

Egypt's Leading Oil And Gas Monthly Publication

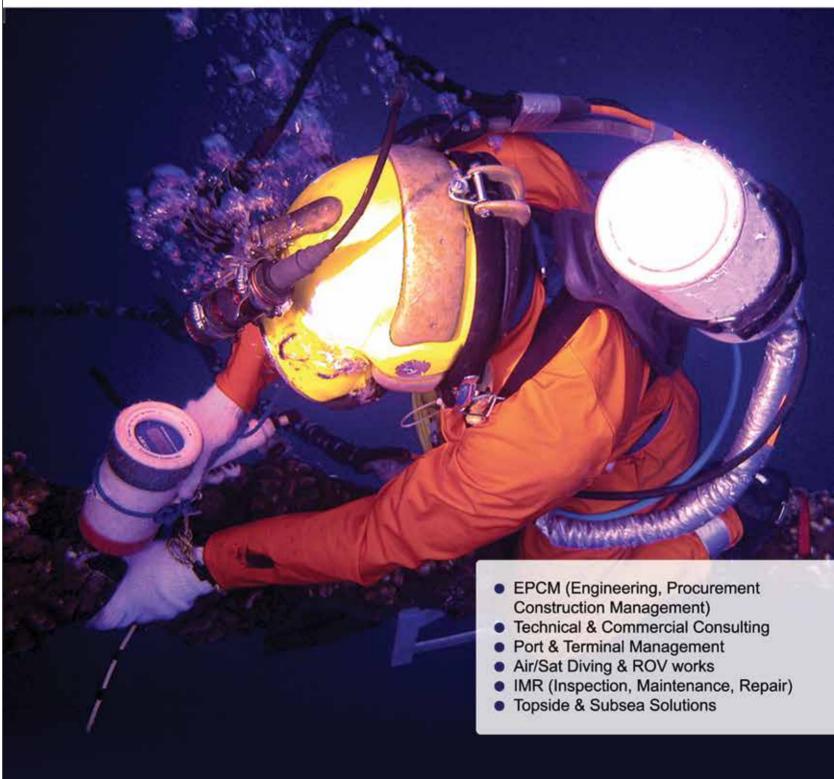
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MARIDIVE OFFSHORE PROJECTS





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A flawless infrastructure development is the main aim of all Oil companies, and in order to achieve such infrastructure a lot of time and thought should be dedicated to build from scratch something that's timeless, yet can be extremely flexible. In this issue you'll find all that you need to know about Upstream Infrastructure.

In our interview with Sayed Rezk, General Manager of the Chilean State-owned Enap Sipetrol - Egypt and General Manager & Managing Director of the JV Company PetroShahd, he got to explain for us how Sipetrol got to develop that iconic field and also he shared with us details about Sipetrol's future plans for it.

A lot of countries nowadays are switching to Plastic pipelines instead of steel. In this issue you'll find an article, that's supported by research studies and experts' opinion, which explains the difference between both and whether or not Egypt can switch too.

Egypt has always been aiming to be the Energy Hub for the region, yet there are many aspects to consider, Sara Samir, EOG's staff writer, talked to experts in order to know the modifications that should be applied to the infrastructure for Egypt to be the hub for the region.

On a personal note; I would like to say that it is a pleasure to be working with a distinguished newspaper such as Egypt Oil & Gas and to be a part of that magnificent team. I'd also like to thank my mentors, the ones that taught me everything I know. I'm eternally grateful.

inside this issue



Opportunity Ceased, Vision Implemented



Maridive's QHSE: a Leading Example in the Industry



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Reservoir Recovery Infrastructure: A Key Investment for Output Boom



Water Management Facilities Saving Money



The Wise Choice for Infrastructure: Metal and **Non-Metal Pipelines**



International Jurisdiction over **Corporate Corruption**



EGYPT'S LEADING OIL AND GAS MONTHLY PUBLICATION

Publisher MOHAMED FOUAD

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18TH OF MAY 2017 - SKY EXECUTIVE RESORT

ROUNDTABLE

THE DISCUSSION WILL FOCUS ON OPPORTUNITIES IN:

- Offshore: Mediterranean / Nile Delta & Gulf of Suez
- Onshore: Western & Eastern Desert
- Unconventional
- Industry Collaboration & Relationship Barriers





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BP Announces Third Gas Discovery in

North Damietta

British Petroleum (BP) announced in a press release that it made a new gas discovery in the North Damietta Offshore Concession in the East Nile Delta, Egypt. The Qattameya Shallow-1 exploration well was drilled to a total depth of 1,961 meters in water. Qattameya Shallow-1 well is located 60km north of Damietta city, 30km southwest of Salamat and only 35km to the west of Ha'py offshore facilities. BP has 100% equity in the discovery.

The wire line logs, pressure data and fluid samples confirmed the presence of 37 meters of net gas pay in high quality Pliocene sandstones. Options to tie the discovery back to nearby infrastructure are being studied.

BP's CEO, Bob Dudley, said: "Qattameya marks our third discovery in the block where we are already developing the Atoll field and appraising the Salamat discovery. This latest discovery confirms our belief that the Nile Delta is a world-class basin."

Additionally, BP's North Africa Regional President, Hesham Mekawi, said "We are delighted to sustain our success in these shallow Pliocene targets. We believe development of Qattameya could help unlock the resources in other nearby discoveries with similar shallow low-pressure characteristics. This is part of our long-standing commitment to Egypt and to unlocking Egypt's energy potential."

Meanwhile, Egypt's President, Abdel



Fattah El Sisi, met with the CEOs of BP, Rosneft, and Eni to discuss the progress on the companies' projects in Egypt, Al Borsa reported. Presidential spokesman, Alaa Youssef, said that the meeting was held in the framework of the president's periodic follow-up to the development of energy projects in Egypt. The heads of international oil companies expressed their optimism about the future of energy in Egypt in the light of recent discoveries of natural gas; with the assumption of the political leadership to develop gas and oil projects in Egypt, according to State Owned News Channel.

The meeting also focused on the activities carried out by the leading companies to highlight the partnership and cooperation between them and some companies operating in the Egyptian market.

The total investments in the Zohr field amounted to \$12b and are expected to reach \$16b throughout the life of the

BP Begins Producing from North Alexandria Concession

(BP)

Taurus and Libra fields, in its North Alexandria concession, to Burullus processing facility. The fields were initially producing 200mcf/d, at the end of March, which increased to the 600mcf/d in April, reported Al Borsa. Egypt's Ministry of Petroleum's plan is aiming to accelerate starting production from North Alexandria Concession, which stopped producing since 2011. The Ministry further plans to link the production of Giza and Fayoum fields through using Rasheed onshore Company's treatment facilities and adding new equipment and facilities to match the gas type extracted from these two fields during the third quarter of 2019.

Petroleum

600mcf/d of natural gas from the

Furthermore, the plan is aiming to link the production of Raven field, by the fourth quarter of 2019, to the new onshore facilities of the project, which is currently being established.



Production of Raven field started at 600mcf/d and it is rising gradually to 1.25mcf/d by the end of 2019. The proven reserves of the North Alexandria fields are estimated by 5tcf of gas and 55m barrels of condensates.

SDX Announced Gas Find in South Disouq Concession

SDX Energy Incorporation announced that drilling on the carried SD-1X well at its South Disouq concession, where it operates and holds a 55% equity interest, has reached its first target depth.

In addition, SDX Energy said that the well has hit its first target depth of 2,370m, encountering close to 20m of net gas pay in the upper Abu-Madi section. Drilling the will continue in order to study the underlying Abu Roash and AEB layers, which are believed to be oilbearing, according to The Oil&Gas Year. SDX' CEO, Paul Welch, commented "It is clearly very encouraging to have made a gas discovery at the first of SD-1X's target intervals. The 3D seismic data acquired and interpreted over the South Disouq concession has provided a very accurate view of the subsurface as the target interval has come in on prognosis. This provides us with additional encouragement for the deeper horizons where we are targeting oil. Any production testing of the Abu Madi or one of the deeper horizons will be undertaken after drilling operations have been completed and the rig has moved off location."

Welch added, "South Disouq is one strand in the SDX story. We have a



diverse portfolio of assets in Egypt and Morocco, including further exploration opportunities. Irrespective of whether we have further success at SD-1X in the deeper horizon, this gas discovery and the ongoing development and facilities upgrades across our asset portfolio mean that we remain on track to build our production profile and maximize the value from our producing, development and exploration asset base. I am optimistic about our ability to deliver for our shareholders and also in the deeper sections of this well and look forward to reporting on our results in due course."

Misr Petroleum Invested \$3b in Suez Canal

Suez Canal Economic Zone Authority's Chairman, Ahmed Darwish, stated to Al Mal News that Misr Petroleum Company's investment reached an amount of \$3b in the Suez Canal Area. The investments covered work on a 2.2m square meters land. The Suez Canal region ensures that investors are financially mature and committed before giving them in lands in the area. According to Darwish, Misr Petroleum Company is a firm that is in totally financing its own investments. The projected implemented in the Suez Canal area were mostly within the plans to develop Ain Sokhna. Yet, Darwish pointed out that East Port Said area is also being processed and will be finalized by years 2018 and 2019.

