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NEWSPAPER

Egypt's Leading Oil And Gas Monthly Publication
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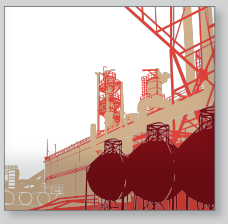
THE MARKET DYNAMICS OF EGYPT'S PETROCHEMICAL INDUSTRY

A deeper look into the impact of subsidy elimination on sector projections



THE HUMAN ELEMENT

An eye into the lives of female field engineers

AN INTERVIEW WITH RAMI QASEM

President & CEO of MENAT & India at BHGE

IOCS AND INVESTMENT

An examination of the lure of Egypt's investment climate

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EDITOR'S NOTE

The vibe of new beginnings continues, as the ministry and private sector alike fill the media with announcements of ambitious plans and results. We embark in the coming period on a journey of great opportunities, starting with two crucial events for the industry: Egypt Oil & Gas' Technical Upstream Convention and EGYPS 2018, both providing fertile ground for networking, enhancing business opportunities, and exchanging know-how.

In this issue we focused our theme on investments in energy, starting with a five year timeline analysis of investments by international oil companies in Egypt.

As a core pillar to the local economy, any changes in that regard theoretically would have a visible impact on the sector. Given this notion, we choose to zoom in on the impact of energy subsidies on the future of the petrochemical industry; shifting further to a macroeconomic examination of the reforms and IMF loan on the sector's investment environment.

We could not successfully, analyze the investment climate without paying attention to the human element. A topic of interest of course was women in the field. Our writers tried to grasp the experience, expectations, and challenges of female engineers working in Egypt. Some things are not about numbers after all.

Another pillar to our examination of the local investment climate is the experience and outlook of private companies operating in it, perhaps that is why we went a bit ambitious, covering the most number of interviews this magazine has seen in a while.

Finally, and on a personal note, this is my last issue with Egypt Oil & Gas. It has definitely been a privilege preparing our monthly publication for you. It has been a great honor working with the amazing minds here at the publication; and most importantly it has been an amazing ride to witness the inner workings of this industry. I guess it is all about matters of drive.

As always thank you for your readership,

EDITOR IN CHIEF

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- Meet with Egypt's Ministry of Petroleum and the country's NOCs to hear the latest updates on the modernisation programme and upcoming projects

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Egypt to End LNG Imports by June 2018

Egypt intends to stop importing liquefied natural gas (LNG) by the end of fiscal year 2017/2018, Egyptian Minister of Petroleum and Mineral Resources, Tarek El Molla, announced on January 27th, Reuters reported. The announced goal is based on speeding of production from new natural gas fields, which according to El Molla, will enable the North African country to save around $250 million per month.

Egypt Signs 83 E&P Agreements in 4 Years

The Egyptian Ministry of Petroleum and Mineral Resources succeeded in signing a total of 83 exploration and production (E&P) agreements between November 2013 and December 2017. The agreements were sealed with international oil companies (IOCs) with minimum investments around $15.5 billion, Egypt Oil & Gas reports. The ministry has paid part of the IOCs arrears decreasing it to $2.3 billion, which is the lowest amount in four years. The E&P agreements have led the country to starting production from the first phase of Zohr natural gas field, with around 350 million standard cubic feet per day (mscf/d). The deals further led the country to finalize the first phase of West Delta/North Alexandria fields, with production capacity around 700 mscf/d.

Enppi IPO Expected in H1 2018

Egypt is expecting the initial public offering (IPO) of the Engineering for the Petroleum and Process Industries (Enppi) to take place during the first half of 2018, Stock Exchange Chairman, Mohamed Farid, stated at a conference on January 9th, according to Amwal Al Ghad. The North African country is seeking to sell shares in Enppi in 12 years in order to raise up to $150 million from the state-owned company's listing in the first of a series of public offerings. Egypt expects to raise total of $276 million to $387 million out of IPOs of state-owned firms in fiscal year (FY) 2017/2018.

Finance Ministry: Petroleum Services Subject to VAT

Egypt's Ministry of Finance has announced a list of 20 products and services related to oil and gas exploration and production (E&P) and export activities to be subject to the value added tariff (VAT) as they will be shifted from sales tax to VAT. The finance ministry sent the list to the Ministry of Petroleum and Mineral Resources. The list included leisure trips and religious trips, medical and social services, cell phone credit charging cards, alcohol and tobacco, vehicles and its spare parts, based on the exception clauses in each agreement. The list further included catering services, conferences and exhibitions' contributions, printed marketing flyers and writing tools, donations and gifts, accommodation services, lawyers and financial auditing fees, and sportive wear and equipment. Moreover, construction outside the work site will be subject to VAT, as well as cleaning work, security service, clubs construction and clubs operations, and magazines and newspapers. E&P activities were not exempted from sales tax as they have only 17 services provided; drilling is not included, except for a list of services agreed upon by the ministries of finance and petroleum.

Egypt to Seal 12 Petroleum Agreements worth $433 M in 2018

Egypt will launch international exploration and production (E&P) tenders for Upper Egypt and the Red Sea. The two geophysical data collection projects will be finalized by the time E&P tenders are issued, Egyptian Minister of Petroleum and Mineral Resources, Tarek El Molla, stated. The minister added that Egypt will seal 12 petroleum agreements worth $433 million minimum investments during 2018, in addition to further deals that will result from the agreements, Egypt Oil & Gas reports.

Petroleum Imports Dip by 37.2% Y.o.Y.

Year-on-year oil imports decreased in value by 37.2% in September, falling from $452 million in September 2016 to $284 million in September 2017, Egypt Oil & Gas reports. Oil exports were also down, slipping to $150 million in September from $192 million in September last year, a decrease of 21.9%, according to statistics released by the Central Agency for Public Mobilization and Statistics (CAPMAS).

Capacity of Egypt's Refineries Rises to 39M Tons

The production capacity of Egypt's refineries rose to 39 million tons per year after the rehabilitation of several refineries, the Head of the Egyptian Petroleum Corporation (EGPC), Abed Ezz El Regal, told Amwal Al Ghad. A higher production capacity will lead to fewer imports of petroleum products and will lower Egypt's import bills, Ezz El Regal noted. He added that the sector's storage capacity now exceeds 14 million tons. Oil imports have fallen. In September, Egypt's oil imports fell to $284 million from $452 million in September 2016.

Output of Petroleum Products Falls by 6.44% Y.o.Y.

Egypt's output of petroleum products fell 1.26% to 2.818 million tons in October from 2.854 million tons in October 2016. Consumption of petroleum products similarly fell, decreasing 9.76% from 3.290 million tons in October 2016 to 2.969 million tons this October. Consumption has fluctuated this year. In September, it stood at 3.256 million tons. The previous month, Egypt consumed 3.094 million tons of petroleum products. Output has remained more stable. Egypt produced 2.809 million tons of petroleum products in August and 2.751 million tons in September.

Diesel Production, Consumption Down from 2016

Consumption of diesel fell 9.07% to 1.203 million tons in October from 1.323 million tons in October 2016, Egypt Oil & Gas reports. Production also fell. It declined from 626,000 tons in October 2016 to 587,000 tons in October 2017, a 6.23% year-on-year (Y.o.Y.) decrease, according to statistics released by the Central Agency for Public Mobilization and Statistics (CAPMAS). Even though consumption fell year-on-year, the numbers could indicate that it has risen since September. Diesel consumption stood at 1.082 million tons in September. Production was at 568,000 tons. An official at the Egyptian General Petroleum Corporation (EGPC) previously told Amwal Al Ghad that consumption for September and October stood at 2.5 million tons.

Cabinet Approves 4 E&P Agreements

The Cabinet approved four oil and gas exploration and production (E&P) agreements worth $230 million, the Minister of Petroleum and Mineral Resources, Tarek El Molla, announced, according to Amwal Al Ghad. Two of the E&P agreements are for exploration in the Red Sea and Western Desert and are with the Egyptian General Petroleum Corporation (EGPC). The other two deals are with the Ganoub El Wadi Petroleum Holding Company (Ganope). "The agreements include drilling 17 new wells," El Molla said during the press conference. Earlier in December, EGPC signed three E&P agreements worth $50 million, Al Borsa reported.

Egypt to Finalize Refining Projects by 2018

Egypt's refining projects witness completion as the new Mostorod refinery starts its operations in 2018, Minister of Petroleum and Mineral Resources, Tarek El Molla, disclosed. The project is one of the most important refineries treating mazut and turning it into light fuels, such as diesel and jet fuel, Egypt Oil & Gas reports. The new year will further have the second phase of MIDOR expansion completed to increase its production capacity. Additionally, projects implemented by Alexandria National Refine & Petrochemical (ANRPC) will be finalized in order to boost the production of high-octane benzene, which will contribute in covering the market needs.

Number of Households Linked to Gas Grid Hits 8.3M

The Egyptian Ministry of Petroleum and Mineral Resources increased the number of households connected to national natural gas grid to around 8.3 million households across the country. The ministry connected total of 580,000 households in fiscal year (FY) 2016/2017, including households in cities and villages in new regions. In September, Amwal Al Ghad reported that EGAS aimed to increase the number of households to 9 million during 2018. The Ministry of Petroleum and Mineral Resources is looking to connect 600,000 households to the grid during fiscal year (FY) 2017/2018, according to the newspaper.

Egypt Implements 6,000 Tons Butane Storage Project in Suhag

Egypt is implementing a butane storage project in Suhag with storage capacity 6,000 tons of butane, which is equivalent to 600,000 butane cylinders, Head of Petroleum Gas Company (Petrogas), Adel Al Shuwaikh, stated, adding that the project includes 4 spherical storage warehouses to boost butane storage capacity. The project will help turn Suhag into a butane supply area to provide demands of Upper Egypt. Egypt has butane filling warehouses across Suhag, Qena, Luxor, and Aswan, which will contribute in decreasing butane transportation process and decrease pressure on roads, El Shuiekh pointed out.

Misr Petroleum Company Increases Storage Capacity to 128,000 Liters

Misr Petroleum Company increased the storage capacity of the different benzene types along with diesel to reach 128,000 liters, upon operation start of Suhag station, Misr Petroleum Head, Hussein Fathy, stated. A service and filling station, belonging to Misr Petroleum Company, started operations in the eastern entrance of Suhag City, on the road between Suhag-Akhmim, Fathy pointed out, adding that the filling station was recently developed. The Suhag station, according to Fathy, is the first to provide 95-octane benzene in Suhag City. Developing the station contributed to boosting the storage capacity of benzene and diesel inside the station.

SOPC to Refine 2M Tons of Crude Oil in FY 2018/2019

Suez Oil Processing Company (SOPC) announced plans to refine two million tons of crude oil during new fiscal year (FY) 2018/2019, in addition to execute new production, innovation and renewal units' projects for equipment,

as well as Health, Safety and Environment (HSE) projects. "SOPC is continuing the construction project of asphalt production unit, which aims to produce around 396,000 tons of asphalt per year, in addition to butane production unit to produce 59,000 tons of butane per annum to cover local market's demands," stated SOPC Head, Mohamed Eliwa.

NPC to Refine 3.8 M Tons of Crude Oil, Condensates in FY 2018/2019

Nasr Petroleum Company (NPC) plans to refine 3.8 million tons of crude oil and condensates during fiscal year (FY) 2018/2019, NPC' Head, Nabil Fahmy, stated, Egypt Oil & Gas reports. He added that "the company further plans to continue investing in implementing projects required for renovation; development; and renewal in order to preserve the refineries production capacity." Fahmy's comments came during the general assembly chaired by Minister of Petroleum and Mineral Resources, Tarek El Molla, to review and authorize the company's FY 2018/2019 budget.

Petrogas to Fill 3.9 M Tons of Butane in 2018/2019

Petroleum Gas Company (Petrogas) plans to fill around 3.9 million tons of butane during fiscal year (FY) 2018/2019 in order to meet local market's demands, Petrogas' Head, Adel Al Shuwaikh, stated; Egypt Oil & Gas reports. The company plans to preserve and develop production and boost efficiency through a number of projects related to securing and filling butane cylinders, as well as to maintain and rehabilitating cylinders, in addition to projects to raise the efficiency of health, safety and environment (HSE) systems, Al Shuwaikh said during the general assembly chaired by Minister of Petroleum and Mineral Resources, Tarek El Molla, to review and authorize Petrogas' 2018/2019 budget.

ANRPC to Refine 5 M Tons of Crude Oil in 2018/2019

Alexandria National Refine & Petrochemical Company (ANRPC) plans to refine 5 million tons of crude oil in fiscal year (FY) 2018/2019 in order to produce around 99,000 tons of butane, 1.3 million tons of naphtha, 1.2 million tons of diesel, 1.4 million tons of mazut, 400,000 tons of jet fuel, and 19,000 tons of asphalt, Egypt Oil & Gas reports. The company is further studying establishing two new projects for vacuum and air distillation in order to boost output, , ANRPC's Head, Medhat Bahgat, stated during the general assembly chaired by Minister of Petroleum and Mineral Resources, Tarek El Molla, to view the company's budget for FY 2018/2019.

ASORC to Refine 4 M Tons of Crude in 2018/2019

Assiut Oil Refining Company (ASORC) plans to refine 4 million tons of crude oil during fiscal year (FY) 2018/2019, in order tom produce around 36,000 tons of butane, 520,000 tons of naphtha, over 1 million tons of diesel, 2.3 million tons of mazut, and 25,000 tons of jet fuel, Egypt Oil & gas reports. ASORC is playing a vital and strategic role in providing petroleum products to Upper Egypt, ASORC's Head, Nagy Kassab, pointed out. He further disclosed that new projects that are currently implemented show the keenness of the Egyptian oil and gas sector for the future of Upper Egypt.

EPC to Produce 90,000 Tons of Polyvinyl Chloride in 2018/2019

The Egyptian Petrochemical Company (EPC) is planning to produce 90,000 tons of polyvinyl chloride, 65,000 tons of caustic soda, and 15,000 tons of hydrochloric acid in fiscal year (FY) 2018/2019, EPC's Head, Gaber Ahmed, stated during the general assembly chaired by Minister of Petroleum and Mineral Resources, Tarek El Molla, to view the company's budget for FY 2018/2019, Egypt Oil & Gas reports. The company is studying the establishment of a new project to produce Olefins and to establish a new polyvinyl chloride production line in order to increase the added value from natural gas, Ahmed said.

BAPETCO to Drill 31 Exploratory Wells

Badr El Din Petroleum Company (BAPETCO) plans to drill a total of 31 exploratory wells starting the second half of fiscal year (FY) 2017/2018 until the end of FY 2018/2019, BAPETCO's Head, Alaa Al Batal, stated, adding that the company's budget plan for FY 2018/2019 aims at boosting petroleum activities in order to increase production and reserves, Egypt Oil & Gas reports. BAPETCO has recently linked North Alam El Shaweish discovery to production facilities, three months ahead of schedule, with 30 million standard cubic feet per day (mscf/d) production capacity to boost Badr El Din natural gas total output to 448 mscf/d, Al Batal pointed out.

Petrogas to Pump 26 M Butane Cylinders/Month

Petrogas Company plans to pump 26 million butane cylinder per month into the Egyptian markets starting June 2018, Petrogas' Head, Adel Al Shuwaikh, stated; according to Amwal Al Ghad. The company plans to increase its butane cylinders to cover local market's demands and decrease butane imports, Al Shuwaikh pointed out.Petrogas aims to fill around 3.9 million tons of butane during fiscal year (FY) 2018/2019 in order to meet local market's demands, Al Shuwaikh previously stated, as reported by Egypt Oil & Gas.

Botagasco Follows Up on Butane Warehouses

The Egyptian Company for Gas Transportation and Delivery (Botagasco)'s Head, Ahmed Abdel Moteleb, has led a follow up visit to the company's warehouses across Cairo in order to ensure the availability of butane cylinders, Amwal Al Ghadreported. The tour included visiting the main strategic butane distribution warehouse in Al Salam City, which is serving the area and its surroundings, the company's central workshop in Cairo, as well as central car maintenance workshop. The head of the company listened to the suggestions of engineers and technicians at the workshop. Botagasco has adopted a state of maximum readiness in all of its butane warehouses to cover the butane demands increasing in winter, Abel Moteleb stated.

Rashpetco Natural Gas Production Reaches 486 mscf/d in H1 2017/2018

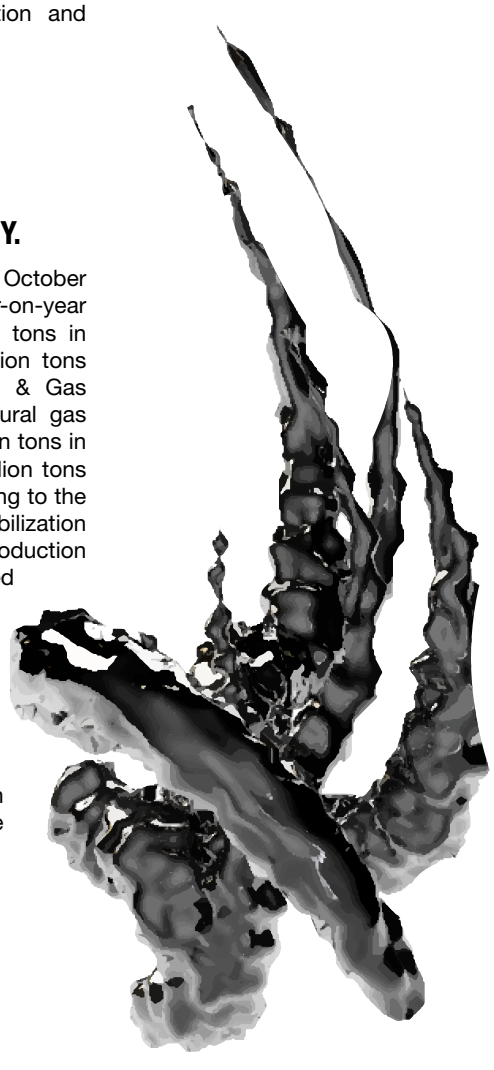
Rashid Petroleum Company/Burullus Gas Company (Rashpetco) has achieved its production target for the first half of fiscal year (FY) 2017/2018, reaching 684 million standard cubic feet per day (mscf/d) of natural gas, Rashpetco's Head, Hisham Al-Attar, stated, during the general assembly chaired by Minister of Petroleum and Mineral Resources, Tarek El Molla, to review the company's budget plan, Egypt Oil & Gas reports. Rashpetco is preparing to start the development and production of Burullus concession, in West Delta deep water, as the company plans to start producing from two natural gas wells during the third quarter of 2018, El Atar pointed out.

Butane Consumption Falls 5.4% Y.o.Y.

Year-on-year (Y.o.Y.) butane consumption fell 5.4% in October, decreasing from 360,600 tons in October 2016 to 341,200 tons in October 2017, Egypt Oil & Gas reports. Butane imports remained constant. Egypt imported 211,200 tons in October 2017 and 211,300 tons in October 2016, according to statistics released by the Central Agency for Public Mobilization and Statistics (CAPMAS). Output fell 14.21% to 135,800 tons in October 2017 from the 158,300 tons produced the previous October. Despite the year-on-year decrease, consumption rose 8.59% from the 314,200 tons of butane consumed in September. Output, however, experienced a 12.27% decline from the 154,800 tons produced in September.

Natural Gas Consumption, Production Increase Y.o.Y.

Natural gas production in October increased 14.7% year-on-year (Y.o.Y.), rising to 3.27 million tons in October 2017 from 2.85 million tons in October 2016, Egypt Oil & Gas reports. Consumption of natural gas rose 9.0% Y.o.Y. to 3.70 million tons in October 2017 from 3.396 million tons the previous October, according to the Central Agency for Public Mobilization and Statistics (CAPMAS). Production of natural gas decreased 4.37% in September 2017 from August. Output in September dipped to 3.217 million tons from 3.365 million tons in August. Production from the Atoll and Zohr natural gas fields, which came online in December, should increase Egypt's production figures.



DEA to Increase Investments in Disouq, Gulf of Suez

DEA Deutsche Erdoel AG has plans to inject more investments in Disouq and the Gulf of Suez, DEA's CEO, Maria Moraeus Hanssen, stated, adding that Egypt is becoming more attractive for investments, especially after the success in North Alexandria project. Hanssen's comments came during her meeting with the Egyptian Minister of Petroleum and Mineral Resources, Tarek El Molla, to discuss the company's projects and activities to develop and produce oil and gas in Egypt, as well as the company's targeted investments. DEA is working in developing West Nile Delta projects in North Alexandria and West Mediterranean deepwater, along with BP, after it successfully worked with the ministry of petroleum in Taurus and Libra fields, the minister pointed out.

TransGlobe Energy Allocates $29.1 M for Egypt in 2018 Budget

TransGlobe Energy Corporation has announced its 2018 capital budget allocating $29.1 million for operations in Egypt and $12.2 million in Canada. TransGlobe Energy has allocated $11.8 million for exploration, focused mainly on the Egyptian Western Desert, and $17.3 million to the development of wells in Egypt's Eastern Desert. The company plans to execute five exploration wells in 2018: two wells in South Ghazalat, two wells in NW Sitra, and one well in South Alemein. Additionally, eight development wells are targeted in the Eastern Desert, including five wells in West Bakr, two in NW Gharib, and one well in West Gharib.

ADES Extends 3 Contracts in Egypt

ADES International Company has extended two contracts in Admarine II and Admarine IV, additionally renewing an existing lease for Admarine VI in Egypt's Gulf of Suez Area. Additionally, the the Admarine VI lease renewal will help ADES secure multi-million-dollar revenue streams for the upcoming two years, according to E&P Magazine. Moreover, ADES' Admarine II jack-up barge contracts between ADES and the Gulf of Suez Petroleum Company (GUPCO), which expired in December 2017, has been extended for another three months. Meanwhile, ADES' third consecutive renewal for Admarine VI contact, which was planned to expire in March 2018, was signed with the General Petroleum Company (GPC).

Roxtec Secures Work in BP's West Nile Delta

Roxtec Company has secured work on BP's plans for the development of West Nile Delta natural gas output in Egypt, Bdaily reported. Rotex supplied several specialist transits in order to secure cable entries, which enabled building onshore facilities and wall penetrations across the site, Roxtec UK Managing Director, Clive Sharp, stated, according to Maritime Executive. Moreover, engineers from Roxtec's office in Egypt provided on-site installation training to the fields' instrumentation and electrical subcontractors.

Egypt's Petrojet Completes Base at Algeria's North Rejan

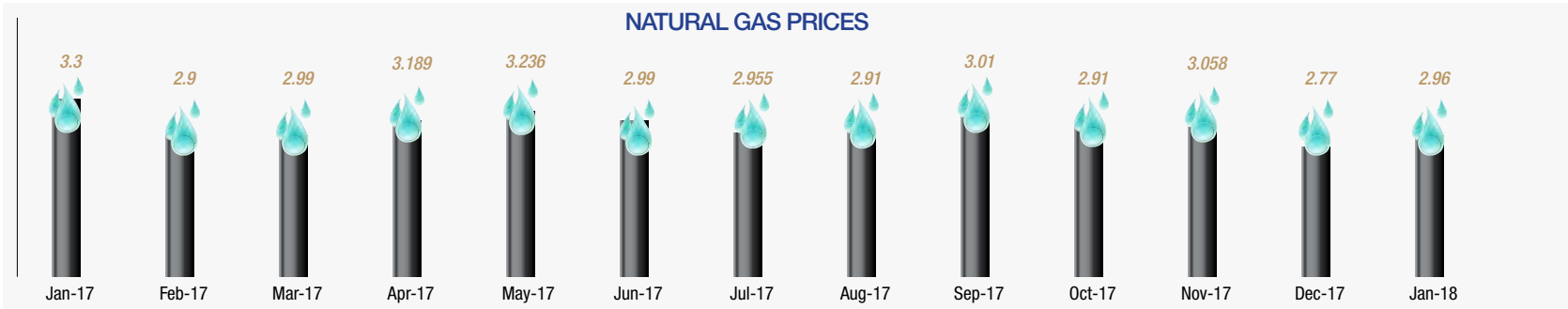
Petrojet completed a permanent residence and security camp at Algeria's North Rejan natural gas field, Egypt Oil & Gas reports. The project is part of a plan to develop the North Rejan field. A consortium of Sonatrach, REPSOL, RWE, and Edison are developing it. The consortium praised Petrojet's performance and its completion of the project on time in accordance with the highest health, safety, and environment (HSE) standards. The company built a permanent-residence base that includes a managerial building, residence buildings, sports clubs, workshops, training centers, storage warehouses, a mosque, a clinic, a sports center, restaurants, and a pool. The project further included a security camp, which consists of 21 residential building for 180 individuals, warehouses, a training building, a mosque, and military-training area.

