monitoring systems, vehicle standards, trip inspections, and journey management, all of which are meant to make 2020 a safer place.

HALLIBURTON'S CONTROL OF WORK

Subsequently, Halliburton's HSEQ Area Manager, Hatem Bashandy, recapitulated on the huge turnout of CoW workshop, saying that at Halliburton, to collaborate and maximize the added value for customers, the company's leaders are driving their teams to the journey of zero hazards. "All of this started with leadership, commitment and Halliburton Management System (HMS) continuous improvement. And this is what all leaders should have: a good and solid management system," Bashandy said.

According to Bashandy, to communicate and address risks is how people can have the right safety tools to implement safe executions for a job, which is often empowered by a robust technology and process improvement.

Halliburton's workshop on the second day of the HSE week had more than 200 attendees from 103 companies, Bashandy said, explaining that it was a great opportunity to give a massive message to all attendees about the COW. The workshop emphasized the leading indicators of HSE leadership, which how to lead by example, how to commit to change and commit to zero incidents, and finally, how to abide by the nine life-saving rules and spread their awareness.

PETROJET'S CONTRACTORS' MANAGEMENT WORKSHOP

Afterwards, Petrojet's CEO HSE Consultant, Tarek Adly, explained their main objective to keep people safe. The keyword is teamwork, he further said.

According to Adly, 80% of worldwide fatalities are caused by contractors, and in Egypt, this percentage is as high as 93%.

To spread awareness and go up against this trend, Petrojet has been addressing Contractors Management with a series of workshops. Six HSE Contractors Management workshops were conducted in Petrojet's headquarters under EGPC's sponsorship by a predetermined committee of a professional team, presenting to more than 49 companies and 193 attendees.

Under the patronage of H.E. Tarek El Molla, Petrojet held another Contractors' Management workshop at the Sky Resort on the third day of the HSE week, with 106 companies and 150 attendees. "Those leaders had very fruitful discussions. I was very happy with the constructive feedback of everyone," Adly said.

Through the workshops, attendees identified six main challenges; lack of HSE leadership and culture, lack of communication in the oil and gas sector, shortage of qualified resources, no proper documentation, lack of competency, and finally, no clear rules and responsibilities. "I want to stress that if we did not solve the first challenge, which is leadership, we will not be able to solve anything else. HSE is a journey which we have begun; we are moving forward and we shall never look back," Adly concluded.

Y2020 HSE COMMITMENT PLAN

EGPC's CEO, Abed Ezz El Regal, later presented the Y2020 HSE commitment plan, showcasing what has been implemented and what is still in the making.

"To start off, what we have reached is the accumulations of all the previous safety

days, along with the ministry's efforts. Listening to different opinions, we were able to come up with a plan to unify the entire sector with one goal," Ezz El Regal said.

The first topic which Ezz El Regal tackled was driver's safety, where he said all the sector's companies must abide by implementing several special technical requirements. The first requirement is checking the vehicle's state, durability, and that it is fit-for-purpose. Ensuring that all vehicles are safe throughout the duration of the trip. The second is providing fit and qualified drivers. The third is checking the route's conditions alongside the weather conditions before moving forward. The fourth is providing a detailed management journey with a tracking network [via GPS/IVMS] to all vehicles and transportation units at each company. Finally, the fifth is providing an electronic tracking system at each company (Electronic JMP), to ensure the availability of all needed elements to ensure safe navigation.

The second topic was COW, whereas all sector's companies must abide by providing an effective business management system to ensure safety in the field. This should happen by providing Permit To Work (PTW) for all the works/jobs that could be provided such as (drilling, lifting, etc...), providing qualified individuals for different types of jobs, communicate with all individuals before starting any project (Tool Box Talk), monitoring all simultaneous operations (SIMOPS), empowering all workers to stop any job not done safely, and finally, implementing necessary revisions to PTW by upper management at least once a year.

The third and final topic was contractors' management, in which Ezz El Regal stated all sectors' companies should implement the requirements of the contractors management's guide, which was published by EGPC in January 2019. According to the guide, all companies must provide bridging documents with the contractors, and it should include the responsibilities of the main and secondary contractors. Moreover, all companies should reassess their current contracts with all contractors to ensure HSE standards align with the guide's provisions.

AWARDS

Enas Shabana, Communications Section Head at the Ministry of Petroleum and Mineral Resources, announced the Y2018 HSE Awards, with four winners. The first award was for Best Employee in Safety, which was won by Ahmed Khattab, Rashid Petroleum Company (Rashpetco).

The second award was for Best HSE Performance, which was received by Sabry El Sharkawy, Rashid Petroleum Company (Rashpetco) Chairman and Managing Director.

The third award was for 'Best Safety Performance in Projects Execution by Contractors', which was won by two companies. Ashraf Bahaa, Enppi's Chairman and Managing Director, and Chemist Mohamed Hassanien, Head of Alexandria National Refine & Petrochemical Company (ANRPC), received the award.

The minister took a group photo with the Safety Modernization Youth and the Technical Committee team. While he was invited on stage for the group photos, he announced that there will be no awards for 2019, as the year witnessed a number of fatalities.

SHAPING HSE FUTURE

Consequently, Gamal Fathy EGPC'S CEO Assistant for HSE presented the HSE cultural threats, such as production pressure, risk normalization, and tolerance of inadequate systems and resources.

Fathy showcased the road map to improve HSE culture, saying that in 2018,





emergency response and preparedness started being reactive. Starting from January 2018, there was compliance for HSE requirements, leadership commitment, and standardization. In December 2019, there was a commitment towards leadership and employees' engagement, challenging KPIs, and a shared vision. According to Fathy, if you compared 2018 with 2019, there is a stark improvement in HSE. Furthermore, the road to 2020 will witness continual improvement of audits and reviews, digitalization, and engagement of the capacity building team.

There are currently actions-in-progress in seven projects, comprising HSE standardization, life-saving rules, process safety management, engagement for the capacity building team, wastewater management (GOS), and finally, firefighting systems.

He further took on the EGPC HSE Standardization (phases one and two), which will help in establishing EGPC HSE code of practice from January 2020 – June 2020. The process started in June with the documentation and an application submit to the International Association of Oil and Gas Producers (IOGP). Later, EGPC obtained the IOGP membership and a standardization committee was formulated to review IOGP standards. In December, EGPC launched OMS based on IOGP 510 Report, with the consultation of various companies.

Fathy elaborated more on the life-saving rules, which were discussed earlier by Bashandy, dividing the rules on three phases. Phase one comprises awareness and training. Phase two includes the integration into the HSE-MS and implementation with positive reinforcement. Phase three ensures follow up and continual improvement. "It is an absolute must to apply these rules in the entire sector," he said.

He presented the way forward of the projects' continuation, which focus on leadership, ownership of the middle management front lines, audits and reviews, and finally, digitization.

PANEL DISCUSSION WITH MODERNIZATION YOUTH

EGPC's CEO sat with the HSE Modernization Youth in a panel discussion moderated by Mohamed Fouad, Managing Director at Egypt Oil & Gas. The panelists were Mahmoud Rabie from Petrojet, Dina Moharram; HSE Head at Gascool, Mohamed Omar; HSE Engineer at GUPCO, Tayseer Gamal; HSE dept. at Rachid Petroleum Company (Rashpetco), and Ahmed Salah; HSE Head.