JBIC is Aiming to Invest in Egyptian Petrochemicals

Egypt's Minister of Petroleum and Mineral Resources, Tarek El Molla, had a meeting with a delegation of Japan Bank for International Cooperation (JBIC). The delegation was led by Executive Officer for Europe, the Middle East and Africa, Moriyuki Aida, accompanied by JBIC's Chief Representative in MENA, Naoki Tamaki, according to Al Mal. Aida said JBIC is currently considering participating in financing the planned petrochemical projects. He pointed out that JBIC has already contributed in a number of successful projects including funding a part of Egyptian Refining Company's project in Mostrood, which is one of the largest implemented projects in the oil and gas sector.

Egypt to Stop Burning Natural Gas by July

An Official source at the Egyptian Natural Gas Holding Company (EGAS) stated exclusively to Egypt Oil&Gas that it was decided to prohibit burning natural gas equivalent that is produced from all fields in different concession areas across the country starting July 2017. The decision was taken for two main reasons: first, to protect the environment. Second, the decision aims to deduct the cost of importing natural gas, which reached between \$10 to \$13 per 1mtu, based on gas quality. The source informed that the equivalent gas being burned will be pumped to electricity power plants during summer instead. The source also explained that preventing companies from burning gas will solve at least 50% of the electricity shortage during summer and will eliminate the power crisis before 2019.

Rockhopper Starts New Exploration Well in Egypt

Rockhopper Exploration and Kuwait Energy Combined have started drilling a new well in the Abu Sennan Concession in Egypt. Rockhopper Exploration has started the initial drilling of the Al Jahraa SE-2X new exploration well on the 26th of April 2017, ans stated that the well is one of two wells that are planned by Kuwait Energy, reported Proactive Investors. Rockhopper has a 22% stake in the Al Jahraa well, which is targeting the Cretaceous Abu Roash-C reservoir in a location immediate of the Al Jahraa South East discovery location. The company said that the well could add 20m barrels of in-place oil to the project if it is successful.

PetroZenima Connects Drilled Wells to Production Platforms



An official source at South Abu Zenima Petroleum Company (PetroZenima) stated exclusively to Egypt Oil&Gas that the company is currently implementing the plan of connecting drilled wells to production platforms.

The source added that the company has drilled eight wells in the 39km Mozhel field in the Gulf of Suez concession area. The first and second wells were connected and began producing from 500b/d to 800b/d of oil. Additionally, the company is working on the reform of the fourth well.

Furthermore, PetroZenima is connecting the third and fifth wells to production platforms at a cost of \$6m. The two wells are planned to be used to increase the field's production. The

rest of the wells will be connected soon to likely increase output and reserves of crude oil.

The source also mentioned that the company is currently conducting a seismic survey of a new exploratory well (SAZ) near Mozhel field with \$17m of investments. The well will be drilled after a month and a half after completing the current research and exploration processes.

South Abu Zenima Petroleum Company (Petrozenima) has been established as a joint venture company between Egyptian General Petroleum Corporation (EGPC) and National Petroleum Company (NPC) to carry out Muzhil Field Development in South Abu Zenima Concession.

Egypt, Jordan to Sign LNG Supply Agreement



Fajr Egypt's Chairman, Ahmed Mahmoud, said that the company is preparing to sign an agreement with Jordan's National Electric Power Company to supply 70mcf/d of LNG to Jordanian industries, adding that Fajr is conducting the necessary studies in cooperation with Egypt Gas. The company is also studying establishing a network of gas stations in Jordan in coordination with Gastec, he added during the company's general assembly to review 2016 results.

According to the Ministry of Petroleum's Press Release, Minister of Petroleum, Tarek El Molla, chaired the general assembly of Fagr to review the company's work, in the presence of the first Undersecretary of the Ministry for Gas Affairs, Chairman of the Egyptian Natural Gas Holding Company (EGAS)'s Chairman of the Board of Directors of Fajr Company, Fouad Rashad and representatives of the Accountability State Authority.

Fajr Egypt further carried out a number of gas delivery projects in Jordan in collaboration with some Egyptian petroleum companies. The Jordan projects included delivering gas to nine power stations. The company also contracted to implement a project to connect SCADA systems in the East Gas Company and Fajr Company, in addition to installing a camera surveillance system to follow the operation of the Arab gas pipeline up.

DRILLING

GPC

GPC, a state-owned company has completed drilling a new gas development well in its concession area in the Western Desert. The production rate of GPC in March 2017 was 125,000 barrels of gas and 1,508,505 barrels of oil.

NWS-1

The well was drilled at a depth of 9,500ft utilizing the EDC-16 rig. Investments surrounding the project are estimated at \$2m.

IEOC

IEOC, an Italian Research and Exploration company has completed drilling a new gas development well in its concession area in the Mediterranean Sea. (IEOC's production rate doesn't exist in attached image)

ZOHR-6

The well was drilled at a depth of 12,467ft utilizing the SPM-10000 rig. Investments surrounding the project are estimated at \$37.600m.

OAPCO

OAPCO, a joint venture company between EGPC and Sahara has completed drilling a new crude oil development well in its concession area in Western Desert. The production rate of OAPCO in March 2017 was 40,870 barrels of crude oil.

WQ34-15-19

The well was drilled at a depth of 7,200ft utilizing the ECDC-2 rig. Investments surrounding the project are estimated at \$1.2m.

PETROSILAH

PETROSILAH, a joint venture company between EGPC and MERLON international has completed drilling a new crude oil development well in its concession area in the Western Desert. The production rate of PETROSILAH in MARCH 2017 was 232,223 barrels of oil.

NSILAH-3

The well was drilled at a depth of 8000ft utilizing the ECDC-1 rig. Investments surrounding the project are estimated at \$1.5m.

BAPETCO

BAPETCO, a joint venture between EGPC and Shell, has completed drilling a new crude oil explanatory well in its concession area in the Western Desert. The production rate of BAPETCO in MARCH 2017 was 1,416,039 barrels of oil and 2,682,302 barrels of gas.

BED3C21

The well was drilled at a depth of 12,300ft utilizing the EDC-51 rig. Investments surrounding the project are estimated at \$2.6m.

TRANSGLOBE

TRANSGLOBE, a Canadian Research and Exploration company has completed drilling a new crude oil explanatory well in its concession area in the Eastern Desert. (transglobe's production rate doesn't exist in attached image)

NWG-27

The well was drilled at a depth of 7,700ft utilizing the EDC-62 rig. Investments surrounding the project are estimated at \$2.1m.

KHALDA

KHALDA, a joint venture between EGPC and Apache, has completed drilling new crude oil development wells in its concession area in the Western Desert. The production rate of Khalda in MARCH 2017 was 4,266,989 barrels of oil and 4,073,098 barrels of gas.

AG-100

The well was drilled at a depth of 11,200ft utilizing the EDC-1 rig. Investments surrounding the project are estimated at \$2,00m.

SALAM-76

The well was drilled at a depth of 6,300ft utilizing the EDC-61 rig. Investments surrounding the project are

estimated at \$1.00m.

PTAH-12

The well was drilled at a depth of 113,300ft utilizing the EDC-54 rig. Investments surrounding the project are estimated at \$2.00m.

RAS KAN-13X ST-1

The well was drilled at a depth of 15,430ft utilizing the EDC-57 rig. Investments surrounding the project are estimated at \$4.3m.

SHADOW-E2

The well was drilled at a depth of 13,600ft utilizing the EDC-47 rig. Investments surrounding the project are estimated at \$2.500m.

AGIBA

AGIBA, a joint venture company between EGPC and IEOC has completed drilling a new crude oil development well in its concession area in the Western Desert. The production rate of AGIBA in MARCH 2017 was 1,404,401 barrels of oil and 101,188 barrels of

MEL-102

The well was drilled at a depth of 9,200ft utilizing the EDC-64 rig. Investments surrounding the project are estimated at \$1.200m.

ESHPETCO

ESHPETCO, a joint venture company between EGPC and Russian LUKOIL has completed drilling a new crude oil development well in its concession area in the Eastern Desert. The production rate of ESHPETCO in MARCH 2017 was 148,357 barrels of oil.

RABEH-E-43

The well was drilled at a depth of 5,800ft utilizing the ECDC-6 rig. Investments surrounding the project are estimated at \$1.00m.

Iran to Join Oil Production Cuts

Iranian Oil Minister, Bijan Zanganeh, told media that Iran is ready to join the initiative of the Organization of the Petroleum Exporting Countries (OPEC) to cut oil production, reported Oil Price.

Zanganed said that most oil producers support an extension of output cuts by OPEC and non-OPEC countries, and Iran would also back such a move despite being exempted from the initial production cuts agreement, which allowed it to boost its crude output to about 4m barrels, informed Reuters.

The country produced enough oil to be comfortable for the time being. The Iranian oil production level serves as a sufficient base for it to continue to ramp up production until May 25, when OPEC will meet in Vienna to discuss extending the cuts beyond June 2017. Saudi Arabia, Kuwait and most other OPEC members are targeting the extension if the agreement is reached with other producers.

Meanwhile, The Organization of Petroleum Exporting

Countries (OPEC) reduced March's output by 153,000b/d to around 31.9mb/d, ForexLive reported, citing OPEC's official statement.

OPEC's 11 members with supply targets cut output to around 29.76mb/d compared to around 29.8mb/d target, suggesting a compliance of 104%, as informed on Seeking Alpha.

Saudi Arabia, the largest producer in the cartel, cut output to 9.9mb/d from February's level of 10.01mb/d. Thus, the Saudi production had reached its lowest since the beginning of 2017. The output production is considered below the level that was supposed to be maintained by Saudi Arabia as part of a global deal to decrease crude supplies.