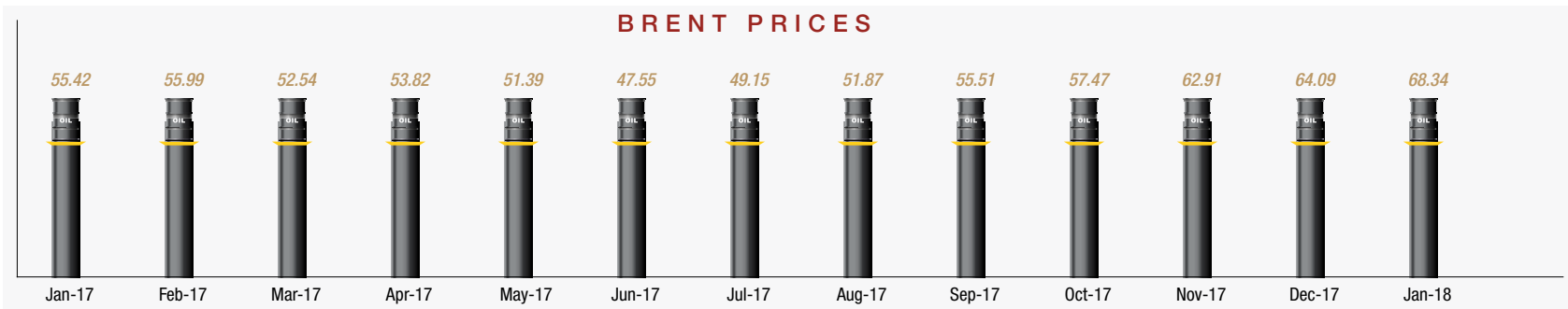
Egyptian Oil Companies Seeking to Double EGP 10 B Loan

Egypt's Co-Operation Petroleum Company (COOP) and Misr Petroleum Company sent a letter to an Egyptian banking consortium asking to double their EGP 10 billion loan, which was granted late 2014. The two companies are owned by the Egyptian General Petroleum Corporation (EGPC) and are seeking to receive the second tranche if EGP 10 billion in order to cover their needs in purchasing and supplying petroleum products to the Egyptian market. The original EGP 10 billion loan was granted by a consortium consisting of Banque Misr, National Bank of Egypt (NBE), Arab African Bank, Commercial International Bank (CBE), and Qatar National Bank. The loan's tenor was agreed for five years from 2014, and included a $550 million segment of foreign currency with only 4 years tenor. Over 12 additional banks contributed in covering the loan's cash.

BTE2 Well Adds 25 mscf/d to Natural Gas Production

Egypt's BTE2 Well, which is operated by Royal Dutch Shell's Joint Venture in Egypt, Badr El Din Petroleum Company (BAPETCO), has started production phase on January 7th, increasing the country's natural gas output by 25 million standard cubic feet per day (mscf/d), which is planned to be increased to 50mscf/d after completing the drilling of BTE1 Well, Badr 3 Wells' Manager, Anton Artes, told Al-Ahram Gate. The fields' agreement has been pushed from 2020 to 2040. The upcoming phase in Badr 3 includes developing existing wells and adding new ones to production map, Artes stated, adding that Badr 3 output reached 245 mscf/d of natural gas, and 25.500 barrels of oil and condensates per day.





The Oil and Gas Industry is Entering a New Energy Era

Existing market dynamics and challenges are forcing a massive change in the industry's approach to technology for each segment – upstream, midstream and downstream. The future of the industry lies with the full digitalization of the chain and the use of knowledge gleaned from connected devices for real-time optimization of processes and operations.

The current digital era is about turning the data made possible through the information era into action, increasing both the speed and quality of decision-making. Digitally connected assets can significantly reduce costs, shorten schedules and minimize risk. ABB has embraced all aspects of electrical, instrumentation, automation and telecoms, being one of the only major players able to help customers achieve completely integrated and digital performance-enhancing solutions. In fact, we've demonstrated time and again our ability to deliver 20 to 30 percent CAPEX and OPEX savings while simultaneously improving uptime and extending asset lifetimes by 20 years.

Through our ABB Ability™ offerings we provide a combination of products, systems and services that are digital and seamlessly connected, all bringing added value to our customers. For the oil and gas sector, we offer a number of solutions including production optimization, plant performance solutions and services, power and asset management, remote and condition monitoring, predictive analytics, intelligent project execution, and safety and alarm management applications.

In essence, ABB Ability solutions for oil and gas provide a digital platform that collects engineering data from sensors across all phases of work and traditional siloes, and then analyzes the information to enable real-time decision-making for operation and maintenance teams.

We offer predictive analytics and maintenance by providing access to our analytics engine and global experts, who assemble and help synthesize data from disparate systems into one dashboard that can help customers collaborate across locations and disciplines on safety, alarm, control loop, cyber security and rotating equipment support.

The ABB Collaborative Support Network saves time by providing easy access to ABB experts around the world. Remote access translates into reduced travel time and requirements, as well as into reduced commission time. It keeps production running while also reducing downtime. More importantly, it enables continuous improvement and efficient decision making.

As we develop technologies for the future of this industry, our digital solutions for subsea power and automation allow oil and gas exploration to go further and deeper than ever before. While doing this, the technology helps customers reduce operational and capital expenditures as well as maintenance and operational costs. Our technologies enable the transmission of up to 100 MW of power via one cable over distances up to 600 kilometers from shore and power equipment at depths of up to 3,000 meters. Our digital solutions also provide process controls that communicate with, and automate, the equipment operating on the seabed.

Oil and gas facilities operate within strict environmental and safety regulations, and when operations approach the limits of these, both risk and cost increase. ABB Ability offers a condition monitoring system that monitors the health status of assets, which can identify potential problems as early as possible.

Today's large facilities can involve hundreds of thousands of I/O points and hundreds of miles of pipeline. They might operate over distances measured in thousands of miles. So, reacting to problems can be difficult, for example assessing the situation, and then designing and delivering a solution. Knowing issues sooner, and delivering fixes quicker, can provide a real competitive advantage. ABB Ability solutions offer a safe, reliable power, communications and control infrastructure that can provide centralized maintenance and operations control across the entire upstream and midstream infrastructure.

ABB Ability solutions turn data into insights and ultimately into action in the physical world, thus providing improved operations and productivity for oil and gas customers. This has been demonstrated time and again to deliver 30 percent OPEX savings, lowered commissioning costs by 50 percent, extended asset lifetime and minimized safety incidents.

One source for all your power and automation needs

ABB offers products, systems and services across the entire hydrocarbon value chain. We provide our customers an integrated approach for automation and electrical needs that reduces cost, keeps customers on schedule, and minimizes risk. ABB has a strong track record for optimized execution in this industry and ensuring reliable operations, functional safety, system availability and compliance with environmental requirements. **abb.com/africa**

UPSTREAM TECHNICAL CONVENTION

Paving the Way for a Modernized Industry

With upstream activities as a core pillar on Egypt's ambitious growth plans, petroleum leaders gathered at Cairo's Sky Executive Resort on January 21st and 22nd to examine recent achievements and discuss ways of enhancing oil and gas production levels, reducing operational costs, and providing new opportunities for young industry professionals.

Under the patronage of H.E. Minister of Petroleum and Mineral Resources, Tarek El Molla, the two-day Upstream Technical Convention was launched in line with the ministry's "Modernization Program," offering important updates on the program's activities and fruitful insights to meet the ministry's expectations.

During his speech El Molla thanked the organizers for their efforts and commitment; he further praised the event's importance in giving "an excellent opportunity to exchange ideas and insights on the challenges and opportunities of the recent developments in the oil and gas sector." The minister expressed his expectation that the mindset-rich environment would promote "production increase and decrease costs," as well as bring "significant recommendations on how to enhance opportunity and productivity of young professionals."

The inaugural speech was presented by Egypt Oil & Gas Managing Director, Eng. Mohamed Fouad, who noted the industry's responsibility to "continuously reinvent itself in order to keep up with the high competitive petroleum market."

"This event gives an excellent opportunity to exchange ideas and insights on the challenges and opportunities of the recent developments in the oil and gas sector."

ENG. TAREK EL MOLLA

H.E Minister of Petroleum and Mineral Resource

As the industry starts a new era, embarking on a new journey of overcoming challenges and contributing to new successes at the Egyptian petroleum sector, Egypt Oil & Gas Technical Committee presented **H.E. Minister ENG. TAREK EL MOLLA** with an Award of Achievement for his guidance through Egypt's accomplishments and his vision behind the modernization of the sector.

Achievements and Plans under the Modernization Program

The Upstream Technical Convention opened with the "Modernization Program Update" panel, providing valuable updates on the Egyptian oil and gas sector's trajectory, as well as insights to ongoing projects within the Ministry's Modernization. Due to a global crash in oil barrel prices and previous political turmoil that shook Egypt's business environment, the country has gone through bold reforms to overcome the market challenges, which have resulted in solid accomplishments in the upstream sector.

"By early 2016, the petroleum sector had already achieved several successful stories. We had signed several concession agreements, with investment commitments of over $15 billion, started accelerating some of the gas development projects, discovered and signed development agreements for Zohr, put back on track North Alexandria, and started several downstream projects," said Eng. Osama Mobarez, Undersecretary for Technical Office at the Ministry of Petroleum.

Despite the previous achievements, Mobarez noted the ministry's ambition to be proactive and do more. "We wanted to set a vision for the sector that is contributing to the sustainability of the country and sector by being efficient and transparent." To that purpose, a diagnostic phase with detailed analysis designed the sector's vision to unlock the industry's full potential as a growth and sustainable engine for Egypt, achieve financial sustainability, as well as become a regional oil and gas hub and role model for the future of modernized Egypt by 2022.

Production Increase

The Ministry's First Undersecretary for Gas Affairs, Upstream Program Sponsor, Eng. Mohamed Mounes, noted that seven pillars sustain the Modernization Project. "Upstream is one of these pillars. The aim of Upstream is to boost oil and gas production, secure the local market with petroleum products and achieve sustainability."

Mounes added that the ministry expects to increase production from existing wells, achieve new activities, build new facilities, improve efficiency, and adopt new technologies. To achieve this vision, production and exploration activity has been increased through signing around 83 agreements. Plateau production and sharing agreements are expected to drive, "an ambitious plan of around eight billion cubic feet of gas per day in 2021, which will be the double of 2015's production." He went on to add that, with an extensive exploration scheme, the ministry hopes to, "start the exploration of around 230 wells, starting from April until the end of 2018," with around $2 billion in investments.

"One of the main objectives from the modernization is to have more investments, as well as to increase efficiency and decrease costs."

ENG. OSAMA MOBAREZ

Undersecretary for Technical Office at the Ministry of Petroleum

Eng. Hafez El Shamy, Assistant General Manager, Production Department at the Egyptian General Petroleum Corporation (EGPC), who made a valuable presentation within the panel, noted that for increasing production both short and long term, Egypt must enhance existing well productivity by identifying new initiatives to increase petroleum production from existing wells, improve surface facilities and pipeline integrity and study secondary recovery projects and unconventional resources. El Shamy further suggested the country should, "drill new wells from existing fields, promote new bid rounds, propose solutions for payment of arrears and internal debt, and drag investment from outside Egypt."

For Mounes, a strong indicator that the program is being effective in enhancing output is the program's quick wins, which correspond to aspects that increase production from three to six months. "One example is the last discovery of Badr Petroleum Company (Bapetco). It was supposed to be put into production by February or March. We succeeded to put it into production around ten days ago [early January]."

Economic Factors

In line with the government's efforts to attract capital influx and boost the industry's performance, the floatation of the Egyptian pound (EGP) was mentioned as a key factor to enable economic recovery. According to Economist Allen Sandeep, Director of Research at Naeem Holding, the currency devaluation represents a third revolution in Egypt's recent history. "It was the best decision taken by the Egyptian government when it comes to macroeconomic stability and setting the books proper."

Sandeep highlighted that although the currency floatation increased local prices and reduced levels of consumption and production in certain sectors – the sales of cars dropped by 60%, as he exemplified – the full economic picture has improved. Since the government took this daring step, it has eliminated the black market for currency, helped recover tourism and increased the country's exports. "We are now in an 'economic flu,' and the floating of the EGP in 2016 was the first antibiotic. It is a long course that must be followed so we do not resort back to the flu."

In addition, currency devaluation works as a main attractive for foreign direct investment (FDI) into the petroleum sector. "As long as the EGP remains weak, you will continue to see foreign investment coming into the market," Sandeep said.

According to Mobarez, "One of the main objectives from the modernization is to have more investments, as well as to increase efficiency and decrease costs." In an economic perspective, "Attracting more investments would definitely support the reserves of foreign currency in the country and at the same time, as production increases, it would limit imports, thus reducing spending of foreign currency," he disclosed, further adding that the optimization of processes equally decreases costs, supporting the state budget and reducing the deficit.

Furthermore, Sandeep remarked that two factors would boost the oil and gas sector: lowering the price of natural gas and, as the petroleum industry contributes more than 30% of the country's exports, channeling some of these exports to the downstream refineries.

"We plan to start the exploration of around 230 wells, starting from April until the end of 2018."

ENG. MOHAMED MOUNES

Undersecretary for Gas Affairs, Upstream Program Sponsor at the Ministry of Petroleum

Technology Transfer and Digitalization

Digging deeper on the technology's fundamental part in the modernization of the sector, Eng. Moataz Darwish, Deputy Chairman of Shell Egypt, remarked that, as IOCs quickly advance in technology development, the challenge relies on how to transfer this technology to Egypt. "It has to be through a very efficient operating model of technology transfer to our joint ventures (JVs), and it will certainly enhance the collaboration through all the supply chain in the country."

"What I would add as one of the key pillars of the program is digitalization," Eng. Rami Qasem, BHGE's President, CEO for MENA, Turkey and India, pointed out. He further questioned, "How can we make sure that upstream and downstream data are available in a very efficient manner that provides data in the right time, making sure we drive transparency and costs out?"

Based on BHGE's experience and partnership with

"We believe the private sector today needs to use Egypt as hub for technology, partnering with different sectors within the ministry to create innovation, and work in collaboration with international oil companies and other services when it comes to building talents for the future."

ENG. RAMI QASEM

President, CEO for MENA, Turkey, and India at BHGE

"It [transferring technology] has to be through a very efficient operating model of technology transfer to our joint ventures, and it will certainly enhance the collaboration through all the supply chain in the country."

ENG. MOATAZ DARWISH
Deputy Chairman at Shell Egypt

Apple, Microsoft, BP, Shell and others, Qasem believes digitalization, "is something we need to bring in to Egypt, leveraging everything we have in a way to fulfill the key pillars of the whole modernization program in the next three years."

Private Sector Participation

With the remarkable presence of the private sector in the Egyptian petroleum industry and its fundamental role in the country's economic sustainability, Qasem stressed the importance of the private companies' contribution to three fundamental pillars within the Modernization Program: People, technology, and building the capability to serve the region.

"We believe the private sector today needs to use Egypt as hub for technology, partnering with different sectors within the ministry to create innovation, and work in collaboration with international oil companies (IOCs) and other services when it comes to building talents for the future," Qasem noted.

Collaboration for Success

In order to meet the discussed expectations, the panelists unanimously indicated collaboration as an essential part of the process. "Even if it is an oil and gas hub, a hub has to go through all sectors of the economy. It has to be backed up by the banking sector, port facilities and by all the agencies in the government and the private sector. It is a collaborative work," Qasem disclosed.

Mounes noted that there is a good agreement between the government and IOCs, to which Darwish, as a representative of the private sector, agreed by stating, "We believe we are truly one party [government and IOCs]. The relationship with the government is very strong and there is no doubt that this is a true partnership."

"The interaction of the government with IOCs is a two-way exchange," Mobarez pointed out. "For two to three years, the discussions with IOCs have been extensive. The investment attraction and the upstream program have a lot of interaction with the IOCs."

Qasem added to the discussion the commitment to address some of the internal economical requirements to increase Egypt's competitiveness in the market. "The question here is the timing. Today, with the prices going up, we will see more and more the need to build new talents and invest in resources, so the sooner we can have everyone supporting the Ministry of Oil, the easiest it is going to be to turn into a hub."

Mobarez further stated that the main factors in making the Modernization Program successful is the support from the leadership of the country and the leadership of the sector. "During the first phase of the Modernization Program, we studied several experiences from other countries and companies. We noticed that a practical factor is the leadership support. If you do not have this, you cannot succeed in this transformation. I believe we already have this support."

Positioning Egypt for Growth

The second day of the convention began with an in-depth look into Egypt's current perspective on upstream oil and gas during the "Positioning Egypt for Growth" panel. The presentations and ensuing discussions focused on the domestic gas situation and the prospects of liquefied natural gas (LNG) exports, but also on the requirements for future growth of the sector in general. During the various exchanges, panelists addressed the need to reshape government policies and enhance investment opportunities, thus creating a more sustainable climate for investors.

Egypt's Capex

Mr. Martijn Murphy, Research Manager Upstream at Wood Mackenzie, the event's official research partner, pointed out that since 2012, Egypt's discoveries have been tending more towards gas. According to him, "2015 was a pretty good year with the discovery of Zohr," and "The outlook for natural gas production now is pretty bright as a record gas output is expected by 2019."

"Within 2017 and 2018, there is record level suspending the capex across North Africa, reaching about $15 billion, from which around 70% is on gas projects in the region," he continued. "By country, you can see that Egypt accounts for about 60% of spending across North Africa last year and this year, and of course a lot of that is concentrated in West Nile Delta and Zohr."

Additionally, Wood Mackenzie's data suggested that the global capex had decreased by 20% each year since the oil price downturn in 2014, before stabilizing in 2017. "In contrast, you can see that Egyptian capex is pretty much doubled in that period," as low breakeven makes Egypt attractive despite low oil prices.

"We are now in an 'economic flu,' and the floating of the EGP in 2016 was the first antibiotic. It is a long course that must be followed so we do not resort back to the flu."

ENG. ALLEN SANDEEP
Director of Research at Naeem Holding

Challenges vs. Opportunities

Murphy further stressed that, with these numbers, Egypt competes globally despite high government share. Low cost recovery ceiling and the high starting government profit share create a highly effective royalty rate and a quite long payback period. "I believe the upstream sector is in a good place and in line with the reforms of the modernization program. I think the future is pretty bright."

However, although Egypt is likely to be self-sufficient in natural gas until possibly the middle of next decade, beyond that, the gap between demand and supply begins to widen again. "We [Wood Mackenzie] think that in 2019 or sooner, Egypt will have a gas surplus. However, we think that Egypt will manage to be self-sufficient until 2023 or 2024, based on current reserves and our production forecast. Beyond that, it is going to be relying on yet-to-find potential," Murphy added. In this line, he indicated, "Discovering new gas offshore and monetizing some of the existing discoveries, which

"We are interested in expanding our activities in new areas. We know there will be bid rounds in the Red Sea in the near future. We hope that it will open new frontiers."

GEO. FABIO CAVANNA
General Manager at IEOC

"New business models with service providers – looking at the total cost other than the individual service cost and more integrated deals – will help attract more business."

ENG. HUSSEIN FOUAD EL GHAZZAWY
Vice President and General Manager at Schlumberger

"There is a lot of liquid hydrocarbon waiting for just a small investment and a timeframe to be brought on stream, especially in the Gulf of Suez."

ENG. ABED EZZ EL REGAL
CEO at EGPC

might require a higher gas price, are some of the challenges in the future."

From a service provider perspective, Eng. Hussein Fouad El Ghazzawy, Vice President and General Manager at Schlumberger, stated that, "One of the main challenges is the business model. I think new business models with service providers – looking at the total cost other than the individual service cost and more integrated deals – will help attract more business."

Geologist Fabio Cavanna, General Manager at the Italian Egyptian Oil Company (IEOC), spoke from the perspective of Egypt having more opportunities than challenges. "First, because of the location of Egypt, which is very well positioned, geographically speaking. Second, because we have a very stable country and third, because we have very knowledgeable third parties and a very strong and robust industry. All this together is consolidating a very good situation for Egypt, which is boosting the future."

One of the opportunities mentioned in the discussion was the continuous potential for offshore exploration and production. "We believe that the potential is still there for offshore, and Zohr unlocked this potential," Eng. Osama El-Bakly, Chairman of EGAS, stated.

"Discovering new gas offshore and monetizing some of the existing discoveries, which might require a higher gas price, are some of the challenges in the future."

MR. MARTIJN MURPHY
Research Manager Upstream at Wood Mackenzie

In addition, speeding up processes was brought up as a main target to sustain Egypt's growth. "Among the 83 concession agreements signed since 2013, around 20 are just amending terms and conditions, and gas pricing. This will save a lot of time and a lot of effort," Eng. Abed Ezz El Regal, CEO at EGPC, commented, subsequently noting that, "There is a lot of liquid hydrocarbon waiting just for just a small investment and a timeframe to be brought on stream, especially in the Gulf of Suez."

In terms of technology, Ghazzawy believes it is "… definitely a challenge and opportunity at the same time," disclosing that Schlumberger has made big investments on its central of efficiency, reaching almost $60 million of investments.

Opening the Way for Gas Exports

Since Egypt began importing LNG in 2015, the country has incorporated floating storage regasification unites (FSRUs) to its infrastructure. As imports gradually decrease due to the hike in domestic natural gas output, the petroleum sector rethinks FSRUs' usage in order to incorporate the existing facilities to Egypt's future market position.

"When we say we are putting effort in turning Egypt into a gas hub, it means we have to maintain our infrastructure," El-Bakly defended. "Our infrastructure is the entire asset we have to cover whatever [options arise], concerning exporting [in the near future]."

The ambitious plan of gaining back the country's position as a gas supplier has brought international partnership into the equation. When it comes to the construction of strategic pipelines between Egypt and Turkey, Greece, Cyprus, or Israel, El-Bakly and El Regal affirmed all options remain open. "We have the project itself coming first and the methodology coming after. We are talking about being a hub, so it is a major project. Methodology could be decided during initiation and all the options are open," El Regal added.

He further reminded that, in order to achieve this plan, the country must keep an eye on the generation of power. "The main consumer of gas in the country is power generation. There is a plan for utilizing renewable energy, which will have a considerable impact in the country, but we cannot drop maximizing the efficiency of power plants."

Growing Oil Production

As oil fields mature and production falls behind the boom in natural gas, IOCs' representatives discussed ways of enhancing oil activities. "We [IEOC] are trying to maximize our oil recovery and, in the Western Desert, we never stop investing," Cavanna stated. "We are also interested in expanding our activities in new areas. We know there will be bid rounds in the Red Sea in the near future. We hope that it will open new frontiers."

As for Schlumberger, El Ghazzawy disclosed the company will be more selective and focus is specific areas. "We are very pleased that we signed, in July, the multiple agreement in the Red Sea. The Red Sea will bring a lot of potential to Egypt."

Speaking on this potential, Murphy believes the Red Sea is an interesting area. However, "It is still a very early case, probably too early to comment on production levels."

According to El-Bakly, the country does not lack facilities to boost offshore output. "We are facing a downturn of oil production and some activities in the industry have slowed down, so some facilities

"When we say we are putting effort in turning Egypt into a gas hub, it means we have to maintain our infrastructure."

ENG. OSAMA EL-BAKLY
Chairman of EGAS

are more available."

Commenting on further exploration drilling in Shorouk concession, Cavanna explained it is still an early call. "We are looking at the exploration data and I cannot confirm now."

Young Professionals

Human capabilities and human development stand as top priorities in the Modernization Program. In this line, the Upstream Technical Convention's third and last panel "Young Professionals" provided successful stories and insights on tailored training sessions to narrow skill gap, programs in building human capital, equal opportunity policies in the petroleum sector, as well as strategies to keep young professionals motivated and the oil and gas sector attractive.

Skill Gap: Academics vs. Practice

In order to prepare undergrad petroleum engineers, technicians, and geologists to face the open market, oil and gas leaders pointed out the need of closing the gap between academic studies and actual practice. "Petroleum engineering education has to show that they give students skills to work in the working environment," noted Dr. Ahmed

"Our education system is a highly technical system. We are missing the practical training and soft skills."

ENG. OSAMA A. HALIM
Egypt & Libya Area Manager at Halliburton

"We [OGS] announced a very promising program as a capacity building program for middle management and young professionals. We are aiming to invite more IOCs in order to join the implementation."

ENG. OSAMA ELSAADAWI
Marketing Manager at OGS

ElBanbi, Professor and Chair of the Department of Petroleum and Energy Engineering at the American University in Cairo. "Before they graduate and join the industry, they must have the skills to educate themselves."

