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An Interview with **SAMEH SABRY**, DEA Egypt's Country Manager

DEA

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EDITOR'S NOTE

With the quality of oil and gas operations closely aligned with a company's environment and safety protocols, discussing key concerns of health, safety and environment (HSE) management in the industry becomes a necessity. Thinking of this, Egypt Oil & Gas has built this issue to shed light onto already known topics within HSE and other angles that affect particularly the Egyptian sector.

On our cover this month, we bring Sameh Sabry, DEA Egypt's new country manager, who told us about his career path towards an executive role and on his expectations and thoughts on the company's position in Egypt, especially after DEA's merger with Wintershall.

In our Industry Insights section, you can find relevant information on international oil companies (IOCs) HSE precautions while operating in conflict zones, in addition to information on Egypt's concerns and requirements toward the safety performance of local contractors. You can also have insights on how workers' mental health affects oil and gas companies' efficiency and how the Egyptian petroleum industry can address this issue, in addition to the risks of groundwater contamination and its solutions. Following Schlumberger's OneSurface Technology Day, you can also find in our pages the full coverage of the event.

Our Research & Analysis department has contributed to this issue with a five-year overview on Egypt's crude oil production, from 2013 to 2017.

We are also proud to offer with this issue the Egypt Oil & Gas CSR Supplement, in which we gathered best corporate social responsibility (CSR) practices taken by oil and gas companies in Egypt in order to spread awareness and inspire other companies into engaging in CSR projects.

As always, thank you for your readership and support. We hope this issue and the supplement bring you valuable knowledge and joy.

EDITOR IN CHIEF

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EGYPT'S LEADING OIL AND GAS MONTHLY PUBLICATION

EGYPS EGYPT PETROLEUM SHOW

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WEST NILE DELTA PHASE 2 FIELDS TO START PRODUCTION IN DECEMBER

The Giza and Fayoum fields in the West Nile Delta concession will be added to production in the second phase of the project in December 2018. Production from the fields will have an initial capacity of 400 million standard cubic feet per day (mmscf/d), which will then gradually grow to reach 700 mmscf/d. The news came during the periodic meeting of the Higher Committee of West Nile Delta natural gas project, chaired by Minister of Petroleum Tarek El Molla. The committee was following up on phase two of development and production at the North Alexandria and the West Delta Deep Marine (WDDM) natural gas fields.

EGYPT TO REACH NATURAL GAS SURPLUS BY APRIL 2019

President Abdel Fattah El Sisi announced that Egypt will obtain a surplus of natural gas by April 2019. The president made his remarks during a dinner organized by the Business Council for International Understanding, held on the sidelines of the 73rd Session of the UN General Assembly. Egypt's geographical location enables it to be an important trading hub between the African and European markets, El Sisi stated. He admitted that Egypt had experienced problems in its energy sector but told attendees that the country was overcoming them.

EGYPT DELAYS PURCHASE OF OIL PRICE HEDGING CONTRACT

The government will delay the purchase of the hedging contract designed to guard against rising oil prices, despite agreeing on a deal with several investment banks, the Egyptian finance minister said. The purchase of the hedging contract aimed to secure the country against fluctuating oil prices, and the government was reportedly in talks with JPMorgan Chase and Citibank earlier this year. Minister of Finance Mohamed Maait said that the $81 Brent price would negatively affect the economy.

ZOHR OUTPUT TO REACH 2.7 BCF/D IN JULY 2019

Eni hopes to finish linking Zohr natural gas field's production in July 2019 instead of the end of 2019. The field will have a total capacity of 2.7 billion cubic feet per day (bcf/d) when the Italian company has finished linking the field to production. The company is currently drilling wells to link the final phase of the project to production, a source at the Egyptian Natural Gas Holding Company said. The project is currently around 80% complete, the source said, adding that this demonstrates the efficiency of national oil companies.

BULGARIA EYES JOINING EGYPT-GREECE-CYPRUS GAS PROJECT

Bulgaria is interested in joining the Egypt-Greece-Cyprus gas project, according to an embassy press release. Sofia sees Egypt as a key trade and economic partner in Africa and the Middle East, said Bulgarian Prime Minister Boyko Borissov. Bulgaria is looking forward to cooperating with the North African country in the energy field, Borissov stated during his meeting with Egyptian President Abdel Fattah El Sisi on the sidelines of the 73rd UN General Assembly held in New York.

EGYPT TRIALS NATURAL GAS SHIPMENTS TO JORDAN

Egypt has begun sending experimental quantities of natural gas to Jordan, Jordanian Minister of Energy Hala Zawati has said. Earlier in September, Egypt finalized negotiations with Jordan to sign a deal for exporting around 250 mmscf/d of gas to a Jordanian electricity-generating power plant, an official source at the ministry stated. According to the new agreement, Egypt will resume exporting natural gas to Jordan in early 2019 via the pipeline linking the two countries, said the source, adding that the agreement would help turn Egypt into a regional energy hub.

EL MOLLA: EGYPT TO STOP LNG IMPORTS

Egypt will halt imports of liquefied natural gas (LNG) after receiving a final shipment in late September, petroleum minister Tarek El Molla has said. The minister told journalist Amr Adib on El Hekaya that this move will save the government $1.5 billion. Domestic natural gas production has increased enough to become the main energy source for Egyptian industries, he added.

ISRAEL, EGYPT GAS PARTNERS ACQUIRE CONTROLLING STAKE IN EMG PIPELINE

Noble Energy, Delek Drilling and Egypt East Gas Company have purchased a 39% stake in the Eastern Mediterranean Gas Company ,paving the way for Israel to begin exporting natural gas to Egypt, Noble announced. The Eastern Mediterranean Gas Company owns the subsea EMG pipeline that runs from the Israeli city of Ashkelon to El Arish on Egypt's north coast. The agreement will allow the consortium to export natural gas from Israel's Tamar and Leviathan fields in the Mediterranean to Egypt's liquefaction facilities. The consortium will pay $518 million for the stake. Delek and Noble will provide $185 million each while Egypt East Gas will pay the remainder.

EGYPT IMPORTS 17 LNG CARGOS IN Q1 2018/19

Egypt has imported a total of 17 LNG cargos during Q1 of fiscal year (FY) 2018/19 worth $500 million, petroleum ministry spokesman Hamdi Abdel Aziz said. Egypt has now halted imports of LNG after receiving its final cargo at the end of September 2018.

EGYPT'S FUEL PRODUCTION-CONSUMPTION GAP DECREASES TO 25%

The gap between Egypt's production and consumption of fuel decreased to 25% compared to 35% at the beginning of 2018, an official source at the Ministry of Petroleum said. This means that the country is consuming 25% more fuel than what it produces. The Egyptian oil and gas sector is working on decreasing the gap gradually by boosting production rates from the recently-discovered fields, the source pointed out. The source explained that new refining projects will support the country's ability to cover domestic consumption. The government will then decrease fuel imports in parallel to the falling fuel subsidy allocations.

EGYPT CONNECTS TOTAL 9M HOUSEHOLDS TO NATIONAL GAS GRID

Egypt has connected 9 million households to the national gas grid, Minister of Petroleum Tarek El Molla told DMC Channel. The country is adding around 100,000 households to the gas grid each month, the minister said. In addition, 150,000 citizens have signed contracts to connect their households to the national grid under the 18-month repayment plan.

11TH ARAB ENERGY CONFERENCE KICKS OFF IN MARRAKESH

The 11th Arab Energy Conference kicked off in Marrakesh, Morocco, on October 1, under the theme of 'Energy and Arab Cooperation'. The conference was held from October 1 to October 4, and brought together delegates from across the Middle East and North Africa (MENA) region to discuss expanding regional cooperation in the field of energy. Egyptian Minister of Petroleum Tarek El Molla made a speech about Egypt's Vision 2030 sustainable development strategy on the first day of the conference. The minister said that the plan sits alongside targets set for the energy sector to receive 40% of the country's energy from renewable sources by 2035.

EGYPT OIL&GAS RESEARCH & ANALYSIS

EGYPT
THE FUTURE REGIONAL NATURAL GAS HUB
REPORT
November 2018

Egypt is closer than ever to becoming the Eastern Mediterranean's natural gas energy hub. The African country is moving steadily towards reaching natural gas self-sufficiency in 2019 and even resuming exporting activities by 2020. Ahead of these historic milestones, Egypt Oil & Gas Research & Analysis has dug deeper into the available natural gas data from 2017-2010. This comprehensive analysis of the domestic gas market will enable our clients to track even the smallest changes in the sector, and help forecast its future prospects. This will enable them to make more precise decisions, placing them in the best possible position to take advantage of future developments in the sector.

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NATURAL GAS PRODUCTION INCREASES BY 14.9% YOY

Egypt's natural gas output rose by 14.9% year-on-year (YOY) to reach 3.873 million tons in July 2018, compared to 3.371 million tons in July 2017. The monthly bulletin published by the Central Agency for Public Mobilization and Statistics (CAPMAS) reveals that Egypt's consumption of natural gas increased by around 9%, rising from 3.944 million tons in June to 4.299 million tons in July. Monthly figures show that Egypt's gas production grew by 1.79% in July 2018, up from the 3.805 million tons produced in June 2018.

PETROLEUM PRODUCTION ROSE BY 1.55% YOY IN JULY

Production of crude oil, condensates, and butane increased by around 1.55% YOY in July 2018, producing 2.818 million tons compared to 2.775 million tons in July 2017. Figures published by CAPMAS show that consumption of petroleum products in Egypt dropped by 15.87%, recording 2.455 million tons in July 2018, from the 2.918 million tons consumed in the same month in 2017.

BUTANE CONSUMPTION DECREASES BY 7.6% YOY IN JULY

Egypt's butane consumption decreased by 7.63% YOY as the country used 284,600 tons in July 2018, compared to 308,100 tons in July 2017. Statistics published by CAPMAS show that Egypt's butane imports dropped by 5.26% to record 176,000 tons in July 2018, down from the 167,200 tons imported in the same month of 2017. Meanwhile, the country's output rose by around 4.96% as it produced 156,500 in July 2018, up from 149,100 in July 2017. Egypt's butane consumption dropped on a monthly basis by around 12.3% as the country consumed 324,500 tons in June 2018.

EL MOLLA: EGYPT WILL CONTINUE TO CUT ENERGY SUBSIDIES

Egypt will continue to cut energy subsidies in order to decrease government expenditure, Petroleum Minister Tarek El Molla said during the 11th Arab Energy Conference in Marrakesh. The minister said that the high cost of energy subsidies puts pressure on the country's finances, and uses money which can be used to improve social services. El Molla's comments came amid an ongoing surge in oil prices that is threatening the government's deficit reduction targets, and placing additional strain on the public purse. Brent rose to $86 per barrel on October 3, a level that has not been seen since November 2017.

DIESEL CONSUMPTION DROPS BY 2.5% YOY

Egypt's diesel consumption dropped by 2.49% YOY to reach 1.136 million tons in July 2018, down from 1.165 million tons in July 2017. Statistics published by CAPMAS reveal that Egypt's diesel output dropped by around 14.26%, producing 529,000 tons in July 2018 compared to 617,000 tons in the same month a year earlier. The country's monthly diesel consumption increased by 12.03% up from the 1.014 million tons consumed in June. Meanwhile, the country's production decreased by around 5.7% down from the 561,000 tons produced in June 2018.

EGYPT'S FUEL SUBSIDIES BILL MAY REACH EGP 100B IN 2018/19: GOVERNMENT SOURCE

Egypt's fuel subsidies bill is expected to reach EGP 100 billion in fiscal year (FY) 2018/19 due to the recent surge in oil prices, a government source said. Brent reached $86 per barrel on October 3, $18 higher than the $67 benchmark that the government used to calculate its FY 2018/19 budget. Calculations by Mohamed Abu Basha, head of macroanalysis at EFG Hermes, suggest that between $1 billion and $1.2 billion is added to the government's current account deficit for every $10 increase in the price of oil. Some analysts are now forecasting prices to rise above $100 per barrel next year.

ENPPI SIGNS DEAL TO MANAGE IPO

Engineering for the Petroleum & Process Industries (Enppi) has signed a contract with three banks to manage the company's initial public offering (IPO) on the Egyptian Exchange Market (EGX). The government signed the agreement with CI Capital, Jefferies, and Emirates NBD, according to an official press statement. Although the release did not state when the IPO would take place, Enppi CEO Mohamed Hathoot said in February that the company would offer stakes by the end of 2018. The sale has repeatedly been delayed over the past couple of years. The company was originally scheduled to go public in December 2017.

EGYPT ADDS 40 TCF OF NATURAL GAS TO RESERVES FROM 2016-18

Egypt has successfully added 40 trillion cubic feet (tcf) of natural gas to reserves from four major projects during the period from 2016 to 2018, Lamia Abou Shahba, Department Manager of Gas Regulatory Affairs at the Egyptian Natural Gas Holding Company (EGAS), said. The four projects are Zohr field, West Nile Delta, Atol, and Nooros. Abou Shahba revealed the information during the 11th Arab Energy Conference held in Marrakesh and organized by the Organization of Arab Petroleum Exporting Countries (OAPEC).

MOSTOROD REFINERY TO CUT EGYPT'S DIESEL IMPORTS BY 50%

Egypt will start trial operations at the Mostorod refinery complex in December 2018 and prepare to start actual operations in Q1 2019, which will contribute to decreasing diesel imports by 50% as the refinery will produce 2.3 million tons per year, a source at the Egyptian General Petroleum Corporation (EGPC) said. The complex will secure 12% of total market's demands of petroleum products as it will produce between 850,000 tons and 1 million tons of benzene; around 80,000 tons of butane; 600,000 tons of jet fuel; 450,000 tons of coal; and 96,000 tons of sulfur annually.

HSBC-LED CONSORTIUM ISSUES $1B LOAN FOR PETROLEUM EXPORT LIMITED

HSBC-led consortium of international and Gulf banks will provide a $1 billion loan for the Petroleum Export Limited, which is a subsidiary of EGPC, banking source said. The loan will be used to partially settle the debts owed by Petroleum Export Limited to foreign partners. EGPC is seeking credit facilities from international financial institutions to secure its needs, especially those of settling its arrears to international oil companies (IOCs). EGPC had hired HSBC to arrange a loan of around $1 billion. The loan facility was requested by the Petroleum Export Limited, which is a special purpose firm that has been used by EGPC in the past to raise loans.

PETROLEUM EXPORTS PROFIT INCREASES BY 33.14% YOY

Egypt's petroleum exports profit increased by around 33.14% YOY as the country exported petroleum worth $8.773 billion in FY 2017/18, compared to $6.5895 billion during 2016/17. The Central Bank of Egypt (CBE) revealed in a press release that the North African country imported petroleum worth $12.4898 billion in 2017/18, around 3.95% higher than the $12.0155 billion spent on petroleum imports during the previous fiscal year. The latest figures show that the petroleum trade deficit decreased by 31.5% to $3.7168 billion during 2017/18, from $5.426 billion in 2016/17. The government is hoping that the trade deficit decreases over the coming months as the country stops importing LNG.

SOCO INTERNATIONAL TO BUY MERLON EL FAYUM

SOCO International has agreed to buy Merlon Petroleum El Fayum Company for around $215 million. The company said that a payment of around $136 million in cash and the issuance of around 66 million new shares – around 19.75% of its issued share capital – will satisfy the consideration. SOCO also plans to pay off Merlon's debts, which were estimated at around $22 million in December 2017. The company considers the acquisition to be an opportunity to help the company grow their operations in Egypt and in the wider Middle East and North Africa (MENA) region.

ENOC TO MARKET JET FUEL IN EGYPT

The Egyptian General Petroleum Corporation (EGPC) has signed an agreement that will allow the Emirates National Oil Company (ENOC) to sell jet fuel in Egypt. The agreement comes in line with both the Ministry of Petroleum's strategy to develop and support jet fuel filling activities, and the strong relations the country has with the UAE. The ministry said that the agreement will have several positive developments, including attracting aviation clients to Cairo International Airport, growing foreign currency reserves, and boosting foreign direct investment.

DEA ANNOUNCES THE CREATION OF WINTERSHALL DEA

BASF and LetterOne have signed a business combination agreement merging their oil and gas businesses to create Wintershall DEA. The merger is still pending customary regulatory approvals, which are expected to take place in early 2019. Should it go ahead, the merger would be the largest in the European oil and gas sector in over a decade. Wintershall DEA would be active in 12 countries in Europe, North Africa, Latin America, and the Middle East, making it the biggest independent European exploration and production (E&P) firm.

NOBLE ENERGY SELLS ITS STAKES IN TAMAR FIELD

Noble Energy sold its 43.5% stake in Israel's Tamar natural gas field on October 3, a week after announcing that it will fund a natural gas export deal with Egypt. The Texas-based firm sold all of its 40 million shares in the Tamar field for $4.26 each through the Tel Aviv Stock Exchange. The announcement comes days after the Noble-led consortium announced the purchase of a 39% stake in the Eastern Mediterranean Gas Company (EMG). The move paves the way for Israel to begin exporting natural gas to Egypt in 2019 through the EMG-owned Ashkelon-El Arish pipeline.

ENERGEAN OIL & GAS APPOINTS IMAN HILL COO

Energean Oil & Gas announced the appointment of Iman Hill as the company's new chief operating officer (COO) effective November 1, 2018. Hill has 30 years of experience as a petroleum engineer. Before working for Energean, Hill was the technical director, GM UAE and president Egypt for Dana Gas. She has worked for several international firms including BP, Shell, and the BG Group. Additionally, Hill held non-executive directorships at Outokumpu and EMGS. "Iman is a highly-experienced oil and gas professional with a proven track record and we are delighted to welcome her to the team," said Mathios Rigas, Energean's CEO.