Additionally, the United Arab Emirates (UAE) made progress in reducing oil production by more than 139,000b/d in March which reassured its commitment to the OPEC cut deal.

Furthermore, OPEC raised its forecast for world

oil demand in 2017 to 1.27mb/d from the prior 1.26mb/d. However, the estimation for OPEC demands in 2017 decreased by 130,000b/d to 32.22mb/d, due to higher supply from non-OPEC members. The cartel said that expectations for non-OPEC oil output growth were 400,000b/d for March and 580,000b/d for April.



Oman Oil Company, Kuwait Petroleum International Sign JV Deal for Duqm Refinery

Oman Oil Company (OOC) signed a joint venture agreement with Kuwait Petroleum International Ltd (KPI) this week for developing the Duqm Refinery and Petrochemical Complex with an investment of around \$7b in the Duqm Special Economic Zone, Gulf Business reported.

The Duqm refinery and petrochemical project is expected to have a capacity of 230,000 b/d by 2019 after completion and is predicted to be one of the most significant industrial projects in the Duqm Special Economic Zone transforming the zone into one of

the key industrial and economic hubs in the sultanate.

According to Muscat Daily, "35% of the project will be funded by the two companies with the remaining amount to be raised from local and international banks, "Oman Oil Company CEO, Hilal al-Kharusi stated.

The two companies formed a joint team to discuss and assess tenders from contractors for the construction and management of the facility.

The agreement came after Abu Dhabi's International Petroleum Investment Company's withdrawal from the project

in 2016 after first founding a joint venture with Oman Oil Company in 2012.

The finance for the scheme is set on a 60% equity base. Meanwhile 40% of the equity required for the project will be financed via debts that will mostly come from international banks and from export credit agencies.

Installed in the special economic zone of Al Wusta, the projects's proximity to the region's seaport gives the Duqm refinery an important advantage in international shipping lines in the Indian Ocean and the Arabian Sea.



Iraq Mulls Exemption from OPEC Cut Deal

Iraq may seek to be exempted from a deal between oil exporters to reduce global supply in order to support crude prices and ask to boost its own output, the leader of the nation's Shi'ite ruling coalition, Ammar al-Hakim, told Reuters.

During a statement in Cairo, Hakim cautioned that Baghdad could ask to be exempted from the deal because the country needs its oil income to fight the Islamic State, Hellenic Shipping News informed.

In addition, Iraqi Oil Minister, Jabbar Al Luaibi, stated, during an energy conference in Baghdad, that the country is planning to increase crude oil output from 4.4mb/d to 5mb/d by the end of 2017, reported the Alpena News.

Al Luaibi didn't announce which of the Iraqi oil fields would produce enough amounts to increase the country's output.

The Minister informed that Iraq is further planning to add 15b barrels to production by 2018. The country has added 10b barrels to production during 2017, which boosted Iraqi total reserves to 153.1b barrels.

Meanwhile, Iraqi oil marketer SOMO said that, following the decision of



the Organization of the Petroleum Exporting Countries (OPEC) to cut production in January 2017, Iraqi production decreased by 300,000b/d to be around 4.5mb/d in March, reported PPP Focus.

OPEC's Secretary General, Mohammed Barkindo, told reporters that the members of OPEC would discuss whether to extend the production decrease agreement during a meeting that will be held in May 2017.

Oman Announces Downstream IPO

Oman plans to offer shares of some stateowned downstream energy companies to the public, partly to raise money as low oil prices pressure its finances. Gulf Base reported, citing Oman's Oil and Gas Minister, Mohammad bin Hamad Al Rumhy. According to the minister, the downstream companies that will see their shares listed are Salalah Methanol Company and an unnamed driller, Oil Price informed. "We are looking at the initial public offering (IPO) option because we want to give a boost to the local stock market, and we want to see more foreign direct investments coming to the country," Al Rumhy stated to

ExxonMobil, Qatar Petroleum to Develop Cyprus' Block 10

ExxonMobil Corporation and Qatar Petroleum signed early April an and production sharing contract with the Republic of Cyprus for the development of the country's Block 10, Sigma Live reported. Drilling operations are already being planned and the first exploration well is expected to be drilled in 2018. Qatar Petroleum's President and CEO, Saad Sherida Al-Kaabi, said, "This agreement expands international upstream footprint into the eastern Mediterranean for what we hope is one of the most promising

opportunities in the area." According to In Cyprus, the agreement includes a commitment from ExxonMobil and Qatar

Petroleum to acquire 3D seismic data.

Aramco Signs MoUs for Petroleum, Energy Collaboration

Saudi Aramco signed early April different memorandums understandings (MoU) covering energy and oil and gas technology, Hellenic Shipping News reported. Shipping added that the first MoU was signed with Abu Dhabi National Oil Company (Adnoc). The deal establishes a collaboration to identify technologies that could deliver improved operational performance and efficiency across the oil and gas value chain. Commenting on the agreement, the UAE's Minister of State and Adnoc's CEO. Sultan Ahmed Al Jaber, stated, "Innovation and technology are critical to our growth strategy, and there is a strong focus on integrating new technologies into our upstream and downstream operations, as we work to harness maximum value.



Eni Finds Gas and Condensates in Libya



Italy's Eni has made a new gas and condensates discovery in Contract Area D, offshore Libya. The new discovery has the capacity to deliver, in production configuration, as much as 700,000boe/d, Offshore Magazine reported.

The Italian company drilled the B1 16/3 well on the Gamma prospect in 150 meters of water, 140km off the Libvan coast. The discovery well reached a total depth of 2.981 meters and presented gas and condensates in the Metlaoui Group of Eocene age. As informed by World Oil, the drilling of the Gamma prospect is part of the "near-field" exploration strategy of Eni. Through the drilling, the company is targeting opportunities that, in case of success, can exploit synergies with existing infrastructure reducing the time to market and providing additional gas to the local market and export.

The new as and condensates discovery is located 15km southwest of the Bouri field and 5km north of the Bahr Essalam field.

Additionally, Libya's El Feel oilfield, operated by a joint venture between Italy's Eni and Libya's National Oil

Corporation (NOC), is ready to resume production after two years of no operartions, Bloomberg reported.

As informed on Oil Price, the field, also known as Elephant, could add up to 90,000b/d to Libya's oil output. The field's pumping is set to restart as soon as the member of the Organization of Petroleum Exporting Countries (OPEC) fixes an electricity outage.

El Feel is an oilfield dependent on oil from Libya's largest field, Sharara, to generate its power. Sharara has not been operating because of a valve closure. Accordingly, El Feel and Sharara crude remains under force majeure, which is a legal status protecting a party from liability if it cannot fulfill a contract for reasons beyond its control.

A revival in Libya's production will put pressure on OPEC and other major producers that agreed in 2016 to cut output to stem a glut and shore up prices. The North African nation, exempted from OPEC's cuts because of its internal strife, was producing 490,000b/d as of April 11, less than a third of the 1.6m it pumped before a 2011 uprising.

Kuwait to Receive \$1b for Refinery Renovation



Kuwait's Al-Ahmadi Oil Refinery, which is managed by Kuwait National Petroleum Company (KNPC), will receive \$1b in funding from the Japan Bank for International Cooperation (JBIC), in addition to Japanese megabanks and a major British financial firm, EOG Asia reported. The funds will be used to renovate the refinery which is located in southern Kuwait.

According to The Japan Times, JBIC, Sumitomo Mitsui Banking Corp., Bank of Tokyo-Mitsubishi UFJ, Mizuho Bank and Britain's HSBC will share the funds in 11-year loans. The commercial lending portion will be covered by the Nippon Export and Investment Insurance's overseas investment insurance.

Additionally, the Japanese engineering company JGC Corporation will participate in the project to enable Al-Ahmadi Refinery to produce gasoline, gas oil and jet fuel according to

European standards.

This is the first foreign fund to be procured by KNPC. The Japanese investors expect it will strengthen Japan's economic ties with Kuwait and help Japanese companies win orders for large-scale infrastructure development projects Kuwait may launch in the future.

Accordingly, Kuwaiti governmental data indicated that the country's exports of crude oil to China in February 2017 increased by 16.5% from February 2016, on daily basis to 1.07m tons, equivalent to around 281,000b/d, KUNA reported.

As informed by MENAFN, the General Administration of Customs announced that in January and February 2017, Kuwait exported 266,000b/d of oil to China

Algeria Not to Exploit Shale Gas

Algerian Energy Minister, Noureddine Bouterfa, announced that the country will not exploit shale gas in the short term. As he explained, Algeria already has enough quantities of other natural resources, which includes natural gas, Xinhua reported. The minister also acknowledged that future prospects in the energy sector point out to renewable energy, and noted that the sector has been experiencing a fast evolvement in terms of technologies applied in energy generation, Sina informed. Bouterfa's remarks came on the sidelines of a conference on renewable energy held in western Algiers. The minister further said that Algeria's energy mode could change by 2050.