Among the themes that were tackled were the ministry's vision for the youth, the role of the Modernization Project in developing the human resources with the best HSE practices, in addition to the HSE challenges and how to overcome them.

Ezz El Regal explained that as there is a need for development, Egypt is seeking to modernize all its sectors, with the oil and gas industry at the forefront. Under the Modernization Project, the petroleum sector has been witnessing many new decisions regarding its development, with a special focus towards human development, as it is one of the most important tools for production, he said.

The five panelists were among a team of 74 individuals responsible for the HSE Capacity Building program within the Modernization Project. Gamal explained that the program does not just depend on trainings, but instead build on the capabilities that make you face your day-to-day challenges and activities. "One of the best perks of this program is diversity, as the team behind it comes from different companies all over the sector, from public to private companies and from downstream to upstream. This made us more aware of the sector's problems"

Ezz El Regal praised the unity of standards that now all companies have to adhere to, as it holds the national companies accountable to international standards. He also mentioned that the contractor's management guide needs to be updated constantly, and to be more detailed. He also recommended that we should have a system with a set of specific standards, statistics, and criteria to uphold.

Moharram discussed how we can implement the best technology in our fields while also upholding the quality standards of safety, this is essential to the job's sustainability. Not only will we ensure the safety of our equipment but also the safety of our engineers. "Personal and process safety are two faces of the same coin" noted Moharram, as she elaborated on how we always must have a safety plan that denotes any sort of dangerous incident that might occur. Not only that, but we should also monitor the KPIs and to leap at the chance of improvement. She also recommended to keep up with the digitization process in order to improve HSE.

Ezz El Regal concluded the panel by advising the young professionals to utilize their knowledge and the technology to their own interest, and praised them as they are considered the future professionals of tomorrow. He also mentioned that after investing in the infrastructure, investing in the human resources now is even more essential as they are the ones who will control the whole industry in the future.

DIGITALIZATION IN HSE

The event's 'Digitalization in HSE' session showcased latest safety digitalization initiatives undertaken in the sector's companies.

Belayim Petroleum Company (Petrobel) introduced its CoW initiative. Petrobel's COW is a complete and effective system that can control operations in an effective and efficient way. Through which, Petrobel managed to control work processes and minimize risks.

Another example for the CoW was Petrogas. Petrogas has digitally transformed its safety system through establishing a complete interactive model. This model includes all the site's data, and records it in 3D Mapping real Time Data. This model enabled Petrogas to optimize its safety system, enhance its productivity, improve the quality of its products, reduce operating costs, and mitigate potential hazards.

The Egyptian Drilling Company (EDC) set an example for digitalizing safety reporting. In 2017, EDC transformed its reporting system into an electronic one, through the Aegis 30 system.

This system enables EDC to manage the huge information and reports received daily and obtain all required observations and analyses quickly and accurately. Moreover, the system enabled EDC to supervise all its locations to minimize risks.

Enppi introduced another example for digitalizing safety reporting through establishing its electronic system to overcome different HSE problems faced while managing their projects. This system can use all gathered data to do a root cause analysis for all incidents, in addition, it includes risk management tools for better levels of safety through managing the site's activities.

Rashid Petroleum Company (Rashpetco) represented an example for driving safety digitalization. Rashpetco made the decision to digitize everything in 2017 through a real time monitoring system that can easily gather statistics on HSE. Throughout the phases of the system's development, it enabled Rashpetco to record daily observations and reduce potential hazards.

Another example for digitalizing drive safety was Badr Eldin Petroleum Company (Bapetco). Bapetco introduced a new web-based Electronic Journey Management System (E-JMS).

The E-JMS provides an accurate way to create and track journey management plans. This system automatically ensures managing road safety hazards, and improves HSE performance.

Concluding the event, Abed Ezz El Regal stressed that HSE is critical for the success of all oil and gas activities, noting that it is important to sharing different companies' success stories or their incidents to learn from them. Ezz El Regal asserted on cascading the event's message and recommendations to all the sector's employees.

Osama Nouredin, Undersecretary for HSE Affairs at the Ministry of Petroleum and Mineral Resources announced the HSE awards for 2020, mentioning that the upcoming year's awards will be directed to oil and gas companies, employees, and contractors. Nouredin noted that the criteria and the program of the 2020 awards will be announced through the ministry's website during January 2020.



SCHLUMBERGER DEPLOYS

THE DELFI ENVIRONMENT FOR A BRIGHTER, MORE OPEN FUTURE

BY DINA EL-BEHIRY

To address the global wave of technology and digitization, Schlumberger convened its SIS Special Event in Cairo, in line with the SIS Global Forum 2019, to showcase its advanced digital solutions for oil and gas exploration and production (E&P) activities. The event, entitled 'Delivering Digital,' was held on December 2, 2019 at JW Marriott Hotel and introduced the DELFI* cognitive E&P environment.

A record number of guests attended, including the Egyptian General Petroleum Corporation (EGPC); the Egyptian Natural Gas Holding Company (EGAS); and Ganoub El Wadi Petroleum Holding Company (GANOPE). Karim Badawi, managing director-Egypt and East Mediterranean at Schlumberger, used his keynote welcoming speech to emphasize the importance of digitalization and its role in creating better, more efficient solutions for E&P in Egypt and worldwide. Looking at the technological level reached in the oil and gas sector, Badawi said, "We realize that we are moving from a physical domain to digital domain and how we bridge the gap between them."

Furthermore, Badawi expressed a view on the future of Egypt, saying "From where we are proudly standing today, we all can see that the future is very bright," explaining that the E&P achievements occurring in many Egyptian regions, such as the Western Desert, Gulf of Suez, Mediterranean Sea, and Red Sea play a leading role in attracting major investors to Egypt's oil and gas sector. Under the umbrella of the Modernization Project, Badawi added, "We can now think how to take Egypt to the next level."

Moreover, Badawi highlighted that "We are very proud of working together with the Ministry of Petroleum, EGPC, EGAS, GANOPE, and our collaborators and customers operating in Egypt," pointing out that "the topic of digitalization is really exciting for everyone."

Badawi also emphasized the ministry's participation in the Cairo International Exhibition and Conference on Telecommunication and Information Technology (Cairo ICT 2019), which he said is, "A big sign of the role that digitalization plays in the oil and gas sector for [a better] future."

Concluding his speech, Badawi expressed that Schlumberger is proud to work with the ministry in indulging digitalization more often in the sector, enabling more discoveries and better production levels.

THE DELFI ENVIRONMENT OVERVIEW:

A presentation entitled 'Digital Vision' was introduced by Bassel Abdelwahab, vice president operations-eastern hemisphere, Schlumberger Software Integrated Solutions, explained the DELFI cognitive E&P environment, a Schlumberger technology which supports the oil and gas sector's digital transformation. Abdelwahab clarified that "Schlumberger leads the way in digital technology for E&P," highlighting that "in Monaco, in September 2019, we showed a clear vision for digital transformation in the industry, powered by openness and the DELFI environment."