Eng. Osama A. Halim, Egypt & Libya Area Manager at Halliburton, believes Egyptian young professionals can deliver when placed in the right working environment, and that universities have a major role in building skills and encouragement. "Our education system is a highly technical system. We are missing the practical training and soft skills," he added.

This gap could be closed through true partnerships between universities and the industry, David Chi, Vice President & General Manager at Apache, stated. "The industry is the one who has a better idea of what it needs in terms of human resources." Thus, universities can benefit from the industry's insights to improve its educational system.

Chi further noted that students should learn how to make decisions, emphasizing project management and problem solving skills. With internships consisting of a one-month formation, Chi proclaimed that this timeframe is not long enough to develop the students' abilities, suggesting lengthier internships for bigger impacts.

"We need to empower young people, so that they are able to make decisions and come up with new ideas that will make us move forward."

ENG. DAVID CHI
Vice President & General Manager at Apache

ElBanbi agreed that internships should be extensive, noting that students are highly pressured to finish university fast to join the work force. "I think we could discuss a one-year off to acquire experience."

Joint programs between the private and the public sector were highly suggested by the industry's representatives as a means of enhancing human development. "A few months ago, we [OGS] announced a very promising program as a capacity building program for middle management and young professionals. We are aiming to invite more IOCs in order to join the implementation. More than 3,000 applicants already submitted their applications in this program," Osama ElSaadawi, Research & Development –Marketing General Manager at Oil & Gas Skills (OGS) stated.

Equal Opportunity

In an industry dominated by men, the discussion progressed toward equality. "We need to give male and females equal opportunities when we talk about hiring processes," Halim stressed.

"As our industry continues to evolve, we need to be more inclusive," Chi continued. "A lot of female employees are mothers, but that does not mean they cannot make a significant contribution to our industry. As an industry, we have to be supportive and identify the strength of our female employees."

Keeping the Sector Attractive and Motivated

With a downturn in petroleum engineering enrollment, ElBanbi pointed out that volatility affects both the industry and the universities. "The last three years have been really tough on geoscientists and petroleum engineer undergrads. What I suggest is that companies should continue hiring, in bad and good times, especially in these two majors," he added.

"The oil and gas industry plays, in many countries, a very critical role. We are a global industry for people with a spirit and taste for adventure. We have to communicate the importance of the industry, its financial reward, and the opportunity of applying technology and making an impact on the society. When we do a better job at that, I believe we will be able to introduce our industry to a lot of talent that young people want to bring in," said Chi.

Halim further stressed the role of senior management in fostering young talent. "People in different levels are the key for the success of every company." According to Halim, people quit their jobs when they do not see a career progression for themselves. In order to keep people attracted, there must be a clear succession plan, as well as a fruitful working environment. "If you have an unfair environment, you will leave. We, in Halliburton, sit with our people from day one and tell them, 'This is where you are now and this is where you are going.' This transparency leads people to continue in the company."

Recommendations within the Modernization Program

In a people development perspective, Chi suggested the Modernization Program should focus on empowering young talents. "We need to empower young people, so that they are able to make decisions and come up with new ideas that will make us move forward."

Geol. Samir Ab. Moaty, Rockhopper Country Manager and Founder of Al-Amal Program, insisted the Modernization Program should direct its efforts toward universities. "What I am looking for is a collaboration between IOCs, JVs, and NOCs and to help with internships and summer training. Those young professionals will be the future leaders. We do not have to wait for them to come to us. We need to go to them and prepare them to be ready upon graduation."

"Educating the young generation is something we do not do for the young generation, but to ourselves. A very important thing to do is leading by example."

DR. AHMED ELBANBI
Professor and Chair of the Department of Petroleum and Energy Engineering at AUC

Halim agreed with Moaty and stressed the need of a national training program that covers a good proportion of fresh graduated employees, with "… technical training and soft skill trainings to educate the students on what they are expected when they come out of university."

ElSaadawi pointed out the industry needs to understand that it is working in complexity. In that line, ElBanbi commented, "Educating the young generation is something we do not do for the young generation, but to ourselves. A very important thing to do is leading by example."

The Upstream Technical Convention was concluded with a series of presentations showcasing initiatives to enhance young professionals' formation, including Al Amal, Shell's NXplorer, Schlumberger's Technician Development Training Program, as well as the Ministry's Subsea Development Program and Zohr Training Project. The convention marked the beginning of important discussions within the ministry's Modernization Program for 2018.

"Those young professionals will be the future leaders. We do not have to wait for them to come to us. We need to go to them and prepare them to be ready upon graduation."

GEOL. SAMIR AB. MOATY
Country Manager at Rockhopper and Founder of Al-Amal Program

Drivers of Greater Production: Efficiency in Operations

The Upstream Technical Convention offered its attendees a series of specialized workshops, tailored towards method of enhancing the yields of upstream operations. The first workshop addressed matters of "Efficiency in Operations," beginning with a session focused on the effective use of upgrades, and two more centered on increased production and the optimization of specific operations, respectively.

Osama Halim, Halliburton's Area Manager for Egypt and Libya, and Mahmoud Shawkat, Director of Sales and Marketing NAF at Baker Hughes, a GE company, chaired the first technical workshop, which aimed to bring insights on ways of optimizing activities in oil and gas fields and, hence, increasing production. "Efficiency is the keyword now in the oil industry world, and we all need to focus on how to bring efficiencies to our business," said Halim in his opening remarks, subsequently introducing Ahmed Adel Fahmy, Senior Reservoir Simulation Engineer at Khalda, for the workshop's first presentation. Berenice Field Simulation Study

Representing Khalda Petroleum Company, Fahmy's presentation revolved around the implementation impacts of Berenice Field Simulation Study.

Fahmy opened his presentation with an explanation of the particularities of Berenice reservoir, which lies under a partial water drive and contains black oil. Fahmy divided Berenice wells into two groups. The first group consists of three high structure wells with high productivity index (PI) ranging from 50 up to 100 barrel per pounds per square inch (BBL/PSI), no water production and no oil water contact (OWC). Meanwhile, "the second group is [four] low structure wells. They have relatively low PI ranging from three up to 40 BBL/PSI, as well as water production and clear OWC," Fahmy explained.

The presentation compared the actual and forecasted economic aspects of upgrading efforts, including proposed rates, candidate wells, timing factor, acceleration period and achieved plateaus, as well as drilling new wells.

Khalda's goal is to "… to maximize the value from the field," Fathy pointed out, adding, "The only ways to accelerate production are by either upgrading or by drilling new wells – or both." Crucially, the evaluation showed that in order "… to maximize the field's production in presence of [the evaluation concerns – including acceleration impact on the oil recovery in light of the field's excessive water movement, pressure impact on acceleration and the best field development plans –] would have been highly critical for the management without the use of reservoir simulation."

The Berenice stimulation proved that, "Increasing the production from the crestal locations does not have negative impact on the ultimate recovery and it achieved even water table movement, which resulted in good water/oil displacement." Fahmy concluded his presentation adding that, "Drilling new wells adds marginal value. Therefore, acceleration from the current wells is sufficient as long as there is no change in the geological structure." The study's result collaborates with a valuable angle on how to boost well performance while decreasing costs.

TransGlobe Increases Production at West Bakr Field

PetroDara Company's Reservoir Engineer Manager, Mahmoud Tolba, subsequently conducted a presentation focused on production optimization of West Bakr field. The presentation introduced Artificial Lift Systems and activities completing it, through which TransGlobe Energy Corporation has been able to decrease costs and reach sustainable production at West Bakr.

"The normal decline rate for West Bakr is 24% per year, so we have succeeded in maintaining the production. We added 22% more to the production, so we actually achieved around 46% more production this year," Tolba said. Therefore, part of the field's development success was "depending on the strategy how to subject the artificial lift that fits the purpose," he added.

The company started developing the field during the period from 2012 to 2014 through drilling operations, which were followed by optimization work in 2016, Tolba presented. TransGlobe was using sucker rod pumps (SRPs) in placing more than 90% of the wells in the field's re-development phase to production. However, the company "...concluded that the SRPs aren't able to produce from those wells in an efficient way so we have started to make a change from SPRs to PCP [progressive cavity pumps], the percentage of PCP in 2017 reached up to 44% compared to just 10 % in 2011," Tolba explained.

During the development work, the operating companies "…had only two wells that exceeded the budget by 10% but the seven rest wells saved a lot of money. Specifically in K29 we just spent 42% actual cash and we used the material in-house. We spent 58% from the budget on the materials so we saved more than $300,000 in comparison with the planned budget," Tolba stated.

KPC Pigging Optimization

The workshop further included a presentation by Mohamed Gad Allah Mahmoud, Surface Engineering AGM at Khalda Petroleum Company, and Mohamed Negm, Senior Production Engineer at Schlumberger, on determining optimum pigging frequency and controlling pig speed to avoid deferred production and reduce operational costs.

In order to both reduce and save annual costs, pig optimization was performed on the Qasr-Salam 24" pipeline and PTAH-UMB pipeline.

Qasr-Salam 24" pipeline has a major problem as there is "…a slug catcher at the end of line. The drainage rate of this slug catcher is around 35,000 barrels per day (b/d)," Mahmoud said. "Typically, [a company] decrease[s] the load on production rate during any pigging period to avoid any process offset on the downstream facility," he added. However, with pigging optimization the pipeline was able to decrease downtime by over 50%, reduce production decline by 50%, decrease the risk of sudden offset occurring due to liquid level constraint violation and reduce pig stuck risk.

Meanwhile, PTAH-UMB field pipeline 8" was affected by wax, which in-turn affected production. Hence, it was proposed to determine the pigging frequency and velocity in order to solve the issue, or to install two new rented heating stations with a cost of approximately $1 million. Pigging optimization at the pipeline prevented pipeline plugging and decreased mitigation cost to a point where it was lower than prevention cost. "PTAH-UMB optimization eliminated the need for the heating station and saved cost of around $1 million per year," Mohamed Negm concluded.

At the end of the three presentations the convention welcomed all other attendees to join individual round table discussions, where questions and open exchanges were welcome and where the presenters could elaborate on specifics.

"So far the convention has been amazing, especially the efficiency workshop and its case studies. It helps in transferring experience between companies. Everything presented by a company might relate to a hidden problem in another firm in which the new technologies in the presentation can be used," said Mostafa El Aswany, General Manager of Regions Evaluation at Qarun Petroleum Company when asked for his comments on the workshops.

APPLICATION OF NEW TECHNOLOGY

A key Factor to Increase Hydrocarbon Production

Industry experts have been developing and implementing new techniques in order to boost oil and gas productivity. These innovative applications and new technologies that are designed to meet a growing demand for energy are of particular value to Egypt's expanding oil and gas sector.

The third technical workshop of the Upstream Technical Convention was dedicated to the "Application of New Technology." It included three presentations by International Oil Companies (IOCs) and national oil companies (NOCs) representatives alike, who focused on new ideas, newly implemented technologies, and relevant success stories.

Seismic Stimulation

The first presentation was by Bill Wooden, Vice President of the Applied Seismic Research (ASR) Corporation. Wooden presented his and business partner Sergey Kostrov's trademarked "Seismic Stimulation" Tool, along with relevant case studies that prove its simple, yet effective approach to increase oil production through revitalizing mature fields.

Wooden focused on the importance of Enhanced Oil Recovery (EOR) techniques as an effective way to boost oil production and clarified that, "The way [ASR] enhance[s] oil recovery does not follow the traditional flow path." As Wooden explained, Seismic Stimulation's approach has thusly proven increases in oil production of greater than 20% in numerous fields. Discussing Seismic Stimulation across boundaries, he also explained that its application contributed to a production increase of 30% in the seven wells drilled in Belayim accounts, or approximately 1,200 billion barrels per day (b/d).

Regarding shale recovery technologies and tools, Wooden elaborated on how a single ASR Tool was one of the most productive methods. "I do not know how many shale reservoirs there are in Egypt but this is a very good technology for that – and believe it or not, our tool is very simple," he highlighted. Wooden concluded his presentation by showing how ASR uses Dynocard to track and monitor the performance of the Seismic Stimulation Tools.

During his breakout session, Wooden received numerous questions from the audience concerning EOR and ASR, one of which enquired about the limitation of applying the presented techniques. Wooden's answer explained how only high gas oil ratio (GOR) wells above [2,000] are unsuitable but that the depth limitation has no effect at all.

Enhanced Characterization of Productive Intervals

The second presentation focused on a paper entitled, "Zohr Field: Enhanced Characterization of Productive Intervals by Means of an Innovative Temperature Monitoring Application During Well Testing," that was introduced by co-author and Zohr Task Force Petrobel Reservoir Expert Iskander Abdeddaiem. He explained how understanding fluid movement from the reservoir through the perforated intervals is crucial for well management and that it is strategic during well test operation. This knowledge is also required for reservoir characterization as it provides reliable input for pressure test analysis.

"Historically, reservoir information is collected after the well test operation with PLT acquisition, leading to cost increase and risks increase, especially in deep water wells," Abdeddaiem said. The main temperature concepts include, "…temperature surveys, which are the backbone of logging for downhole fluid movement detection," he added. Usually the temperatures in wells increase with depth and the actual rate of increase will depend upon the geographic area, formation mineralogy, rocks petro-physical properties and rocks' thermal features.

Representing a new technique, Abdeddaiem explained that the "Multiple Discrete Temperature Sensor System" is a wireless temperature monitoring system that allows continuous high-resolution temperature profiles to be gathered from any section of the well.

Regarding Zohr's well-test description, "Two well tests have been successfully performed in wells Zohr-2 (North-east Culmination) and Zohr-5 (South Western culmination)," said Abdeddaiem, noting that the results show that both wells are characterized by a great production capacity. Deliverability is estimated up to 250 million standard cubic feet per day (mscf/d), per well in the final production configuration.

Abdeddaiem concluded that the multiple discrete temperature sensors deployed with TCP guns has been successfully applied during well test operation in Zohr-5. No sensor damage was noted during the perforating operation. In addition, a reliable understanding of the reservoir behavior and well deliverability has been achieved safely, thus providing a downhole flow allocation during well test time.

Finally, Abdeddaiem explained how integration of the concurrent data from a single well test and a MDTS tool permits savings in the range of 15% when compared to a single well test with PLT, or 40% if compared to a dual well test strategy.

In the open discussion that followed his presentation, Abdeddaiem received a question concerning the role of temperature profiles in improving well analysis. He supported their application and explained that, "Understanding the temperature profile is a key point to understanding the contribution of each part of your reservoir. Since the technology is already available, you should take advantage of it and use it."

Powered Dump Flood

The third session was dedicated to "Enhanced Oil Production Using Powered Dump Flood," as presented by BHGE's Artificial Lift Regional Sales Manager, Walid Abdelrahman, who focused on how Powered Dump Flood adds value, through its minimal environmental impact, higher production, enhanced reliability and economic gains. Conventional water flood was ruled out on account of limited productivity and negative agricultural impact. "Installing a Dump Flood ESP with in a dual injection completion has saved [an unspecified] client over $70,000 per month," Abdelrahman said. Moreover, he explained that reservoir characteristics change from time to time. He stressed the importance of knowing the root cause of the failure – and to design the pump to fit its purpose.

In addition to powered injection, the six Powered Dump Flood systems running so far have demonstrated their capability to increase oil recovery. "The cost savings are plus or minus $ 2 million per year, per field," he noted.

Following his presentation, Abdelrahman received a question during the breakout session querying how Powered Dump Flood could help Egypt meet the targets of its Modernization Program. "Boost the production, enhance the well life, and minimize the cost per barrel – those are the aspects we are looking for," he explained. "At the end of the day, the discussions we had will bring us insights on two things: The possibility of the cost per barrel being down, which will encourage new investments, and the life-increase of the equipment." Abdelrahman projected that, "…if [the companies] put those actions into a timeline, I believe by the middle of the year, or the third quarter, we would be able to make a change."

Recovering oil and increasing production is becoming more difficult at a time when oil fields are declining. Effective techniques used to extract more oil from mature fields are hence crucial. Commenting on the three presentations, multiple attendees mentioned that cost-effective reservoir monitoring is essential to make well-informed field-development decisions, mitigate project risks and meet production targets.

"[These were] very interesting and strong presentations. All three were novel applications [representing] new concepts brought together with valued cases to rise. I think there is a lot of interest from the attendees and a lot of feedback to be received. Excellent session," Ismail El Kholy, Strategic Projects Director at Schlumberger and one of EOG's Technical Committee members summarized

Designing Impactful Exploration and Development

With well optimization being specified as a major step in the country's path toward production increase and cost reduction, representatives from key industry players shared their successful stories in a workshop dedicated to "Impactful Exploration and Development."

21st Century Egypt E&P

In her presentation, Rand Al-Obaidy, Senior Petroleum Engineer and North Africa BD Manager at Gaffney Cline & Associates (GCA), suggested several solutions for increased oil production in Egypt. Her approach was to first review already existing wells and then apply various methods and techniques to increase their productivity. Al-Obaidy discussed several successful cases in-depth, including reviving the Amal field in the Gulf of Suez (GOS).

Oil asset managers were encouraged by Al-Obaidy to "listen" to existing wells, emphasizing that reviewing and reinterpreting them is the first step to increased productivity. "If we do nothing, we will continue with the natural declining of the field and it will dry up. However, if we invest, we could actually increase our enhanced oil recovery (EOR)," she stated.

Al-Obaidy stressed the importance of initiating this process now, so as to benefit both from the recent increase in oil production and the current low production cost in Egypt. "I will be confidently saying from all the projects I have worked on that Egypt definitely sets in the lower [ranking] of the cost per barrel," she said, adding that GCA benefits significantly from this.

Sour gas reserves, especially the ones at GOS, represent another potential to increase production in Egypt, Al-Obaidy stated. As a senior petroleum engineer, she described the existing facilities at GOS as world class "I am not just saying that myself, but I went with facilities engineers and they were really impressed," she explained.

Regarding the challenges in well optimization, Al-Obaidy disclosed that the country faces imaging-related challenges, especially in the GOS. Yet, overcoming this problem is both rewarding and doable. "Recently, one of the clients we worked with reprocessed, reimaged and then reinterpreted the size that they have in GOS assets and, as a direct result from that, they are currently reviewing nine prospects – and of course this will be translated into more production," Al-Obaidy explained.

Production from Yakout Shale

In a similar vein, the following presentation highlighted another aspect of the importance of re-exploring and re-studying already existing wells. Ahmed Essa, Geographical Operation Section Head of Agiba Petroleum Company, showed that reviving mature wells lead to uncovering new production opportunities.

Essa introduced the case of Agiba's increased production in the Meleiha area through revisiting the Yakout Shale. He announced that, due to this recent study, the production of Agiba's reservoir at Rosa North 4 in the Yakout Shale in Katatba will be stabilized at 3300 b/d.

The discovery of the Yakout shale formations in the Meleiha area and the increased production from the formation were another valuable example of exploration and production (E&P) improvement. When it was first tested, Agiba's team overcame numerous challenges before initiating production from the shale, including the area's porosity and seismic resolution, said Essa. "Measuring the seismic resolution to exactly detect the extension of the revoir was the main risk for us, because its seismic survey is very low."

Essa summarized his presentation by emphasizing how the production from the Yakout Shale has been a turning point for Agiba and added that this specific case shows how even fields that are considered non-promising can increase production if restudied.

Unlocking Bypassed Oil

The third presentation was lead by Mostafa Mamdouh, Senior Reservoir Engineer at the Gulf of Suez Petroleum Company (GUPCO), who highlighted the importance of bypassed oil in mature fields. He also spoke highly of the productive value of combining engineering and geological data and discussed, cost reduction through rigless work. GUPCO's development process carried out in the Belayim area was a perfect example of following these previously mentioned approaches.

"In such a high recovery factor of Belayim and such high performance reaching the red line of high water cap, it is not that easy to deliver new opportunities in that field," Mamdouh said. He added that water injection in Belayim has been conducted for around 40 years, which reduced the field's potential. Yet, positive results from GUPCO's work at this field prove it is indeed possible to increase the productivity of mature reservoirs.

GUPCO's team started operations at the southern part (B1) of Belayim, with lesser quality of sand, since it would be less affected by water injection. The team further tested three wells and managed to get 700 b/d from the first tested well, 500 b/d from the second, and 300 b/d from the third.

Mamdouh concluded his presentation stating that there is always a way to maximize oil productivity by following a robust integrated approach.

The Propelling Impact of Natural Gas Growth

On the second day of the Upstream Technical Convention, Deputy Reservoir General Manager and Board Member of Petrobel, and Santo Giannone, Deputy Exploration Manager at Petrosilah, James Pendergrass, chaired the final technical workshop dedicated to natural gas growth. The workshop commenced with Wood Mackenzie's trace of Egypt's natural gas history and was then followed by three more success stories from natural gas fields and unconventional fields that were presented by SDX and Shell, respectively.

Natural Gas Growth Story

Research Associate at Wood Mackenzie, Stephen Fullerton, has tracked Egypt's natural gas path and forecasted the upcoming years for the natural gas industry. "The Egyptian gas market really has gone through transformations in the past few years," Fullerton highlighted in his presentation, as he examined the challenges faced by the gas market and previewed endeavors to address said obstacles.

"Over the studied period of 2008 through 2016, Egypt only discovered that more natural gas resources were produced in two of the years [2008 and 2015]," Fullerton explained during his presentation; stressing the significance of this fact he further added "these gas discoveries helped keep up production rates and drive Egypt forward."

The session moved on to highlight how the natural gas resources landscape has evolved over the years. Fullerton cited Wood Mackenzie's data for discoveries and production specifically between 2009 and 2012, pointing out that during this period, "Egypt only discovered a third of the resource that it produces, which was a real concern and has been addressed going forward. The reason this happened was because easy gas had been discovered. So, companies were having to focus on higher cost exploration, and this, at the time, was not as attractive as the gas prices that they were receiving, for their gas [volume discovered] was reasonably low. There is a buildup of arrears [that the Egyptian government owed IOCs] and a general idea that Egypt wasn't viewed as an attractive place to invest capital," he said. However, new laws issued to help protect contractors – for example the new gas market regulating law – and new discoveries that have recently surfaced in areas including West Nile Delta, Nooros and Zohr, have "transformed the Egyptian gas market" and Egypt has thus grown to become an increasingly attractive market.

In recent time, Egypt has grappled with increasing arrears for oil and gas companies. Yet, simultaneously, Egypt has also been developing natural gas, especially as the sector has seen significant payments issued from the Egyptian oil sector to IOCs in the past months alone. "Wood Mackenzie anticipates arrears continuing to fall and [that they] would be paid off by mid-2019, in line with the IMF agreements," Fullerton pointed out.

With its location among numerous prominent natural gas fields and LNG facilities, Fullerton viewed Egypt as a potential natural gas regional trading hub. "Egypt would appear the most logical destination for gas from fields like Aphrodite, Calypso, Leviathan and Tamar, either into the domestic market or into the LNG facilities to be exported," he said.

SDX Route to Natural Gas from South Disouq

The first presentation of the workshop focused on SDX strategy and activities towards achieving the natural gas discovery and early production in South Disouq concession, leading to a further exploration of its potential. The session was presented by Stephan Jackson, Senior Staff Geophysicist at SDX Energy.

In April 2017, SDX Energy announced natural gas finds at the concession, where it both operates and holds a 55% equity interest. Jackson, highlighted that the South Disouq concession was already producing; however, by adopting innovative forces in drilling new wells, the company was able to strike natural gas in the Abu Madi field.

Throughout the presentation, Jackson stressed that by means of "…successful exploration programs, [the] agility of small, well-funded operators and a pioneering attitude to exploration, the company can unlock significant natural gas resources."

"Our experience in South Disouq shows that a company can take an area where people have drilled wells before and, just by applying a tiny bit of innovative force, [the company] can come up with a new exploration concept in that area," Jackson told Egypt Oil & Gas on the sideline of the workshop, adding that SDX' stands as an, "…example of how thinking slightly differently can bring success."

Shell's Unconventional Natural Gas Appraisal in Egypt

Despite the increasing natural gas discoveries and the widely held belief that Egypt can be reach self-sufficiency before the end of 2018, Shell has been exploring unconventional natural gas resources within the country's borders.

Reservoir Engineer at Shell Egypt, Amr Zaher, presented during the workshop a session on the unconventional natural gas appraisals in Shell Egypt's portfolio, highlighting the Apollonia reservoir as an example of an unconventional opportunity.

The main drive for Shell to address unconventional resources is that "the natural gas market has opened up and the new gas law is out, so if a company has the right opportunity and a cost-effective strategy, then it definitely has a chance to succeed," Zaher explained.