WORLEYPARSONS TO PROVIDE PROJECT MANAGEMENT CONSULTANCY FOR ASSIUT HYDROCRACKING COMPLEX

WorleyParsons won a four-year contract from Assiut Oil Refining Co. (ASORC) to provide project management consultancy for the Assiut Hydrocracking Complex, which is located in Upper Egypt. ASORC awarded the contract through its subsidiary Assiut National Oil Processing Company (ANOPC). According to the deal, WorleyParsons will supervise the basic engineering phase, detailed design, open-book estimate, construction, procurement, and commissioning of the complex. The facility will annually turn 2.5 million tons of heavy fuel oil into high-quality petroleum products such as butane, diesel, kerosene, naphtha, and gasoline.

ENI SEEKS LICENSE TO CONSTRUCT EGYPTIAN SOLAR PLANT

Italy's Eni requested a license from the Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA) to establish a 50-MW solar power plant. The company will build the plant as an independent power producer (IPP). This means it will construct the facility and sell energy directly to consumers after it begins operations. Eni is also negotiating with the Egyptian Electricity Transmission Company (EETC) to establish a 250-MW solar plant under the Build-Own-Operate (BOO) system. The company said it will invest $300 million in the two plants.

UNITED ENERGY TO INCREASE INVESTMENTS IN EGYPT

China's United Energy Group is planning to launch new investments in Egypt, which will increase oil and gas production, said Mansour Bukhamseen, board chairman of Kuwait Energy Company. The Chinese group is producing 30,000 barrels per day (b/d) of petroleum from its concessions in the Western Desert, Bukhamseen said during a meeting with the Egyptian Minister of Petroleum Tarek El Molla.

SDX, BP TERMINATE ACQUISITION TALKS

SDX Energy Corporation has announced the termination of talks to acquire a part of BP's assets in Egypt. The decision to end the acquisition was taken by mutual agreement of the two firms. SDX was in talks with BP regarding the acquisition of "a significant package of assets in Egypt", the company had previously announced in a press statement. The company had said that "the acquisition would constitute a reverse take-over under Rule 14 of the Alternative Investment Market (AIM) Rules for Companies and would be subject to shareholder approval."

ENI TO SELL FARAMID GAS TO PETROLEUM MINISTRY

Eni agreed to sell the natural gas produced by the Faramid well to the Egyptian Ministry of Petroleum for $2.60 per 1 million British thermal units (mbtu). Production from the Faramid well, which was recently discovered in Eni's Western Desert concessions, is set to be connected to the Shell-owned Obaiyed gas processing plant. However, the well will be closed until the two companies reach an agreement and a pipeline is constructed between the two facilities. Eni announced the Faramid discovery in September, saying that it is delivering an initial 25 million standard cubic feet per day (mmscf/d).

EXXONMOBIL SIGNS LNG FRAMEWORK AGREEMENT WITH CHINA'S ZHEJIANG

ExxonMobil signed a framework agreement with China's Zhejiang Energy on October 18 for the Chinese firm to supply liquefied natural gas (LNG) for ExxonMobil, said Peter Clarke, president of ExxonMobil gas and power marketing. Zhejiang Energy won the 15-year term agreement, which is the first long-term supply deal in its history, Clarke stated during his speech at an oil and gas conference, held in Zhoushan, China. ExxonMobil is taking fast steps to cover LNG growing demand as it works on multi-billion-dollar production projects around the world along with working on its first mainland storage and distribution facility.

BWE TO INVEST IN APEX ENERGY

Blue Water Energy (BWE) has announced that it will invest in independent oil and gas exploration and production (E&P) company APEX International Energy. BWE will join Warburg Pincus LLC and the International Finance Corporation (IFC) in jointly financing Apex's investment program, which include drilling, asset acquisitions as well as corporate transactions. Neither company has yet disclosed how much BWE intends to invest in the MENA-focused E&P company.

TRANSGLOBE STARTS DRILLING SGZ 6X WELL IN WESTERN DESERT

TransGlobe Energy Corporation announced that it started drilling the second oil exploratory well, SGZ 6X, in the Western Desert South Ghazalat concession, on October 23. The well is located at the eastern part of the Western Desert concession, offsetting the Raml oil field, which is located in the Abu Gharadig basin. TransGlobe has also been granted access from the military to drill in the South Alamein 24X Jurassic exploration prospect. The company submitted the required documentation and is now waiting for the final written approval, which is expected to come before the end of 2018. TransGlobe began preparations for drilling SA 24X as part of its 2019 exploration plans.

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SAUDI ARABIA

Saudi Aramco's initial public offering (IPO) will take place by 2021, Crown Prince Mohammed bin Salman has said. The IPO was first announced in 2016 as a part of bin Salman's Vision 2030 plan to revamp the Saudi economy and was originally planned to take place during H2 2018. However, **the sale was unexpectedly put on hold in August, delaying what was expected to be the biggest IPO in history.**

An upgrade to Saudi Aramco's Yanbu South Terminal (YST) has added 3 million barrels per day (b/d) to the export capacity of the Red Sea facility. The YST facility contains a tank farm and offshore facilities to receive, store and load both Arab Light and Arab Super Light crude. Saudi Arabia is looking to increase its export activity on its west coast, avoiding the east coast route via the Strait of Hormuz due to threats from Iran to close the export channel.

Saudi Aramco plans to purchase a stake in a new refinery being built by Zhejiang Petrochemical. Aramco expects to supply the refinery, located in Zhoushan in eastern China, with 170,000 b/d of Saudi crude once it is operational – expected in late 2018. The total capacity for the refinery will be 400,000 b/d.

Saudi Arabia's energy minister Khalid al-Falih stated that the Kingdom does not plan to impose an oil embargo akin to that of 1973. The minister's statement came amid fears that Riyadh may cut supply by 500,000 b/d amid rising tensions over the killing of journalist Jamal Khashoggi. "This incident will pass. But Saudi Arabia is a very responsible country, for decades we used our oil policy as a responsible economic tool and isolated it from politics," al-Falih said.

Saudi Aramco signed 15 preliminary deals and strategic and commercial collaborations worth more than $34 billion at the Future Investment Initiative Forum. The memoranda of understanding are all aimed at diversifying the Saudi economy and include deals for downstream, offshore, and engineering.

IRAN

A subsidiary of the National Iranian Oil Company (NIOC) signed an agreement with a domestic firm to construct a $232-million crude storage facility near Iran's southeastern port of Jask. The Petroleum Engineering and Development Company (PEDEC) agreed the deal with Petro Omid Asia Company to build the facility over the next three years. It will have a capacity of 10 million barrels and will be implemented on a build-operate-transfer (BOT) basis.

Iran plans to offer 1 million barrels of export oil on the Iranian stock exchange (TSE). Ali Kardor, managing director at the NIOC, said that 5,000-barrel share packages will be offered to the country's energy stock exchange. Iran's First Vice-President Eshaq Jahangiri said in July that the country would be looking to offer oil via the stock exchange as a way to avoid restrictions placed on the country's exports by US sanctions.

Two Indian companies have placed purchase orders for Iranian oil in November, oil minister Dharmendra Pradhan said on October 8, adding that India does not yet know if it will receive a waiver from the US excluding it from sanctions on Iranian energy trade set to take full effect on November 4. India has been discussing its options to purchase Iranian oil with all authorities, Pradhan added.

QATAR

State-owned Qatar Petroleum has signed a five-year deal with China's Oriental Energy to supply 600,000 tons of liquefied petroleum gas (LPG) per year. The contract will start in January 2019 and was signed by Qatar Petroleum for Sale of Petroleum Products Company Ltd. (QPSPP) and Oriental Energy (Singapore).

Occidental Petroleum Corp announced they are no longer pursuing an extension of the Qatari Idd El-Sharghi North Dome (ISND) offshore oil field. Occidental's current contract expires in October 2019. The company stated that the 2018 free cash flow for ISND is estimated to be less than $300 million, with production of 51,000 b/d. **Major infrastructure investments required under an extension of the contract would mean the company's estimated free cash flow for the first five years would be roughly $70 million annually.**

Qatar plans to boost its LNG production capacity to 110 million metric tons per year (mt/year) by 2024, an increase of roughly 43%. Global demand for LNG is expected to rise sharply due to the Asian markets according to the International Energy Agency. Qatar's rapid expansion means it will be able to beat out competition from Australia that expects to be able to export 88 million mt/year if all its 10 projects reach full capacity.

ExxonMobil and Qatar Petroleum have been awarded exploration rights in Brazil's offshore Titã block. Brazil's National Agency of Petroleum, Natural Gas and Biofuels (ANP) sold the rights in its fifth pre-salt bidding round, announced on September 28. ExxonMobil bought a controlling 64% stake in the block while Qatar Petroleum purchased the remaining 36%. Under the terms of the agreement, the consortium will pay the Brazilian government a 23.48% royalty on any profits made from the block, in addition to a $777 million signing bonus. **The block is thought to contain around 3.9 billion barrels of unrisked reserves.**

UAE

The Abu Dhabi National Oil Company's (ADNOC) liquefied natural gas (LNG) subsidiary signed an engineering, procurement, and construction (EPC) contract worth $860 million with Spain's Tecnicas Reunidas and Abu Dhabi's Target Engineering Construction Company. The EPC contract is for the second phase of the Integrated Gas Development Expansion (IGD-E), which will take 54 months to complete and will add 245 million cubic feet per day (cf/d) of associated gas to the 1.4 billion cf/d already being sent to ADNOC Gas Processing's Habshan facilities from Das Island.

Austrian OMV started oil production from the Satah Al-Razboot (SARB) and Umm Lulu fields off the coast of Abu Dhabi and expects to produce 25,800 barrels per day (b/d) before the end of 2018. **The company will initially produce 10,000 b/d and plans to increase production to 43,000 b/d by 2023.**

Baker Hughes General Electric (BHGE), the world's second-largest services company, purchased a 5% interest in the ADNOC's drilling unit. ADNOC drilling is valued at roughly $11 billion in the transaction, and Baker Hughes will receive a seat on ADNOC Drilling's board of directors.

ADNOC is constructing a crude oil storage facility under Fujairah's Hajar mountain range. The underground facility, named Mandous, will have a storage capacity of roughly 40 million barrels of oil and is expected to be completed by 2020. South Korea's SK Engineering & Construction was the winner of the contract to build the facility.

The upstream investment arm of state-owned Emirates National Oil Company (ENOC), Dragon Oil, plans to invest $500 million in oil and gas assets next year, CEO Ali Rashid al-Jarwan said. Dragon Oil aims to boost its production to 300,000 b/d by 2025 and is looking to new opportunities in Turkmenistan, North Africa, and Iraq.

IRAQ

Iraq is increasing crude oil production from its Qayara oil field with a target of 60,000 b/d before 2019. The current production levels of 30,000 b/d will be doubled by the end of 2018, according to an Iraqi oil ministry statement, which also stated that the crude from the field was being exported the first time by Iraq's State Oil Marketing Organization (SOMO).

Iraq completed repairs at the Ajil oil field which was torched by Islamic State militants in 2015, the country's oil minister Jabar al-Luiabi said on October 9. He added that the field, located in Salahuddin province, is now producing 7,000 b/d. **Output is expected to increase to 17,000 b/d by the end of the year.** The field has also been producing up to 100 million cf/d of gas since the last round of repairs.

Iraq aims to produce 7 million b/d of oil and export 4 million b/d in 2019 through its newly-established National Oil Company. Luaibi said that the country hopes to export 1 million b/d through the Jordanian Aqaba port without giving a timeline for the plan. He added that the burning of gas byproduct from oil extraction would stop by 2021.

Iraqi state oil marketing company SOMO sold Basra crude oil on the Dubai Mercantile Exchange (DME) for the first time since January. SOMO sold 2 million barrels of Basra Light crude for loading on November 16-17 at 20 cents above its official listing price, the DME said. **Trade sources told Reuters that China's Unipec won the auction.**

OPEC

The Organization of Petroleum Exporting Countries (OPEC) has cut its 2019 global oil demand growth forecasts for the third straight month, citing trade disputes and volatile emerging markets, particularly in key consuming countries. The monthly report stated that world oil demand growth would increase by 1.36 million b/d next year, a 50,000 b/d fall from the previous month's report. OPEC also cut the estimated demand for its own crude by 300,000 b/d from the last report to 31.8 million b/d, marking a 900,000 b/d reduction in demand from the projection for 2018.

OPEC advised its members to not mention oil prices when discussing policy in order to avoid US legal action over manipulating the market. US President Donald Trump, a vocal critic of the cartel, is preparing to ratify NOPEC, or the No Oil Producing and Exporting Cartels act, which could open OPEC up to anti-trust lawsuits. Refraining from discussing a preferred oil price level – a method OPEC uses to guide market expectations – was advised to the group by law firm White & Case.

OMAN

Oman Power and Water Procurement (OPWP) opened a bidding round for a new utility-scale 1 gigawatt (GW) solar power plant in Oman's Dhahirah governorate. OPWP said that the photovoltaic (PV) based project, dubbed Solar 2022 IPP, will launch commercially in four years-time. OPWP aims to add 2.6 GW of renewable energy generation to its capacity by 2025, in line with the goal of a minimum of 10% of Omani power generation coming from renewables.

Malaysian Petronas is close to buying a 10% stake in Oman's al Khazzan gas field from the state-owned Oman Oil Company. PC Oman Ventures, a subsidiary of Petronas, will acquire the stake in Block 61 of the field, which is expected to produce roughly 1.5 billion cf/d of natural gas by 2020.

WINTERSHALL DEA:

THE LARGEST INDEPENDENT EUROPEAN E&P COMPANY IN THE MAKING

An Interview with **SAMEH SABRY**, DEA Egypt's Country Manager

BY MARIANA SOMENSI

In August 2018, Deutsche Erdoel AG (DEA) welcomed a new country manager in Egypt. The Egyptian Sameh Sabry returned to his homeland and took over the role after a successful performance as general manager for DEA Algeria. Sabry talked to Egypt Oil & Gas and commented on his journey towards a management position, as well as on his views on the Egyptian oil and gas sector and DEA's plans after the merger with Wintershall.

Could you introduce yourself and tell us about your career path?

I am an engineer, holding a Master of Business Administration and currently pursuing a Masters in Petroleum Engineering from Heriot Watt University. In the last 18 years, I have collected experience in the oil and gas industry - upstream as well as downstream. I had the pleasure to work for a number of multinational companies, starting with ExxonMobil, followed by Chevron. My current employer is DEA and it has been for the last 10 years. My international exposure focused on Europe and North Africa. I have been based in DEA's headquarters (Hamburg, Germany) twice, where I worked for four years in two different roles.

At the beginning of my career, I focused on commercial, business analysis as well as business development roles, where I have assumed the roles of commercial manager for DEA in Europe during 2012-2014, and the role of commercial and business development manager for DEA in Egypt during 2014-2016. Afterwards, I moved to general management roles, where I became the deputy general manager for DEA in Egypt, followed by being assigned as the general manager for DEA business in Algeria during 2017-2018. The latest move came in August 2018, when I was made general manager for DEA Egypt and board member for DEA's joint ventures (JVs) with the Egyptian General Petroleum Corporation (EGPC) and the Egyptian Natural Gas Holding Company (EGAS), SUCO and DISOUCO.

There are not many people in your position at your age. Can you talk us through what it is like to be younger in an executive role?

First of all, I strongly believe that having the right set of leadership skills, long-term vision and being balanced between operational and strategical capabilities are the main decisive factors for success in similar executive positions - not age. Secondly, I am not that young anymore, although I might be slightly younger than the average age for similar executive roles. This makes it easier for me to be flexible, dynamic and stay connected with the new trends in our industry. Whether it would be new technologies, digitalization solutions, or new approaches of leadership. Being middle aged makes me more down to earth and more accessible to junior colleagues, where I can benefit from their creative ideas as well as give senior experts enough space to maximize the company's benefit of their expertise.

What challenges have you faced in your journey towards a management position and how have you tackled them?

The biggest challenge I faced in my career so far was being told - at every milestone in my career - that this would be the ceiling and I could not grow my career further because of my background or my age. However, if there is a will, there is a way! Persistence, continuous learning and self-development allowed me to expand my knowledge, increase my experience significantly in a short period of time, and enrich my role beyond job boundaries. The second challenge was continuously assuming roles outside of my comfort zone. In particular, when I was assigned to international roles; for example, being the commercial manager of DEA in Europe. Many suspected that I would have to struggle to maintain my level of performance being exposed to different business cultures and environments. However, I managed to keep my level of good performance and supported DEA's senior management and its teams to develop a number of key projects in the United Kingdom as well as in Norway. Then, I assumed a role in a totally different region, as the general manager for DEA in Algeria during 2017-2018. In Algeria, I was proud to make a number of achievements (with partners) in a very short time. This career record allowed me to compete and then be selected in an open internal application process for the general manager position in DEA Egypt.

What is your personal advice to the young professionals who aspire for a career in the oil and gas sector?

Be ambitious, and never rest for less! Persistence and willingness to continue learning and developing yourselves is key for any career success. Believe in yourself and be positive. Do not get easily demotivated or frustrated when you face a challenge or when you have a failure. Keep trying and never give up!

You have recently joined the EOG Technical Committee. In your opinion, what role does the committee play in Egypt's petroleum sector and how do you see your contribution as a member?