Abdelwahab described the DELFI environment as "A secure, scalable, cloud-based environment that serves as the data ecosystem for the industry, where each customer can have their own universe of data and workflows."

The first implementation of the DELFI environment in the market was in 2017, followed by several other successful projects and implementations, according to Abdelwahab. Consequently he said, "We managed to reduce the size of interpretation time from 13 months to 2½ months. We reduced well intervention workflow planning time by 80% and in field development planning, we were able to evaluate fourteen times the number of scenarios three times faster, dropping

simulation of some mega-size models from 120 days to around three days." In addition, Abdelwahab pointed out the wide footprint of the DELFI environment; it has succeeded to include around 100 worldwide customers—and one of them is in Egypt.

With an eye on data security, Abdelwahab affirmed that "The DELFI environment is secure. On our customer's behalf, Schlumberger focuses a unprecedented levels of attention on data security. We established a 24/7 cybersecurity center in Houston to ensure that we are protected against any attacks from outside."

Moreover, Abdelwahab noted that the DELFI environment is cognitive, which means that "It combines the best of human and computer. It supports domain experts in understanding, learning, and digestion of data with the machine power to give the best results." He said, adding, "The DELFI environment is personalized, delivering a full dataset to domain experts, tailored to their own perspective."

Abdelwahab further explained the DELFI environment's main components. The first one is to liberate, which means liberating data and the use of other data sources. "Today with the DELFI environment, we can support 270 data types, and we can read from more than 150 different data sources," he said, noting that Schlumberger has contributed the DELFI data ecosystem to the Open Subsurface Data Universe™ (OSDU) Forum; an open source data ecosystem, with many participating E&P companies. The OSDU enables digital collaboration.

The second factor is to connect, not only internally, but also connecting different technologies to obtain the best results.



DIGITAL READINESS

Mark Gibbons, director marketing operations at Schlumberger, delivered a presentation entitled 'Digital Readiness, What Does it Take?'. He began his discussion emphasizing that Schlumberger collaborates with its customers along every step of their digital journey through the implementation of the DELFI environment and other solutions. "We look at our customers, and we look at how familiar they are with their digital journey," he noted. Gibbons further explained that some customers do not have enough information about what digitalization is, what it means, and how it impacts the business. Other customers have an idea about what they want to do for their digital transformation, but they do not have a clear road map for implementation. Others try to implement a digitalization strategy and want help in improving their strategies for a better future.

Moreover, Gibbons illustrated that Schlumberger helps its customers meet their digitalization needs through four main services. The first one is Digital Transformation Consulting, which helps customers adopt the steps required for digital transformation.

The second is Digital Innovation Labs, which provides a way for customers to reach out for new technologies to address challenges facing the business while implementing a digital transformation plan. The third is Transition Services, helping customers to understand new technologies and the process needed for digital transformation. The fourth is Operations Services, in which the DELFI environment is implemented for the needed digital change.

In order to have unique expertise in E&P digital enablement, the summation of applied E&P digital technology, E&P domain workflow knowledge, transformation program expertise, digital innovation, and impact acceleration should be acquired. Gibbons noted that the successful implementation of that equation will result in achieving successful business outcomes.



DIGITAL TRANSFORMATION

The event continued with a presentation entitled 'Digital Transformation—From Ambition to Action' by Rizkallah Nicolas Ward, digital consulting engagement manager, Middle East and Africa at Schlumberger. In his presentation, Ward raised a question on whether digitalization is a revolution or an evolution, explaining that digital transformation helps in offering many benefits and values for a business, increasing its return on investment (ROI).

Speaking about the reality of digital transformation, Ward said, "The first point we look at is how we are using our data. Today, only 4–5% of our data is used to generate value. The cloud and big data, according to some studies, are ranked as the two most confusing buzzwords of the decade." He added that "Only 3% of oil and gas companies have hired a Chief Data Officer (CDO). A CDO is a person who knows about data ecosystem, data governance, and the ownership of data to create value. The last point is that although many executives genuinely think that embarking and embracing the digital journey is essential for survival, and that is very true, 70% of digital transformation fails because of lack of vision and poor management and collaboration."

Returning back to the evolution versus revolution question, Ward commented that "Societies, organizations, and companies evolve in two ways. First, they evolve by optimization, until a disruptive event takes place," adding that "the disrupting events we are living today are called artificial intelligence (AI) and machine learning, but there is a process and transformational aspect to develop in that journey to take the evolution to the next level." Ward explained that the implementation of AI and machine learning has to occur in a sustainable way in order to ensure it takes an organization to the next level, hence, achieving digital transformation.

Ward continued by asking "Why do we need to achieve that next level of digital transformation? Because it enables the connection of our equipment. Today, only 3–5% of oil and gas equipment is connected. This has an impact of data quality and how we utilize data efficiently to make decisions. So, connecting our data is priority number one."

Ward clarified that we are moving toward a data-driven world, where "The sum of good quality data, the AI tools, and workflows, are going to create the insights." These insights help an organization to be digitally transformed, "We scan the organization and we identify areas to start with. Secondly, we develop the adapted digital strategy for your business, and we translate it into a portfolio of projects and investments," he added.

Additionally, Ward stressed that success in digital transformation requires us to go beyond the technology to set a digital strategy. This raises many questions. The subjects that need to be addressed are:



- Why do we need digital transformation?
- What are the organization's priorities, and when can they be executed?
- How can we digitally transform?

These questions can help any organization reach its full digital maturity assessment through identifying its priorities, quick wins, and long-term projects.

Ward stated that "Proper digital transformation needs to be sponsored internally and supported externally by the right collaborations and partnerships. Schlumberger has demonstrated over the last 90 years that hiring the best domain expertise achieves success." Moreover, Ward pointed out some lessons learned from other digital transformation journeys, where underestimating the business scope leads to the wrong decisions and selecting technology that does not achieve the business goals.

SUCCESS STORIES

Gibbons mentioned some success stories for strategic digital collaboration, in which Schlumberger helped its customers achieve digital transformation and realize success. These customers include OMV, Petro, INPEX Corporation, and BP.

Furthermore, guests at the event asked questions to the presenters related to the DELFI environment and other technologies. In addition, booths at the event provided guests with more information about the DELFI environment and Schlumberger expertise.

Convening such an event demonstrated the deep commitment and continued effort by Schlumberger to accelerate digital transformation in the oil and gas industry.



POWER FROM PIPELINES

THOMAS ROTHER EXPLORES ENERGY RECOVERY IN CRUDE OIL PIPELINES

In some oil pipelines, pressure reduction systems are installed to guarantee a smooth and safe operation (mainly in pipelines with high elevation differences). Such systems convert pressure or kinetic energy into heat. The question is whether it is also possible to transform kinetic energy into electricity. The answer is yes.

ILF recently had the chance to investigate a potential pipeline system for the installation of a turbine for energy recovery in a crude oil pipeline. The system needed to overcome a hill. To avoid slackline regions, which makes it easier for leak detection and pigging, a back pressure control valve (PCV) was installed. Depending on the pipeline system flow rates, the PCV converted energy within the range of 1.5 megawatts (MW) to 8 MW.