Part of Zaher's presentation revolved around showcasing the Apollonia unconventional reservoir, which is characterized as a carbonate reservoir, and consists mainly of low permeability limestone and high-porosity soft chalky.

"The reservoir is already producing. It is close to infrastructure and facilities and there are large amounts of gas in place," Zaher said commenting on what he considers to be the key drivers of the reservoir. Meanwhile, the challenges faced by Shell in operating Apollonia included the "…chalky [nature of the] reservoir." Zaher also pointed out that, "It is very thin and poor in terms of vertical connectivity. It has a thick transition zone and the water produced is very high."

At first, the operating companies tried vertical fracs for the Apollonia reservoir, but it was proved that, "Vertical well performance does not justify economic full field development even with stimulation." Thus, firms resorted to, "…horizontal wells with multi-stage hydraulic frac, which resulted into much better sustainable relatively higher gas rates compared to the stimulated vertical wells," Zaher stated.

Addressing Reservoir Uncertainties

Shell Egypt has adopted an integrated methodology in recognizing and handling the uncertainties in its fields' operations. Reservoir Engineer at Shell Egypt, Mostafa Abdelkhalek, gave the concluding presentation of the "Natural Gas Growth Story" workshop, presenting the company's approach in addressing the BTE natural gas discovery.

Shell's approach included "…Statistical Risk Analysis (SRA), which can be used to analyze and quantify the risk associated to any kind of problem or business," Abdelkhalek pointed out. "In BTE study, SRA was used with Monte Carlo simulation to pinpoint all the possible outcomes of gas recovery." The approach further encompassed, "…Material Balance Equation [MBE], which has been recognized as one of the basic tools for interpreting and predicting reservoir performance," according to Abdelkhalek.

In order to transfer data from SRA into MBE, the company required the use of a programming language. "The experimental design model is created to assess all the possible scenarios of different uncertainties," Abdelkhalek concluded, explaining that it is a "…fast and easy model to use."

The propelling potential of the natural gas industry, highlighted through these sessions, has shown that the industry is well on its way to further enhance production and surpass a state of self-sufficiency.

PEOPLE ORIENTED PROGRAMS

In line with the fruitful discussions on ways of enhancing young professionals' skills and integrating them to the market, the Upstream Technical Convention was concluded with the "People Oriented" workshop, which brought a series of presentations displaying people development initiatives in Egypt.

Shell's NXplorer

In the first presentation, Nashwa Saleh, Social Investment Manager at Shell, introduced Shell's NXplorer, a unique program to help prepare future leaders for a complex and interconnected world. The program equips participants with tools and skills to embrace complexity, empowers participants to create a positive change in themselves, locally and globally, and unlocks the STEM Habits of Mind.

"What we have identified at Shell is that globally, young professionals are lacking what we call STEAM Habits of Mind," Saleh explained. According to her, the concept consists of creative problem solving, improvising, adapting, systems thinking, problem finding and visualizing.

During three- to five-day workshops, trained facilitators work with participants in finding solutions to real world challenges that are relevant to themselves and their communities. Through the program, participants select the issue, learn and apply "NXThinking" to help create ideas and "NXTools" to create future scenarios. Participants continue to develop the project over four to 12 months.

"What we learn with pleasure, we never forget. It was a joyful, interesting experience. It made me be creative and think out of the box, changing the ways I think when facing a problem," Fatma Sherif, an NXplorer former participant, commented.

Schlumberger's Technician Development Training Program

As Schlumberger identified the need to increasingly integrate blue-collar labor, the second presentation, presented by Heba Abaza, Training Program Manager at Schlumberger, gave attendees the chance to have a closer look at the company's Technician Development Training Program, which was designed to bridge the gap between formal university education and the demands of the current labor market.

The program looks at empowering participants to discover their capabilities, strengths and weaknesses to better establish and work toward their career goals, helping reduce unemployment rates. Additionally, Schlumberger aims to build a strong database of qualified technicians to help serve the oil and gas industry, extending its support to multiple industries around Egypt and supporting the country's vision of growth. "We usually make group interviews with around 30 participants in each group. Once they are selected, they start their training program," Abaza, stated.

Applicants of up to 25 years of age are considered, and the program is divided in six phases. "They start with a six-week soft skills training. After they finish the six weeks, they move on to phase two, consisting of safety trainings that all of us Schlumberger employees go through when joining the company," Abaza added. Phase three consists of a five-week job training at the company's bases, and phase four concludes the program with a debrief and recap. "They also attend something called 'Train the Trainer' to pass the knowledge they gained."

Subsea Development Program

Under the umbrella of the Modernization Program, the third presentation, conducted by Randi Banna, Subsea Engineer at Oil & Gas Skills (OGS), introduced the Ministry of Petroleum's Subsea Development Program. In its class component, "…the program will cover all the main aspects of the Subsea engineering delivery scope of work, as well as the operational requirements for the life field," Banna disclosed. In its practical component, it will offer a rotational program to work in local fabrication shops for three to four weeks per group. Overseas, participants will visit supplier-manufacturing facilities over the course of two weeks, in addition to trips to ongoing projects in collaboration with Subsea installation companies operating on Egyptian projects.

Potential partners consist of international universities, as well as international and local companies. Banna explained that since many international universities developed master programs in petroleum engineering, this creates numerous partnership opportunities between international and local companies and international universities.

Zohr Training Project

Another initiative within the Modernization Program is the Zohr Training Project (ZTP), which was presented by Ahmed Yousry El-Sharkawy, ZTP's Technical Manager, on the fourth presentation within the "People Oriented" workshop. The project represents an opportunity to provide a role model in the development of human resources, El-Sharkawy stated. "It was sanctioned in October 2016 by Petrobel to ensure the availability of skilled and competent staff for the safest operations of Zohr gas plant."

The program is designed and operated by OGS in cooperation with Eni Corporate University (ECU), under the supervision of Petrobel. It consists in health, security, and environment (HSE) mandatory training, tailored training path for skilled Petrobel staff, and competence based training path for Zohr qualified trainees.

For example, the tailored training path for skilled Petrobel staff consists of a specific training addressed to 125 selected participants to enhance their existing competencies in order to operate Zohr new process units and technology. El-Shakawy's presentation on Zohr Training Project closed the "People Oriented" workshop.

THE DAWN OF A NEW ERA

An Interview with Rami Qasem President & CEO of MENAT & India at BHGE

By Nadine Abou el Atta

As Egypt's hydrocarbon industry enters a new dawn of promised prosperity, the question still remains about the perception of the private sector. In efforts to understand how global players view the local market in terms of potential and performance, Egypt oil & Gas sat with Rami Qasem, the President and Chief Executive Officer for the MENAT & India region at BHGE.

The interview began by highlighting the company's edge in light of its new orientation. Last year, Baker Hughes and GE's oil and gas business have successfully combined to form Baker Hughes, a GE company (BHGE). The company is the first and only company to bring together industry-leading equipment, services, and digital solutions across the entire spectrum of oil and gas development - from upstream, to midstream, to downstream.

"By drawing from GE's technology expertise and the capabilities of Baker Hughes in oilfield services, BHGE is able to provide best-in-class physical and digital technology solutions to drive customer productivity," Qasem highlighted. He went on to add: "This is a breakthrough for the service industry due to our unique offering and differentiating technology. With operations in over 120 countries, BHGE's global scale, local know-how and commitment to service continues to be a leading force in the industry."

What can you tell us about BHGE's future plans of expansion in Egypt?

BHGE has always been a key partner to Egypt's oil and gas sector. Our presence dates back to the early 1900s when we were part of the country's first oil discovery. Egypt holds some of the world's largest oil discoveries and as the world's only fullstream company we have a major role to play in the development of its natural resources.

We currently have a workforce of over 600 in-country and continue to increase our local capabilities through our engagement in large-scale projects that are driving further local impact. Most recently BHGE was awarded with a major contract for subsea oilfield equipment for phase 2 of the giant Zohr gas field offshore Egypt, we will provide project management, engineering procurement, fabrication, construction, testing and transportation of a subsea production system.

The award underlines the global scope and breadth of BHGE's fullstream portfolio and local capabilities, with engineering support for the project coming from the UK, Italy and Norway. The steel structures will be manufactured in Alexandria, supporting local employment in Egypt, as well as the UK, Norway and Italy. Project management services will also be supported from Egypt and from the UK.

Leveraging decades of expertise in-country and growing its local manufacturing ecosystem, BHGE is committed to helping secure Egypt's energy future through the development of local talent and efficiency-driven solutions.

How does the company's technology and strengths affect its market share and presence in the industry?

In today's oil and gas industry, innovation is paramount to staying ahead, especially when it comes to expensive offshore operations. We are continuously looking for ways to increase the industry's access to new technologies and strengthen operational efficiencies.

Collaboration and partnership are key components to our success. We are working closely with our E&P customers to co-create new solutions that can increase efficiency, optimize production and improve ultimate recovery.

In Egypt, BHGE is helping customers develop energy reserves with latest technologies at a cost-effective manner and in a safe and compliant environment which has positioned us as the best-in-class company in providing complex technology solutions in the most efficient way.

How does Egypt compare to other countries BHGE operates in, in terms of growth prospects, potential market share, and general outlook?

With Egypt being the largest non-OPEC oil producer in Africa and the second-largest dry natural gas producer on the continent, BHGE fully understands the strategic role of Egypt in Africa and the Middle East region. Oil and gas is one of the most dynamic industries in Egypt, and hydrocarbon production is by far the largest single industrial activity, representing approximately 1% of Egypt's GDP.

The Egyptian government encourages international oil companies (IOC) to participate in the oil and gas sector, and currently more than 50 IOCs are operating in Egypt.

We have been a major player and partner in the industry throughout the full cycle for decades and we continue to invest in our people and technology to support the demands of our customers in the country.

BGHE has been focused on localization and in-country value programs, can you elaborate on the company's approach and philosophy in this regard?

Localization is transforming how producers and oil services companies are operating around the world. Increasingly, value-add is generated in the same country where the hydrocarbon resource is based. BHGE has been an early proponent of localization, realizing the win-win benefits it brings to both BHGE and the local markets it serves.

In Egypt, we are partnering with Petrojet, a leading EPC services provider, to locally manufacture API Certified Sucker Rod pumping units. The units have been fabricated and assembled in Petrojet's workshop in Idku, Alexandria. Petrojet is considered the first partner for GE Well Performance Services (WPS) outside the United States for building surface-well pumps that have served oil fields in Egypt, the region and Europe. To date, more than 1,170 units have been assembled in Egypt.

Moreover, our industry has grown significantly across the globe, and it makes it more compelling from a commercial and sustainability point of view to locate more of the manufacturing, training and repair operations in the markets that we are invested in. For instance our Drill Bit Manufacturing Plant in Saudi Arabia is producing polycrystalline diamond compact (PDC) bits that are made entirely in the Kingdom. We now export these "Made in Saudi" bits to over 40 countries, which is helping create jobs and boost the local supply chain ecosystem.

Being closer to our customers has always been an important part of our strategy and we take pride in our growing regional footprint as well as commitment to technology transfer, working to raise manufacturing standards across the local supply chain, and creating new, higher-skilled jobs for the local workforce.

How do you see Zohr's impact on the industry and the Egyptian economy?

Zohr which is the largest natural gas field ever discovered in the Mediterranean was discovered by Eni in August of 2015. With a potential of 850 billion cubic meters of gas in place, not only will Zohr be able to satisfy almost all the total domestic gas demand for the coming decades, but it will also allow Egypt to return to being an energy exporter.

With this discovery, the Zohr gas field will help strengthen Egypt's energy ecosystem by creating a gas surplus to support the growth witnessed across sectors as well as drive economic and industrial development in the longer term.

Generally speaking, how can the private sector positively impact the local petroleum industry and economic welfare?

The private sector already plays an integral role in the economy, providing the lion's share of employment. In my opinion, there is significant potential for private sector investment to meet the country's growing demand for energy and fostering a dynamic economy. There is also ample scope for the private sector to address skills mismatch challenges, and enhance training.

Egypt is a country rich in young, talented human capital, therefore we are always keen to promote localization and to create job opportunities to leverage their skills to better serve the market. We continue to invest in the workforce of the country, for example we have the Field Engineers' Lead Program which develops and invests in talented petroleum engineers through learning and international assignments. Additionally, we are looking for partnerships to help build local supply chains, which in turn help build capabilities, create jobs and positive economic returns.

Ensuring a predictable and attractive investment climate would help attract significant foreign direct investment and better utilization of the country's oil and gas resource base. In the longer term, Egypt faces the challenge of transitioning to a more environmentally sustainable economic model. A range of energy efficiency and renewable investments are already financially viable under current conditions in the industrial, commercial, and residential sectors, especially if accompanied by more coherent regulation and better monitoring and enforcement.

IN THE TIMES OF PROMISES AND CHALLENGES

An Interview with Paul Dixon, Global Business Development Director and General Manager for ODENA

By Nadine Abou el Atta

Exploring the side of international service companies in the local equation has often unveiled a series of unique experiences. Given the journey the Egyptian hydrocarbon market has embarked on in the last decade, from turbulences to a celebrated upwards trajectory, service companies have continued to ride the tide with stride. Egypt Oil & Gas sat with Paul Dixon, Global Business Development Director and General Manager for ODE North Africa to explore the company's view on the local market and their plans of growth in the times of promises.

How would you define ODE's competitive edge? And how does ODE's technology and services separate you from competition?

ODE is part of a larger group, DORiS Engineering, and as such we have the depth of international experience in both oil and gas as well as renewable energy. This allows us to tap in the expertise that reside in both the UK and Paris offices, as well as other centers around the world should we need to. In terms of what differentiates us, I think brownfield engineering is a core business for us. Our abilities are well recognized in this area. Furthermore, we are unique as a company in size, as we actually operate natural gas production facilities in the Southern Northern Sea in the United Kingdom. The expertise gained from operating these particular assets gives us a greater understanding, I think, with issues relating to asset integrity, production, operations, and maintenance.

We have established a reputation to be known for quality and delivery on schedule, and we get repeat business as a consequence of that. Moreover, we take a flexible approach of how we work with our clients; rather that tell them this is the only way we execute a solution, we look for alternative ways. We try to understand what it is they really need and really want. Our focus is to try and develop a unique, fit for purpose, and cost effective solution. This is quite interesting for us, as it means that the engineers have to think laterally.

What is ODE's growth plan in Egypt for the coming five years?

Our commitment to Egypt is long-term; we have already been here ten years. ODE North Africa was established in April 2008, and this year we are about to celebrate our ten year anniversary.

We have seen some interesting times in those ten years, from changes in how the country runs to the global oil crisis. However, we are now firmly established and thus we have seen a continued year on year growth and expansion.

Within ODE , this office here in Cairo is recognized as a center of excellence for specialist modeling, analytical work, and simulation related work. We are looking now to expand our capabilities as the global oil and gas industry reemerges from its downturn.

Separately, we are developing the engineering center we have here to become a hub, and the intent is that this hub serves the wider MENA region. In parallel, we are developing the Cairo office to be what is called "a high value engineering center" to serve international projects for the ODE/DORiS group. I think that is very exciting.

Furthermore, we are working on securing more offshore development projects, particularly in the Mediterranean area. We recently began providing an asset integrity consultancy service here in Egypt, building on the knowledge and capabilities we have in terms of asset integrity for offshore production facilities. This is in line with a key focus for us in the coming period, which is to grow and expand our capability to serve existing facilities.

Given that you are celebrating your tenth anniversary, if you would choose one main highlight to note, what would that be?

I think that we have been recognized by both the International Oil Companies (IOCs) and Joint Ventures (JVs) as an engineering house that provides a quality engineering service. For me, that is very important. It is about getting the quality right and on-time delivery. It is about long-term relationships.

ODE has an extensive record in Brownfield activity, in your opinion how can Brownfield technology impact crude oil in Egypt? And what is the economic impact of boosting investment in Brownfield technology?

Brownfield means all sorts of things to different people and different businesses. For us, Brownfield revolves around the existing infrastructure, working with and developing that infrastructure to get the best possible return on its investment.

Egypt as a country has made significant investments in its existing oil and gas infrastructure. It has been developed piece by piece, project by project, expanded and built upon; therefore, there needs to be a maximum return on that investment. By return I mean we need to bring as much hydrocarbons through those assets as possible. To achieve that, for us as a company, means maintaining the assets' integrity. The investment has been made, however, you can't just leave it there you have to execute upgrades, modifications, and day to day maintenance to sustain the integrity of each asset. If you maintain the integrity of that asset you see a continuity of production and a better return on investment.

What are the local challenges faced in this regards?

Egypt does have a challenge in introducing technology to improve the way an asset might operate and develop. By introducing technology, quite often there is a trade-off, which is loss of jobs. We can look at items such as minimum facility platforms, automation facilities, and remote diagnostics; however, there is a balance to be made. Egypt needs to have jobs for the population, while at the same time investing in the future. This means that it is not always appropriate to invest in full aspects of automation in technology; it is just as important to maintain jobs for the population. Furthermore, I think that this is a challenging trade-off that needs to be addressed by the industry going forward in the coming period.

In your opinion, which is macro-economically higher in value, the return from enhanced production resulting from the development of automation or having a sort-of glass ceiling and shifting more attention to developing the human element?

I think they go hand in hand. If you introduce automation and new technology, for it to become appropriate, you need to up-skill your workforce. They need to be able to understand it, maintain it, operate it, and develop it going forward.

Through your experience, what needs to be done both from the side of IOCs and from the government front to enhance the level of usage of Brownfield technology?

I think the IOCs do have a key role within the whole spectrum of Egypt's oil and gas sector. The first thing to address is extending a field's life, and a key way to achieve that is through the reduction of operating costs. In other words, taking costs out of the situation, removing any unnecessary expenses, whether it is from an administrative burden, operations, or even if it is from the actual technology used in that particular asset.

It may be more beneficial to change a piece of equipment for something that requires less maintenance and has a lower operating life-cost. I think that another area to look at in terms of cost-effective solutions is fast tracking projects, if the project drivers are all aligned and there is a real intent to bring projects through on a fast-track basis then you are actually seeing a return for that investment much quicker. The challenge is getting the approvals and all various processes lined up to have a fast-track project. When I look at the Zohr project for example, it followed a very fast-tracked approach, with successful delivery.

If the IOCs and JVs, develop projects in unique and fast-tracked methods, there is an opportunity to show to the global industry these alternative practices, which in turn raises the profile of Egypt as a country as well.

In terms of the government however, I would say straightaway, that we as a company recognize that President Al Sisi, the Ministry of Petroleum, EGPC, and EGAS are promoting major changes across the industry to resolve a whole range of issues. I think, however, that there always has to be stability within a market to promote investment, and brownfield as an investment is exactly the same. This means that

there has to be visible support from state bodies to encourage private companies to continue to invest and develop existing assets; in addition to exploring any and all means possible of increasing productivity from said assets. Whether there are financial incentives to do so, that is not for me say. However, in other regions there are considerations for Brownfields, such as lowering taxation on profitability.

One of ODE's strengths is offering cost-effective solutions, in times of volatile crude prices, how would cost-efficiency practices impact the performance of the sector both on the front of IOCs welfare and in terms of overall market welfare?

Overall, I think it is about looking at cost and how you can reduce cost. The oil and gas industry is generally very conservative in terms of using new approaches or new technologies or even the re-use of equipment as well. We have run a number of projects both here in Egypt and internationally where we have reused facilities that have already done their time in terms of producing at a particular field, and we re-engineered the components to have a new extended life serving another location. I think there should be more consideration given to this approach.

Why do you think the market is conservative towards this approach?

I don't think it is just the market in Egypt, I think it is an issue in the global market in general. Generally, there has been a tendency to develop bespoke solutions for a particular development.

In terms of macroeconomic impact, especially regarding investment influx, how can cost-effectiveness shape the market?

I think you would see more challenging developments being brought to the market far quicker; and given the speed there would be more natural gas and more crude oil, thus benefiting Egypt's economy. I think it is as simple as that.

Here in Egypt, certainly the cost of producing from onshore assets is relatively low compared to many other regions. This was one of the main reasons why the country continued to see projects going forward despite the global downturn, adding to that the growing local demand and the need to keep up with it.

What about investment influx?

There has been a degree of let's say apparent slowdown in the investment in some project developments, probably due to the problem in payment of receivables, which has been improved quite considerably, and consequently the IOCs that have been impacted are considering their investment positions, and are re-investing in new developments.

In your opinion, what are the main challenges facing service companies in Egypt? And what steps are needed from both the Ministry and IOCs to address these issues?

As I said earlier, we recognize how the Government is pushing forward in terms of changes, and how those changes have impacted the industry. In addition, Egypt encourages companies like ODE to invest into the sector, which I think is very important. What we need now is the stability that we see across the country to continue.

Furthermore, I think there needs to be a greater willingness by some of the JVs to engage with independent contractors, rather than just the reliance on state organizations. State-owned companies are very competent and they have real capabilities, however, there are other independent companies that offer parallel solutions as well.

Another challenge would be the length of time for payment, coupled with the difficulty there has been in receiving an element of payment in foreign currency as well. That is changing, yet, it has been exceptionally difficult in the last few years.

Additionally, the level of bureaucracy in terms of paperwork, administration, registration, documentation, and resubmission of documentation presents a challenge as well. There has to be a change in the way that we work as an industry to remove unnecessary administrative burden that in turn would help streamline everything and reduce cost as well.

Through your experience, what steps are needed to enhance the efficiency of upstream operations?

Simply, reducing the overall time from the evaluation phase to the realization of the project. A lot of these projects should and could be done a lot quicker. I think a contributing issue here is centralization. The people within the project organization , they have a budget, they have a project but they still have to refer any significant decisions back through senior channels. If those aspects could be streamlined, many projects would be realized a lot faster.

Finally, how does Egypt compare to other markets ODE operates in?

Egypt is what we would call a mature market, yet it is one with an exciting future. It still has large volumes of untapped hydrocarbons; while in other mature regions we are seeing a contraction. The country has got a strong mix of onshore and offshore opportunities. In addition, I think the fact that Egypt remained relatively buoyant during the global downturn has been quite unique.

We see Egypt as a very exciting place going forward.

Fruitful Land for Private Investment

An Interview with Ali Rashid Al Jarwan, Dragon Oil's CEO

By Mariana Somensi

The private sector represents a solid ground in Egypt's economic path. Given its remarkable presence, the oil and gas industry has built key partnerships for private investment and has invited prominent international oil companies (IOCs) to build the foundations of its prosperous energy market. The welcoming environment recently encouraged the privately held and wholly owned subsidiary of Emirates National Oil Company (ENOC), Dragon Oil, to bet its cards in the Egyptian resources.

Dragon Oil has successful exploration and production (E&P) operations in Africa and Asia. The company operates in Turkmenistan, Iraq, Algeria, Tunisia and Egypt, both in the oil and gas sectors. Egypt Oil & Gas sat with Ali Rashid Al Jarwan, the company's CEO, and discussed Dragon Oil's operations and aspirations for exploration, development, and production in the Egyptian oil and gas domains.

Current Operations

The interview began with a brief overview of the company's activities and expectations in Egypt. Dragon Oil fully owns the East Zeit Bay offshore concession, located southern the Gulf of Suez. The concession covers an area of 93 square kilometers and lies in shallow waters ranging in depth from 10 to 40 meters. "We are in the process of starting high resolution 2D seismic and our commitment is to drill two wells," Al Jarwan disclosed. "We still have to explore, and although we do not expect a major discovery, we hope that we come out with a discovery good enough for us to expand," he added.

Expansion Goals

When asked about what attracts Dragon Oil to Egypt, Al Jarwan affirmed that the company sees the country as prospective for the future of oil and gas. "Egypt is really diversified in terms of natural resources, and we would like to stay. We need the government's guidance and we look at being a good partner, assessing technicalities, geology, and prospects, in order to build something that contributes to the economy of Egypt."

East Zeit Bay is the company's initial entry in the Egyptian market and Dragon Oil looks forward to be involved in future rounds of bidding. "Onshore, we are interested in the Western Desert; so we will be involved in the new offers of the government in the area," he disclosed.

In order to strengthen the company's operations in Egypt, Al Jarwan highlighted the government's role in facilitating the private participation in the oil and gas sector. "Previously, our challenge [in Egypt] consisted of mobilizing resources, as well as some approvals that took a long time. However, we appreciate the government's aspiration to do things quickly and with less routine, which helps us. It is a combination of our efforts and the government's."