Iraq to Build 3 Gas Processing Plants

Iraqi Oil Minister, Jabar Al Luaibi, stated to Reuters that Iraq will establish three natural gas processing plants aiming to reduce flaring. The plants will process the natural gas that is being flared at southern oil fields, which will be used it

in power generation and in increasing the Iraqi income from energy exports. Al Luaibi stated, "The ministry is seeking to end the flaring of associated gas in the next few years, despite the economic and financial challenges." Accordingly, Iraq's natural gas output will triple to 1,700mcf/d by 2018 as flaring-reduction projects are developed, Luaibi announced at an energy conference in Baghdad on April

Sound Energy to Mobilize Rig to Morocco's Sidi Moktar

Sound Energy, the African and European focused upstream gas company, recently announced in a press release the mobilization of a rig to the company's Sidi Moktar asset, onshore Morocco, World Oil reported. According to Oilfield Technology, the company announced that the mobilized rig is the SAIPEM rig used to drill the firm's most recent Tendrara well (TE-8), which will, upon arrival in May 2017, execute the re-entering and testing of the two existing wells on the Kechoula discovery. Two wells have already been drilled by previous operators and have been estimated to have an unrisked mid case original gas in place (GOIP) of 293bscf (gross).

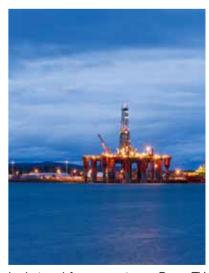
US Greenlights BP in Iran

UK's BP and the National Iranian Oil Company (NIOC) have received a license from the US Treasury to operate their joint gas field in the North Sea following the lifting of Western sanctions on Tehran, reported Reuters. According to Press TV, the BP stated that the authorization was obtained in September 2016.

The Rhum gas field contains 22.6b cubic meters of gas. The field was discovered in 1977. However, in 2010, production was suspended due to sanctions imposed by Europe over the Iranian nuclear program. Then, operations were resumed in 2014 after Britain agreed to set up a temporary management scheme whereby all revenue due to Tehran would be held until sanctions were lifted.

Although the field's current production is not clear, it is believed to be capable of producing around 8.5m cubic meters daily at its peak. In its 2016 annual report, BP emphasized it had obtained a net profit of \$31.6m over the year from its 50% stake in Rhum field.

Meanwhile, Iran had sold all the oil it



had stored for years at sea, Press TV informed, citing oil market sources. According to the news portal, this is a sign of the country's positive performance in marketing its vital crude oil supplies.

However, Reuters reported that now Iran is struggling to keep exports growing as it grapples with production constraints and the end of its floating storage.

Cairn Energy Discovers Oil Offshore Senegal



Cairn Energy, in partnership with the Australian independent FAR Ltd, announced late March the discovery of oil at the VR-1 well, located on offshore Senegal, Offshore Energy Today reported.

As Natural Gas World informed, VR-1 is located 5km from the SNE-1 well, which was discovered in 2014. Drilling operations at the VR-1 reached a depth of 2,759 meters. Wireline logging and sampling through the SNE section are complete and preparations are underway for deepening the well into the Aptian carbonate objectives below the SNE field.

FAR's Managing Director, Cath Norman, said: "The VR-1 well has been highly successful, providing important information regarding the geology of the western flank of the SNE field, and in particular the nature of the 500 series reservoirs. Understanding these reservoirs are critical to finalizing the Phase 1 development concept and plan."

According to Cairn, the results of the VR-1 well, together with the recent SNE-5 results, will lead to a revision of contingent resource estimate for the SNE field and have an impact on the design of the development plan in the coming months.

In related news, China's CNOOC Ltd has agreed to collaborate with Australian minnow FAR Ltd to search for oil and gas prospects in what is considered to be encouraging frontier off Senegal and Gambia over the next two years, Reuters reported.

According to Petroleum Africa, FAR Ltd. and CNOOC UK signed an Area of Mutual Interest (AMI) agreement that covers selected licenses offshore Senegal and The Gambia. The AMI states that FAR and CNOOC will partner in evaluating, bidding, negotiating and managing JVs on farm-in and open acreage opportunities for oil and gas licenses.

"The partnership and AMI (Area of Mutual Interest agreement) with CNOOC UK dramatically enhance FAR's ability to acquire new assets in our core strategic geographic area of expertise," FAR Managing Director, Cath Norman stated.

Previously FAR announced that it is collaborating with Woodside Petroleum and Cairn Energy to develop a deep water oil field in Senegal and in late March it acquired an 80% stake in blocks off Gambia, just south of the Senegal acreage, from Erin Energy Corp.

Uganda Expects \$20b in Oil and Gas Investments

Uganda's developmental plans in the oil and gas sector will allow the country to gain up to \$20b in investments in the next three years. The African nation currently begins its first developmental phase, which involves the construction of a crude oil pipeline to be completed by 2020, Oil News Kenya reported. According to Procurement and Logistics Online, the projects cover the 24-inche 1445-kilometer crude oil pipeline, an oil refinery in Hoima, amid other facilities that are expected to be launched by the end of 2017 when the final investment decision (FID) is reached.

The Front End Engineering Design (FEED) has already started and is expected to be finalized by the end of 2017 at the cost of \$11m with Gulf Integrated Engineering holding the project.

NIPCO Acquires ExxonMobil's 60% Stake in Mobil Oil Nigeria

NIPCO Investments Limited, a subsidiary of NIPCO Plc, took over the 60% majority equity stake of ExxonMobil Oil Corporation in Mobil Oil Nigeria Plc late March. The negotiation is considered to be one of the biggest deals in the downstream sector in the recent years, The Nation reported.

According to 4-traders, the \$294.3 acquisition was finalized after the approval of the Securities and Exchange Commission (SEC) and the Nigerian Stock Exchange (NSE). Cordros Securities Limited acted as the execution stockbroker for the deal. In October 2016, ExxonMobil and NIPCO signed a sale and purchase agreement (SPA) to sell the former's majority equity stake of 60 % in Mobil Oil Nigeria (MON) to NIPCO.

Agip \$13.5b Project Boosts Nigeria's Oil Production



Nigeria's daily crude oil production is expected to rise as the Nigerian Agip Exploration Limited (NAE) starts work on Zabazaba deep water project, which is expected to gulp \$13.5b. Agip will start taking in commercial proposals for the project this month, All Africa reported.

The Nigerian Content Development and Monitoring Board (NCDMB) and NAE are calling for commercial tenders from bidders after the completion of the technical evaluation for the main packages of the project with the aim to boost local content. The packages cover the floating, production, storage and offloading (FPSO) units, subsea, installation and rigs, The Guardian informed.

The Executive Secretary of Nigerian Content Development Monitoring Board (NCDMB), Simbi Wabote, noted that the board fast-tracked its evaluations and approvals on the Zabazaba project to increase Nigeria's

crude oil production and create opportunities for the growth and development of Nigerian content.

The project is expected to develop oil and gas reserves in the range of 560m barrels of oil equivalent. According to NAE's project plans; the Zabazaba field will be developed first and will be followed by the Etan field three years later to be tied back to the Zabazaba FPSO from where the produced hydrocarbons will be processed and exported.

In related news, Nigeria's Warri oil refinery reopened and is back to operation with 60% of its installed capacity after a maintenance period, Reuters reported.

Early March, the Nigerian National Petroleum Corporation (NNPC) announced it had shut down the refinery due to technical operational issues, Vanguard reported.

China to Increase Oil Imports from West

Africa

China will import record amounts of crude oil from West Africa in April. The OPEC's supply cuts allowed other nations to attract the fast-growing Asian market, Bloomberg reported. According to South China Morning Post, top West African producers Angola and Nigeria will export crude oil to China at the rate of 1.48mb/d in April, which is considered the highest rate since August 2011. Total Asian imports of West African crude are expected to reach 2.4mb/d during April.

The Organization of Petroleum Exporting Countries (OPEC) has been restricting the oil output to drain the worldwide glut that affected the crude prices for nearly three years. The 2017 OPEC'S cuts increased the Middle Eastern oil prices. Accordingly, Asia has been approaching other suppliers for crude, including Africa and the US.

KBC Advanced Technologies' Principal consultant, Ehsan UI-Haq, commented to Bloomberg, "In the absence of Middle Eastern barrels, there is no other alternative for Asian refiners than to remain on a buying spree to meet regional demand."

Meanwhile, In line with its plan to



support the Organization of Petroleum Exporting Countries' (OPEC) move to limit production, Angola's staterun Sonangol has reduced its May exports by taking two cargoes out of circulation, an oil trader informed Reuters.

Accordingly, Angola will export 1.61mb/d from 52 cargoes, down from 1.67mb/d from the original 54, Petroleum Africa reported.

Sources noted to Reuters that two cargoes that were supposed to load in May were postponed to June. The takers are an end-month Dalia, which was with Sonangol and a Cabinda, which was meant to load with Eni.



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uring April 2017, Egypt oil & gas Newspaper has met with Eng. Sayed Rezk, General Manager of Enap Sipetrol Egypt and General Manager & Managing Director of the JV Company "PetroShahd", sharing the history and all recent E&P developments of East Ras Qattara (ERQ) concession in the Western Desert.

Sipetrol in Egypt

ENAP Sipetrol, is a subsidiary of the Chilean State-owned ENAP which is a multinational entity engaging in a variety of activities related to both upstream and downstream operations in several countries such as Chile, Argentina, Ecuador and Egypt. Enap Sipetrol has been in Egypt for more than 14 years with investments in several concessions in the Western Desert, North Sinai & offshore Mediterranean. Currently, it operates only East Ras Qattara Concession in the Western Desert with 50.5% participation and 49.5% for Kuwait Energy Egypt (KEE).