PIPELINE SYSTEMS AND ENERGY RECOVERY CONFIGURATIONS

Starting with two pipeline sections, the potential energy that could be recovered was discussed. One main aspect was that the energy recovery system must not influence the goal of the pipeline system: oil transport. Another aspect was that pipelines are normally operated at different throughputs with changing pressure conditions. The resulting system curves needed to be considered when selecting the recovery system, which could be a reverse-operating pump or turbine. In addition, the task of the recovery system influenced the sizing of the energy recovery system. Energy can be produced either for consumers in a demand-driven island-mode or for a grid with a maximum possible energy recovery mode.

In general, systems can be used where pressure reduction or back PCVs are installed. At each pressure reducing valve, pressure will be converted into heat,

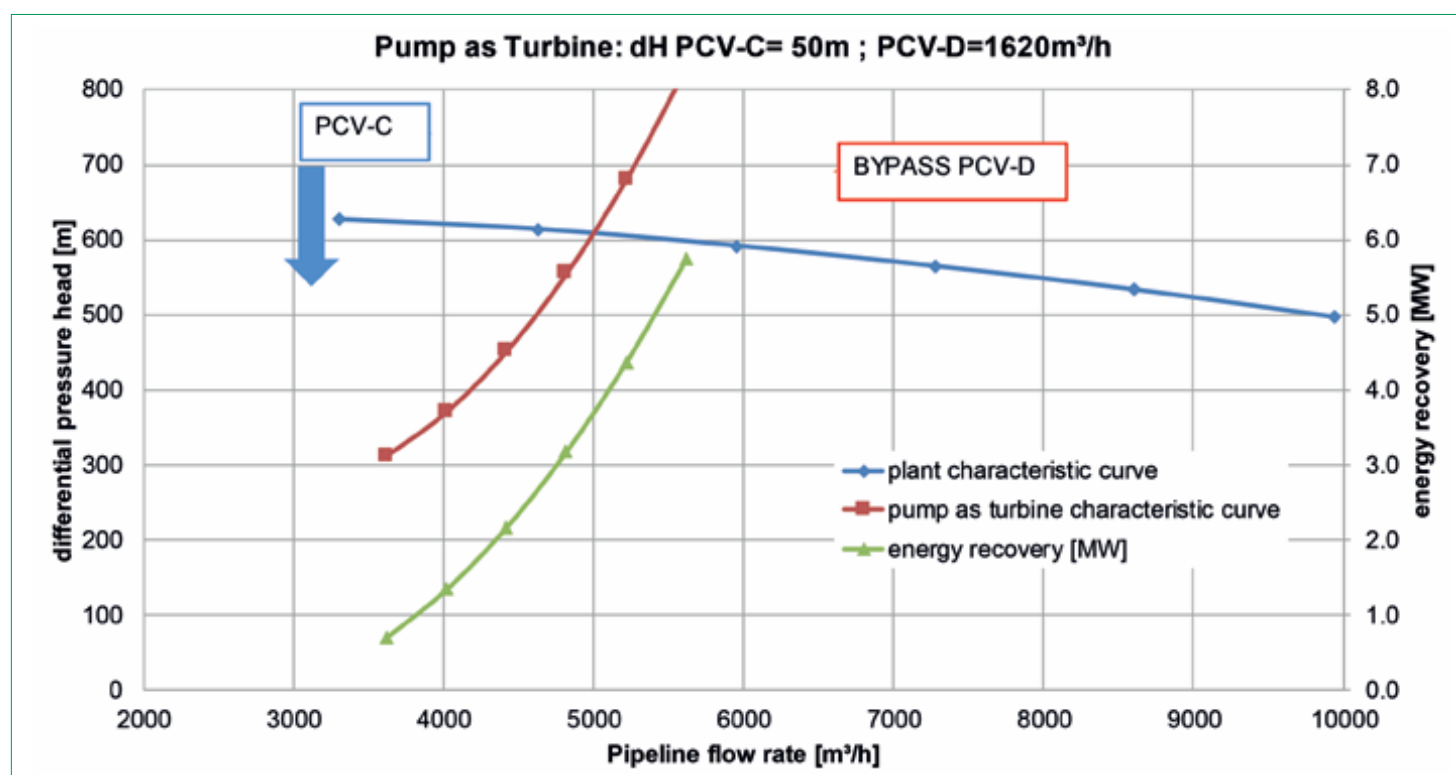
vibration, and noise. In the above example, a 48-inch-pipeline is considered. A hill with about 700 meters height is located 30 kilometers upstream of the storage tank terminal.

Within the project, it was decided that only one unit, either one pump as turbine (PaT) or one turbine, should be used. Together with the required power recovery range of between 1.5 and 3.5 MW, at all given process conditions (flow/pressure) the task was to find proper solutions for both systems. For a pump there is one characteristic curve. To recover a specific amount of energy, the pump must be operated at the corresponding intersection point between the system curve and the pump characteristic.

Fig. 1 shows the system curve (blue) together with the pump characteristic curve (red line). The green line shows the recovered energy that can be obtained (for a certain crude density of 834 kg/m³). The energy



FIG. 1. PUMP AS TURBINE - OPERATING POINT



values of the green line are calculated by the pump head, pump flow, and efficiency. Pump characteristic curve and energy recovery curve always cover the same flow range.

The recovered amount of energy is given at the intersection point between the system curve and the pump characteristic. In this case, the recovered energy would be about 3.6 MW. The pipeline flow is about 5,000 m³/h, the flow through the bypass PCV, PCV-D is 1,620 meter square per hour (m³/h), and an additional pressure loss of 50 meters (m) must be generated at PCV-C.

For turbines, the given ratio between flow and pressure head leads to a design with operating points on the left side of the turbine characteristic. The required energy can be recovered in the range between 1.5 MW and 3.5 MW. However, the turbine is oversized regarding the initial approach. The potential energy recovery of the turbine is up to about 8 MW.

Using that turbine, it was possible to recover the requested energy with all different pipeline operations. The request to recover energy up to 3.5 MW, even at smaller flow rates, requires turbine operation with high differential head. This enables the turbine to recover energy up to 8 MW, too. To handle the higher amount of energy, the electrical system needs to be adapted accordingly.

OPERATIONAL CHALLENGES

The installation of the system must be done in a way that the main goal of pipeline operation is possible all the time. Therefore, the energy recovery system needs to be installed in parallel to the existing line. In addition, the existing task of the control valves must be kept. That is to control the backpressure – to avoid slackline operation.

The energy recovery systems can only be used if the pipeline is operational. Furthermore, the energy recovery system must be easily started and stopped.

In case of a pipeline emergency shutdown (ESD), the turbine generator will be stopped immediately; energy cannot be recovered any more. In this case, the grid load must be considered. The evaluation of the grid stability is one of the main tasks. If the recovery system is designed for island mode, a kind of priority list can be installed to stop electrical consumers in preferred order. In the island mode, it is also important to ensure the energy balance between energy recovery and consumers. What happens if the island consumers need less energy than the minimum recoverable energy? In that case, the installation of a load bank can help.