I am extremely glad to join the EOG Technical Committee. I see this committee as a 'think tank' for our industry in Egypt, where experiences are shared and new initiatives are created for the benefit of the industry, our companies and ultimately Egypt. In this committee, we try to distance ourselves from the narrow individual benefits of our companies to the overall benefit of the industry. We focus on initiatives and projects which would support the modernization program led by the Ministry of Petroleum. For example, we organize workshops and conventions for sharing best field practices, innovative projects, new technologies and HSE initiatives. We recognize achievements and award individuals in all disciplines of the industry. Additionally, we have started a collective move for corporate social responsibility (CSR) projects. Any of our companies, whatever its size, would not be as influential and effective as having a collective committee representing the international and private oil and gas companies in Egypt.

What do you hope to achieve as general manager of DEA Egypt?

My aspirations for DEA in Egypt are unlimited. My vision is to gradually grow DEA's portfolio and activities in Egypt to a level which would make it one of the top oil and gas producers in the country. In the short and the mid-term, I will be focusing on maximizing the value of our existing operated assets in both the Gulf of Suez and Disouq, as well as our non-operated assets in West Nile Delta (WND). In the longer-term, I personally believe that Egypt offers an excellent growth platform for DEA through assets acquisitions as well as exploration activities.

> "PERSISTENCE, CONTINUOUS LEARNING AND SELF-DEVELOPMENT ALLOWED ME TO EXPAND MY KNOWLEDGE, INCREASE MY EXPERIENCE SIGNIFICANTLY IN A SHORT PERIOD OF TIME, AND ENRICH MY ROLE BEYOND JOB BOUNDARIES."

You were previously general manager of DEA Algeria. How does the Egyptian oil and gas market compare to the Algerian?

Both Egypt and Algeria share many similarities in their oil and gas market. Both are countries with long-term experiences in oil and gas, both have skilled labor forces, professional state companies as well as national oil and gas infrastructures. While Algeria has recently announced plans to amend the Algerian hydrocarbons law to increase flexibilities and incentives granted to foreign investors, Egypt is ahead in modifying contracts and amending its laws to attract foreign investments. Domestic demand for petroleum products is much less in Algeria than the case in Egypt, which relieves the Algerian state companies from carrying similar financial burdens as carried by their Egyptian counterparts.

How does DEA's merger with Wintershall affect its commercial and business development?

BASF and LetterOne have signed a definitive transaction agreement to merge their respective oil and gas business. Accordingly, Wintershall and DEA Deutsche Erdoel AG will become one company, following acquiring the required legal approvals. The new merged company, Wintershall DEA, will form the largest independent exploration and production (E&P) company in Europe with ambitious growth targets. To allow for achieving those growth targets, we expect the new company to be active in the mergers and acquisitions of new assets worldwide as well as exploration in new blocks. We expect the new company to evolve rapidly into a world-class and globally competitive organization with an international portfolio.

What new ground will DEA be able to cover in Egypt once it has merged with Wintershall? Will this change the timeline of DEA's plan to double its Egypt production?

DEA plans to double its production from current existing assets in Gulf of Suez, Disouq and DEA's share in West Nile Delta within a couple of years. This will stay unchanged following the merger. Nevertheless, the merger will unlock synergies, provide for additional resources, capabilities and will provide the new merged company with the scale needed to access important new opportunities. All this will enable us to be more active, as well as seek further growth in Egypt.

The industry is diverse in different ways. How do you see diversity in the oil and gas industry?

Diversity in our industry extends not only to its key part of gender diversity, but also extends to diversity in races, colors, nationalities, ethnicities, religions as well as personal beliefs. On my very first day in DEA Egypt, as the new general manager, I have gladly signed DEA's Diversity Mission Statement and invited my fellow colleagues in DEA Egypt to sign it as well. In DEA, we are proud to have a female CEO, who is inspiring the whole organization on the needs and benefits of diversity. In November, DEA is organizing its first DEA Women Summit, where all females in DEA worldwide will gather in one place and meet the board and the executive team of the company. I think we need to encourage a higher involvement and equal opportunities of females in the Egyptian oil and gas sector. We have to continue to put more effort into this important subject since we want to attract the best talent for our company.

"I SEE THIS COMMITTEE [EOG TECHNICAL COMMITTEE] AS A 'THINK TANK' FOR OUR INDUSTRY IN EGYPT, WHERE EXPERIENCES ARE SHARED AND NEW INITIATIVES ARE CREATED FOR THE BENEFIT OF THE INDUSTRY, OUR COMPANIES AND ULTIMATELY EGYPT."

"MY VISION IS TO GRADUALLY GROW DEA'S PORTFOLIO AND ACTIVITIES IN EGYPT TO A LEVEL WHICH WOULD MAKE IT ONE OF THE TOP OIL AND GAS PRODUCERS IN THE COUNTRY."

What does DEA's CSR program in Egypt entail?

DEA Egypt is very active in CSR activities, particularly in the regions where we operate oil and gas fields, in Gulf of Suez as well as in Disouq. Recent examples of CSR activities include the "Ophthalmia Convoy", a medical convoy that DEA Egypt has been organizing and supporting in the Abou Redis area near our oil fields in Ras Budran in the Gulf of Suez. DEA worked together successfully with the Misr El-Kheir Foundation to organize this. Additionally, a similar medical convoy is planned this year in Kafr El Sheikh close to our Disouq gas fields. In the Gulf of Suez area, DEA celebrated the orphans' day together with SUCO, where hundreds of orphans between 4 and 16 years of age have received toys and books as gifts from DEA Egypt. In addition to this, we actively finance (proportional to our participating share) the CSR activities in Idku in the vicinity of the West Nile Delta with our operator BP.

A FIVE-YEAR OVERVIEW OF EGYPT'S CRUDE OIL PRODUCTION

By Amina Hussein

Egypt has a long history as an oil-producing nation. Exploration first started in 1860, leading to the country's first oil discovery, the Gemsa field - which was discovered around 140 years ago. Having first pumped oil in 1910, it has now become the largest oil producer in Africa that is not part of the Organization of Petroleum Exporting Countries (OPEC).

Most of Egypt's crude comes from the Western Desert and the Gulf of Suez, while the remainder comes from the Eastern Desert and Sinai regions. The Mediterranean, Nile Delta, and Upper Egypt regions combined do not exceed 2% of the country's total annual production.

The Gulf of Suez area has supported oil production in Egypt since the 1960s; however, most of its fields are now mature. Since 2000, the Western Desert has emerged as the country's key oil-producing region and has compensated a large part of the declining production from the Gulf of Suez.

Egypt's crude oil production is supported by its developed infrastructure, low production costs, and relatively large volumes of both onshore and offshore fields. This report analyses the country's oil output from 2013 to 2017.

EGYPT'S TOTAL PRODUCTION OF CRUDE OIL

Egypt produced around 211.33 million barrels of crude oil each year between 2013 and 2017. Production peaked at 222 million barrels in 2015, before falling to its lowest level of 200.13 million barrels in 2017.

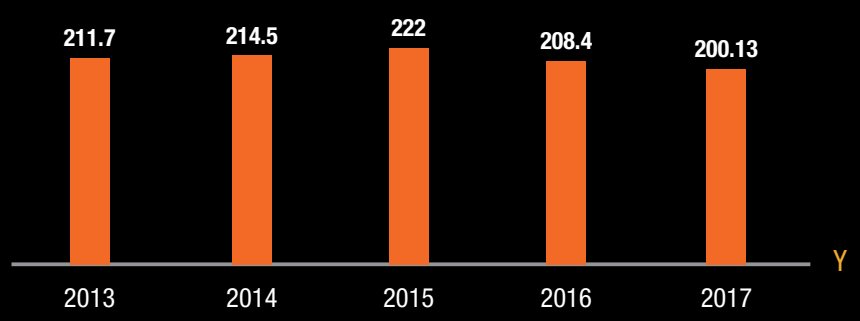
The decline in the production between 2015 and 2017 was driven by a combination of factors: the decrease of atmospheric pressure, the increase of sand movement, and the increase of water produced from the wells, which is caused by an aging reservoir.

A report by the Egyptian General Petroleum Company (EGPC) also admitted that the delay of development projects contributed to the falling output.

KEY PRODUCTION AREAS

Figures show that between 2013 and 2017 the Western Desert produced the most crude oil on average, followed by the Gulf of Suez. The Eastern Desert and Sinai contributed the least, with both regions sharing relatively similar average annual production.

EGYPT'S TOTAL CRUDE OIL PRODUCTION (2013-2017) MILLION BARRELS



Source: EGPC

WESTERN DESERT

From 2013 to 2017, the Western Desert witnessed a steadily increasing trend. It moved from representing 50.2% of Egypt's crude oil production in 2013 to 54.7% in 2017. The region produced an annual average of 111.64 million barrels during the comparison period, accounting for an average of 52.8% of Egypt's total annual production. In 2015, the Western Desert experienced a production peak of 118.76 million barrels. On the other hand, output was lowest in 2013, producing an average of 106.23 million barrels.

Oil companies have given increasing amounts of attention to the Western Desert. In the past few years, the Western Desert witnessed a series of major oil discoveries, including new fields in the Faghur, Shushan, Alamein, and Matruh basins.

GULF OF SUEZ

The Gulf of Suez's large mature fields are now less productive than before, having operated for 40 years. Production witnessed a continuous decline between 2014 and 2016, decreasing from a peak of 51.48 million barrels in 2014 to 45.72 million barrels in 2014. On average, the production of crude oil coming from the Gulf of Suez represents 23.1% of Egypt's total production over the comparison period.

EASTERN DESERT

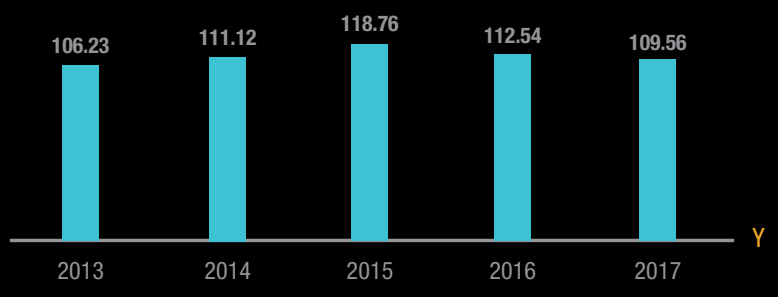
From 2013 to 2017, the average crude oil production in the Eastern Desert accounted for 11.7% of Egypt's annual production. However, the annual average fell 3.8% over the period. From 2013 to 2016, production declined by 28%. In 2013, the production reached 29.12 million barrels and declined to 21.02 million barrels in 2016.

In 2017, production increased again in a sign of the developments taking place in the area. Mohsen El-Noby, chairman of the General Petroleum Company (GPC), said during the company's general assembly in January 2018 that two oil fields were discovered in fiscal year (FY) 2017/18.

SINAI

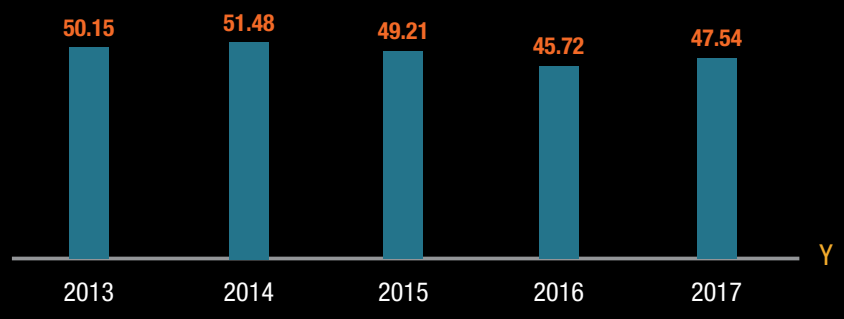
Like the Eastern Desert, the Sinai region have experienced a slow decline in production, falling from 25.23 million barrels in 2013 to 19.40 million barrels in 2017. It peaked at 25.40 million barrels in 2015. Over the analyzed period, Sinai's share in crude oil domestic production declined from 11.9% to 9.7%. The region contributed with an average share of 11% to Egypt's crude oil total production, equivalent to 23.03 million barrels per year (b/y).

WESTERN DESERT'S CRUDE OIL PRODUCTION (2013-2017) MILLION BARRELS



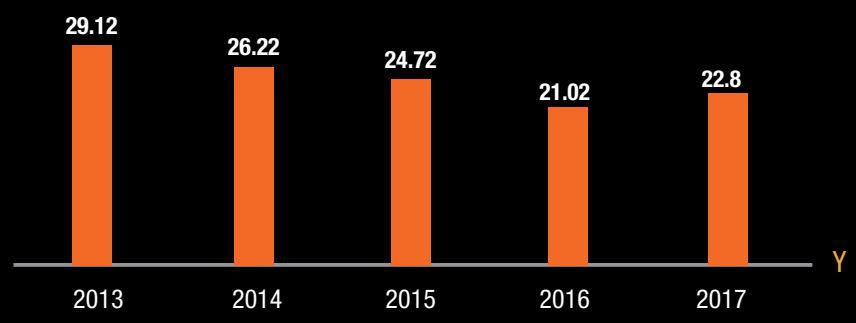
Source: EGPC & EGAS

GULF OF SUEZ'S CRUDE OIL PRODUCTION (2013-2017) MILLION BARRELS



Source: EGPC

EASTERN DESERT'S CRUDE OIL PRODUCTION (2013-2017) MILLION BARRELS



Source: EGPC

TARGETING PRODUCTION INCREASE

The Egyptian crude production has recently witnessed a decreasing trend. This declining trend combined with an increasing domestic consumption of oil products resulted in a consumption- production gap that must be narrowed down. Based on this, the government is following different paths to narrow this gap, including rationalizing energy subsidies and increasing crude production.

The government's plan to increase its domestic production of crude oil and narrow this gap is supported by the crude discoveries recorded annually, especially in FY 2012/13 - when it recorded 57 discoveries. However, this number declined recently as only 24 discoveries were announced in FY 2015/16. This motivated the Egyptian government to focus on the exploration activities and offer bid rounds.

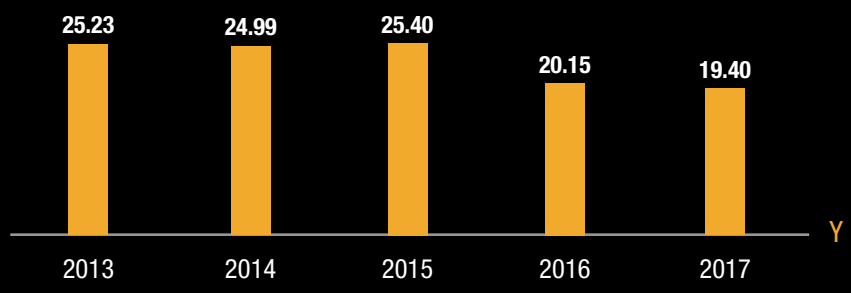
Recently, the Ministry of Petroleum and Mineral Resources (MoP) announced a new agreement to drill seven oil wells in the East Bahariya concession in the Western Desert with $9 million investments and a signature grant worth $30 million. Moreover, in September 2017, GPC announced its latest exploration tender in the Eastern Desert. Concessions offered in the bid round included Wadi Dara and West Gharib.

To increase the opportunities, the state is not only supporting exploration in the most known producing regions, but also tends to highlight the less known frontier areas, such as the Red Sea and Upper Egypt.

The MoP announced, during the second half of 2018, that two bid rounds will be held in Blocks A and B in the Red Sea, each covering 20,000 sq km. The agreements are expected to be signed with the winners by the first quarter of 2019. Similarly, Ganope will offer Block C in the Red Sea.

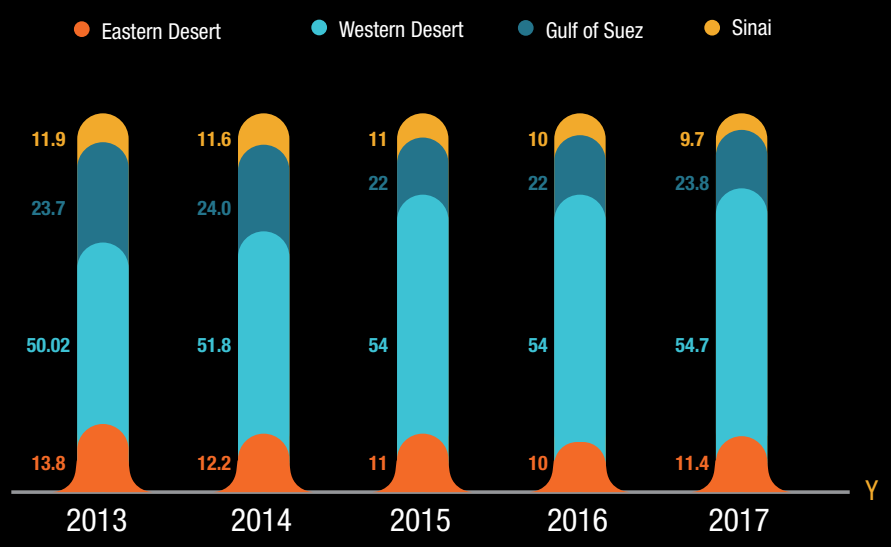
The MoP is hoping to announce at least one bid round in the Red Sea every year starting in 2020, according to various media reports quoting minister of petroleum, Eng. Tarek El Molla.