Market Advantages

Moving on, Egypt Oil & Gas asked about the advantages Dragon Oil brings to overcome the highly competitive market. "Now we are going through a transformation to improve our capabilities, so we have world-class expertise, exploration, reservoir development, drilling, and project management," the CEO answered. He further explained that Dragon Oil has become a cost-effective company, which, as a commercial enterprise, looks at increasing its profit making. "Since we were established on commercial bases, profitability is a key factor and driver for us. Our company's character relies on agility, so we go fast to our target with an integrated team. We develop good understanding of the prospect and we manage any challenges we have."

Additionally, the company adopted an Enterprise Risk Management (ERM) framework in 2012 and developed a methodology to reduce and mitigate potential business risks in the execution of the company's strategies. "We have a good risk management developed for each region. Our business risk factors could be technical, where we mobilize our best resources to analyze the problem, or they could be economical. In this case, we manage the economic uncertainty and cost management through innovation," he explained.

Dragon Oil's is a global and innovative company, which is achieved through a diversified team with an international workforce, Al Jarwan pointed out. "It creates a good environment for managing and for challenges. We believe innovation is key to manage challenges, including adequate cost management, always making sure we maintain the profitability." When it comes to innovation, Dragon Oil's Head believes Egypt is a fruitful land. "We are happy to see the professional strength of the Egyptian people. There is a lot of great minds in technology," he stated.

Private Sector Participation

When asked about how the private sector can contribute to the petroleum industry in Egypt, Al Jarwan stressed that "eventually, the private sector will bring sustainable impacts to the flourishing economy." According to him, the Egyptian government has showed encouragement and cooperation with private companies and consistent measures to encourage new partnerships. "Everything starts with collaboration, and we believe that Egypt has the right environment and encouragement to the private sector right now. I believe there is a lot of potential for contributions and economic impact by opening up to private companies like Dragon Oil."

In closing, Al Jarwan reaffirmed the company's commitment to its E&P operations in Egypt. "We aim to improve quality and use innovative technologies to open up and unlock potential for oil production. What we hear from the government is that they are promoting and engaging more serious companies, as Dragon Oil. We are ambitious to explore, produce, make business, and contribute to the Egyptian economy."

IOCs and Investment

An Examination of the Lure of Egypt's Investment Climate

By Mahinaz El Baz

Egypt's exploration and production (E&P) activities are by far one of the most significant sectors activities attracting investments into the country, representing approximately 16% of the country's Gross Domestic Product (GDP), according to the Ministry of Petroleum and Mineral Resources.

The government has already begun a promising economic reform program aiming to reach macro-economic stability and attract extra investments. Therefore, the Ministry of Petroleum and Mineral Resources is taking huge steps to bring in more foreign direct investments (FDI), especially in the upstream sector, as further discoveries are being made.

Among the steps to create a safer and more investment attractive climate for exploration and production international oil companies (IOCs) is the Modernization Program. The program aims to accomplish the country's vision of reaching energy self-sufficiency through a diversified energy mix. Although recent discovery of Zohr field unveiled Egypt's vast reserves of conventional gas, attracting extra foreign investments in the unconventional plays is another angle the government is working on.

The Declining Influence of Arrears

Egypt has been witnessing milestone payments to IOCs during the past few years. In 2012, the country faced the highest foreign debt to IOCs over the past seven years, reaching $8 billion, according to a official figures. One year later, Egypt's then-interim government was trying to handle the daunting task of restoring the petroleum sector. One of the biggest hurdles was the government's debt to IOCs, which decreased to $6.3 billion by the end of the year, yet burdened the country's budget and negatively affected investors' confidence in the sector.

As soon as he took over power, President Abdel Fattah El-Sisi has pledged in several occasions to mitigate those debts, and that the government is "committed" to paying IOCs' arrears.

The ministry was successfully able to ground half of the receivables total down from $6.3 billion in 2013 to around $3.5 billion by the end of 2016, according to a Petroleum Economist. This has been accompanied by well-received moves to speed up decision making over block awards, and a new revised model contract.

At time of press, the government owed IOCs $2.2 billion, according to the Ministry of Finance. It is worth noting that it paid $2.2 billion during June 2017. "It is hard to determine a specific date, but we imagine that if the current rate of payment continues we will be able to reach zero external debt within two years," Egypt's Minister of Petroleum and Mineral Resources, Tarek El Molla stated, according to an official press release.

On the other hand, Egypt faced a sharp decline in investment, following the events of 2011. For instance, natural gas total investments decreased from EGP 54,291.2 Million in the Fiscal Year (FY) 2011/2012 to around EGP 25,509.4 Million in FY 2013/2014, according to Egypt's Ministry of Planning.

Experts argue that this drop was not only due to the state of political unrest and macro-economic fluctuations, but the decline of global oil prices played a role as well. "The decline in investment happened in Egypt and the global market as a whole due to the decrease in oil prices," Diaa Eldin M. Kassem, former Deputy CEO for Production at the Egyptian General Petroleum Corporation (EGPC), told Egypt Oil & Gas earlier in 2017.

Nonetheless, during the past three years, Egypt has signed more than 82 new upstream exploration and production agreements with a minimum commitment of $15.4 billion in investments, according to an official press release.

Despite all local, regional, and international challenges, IOCs' increased their investments in Egypt to $8.1 billion during FY 2016/2017, up 19% from the $6.8 billion invested in FY 2015/2016, El Molla told Reuters.

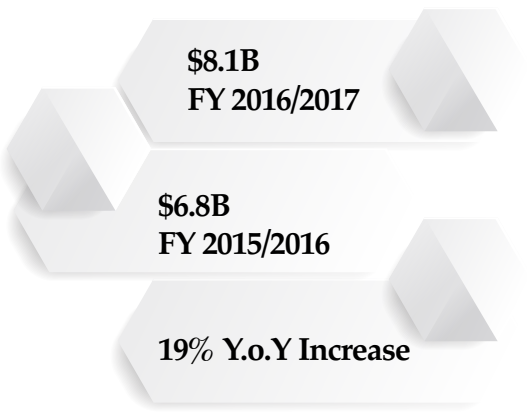
Increasing Investments

In light of decreasing arrears to IOCs, industry experts expect Egypt sector to receive extra FDI flows into the petroleum sector, which will help boost development work and increase production to meet local market's demands of petroleum and natural gas.

"IOCs' investments showed mixed trends whereby large oil majors boosted investment in high-profile offshore gas wells, while most juniors stayed put due to combined effect of low oil prices and accumulation of EGPC arrears up to 2015," Youssef Beshay, Senior Banker at BNP Paribas stated."Those trends have clearly converged in 2017 where we now see full-steam acceleration of upstream investments, due to improved macroeconomic dynamics," he added.

The petroleum ministry is continuing to pay back IOCs in order to attract $10bn worth of investments in 2018, CEO of EGPC Abed Ezz El Regal told Egypt Oil & Gas in May 2017. The Ministry further aims to increase investments to $32 billion within 3 years, after applying the new investment law, which will facilitate Egyptian oil and gas investment process, he added.

IOCs Investments in Egypt



Affirming on Ezz El Regal's announcement, Mohamed Ghanim, Senior Geologist mentioned that "IOCS investments in Egypt during the past 3 years were very good with the huge discovery of Zohr field." Investment flows were pumped into other offshore Mediterranean fields, such as Taurus and Delta fields like Noroos field, in addition to Western Desert fields, he further noted.

"As all know in the sector, IOCs' investments in Egypt's oil and gas sector rose during 2017, which is an excellent sign that we are on the right track, especially that Egypt paid most of its arrears during the past three years," added Ghanim.

Investing in Unconventional Activates

Egypt is currently pursuing a balanced energy mix in order to maintain energy safety and security, reach economic efficiency, and mitigate environmental effects. Therefore, the Ministry of Petroleum and Mineral Resources is focusing on achieving favorable levels of self-sufficiency by using locally produced energy to cover domestic demand levels and ensure that energy reaches various areas within a country. In regard to energy security, it is vital for the government to sustain steady and diverse energy supply levels to ensure a continuous flow of fuel.

Unconventional reservoirs have an opportunity as a great potential player in the future of Egypt's diversified energy mix. It is worth noting that the launch of unconventional exploration in Egypt was marked a few years ago in the identified Apollonia field in the Western Desert.

"While Egypt has good conventional reservoirs, the country is looking at alternative supplements such as unconventional plays to accommodate its growing energy demand and prepare for future energy scenario. […] Egypt does have potential in unconventional oil and gas, and I believe these unconventional resources can play a part in Egypt's energy picture," Apache's Vice President and General Manager, David Chi told Egypt Oil & Gas.

"To reach this goal, it requires the partnership and true cooperation from the government, exploration and production companies, and service providers […] We are ready to share our experience and expertise in making unconventional resource development a reality in Egypt," added Chi.

Furthermore, Apache's input and contribution to Egypt's unconventional resources will not cease, the company will rather build upon the significant inflow of capital it has already poured into unconventional plays with all its trust in the existing potential and its confidence to achieve what previously might have been perceived as unachievable, according to Chi. "Apache is interested to continue its investments in unconventional portion of Egypt's oil and gas industry," which, as Chi puts it, "can be a tremendous opportunity for the country to supplement its growing energy demand in the future."

When asked about his expectations regarding the future of IOCs' investments in Egypt's unconventional fields, Ghanim explained that Egypt has some important unconventional fields such as Apollonia, which is tempting reservoir for investors, in spite of the usual unconventional economic challenges. "Evaluation using high expertise, processes, workflows, and technology are very important solutions for unconventional economic issues since this play is extended from east of the Delta across the Western Desert, Ghanim added.

Challenges vs. Opportunities

Economic experts argue that economic instability and insufficient macro-economic policies are the main challenges facing IOCs in Egypt." IOCs face the macro-economic challenge of over subsidized fuel prices that limit EGPC's ability to generate free cash flow. That challenge is addressed by continued price liberalization under the energy reform program.

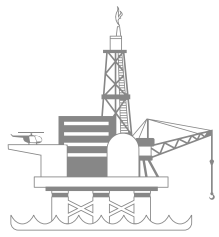
"I see limited political challenges facing IOCs in Egypt compared to other countries in the Middle East and Africa. In fact, Egypt has proven to be 'crisis-proof' for the oil sector despite various internal and external shocks," stated Beshay.

Despite major operational and economic challenges they face, IOCs with interests in Egypt have some cause for comfort in light of newly discovered fields, such as Zohr. For instance, in his meeting with the El Molla in August 2017 to discuss Peronas' projects in Egypt and its future plans, the company's vice president, Adnan Zainal Abidin noted that Egypt has become a country of interest to IOCs, due to recent developments in its oil and gas industry.

"I believe that there are many opportunities for IOCs in Egypt's oil and gas sector, especially in exploring and producing oil and gas from offshore deep water in Mediterranean, onshore Western Desert fields, and Nile Delta fields," said Ghanim "The country has signed 82 exploration and production agreements worth $15.4 billion over the past three years, that will lead to new discoveries and boost oil and gas production and reserves," noted highlighted Ghanim.

He further explained that exploration activities in the Red Sea will pump extra investments into the sector if the currently held seismic surveys to visualize the Red Sea underneath geometry and structures were positive.

In addition, Egypt has plenty of spare capacity in its existing gas pipelines and other infrastructure meant new production costs were competitive. "We find here [Egypt] there has been very competitive costs and operating costs in a context of volatile prices. This is an area where we think we will continue to make investments and develop as opposed to other regions which are higher in cost,"



16% of Egypt's GDP comes from E&P activities

Marc Benayoun, Chief Executive of Italian energy group Edison said, according to Reuters.

British Petroleum (BP) is another key IOC player in the Egyptian hydrocarbon market with its increasing investments. The Company has been present in Egypt for half a century; 2016 bought a 10% stake in Zohr from ENI. It has been actively snapping up license blocks in Egypt's recent exploration rounds as well. "In 2016-2017, we are investing more money in Egypt than any country in the world. We have a lot of confidence in Egypt," Bob Dudley, Chief Executive of BP, said during the event of EGYPS 2017.

One Year ago, major IOCs declared at EGYPS2017 that they plan to increase their investments in Egypt, expecting to find more oil and gas now that ENI's giant Zohr gas discovery has put its Mediterranean waters on the map, according to Reuters.

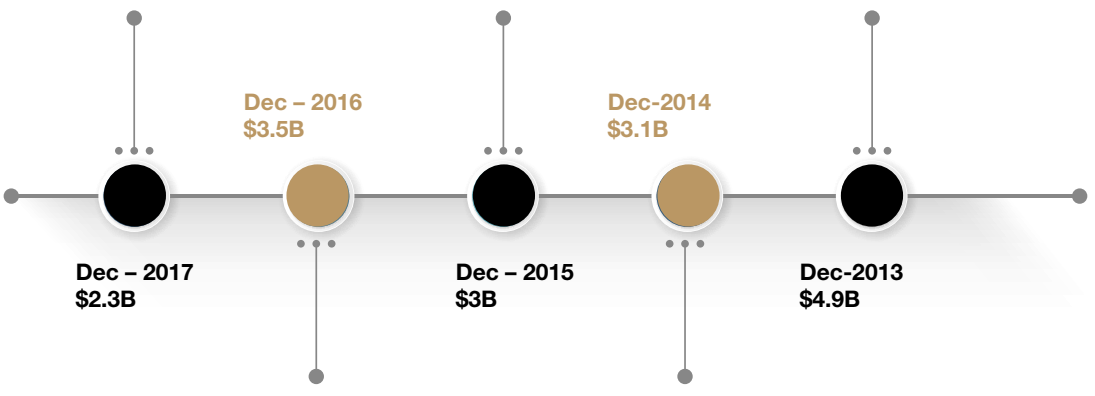
On the other hand, the Egyptian government took serious actions during 2017 to revive investment climate, fix macro-economic mechanisms, and ensure political stability; in order to allow IOCs to easily pump extra investments.

Experts encourage the government to continue with its fruitful efforts. "Certainty rather than reduction of arrears is the key to increasing IOC investments. Upstream investors need certainty on cash flow timing, hence, the government should device a stable mechanism not only to clear current arrears, but also to prevent accumulation of future over dues," noted Beshay.

$15.4B worth of minimum E&P investment commitments were signed in the last three years.

Egypt's hydrocarbon industry is well positioned to benefit from current economic reforms in the light of the growth of the country's natural gas production, which could help drive the Egyptian economy in the future. Moreover, the increase in foreign reserves is supporting investors' confidence, as it improves exchange market stability and therefore reduces exchange risk associated with capital investment decisions.

Arrears to IOCs



The Market Dynamics of Egypt's Petrochemical Industry in the Era of Subsidy Elimination

By Mahinaz El Baz

Egypt's petroleum sector is starting a new era of energy self-sufficiency. The Ministry of Petroleum and Mineral Resources has already announced the first milestone in its ambitious plan by declaring that Egypt will achieve self-sufficiency of natural gas before the end of 2018. As a result, the country is witnessing an expansion in exploration and production (E&P). Although upstream activates drive a great portion of investments in Egypt, looking at the petrochemical industry it is equally essential to reach the goal of transforming the country into a regional energy hub. Furthermore, petrochemicals play an important role in the Egyptian economy and are one of the most dynamic parts of the oil and gas sector.

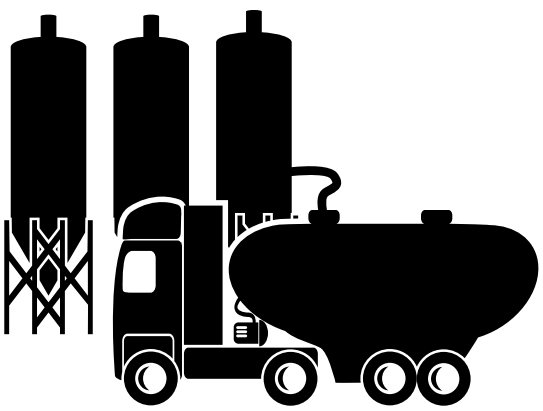
The industry contributes around 3% of the country's gross domestic product (GDP) and 12% of the local industrial production as a whole, according to the General Authority for Investment and Free Zones (GAFI).

Egypt's petrochemical industry witnessed changes that rewrote the future of the industry, most notably the reduction of fuel subsidies. On the other hand, new hydrocarbon findings created a great potential to start new petrochemical projects and raise the capacities of the well-established complexes.

Implications of Energy Subsidies Reform Program

In November 2016, Egypt launched a major economic reform program through a number of fiscal policy and monetary policy decisions. The most powerful decisions included, floating the exchange rate, reducing energy subsidies, issuing new taxes, and increasing interest rates. The petrochemical industry is well positioned to benefit from those economic reforms in addition to the growth of Egypt's natural gas sector. The industry could help drive the Egyptian economy in the future in many ways.

Some industry experts, however, argue that the subsidies cut has an indirect effect on the petrochemical industry, as the cost of producing petrochemicals is depending on more than one factor. "As petrochemical products are priced internationally according to many factors, including supply and demand trends,



12% of local industries are petrochemical.

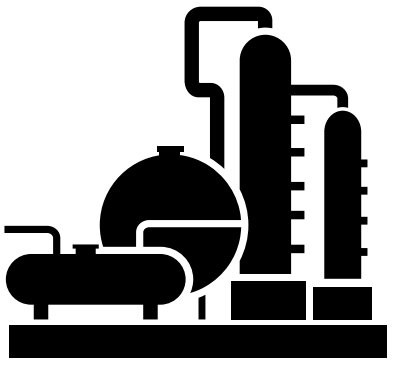
substitutes, and feedstock prices, consequently, domestic subsidies cut will not affect the prices of petrochemical products, yet, it might have an impact on their profitability and some products will not be that profitable," Abeer El Sherbiny, Business Development Engineer, Egyptian Petrochemicals Holding Company (ECHEM) noted. She further explained that if local producers increase prices of their products, then they will not be able to compete with imported less priced petrochemicals products neither in the open Egyptian market, nor in international markets

"As petrochemical products are priced internationally according to many factors, including supply and demand trends, substitutes, and feedstock prices, consequently, domestic subsidies cut will not affect the prices of petrochemical products, yet, it might have an impact on their profitability."

On the contrary, other industry experts believe that the cost of producing petrochemicals is highly dependent on feedstock, thus there will be a direct effect of reducing energy subsidies. "The regions with abundant low cost feedstock have obvious advantage over the regions where the availability of feedstock is limited or closely related to crude oil pricing levels," it was disclosed during the Southwest Process Technology Conference, held in the US. For instance, "Polymers are added value derivatives to natural gas components, which are mainly ethane and propane feedstock. After the subsidies cut, the earnings before interest, taxes, depreciation, and amortization for these derivatives squeezed by 30-40%. Prices of such goods are currently matching international prices as well as the feedstock, on the other hand petrochemical products like those used as fuel and in industry inputs, representing a big load on governmental budget before subsidies cut will be diminished to fade out after complete subsidies cut, hence these improvements will dramatically affect prices of those goods," stated an industry expert in petrochemicals, who requested anonymity.

The Impact of New Gas Discoveries

Though feedstock includes lighter crude-oil products, natural gas is increasingly at the heart of the global petrochemical industry's ability to produce for the components of many products. The natural gas feed stock, a primary factor for the petrochemical industry, is expected to be available in Egypt at competitive prices as gas discoveries have brought online, especially Zohr field. In December 2017, El Molla, announced the start of natural gas production from Egypt's and the Mediterranean's largest offshore field, Zohr, according to an official press release. Zohr's production is considered a milestone in



3% of Egypt's GDP comes from the petrochemical sector.

the history of the natural gas industry and related industries as petrochemical, both globally and in Egypt, especially after adding initial output from Zohr field to the production map in an unprecedented record time, compared to other natural gas discoveries all over the world, El Molla pointed out.

The onshore processing facility will process and pump production from the field into the country's natural gas national grid, with an initial production capacity of 350 million standard cubic feet per day (mscf/d), after the success of operational trials of processing facilities and pipelines. Upon completing the first phase of the project, which is planned in June 2018, the field's output will gradually reach more than 1 billion cubic feet per day (bcf/d) of natural gas, El Molla highlighted, adding that this production will contribute to achieving self-sufficiency of natural gas and

decreasing imports bill. The minister pointed out that Zohr's output will reach 2.7 bcf/d, upon finalizing all phases of the project by the end of 2019.

"The completion of Zohr project phase one will avail the opportunity to utilize excess gas either in Liquefied Natural Gas (LNG) production or in the petrochemical industry, provided that Zohr produces lean gas. The route by which lean gas can be utilized in the petrochemicals sector depends mainly on gas pricing, as some routes cannot be achieved unless a competitive gas price is available," El Sherbiny explained. Therefore, increasing natural gas production and decreasing imports are expected to ease the burden on the country's budget in the light of the energy subsidies cut. Accordingly, the production increase will secure competitive gas price and allow petrochemical industry to expand.

"It depends if the gas from Zohr is Ethane rich or methane rich. In case of the former then we embark on a bigger plan to produce Ethylene and other downstreams such Polyethyline, Polyproplyne , ect. In case of latter then we can produce fertilizers such Ammonia then Urea."

"On the positive side, there are a numerous traditional routes for petrochemicals production using lean gas, such as, Methanol and its derivatives (Acetic Acid, Formaldehyde…etc) and Urea and non-traditional routes such as olefins production via the Gas To Olefins route (GTO). [….] There are nonstop technological efforts to produce chemicals and petrochemicals products directly from lean gas, such as Oxidative Methane Coupling (OCM), however, some of these technologies are not yet commercialized," El Sherbiny added.

To be competitive, petrochemical experts advise that production sites should have easy access to both feedstock and markets. They must be capable of producing the high quality, lighter products that world markets are increasingly demanding. "Zohr is online now, and gradually more gas will be pumped, [yet] without easy access to gas facilities, there will not be any more gas exploitation. The majority of petrochemical plants in Egypt are not planned to use the feed coming from Zohr, it was initially planned to use the western desert gas resources. In order to add more value to Zohr's gas we have two scenarios to be economically evaluated: either building new petrochemicals plants near Zohr`s gas receiving facilities located near Port Saied and Suez or building other new gas facilities to serve the online petrochemical plants located near Alexandria and Damietta," noted the industry expert .

"It depends if the gas from Zohr is Ethane rich or methane rich. In case of [the] former then we embark on a bigger plan to produce Ethylene and other downstreams such Polyethyline, Polyproplyne , ect. In case of latter then we can produce fertilizers such Ammonia then Urea," Dr. Sherif El Gabaly, Chairman of Board of the Egyptian Chamber of Chemical Industries, Federation of Egyptian Industries (FEI) noted commenting on the Impact of bringing Zohr online on Egypt's Petrochemical Sector.

It is worth noting that most of Egypt's petrochemical companies have operated at 50% or less of their total capacity since 2011 due to natural gas scarcity, Amr El Shikh, a petrochemical engineer stated. Petrochemical companies are expected to boost their capacity by up to 80% and may permit the development and production of new products, he added. "In my opinion petrochemicals will be leading the Egyptian industry especially once Zohr gas becomes available," El Gabaly said.

Output Growth Leads to Exports Boom

Egypt's petroleum sector includes eight large petrochemical projects with investments worth almost $7 billion and a total capacity of about 4.5 million tons per year, according to a September 2016 report by Plastics News Europe. The projects are located in four regions: Port Said, Suez, Damietta, and Alexandria. The petroleum sector is pursuing two parallel paths in the development of the petrochemicals industry. Egypt is both developing existing petrochemical projects to increase their competitive capacities and establishing new projects, sources at ECHEM informed Amwal Al Ghad. "Many petrochemical projects are on the pipeline now, either under study or under evaluation, but I do not expect any projects to be online during 2018 as we are witnessing Zohr gas production ramping up," the industry expert said.

Production of petrochemical and derivative products reached 35.5 million tons during fiscal year (FY) 2016/2017—up from 31.2 million tons during FY 2015/2016—according to Amwal Al Ghad. This production rate was accompanied by sales nearly 20% higher, according to ECHEM's annual report. Moreover, the Egyptian oil and gas sector is aiming to boost the production of petrochemical products to 40 million tons during FY 2017/2018 to meet the growing demand, sources at ECHEM told Amwal Al Ghad.

Egypt plastics exports rose from $886.5 million in 2010 to $1.6 billion in 2014, however, it dropped to $1.17bilion in 2016, due to shortage in feedstock supply to both Polyethylene and Polyvinyl chloride plants, as well as the decrease in international petrochemicals prices, according to the United Nations (UN) trade statistics. "On the other side, Egypt's petrochemicals exports are expected to increase in 2018, which is attributed to the recent start-up of some plants during 2017, namely MOPCO second train in Damietta (1.26 Million TPA of Urea and 788,000 TPA of Ammonia for both trains), and Ethydco plant in Alexandria (200,000 TPA of HDPE and LDPE, and 36,000 TPA of butadiene derivatives)," El Sherbiny added.