COMMERCIAL ISSUES

What is the benefit of an energy recovery system? It can be estimated using the following rule of thumb. Pressure loss (in bar) of the PCV divided by 10 and multiplied with the flow rate [m³/s] results in the potential energy (in MW). Assuming that 70% of the potential energy could be recovered this leads to:

$$P \text{ [MW]} = dP \text{ [bar]} / 10 * Q \text{ [m³/s]} * 0.7$$

The energy recovery is only an add-on. It is not required for the normal operation and main task of the pipeline. One important question needs to be clarified: is it possible to feed the grid all the time? Together with the pipeline availability, this results in the benefit of such systems. Assuming 10 Euro per megawatts (€/MW), the earning per year (in total 70% of the year energy recovery operation: 6,132 h) can be calculated as:

$$\text{Earning [€]} = P \text{ [MW]} * \text{operating hours [h]} * 10 \text{ [€]} \quad \text{Example 1} = 3.5 \text{ [MW]} * 6132 \text{ [h]} * 10 \text{ [€]} \sim 214.000\text{€}$$

$$\text{Example 2} = 2.1 \text{ [MW]} * 6132 \text{ [h]} * 10 \text{ [€]} \sim 129.000\text{€}$$

Installing energy recovery systems in oil pipelines is not something that is done as a standard. There is no a general, ready-to-use solution. Each system must be designed individually and the required machines must be carefully selected. Therefore, there must be close contact with the manufacturers. In contrast to many conventional tasks, such projects also have to take into account the efforts of the manufacturers, as otherwise it may be difficult to obtain the necessary information in time.

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EOG HSE/CSR SUBCOMMITTEES SPREAD HSE CULTURE AMONG STUDENTS



Egypt Oil & Gas (EOG) Corporate Social Responsibility (CSR) Subcommittee along with the Health, Safety, and Environment (HSE) Subcommittee, in partnership with Ain Shams University, Faculty of Engineering, kicked off the first HSE awareness workshop in Egypt for university students to develop their interpersonal skills.

The event came in parallel with the Ministry of Petroleum and Mineral Resources' annual safety week, aiming to disseminate the HSE culture among students and equip them with the main interpersonal skills that they will need in their practical life.

About 100 students attended two parts of the day; one part worked on developing their soft skills and the other part worked on developing their safe behavior.

Through the sessions, attendees got to know more about the HSE culture, hazard identification and risk assessments. The presentations focused on the life-saving rules and how they can be applied to make the petroleum sector a safer place.

As the lifesaving rules were a main part of the discussions, facilitators talked about what should be done in bypassing safety controls, confined space, driving, energy isolation, hot work, line of fire, safe mechanical lifting, work authorization, and working at height.

Safety driving was also a vital part of the workshops, as participants experienced the importance of using seat belts through a seat belt convincer crash simulator device. During the safe driving awareness presentation, Intelligent Safety Solutions (ISS) provided their driving simulator and seat belt convincer. The device is used to help both drivers and passengers to better understand the forces of a low-speed crash and the benefits of wearing seat belts whenever a vehicle is in motion.

In the soft skills training part, the presenters discussed how to make creative problem solutions. Accordingly, there were eight steps that were elaborated to be followed in order to make the right decision.

The first step is to identify the problem. Then, you have to identify the decision criteria (costs, risks and outcomes), which is the main factor to solve a problem. After that, you have to allocate the importance of the criteria you have just identified in the correct priority order. The fourth step is to get alternatives that enable you to the problem. The fifth one is to evaluate these alternatives' strengths and weaknesses. Step six is to select the optimum alternative. The next step is to implement the decision. The last one is to identify if the problem is resolved and to what extent the decision is effective.

One of the junior students said, "we learnt from this training how to be safe while driving and how to be safe in the working place"

Meanwhile, a female junior student said, "I am pleased and excited by that training as it is important and useful."

Another junior student declared, "we learnt from these sessions useful things including presentation skills, how to brainstorm for new ideas, how to identify problems and solve them, and finally, HSE."

Participants engaged in a pre and post assessment to find out their level of development. All workshop

participants have undertaken the same assessment prior to the commencement of the training workshop and later upon the completion of the delivered materials.

All the questions incorporated covered the most important topics delivered by the facilitators throughout the workshop. Thus, the assessment was meant to confirm that the participants have acquired the necessary knowledge level and increased their awareness of the foundational skills pertaining to the addressed topic.

All the participants have shown positive difference in the percentage of knowledge improvement between the pre and post assessments scores; indicating the amount of knowledge gain that was achieved during the workshop. The maximum percentage was 80% and the minimum percentage was 0%, indicating a wide range in the knowledge difference between the participants. However, the knowledge gap was successfully compensated throughout the training workshop.

All the participants have demonstrated a noticeable improvement in their level of knowledge, each individual according to his/her own ability to grasp and comprehend the delivered material. However, as a general indication and conclusion from the data analysis; the overall objective from the intervention was attained as per the improvement in all the participants' results.



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BUILDING A HEALTHY COMMUNITY

Empowerment, opportunity, and community are key elements to define SAHARA Petroleum Services Company (SAPESCO)'s workforce. As a conscience entity, the company firmly believes in harnessing and supporting individuals' skills to enable them to reach their full potential. SAPESCO plays an active role in developing the Egyptian society and communities with their vital and effective corporate social responsibility (CSR) programs. SAPESCO strives to develop healthy habits and mindsets among the youth by nourishing fitness and exercises.

The idea of KO SQUAD arose as part of SAPESCO's CSR in the Egyptian community. KO SQUAD discerns between an amateur and a professional athlete; where an amateur lack the resources that makes them a professional athlete. Being a professional athlete simply means being committed, competitive and persistent. From this point, the idea of KO SQUAD commenced; an organization that provides athletes with whatever they need to peruse their dreams and develop their characteristics.

Mr. Islam Kortam's goal, KO SQUAD's Founder, is to provide resources to spread sports amongst Egyptian youth. Accordingly, he chose three main sports, football, street workout (Calisthenics) and bodybuilding.

The first chosen sport is street workout, which originated in Ancient Greece and spread all over Europe and Russia later. It is a newly recognized sport that encourages creativity and strength. It is a sport that attracted a big number of teenagers as it could be conducted in any place; hence its name. As a start, KO SQUAD provided support for street workout athletes by providing venues for training. KO SQUAD team for street workout participated in a couple of international events. In addition, KO SQUAD organized Egypt's championship and world cup super-finals where many celebrities attended. One of its greatest achievements is that KO SQUAD gave birth to the Egyptian Federation for Street Workout and Calisthenics (ESWCF), along with preparing public parks all over Egypt for street workout players to train.

The second sport was bodybuilding, which needs hardcore exercises and a healthy life. Many obstacles face bodybuilders in Egypt such as knowledge, facilities and financial resources. Due to the vast number of youth practicing this kind of sport, the challenge that faced KO SQUAD was the criteria of choosing athletes who need support. The reason behind KO SQUAD's interest in bodybuilding and physique is to encourage youth development both physically and mentally, and to enhance their communication skills by interacting with different cultures and backgrounds by participating in international events. KO SQUAD hosted many events and attracted many influential athletes worldwide to share their stories and motivate Egyptian youth. In addition to that, KO SQUAD presented the first Arabic website specialized in training and nutrition (www.bodybuilding-arabia.com). Also, KO SQUAD will host Mr. Olympia 2020, which is considered one of the biggest international bodybuilding competitions that is held annually.