SINAI'S CRUDE OIL PRODUCTION (2013-2017) MILLION BARRELS



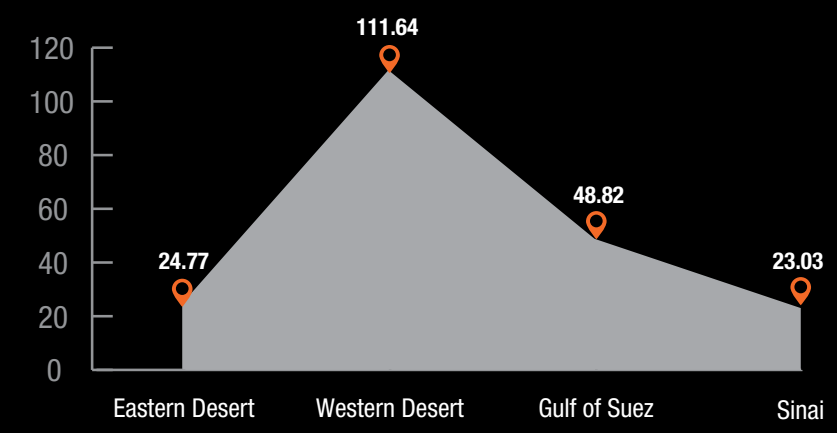
Source: EGPC

KEY AREAS SHARE IN CRUDE OIL PRODUCTION (2013-2017) %



Source: Calculations Based on EGPC Data

CRUDE OIL ANNUAL AVERAGE PRODUCTION BY AREA MILLION BARRELS



Source: Calculations Based on EGPC Data

SAHARA CHEMICAL SOLUTIONS – SCS, as part of Sahara Integrated – SI, took part in one of the largest oil and gas events "Annual Technical Conference & Exhibition ATCE-2018" held from 24th to 26th of September 2018 in Dallas - Texas USA, under the sponsorship of the Society of Petroleum Engineering - SPE.

During the event, **SAHARA CHEMICAL SOLUTIONS – SCS** presented the latest de-Scaling breakthrough solutions, oil and gas case studies and sustainable solutions with consistent product quality.

The SPE Technical Committee selected one of the successful case studies performed by **SCS,** "Removal of Iron Sulfide Scale with a New Formulation: A Field Application in a Sandstone Reservoir in Egypt," to be presented during the technical conference, being the latest breakthrough solution in removing the hard scale under the accreditation of Texas A&M university - Houston, USA.

Innovative Chemistry **www.sahara-scs.com**

IMPROVING SAFETY PERFORMANCE AMONG LOCAL CONTRACTORS

BY MATTHEW HOARE

Applying and maintaining a coherent set of HSE rules and guidelines within a sector containing inherent safety risks and complex contracting chains – such as the oil and gas industry – can present challenges for governments, operating and services companies, and local businesses alike. The networks of contractors and subcontractors that companies rely on to carry out day-to-day operations can be diffuse, making oversight harder, reducing accountability, and presenting a number of obstacles to maintaining HSE performance throughout the contracting chain.

At Egypt Oil & Gas's recent Field Best Practices workshop, Mark Konecki, Region Operations Director at Apache Egypt, spoke of the need to put in place a set of guidelines and training programs for all contractors working within the sector. "For many contractors that work in our day-to-day operations, their safety performance is not as good as that of the other more experienced contractors that work in the industry… It is the contractor safety performance that we struggle with the most," he said, speaking from his experience working with Apache, Qarun Petroleum Company (QPC) and Khalda Petroleum Company (KPC).

Given this ongoing problem faced by Egyptian companies, questions should now be raised about what can be done to solve the problem.

MAPPING THE CONTRACTOR LANDSCAPE

Over the past decades the role played by contractors in the global oil and gas industry has increased significantly. Although there are no specific work-hour statistics available for the Egyptian oil and gas sector, existing global data evidences the large involvement of contractors in the industry. Figures published by the International Association of Oil & Gas Producers (IOGP) suggest that the number of hours worked by contractors is almost four times greater than those worked by the client company.

In Egypt, local contractors are hired by operating companies for different activities. National contractors such as Enppi, Petrojet and the Egyptian Drilling Company (EDC) employ specialists and can deliver technical services more akin to the large multi-national contractors. Smaller, local contractors – which sometimes include local Bedouin families – will typically deliver services which do not always require a high level of skill or technical ability. These services include site maintenance, such as electrical and plumbing work; construction, such as operating heavy machinery, material hauling and labor work; and catering for workers on the site. Each phase of implementation - exploration, construction, operations and decommissioning - to varying extents rely on contractors in order to ensure that operations are run in an efficient and cost-effective way.

LOCAL CONTRACTORS AND HSE

While experienced multi-nationals are familiar with international HSE standards and have the resources to ensure that company employees maintain them, the same cannot always be said for local contractors. This does not include Egypt's national state-owned contracting firms

> FOR MANY CONTRACTORS THAT WORK IN OUR DAY-TO-DAY OPERATIONS, THEIR SAFETY PERFORMANCE IS NOT AS GOOD AS THAT OF THE OTHER MORE EXPERIENCED CONTRACTORS THAT WORK IN THE INDUSTRY… IT IS THE CONTRACTOR SAFETY PERFORMANCE THAT WE STRUGGLE WITH THE MOST.
>
> Mark Konecki,
> Region Operations Director at Apache Egypt

– which have strong guidelines embedded into their operations – but the smaller, local businesses which may not have the knowledge, the means or the will to ensure these standards are followed by their employees.

"Generally speaking, local contractors' adherence toward HSE needs improvement," Abdelsalam Yasseen, HSE Manager at Baker Hughes GE (BHGE), tells Egypt Oil & Gas. Although safety standards among local contractors in the oil and gas sector is generally better than in other Egyptian sectors, Yasseen maintains that HSE performance is below international norms.

"I can give you a number of personal experience examples of people working for local contractors that actually lost their lives or suffered severe injuries due to the local contractor being reluctant to provide the correct equipment or adequate PPE [personal protective equipment] in order to save some cost," he says.

> GENERALLY SPEAKING, LOCAL CONTRACTORS' ADHERENCE TOWARD HSE NEEDS IMPROVEMENT.
>
> Abdelsalam Yasseen, HSE manager at BHGE

Konecki, who has worked extensively in the Egyptian oil and gas sector, tells us that HSE guidelines are regularly breached by local contractors. "This happens more frequently than one could imagine," he tells us. The failure to use seatbelts, for example, has resulted in deaths and injuries among workers employed by local contractors.

Poor HSE performance is felt first and foremost by the frontline workers who are tasked with operating in a hazardous work environment. What may be less obvious are the potential implications for the industry as a whole. According to a report by the International Institute for Environment and Development (IIED), the widespread use of contractors and subcontractors means that the resources required to manage risk affects other areas of the sector's social and environmental performance.

The complexity of modern-day contracting requires a sector-wide system of HSE enforcement that removes the challenges that individual companies face when it comes to monitoring their contractors and subcontractors. As it stands, the IIED raises important questions about whether it is even possible to achieve the level of oversight necessary to ensure safe working conditions throughout the contracting chain.

IMPROVING SAFETY AMONG LOCAL CONTRACTORS

Agreeing to a set of HSE policies and procedures will be the first step for some local contractors working in the Egyptian oil and gas sector, many of which do not yet have a coherent HSE framework in place. However, this is not enough to ensure that the company improves its HSE performance, Konecki tells us. "Just because it is written down on a piece of paper, it does not mean it is effectively implemented in a company," he says. "It needs to become part of a company's safety culture."

One way of achieving this is to make HSE policies a high priority during the procurement process. By doing this, the tendering company can ensure that the contractor will perform to a certain HSE standard, and – if it does not meet all the criteria - measures can be taken to ensure that all workers receive adequate training.

This can tie-in with an idea floated by Yasseen that would see the creation of a pool of HSE-approved contractors. To enter this group, each contractor would have to be pre-screened, audited and assessed against an agreed-upon set of HSE key performance indicators. This way, oil and gas companies would be able to tender contracts safe in the knowledge a high HSE standards will be applied.

> THE COMPLEXITY OF MODERN-DAY CONTRACTING REQUIRES A SECTOR-WIDE SYSTEM OF HSE ENFORCEMENT THAT REMOVES THE CHALLENGES THAT INDIVIDUAL COMPANIES FACE WHEN IT COMES TO MONITORING THEIR CONTRACTORS AND SUBCONTRACTORS.

Creating a pool would also create an additional incentive for contractors to maintain a high HSE performance. The fear of losing business should in theory already provide sufficient incentive for contractors to ensure their operations are conducted in a safe and environmentally-conscious manner. However, while there can be repercussions for contractors which continuously fail to meet the requisite standards, contracts often continue to emphasize cost and time. Incentivizing contractors to deliver work as quickly as possible and on a tight budget is not likely to generate positive HSE results. Instead, by creating a pool, local firms would be forced both to implement changes in order to be eligible to compete for future contracts, and tendering companies would be obliged to contract HSE-approved contractors.

Yasseen describes to us the story of a local contractor, which had no prior experience of implementing HSE policies and procedures. "The [service] company worked with the contractor hand-by-hand, guiding the contractors on the HSE requirements, providing support, training and frequent audits… At the end, this contractor became one of the best players in the market of transportation in Egypt." While it is unfeasible for service companies to engage with every local contractor through the HSE process in such a way, the journey taken by this contractor demonstrates that it is possible to effect change on a case-by-case basis. When combined with large-scale initiatives – the private sector acting in concert with the government to introduce sector-wide enforcement mechanisms - there remains real hope that safety and environmental standards can improve throughout the Egyptian contracting chain.

MENTAL HEALTH IN THE OIL & GAS SECTOR: A PILLAR THAT MUST BE BUILT

BY DINA EL-BEHIRY

Mental health of workers in the oil and gas sector is one of the less publicized risks facing workers despite being a very crucial issue. The World Health Organization defines workers' mental health as a state in which the workers realize their own potential, can cope with normal life stresses, can work more productively with less stresses, and can be able to contribute positively to their society. In simple terms, worker's mental health consists of their social, emotional, and physical state.

Currently, the oil and gas industry's main concern is on physical health; however, although working in oil and gas fields is demanding and stressful – as workers often live in remote areas far away from their families, face sleep problems, skin irritations, and other difficulties – the sector still does not pay as much attention to mental support.

After the downturn in oil prices, the working environment in petroleum companies have become more tense. "Over the last three and a half years, the oil industry has experienced its deepest downturn since at least the 1990s. This means less investment into new projects and a squeeze on available jobs in the sector," Hatem Kilany, QHSSE Manager & DPA at Maridive & Oil Services, told Egypt Oil & Gas.

As Kilany explained, the tense atmosphere created by the oil crash has been reflected on increasing the workers' anxiety, stress, feelings of being overwhelmed by circumstances larger than them, lack of control, and potential isolation and loneliness. This scenario can negatively impact employees' efficiency and have a broader impact on each company's performance.

WHY DOES MENTAL HEALTH MATTER?

"Mental health is something we [the oil and gas industry] totally ignored in the near past as management used to consider workers like machines," Emad Elewa, HSE Manager at Apex International Energy, told Egypt Oil & Gas.

Elewa explained that the managers' strategy of considering only the physical conditions of their employees achieved good results for a short time, but after that, production decreased sharply. The history of operational incidents indicates that workers must not only be physically fit for work, but also mentally, he said.

Kilany highlighted that the industry currently suffers from poor mental health from mild anxiety, depression or a mix of the two, to severe phobias. The mental disorders can make simple tasks seem impossible and seriously hinder day-to-day life.

Neglecting the wellbeing of employees lead them to poorly handle the rapid changes that take place in the work environment, which compromises their ability to work under pressure. Additionally, employees who do not find mental support from their companies tend to either abandon their position or question their loyalty to the company. While leaving the company can negatively affect the employees and their families, it also affects the company's costs; and losing the loyalty and motivation of employees can significantly decrease the quality of the company's operations.

THE DIFFERENCE BETWEEN ONSHORE AND OFFSHORE

Although all workers in the oil and gas sector can have their mental health affected by the harsh working conditions, Katharine Parkes has developed a comparative study that analyzes how differently onshore and offshore operations impact workers. The study suggests that the comparison between onshore and offshore workers is mainly attributable to their anxiety levels in their work environment; in this case, offshore workers present higher levels of anxiety than onshore workers.

"It is more important to focus on the offshore workers due to their high-risk operations and tasks," Kilany stated. The offshore work environment is more difficult than the onshore as offshore fields have specific emergencies that may arise unexpectedly. Additionally, offshore workers work under different regulations than the ones onshore, such as the work permit system, safety procedures, protective clothing requirement, and certain restrictions. On top of that, offshore fields are more confined and isolated. This harsher isolation from families, friends, and local communities can be especially hard.

"Employees are often working in isolated or hostile locations. This can lead to a lack of genuine down time, with offshore work being particularly draining. They spend a lot of time on the edge in high-risk situations," Kilany said, adding that "stress and fatigue can quickly become overwhelming and could lead to mistakes that put the lives of others at risk." Moreover, "the pressure and expectations on

employees can lead to inner conflict based on balancing a career with family."

Despite the evidence that offshore conditions have a stronger impact on workers' mental health, both offshore and onshore workers are exposed to this psychological hazard. In case of employees who work abroad, far from their homeland, culture shock can also contribute to the employees' emotional instability and companies should have a good program to help their employees adapt.

MENTAL SUPPORT CHALLENGES

Employers are faced with many challenges while dealing with the mental health issue. Firstly, it is important to note that many employers do not consider mental health as a priority when compared to the higher demands they have; in this case, they often find insufficient resources and not enough time to tackle this issue. Dropping mental health at the bottom of the priorities list mainly happens due to the lack of awareness about this issue, which makes employers underestimate its importance and effects.

Another challenge is the lack of clear data around the impact of mental health, as well as data on the employees who suffer from this condition. When an incident happens, the hypothesis of human failure conditioned by poor mental health is often not considered. Because of this, it is difficult to develop sustainable projects to address the problem and even harder to identify who needs help.

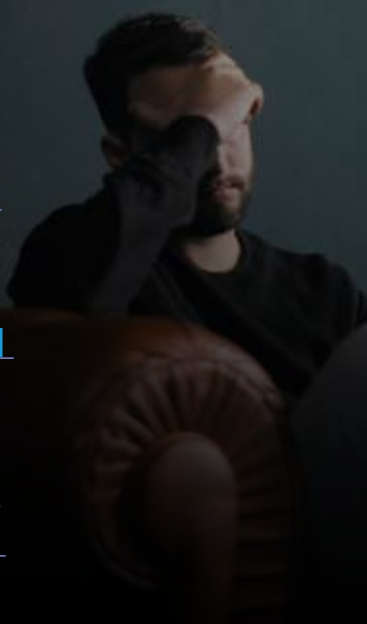
HOW CAN EMPLOYERS HELP?

Employers in the oil and gas industry should first be fully aware that having employees who suffer from poor mental health will be very costly to the company as the issue leads to a decrease in the workers' productivity. Furthermore, replacing employees who leave due to these mental health issues adds additional costs to employers as unstable staff negatively affects the return that employers seek gaining with the recruitment process. In order to avoid that, employers should work to build a mentally healthy environment and stay alert to identify and act upon cases of poor mental health.

Kilany, who believes oil and gas companies should do more to offer potential solutions to treat anyone in the industry who is struggling with mental conditions, suggested that workers with these afflictions do not focus on things that are out of their control. Instead, they should focus on themselves and the way in which they respond to the challenging circumstances they face. "I strongly believe that real change starts from the inside. So, work on yourself first and you may be surprised by how things change," he said.

In addition to this, employers must reorganize poor working processes that make employees face higher work intensity and time pressure. Some studies suggest decreasing working hours, which can be effective to solve the low performance caused by stress. This reduction can provide workers with some ease and comfort in doing their work, which motivates them and optimizes their actions.

Another method that can be experimented is providing employees with the freedom to organize their own work process and strategies to carry out their required tasks. This does not mean that workers would operate in a state of anarchy. Instead, it means that management would be encouraged to apply transparent decision-making and information policies with their employees and involve them in arranging these policies in a way that motivates them.



EMPLOYEES ARE OFTEN WORKING IN ISOLATED OR HOSTILE LOCATIONS. THIS CAN LEAD TO A LACK OF GENUINE DOWN TIME, WITH OFFSHORE WORK BEING PARTICULARLY DRAINING. THEY SPEND A LOT OF TIME ON THE EDGE IN HIGH-RISK SITUATIONS.

Hatem Kilany, QHSSE Manager & DPA at Maridive & Oil Services

Moreover, employers should work on building a net of trust with their employees, which in return will play an essential role in promoting their commitment to their responsibilities and affect positively their mental health. Employers should also provide workers with emotional intelligence training, safety procedures, and supportive workshops concerning how to deal with stressful and extreme situations.

It is important to note that employers should also invest in training for themselves. Companies' managers should participate in courses designed to enhance their abilities in dealing with their own employees and in instructing them in a supportive way to eliminate the intensity of the problems that they face daily in their work. Employers can also arrange some activities for their employees, like sports activities.

At the same time, they need to follow up with the psychological resilience of their workers by, for example, arranging a questionnaire to check their satisfaction degree and determine the problems they face, which will enable employers to spot which workers suffer from mental conditions. Additionally, companies can develop a health-related phone application that facilitates the communication between employers and employees on physical and mental health. In order to build a sustainable policy on mental health, the companies are also highly advised to develop a data bank on their workforce and workplace.