East Ras Qattara Concession

Approval Phase

In 2004, Sipetrol acquired the ERQ block as a sole bidder where no one has considered such area as valuable at the time where 15 dry unsuccessful wells been drilled in the concession by several international oil companies whom considered the FRQ area is outside the hydrocarbon pathway due to the absence of the mature source basin. After several special geological studies made and dry hole analysis, ending up with a conclusion that the main reason of failure of drilled wells was complexity of the existing structure. Late 2005, Sipetrol conducted its first 1,500 km2 of 3D seismic program followed by drilling and exploring three successive oil fields with 100% success ratio; namely Shahd, Ghard & Rana and followed by other discoveries for Al Zahraa, Shahd SE, Shebl and Diaa.

By the end of 2007; Sipetrol have managed to accomplish its Exploration commitment with EGPC, which was set to be delivered in 7 years' time with such three remarkable oil discoveries, producing around 1,000 barrels per day. Eng. Rezk do believe that they could have achieved it in less time, except for the fact that the paper work took longer than expected to be signed. "If the paperwork didn't take as much time as it did, we could have set a record as the first company to explore, drill, and produce three wells in less than 6 months and establish a joined venture a year after" added Eng. Rezk.

"If the paperwork didn't take as much time as it did, we could have set a record as the first company to explore, drill, and produce three wells in less than 6 months and establish a joined venture a year after"

Sipetrol has witnessed immense production growth in the last six years after drilling several wells in the area and acquiring more than 9 Development Leases. In 2008, production was 2,925 BOPD to reach a peak production record of 27,000 BOPD in December 2014 where Sipetrol has achieved a gas condensate discovery from the Jurassic Wadi El Natrun sand for the first time in the Egyptian Western Desert which opens the door for a new potential reservoir that was unseen before. Today daily production exceeds 17,000 BOPD and accumulated production has reached more than 45 MMBBL in spite of suspending the drilling activities for more than 28 months till getting the necessary approvals.

Construction Phase

Enap Sipetrol had a clear vision that their production levels will increase massively, so in 2008, they decided to sign with Apache to build the PetroShahd receiving facilities in Qarun Petroleum Company Base on Wahat Road.

The Qarun receiving station can hold up to 140,000 barrels before distribution and all the processes are made under the supervision of Qarun Petroleum. "The crude oil that we receive at PetroShahd receiving facilities in Qarun base is that of high quality, it's what we call 'on-Spec' with an API over 40" added Eng. Rezk.

"We've also managed to enter into a partnership with Apache to build a third train treatment centre with 13% of the total production, which was equivalent to 3,000 barrels" said Eng. Rezk adding that "Later on we decided to build our own fourth train treatment centre in order to create our own production lines".

But as production rate increased Sipetrol faced the dilemma of transporting crude oil across the desert, and that's when PetroShahd pipeline was planned to be built "by the end of 2014, our production has peaked to be 27,000 BOPD and back then, we used trucks to transport our crude oil production from the wells to PetroShahd receiving facilities in Qarun base, but we were not satisfied with that process so we thought of construction of a transport pipeline as an alternative" explained Eng. Rezk.

The main and most important reason why ENAP Sipetrol decided to build the pipeline was to eliminate all Health and Safety hazards, in addition that ENAP main KPI strategy towards the environment is to comply with the industry's best practices and the Egyptian regulations.

Eng. Rezk believes in ERQ value which is managed by expert technical team with continuous development in the infrastructure serving the operations with optimum lifting costs of $\pm~2.4~\text{\$/}$ bbl that is considered the lowest in the Western Desert area.

Future Plans

Enap Sipetrol has aggressive plans to drill in the area believing that the concession has huge potential that is yet to be explored that will help them produce more than double of what they are producing at the moment.

Mr. Rezk highlighted that the importance of ENAP Sipetrol's Gas/Condensate discovery in December 2014 will certainly add importance to the overall upstream portfolio of Sipetrol Egypt and contribute in country resources for gas supplies. In the meantime, full assessment for gas



"Later on we decided to build our own fourth train treatment centre in order to create our own production lines".

potentiality is undergoing using a high resolution seismic data in order to detect future drilling locations that will confirm the potentiality of the gas in the area.

In parallel, Enap Sipetrol is undergoing comprehensive studies to evaluate the optimum gas facilities required for the gas project, including a gas pipeline that will extend from ERQ Concession to tie in with GASCO 32" gas pipeline to Al-Amreya gas complex in Alexandria, with length of 77 km and 12 inch size.

Although the international oil prices have fallen rapidly from second half of 2015, and outlook for recovery is still unclear especially after currency floatation.

ENAP Sipetrol still believe that crude oil & natural gas resources will always be a vital and primary sources of energy in the world and Enap is a state owned Chilean company opened to the world with short-medium to long term business vision. During Feb 2017 Enap CEO Mr. Marcello Tokman together with Enap E&P CEO Mr. Hesketh Streeter were present in Egypt where they have visited H.E. Egyptian Petroleum Minister, Eng. Tarek El Molla with the objective of having close business insight and strengthen the presence of Enap in the country. The meeting has been covered by the media where it has positively marked up the effective relationship between EGPC and ENAP Sipetrol with mutual understanding for growth and maximizing the economic and financial value of Sipetrol in Egypt.

Finally, Eng. Rezk is extremely optimistic of Sipetrol future and has an optimistic vision about the industry in the near future under the current management regime of Mr. President El Sisi and His Delegates.

MARIDIVE'S QHSE:

A LEADING EXAMPLE IN THE INDUSTRY

uality, health, safety, and Environment (QHSE) are the most important aspects that any company, especially in the field of Oil and Gas, should put into consideration. Many International and national companies always set a keen eye on potential threats to manage to find solutions to overcome them and also they look for the best ways to increase efficiency when it comes to their work.

Maridive Group, the largest company providing offshore marine and oil support services in Egypt, and the largest regionally, has that keen eye on QHSE and considers it to be one of its great assets and an integral part of its management system that has helped it improve the company's performance.

Among the methods used to achieve this goal, Maridive had signed a contract with Haztek International to help restructure and continue to improve its QHSE methods. Haztek International is a consultancy agency in London that has over 20 years of experience in providing solutions to oil, gas and power companies that entitles the development and improvement of the QHSSE system, already applied at Maridive, to be an Integrated Management System (IMS) by conducting trainings and workshops, guidelines and procedures for the staff and employees.

These developments were achieved via IMS training sessions for Top Managements, Steering Committee, and Key Personals at Maridive that consisted of 3 extensive sessions so far, the 4th session will initiate on 2nd week of May 2017 for selective internal auditors. After the conclusion of the IMS training sessions, internal audit will be performed to ensure the application of new methods learned and their consistency.

Haztek also took part in consulting the steering committee at Maridive to prepare the requirements of Quality management system according to ISO 9001:2015, Environment management system and according to ISO 14001:2015, Occupational Health and Safety management system according to ISO 45000, which's still a draft and yet to be implemented.

Those IMS requirements insures Maridive's modernization by changing style of management, setting a common business language for dealing with customers and suppliers worldwide, increasing company effectiveness and efficiency, and building quality into services from basic phase onwards. Haztek was also responsible for creating a framework for Maridive to guarantee continual improvements by helping employees better understand their roles and functions, and by motivating staff and employees by setting clear business goals.

The training ensures that Maridive's employees are competent; well trained, qualified, and experienced with a positive attitude who contribute actively in developing and maintaining procedures to ensure reporting, investigating, recording and analyzing accidents & incidents for better performance and lesson learned.

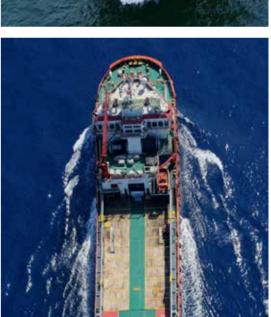
Via the training; Maridive was also able to decrease Direct costs, which are measurable costs arising directly from an accident and/or claim for liability under the civil or criminal courts and Decrease Indirect costs, which are the costs that may arise as a consequence of an incident or accident.

About Maridive Group

The company was established in 1978 in Port Said as a Joint Stock company. Maridive Group has expanded over the years together with its subsidiaries Maridive Offshore Projects, Maritide, Valentine Maritime and Ocean Marine FZC. Now has a strong reputation for excellence and efficiency in the offshore oil and gas services fields. We have a long track record with our loyal customers and the company's goal is to continue to diversify with a global footprint.

Today Maridive Group owns 73 marine units and service boats representing the largest integrated fleet operator for oil services in the region. Moreover, Maridive is acknowledged to be one of the most competitive companies of its kind in terms of vessels, equipment and new technologies in underwater works, construction and project management services.













Petroshahd Pipeline:

IN SIMPLICITY LIES PERFECTION

By Ahmed Mansou

or this month, Egypt Oil and Gas Newspaper had the privilege of visiting one of the most ideal concessions in the region, the East Ras Qattara Concession (ERQ). Eng.Gamal Shanhory, Field Manager, showed us around so that we would get to understand how Enap Sipetrol (Petroshahd joined Venture) managed to implement an infrastructure that is cost efficient but yet extremely productive and massively successful.