The third sport is football, which is a sport that enhances team work and talent. KO SQUAD established a couple of football academies for supporting more than 2,000 players. KO SQUAD football team achieved many good ranks in different tournaments, and the future plan is registering a club to participate in the Egyptian football league.

KO SQUAD believes that sports do not recognize any boundaries and will continue serving the Egyptian community.



CURRENT MAJOR CHALLENGES IN THE EGYPTIAN OIL AND GAS INDUSTRY

The oil and gas industry is constructed on two basis; capitals investment and available human resources (HR). Thus, there is no doubt that the human element is considered as a cornerstone or a backbone of all the industry's activities and investments worldwide.

Nowadays, the oil and gas industry in Egypt is facing two major challenges that is affecting the overall performance negatively and making loss of Authorization for Expenditure (AFE), which may lead to uneconomical investment or low return. Those two major challenges are: Health, Safety and Environment (HSE) rules based on personnel culture and their beliefs, and the availability of technical qualified personnel their development to get the maximum performance and reach the technical limit of industry.

At first, I find myself in need to highlight those HSE rules as they have become entrenched in our culture and any progress depend on achieving the highest safety level and environment protection during the project lifetime. Consequently, the Egyptian Ministry of Petroleum and Mineral Resources put a new strategy for HSE, compatible with the international standards of safe work environment.

On the other hand, availability of qualified technical personnel in the Egyptian oil sector has become an urgent necessity due to the huge number of experienced technicians and engineers who have retired or joined a national or international oil company outside Egypt

without equivalent replacement in their teams.

Therefore, the hiring process has become a crucial part in forming new technical work teams. The teams should undergo an integrated technical training program to qualify them to be a principal pillar of the oil and gas industry in Egypt.

As a conclusion, I see that we are in dire need to re-organize the oil sector's HR and their investments, in addition to dealing with the HR as a precious asset worth more care and development as the other natural resources.

There also a need to work on the activation and application of law no. 4 / 1994 that was issued for environment protection to be a reference for HSE policies of oil and gas sector companies in Egypt.

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



THE EVOLUTION OF THE PETROLEUM AGREEMENTS MODEL

Petroleum agreements in Egypt have gone through several development phases, which begin with royalty and rent, giving licenses for 30 years and renewals for 15 years in exchange of taking annual rent and royalty on production until law No. 136 of 1948 was issued. The law stipulates that all raw materials and minerals inside the lands of Egypt belong to Egypt, and it stipulates exploration licenses are granted by laws for a specific period of time, while production is through an Egyptian joint venture company.

After that, the Mines Law No. 66 of 1953 was issued, which entails that exploration concession areas are to be offered in bid rounds, and in 1954 the first agreement was issued requiring the relinquishment of 25% of the exploration areas after the expiration of a certain period.

The petroleum agreements model was modified in the beginning of the 60s to the participation system, where the foreign partner bears all the costs and risks of the research and exploration process, with a minimum spending limit for a specific period, in addition to the rents and bonus agreed upon.

When a commercial discovery is achieved and production begins, the Egyptian General Petroleum Corporation (EGPC) contributes equally with the foreign partner in establishing a joint company that carries out the operations, provided that the foreign partner recovers half of the exploration expenditures, and the production is distributed equally between the two parties.

Subsequently, the agreements model was modified into the Production Sharing Agreement (PSA), whereby the foreign partner alone bears the risks of exploration and development expenditures, and in case the absence of any commercial discovery, the foreign partner does not recover any expenses that were spent in the exploration stage. But in the event that a commercial discovery is proven, it is converted to a development lease and production is carried out from the area that includes the development lease. Part of the production is assigned to the recovery of the exploration and development expenditures by the foreign partner and the remaining percentage of petroleum shall be divided between EGPC, the Egyptian Natural Gas Holding Company

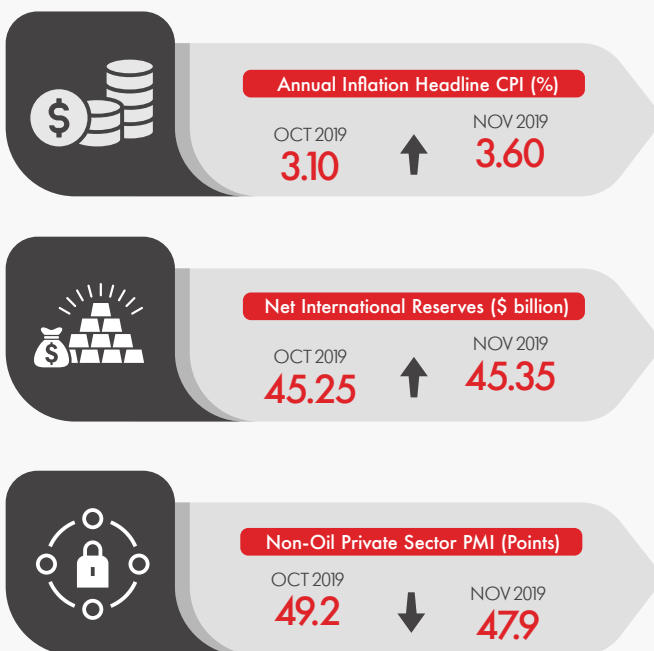
(EGAS), Ganoub El Wadi Petroleum Holding Company (GANOPE) and the foreign partner based on the Brent price and according to the production tranches. Moreover, the foreign partner shall pay a signature bonus, development lease bonus and production bonus.

The Ministry of Petroleum and Mineral Resources has developed the PSA during the past years in order to attract new investments and increase research and exploration in light of the high-risk factor and the high cost of developing commercial discoveries in the deep waters of the Mediterranean Sea. The improvement of the PSA aims to achieve an appropriate return on investment, which encourages the foreign partner to invest and quickly put discoveries on production, to meet the needs of the domestic gas market, and to promote a balance between both parties.

As a result of this continuous improvement of the petroleum agreements model, major companies in the fields of research and exploration have invested in Egypt. This was reflected in the international bid round results of EGAS for the year 2018, by awarding deep-water areas in the Mediterranean Sea to major companies, in particular, ExxonMobil, one of the largest companies in the field of exploration and development.