MENTAL HEALTH AS A CORE VALUE

As poor mental health has severe impacts on the companies and their employees, addressing mental health should become one of the sector's core values. In order to establish it as a pillar, the Egyptian oil and gas sector could encourage research and data collection on mental health in order to provide a baseline for monitoring plans to tackle mental health issues. This encouragement could come through an organization or team created to exclusively address this issue.

"Today, a good HSE and HR manager considers mental health as important as physical health by dealing with workers as humans who can create, innovate, and have more value added if they are treated properly," Elewa declared.

Additionally, having mental health as a core value is a concept that must be built not only within the companies, but also in a university setting. Students who will be future engineers, geologists, technicians, and decision-makers should receive information on the importance of mental health, as well as on the problems they will face and the solutions to them.

"Involving more early-career engineers and students in the field work can effectively guide them to choose their own career pathways after overseeing the associated stresses and the needed stamina," Osama Radwan, a senior petroleum engineering student, told Egypt Oil & Gas.

Furthermore, the Egyptian oil and gas sector must promote training to address mental health in all its facilities. As a highly effective measure, the sector could also invest in mental health care units, involving teams that can develop a program to support the employees and their families.

The higher the care provided to the workers, the higher their productivity.

OPERATIONAL SAFETY IN CONFLICT ZONES: AN OVERVIEW

BY FELIX FALLON

The safety and security of an oil or gas field and its personnel is an important consideration in a country, but especially so when it is in an area of potential or ongoing conflict. Energy is a commodity integral to the economic security and growth of a nation, which means that it is often a primary target for parties looking to undermine the state's stability. The disruption of pipelines, pumps, storage facilities, and export terminals can wreak havoc on the local energy grid and potential export revenue of a country. However, the scope of potentially damaging conflict is not limited to full-scale war or revolution; small scale pushback by local communities in oil and gas operational areas also present a business risk that international oil companies (IOCs) cannot afford to ignore.

An IOC looking to start operations in a dangerous or potentially dangerous area has to consider the possible operational losses, given that their work could be the target of attacks. It also must consider the potential for their activities to exacerbate or spark any conflict in the area. Lastly, but by no means least, they must have systems in place to ensure the protection and safety of its workers.

Given their sensitive nature, an IOC is often not willing to release the exact details of their plans for a given region, the release of which could compromise ongoing operations. OMV, an Austrian oil and gas company operating in Libya, told Egypt Oil & Gas that they would not share information on the topic for security reasons. However, IOCs often have an overarching policy on the specific actions necessary to establish the security of assets in a conflict zone. The security policy framework is then modified for the specifics of a given country.

COUNTRY ENTRY CHECK AND RISK ASSESSMENT SYSTEMS

The first stage of an IOC's security policy is establishing whether or not to commence operations in an area of present or potential

conflict. OMV refers to this process as a 'Country Entry Check'.

The Country Entry Check involves the IOC commissioning a comprehensive impact assessment externally, evaluating the environmental impacts, effects on local community and society as well as the human rights situation in the target country. OMV then works with "internationally acclaimed experts and local, national, and international stakeholders" in order to develop measures to reduce any negative impacts of their potential work in the country as well as understanding and strengthening any positive effects it can have in the region.

A 2008 report from the International Petroleum Industry Environmental Conservation Association (IPIECA) detailed measures to ensure safety and security in conflict zone operations, which can "assist companies to avoid costly mistakes by alerting them to existing or emerging conflict issues and by informing both investment decisions and successful conflict management strategies."

PMCS ARE OFTEN A GO-TO FOR IOCS IN THEIR EFFORTS TO PROTECT PERSONNEL AND ASSETS OPERATING AMONG LARGER SCALE CONFLICTS.

The report states that IOCs must establish risk assessment and risk management systems which monitor the conflict situation and dynamics in an area of operation over time, continuously assess impacts of conflict in investments and vice versa, and provide input to conflict management responses. A major part of these risk management protocols is to look at how corporate policies and practices affect the dynamics of the conflict. This takes the form of ensuring a company's actions and behavior of its personnel do not exacerbate existing conflict or cause new conflict.

The initial risk assessment can include an Above Ground Review (AGR), which evaluates and anticipates whether a country is in a "pre-conflict phase." Factors in identifying an imminent or growing conflict, particularly aimed against an IOC, are established by engaging governments, nongovernmental organizations (NGOs), and communities and can include expressions of grievance and frustrations amongst communities over an IOC's operations, leading to demonstrations, vandalism and potential violence by a local community against the IOC. High levels of gun crime in operational areas is also considered a warning sign, alongside weak or biased government law enforcement.

A MAJOR PART OF THESE RISK MANAGEMENT PROTOCOLS IS TO LOOK AT HOW CORPORATE POLICIES AND PRACTICES AFFECT THE DYNAMICS OF THE CONFLICT.

The basic principle of mitigating local dissent against an IOC is community engagement, often taking the form of corporate social responsibility (CSR) initiatives, which aim to provide support to local communities by distributing the benefits of an IOC's presence in the area through jobs and developmental assistance. In the Matrouh area of Egypt's Western Desert, Apache, in partnership with the Ministry of Education, built six schools as of 2014; previously, the closest was 10 km away.

The "do something" approach to situations of violent conflict is often taken by companies looking to take a more active role in the external environment to ensure security and safety for its assets and personnel. It involves bolstering the company's front-line and secondary conflict management capabilities, establishing early warning systems in zones of frequent direct conflict.

The IPIECA report also describes a more substantial "do something ++" strategy for areas where an impact of conflict is more significant. This includes supporting local and national conflict management capacities through providing training and funding assessments of the situation, as well as providing funding and technical assistance to conflict resolution efforts.

RISK-REWARD IMBALANCE

Conducting oil and gas operations in a conflict zone is based off a risk-reward dynamic that is easily overturned in the case of large-scale violent conflicts. The security measures detailed in the IPIECA report concerns only small-scale violence and local dissatisfaction regarding an IOC's operations. In the case of large conflicts, some of the proactive measures mentioned above may have little effect.

In October 2018, sources told S&P Global Platts that the deteriorating security situation around Libya's largest oil field, Sharara, caused the country's crude oil output to fall once again. Increased militia activity caused some oil workers to evacuate fields, with output from the field dropping drastically over the course of days. Earlier, in mid-July, the national oil company (NOC) closed Sharara after gunmen infiltrated the area and kidnapped four staff members. The oil company also recently declared a force-majeure on exports at its Zawiya terminal.

In the same month, at least ten Iraqi security forces were killed in an attack by Islamic State (IS) militants on the Akkas gas field in the western province of Anbar.

Cases such as these represent a more serious problem for IOCs; large scale organized attacks are not easily mitigated with community outreach programs and voluntary human rights principles. As is often the case when the risk of violence increases, IOCs may decide to withdraw from the country and relinquish operational rights.

As the ongoing war in Yemen was escalating in 2015, many IOCs that had remained steadfast in the face of considerable risk opted to hand over their assets and withdraw from the country as international intervention in the conflict made no progress in bringing stability back to the country.

In April 2015, French oil major Total, which was then the last remaining IOC in Yemen, halted its operations and withdrew all expatriate staff from its sites. Given the considerable investment that goes into oil and gas operations, the decision to withdraw from operations are not taken easily.

FIELD SECURITY AND PMCS

Private military contractors (PMCs) are often a go-to for IOCs in their efforts to protect personnel and assets operating among larger scale conflicts. Often made up of former military personnel, PMCs are employed to protect assets from threats such as non-state militias.

However, questions over the regulation and professionalism of PMCs due to frequent reports of reckless and extralegal behavior - though often not in operations directly linked to oilfield security – have tarnished their reputation.

Security contractor Blackwater, then contracted by the US State Department, was reportedly involved in over 195 shooting incidents in Iraq between 2005 and 2007. In one particular shooting incident on December 24, 2006, a security guard for Iraqi Vice President Adel Abdul-Mahdi was killed by an allegedly drunken Blackwater contractor, who was then flown out of the country and faced no charges.

The effect of such reports on both local and governmental attitudes was so great that in March 2012 the Iraqi government banned PMCs from acting as security for oilfields, offering the replacement of Iraq's Oil Police, who, as stated in a memo from the South Oil Company, "will provide the necessary protection". The decision has since been overturned, but the reputation of PMCs remains poor among Iraqis.

However, Chinese security subcontractors employed by China National Petroleum Corporation (CNPC) have been forced by the Iraqi government's requirements for licenses and regulatory compliance, as well as the internal regulations of Chinese state-owned energy companies, to act more professionally than other PMCs employed in other regions.

Chinese PMCs in southern Iraq have more passive protocols than other such international firms in the area. For instance, Chinese PMCs, such as Ding Tai An Yuan, cooperate with armed Iraqi ones to protect personnel and infrastructure, as well as to introduce new standards, such as unmanned aerial vehicles and tethered blimps for scouting.

CRUDE SENSITIVITY

The security of oil and gas assets is a high priority for IOCs. From stifling small-scale local conflicts to understanding the dynamics of a given war, the IOC must conduct due diligence in not exacerbating tensions. Providing sufficient respect and support to local communities, as well as managing the behavior of PMCs, can be challenging tasks for IOCs to undertake, but ultimately necessary in both protecting its employees and its investment.

REDUCING GROUNDWATER CONTAMINATION IN THE EGYPTIAN OIL AND GAS SECTOR

BY SARAH SAMIR

Onshore oil and gas activities which discharge waste water can potentially contaminate groundwater. According to a book entitled 'Overexploitation and Contamination of Shared Groundwater Resources' published by the NATO Science for Peace program, around 70% of the world's fresh water comes from groundwater aquifers. Egypt is less reliant on groundwater than other parts of the world, representing just 15.3% of the country's annual water supply, at 11.3 billion cubic meter per year. Nonetheless, any pollutants that enter groundwater reservoirs as a result of oil and gas activities can cause infections for humans and animals, and may even lead to death. Hence, the Egyptian oil and gas industry has begun to employ new methods and new approaches in order to mitigate groundwater contamination.

GROUNDWATER CONTAMINATION

Egypt has several groundwater sources "ranging from shallow local aquifers [in the Nile Delta], recharged by rainfall, to deep non-replenishable aquifers [in the Western Desert and in Nubian sandstone]," according to research by the Egyptian Journal of Chemistry.

Due to the population growth in Egypt, a lot of people have moved to the new cities built in the wider desert where the main source of fresh water is groundwater. Hence, groundwater "ranks as the second source after the Nile River," the journal's article explained.

Around 1.65 billion cubic meters of groundwater is used in Egypt each year, mainly taken from around the Western Desert oases, Walaa Y. Elnashar said in her article 'Groundwater Management in Egypt'. Yet, groundwater in the desert and in coastal cities has been contaminated for a number of reasons; one of those being the activities of the oil and gas sector.

When oil fields produce, the output is combined with water. Despite extracting oil from this produced water, the wastewater is still not clean as it "will contain some residual oil usually in the form of small droplets dispersed in the water and also possibly some solids," David Robinson wrote in an article entitled 'Oil and gas: Water treatment in oil and gas production – does it matter?'

The water will further have "small amounts of dissolved hydrocarbons and gases such as (corrosive) carbon dioxide and the lighter hydrocarbons, as well as any water-soluble chemicals used to optimize the production of the hydrocarbons," Robinson explained.

"Crude oil is generally composed of a wide range of hydrocarbons and a small amount of impurities, in addition to different types of heavy metals including arsenic, cadmium, mercury and nickel," according to an article published by the National Authority for Remote Sensing and Space Sciences. Accordingly, discharging this wastewater on the onshore oil fields contaminates the country's groundwater sources.

Oil and gas operations can also lead to the presence of methane in nearby groundwater aquifers, according to research by the American Geosciences Institution. In addition, groundwater can also become contaminated if oil or other polluting materials are spilled on the surface.

Exploration equipment also risks polluting groundwater as it can be affected by "rig and turbine washes, hydraulic fluids used in oil wells stabilization, rigs and turbines waste oil storage, and chemicals used in the primary treatment of products on field," Ahmed Abd El Maged Maharek, Senior Environmental Engineer and Water Quality Expert, told Egypt Oil & Gas.

THE DANGERS OF GROUNDWATER CONTAMINATION

According to the Groundwater Foundation, groundwater contamination can lead to dangerous health effects, including hepatitis, dysentery, and cancer.

"Contamination of groundwater with heavy metals sources such as chemicals, waste oil and hydraulic fluids with high levels of heavy metals can be a source of poisoning, especially in remote areas where groundwater is a main source for drinking water and daily activities," Maharek noted.

People who drink groundwater contaminated by heavy metals, which is due to petroleum activities, "risk acute and chronic toxicity, liver, kidney, and intestinal damage, anemia," according to an article published by the United States Environmental Protection Agency (EPA).

Moreover, groundwater contamination has been linked to some diseases including cholera, according to Arcadia Power's article 'Causes and Effects of Groundwater Pollution'. The polluted water can lead to birth defects and harm children. "One example of a serious condition caused by groundwater pollution is the nitrate-induced illness called Methemoglobinemia or 'Blue Baby Syndrome'. This can affect children whose formula is mixed with nitrate rich water," the article pointed out.

The extent to which polluted groundwater can be a severe health and environmental hazard was demonstrated in a study conducted in the US. The research revealed that groundwater contamination had led to 403,000 people becoming infected and 80 dying, explained Raafat Abdelrazek, safety department manager at the General Petroleum Company (GPC), during his presentation in Egypt Oil & Gas's Field Best Practices Workshop held on September 22.

HYDROFRACTURING

Egypt has started to tap its unconventional resources while exploring for natural gas in the Apollonia reservoir. Hydraulic fracturing "is known for its possible impact on groundwater quality by the introduction of unwanted byproducts, chemical and contaminated oil that cause pollution of the soil and migrate to the groundwater reservoir as a result of discharge or accidental spillage," Maharek explained.

The process affects groundwater as "an average shale well can use anywhere from 2 to 7 million gallons of water during its lifetime," Christopher Coats wrote for Forbes.

The Apollonia reservoir is located close to groundwater aquifers. Most of Egypt's west is part of the 2 million square km of fissured carbonate aquifer called the Nubian sandstone aquifer system (NSAS), according to the article in the Egyptian Journal of Chemistry. The aquifer goes in Egypt, Libya, Chad and Sudan. The aquifer holds around 150,000 cubic km of groundwater, the article said, adding that it is "composed mostly of hard ferruginous sandstone with clay and great shale intercalation".

A study published by Hydrogeology Journal mentioned that the NSAS has several formations including the Upper Cretaceous layer consisting of the Apollonia, Khoman and Abu Roash formations, and the Dabaa formation.

Tapping natural gas in unconventional resources is processed through hydraulic fracturing. When this process takes place near groundwater sources "there is a greater potential for activities in the hydraulic fracturing water cycle to impact those resources," according to the US Environmental Protection Agency (EPA).

Groundwater aquifers that are close to hydraulic fracturing operations could be affected by spillage on the ground and pollutants derived from well-bore failures, an article by Proceedings of the National Academy of Science of the United States of America (PNAS) explained.

RAS GHAREB

Coastal cities on the Red Sea have two sources of water: desalinated sea water and groundwater. Ras Ghareb, a city on the Red Sea, is an important site for oil exploration and production activities, and has six large oil fields in the vicinity.

The National Authority for Remote Sensing and Space Sciences conducted a geophysical survey of Ras Ghareb and analyzed the collected groundwater samples. The research found that groundwater contained low levels of total petroleum hydrocarbons (TPH) in the groundwater, and detected low quantities of zinc, chromium, selenium, arsenic, cyanide and mercury. Copper levels were found around the intervention value – the level at which action is required to clean the water - while high levels of lead and cadmium were detected that exceeded the intervention values.

According to the analysis, cadmium traces were highest near the Kareem and Al-Ayun oilfields, while the highest levels of TPH and benzene, toluene, ethylbenzene and xylene (BTEX) were found near wells number 10 and 15, near the Um Yusr station. The research, indicating a severe level of contamination, stated that there was a "necessity for remedial action".

MITIGATING GROUNDWATER CONTAMINATION

Preserving groundwater against oil contaminants is vital as Egypt's per capita water share keeps decreasing over time. CAPMAS data reveals that during the 67 years between 1947 and 2013, Egypt's annual water quota per citizen decreased by 60%. The trend is set to continue as the population grows, the temperature changes, and as Ethiopia builds a dam that is expected to affect Egypt's water share.

To protect groundwater, companies should try to control the leakage of contaminating materials. "Oil and chemical spill kits represent a very first defense line to contain and prevent chemicals and oils from reaching the soil," Maharek said, adding that "using this material became more common in Egyptian fields but needs to be promoted to be fully integrated."

It is dangerous to discharge wastes in the soil as it pollutes groundwater. Hence, operators could use septic tanks that enable the separation of wastewater into three layers: solid, liquid, oil/grease. Abdelrazek, proposing this method during his presentation at the Field Best Practices workshop, said however that this kind of septic tank can only be used in soil that is "at least semi-permeable and not be saturated around the tank".

Egypt can also adapt international methods to prevent contamination. Maharek suggests the usage of "soil bioremediation by introducing microorganisms to consume and break down soil pollutants and prevent its migration to the groundwater." However, he added that "the Egyptian laws don't have criteria for soil contamination and bioremediation."

Not only should operators try to control contamination, but employees should also act according to specific standards to protect groundwater. Maharek proposed "raising the awareness of the on-site staff site to manage fuel or lubricant spills properly if they occur," stressing the importance of "implementing clear and strict environmental management procedures for the hazardous materials handling and storing."