Enap Sipetrol is a subsidiary of the Chilean governmental company. ENAP is a multinational entity actively engaged in a variety of upstream and downstream activities in countries such as Chile, Argentina, Ecuador and Egypt. In Egypt, Enap Sipetrol currently operates in the Western Desert with the Fast Ras Qattara concession. The concession has 7 fields Shahd, Shahd SE, Ghard, Rana, Al Zahra, Diaa, and Shebl, with production temporary halting at the Rana Field. The peak production of the concession has reached 27,000b/d that are all being transported on a daily basis to Petroshahd receiving facilities in Qarun Petroleum Company base on Wahat road located 95 km away from Shahd SE and to Pipeline Petroleum Company (PPC) shipping destination located 208 km away from ERQ field.

"The East Ras Qattara concession was 5,916 square kilometers, located in the northern part of the Western Desert. The concession encompasses three main geological provinces, including the Zebeida High in the north, the East Tiba Half Graben in the center and finally the Kattaniya Inversion in the southern part of the block. The far Northwestern corner of the block covers the eastern extension of the Alamein Basin" said Eng. Shanhory to EOG.

Infrastructure: Petroshahd Pipeline

Enap Sipetrol realized that using trucks to transport their production from their fields to the storage facilities is costly and above all not safe "the count of loads (trips between the production & shipping stations) exceeded 100 trips per day". And given the nature of the [off-road] streets, those trucks and their drivers were subjected to accidents, oil spills, etc. and that threatened our QHSE policies. That's when the Petroshahd pipeline came in to play" said Eng. Sayed Rezk, Enap Sipetrol General Manager to EOG.

With their recent application of the Petroshahd Crude Oil Pipeline, Enap Sipetrol was able to achieve what many couldn't; a safer, less time and less money consuming way that would guarantee a safe transport of their fields' production.

The pipeline is 10 inches in diameter, and it is 84km long, that extends from the Shahd SE field, which is the highest producing field with around 8,000b/d, to Petroshahd receiving facilities in Qarun Petroleum Company base on Wahat road. It's also buried 2 meters deep into the ground.

There are future plans to connect the Al-Zahraa field to the pipeline "in order for the pipeline to connect both the Shahd SE field and the Petroshahd receiving facilities in Qarun, it had to pass right next to the Zahraa field, so it was decided to construct a pumping station in the field so that it can be used to pump Al Zahraa crude oil "Currently transferred by internal trucking (3 trucks per day) to pumping station in Shahd SE, using such tie-in point will achieve Zero trucking in ERQ field." explained Eng. Shanhory

The main productive zones in Enap Sipetrol's ERQ concession are the Upper and Lower-Bahariya





reservoirs. A couple of years ago; Enap Sipetrol has successfully explored a deeper Jurassic target; Wadi Natrun Reservoir, and achieved a gas condensate discovery from such target for the first time through the Western Desert which opens the door for all neighboring companies for a new potential was not seen before.

On the other hand, engineers and G&G teams at Enap Sipetrol have prepared an aggressive exploration and development programs to explore and confirm such new Jurassic potential and develop the currently producing Bahariya sands added Eng. Shanhory.

History of ERQ Concession

In 2004 Enap Sipetrol acquired the ERQ block. The area contained 15 dry holes previously drilled by a variety of international oil companies. It was initially thought that the ERQ area was outside the hydrocarbon fairway due to the absence of the mature source basin. However, geological studies concluded that the complexity of the existing structure was to blame for previous failures. In late 2005 Enap Sipetrol conducted its first 1500 km2 3D seismic program. Shortly thereafter, Enap Sipetrol commenced exploration and drilling on three successive oil fields that achieved a 100% success ratio



Mohamed Ismail, Engineering Maanager at Enap Sipetrol stated to EOG 3 that the record-breaking production in the ERQ, estimated back then at 27,000 b/d, was achieved by stringent execution of field development plans and reservoir management. He added that Enap Sipetrol manages its reservoirs by adhering to optimal production schemes in all its producing wells.

In 2007, early production commenced with the Shad, Ghard and Rana wells, producing around 1,000 barrels per day. In 2008, permanent facilities were constructed in the Shahd and Ghard fields and production with peak production of 3.4 Mbpd and total production reached 667.9 MBBL by the end of 2008. However, Enap Sipetrol faced a dilemma when it came to shipping what they were producing.

Western Desert concessions are not like other concessions in Egypt where pipelines and shipping lanes are readily available, instead oil must be trucked far distances or agreements have to be made between companies to share pipelines and facilities like those Enap Sipetrol has held with Apache and Qarun Company to ship oil through their facilities. With Petroshahd's 84 KM Pipeline on service; ERQ concession became a central point for crude oil shipping in the Western Desert and Enap Sipetrol has switched sides from being only sharing to be offering opportunities for others to share.



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PETROBEL, MOP Launch Time and Cost-Saving Nontraditional Subsea Solution

By Mariana Somens





n line with the efforts to improve cost-savings by keeping production costs at minimum levels, Petrobel Management took innovative steps to restore its damaged pipelines. Instead of the time-demanding works traditionally applied in restoration projects, the company carried extensive studies to develop a more time and cost effective maneuver.

"We needed to look for alternative solutions, otherwise some pipelines would go out of service until allocating the required budgets," Petrobel's Operations Staff explained to Egypt Oil&Gas.

Pipelines' quality deteriorates by time, even with constant supervision and maintenance. Due to subjecting factors, such as corrosion from the products carried, and geographical and environmental threats, all pipelines eventually lose their efficiency. According to a study made by the Canadian Energy Pipeline Association (CEPA) published in 2015, pipelines have an expiration date, and oil and gas companies should think of unconventional ways to be able to restore them and achieve highest performance.

Traditional restoration projects usually include laying new sections of damaged pipelines using standard line pipes deployed from a specially equipped vessel called Pipe Lay Barge. Such campaign requires long lead-time for new material delivery, finding the lay barge suitable for the job, in addition to the expensive rate for such vessel and the huge cost for mobilization and demobilization.

Instead, following Petrobel's research, the company came up with the idea of fixing damaged facilities by using surplus drilling-pipes material already available on stock. Maridive Offshore Projects (MOP), an Egyptian offshore contractor with over 30 years of proven record of accomplishment, worked in partnership with Petrobel as consultant of the project.

Maridive's Managing Director, Mohamed Nadim, explained that the collapse in oil prices has led to severe cutbacks in management budgets across the global oil and gas industry, and the real predicament for IOC's & NOC's alike is how to scale back spending whilst ensuring the highest level of safety, efficiency and productivity.

"At MOP we saw this as an opportunity rather

than a problem. We transformed our operating model from being a service provider to a fully-fledged solutions provider. We learned that working closely with our partners enables us to breakdown complex problems and translate them into simple solutions. There lies the core of optimization and innovation. This is where we saw the greatest value proposition," Nadim added. Maridive has been working in partnership with Petrobel for over 20 years.

The new scheme initially presented a considerable amount of challenges, such as overcoming the relatively high operating conditions of sea lines, finding cost-effective alternatives for installation, as well as establishing the lines' pre-commissioning in a way that meets the operating parameters.

To fulfill the project's requirements, MOP considered the application of the offshore applicable Codes & Standards, such as DNV-OS-F101 and IMCA, and started a technical study that included material mechanical testing and threaded joints testing under the same values extracted from comprehensive laying analysis performed by the Maridive technical office.

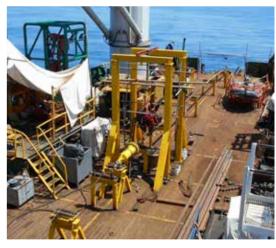
Based on the technical study and the laying parameters, MOP utilized its Maridive-232 vessel, a DPII DSV construction vessel equipped with diving station, in addition to an 80-tons crane. The company also looked at enough deck space to accommodate the line pipe material, which should be wide enough to construct a customized firing line suitable for the operation.

Maridive's team further worked on the customization of the line-tensioning machine in order to fit in the firing line in horizontal position instead of the conventional vertical configuration. Additionally, under the sponsorship of Petrobel, MOP & Weatherford cooperated in the customization of the torque machine.

MOP's General Manager, Said Mostafa Ashour, stated, "The project was a bold maneuver. Our company is glad to be part of this innovative scheme that adds up to our successful cooperation with Petrobel."

The pipelines were laid in several campaigns and the lines were connected to existing offshore platforms using conventional subsea spools. They were further tested for the operating conditions,





which range from 35 to 100 bars, and for the usage of different products, such as gas, water injection, and crude oil.

The project's requirements were successfully met and Petrobel collected outstanding results, as its lines have been working for over a year without any repercussions or issues and the project led to millions of dollars of cost-savings in the company's operations.

Petrobel's Former Assistant Chairman for Projects, Saleh Mansour, stated, "We believe that our achievement was the product of team work between all parties and it resulted in cost-savings for Petrobel. We sure do hope that one day we can share our experience with our sister companies and that they would adopt this solution as their own."