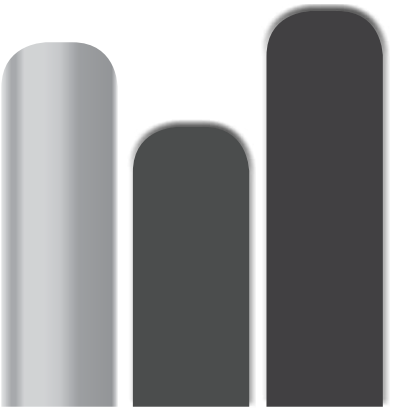
Egypt petrochemical industry is well positioned to benefit from the currently held economic reforms in addition to the growth of natural gas production. I can confirm that Egypt's petrochemical sector will feature a prosperous stage in the coming years, by the support of the president and ministry of petroleum for considering this industry as a crucial industry for improving Egypt's economic development. Egypt already has eight successful operating petrochemical plants [...] Consequently, this can be the base for the coming era of producing more downstream finished products and more high value specialized products, meeting market needs and making use of technological development," El Sherbiny noted.

Industry experts believe that the country can achieve its petrochemical ultimate exports increase goal upon implementing several changes. "In order for Egypt to achieve its ultimate goal in the petrochemical sector, the gas produced should go at least 50 to 60% of the industry instead of giving 70% of the natural gas to the power generation as is the case today," El Gabaly stated.

In addition, El Sherbiny explained that petrochemicals are a strategic industry that can drive economic development, therefore strategic support from all related governmental entities is required to boost forward this industry. "First of all, integration between refineries and petrochemical plants can be the name of the game by utilizing excess refinery capacities to produce petrochemical products integrally. Secondly, large economic scale production for newly developed projects is a must, thus reducing fixed costs per ton and, securing the project when product prices decrease for any unforeseen reasons. Finally, it is essential to continuously consider product development to avoid maturity stage, alongside consider more production of specialty polymers and chemicals," she added.

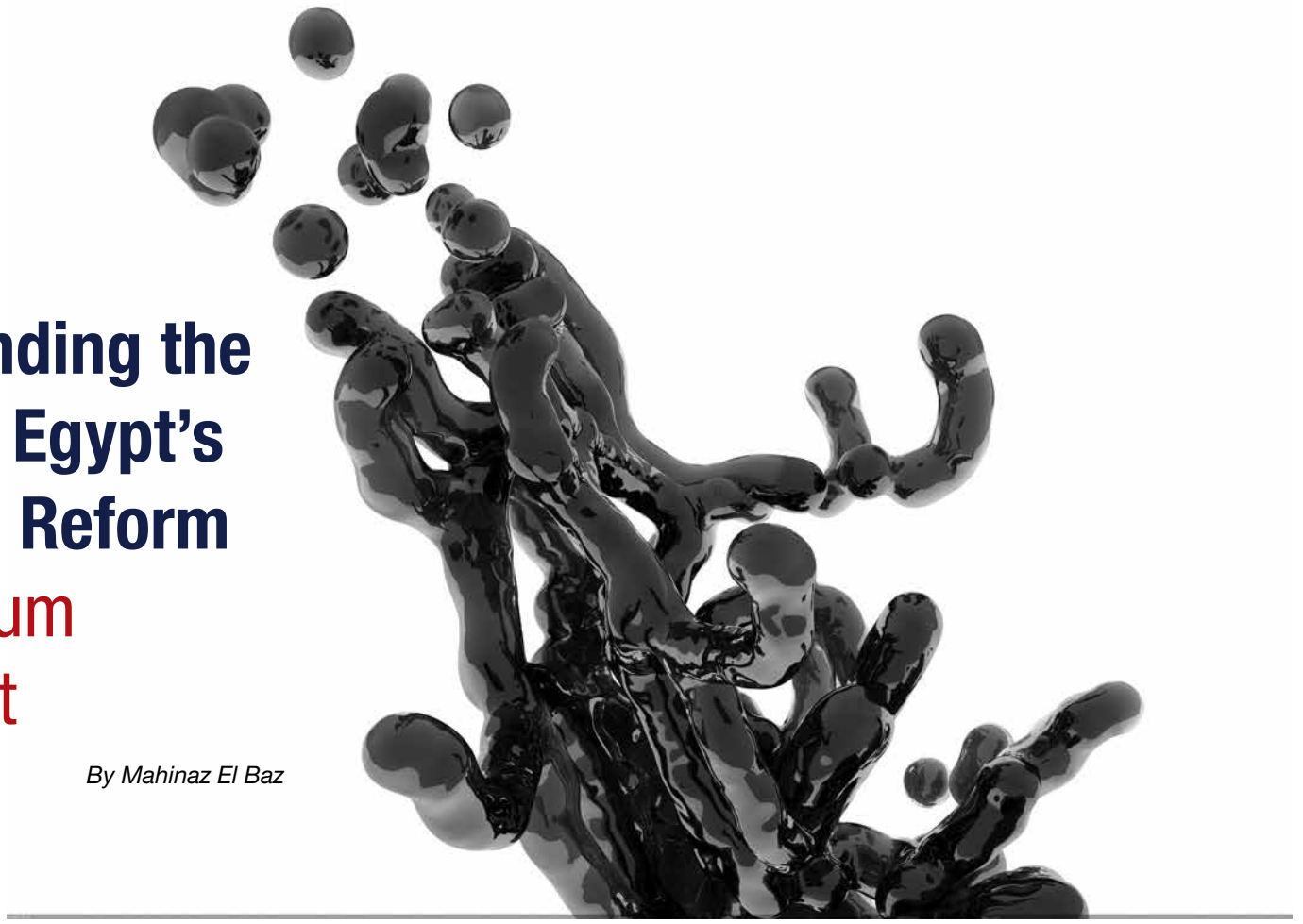
Despite Egypt's fluctuating economic performance, the profitability of the petrochemical industry has remained fairly positive and stable. A fact that begs the conclusion that incentives to attract investment influx, strategy, and sustainable feedstock would yield a significant future for this industry.

Petrochemical Production



35.5 MT	31.2 MT	40* MT
FY 2016/2017	FY 2015/2016	FY 2017/2018

*Planned.



Understanding the Impact of Egypt's Economic Reform on Petroleum Investment

By Mahinaz El Baz

Egypt's oil and gas industry has always been one of the core indicators of the health of the country's economic environment. To note, in response to the fluctuations resulting during the early phases post 2011, Foreign Direct Investment (FDI) influx into the industry saw a decline, decreasing from EGP 54.3 billion in the Fiscal Year (FY) 2011/2012 to around EGP 25.5 billion in FY 2013/2014, according to Egypt's Ministry of Planning.

Rigorous economic reform program and hydrocarbon modernization strategies were urgently needed to retain the investor's confidence in the petroleum sector, in addition to unleashing the great potential of the sector. Thus, the Egyptian government started searching for opportunities by implementing a comprehensive reform program in November 2016. The program is essentially aiming to improve Egypt's foreign-exchange market, raise the competitiveness of its investment climate, reduce the inflation rate, and control the Balance of Payments (BOP) and budget deficits. Experts argue that all those factors combined, in addition to the decreasing debt to international oil companies (IOCs), are expected to increase FDI inflow, specifically into exploration and production (E&P) activities.

Investor's Increasing Confidence

Egypt's major economic reform program included reshaping the country's fixed exchange rate system. The Central Bank of Egypt (CBE) has tightened monetary policy, mainly through liberalizing the exchange rate, which is considered a milestone towards restoring the competitiveness of the economy and boosting private sector activity and investment in the petroleum sector.

Macroeconomic conditions are already showing signs of stabilization following the liberalization of the exchange rate, according to the World Bank's (WB) Egypt Economic Outlook for October 2017. It eased shortages in foreign currency, eliminated the parallel market, and kick-started an improvement in Egypt's external accounts. The BOP achieved a $13.7 billion surplus around 5.8% of the year's projected Gross Domestic Product (GDP); 90% of which was realized only following the exchange rate floatation, according to the WB statistics. Moreover, FDI in the oil sector rose to $8.1 billion in FY 2016/2017, compared to $6.8 billion in FY 2015/2016, according to the Ministry of Petroleum and Mineral Resources.

"Floating the exchange rate and eliminating the parallel foreign exchange market would ensure the availability of foreign currency in the market and accordingly would provide more confidence to [oil] companies about investing in the Egyptian market at the moment, Omar El-Shenety, Managing Director, Multiples Group noted.

Furthermore, petroleum experts believe that the authorities are determined to continue with the reforms, and there is great progress in addressing various issues that IOC are facing within the Egyptian market today, which will drive further investments and increase their confidence in Egypt, said Gasser Hanter, Vice President Upstream, Country Chair and Managing Director for Shell in Egypt.

Having a similar positive view, Nicolas Katcharov, Edison's General Manager Egypt Branch and VP North Africa and the Middle East Operations, told Egypt Oil & Gas that "as a result to the reforms, and the new regulation, increase in investments in exploration is expected." On the other hand, he explained that "the major obstacle to further investments is the remaining $2 billion overdue towards IOC."

"The liberalization of the gas market, for example, intends to facilitate the progressive re-absorption of this debt. Everything depends on how the applicable rules of the new gas act will be designed, and particularly the possibility of using existing assets for an investor in the Egyptian oil and gas sector to recover," Katcharov added.

Foreign Reserves Hike

Tracking the reasons behind the oil and gas FDI boom after initiating the reform program, experts believe that one of the main reasons is the increasing foreign reserves.

International Monetary Fund (IMF)'s executive board approved, in November 2016, the decision to assist Egypt financially in the form of an Extended Fund Facility (EFF) arrangement worth $12. The Executive Board approved its first review on July 13, 2017 and the second review on December 20, 2017.

Egypt has already received two tranches of the IMF loan. The first tranche, of $2.75 billion, was received in November 2016. The second tranche, of $1.25 billion, was received in July 2017, and a $500 million installment of a $1.5 billion loan from the African Development Bank was received in March 2017, according to Reuters.

Following the second review by the IMF's executive board approved the loan's third installment to Egypt after the second review in December 2017, yet no official announcements were made about receiving this tranche. Once paid, the third installment would raise the total sum of the IMF loan to Egypt to a sum of $6 billion, out of a total $12 billion, according to the IMF. This is half of the total amount approved by the IMF Executive Board for Egypt's program. Completion of the third review and subsequent reviews will allow the disbursement of about $2 billion per review.

As a result of sealing the $12 billion deal between the CBE and the IMF, foreign reserves increased by 60%, reaching $31.3 billion in June 2017, equivalent to nearly six months worth of goods and services imports, according to a BN Paribas' report. In general, international reserves in Egypt have averaged around $22.7 billion from 2003 until 2017, reaching an all-time high of $37 billion in December 2017 and a record low of $13.4 billion in March 2013, according to the CBE.

> "As a result to the reforms, and the new regulation, increase in investments in exploration is expected."

Economic experts agree on the positive impact of increasing reserves on foreign investors' confidence in Egypt's oil and gas sector. "The increase in foreign reserves strengthen investors' confidence as it improves exchange market stability, and hence, reduces exchange risk associated with capital investment decisions, especially in regard to reducing risks of capital account restrictions on profit transfers for FDI," Dr. Alaa El Shazly, Professor of Economics at the Faculty of Economics and Political Science (FEPS) at Cairo University stated.

Affirming the consequences of increasing foreign reserves on Egypt's petroleum sector, Dr. Pascal Devaux, Senior Economist MENA, BNP Paribas said that, " Even if the investments in the oil and gas [sector] are long term, the increase in CBE foreign exchange (FX) reserves is a positive signal to foreign investors." It is a guarantee of the capacity of any Egyptian counterpart –the government or a private company– to repay its debt in foreign currencies, and it ensures the foreign investors to repatriate their profits as an adequate level of FX reserves means the removal of capital control, he added.

Devaux further explained that "the EGP floating and the end of the parallel market means that the FX rate is the [real market] rate and is the result of FX demand and supply [equilibrium]. It allows the foreign investor to plan [their] investments with more accurate FX rate forecasts."

"Everything depends on how the applicable rules of the new gas act will be designed."

Zero Arrears Goal

The exchange rate adjustment, in addition to the increasing foreign reserves have helped in freeing up resources to pay for part of the accumulated arrears to international oil companies, which currently [at time of going to press] stand at $2.2 billion at the end of January 2018 down from $3.5 billion in end-2016, according to the WB.

"Some of the money coming from the IMF has already been channeled to oil companies to decrease the arrears and lately we have been seeing the arrears account getting diminished. Yet, it is hard to see arrears getting to zero soon. It will take time until arrears are fully cleared."

"One of the main concerns for oil majors has been delayed payments and arrears at the Egyptian government. With the increase of reserves and the smooth flow of foreign currency into the economy after the free float end of 2016, this concern is diminishing, which should give oil companies the confidence needed to invest in the market, especially with the new discoveries," El-Shenety stated.

Regarding Egypt's goal of reaching zero debt to IOCs, Egypt's Minister of Petroleum and Mineral Resources, Tarek El Molla declared that "it is hard to determine a specific date, but we imagine that if the current rate of payment continues we will be able to reach zero external debt within two years," according to Reuters.

Experts find it hard to set a date as well. "As far as has been announced, some of the money coming from the IMF has already been channeled to oil companies to decrease the arrears and lately we have been seeing the arrears account getting diminished. Yet, it is hard to see arrears getting to zero soon. It will take time until arrears are fully cleared but I believe what matters at the moment are to see the balance decreasing and to see the new discoveries opening new opportunities in the market," El-Shenety stated.

Linking between the IMF loan and IOCs' areas, El-Shazly explained that "the improvement in BOP results related to economic reform is making debt repayment to oil companies less sensitive to the availability of IMF facilities by depending more on own resources."

On the contrary, when asked if the Ministry of Petroleum and Mineral Resources will use the money of one of the upcoming IMF loan tranches to pay for IOCS' arrears, Devaux explained that "the decision to repay IOCs arrears is up to the Ministry of Finance." More generally, there is no direct link between a capital inflow (IMF loan for example) and a capital outflow (IOCs repayment), he added.

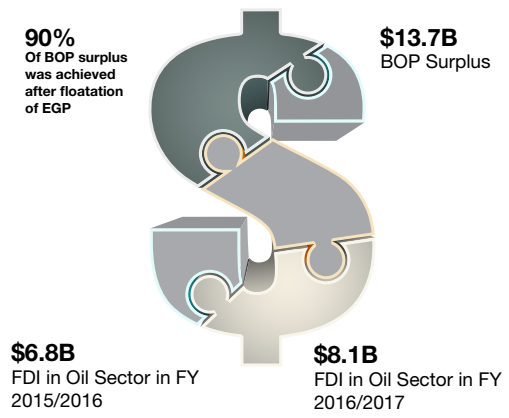
"However, the decision to repay arrears depends on the level of CBE FX reserves and of the fiscal prospects. The IMF loan contributes positively to those two elements, but not because of the amount of the IMF loan but because the IMF's support has allowed Egypt to benefit from external financial support, and to issue Eurobonds on international capital markets. The repayment of IOC arrears contributes positively to FDI in the sector. No idea when the debt to IOCs will be zero," Devaux further noted.

New Discoveries, New Hope

In December 2017, El Molla, announced the start of natural gas production from Egypt's and the Mediterranean's largest offshore field, Zohr, according to the Ministry's official press release. As the giant field starts producing natural gas and taking more steps towards reaching energy self-sufficiency, many speculations revolve around how soon it will begin to directly impact the market dynamics, and indirectly affect the IOCs' investment in E&P activities.

"Achieving self-sufficiency in natural gas will create more room to produce for export markets through FDI," El-Shazly stated. On the other hand, Devaux thinks there is an indirect relationship between reaching self-sufficiency and attracting more FDI to the E&P activities, as FDI attraction will notably rely on the market– domestic consumption or exports–, the selling price, and the macroeconomic situation.

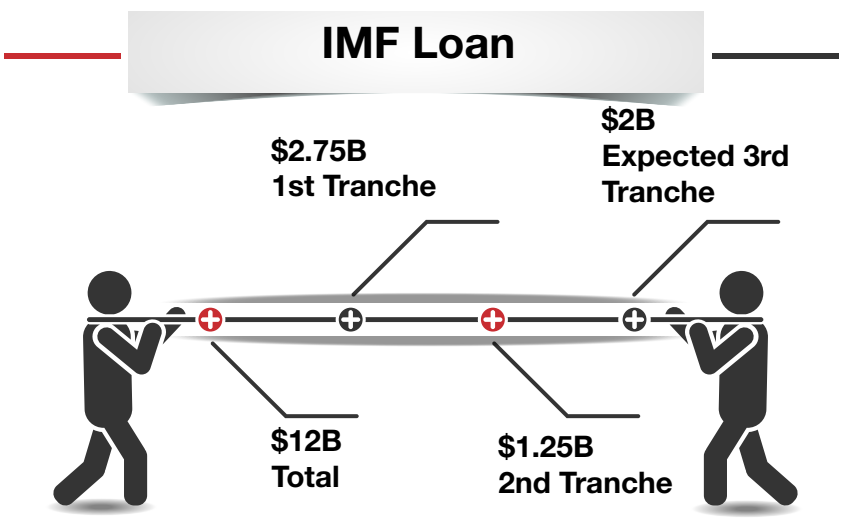
On the long run, Egypt has to repay IMF's loan. Thus, a debate started about the role of natural gas export revenues in covering such a debt. "Expansion in natural gas production and exports will normally help in debt repayment including IMF's," El-Shazly said. Giving more explanation, Devaux mentioned that "any factor that positively impacts the current account balance is positive for the Egyptian capacity to repay external debt."



While El-Shenety believes that having the new discoveries is great news and will decrease the trade balance deficit, and thus enhance the government's capability to pay its external dues to IMF and others. "Still I don't see us having a surplus that we can export and when it comes to paying back IMF loans and other external debt, I believe the government needs to foster broad based economic recovery across a wide variety of sectors especially tourism and industrial sector which can generate sustainable revenues in foreign currency to help with external debt repayment. Counting on oil discoveries alone will not be sufficient," he stressed.

The country's ongoing transformational economic reform program has already started spurring the economy, enhancing the country's business environment, and staging a balanced and inclusive growth. The program is widely endorsed by key development partners, including the WB's programmatic DPF series, the IMF's EFF, and the African Development Bank parallel financing.

The implementation of monetary and fiscal reforms along with the gradual restoration of confidence and stability are starting to yield positive results. Consequently, both economic and petroleum experts are optimistic about the potential effect of the economic reform on the oil and gas industry, especially its ability to attract extra FDI after getting back the foreign investors' confidence. Moreover, discovering Zohr has is positive effect on the industry as well.



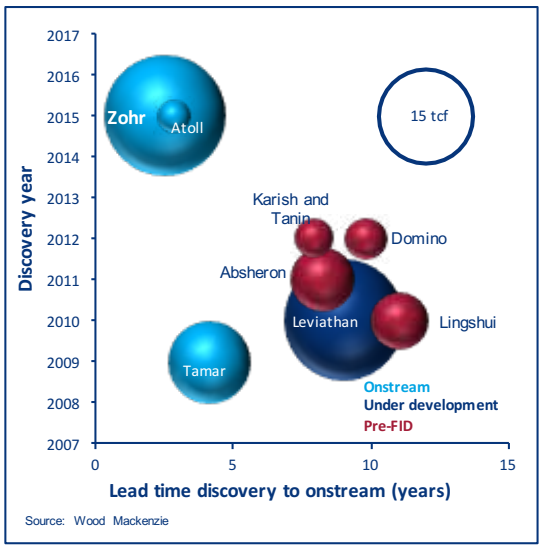
ZOHR

The Pathway to Egypt's Dream

By Stephen Fullerton, Research Analyst Middle East and North Africa Upstream Research, Wood Mackenzie

On the 16th of December Eni alongside partners BP and Rosneft began production from Egypt's giant Zohr field. This milestone was reached on schedule, a mere 22 months after FID was taken. Phase One is expected to add 800 mmcfd to Egypt's surging gas supply next year.

Zohr is the largest discovery in the Eastern Mediterranean and is vital to Egypt achieving energy independence. The pace at which Eni has delivered first gas is impressive; just two and a half years from discovery, making Zohr the fastest deepwater gas development of such a scale ever. Fast-tracking has been achieved due to government pragmatism and space in the supply chain. Government pressure to bring Zohr onstream rapidly stems from the desire to replace costlier LNG imports.



Source: Wood Mackenzie

The discovery of Zohr in August 2015 signalled a U-turn in Egypt's gas supply fortunes. The country swung from being the eighth largest LNG exporter in 2009 to the eighth largest importer in 2016 due to upstream underinvestment and burgeoning demand. New developments such as Nooros and West Nile Delta have helped redress gas shortfalls. But Zohr will ensure that gas demand is fully met in the short term. We believe that Zohr will once again make Egypt a net LNG exporter come 2019.

Zohr is a play opener for the region. It is the first Cretaceous reef play in the Eastern Mediterranean and has resulted in increased exploration interest. To date one 'Zohr like' prospect has been drilled, Onisiforos West offshore Cyprus which disappointed. However, there are many prospects to go after and active drilling campaigns are planned on both sides of the Egyptian/Cypriot maritime boundary.

Moreover, the start-up of Zohr is a major milestone for Eni and its partners. The field is one of Eni's largest ever discoveries, and the scale and attractive economics (Total PV,10 US$5.1 billion and IRR 16%) were enough to attract BP and Rosneft. It is the final project Eni (fourth) and BP (seventh) planned to bring onstream in 2017, either on or ahead of schedule. Improved project delivery and capital discipline from the Majors has proven to be the 'silver lining' to the oil price crash.

Zohr is Eni's largest ongoing operated project, vital to its growth outlook, and an important source of long-life cash generation into the 2020s. The second phase of development will increase entitlement production to a peak of 1.3 bcf/d by 2024, with the field contributing over 10% of Eni's total production. Eni has already realised value from the discovery, reducing its interest and expenditure in development phases following exploration success. A combined 40% stake was sold to Rosneft (30%) and BP (10%) for a total consideration of US$2.1 billion in 2016.

Egyptian gas is an important growth area for BP, and Zohr will propel Egypt to the biggest source of production outside of Russia next decade. Zohr is a natural fit for BP's deepwater Nile Delta portfolio, which includes the major West Nile Delta and Atoll projects. Outside of Russia, Zohr is Rosneft's most important asset. But perhaps more importantly, it provides a platform for other moves into Egypt's energy sector. Increasing LNG exposure is a strategic priority, and while we expect gas production from Zohr to be sold domestically, subsequent phases could open up new LNG opportunities.

The Human Element

An Eye into the Lives of Female Field Engineers

By Omnia Farrag

The petroleum industry is widely known for being dominated by men, especially upstream fieldwork. Whether the field is located in the middle of the desert or in the middle of the Mediterranean, on-site workers have to spend weeks working for long shifts under difficult conditions.

Some people, including petroleum engineers themselves, believe that only men can handle such conditions; however, looking closer into the industry, there are women who broke this stereotype, many of which have been working in the field for decades.

Scarcity of women working on rigs is not exclusive in Egypt. Yassmin Abdel Magied, Sudanese born and Australian bred Petroleum Engineer, often shares her experience working on rigs on social media. Abdel Magied, who is currently a writer and a TV presenter, explained that sometimes she was the only woman among around 30 men and maybe another woman but not more than one.

In offshore activities, the men to women ratio is even lower with around four women to 150 men, Abdel Magied told the Guardian. In general, her writings highlight how much she enjoys working on rigs as well as her appreciation of the whole experience both on the personal and professional level. Yet, she refers to the comments she receives from some workmates doubting her abilities because she is a woman.

Shifting focus to Egypt, and in efforts to qualitatively address the experience of women working in the field, Egypt Oil & Gas spoke to several women field engineers, from different age groups and at different stages in their career paths.

Reflections on Field Experience

Beginning with Marwa Borais, General Manager of Advanced Petroleum Investment (API), with 18 years of experience in oil fields. “I was three years old when my father established his company. I spent my childhood playing in sites and moving from a site to another,” she said.

Borais shadowed her father when she was in college and started her career right after graduation in 2000. She worked on rigs at different places including Sinai, Eastern Desert, Red Sea, and Gulf of Suez, West to Western Desert, Delta, South Sudan, and Kuwait.

“I am usually consulted in drilling by many organizations including the Armed Forces Engineering Authority. I even give drilling training for military officers,” she explained. Now she is the owner of Petroleum Investment Companies. “I’m the only Arab Egyptian woman who owns a company specialized in drilling, starting from the most sophisticated to the simplest drilling techniques,” she affirmed.