By using the right techniques, following global environment standards and training people on safety, the companies could mitigate groundwater pollution. As Egypt implements new HSE technologies in E&P activities, the country could control pollution. Eventually it would be able to secure local water demands for people and combat the water shortage problem; meeting the needs of agriculture and other water-dependent economic sectors.

SCHLUMBERGER INTRODUCES ONESURFACE PRODUCT LINE FOR DEVELOPING THE INDUSTRY

BY DINA EL-BEHIRY, SARAH SAMIR

Schlumberger held on October 22 the Schlumberger OneSurface Technology Day to introduce its new OneSurface product line. The event, which took place at the Renaissance Hotel in Cairo, was divided into two main parts: the first to share the overall OneSurface technology portfolio, services, and products; and the second to discuss specific technologies that could support some of the pillars of the Ministry of Petroleum's Modernization Program.

The newly-created OneSurface product line is the evolution of Process Solutions & Systems (PSS), which previously consisted of Cameron Process Systems and Early Production Facilities (EPF), according to the company. "The OneSurface portfolio enables a safe deployment of different technologies to enable treating existing facilities, and upgrading existing facilities and production," Karim Badawi, Managing Director of Egypt and East Mediterranean at Schlumberger, told Egypt Oil & Gas.

Attendees included Eng. Abed Ezz El Regal, CEO of the Egyptian General Petroleum Corporation (EGPC); Eng. Nabil Salah, EGPC Vice Chairman for Production; Geo. Osama Farouk, EGPC Vice Chairman for Exploration; Major General Abdelbaset El Sayeh Abdelbaset, Chairman of the Egyptian National Petroleum for Exploration and Development Company (ENPEDCO); Khaled Hemdan, Chairman of GUPCO; Eng. Mahmoud Abdel Hamid, Chairman and Managing Director of Esh El Mallaha Petroleum (ESHPETCO); Chemist Nabil Fahmy Abdel Khalek, Chairman of El Nasr Petroleum Company; Dr. Mohamed Abdel Aziz Metwally, Chairman and CEO of the Middle East Oil Refinery (MIDOR); Mark Konecki, Region Operations Director at Apache; and operations and production engineers from national oil companies (NOCs).

EARLY PRODUCTION FACILITIES

Production is a vital phase in oil and gas projects, as it is the only stage that generates revenue and validates reservoir deliverability and potential estimates. Tarek Medhat, OneSurface Business Development Manager at Schlumberger, discussed Schlumberger OneSurface's capacity for early production facilities.

"In Schlumberger, we engage at the early stage of field development with our clients, leveraging diverse knowledge in upstream services to provide our customers with optimum facility design in a modular approach to allow scaling and upgrading the facility with the field life-cycle," he said.

Schlumberger employs the project life-cycle governance approach in execution and delivery of EPF. With that approach, the company has delivered several projects worldwide in different environments and configurations, either turnkey or engineering procurement, and construction (EPC) mode of engagement.

During the presentation, Medhat went through diverse EPF configurations with case studies and project history delivered by Schlumberger.

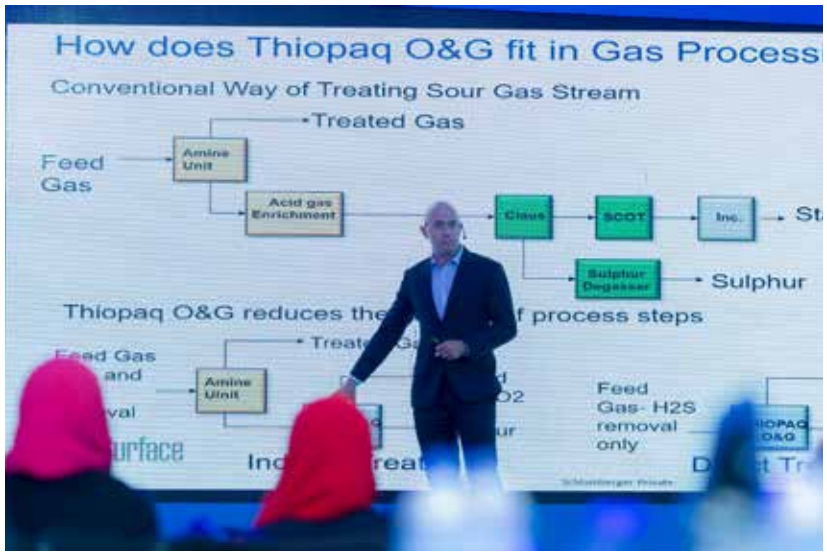
The company delivered fully automated facilities to allow the safe and continuous monitoring and controlling of plant operations through a central control room (CCR) and motor control center (MCC).

"EPF project deployment faces challenges, especially fast track ones. The company leverages their global network of supply chains, including vendors, packagers, and worldwide distribution facilities to overcome logistical challenges in project execution," Medhat said.

Medhat added that "information is the bottom line of the challenges." He clarified the importance of information's quantity and quality in order not to have overestimated or underestimated reservoir expectations. He also explained that the main consequence of the lack of timely and accurate information is the waste of investors' capital by building an over-designed or under-designed EPF.

ONESURFACE GAS PROCESSING

As a reservoir-integrated production system, OneSurface can provide its clients with several types of technology related to gas, oil, water, processed water, sea water, and solids, according to Malcolm Corsie, Schlumberger's Sales Manager for OneSurface in the Middle East.



OneSurface delivers projects related to sour gas treatment, the treatment of which depends on the nature of the gas. First, Corsie described amine refining units as a system for removing hydrogen sulfide (H2S) and carbon dioxide (CO2) from gas, pointing out that producers cannot sell gas that contains H2S due to its poisonous, corrosive and dangerous nature to the environment.

Amine units work through a solvent-based process, which removes H2S and CO2 from the gas. The units then clean up the solvent before it is put back into the system and the process is repeated, Corsie explained.

OneSurface also provides membrane units as a way of removing CO2 from gas. The Cynara CO2 membrane systems are efficient, compact, flexible, reliable, environmentally-friendly, and easy to operate. However, "one of the main disadvantages of a system like that is, it does not remove sulfur. It just removes H2S and CO2," Corsie commented.

Meanwhile, Thiopaq uses naturally-occurring and self-regulating bacteria to convert H2S into manageable solid elemental sulfur that can be used in a variety of agricultural applications or disposed of in landfill. "It is a bacterial process that eats the H2S," Corsie said. Furthermore, Thiopaq is operationally and environmentally-friendly as it is a naturally-occurring aerobic process.

Thiopaq is reliable and simple to use, it reduces operating costs, and it complies with stringent HSE regulations and the Environmental Technology Verification (ETV) program.

For a cost-effective solution, OneSurface also offers Sulfatreat and Select XLP, which are low-cost iron oxides to remove H2S.

Treating gas does not just include removing CO2 and H2S; it also has to address water. OneSurface provides glycol dehydration units which remove water, liquids and heavier hydrocarbons from the gas.

The gas treatment facilities offered by OneSurface also included mol sieve units - which are better used in large and offshore applications and have lower capital costs compared to glycol dehydration systems - and condensate stabilization technology, which reduces stock tank emissions and makes the product suitable for transportation.

OIL AND WATER TREATMENT

Treating oil and water is as important as treating gas for the OneSurface team. "Water is getting scarce not only in Egypt, but also in the US, Canada and other places" said Rob Stoffele, lead produced water product engineer at Schlumberger. Water treatment is therefore a vital process for protecting the country's water resources.

Johnny Cezar Martinez, senior product engineer, discussed multiphase separation technology, in which the operator can separate water from oil and gas. Schlumberger uses both 2-phase and 3-phase separators, which use gravity to separate the liquids from the gas.

OneSurface also offers different types of dehydration and desalting vessels, including AC dehydrators/desalters, dual polarity (DP) dehydrators/desalters, electro-dynamic desalters (EDD), and dual frequency (DF) dehydrators/desalters. This technology removes water droplets from crude using electrostatic coalescence (dehydration), before washing the oil to remove water soluble impurities (desalting).

During his presentation, Stoffele also discussed methods of treating produced water. According to him, produced water can be discharged, but this has to meet local and federal discharge requirements. Another way to deal with produced water is via reinjection into disposal wells.

The OneSurface oilfield water treatment services include frac water treatment, which ensures consistent frac-grade water quality and reduces requirements for transported water. The services also include pond flipping with its expedited oil removal and biological control; saltwater disposal services with the hydrocarbon recovery; and improved lifespan of the disposal well, in addition to pipeline and storage protection.

Stoffele talked about seawater in the oil and gas industry. Seawater has several applications including biofouling control, particle filtration, ionic filtration, deoxygenation, and chemical injection. Hence, OneSurface offers seawater treatment methods, which include solids removal, bio-growth control, chemical treatment, dissolved oxygen removal, and modification of seawater.

AFTER MARKET SUPPORT

OneSurface has several aftermarket global networks. "That allows [OneSurface] to react very quickly, as it has foot printing in Europe, the Middle East, the US, and across Malaysia. The services are completely tailored to whatever [the clients'] requirements", Chris Ridley-Smith, Senior Project Manager, explained in his presentation during the event. He explained that Schlumberger uses its own equipment which they designed, built, engineered, and operate.

OneSurface offers spare parts for their equipment. The client does not have to buy new equipment. "[OneSurface] can supply entails for existing vessels to bring the existing technology up to speed and bring the latest establishments, and the latest developments in technology they offer," he said.

Smith said that the company has begun to open support facilities in Algeria, Iraq, Kuwait, and Saudi Arabia, adding that he sees no reason that prevents the team from opening a facility in Egypt.

Schlumberger also offers auditing services through its OneSurface team, in which the team dispatches a specialist to assist the company. "What the company tries to do is to choose people who have experience in full types of equipment, full operating facilities; somebody who can come to site, review full operations – upstream and downstream - and then submit recommendations to help support and develop the operations," Smith pointed out. Hence, the service was created to help clients understand the kind of help they need.

Schlumberger's OneSurface product line offers many facilities from the production to the market. Its teams assist clients step-by-step to support and provide them with any needed help. Moreover, they provide them with spare parts and perform any maintenance required.

On top of that, Schlumberger confirmed during the event that OneSurface is environmentally safe, and the company pays great attention to the country's regulations while implementing any project.

"I think it is great opportunity to hear what Schlumberger can do. This event shows me what Schlumberger's capabilities are," Mark Konecki, Region Operations Director at Apache Egypt, said following the event.

Schlumberger has been investing in Egypt for 80 years, during which it has been developing its technologies and products to enhance the Egyptian oil and gas industry. On the sidelines of the event, Badawy told us he expects the event to bring "awareness to the oil and gas industry in Egypt about the capabilities of Schlumberger in the service facilities framework, which will be key to deliver the full technology portfolio."

> **"ONESURFACE CAN SUPPLY ENTAILS FOR EXISTING VESSELS TO BRING THE EXISTING TECHNOLOGY UP TO SPEED AND BRING THE LATEST ESTABLISHMENTS, AND THE LATEST DEVELOPMENTS IN TECHNOLOGY THEY OFFER."**
>
> CHRIS RIDLEY-SMITH, SENIOR PROJECT MANAGER AT SCHLUMBERGER

THE HOLY GRAIL: WHAT DOES BLOCKCHAIN HOLD FOR THE ENERGY INDUSTRY?

BY VINODKUMAR RAGHOTHAMARAO, DIRECTOR CONSULTING, ENERGY WIDE PERSPECTIVES & STRATEGY, IHS MARKIT EMEA

Oil and gas companies operate in dynamic and complex environments where they face constant challenges, especially in terms of supply and demand. Now, with oil prices at historic lows, the time has come to evaluate and adapt new technology. When the price of crude oil is low, the high cost of upstream oil exploration and development, coupled with downstream efficiency challenges, forces most companies to reduce costs. The oil and gas industry presents a particularly compelling opportunity to leverage blockchain technologies due to the high transactional values (and therefore risks) and economic pressures to reduce costs. A secure system that mitigates risk, increases transparency, provides an audit trail, and speeds up transactions at a significantly reduced cost may be appealing to oil and gas companies.

Blockchain is a distributed transaction-ledger database shared across traditional boundaries. The seamlessness of sharing a constantly updated, single source of the truth is one of the digital technology's primary strengths. The expanding chain of "blocks" of digital data preserve every follow-on action by parties who have played roles in sourcing, producing, transporting, installing, trading and reselling oil and gas products. After business rules have been encoded, blockchain helps eliminate the need for human intervention to validate and reconcile the data.

One of the most obvious and powerful uses for the digital ledger technology is to provide a reliable and efficient platform for executing and recording energy trades. The entire non-hydrocarbon supply chain could be transformed with blockchain. The interaction with thousands of suppliers, vendors and counterparties drives up complexity and cost, but blockchain could help companies monitor compliance from their suppliers.

Additionally, the introduction of smart contracts, which are essentially computer code stored on blockchain that can execute actions under specified circumstances, should give oil and gas executives greater interest to improve their supply chain and finance activities. Smart contracts enable counter-parties to automate transaction tasks that are typically performed manually and that require the involvement of third-party intermediaries.

Smart contract technology can result in processes that are faster, and more accurate and cost-efficient. The parties to a smart contract also agree to be bound by the rules and determinations of the underlying code, which in theory should lead to fewer contract disputes.

Joint ventures are common in the oil and gas industry and generally require a suite of complex agreements (for example, relating to the sharing of costs or revenues), which could be implemented as smart contracts. Most contracts contain audit clauses giving the parties the right to audit each other to make sure that all parties are complying with the contract. Introducing a blockchain ledger to record joint venture transactions and using smart contracts to define, negotiate, and execute the contractual conditions will provide all involved parties, including the tax authorities, with transparency and consensus on what has occurred. This single audit trail, agreed upon by all participants, will significantly reduce the effort needed to ensure timely tax compliance and reporting, as well as the effort needed by the tax authorities to understand tax positions.

Global supply chains in the oil and gas industry comprise a complex web of suppliers, shippers, and contractors. The sophistication and scale of this network requires substantial administration and creates opportunities for errors. From the tax authorities' and customers' perspectives, there also is a concern that suppliers might manipulate invoice values, potentially avoiding taxes or inflating costs as goods are sold and shipped around the world. Utilizing blockchain technology to record and manage the movement of goods and related invoices will significantly mitigate the risk of errors and the opportunity to alter invoice values or recipients. Goods will be tracked from source to customer, reducing time and costs, and providing insight into the supply chain process that could be used to improve efficiency. Invoices will be recorded in the blockchain, creating an immutable record of its contents.

The movement of invoices can also be addressed in the blockchain using public and private keys, preventing unapproved parties from accessing the invoices. This again could help reduce the administrative burden on companies to report transactions to authorities and reduce the time taken by tax authority audits because of the reliability and transparency of data in the blockchain.

Operations and maintenance, and quality control personnel have a real need to track where asset components come from, using which manufacturing activities and which heat-treating processes. Blockchain has the capability to help track all related components and assets, and to share records among business partners. It provides a framework for registering contractors, tracking performance and reliability. A blockchain could be used, for example, to track which suppliers produced the components and subcomponents for a blowout preventer (BOP). If a certain component breaks down, the operator could consult data in the chain to determine when, where and by which company the component was produced. Manufacturers might examine the data to see if maintenance—frequently outsourced—was performed as recommended. As an increasing number of assets are computerized, blockchain technology also could help keep track of software updates to protect Internet of Things devices so as to avert sabotage and potential damage from cyberattacks.

In addition, blockchain allows the operational performance of a critical asset or equipment to be tracked not only by the cost of the equipment but also by the cost of all aspects of the performance life-cycle — including maintenance, operating costs, uptime, downtime, etc. Once a service-level agreement has been determined and coded in the system, sensors could communicate to the blockchain, and performance factors would determine payment amounts (including bonuses or penalties).

Within the power industry, blockchain can be used in the following applications:

Energy trading and process optimization: Blockchains can facilitate trading of energy by allowing for a faster settlement, reducing transaction costs and risks.

Grid management: The combination of smart devices and blockchains will allow the grid to self-regulate by automatically triggering actions such as curtailment, redispatch, demand-side management, and production/storage from batteries.

Renewable funding: Blockchain provides a fast, secure, and universal solution to financially support renewable energy developments. It opens renewables ownership to every type of investor, either through direct investment or through the use of crypto–guarantee of origin (GoO) (e.g. SolarCoin).

Small-scale peer-to-peer (P2P) trading: Blockchains can create a frictionless marketplace, allowing the exchange of power between consumers by reducing transaction costs, removing intermediaries, and facilitating billing processes. This new transaction framework is currently used for power supply and electric vehicle charging.

Going forward, we realize that even though some of the most relevant technological best practices have trickled through the energy industry, there is always still scope for further improvement. Using blockchain, the oil and gas industry can see reductions in cost of managing complex financial agreements, such as those governing royalties and payments, improvement in transparency through their supply chain, reduction in trade finance costs, and ultimately greater responsiveness to changing market conditions.

Effective deployment of pertinent blockchain technologies is the way forward for oil and gas companies to reduce costs in this era of low oil prices, and to focus on oil and gas production and exploration in the most optimized way. It will be really interesting to see how blockchain adoption evolves in the energy industry and its ramifications for the sector in 2018.

WATER AND ENERGY

The world has a water problem. More than a third of the global population is affected by water scarcity and 80% of wastewater is discharged untreated adding to an already problematic level of water pollution. But energy can be part of the solution.

Energy production depends on water. It is used in power generation, primarily for cooling thermal power plants; and increasingly in irrigation to grow biomass feedstock crops.