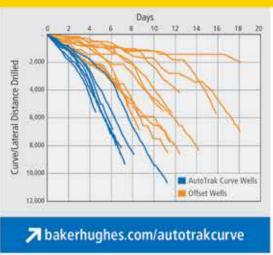


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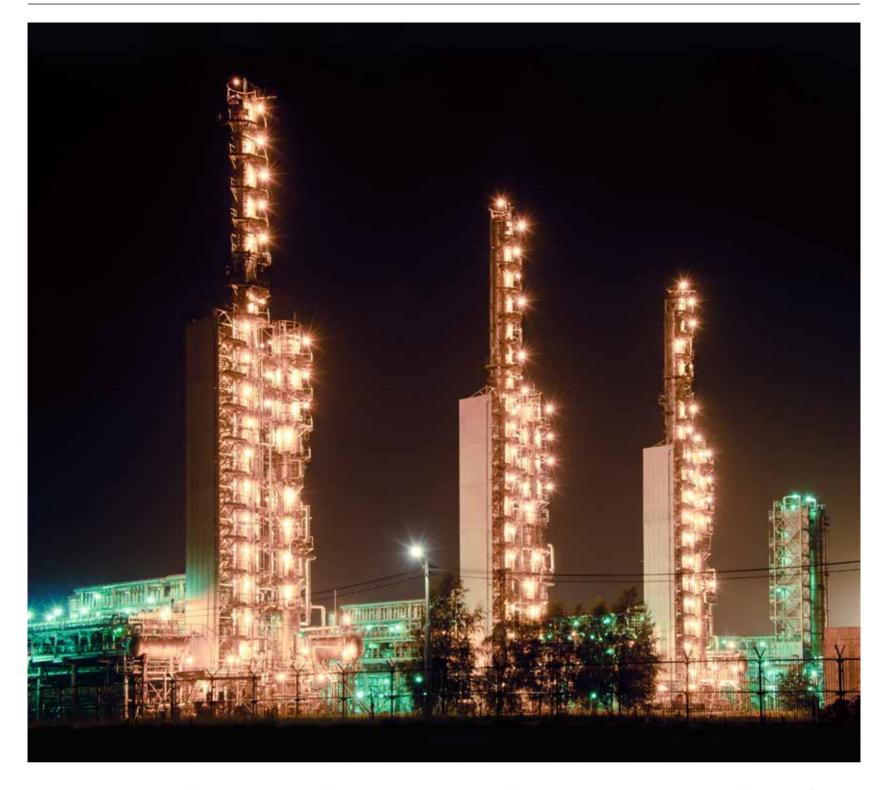
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INFRASTRUCTURE CHALLENGES

FOR GLOBAL ENERGY MARKET

By Salma Essam

eyond oil prices and energy market volatility, efficient and effective infrastructure facilities are essential components for the welfare of the oil and gas industry. The potential increase in global energy demand poses serious challenges, common in infrastructure development, which the world governments would need to address.

Environmental Considerations

Energy infrastructure development should occur in a manner that minimizes the environmental footprint. In this sense, technological advancement and governmental energy policies are key to protecting the ecology, enabling world governments to provide and sustain oil and gas

supply. Infrastructure investment decisions should be based on firmly anchored environmental plans and integrated energy initiatives adopted by the government. Climate change policies, therefore, should be optimally developed, strictly addressed and enforced. This will help provide a degree of certainty for infrastructure investment decisions.

There are regional constraints that withhold huge effects on infrastructure developments. Canada's Energy Future: Infrastructure Changes and Challenges to 2020 report published in 2010 set an example for imposing rules on governments on building new international power lines. In efforts to lessen dependence of electricity generated from burning fossil fuel plant, the report suggests

that renewable energy can be replaced for power generation requirements. In turn, investment decisions in infrastructure can be diverted to solar power plants rather than the international power lines.

Although environmental measures have been firmly adhered due to the active role environmentalists have played, many oil and gas companies try to overlook them. Establishing infrastructure that complies with ecological standards is deemed costly and needs advanced technology. In some cases, applying environment's standards require companies to abandon areas replete with oil wealth either because they bear serious effects on the nearby inhabitants or they withhold negative impact

on the surrounding nature.

On its part, offshore drilling operations have triggered controversial debates between legality and oil greed. Environmentalists have championed campaigns worldwide demanding the ban of drilling in the seas in efforts to preserve the marine life. As a matter of fact, offshore operations effects on the marine ecosystem range from disorders of marines to chemical and toxicological effects, which threatens the biodiversity of the marine life. This has prompted several states such as the US and Mexico to issue strict laws to offshore oil and gas developments.

Even though the energy market has been maintaining progressing behavior towards the environment, the oil and gas industry is still its major energy. In this regards, IOCs have no other option but to invest their technological capacities into the infrastructure facilities and understand to cost to environmental compliance.

"In countries with insufficient investments in infrastructure and weak environmental governance, oil leakage from pipelines often occurs as a result of poor management and maintenance."

According to the research study Attacks on oil transport pipelines in Nigeria: A Quantitative Exploration and Possible Explanation of Observed Patterns.

Safety

Indeed, Safety is an issue of primary public interest and should be included on governments' agendas. Research paper - Attacks on Oil Transport Pipelines in Nigeria: A Quantitative Exploration and Possible Explanation of Observed Patterns, published by Elsevier in July 2010 explained that "in countries with insufficient investments in infrastructure and weak environmental governance, oil leakage from pipelines often occurs as a result of poor management and maintenance." If storage facilities, oil tankers, or pipeline break down or explode, the accident will deliberately have massive impact on the field workers. A famous example in history is the oil spill of Gulf Mexico that killed a number of 11 people aboard due to oil rig explosion. This is in addition to the huge harm it had on sea animals.

Incompliance to safety is gross and can lead to health issues. Not only does it endanger the environment, it further agitates the inhabitants who find the oil and gas exploration activities risky. Blowouts caused by pipeline leakage have dangerous effects on the people as toxic gases are transferred through the air causing heath complications. Indirect impacts related to seafood consumption from affected offshore areas are matters of concern. Ocean Portal's report on Gulf Oil Spill stated that "the chemicals in oil that are of most concern to humans are called polycyclic aromatic hydrocarbons (PAHs). Some of these are known to cause cancer."

Inadequate investment in infrastructure, in fact, risks the Social License to Operate (SLO) of the IOCs, making the sustainability of their business unlikely. In addition, safety of personnel working at the sites should be highly considered. Poor infrastructure can result in oil spills which in turn are the main reason behind offshore arsons. So before ensuring the firefighters measures are being maintained, infrastructure should be more efficient and effective.

It is, therefore, important to ensure that IOCs adhere to safety of the employees, the public, and protection of property that may be significantly affected with the construction, design, and operation of these facilities.

Security

One of the main challenges infrastructure developers encounter is securing their pipelines and facilities.

As the energy development have become indispensable in today's world, several countries, particularly heavy oil producers, have witnessed attacks on its infrastructure facilities due to companies' non compliance with safety measures. Nigeria, for instance, has eyed frequent attacks on its pipelines and oil facilities throughout 2016. In the midst of a global oil price downturn that has brought the giant OPEC member into a serious economic conundrum, Nigerian President Muhammadu Buhari has been challenged by the rising threat of the Niger Delta Avenger militants. The militant group is in the business of vandalizing IOCs oil infrastructure, launching explosives and blowing up pipelines. The group is driven by economic and environmental concerns, demanding a greater share of Nigeria's oil wealth to be given to impoverished regions and oil spills to be cleaned up.

The dispute between the group and the government has been on the rise which helped slump Nigeria's crude output to its lowest level in decades. The attacks presented serious challenges to major international operators in the African country. In May 2016, Energy giant Eni confirmed that one of its pipelines in Nigeria was sabotaged. At Nigeria's largest oil terminal, namely Qua lboe, operations carried out by Exxon Mobil had been disrupted on the same month. On their side, Shell and Chevron have evacuated their staff in early 2016 following attacks on Chevron's Okan offshore platform and Shell's Forcados oil pipeline which the Niger Avengers claimed responsibility for.

Attacks on infrastructure that happen on a frequent basis signal potential future subversions, a fact that prompts foreign investors to halt oil and gas activities. This challenge jeopardizes huge revenues for countries whose economies heavily rely on energy industry as a profit generator. In mitigating this risk, the governments must draft elaborative strategies that strictly address infrastructure vandalism. It is therefore recommended that governments would join forces with experts to develop security standards that will handle the management of security risks and further prevent them. These standards will help contain the negative impacts on people, property, the environment, and most importantly the economic stability.

Canada presents a model for security measures in the energy industry. Canada's Energy Future – Infrastructure Changes and Challenges towards 2020, an energy market assessment report published by the National Energy Board (NEB) explained that "the NEB produced a security brochure which promotes the reporting of suspicious activity around pipeline facilities."

This came in collaboration with the Royal Canadian Mounted Police, Public Safety Canada, Natural Resources Canada, the Canadian Energy Pipeline Association and the Canadian Association of Petroleum Producers" the report stated.

Financing

Rising commodity prices of pipeline steel and tight labor markets in the energy industry has posed huge cost pressures for the investors over the past few years. Couple this with the fact that the sector has been going through a period of recession following the global decrease in oil prices since 2014. In essence, bringing large infrastructure projects to table burdens investors, particularly because of the steady rise in the cost prom the time of project conception to construction.