Experience of Different Generations

Another example of female petroleum engineers working in sites is Maureen Amir, Sub-sea Engineer at British Petroleum (BP). She has been working on rigs since January 2017. Amir graduated from Faculty of Petroleum Engineering at the American University in Cairo (AUC) in 2013, and received her master’s degree in industrial engineering in 2017 from AUC as well.

Amir was hesitant to work on rigs; however, this has changed afterwards. “I was scared but I told myself that this is my industry. I have been trying to find another job at other industries for three years and it didn’t work, so let’s try it,” she explained.

Amir highlighted the fact that other women worked on the same site eased the process at the beginning. “People there are always willing to teach me how things work step by step,” she said. Admitting that working on rigs might be challenging sometimes, yet it helped her develop. “Some people challenge us until we fail, but in my current job they challenge me to succeed,” she added.

Borais had a different experience during her first years of working in the field back in 2000. “People at sites weren’t listening to me. They didn’t trust my abilities. They saw me as a young girl, not an engineer. I used to talk to my father and cry. He told me ‘you either prove them wrong or stay at home cooking.’ I endured and worked [hard] and now [I sit with] high-profile government officials,” she said proudly.

Now, 18 years later, young female engineers still go through similar experiences. AlShimaa Ibrahim, Senior Petroleum Engineering student at Suez University, faced some challenges as well when she did an internship in a field in The Gulf of Suez. “Some supervisors didn’t want to let me go on the rig. They kept telling me ‘your presence is causing troubles because you are a girl’. But at the same

time some other supervisors helped me and taught me a lot," Ibrahim said. Field training is a prerequisite for graduation at all petroleum engineering schools in Egypt, not allowing women on the rig can hinder their career development, she explained.

Nadine El Tanahy, Senior Political Science student at AUC, echoed Ibrahim saying that female engineers are sometimes not given the permission to get into some areas of the field, adding that "some companies state explicitly that they don't want women on their rig." El Tanahy completed two office based internships which she found beneficial. She went once to the field for one day which she described it as "the most useful experience."

Borais participates in giving those trainings to undergraduates in government-owned companies and she noticed that she has never seen female students attending the training. "I don't know why. Maybe the management doesn't allow them. Maybe the girls just give up on their right [to do the internship] or maybe their families just want them to work in offices, or it could be a policy. I believe it is most probably the policies," she explained.

As a company owner, she said that it is not an easy decision for her to appoint female engineers to work roughneck. "I always support women to go through this experience but sometimes it happens that I give some female engineers the opportunity to work in such positions and then they find it overwhelming or too rough for them," she commented.

Determination vs. Social Norms

"I believe that women can do anything. If you are well educated and experienced practically, you can succeed at anything. At the end of the day we are not living in a jungle. If a woman is self-confident, it is really difficult for anyone to hinder her chances working on sites," Borais stressed.

Amir, as well, enjoyed her experience of working on rigs. "A year ago I wasn't the same person […] I'm really grateful for this experience, actually it had helped me grow a lot in only one year," she said.

Supporting the same opinion, Ibrahim explains: "It is like any other life experience. You will always find some people supporting you and others discouraging you. The point is how you perceive this. Discoursing people should motivate you to succeed while supporting people are a god's blessing to actually help you succeed."

Shifting to social challenges, the fact that the petroleum industry is male dominant makes every step toward working in this field a challenge starting from the mere idea of studying petroleum engineering. As someone who was raised in the fields, Borais didn't think twice before studying petroleum engineering and pursue her postgraduate studies and career in this field; nonetheless, this wasn't welcomed by her extended family.

Despite the fact that she descends from a family of petroleum engineers, her decision to work with her father was rejected by her extended family. "There was a strong conflict between my father and my extended family when I started working with him. My family kept telling him how come you take your girl to the field and the rig? She can work in the office but not the rig," she added. Those words changed nothing about her father's position as a strong believer in her abilities.

Unlike Borais, Amir faced complete support from her family's side when she decided to join petroleum engineering school and when she started her job that required her to work on rigs for at least two weeks per month.

For Amir, those two decisions represented challenges for herself and for social norms. "Everyone was telling me 'this is a man's' major. Don't join that major, don't join this industry," she said.

"I declared Petroleum Engineering major but I have never thought that I will actually go on a rig," Amir explained. She believes that the society is yet to be ready to accept women in this job. To highlight her point she recalled an experience with an Uber driver, who was shocked to discover that she was a field engineer. She recalls his reply: "This is crazy and who am I to prove myself in a field like this [...] It was extremely offensive."

Recalling her story, El Tanahy faced more resistance from her family, when she decided to study petroleum engineering. First, she joined school of medicine as almost all of her family members are physicians, switching to petroleum engineering after the first semester. "It wasn't an easy decision. Not at all. I faced a lot of resistance even from family members who work in this field who I had thought that they would support me. It took some time to convince them," she said.

Her decision to study petroleum engineering was due to her disinterest in studying medicine, she wanted to study something more challenging, and of brighter future. On the other hand, her family wanted her to study something more suitable for a woman. "They were telling me 'do you think you will be able to stay on the rig for months?" she added.

Ibrahim's story was different. Her family supported her to go after what she likes; nonetheless, she was scared of being the only girl in her class studying petroleum engineering. "There are very few girls studying at my college, in general, and most of them specialize in metallurgy. I'm the only girl at the petroleum engineering department. Professors and teacher assistants always ask me why I'm studying this specialization," she explained.

Work-Life Balance

Asking Ibrahim about working in the field, she explained that she does not mind working on site for a while, but not adopting this lifestyle for the rest of her life. "At the end of the day I'm a woman and I want to have a family. I expect it to be difficult for me to work on site after marriage. At the same time, I don't want to be restricted by working in an office. I want to explore field activities," she elucidates.

As for El Tanahy, convincing her family to let her work on rigs will not be an easy job. "I am expecting strong resistance from my family, from my fiancé if I decided to work in the field," she explained.

Borais and Amir disagree with Ibrahim and El Tanahy, as they believe working in the field doesn't impact women's ability to successfully have their own family. "I have four sons […] The eldest is in high school and the three others are in middle and elementary schools. My work has never affected my family. My job is likewise any other job that requires the person to be away from home such as physicians or flight attendants," Borais said. As time goes by, site workers become able to manage their own working schedule and see what fits them and their family commitments, she added further noting that most people stress on the importance of family commitments for women but she believes that building career is as important as family and women should balance between both, not only focus on one of them.

Egyptian women in the field proved that there isn't a glass ceiling in Egypt's oil and gas industry, nor is there an industry just for men. They proved that hard working, determination, and quality education are the main factors determining career development, despite of gender roles and social norms.


AlSimaa Ibrahim


Maureen Amir


Marwa Borais

Petrochemical Sector Update

Ongoing Projects and Fruitful Results

By Mariana Somensi

The risks of failure involved in chemical processes cause the petrochemical industry to be relatively averse to innovation. Yet, as the sector corresponds to 3% of Egypt's gross domestic product (GDP), as well as directly and indirectly impacts other sectors of the economy, the petrochemical sector requires the most up-to-date technology to increase production and meet growing domestic demand. In line with the investments in the oil and gas sector, the government has gradually developed the petrochemical sector over the past few years, paving the way for market stability and higher revenues.

Master Plan, Expectations, and Recent Achievements

In 2002, the government launched a 20-year master plan to improve Egypt's petrochemicals industry. It aimed to increase its annual production capacity by 15 million tons. The state-owned Egyptian Petrochemicals Holding Company (ECHEM) expected the industry's expansion to generate annual revenues of $15 billion and create 100,000 direct and indirect jobs. The long-term upgrade is projected to require $20 billion in investments. The funds are for the construction of 14 petrochemical complexes with 50 production units in 24 projects.

Previous Phases

The plan was divided into three phase. The first one ran between 2002 and 2008 and generated as much as $6 billion in investments. It resulted in five fully-operational facilities for the production of alkyl, gasoline, polypropylene, propylene, ammonia, and polystyrene. The second phase, which garnered $7 billion of investments, ran from 2008 to 2015 and included the production of purified terephthalic acid, polyester, and latex. In addition, the phase included the development of aromatics and olefins.

Current Phase

The third phase is ongoing and is expected to attract another $7 billion in investments between 2015 and 2022. These investments are to be directed to the construction of an additional olefin complex, a second propylene and polypropylene complex, and the production, among other products, of vinyl and detergents.

In 2016, ECHEM released an official report indicating that the master plan's efforts had resulted in a 30% increase in production and a 20% increase in sales during fiscal year (FY) 2015/2016. The company further announced the inauguration of two projects under the master plan during FY 2015/2016: Misr Fertilizers Production Company (MOPCO) and the Egyptian Ethylene & Derivatives Company (ETHYDCO).

MOPCO was established with the purpose of producing ammonia and urea. Ammonia is produced to facilitate urea production—primarily intended for export. The surplus of both products would be directed to the local market. The plan calls for an annual capacity of 1.38 million tons of urea and an annual surplus of 80,000 tons of ammonia. MOPCO is located in the Damietta Free Zone and received almost $2 million in investments— 70.97% from Egypt and 29.03% from international sources. In June 2016, MOPCO's annual urea production

3% of Egypt's GDP comes from Petrochemicals

reached 350,000 tons.

Meanwhile, ETHYDCO was launched to produce ethylene and other derivatives from an ethane/propane mixture produced by the Egyptian Natural Gas Company (GASCO). The project has a proposed annual capacity of 460,000 tons of ethylene, 400,000 tons of polyethylene, and 20,000 tons of butadiene derivatives. Nearly $2 million have been invested in the project. The funds for ETHYDCO were all raised domestically.

ECHEM announced at least five new ventures under the master plan in its FY 2015/2016 official report. The Resins & MDF Wood Panels Project, set to be launched in 2018, aims to produce adhesive-based chemicals & medium-density-fibreboard (MDF) wood panels using agricultural residues as a feedstock. With feedstock sufficient for 7,000 tons of urea formaldehyde (SUPSC) and 120,000 tons of rice straw per year, the plant is expected to have an annual capacity of 120,000 cubic meters of MDF Wood Panels and 15,000 tons of adhesive-based chemicals. Production will be directed to meet local market demands and replace imports. ECHEM expects as much as $110 million in investments.

Two projects are to be launched in 2019, according to ECHEM. The Ammonium Sulfate Fertilizer Project aims to produce ammonium sulfate fertilizer. It will utilize ammonia from Alexandria National Refine & Petrochemical (ANRPC) as feedstock. The plant will permit the expansion of the projects of the Suez Petroleum Services Company (SUPSC). The project is expected to garner as much as $145 million in investments. Using 350,000 tons of sulfuric acid and 160,000 tons of ammonia, the project is projected to have an annual production capacity of 480,000 tons of ammonium sulfate. Meanwhile, the Formaldehyde & Derivatives Project aims to produce formaldehyde and other derivatives by utilizing 30,000 tons of METANEX's methanol and 10,000 tons of MOPCO's urea per year as feedstock. With a total investment cost of $30 million, the plant's annual capacity is expected to reach 60,000 tons of formaldehyde and 40,000 tons urea formaldehyde (UFC-85 & UFC-65).

35.5 MT

Annual production of petrochemicals and derivative projects

In 2020, the Styrene Production Project is expected to be launched. With $593 million in investments, it aims to produce 300,000 tons of styrene per year. The styrene will be used to bolster polystyrene production and replace imports—excess styrene will be dedicated for export. ECHEM further announced the Propylene and Derivatives Project to be initiated in 2021. The project aims to produce polypropylene by utilizing 590,000 tons of propane from GASCO per year as feedstock. The plant's annual capacity is designed to reach 470,000 tons of propylene and 450,000 tons of polypropylene. Production from the plant will serve local market demands for polypropylene while exporting the surplus. Its output will primarily be used by Sidi Kerir Petrochemicals (Sidpec).

Besides the obvious economic benefits from the completion of these projects, ECHEM expects to attract international joint-ventures investors, build value from downstream derivatives, and boost the country's investment rating.

Additional Petrochemical Complexes

In addition to the projects overseen by ECHEM, the Egyptian government has announced other new petrochemical schemes, such as the construction of a petrochemical plant in the Suez Canal Economic Zone. The project aims to use around 4 million tons of naphtha to produce as much as 2.7 million tons of petrochemical products, such as gasoline, ammonia, p-xylene, styrene, polypropylene, and polyethylene, the Minister of Petroleum and Mineral Resources, Tarek El-Molla, stated in September. The plan is part of an overarching $20 billion investment project that is comprised of 30 separate projects in the Suez corridor. As much as $6.8 billion will be injected in this project alone over a period of up to five years, El-Molla said, noting that the new complex is expected to cover local market needs and provide raw material for other petrochemical schemes.

In June, Egypt's Carbon Holdings Company announced it will begin the construction of its Tahrir Petrochemicals Project by June 2018. The complex is to be located within the Ain Sokhna Industrial Zone and has an investment cost of $10.6 billion. Tahrir Petrochemicals will be the largest petrochemical investment in the country, according to the company's CEO, Basil El Baz. Construction is estimated to take up to five years. Its production of raw materials is designed to cover the industrial sector's needs. El Baz further believes that continuous output growth will stimulate domestic and international manufacturing firms to invest closer to the project's production facilities.

Petrochemical Goals

Egypt's plans for the petroleum industry are sustained by five pillars, according to the Ministry of Petroleum. These pillars are: increasing crude oil exploration and production, securing its petroleum products and natural gases needs, expanding to the natural gas grid to houses and factories, transforming Egypt into a regional hub for energy, and expanding the petrochemical industry to increase product value, Arab Finance reported.

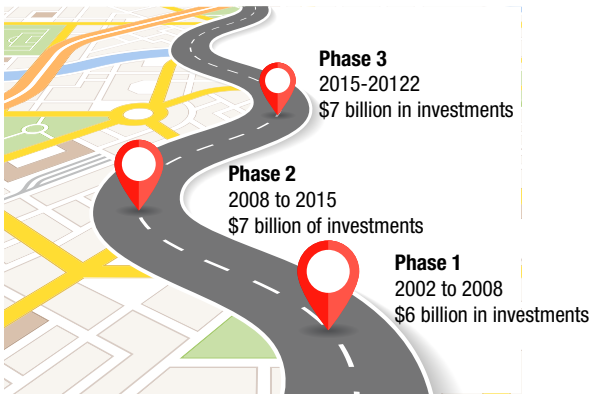
The Ministry of Petroleum has developed assertive goals to secure the raw material necessary to prosecute its plans for the petrochemical sector. Increasing Egypt's capacity to produce raw materials through the construction of new petrochemical facilities will serve as a significant asset to attract multinationals and incentivize them to start manufacturing in Egypt. "Why haven't all these foreign multinationals that keep making visits to Egypt every month started manufacturing? What it comes down to is that there are no raw materials," Egypt Today quoted El Baz as saying. The ministry's target of improving the supply of raw materials is to encourage investment, create jobs, and activate an integration policy between the oil companies, El Molla told the media.

Developing the industry will also directly produce good job opportunities for both junior and senior oil and gas engineers and technicians and a wide range of indirect job opportunities. Tahrir Petrochemicals Complex alone, for instance, will create up to 20,000 jobs. "Approximately 20,000 Egyptians will be directly employed during the peak construction phase with approximately 3,000 engineers and technicians being employed during the operations phase," El Baz said. These opportunities are critical to Egyptian young people who have been severely harmed by the unemployment rates in the country.

Impact on Import Bill

Increasing consumption of petroleum products impacts Egypt's trade deficit, requiring the utilization of limited budgetary resources to cover imports. In 2015, the production of plastic materials covered only 28% of the 2.22 million tons of plastic consumed domestically. During the first nine months of FY 2016/2017, the government spent $7 billion on the import of petroleum products, up from $6.2 billion during the same time period in FY 2015/2016. However, although consumption is increasing at an annual growth rate of 6%, the new petrochemical investments are projected to supply a larger share of the country's domestic demand. During FY 2015/2016, production of petrochemicals and derivative products reached 35.5 million tons, as opposed to 31.2 million tons in the previous year. On the long-term, investments in petrochemicals are expected to alleviate the economic burden caused by imports, especially after the flotation of the Egyptian pound.

Phases of Petrochemical Sector Development Scheme



Market Challenges

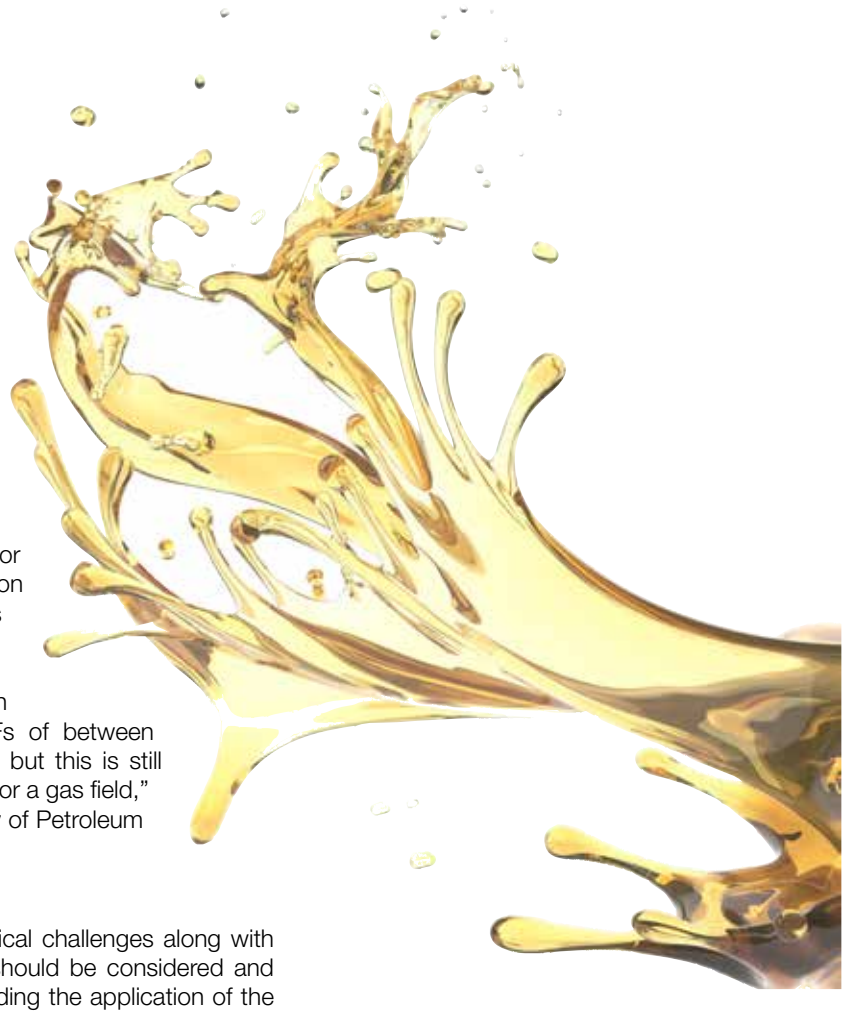
The devaluation of the Egyptian pound posed an extra challenge to the government's investment plan. As materials for construction are mostly imported, building new petrochemical plants became more expensive, especially with rising inflation. In order to remediate the price increase, Egypt has taken measures to attract foreign investments. Besides a new law to regulate and facilitate the influx of natural gas, which brings the oil and gas sector into the spotlight, the government further approved new legislation to simplify the bureaucratic process for investors and offer tax breaks for investments in underdeveloped regions and select industries. These higher costs, however, have forced the government to raise addition funds through loans and new revenue sources in order to finance the petrochemical master plan. The country has received important deals—such as the three-year agreement with the International Monetary Fund (IMF) to receive a $12 billion loan—that are linked to subsidy reductions and the tax increases.

Wider Results

The development of Egypt's petrochemical industry plays a significant role in the economic reforms being carried out by the government. As increased production helps local industry cover domestic demand, the lower importation rate of petrochemical products will bring relief to Egypt's budget. These savings will increase the availability of foreign currency in the country, helping to stabilize of the Egyptian pound. As such, Egypt can expect positive results from its efforts to develop the petrochemical industry that will impact not only the oil and gas industry—of which the petrochemical industry comprises 12%—but also economic development in all sectors that utilize hydrocarbon derivatives in their activities.

A Deeper Look at the Potential Challenges of **EOR Applications in Egypt**

By Mahinaz El Baz



The interest in application of Enhanced Oil Recovery (EOR) has globally increased, as most of mature oilfields cannot maintain their production unless EOR treatment is deployed. However, the currently implemented oil recovery phases in Egypt are mainly primary and secondary phases with limited applications of EOR techniques, including steam stimulation technique thermal EOR method as well as polymer flooding chemical EOR method. "Substantial oil, as much as 60% of the initial oil in place, may remain after secondary recovery because of capillary forces, interfacial tensions, and partial reservoir sweep by injected fluids," explained Dr. Mahmoud Abu El Ela, Professor of Petroleum Engineering, Cairo University. Industry experts and scientists believe that several technical challenges along with oil price fluctuations should be considered and studied to be able to widely extend the applications of the EOR technologies in Egypt.

The Increasing Need for EOR

EOR refers to the process of producing hydrocarbons in an oil field in unconventional methods and reservoir re-pressurizing schemes, such as displacement of oil by miscible gas injections or water-flooding with soluble chemicals, according to Corex. Demand for this technology is mainly fueled by the need to maintain production levels. Furthermore, some of the oil reserves, known as un-easy reserves, require EOR from early stages to meet production level. Therefore, some experts argue that it is more than just reservoir optimization as it can significantly extend global oil reserves once oil prices are high enough to make these techniques economic, noted Muggeridge et.al's research paper published in the Philosophical Transactions of the Royal Society.

"Most of the current oil production in Egypt comes from mature fields. The rate of replacement of the produced reserves by new discoveries has been declining steadily in the last decades. In addition, operators are focusing on redeveloping and improving oil recovery from existing oil reservoirs because of increased exploration costs for new oil fields and the limited opportunity for discovering major high-quality oil reserves," said Abu El Ela. "Therefore, the increase of the recovery factors from mature fields by applying the EOR technologies will play a key role to meet the growing energy demand in the coming years," he explained.

Moreover, there is a new international trend to apply improved oil recovery (IOR) techniques. IOR is a term that is sometimes used synonymously with EOR, although it applies to improvements in oil recovery achieved through identifying volumes of oil that have been bypassed during water injection using seismic surveying, and then drilling new wells to access those oil pockets, explained Sneider et.al. in their paper for the American Association of Petroleum Geologists . "Using combinations of traditional EOR and IOR technologies it has been possible to achieve RFs of between 50-70% for some fields but this is still less than the typical RF for a gas field," according to the Society of Petroleum Engineers.

Technical Concerns

There are various technical challenges along with the financial concerns should be considered and addressed before extending the application of the EOR methods in the Egyptian oil fields. Therefore, an integrated approach and methodology should be considered to make sure that the selected EOR technology is suitable for the Egyptian reservoirs. "It [EOR] is specific for a specific reservoir," stated Dr. Mohamed Helmy Sayyouh, Professor of Petroleum Engineering, Cairo University.

The methodology should include screening, laboratory work, simulation, and modeling along with pilot projects. These steps are required before full field scale applications, noted Abu El Ela. It worth noting that the screeding phase is very important step to select the most appropriate EOR technique for each reservoir under study, as each EOR technique has its own special conditions and specific technical challenges and concerns.

"The main technical challenges associated with chemical processes are that the chemicals must be able to tolerate the environment they are placed in. The high salinity of the Egyptian formations imposes a serous limitation on the use of micellar and polymer floods. High values of formation water salinity and temperature cause problems in degradation, difficulty of designing stable surfactant/polymers systems; and/ or consumption of the chemicals used in the process," Abu El Ela stated.

He further disclosed that "several publications and successful case studies clarified that the thermal degradation starts at 125°C and the polymer is totally degraded at 175 °C. In addition, salinity is recommended to be less than 100,000 ppm to avoid mechanical degradation. Therefore, pre-flush slug of law water salinity can be used to apply the chemical EOR technologies in the formations of the high water salinity."

Abu El Ela explained that the serious challenge to the use of miscible flooding technique in the Egyptian oil fields, especially CO2 Miscible flooding, is the availability and the transportation problem associated with the CO2 itself. It worth noting that there are several sources of CO2 in Egypt which need to be assessed and studied, such as gas processing plants, power plants, refineries, and other industries, such as petrochemicals, cement, fertilizers, iron, and steel.