With both water and energy needs set to increase, the interdependency between energy and water will intensify, this challenge will be especially acute in developing countries. Where energy demand is rising fastest, is also where water demand is likely to grow rapidly for agriculture and households, including those getting access to reliable clean water and sanitation for the first time.

This growth will lead to higher levels of wastewater that must be collected and treated, and this will require that the water supply is available when and where it is needed. As such, how the water-energy nexus is managed is critical, as it has significant implications for economic and social development.

Technology is opening up new ways to manage the potential strains on both the energy and water supplies, with creative solutions that leapfrog those used in the past.

For example, building new wastewater capacity that capitalizes on energy efficiency and energy recovery.

We offer analysis that found that utilizing the energy embedded in wastewater alone can meet more than half of the electricity required at wastewater treatment plants. Wastewater contains significant amounts of embedded energy and capitalizing on this resource has the potential to provide over 55% of the energy required for municipal wastewater treatment by 2040.

The greater use of biogas can also help manage variable renewable energy resources in a network. Where there is significant potential to recover embedded energy and to pair it with other waste via co-fermentation, increased use of waste-to-energy technologies will require both the right regulatory framework and, at least initially, fiscal incentives. Including the energy generated from wastewater treatment plants in renewable energy programs such as certificate schemes and tax credits could encourage use on a wider scale.

Speaking for myself, I think that the energy system is undergoing substantial changes; tracking the progress of clean energy and assessing progress towards long term goals.

The energy sector must be at the heart of efforts to lead the world on a more sustainable path.

DR. MAHA EL GAMMA
Environmental Protection Specialist, EGPC

EGYPT VISION 2030

NEW STRATEGY FOR EGYPTIAN OIL SECTOR DEVELOPMENT: THE MIDDLE MANAGEMENT & YOUNG PROFESSIONALS PROGRAM

One of the main milestones of the new strategy for Egyptian petroleum sector development project, under the umbrella of Egypt's Vision 2030, is the talented management program for young and middle management oil sector professionals. I am one of those tied to "The Middle Management & Young Professionals Program" which was launched by the Egyptian Ministry of Petroleum as part of its modernization strategy. It targets young professionals with high skills and capabilities that understand the importance of the ministry's comprehensive development and succession plan.

Candidates will go through a four-phase evaluation process (as shown in the below figure) in order to screen and identify the highly-skilled and capable individuals.

Candidates have so far finished the first three phases and are now waiting for shortlisting to jump to the final 'Assessment Center' phase. Following this phase, they will then be shortlisted for the opportunity to start the talented management program. This scheme will qualify them to be ready for occupying leadership positions in the future.

Once the initial screening phase was completed, candidates completed a written examination. They were then interviewed by a panel and are now waiting to find out whether they will participate in the last phase.

The qualifying and development program is promising, well-designed and valid for achieving its objectives. Moreover, it will be a good tool for discovering the hidden talent that exists among our young professionals in the petroleum sector and in broader Egyptian society.

There is no denying that the manpower is a principal cornerstone of the oil and gas industry. Developing human resources is a fixed strategy in the global oil and gas industry, and should be considered as one of the best investments. The major petroleum companies and national petroleum corporations allocate a large annual budget for employee training and development.

Human resources in the petroleum sector is one of its most important assets. The workforce should be kept in good condition and its performance level optimized. This development program has come at a good time and I think that the current conditions are appropriate for hitting this program's targets.

ENG. MOHSEN AHMED FARHAN
Drilling Department Head
General Petroleum Company (GPC)

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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Current Account Deficit

FY(2016/17)	FY(2017/18)
$14.4bn	$6.0bn

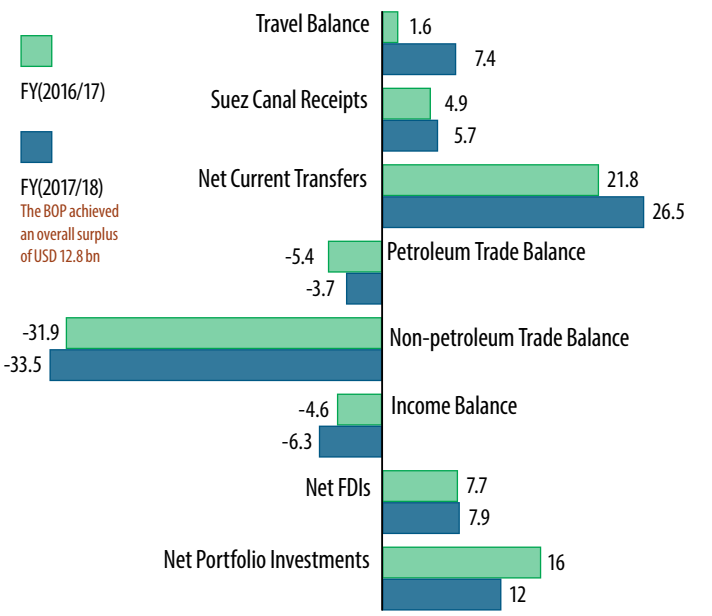
Annual Inflation Headline CPI

AUG 2018	SEP 2018
14.24%	15.97%

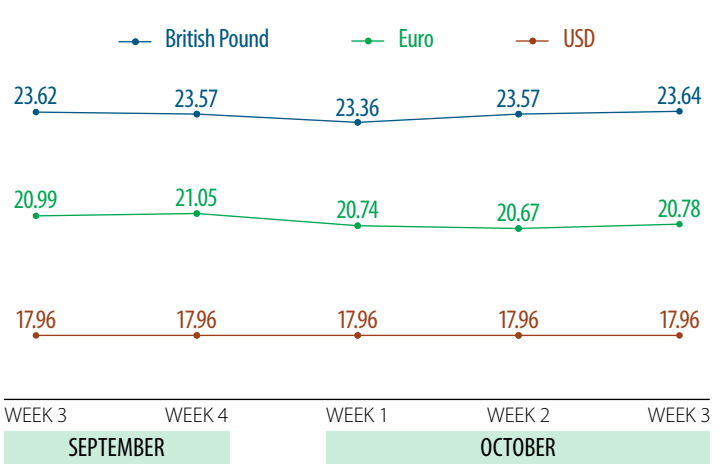
Net International Reserves

AUG 2018	SEP 2018
$44.42bn	$44.46bn

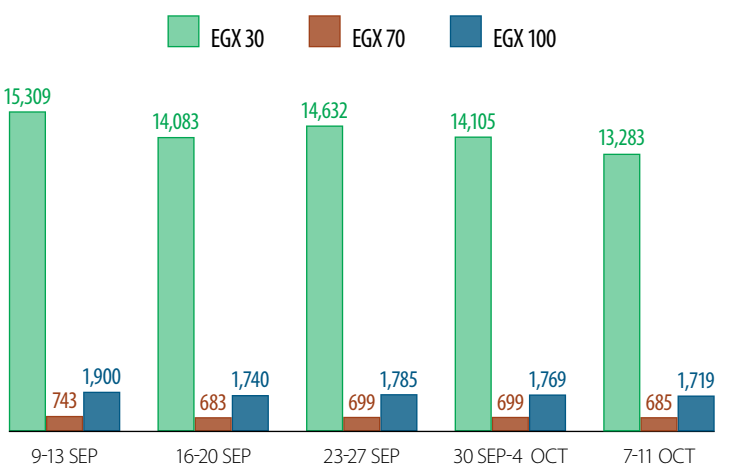
Key Balance of Payments (BOP) Accounts (USD mn)



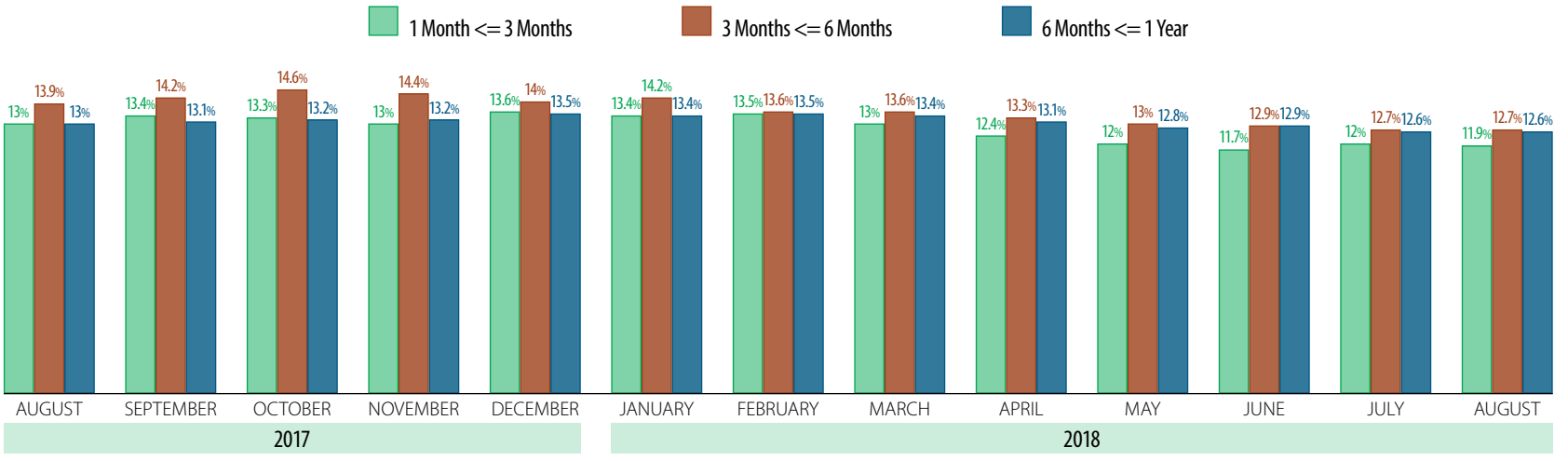
Exchange Rates



Capital Market Indicators



Average Interest Rates (EGP Deposits)

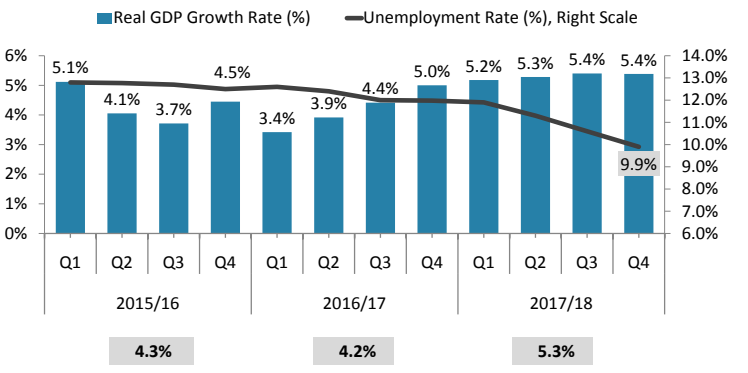


Source of Raw Data: Central Bank of Egypt, Central Agency for Public Mobilization and Statistics and Egyptian Exchange.

RESEARCH BY HAGER MAGDY

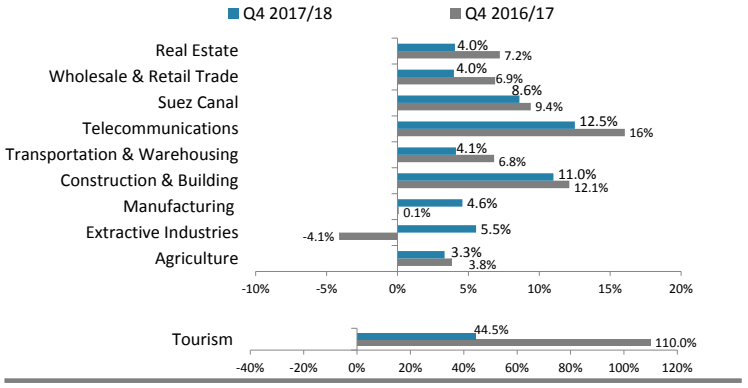
Economic Snapshot: Egypt's Key Macroeconomic Developments

Chart 1 Annual Real Economic Growth and Unemployment (%)



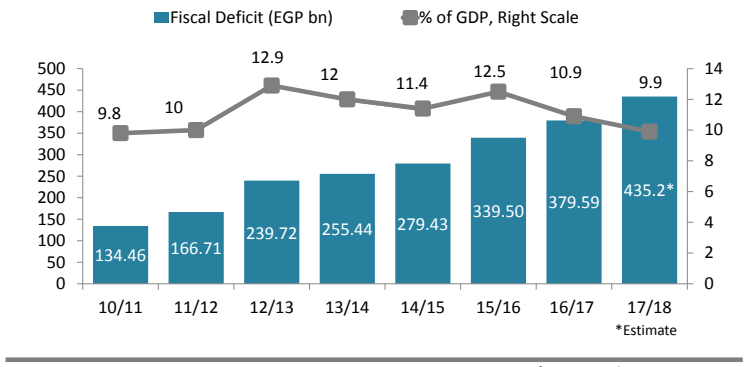
Source: Ministry of Planning and CAPMAS.

Chart 2 Sectoral Performance: Annual Real Growth (%)



Source: Ministry of Planning.

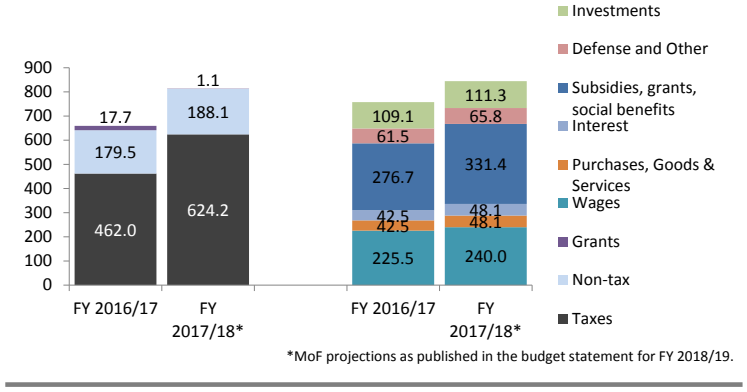
Chart 3 Budget Deficit (EGP bn; % of GDP)



*Estimate

Source: Ministry of Finance and News Statements.

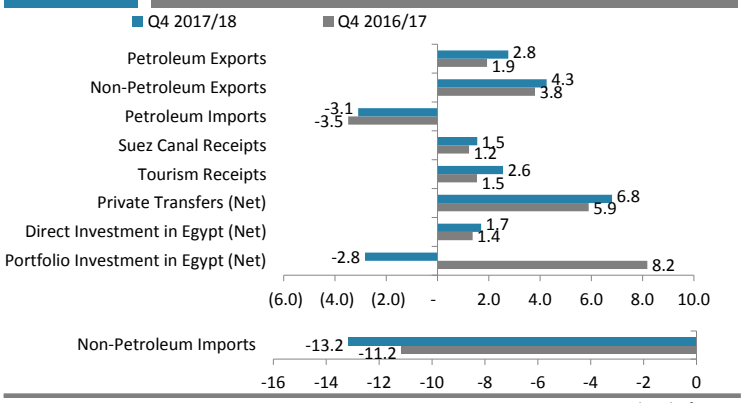
Chart 4 Composition of Government Finances (EGP bn)



*MoF projections as published in the budget statement for FY 2018/19.

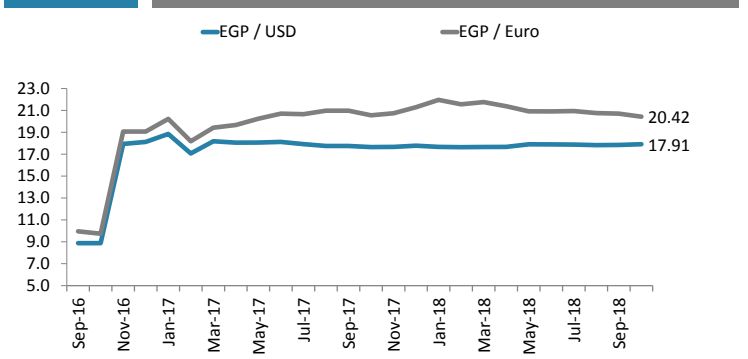
Source: Ministry of Finance.

Chart 5 Key Balance of Payments Accounts in Q4 2017/18 (USD bn)



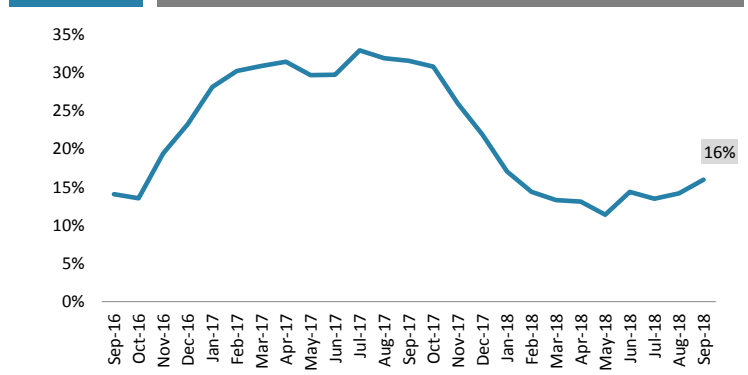
Source: Central Bank of Egypt.