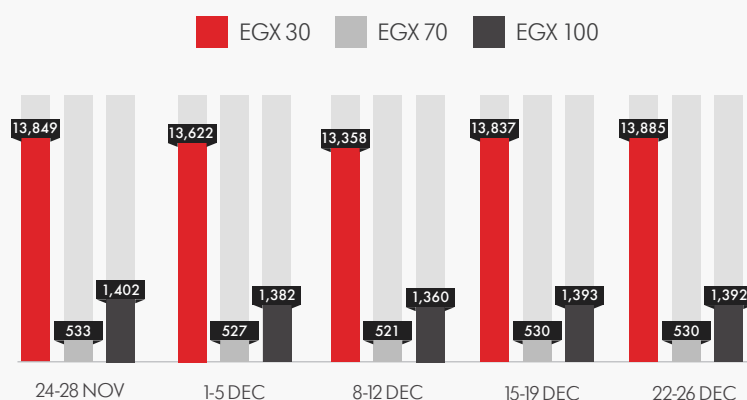
Geo. Ahmed Sobhy Abdel Shafy
Department Manager for Development Leases
Follow-up at Egyptian Natural Gas Holding Company (EGAS)



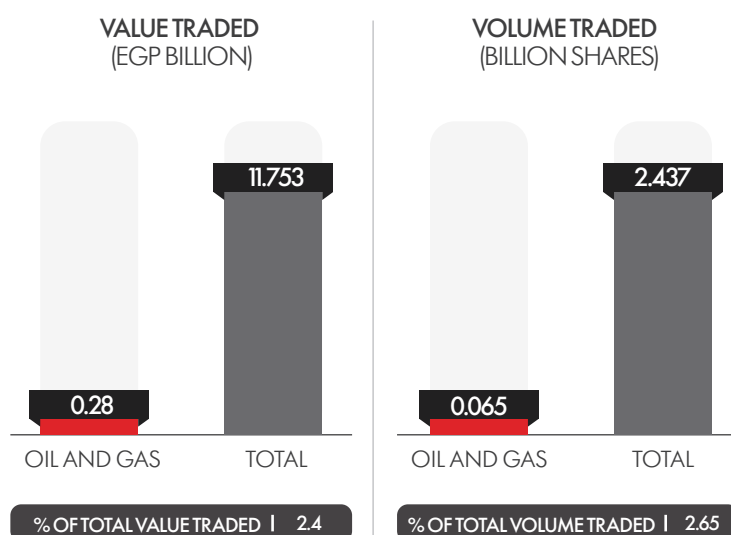

Exchange Rates




Capital Market Indicators



Oil and Gas Sector Financial Performance in November 2019



National Drilling

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
USD	4.96	▲ 9.01



Alexandria Mineral Oils Co.

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	3.9	▼ 37.5



Egypt Gas

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	56.75	▼ 22.45



Sidi Kerir Petrochemicals

CURRENCY	CLOSE PRICE	YTD PRICE CHANGE (%)
EGP	11.37	▼ 33.59



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Zohr's natural gas production capacity reached **3 bcf/d**, in December 2019.

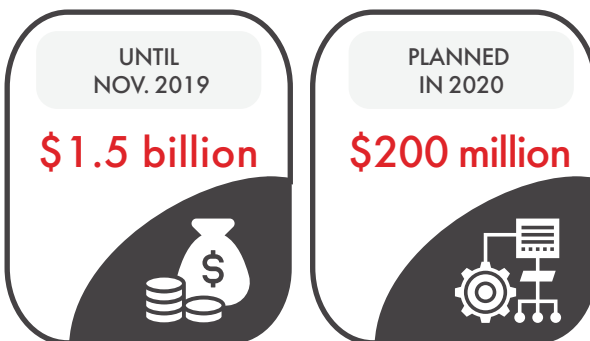


ECHEM TO ESTABLISH NEW POLYACETAL PRODUCTION PROJECT

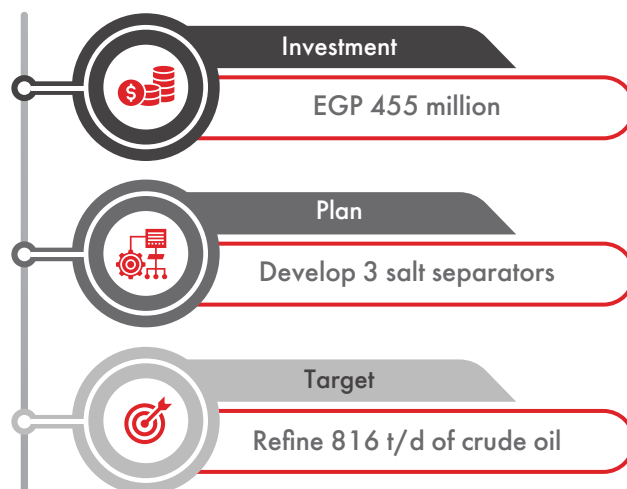
Location	Damietta Port
Investments	\$400 million
Estimated Production Capacity	50,000 t/y



TCI SANMAR CHEMICALS COMPANY INVESTMENT IN EGYPT



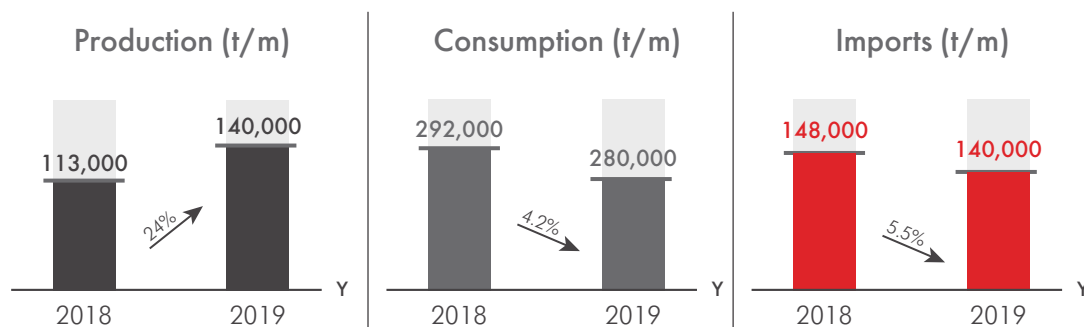
Petrojet signed a contract, in Dec. 2019, to develop **El-Nasr Petroleum Refinery**



Production Capacity of the New Naphtha Complex of ASORC is **660,000 t/y**.

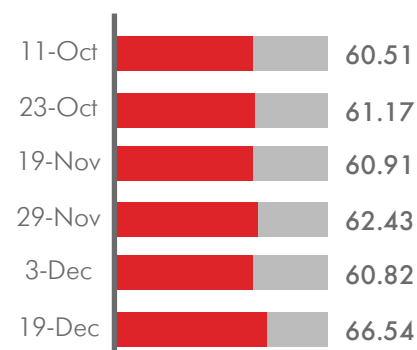


BUTANE INDICATORS UPDATES (YOY)

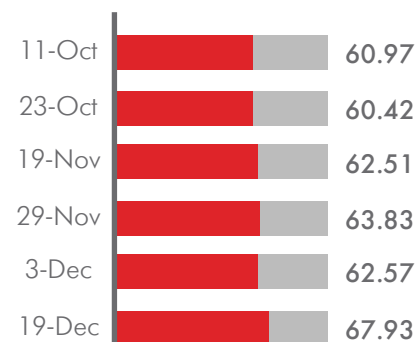


INTERNATIONAL OIL PRICES

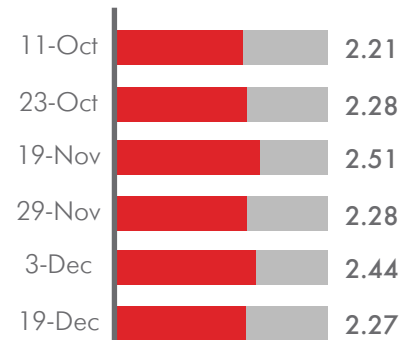
BRENT PRICES (\$/bbl)