On the other hand, thermal EOR methods are usually suited for high viscosity oils and shallow formations, requiring oil reservoirs of fairly high values of rock permeability. "The restriction of thermal processes to relatively deep reservoirs is because of potential heat losses through lengthy wellbores. The main technical challenges associated with steam technique in the shallow reservoirs in Egypt are poor sweep efficiencies, loss of heat energy to unproductive zones underground and poor injectivity of steam. Poor sweep efficiencies are due to the density differences between the injected fluids and the reservoir crude oils. The lighter steam tends to rise to the top of the formation and bypass large portions of crude oil. Techniques involving foams are being employed. Operational problems associated with the steam injection include the following: the formation of emulsions and the corrosion of injection and production tubing and facilities. When emulsions are formed with heavy crude oil, they are very difficult to break. Many operators need to be prepared for this," highlighted Abu El Ela.

Towards an Oil Recovery Revolution

It is becoming more difficult to relay mainly on primary and secondary phases to recover hydrocarbons in Egypt, as oil fields are declining and energy demand is growing; hence, EOR techniques are essential to extract more oil from mature fields. Despite the potential challenges of EOR applications in Egypt, implementing such techniques will benefit Egypt's hydrocarbon industry in many ways, according to industry experts. For instant, conventional oil resources will become depleted by time, and new advanced methods and strategies are needed to extract unconventional resources. This will be achieved by EOR implementation.

SAPESCO, Providing High-Quality Services at the Pre-Commissioning of Atoll, Zohr, and New Power Stations

Less than two-and-a-half years since its discovery, the supergiant Egyptian gas field Zohr has started production. Located 180km (110 miles) from Port Said and 1,500m deep in the Mediterranean, Zohr is expected to have 20 wells drilled by the end of 2019. The field is one of Eni's seven record-breaking projects and will soon be able to play its part in meeting Egypt's demand for natural gas for the coming decades.

Selected by Petrobel/Eni, **SAPESCO Industrial Services (SIS)** has been awarded more than 70% of the pre-commissioning activities of the whole project. The company is an active service provider in the pre-commissioning of the Early Production Facilities (EPF) provided by Schlumberger, along with the Mechanical completion of the project with Petrojet.

This selection is a reflection of **SAPESCO's** excellent performance in the oil and gas industry all over the country since 1985. The contract with Petrobel/Eni is for two years with potential activities' extension to further periods, as a result of confidence in **SAPESCO's** services.

The company's excellence in the petroleum sector has been proved by EGPC reports and its outstanding history with its clients. This trust has supported **SAPESCO** to expand its activities into the power sector by participating in the pre-commissioning of all Egypt's new power plants, including New Capital, Beni Suif, Hurghada, Sharm El Sheikh, ATAQA, Mahmoudia, Burullus, Asuit, and Port Said power plants.

Additionally, **SIS** has been awarded the pre-commissioning of the development of the first phase of Atoll field, which is one of the biggest gas fields in Egypt. The field's development has been executed and operated by Pharaonic Petroleum Co. (PhPC), BP's joint venture with EGAS and Eni.

SAPESCO's presence in Egypt's major projects in the energy sector represents a successful story for the company's team, reflecting the hard work, loyalty, consistency, and tenacity of **SAPESCO's** personnel in pursuing to achieve most outstanding performance and deliver the best services to Egypt's oil and gas industry.

R/V KOBI RUEGG

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

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

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

The vessel is particularly suited for the following project types:

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

AUV being deployed off back of vessel.

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Environmental Tsunami: What does it Mean for Egypt's Oil Sector?

As we enter 2018 and look at the international energy market, there is the traditional crystal ball approach: forecasting supply and demand and predicting the roller coaster oil and gas prices. The 2017 Brent price for oil hit a low of $44.35 and a high of $66.87; LNG prices in the Asian market ranged from a low of $5.4 to $11.2 per mmbtu. However, if one focused only on energy sector economics, the history making story of 2017 would be missed. An environmental tsunami has been unleashed.

In November 2017 Norges Bank Investment Management, which oversees Norway's Government Pension Fund Global, the world's largest sovereign wealth fund with Euro 860 billion in investments, recommended to Norway's Ministry of Finance that oil and gas should no longer be part of its benchmark index --- ironically Norway itself invests in oil and gas exploration and development in Norwegian waters . Moreover, on December 12, 2017, the World Bank, the pace setter of the international financial institutions, broke with the past and announced that, as of 2019, it will no longer support oil and gas exploration, most of which occurred in developing nations. Axa insurance has taken an unprecedented step by announcing that it will not insure tar sands pipeline projects. Further the sale (or the unloading) by institutional funds of fossil fuel investments has doubled in just one year to $5.2 trillion. These events come after, admittedly with a four year time lag, India's historical and pioneering 2013 adoption of a revised companies act mandating a company's directors to not only promote the best interests of the company but also protect the environment. Equating the interests of stockholders and the environment is literally a revolution in corporate thinking and other countries will be sure to follow India's lead.

What drives this revolutionary thinking was the push to the signing of the Paris Climate Agreement and a global appreciation, notwithstanding the US withdrawal from that agreement, that fossil fuels are a cause of climate change. Admittedly adoption of green energy cannot happen overnight, and fossil fuels, especially oil and gas, will be used for some time. However, with the pullout of the World Bank from energy financing, companies will no longer have a recognized independent institutional authority to give its "stamp of approval" of the environmental soundness of a company's proposed energy project. International banks will now be pressured to follow the World Bank lead and limit their lending for energy exploration projects. With the increasing loss of institutional financial support, fossil fuel projects will become more costly to undertake. Moreover the public, evidenced by the US Dakota pipeline protests to Peru Amazon riots, will continue to challenge fossil fuel projects.

What does this mean for Egypt? Egypt has effectively no choice but to develop its gas for domestic use ---- and not for export to Europe which will be subject to increasing environmental pressures to not support energy projects. Otherwise Egypt may well find itself with stranded gas reserves. Moreover, as international banks providing credit to the developers of Egyptian gas will be under increased scrutiny to ensure that they meet UN SDGs and do not conflict with the Paris Climate Agreement, the developers will be well advised to adhere to the highest and best technological standards in constructing its gas facilities to minimize inevitable environmental impacts. The World Bank has kicked off an environmental tsunami in the energy sector. 2018 will see this tsunami pick up increasing force.

By Jenik Radon

Adjunct Professor, School of International and Public Affairs, Columbia University

The Rising Potential of Egypt's Natural Gas Market

Egypt has a long history of gas production growth. Data from the Egyptian Natural Gas Holding (EGAS) illustrates that gas production peaked at 6.1 Bcfd in 2009. Few years later, production declined by around 30% to reach 4.2 Bcfd in mid 2017. However, I believe that recent Egyptian production decline will be arrested in the near-term by development of gas resources in proximity to existing infrastructure.Egypt is enjoying a re-invigorated upstream gas sector based on the giant Zohr discovery, go ahead for West Nile Delta (WND), and a range of other gas developments tied back to spare gas process plant capacity.

The IMF announcement in November 2016 to grant Egypt a $12bn loan, in addition to the floating of the Egyptian Pound, and outlining a strategy to eliminate energy subsidies, and create a fully functioning wholesale gas market are all promising measures for growth and stability within the natural gas sector.

Moreover, Egypt is opening the door to private participation in its natural gas sector, moving to end the state's monopoly.

The new law, the natural gas regulating law, signed by President Abdel-Fattah El-Sisi sets up a natural gas regulatory authority charged with licensing and devising a plan to open the gas market to competition. By signing this law, President El-Sisi is expanding the private sector role by allowing private firms to use the state import and distribution infrastructure to trade in natural gas. Private firms will be able to import, distribute, and store natural gas in Egypt, under the supervision of a state regulatory body.

The Egyptian natural gas market is still attracting considerable interest from major players, a recent example is BP's (10%) and Rosneft's (30%) acquisitions of stakes in Zohr.

Meanwhile, the World Bank is examining the feasibility of creating a regional Mediterranean energy hub premised upon Egypt. Supported by domestic gas market reform, unbundling in Egypt, and the impact of potential LNG exports from existing plants, this will significantly alter the market structure and pricing of gas in the region.

Reflecting on the latest regulatory and energy policy changes, Egypt is now back on track as the largest and fastest growing natural gas market in Africa.

By Mohamed El Haythem, Mphil, DBA, MBA, PMP

General Manager, Foreign Companies' Control at EGPC

Linking Performance Evaluation to Training Needs

As a new year begins, Human Resources (HR) managers reach out to supervisors to identify training needs in their departments. After each manager selects a set of training programs, he sends them back to the HR manager, who arranges those training programs and coordinates their preparation and implementation.

This training strategy is like going for an unplanned shopping, buying a lot of stuff, some of which you might not really need. Those training programs do not always fit the training necessities for employees, for many reasons including: the lack of connection between the training and the entity's strategy; the poor relation between the training and the employees' performance programs; in addition to the ambiguity of training needs. Besides, these training strategies are difficult to evaluate.

Now the question is: how do we plan a training strategy? First of all, I have to distinguish between two different educational programs inside any institution. We have the training programs which enable the employee to perform his current job, and the development programs which focus on helping the employee to undertake advanced jobs or promotions. Training strategies need to include both programs, and each of those two programs are based on employees performance evaluation results.

There are usually two scenarios for evaluating employees' performance. One is finding out that the employee had certain shortcomings while performing his job and this requires defining the aspects of this underperformance in relation to his job description and accordingly choosing the proper training programs. Second is an employee who fulfilled the task completely, and this requires planning a more challenging job for him in the future and introducing him to its job description.

Therefore, I recommend supplying managers with training programs that help them outline the employee's needs in his career path according to each training department. This includes the professional and behavioral qualification for employees from their start date and throughout their progression, and constantly updating the training content to keep up with international standards. Based on that, employee training will perfectly fit his needs, by either becoming more competent to perform the job or get promoted to do advanced jobs.

By Safaa Soliman

Director of Information and Media Department at EGPC

Economic Snapshot: Egypt's Economic Reforms' Ripple Effects ...One Year Later

The Government of Egypt (GoE) and Central Bank of Egypt embarked on unprecedented macro and socio-economic reform measures in 2016/17 aiming at decreasing the budget deficit and improving the foreign currency availability. In 2017/18, the GoE introduced another wave of reforms; in addition to new laws & regulations aiming at improving the investment climate and attracting investors.

Dcode Economic & Financial Consulting

Social Reforms

Social Safety Net

Increasing the amount allocated to individuals holding food subsidy cards twice to reach **EGP 50** in June 2017.

An **EGP 100** increase in the Takaful & Karama monthly allowance in June 2017. Currently, more than **1.9 million** families benefit from it.

15% increase in pensions in June 2017.

7% annual raise and **7%** hardship raise for state bureaucrats under the Civil Service Act.

Macroeconomic Reforms

Flexible Exchange Rate

EGP **floatation** in Nov. 2016

Increasing interest rates by **7 PPT** (on 3 phases)

Removing **foreign currency limits** on importers of non-essential goods

Consolidated Government Finances

Enacting the Value-Added Tax (VAT) of **13%** in Sep. 2016 and **14%** starting Jul. 2017

Increasing fuel prices by **38%** in Nov. 2016 and **55%** in Jul. 2017 in addition to **100%** increase in the price of LNG cylinders.

Increasing Custom Tariffs to range between **40-60%** for some "luxury" imports in Dec. 2016

Increasing electricity prices by **29%** for residential users, **35%** for commercial users and **52%** for industrial users in Jul. 2017

Increasing water prices by an average of **45%** in Jul. 2017

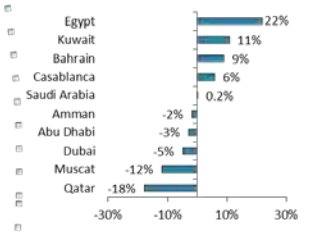
Legal Reforms

New Laws and Regulations

Value-Added Tax Law	Civil Service Law
Moveable Collateral Law	Industrial Licensing Law
Amendments to the Personal Income Tax Law	Adding part of public entities' private funds to state budget
Stamp Tax Law	Contractors' Remuneration Law
New Gas Law	New Investment Law

Effect on Business Climate

EGX: Top Arab Performer in 2017



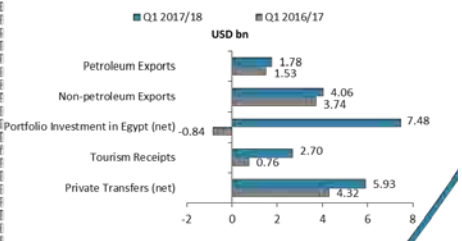
STANDARD &POOR'S

S&P revised Egypt's sovereign credit outlook up to **Stable** from Negative in Nov. 2016 and then to **Positive** in November 2017

Effect on External Sector

Foreign Reserves Hit a Record High

Significant Improvement in the Balance of Payments In Q1 2017/18



Moreover, Egyptian banks have collected **USD 59 bn** since the currency floatation

Effect on Gov. Finances

Higher Government Tax Revenues (51.54% Increase) in Q1 2017/18

- Budget deficit decreased from **12.5%** of GDP in 2015/16 to **10.9%** of GDP in 2016/17; according to a presidency statement.

Effect on Monetary Sector

Significant (yet Gradually Decreasing) Hikes in Inflation

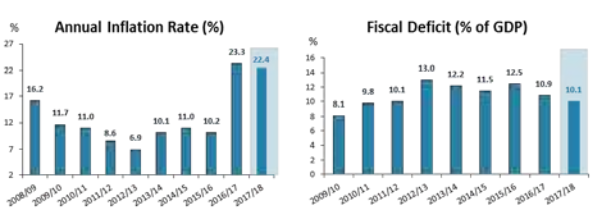
Effect on Real Sector

Higher Growth Rate; Lower Unemployment

Dcode EFC's Forecasts

Dcode EFC's Forecasts

- Dcode EFC projects economic growth to record **5.1%** in FY 2017/18; in line with GoE's target.
- We project the budget deficit to record **10.1%** in FY 2017/18. We affirm and maintain our projection of a declining fiscal deficit path over the medium term.
- We project the annual headline inflation to record an average of **22.4%** in 2017/18.



Government's Macroeconomic Targets

Macroeconomic Targets

- GoE is targeting a growth rate of around **5%** for FY 2017/18.
- GoE is targeting a fiscal deficit of around **9.1%** of GDP in FY 2017/18.
- The CBE is targeting an inflation rate **of 13% (+/-3%)** by the end of Q2 2018/19.

Laws yet to be Ratified in 2018

New Companies Act
New SMEs Law
Bankruptcy Law
Amendments to Capital Markets Law
Amendments to Leasing and Factoring Law
Consumers Protection Act
New Customs Act
Amendments to Gov. Procurement Law

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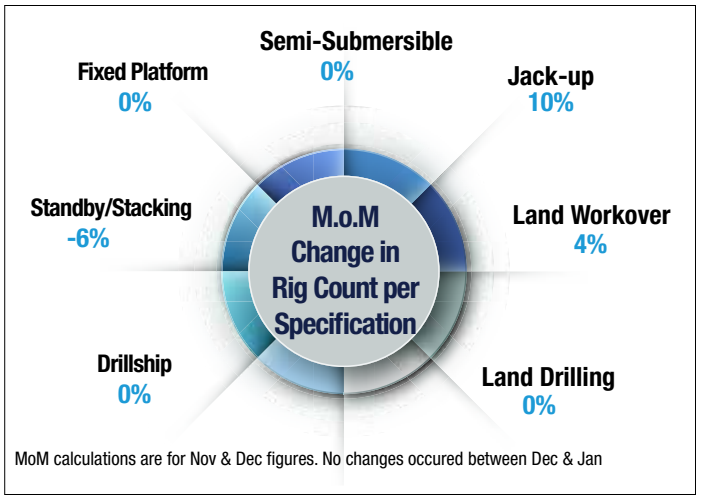
Rigs per Specification

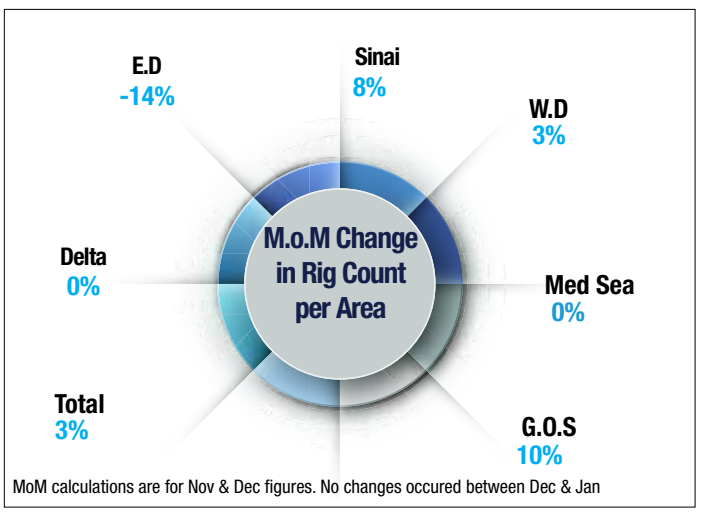
Date	Land-Drilling	Land Workover	Jack-Up	Semi Submersible	Fixed Platform	Standby/ Stacking	Drillship	Total
Jun-17	44	37	11	1	1	53	2	149
Jul-17	45	40	11	1	1	49	2	149
Aug-17	45	37	11	1	1	52	2	149
Sep-17	42	37	11	1	1	55	2	149
Oct-17	39	40	10	1	2	56	0	149
Nov-17	41	43	10	1	1	50	2	148
Dec-17	41	45	10	1	1	49	2	149
Jan-18	41	47	11	1	1	46	2	149



MoM calculations are for Nov & Dec figures. No changes occured between Dec & Jan

Rigs per Area

Month	G.O.S.	Med. Sea	W.D.	Sinai	E.D.	Delta	Total
Jun-17	9	6	61	13	6	5	100
Jul-17	9	6	59	14	6	3	97
Aug-17	9	5	59	13	5	3	94
Sep-17	9	5	61	11	5	2	93
Oct-17	10	4	64	12	6	2	98
Nov-17	10	4	63	13	7	3	100
Dec-17	11	4	65	14	6	3	103
Jan-18	11	4	65	14	6	3	103



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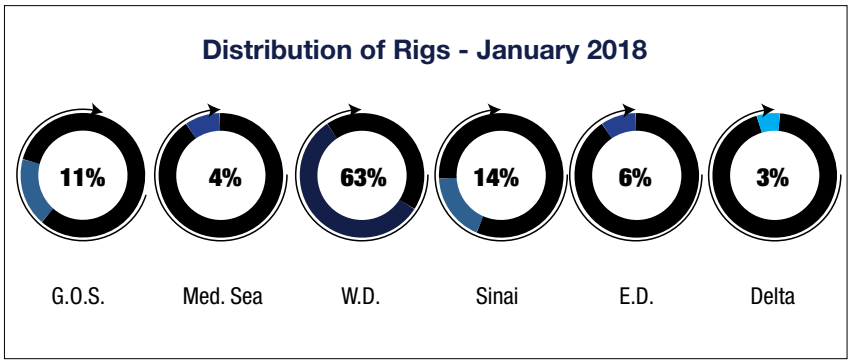


PRODUCTION Q4 2017

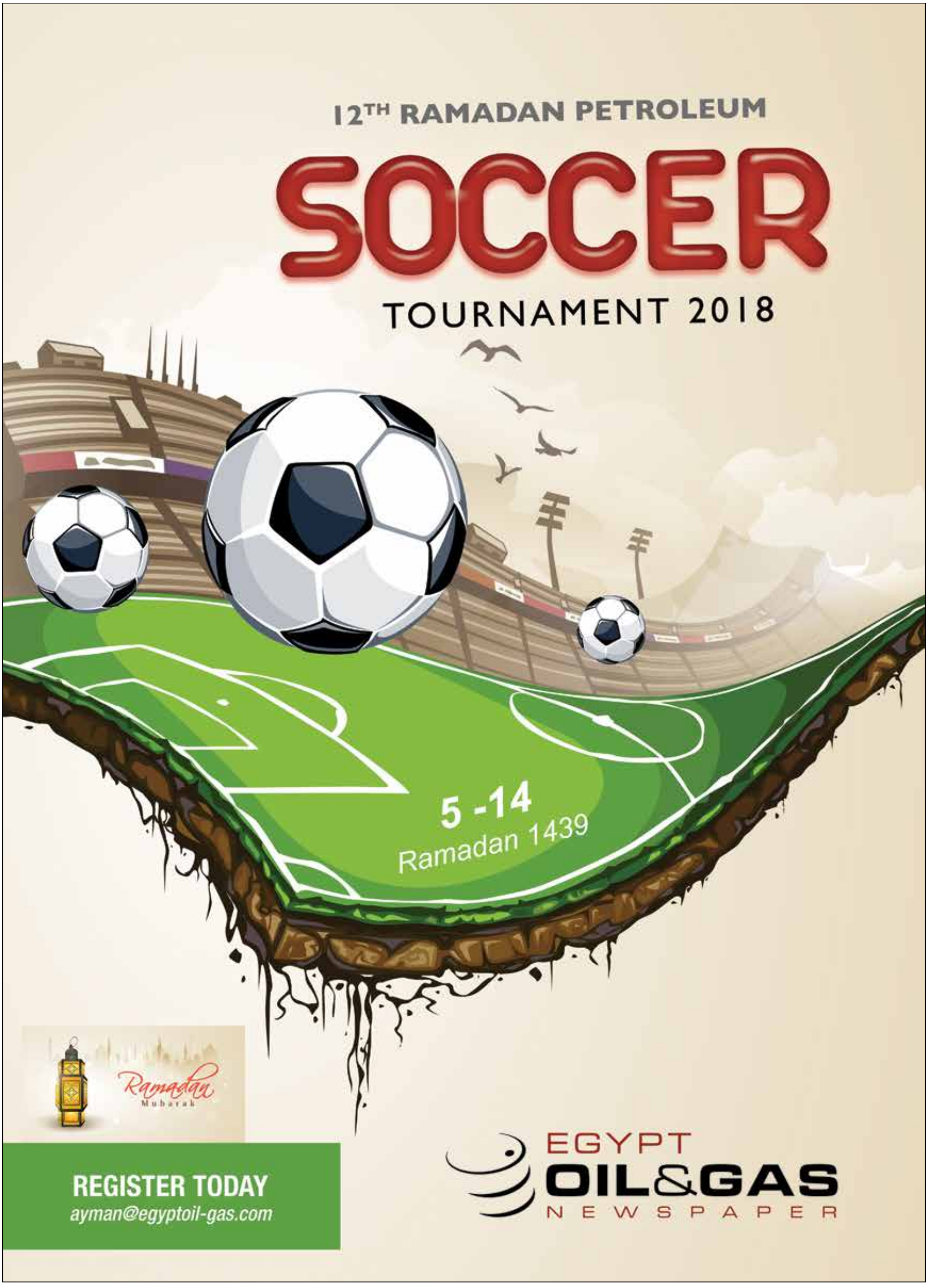
	Crude Oil	Equivalent Gas	Liquified Gas	Condensate
Med. Sea	117,115	37,161,769	584,721	1,955,439
E.D.	5,355,524	73,259	33,108	31,061
W.D.	28,310,371	21,085,393	1,690,048	3,834,397
GOS	11,614,394	2,169,250	866,451	285,850
Delta	110,829	21,647,884	480,202	1,108,035
Sinai	4,677,963	76,144	108,621	58,994
Total	50,186,196	82,213,699	3,763,151	7,273,776

*Natural Gas figures are in Boe. *Crude total excludes Upper Egypt production

Unit: Barrel

DRILLING UPDATES

Region	Company	Well	Well Type	Rig	Depth	Well Investments
Sinai	PETROBEL	113-A-75	Development	ST-3	6293	$1.64 M
	PETROBEL	113-199	Development	ST-1	9948	$2.66 M
	MEDITERRT	ASL-30	Development	SHAMS-1	4020	$272,835
	PETROBEL	W.FEIRAN-1	Development	ST-3	11900	$6.19 M
Western Desert	THARWA	EAS C-1X	EXP	TANMIA-1	7950	$1 M
	QARUN	ZAINA-7	Development	EDC-65	7550	$882,029
	QARUN	ED-81	W.Inj.	EDC-63	6650	$645,089
	PETROSILAH	WARD 1-2	Development	TANMIA-1	8550	$2M
	AGIBA	FALAK-24	Development	ST-8	10015	$1M
	NORPETCO	ABRAR S-7 ST-1	Development	ECDC-2	6774	$1.5 M
	PETROSILAH	SILAH-25	Developmnt	IPR-1	7550	$1.6 M
GOS	GUPCO	HILAL B-2	Development	ADMARINE-4	11950	$8.5 M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