Chart 6 Exchange Rates (Monthly Average)



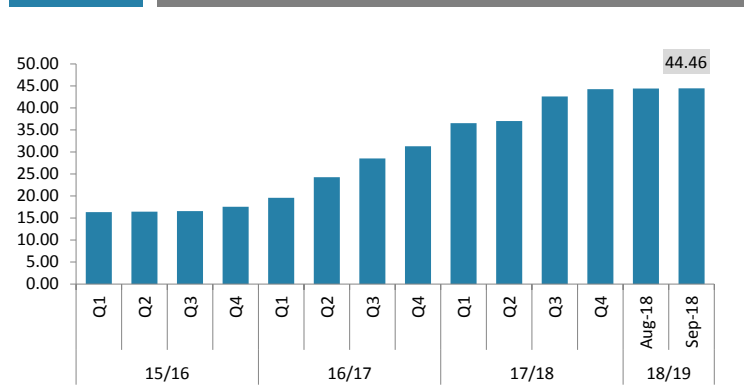
Source: OANDA.

Chart 7 Annual Headline Inflation (%)



Source: Central Bank of Egypt.

Chart 8 Net International Reserves (USD bn)

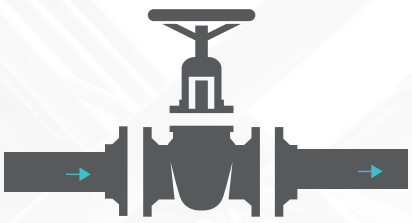


Source: Central Bank of Egypt.

Mostorod refinery complex will produce

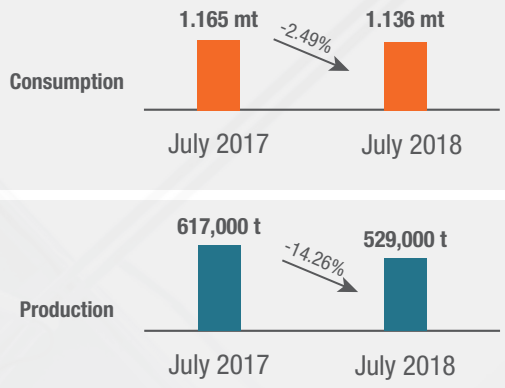
- **2.3 mt/y** DIESEL
- between **850,000 t** & **1 mt** BENZENE
- around **80,000 t** BUTANE
- **600,000 t** JET FUEL
- **450,000 t** COAL
- **96,000 t/y** SULFUR

Egypt has connected **9 million** households to the national gas grid

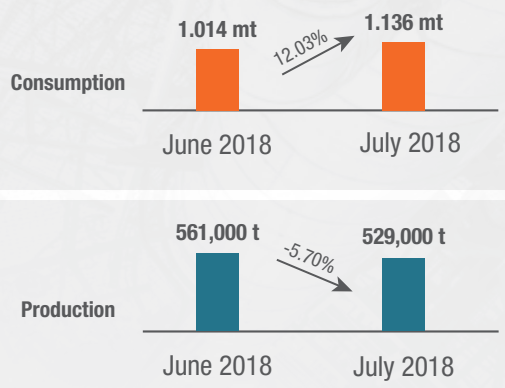


The country is adding around **100,000** households to the gas grid monthly

Diesel Production & Consumption (YoY)



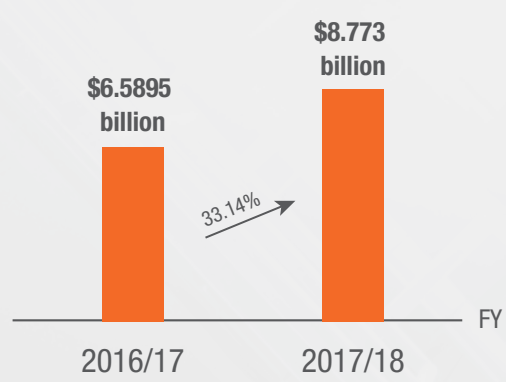
Diesel Production & Consumption (MoM)



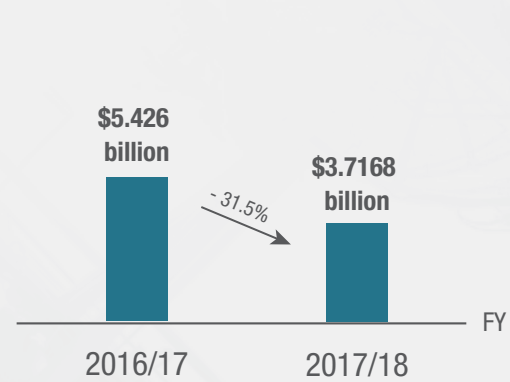
From **2016** to **2018**, Egypt has successfully added **40** Tcf of natural gas to reserves from four major projects

- Zohr field
- Atol
- The West Nile Delta project
- The Nooros development project

Egypt's Petroleum Exports Profit (YoY)



Egyptian Petroleum Trade Deficit (YoY)



Assiut hydrocracking complex will

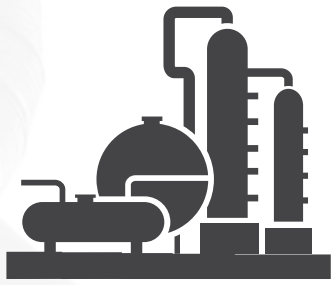
- turn **2.5 mt/y** of heavy fuel oil into High-quality petroleum products such as butane, diesel, kerosine, naphtha and gasoline.
- turn Mazut into **1.6 mt/y** of Euro 5-quality fuels, low-sulfur, in addition to **101,000 t/y** of butane and **402,000 t/y** of naphtha

The Giza and Fayoum fields will be added to production of the West Nile Delta Concession in **December 2018** with an initial capacity of **400** mmscf/d which will gradually **grow** to reach **700 mmscf/d**

EGYPT OIL&GAS RESEARCH & ANALYSIS

The Egyptian Natural Gas Holding Company (EGAS)

Secured **2.1 Tcf** of natural gas during **FY 2017/18**



Six new petrochemical projects

are under development with construction Cost of **$2 billion** Including

The Suez methanol derivatives project

Ethidco's 150-MW electricity plant

MOPCO's storage facilities project

The gap between Egypt's **production** and **consumption** of fuel **decreased to**

25% compared to **35%** at the beginning of **2018**

Egypt's Imports of Liquefied Natural Gas (LNG)

76 shipments in 2017-2018 → worth **$1.8** billion

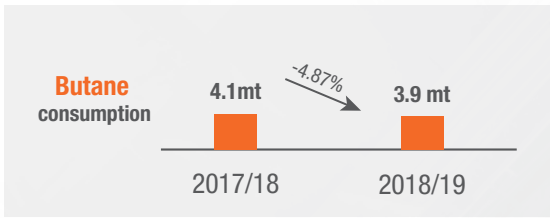
17 shipments during Q1 of FY 2018/19 → worth **$500** million

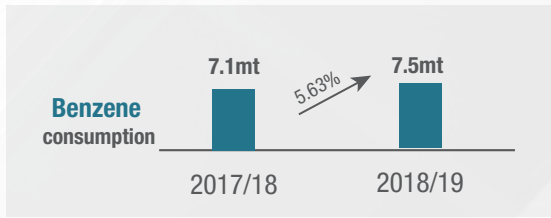
The country will save $1.5 billion yearly by no longer importing LNG after receiving its cargo at the end of September 2018

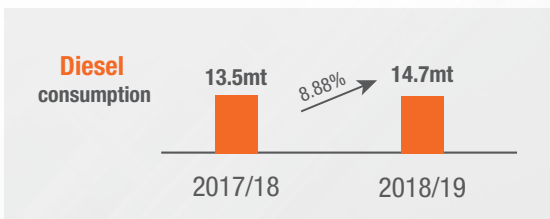
Raven Field of the West Nile Delta Concession

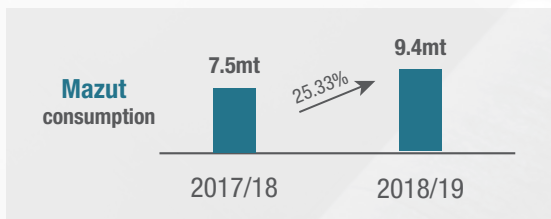
Planned to start production in **Q3, 2019** with **450 mmscf/d** natural gas production capacity, which will increase to reach **900 mmscf/d**

Domestic Consumption of Petroleum Products is expected to rise by **10.24%** to reach **35.5 mt** in **FY 2018/19**



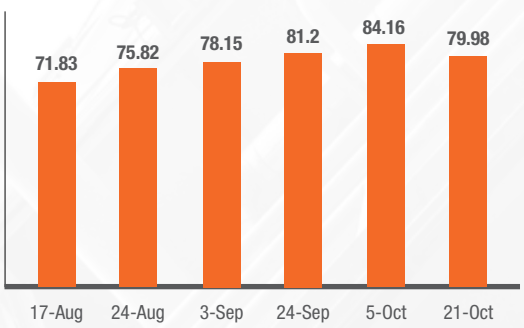




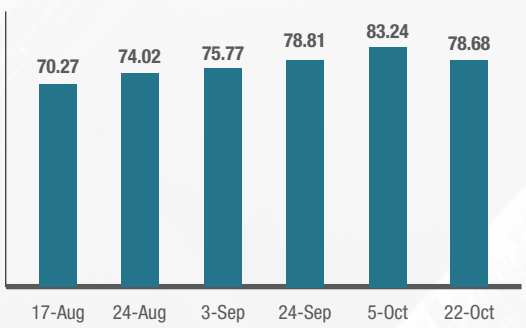


Sources of Raw Data: Ministry of Petroleum, Ministry of Planning, Eni and Central Agency for Public Mobilization and Statistics.

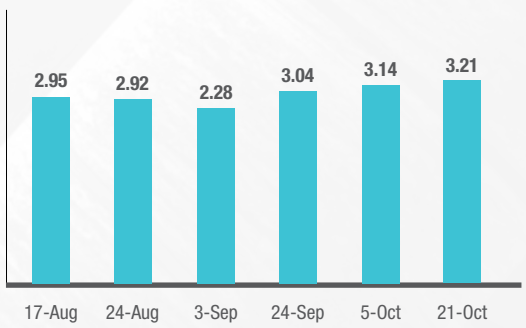
BRENT PRICES



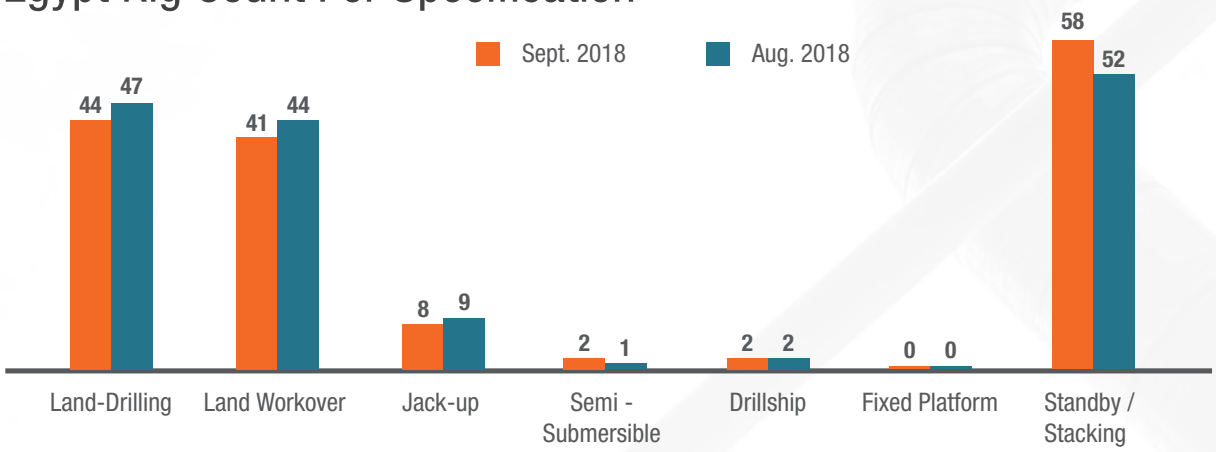
OPEC BASKET PRICES



NATURAL GAS PRICES



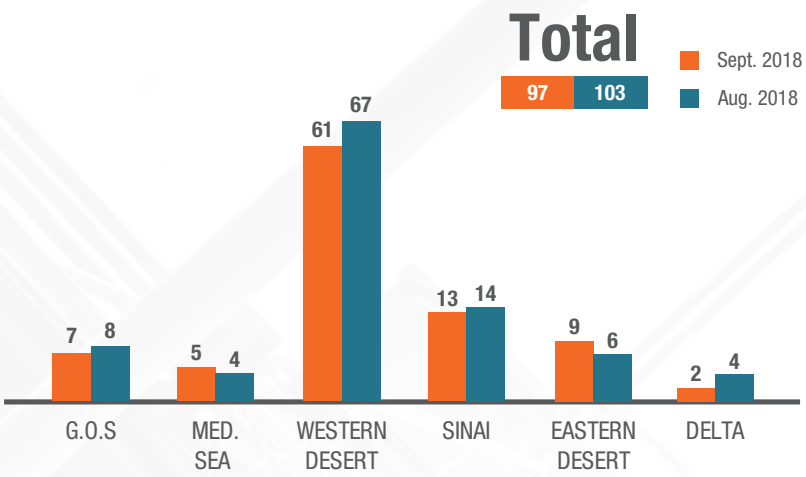
Egypt Rig Count Per Specification



Total

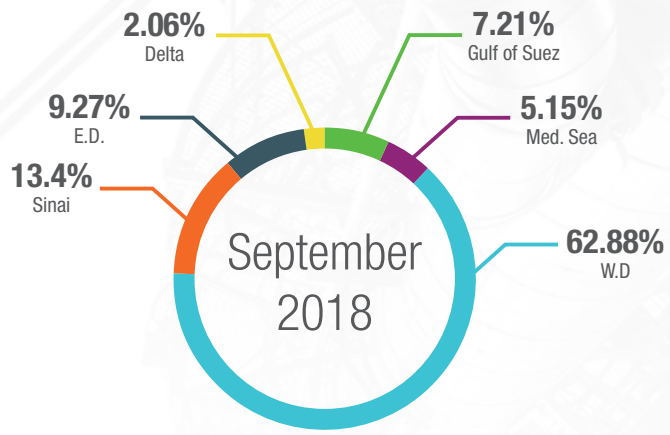
155	155

Egypt Rig Count Per Area



The difference between the total of rigs per area and per specification is due to the standby / stacking number

Distribution of Rigs



Production

Total

16,441,000	Barrels
200.4898139	BCF
195132	MCF
2,689,000	Barrels

	CRUDE OIL	GAS	SOLD GAS	CONDENSATES
MEDITERRANEAN SEA	15,000	117.7665009	114619	915,000
EASTERN DESERT	1,845,000	0.21126644	206	3,000
WESTERN DESERT	9,568,000	39.1656272	38119	1,326,000
GULF OF SUEZ	3,561,000	3.12298476	3040	58,000
DELTA	11,000	40.22148298	39147	371,000
SINAI	1,435,000	0.0019516	2	16,000
UPPER EGYPT	6,000	0	0	0

Drilling Updates

REGION	COMPANY	WELL	WELL TYPE	RIG	DEPTH	WELL INVESTMENTS
MED. SEA	RASHPETCO	SCARAB DT	Development	N.GLOBE 1	5,276	11.980 M$
SINAI	PETROBEL	112-173	Development	ST-10	9967	2.400 M$
DELTA	SUCO	NSG 4-2	EXP	PDI-94	11.713	5.730 M$
WESTERN DESERT	AGIBA	MEL-121	Development	EDC-64	9,200	1.100 M$
	QARUN	WON X-26	Development	EDC-63	7,500	1.200 M$
	KHALDA	SIWA- 2- L-6	Development	ST-4	15,400	2.666 M$
		BERIENCE-9	Development	EDC-54	11,418	1.468 M$
		NU-3	Development	EDC-11	11,900	1.303 M$
		MANSOUR SE-1X	EXP	EDC-57	15,500	2.534 M$
		NEBTU-1X	EXP	EDC-54	12,867	1.315 M$

*DRILLING are for September 2018.

FTeX advanced wireline formation pressure testing service

Acquire pressure data accurately and efficiently with automation and real-time control

The **FTeX™ advanced wireline formation pressure testing service**, from Baker Hughes, a GE company (BHGE), delivers reliable and accurate pressure data by combining downhole automation with real-time control. It provides critical formation data—from pressure profiles to fluid contact and mobility information—as early as the first logging run to help reduce time in the well. This offers reservoir engineers and petrophysicists the opportunity to make earlier decisions about how to best proceed with their formation evaluation objectives.

With conventional pressure testing services, inaccurate data is possible due to inconsistent test outcomes derived from manual measurements. Using its intelligent platform, the FTeX service reduces the possibility of human error and minimizes test time by optimizing the operation sequence. Test parameters and controls for drawdowns are set automatically, requiring minimal effort to run a test. By adapting the formation response from the first drawdown and defining a behavior for subsequent drawdowns in real time, the service determines optimal pressure measurements, leading to increased data accuracy and time utilization.

Combinable with other wireline formation evaluation and petrophysical services, the FTeX service decreases time dedicated to evaluation, saving valuable rig time and cost. Additionally, the intelligent platform's electrical features minimize risk of system failure, and its precise pressure gauge acquires some of the most accurate measurements in the industry.

For more information on how the FTeX service can help you obtain accurate pressure data more reliably and efficiently, contact your BHGE representative today or visit bhge.com.

bhge.com

Applications

- Openhole logging
- Slimhole logging
- High-pressure environments
- All formation types

Benefits

- Automates pressure measurements and analysis and calculates mobility data
- Reduces risk of human error by enabling downhole automation and real-time control
- Saves rig time by providing pressure profiles as early as the first logging run
- Enhances efficiency by reducing number of runs
- Ensures accurate measurements