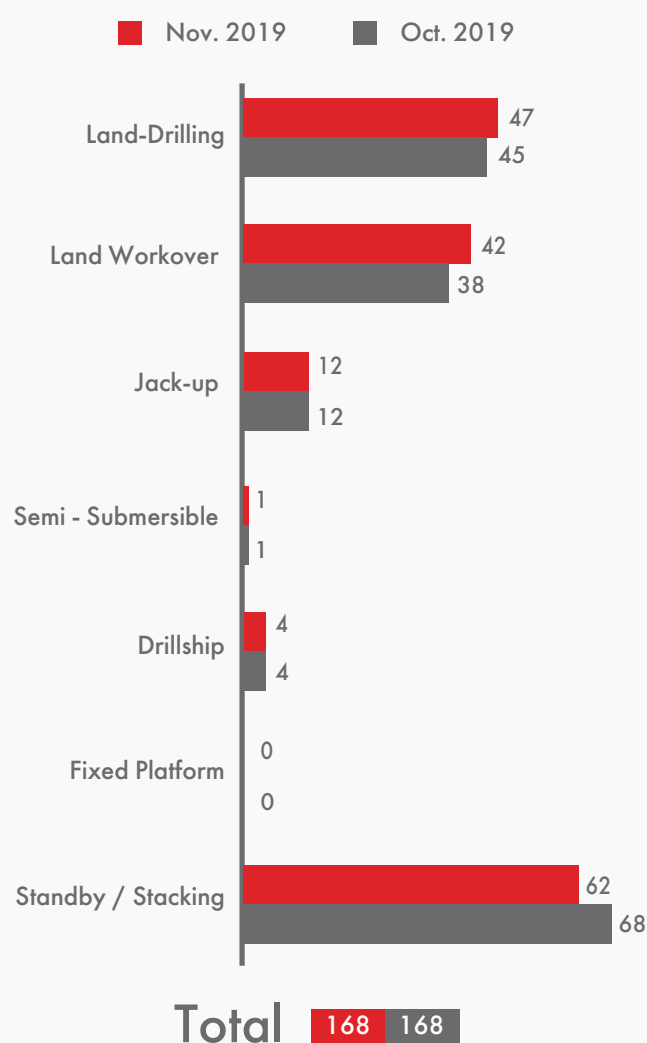
OPEC BASKET PRICES (\$/bbl)



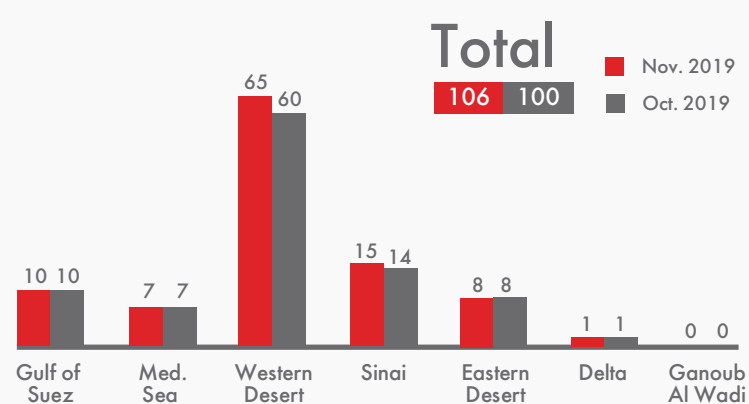
NATURAL GAS PRICES (\$/mmBtu)



EGYPT RIG COUNT PER TYPE Nov. 2019

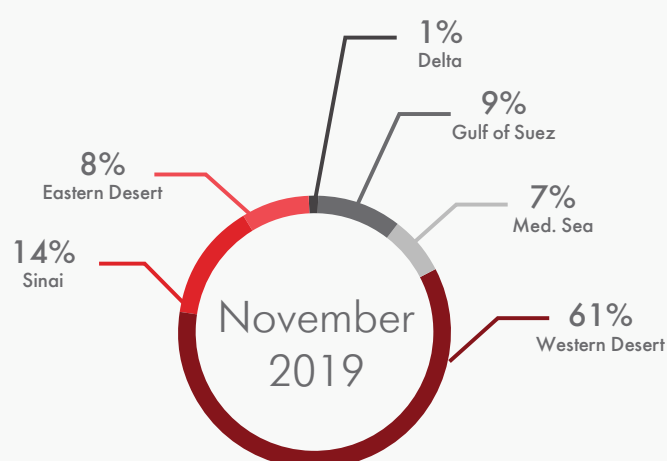


EGYPT RIG COUNT PER AREA Nov. 2019



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 NOV. 2019

Total

537,329	BBL/D
6.829	BCF/D
6,663	MCF/D
93,574	BBL/D

Numbers are calculated per day on average.

	CRUDE OIL	NATURAL GAS	SOLD GAS	CONDENSATES
MEDITERRANEAN SEA	388	4.388	4281	38,184
EASTERN DESERT	64,847	0.010	9	40
WESTERN DESERT	297,122	1.229	1199	41,489
GULF OF SUEZ	124,419	0.076	74	1,771
DELTA	161	1.127	1100	11,552
SINAI	50,219	0	0	537
UPPER EGYPT	174	0	0	0

DRILLING UPDATE NOV. 2019

REGION	COMPANY	WELL	WELL TYPE	RIG	DEPTH	WELL INVESTMENTS
EASTERN DESERT	GPC	BAKR-131	Development	ST-4	4,839	2.010 M\$
DELTA	DISOUCO	DSQ 1-6	Development	EDC-1	2,390	4.130 M\$
MEDITERRANEAN	PETROBEL	NIGMA-1X	EXP	TUNGSTEN EXPLORER	5,232	45.050 M\$
	BP	ATOLL-4	Development	MAERSK DISCOVERER	5,980	86.010 M\$
WESTERN DESERT	BAPETCO	BED 18-M	Development	EDC-50	11,627	1.200 M\$
	AGIBA	NE-78	Development	EDC-66	7,800	1.020 M\$
	GPC	NES-16	Development	EDC-73	5,748	2.000 M\$
	PETROSILAH	NE TERSA 1-3	Development	ECDC-1	9,600	1.200 M\$
	QARUN	WON X-30	Development	EDC-65	7,100	1.100 M\$
		COBRA-3	Development	EDC-63	10,700	1.600 M\$

COMPETITIVE ADVANTAGE THROUGH THE GAS VALUE CHAIN



SHELL IS A PIONEER AND A LEADER IN THE GAS INDUSTRY WITH OVER 100 YEARS' EXPERIENCE. WE FOCUS ON PROVIDING EFFECTIVE SOLUTIONS FOR MONETISING GAS RESOURCES.

We can provide a portfolio of integrated solutions across the full gas value chain, from finding and producing gas through to the marketing of products. Shell technologies can help a country boost its economy by building up local gas-based industry. In addition, we bring skills transfer and people development which are key for creating in-country value. Shell plays a role in supporting the natural gas industry in many countries and is proud of how these strong, mutually beneficial relationships have developed.