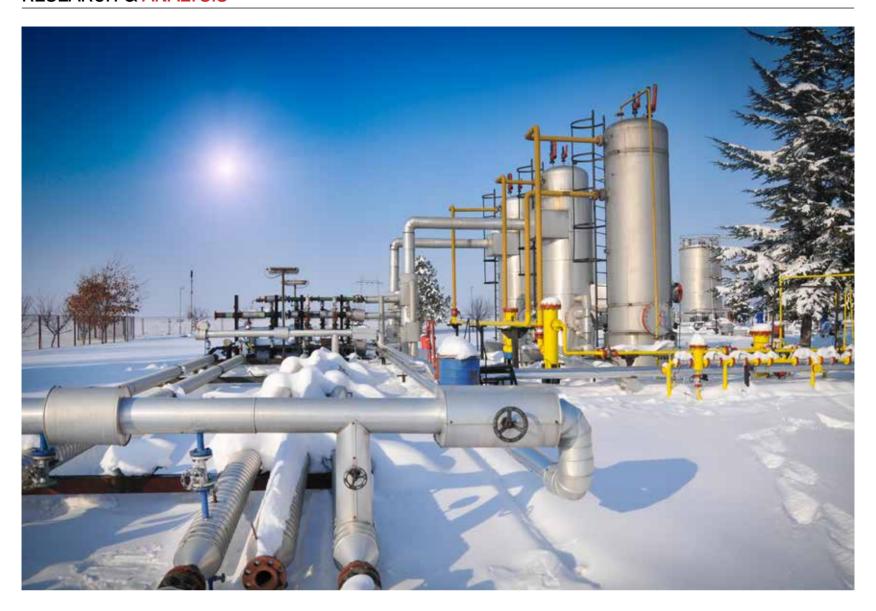
Financial markets, additionally, have experienced uncertainties and stricter credit requirement in 2008 and 2009 on the upheaval of the world's economic crisis. This has had its impact on the new investment projects related to large infrastructure plans and developments as the business environment was less appealing to bring cash flows for projects. In addition, the situation in the financial market has made it more difficult for investing in infrastructure. New projects need massive financial backing and commercial arrangement more than it required in the past. Canada report stated that "for the most part, large energy companies in Canada with solid financial ratings have been able to obtain financing for the projects that are currently being built. One challenge may come in the form of securing commitments from shippers, if shippers have difficulties obtaining financing."

Remoteness of New Energy Sources

As the energy industry evolves, the search for new energy sources to satisfy demand often becomes increasingly distant from the consumption areas and more widely dispersed. This makes the transmission of oil, gas, and other petroleum derivatives, more demanding to advanced infrastructure facilities. For instance, oil and gas drilling in remote locations and difficult terrain can require big cost in resource work. In climate challenging environments such as remote north poles, drilling is seasonal, unlike southern fields where operations can take place all year. The challenge arises with the high cost of moving heavy equipment to distant locations in addition to building roads and accessing building materials.

But the high expense of transferring equipments to these areas is not the only problem operators face. The uneasy access to fresh water in remote location poses another challenge. This is beside the limited supply for the sand used in hydraulic fracturing, access for electricity to generate power for some activities. Even worse, consuming the little resources of small communities in remote areas can be pressuring and may lead to serious issues between the operator and the inhabitants.

The decisions to invest in huge infrastructure projects will need to be made in a timely manner to provide the sufficient time needed to accommodate regulatory processes. Today's energy market should adopt a collaborative approach among regulatory bodies and government offices. Coordination among involved partners gives room for a more efficient streamlining for the regulatory process, which further helps well-timed decisions to be made and enables the development of sustainable infrastructure. Despite the challenges inherent in establishing infrastructure projects, governments espousing an effective approach are poised to meet the energy demands with safe, secure, and environment-friendly infrastructure.



RESERVOIR RECOVERY INFRASTRUCTURE:

A KEY INVESTMENT FOR OUTPUT BOOM

By Mariana Somensi-

xploring different areas in the hunt for oil and gas resources is of undeniable importance when it comes to expanding output levels. However, in order to ensure that proved production capacity remains at its highest rates, operators must equally invest in well-developed recovery infrastructure and managing technology.

Large investments in infrastructure and the reuse of reservoirs features to enable secondary and enhanced recovery help improve reservoir's pressure and, subsequently, assure full capacity production at oil and gas fields, which also save costs.

Additionally, applying high-technology programs to the fields to monitor installed infrastructure helps operators quickly spot technical failures, avoiding a huge quantity of hydrocarbons waste, and reducing the risk of having to shut down the facility for maintenance.

Considering the importance of the petroleum industry to move all the other sectors of a country's economy, squeezing reservoirs to profit from each drop of oil and every single cubic meter of gas is the key to keep the industry moving. Accordingly, the investments in recovery infrastructure and infrastructure monitoring are main priorities operators should set.

Why Improving Reservoir Pressure?

When oil and gas reservoirs start producing through its primary recovery phase, the subsurface pressure is usually enough for a number of years to force supply into the well. Nevertheless, reservoir pressure naturally dissipates, and the biggest percentage of the field's capacity remains underground. When it comes to oil production, for instance, an analysis published by the US Department of Energy shows that primary recovery usually leaves 60% or more of residual oils.

In gas and condensate production, performance also decreases over time. It happens because, when condensate liquid is formed in a gas reservoir, small drops of condensate tend to be trapped in tiny pores, which reduces the gas mobility to flow toward the well.

There are two subsequent phases to pump oil and gas after subsurface pressure is no longer enough; secondary and enhanced recovery. The secondary recovery is usually accomplished by filling the well with gas or water to replace produced fluids and maintain or boost the asset's pressure. Global International Sellers' CEO, Antonio Bhardwaj, explained in his study - Challenges and Solutions in an Upstream and Downstream Oil and Gas Operations that secondary recovery techniques

result "in the recovery of 20% to 40% of the original oil in place."

However, as much as one-third of the field's capacity remains untouched, opening space to enhanced recovery strategies. A common and effective enhanced maneuver is the injection of carbon dioxide (CO2) in the reservoirs previously recovered by water flooding.

As a matter of course, additional infrastructure to inject water and gas into the wells and increase pressure is extremely necessary to pump the remaining resources and reach the huge amount of hydrocarbons left after primary recovery. For that purpose, the investment in pipelines, compressors and air separation plants play an important role in the petroleum fields.

CO2 and Nitrogen Injection Infrastructure

CO2 and Nitrogen are two of the gases injected in oil and gas wells to maintain reservoir pressure and improve recovery. Physically, there are some differences between the usage of both gases. CO2 usually requires a larger quantity of gas to create high pressure since it needs more compression than Nitrogen.

To enable CO2 and Nitrogen injection, an oil and gas facility must contain specific infrastructures added

to the regular pumping jacks. The infrastructure features include CO2 or Nitrogen pipeline metering, injection wellheads, processing plants where the gases are collected for re-injection, separators for separating produced fluids (oil, water, and gas), well production manifold to allow individual testing of wells, and compressors to compress the gases prior to re-injection.

According to The Linde Group, a gas and engineering company, the Abu Dhabi National Oil Company (ADNOC) is one of the petroleum firms that successfully applied gas injection to recover its facilities. In 2011, Linde and ADNOC founded the joint venture Elixier and constructed two major air separation plants in Mirfa, a coastal city in Abu Dhabi. As stated by Linde, the air separation plants held a capacity of 670,000 cubic meters of Nitrogen per hour, which was transported to ADNOC's inland Habshan field via a 50-kilometer long pipeline to boost recovery at oil and gas reserves. Considering the high reliance of natural gas to produce electricity and the importance of stable oil output in a country that relies on crude exports, the investment in the Nitrogen separation facilities was of extreme importance to avoid energy shortages and economic crisis.

In Egypt, Tanmia Petroleum Company and Petrosannan Company also bet their cards on recovery infrastructure to boost reservoir pressure. The two companies launched a project at AESE-6 Concession Area, in Alam El Shawish East, focusing on investments in pipelines and compressors to boost daily gas output to around 20.8 million cubic feet per day, in addition to 800-900 billion barrels per day of condensate.

As much as \$12 million of investments were directed to the installation of dehydrated equipment to pumping dry gases. Additionally, the process included the installation of a compressor to recover flared gases at Karima oil facility. The compressor is important as it maintains flow rate of gas above hydraulic limit for more time if compared to production by natural pressure, which results in more hydrocarbons recovered from the reservoir.

Parallel to this investment, an amount of \$2.3 million was raised to the construction of new gas pipelines. The Front End Engineering Design (FEED) included building a gas pipeline with eight inches of diameter and 22 kilometers of length, and an oil pipeline equally designed with 8 inches of diameter and 28 kilometers of length. Furthermore, internal flow lines between the field's HG and AES-E6 stations were built, which included an oil pipeline of 19 kilometers of length and 6 inches of diameter, and another one with the same length and diameter for gas. Large pipelines are usually required to maintain high production rates when reservoir pressure has declined.

As Egypt struggles to reduce the deficit at its petroleum trade balance and to overcome its energy shortages, the infrastructure project at AESE-6 Concession Area to enhance recovery represents a great asset to help the African nation face its challenges.

Production Impact of Recovery Investments

An analysis on the Oil Denver Unit in the Wasson Field in West Texas, US, exposed the impacts of investing in water flooding and CO2 recovery infrastructure in output levels. The field, which began operations under primary recovery in 1938, started receiving water injections to boost reservoir pressure in 1965. By the end of 1982, the amount of water in the formation was considered higher than the volume of oil, which led operators to shift from water flooding to CO2 enhanced oil recovery (EOR).

"At the end of 1998, one could determine the incremental oil attributable to CO2 EOR by calculating the cumulative difference between the projected decline rate without CO2 injection and the actual production rate," data from the US Department of Energy explained.

Through this analysis, it was possible to identify that during 2008 the CO2 EOR project at Wasson Field's Denver Unit resulted in the recovery of more than 120 million barrels. In 2010, the field's output reached about 31,500 barrels of oil per day, of which 26,850 barrels consisted of incremental oil recovered from CO2 injections.

The proved results of water and gas injections led many countries to direct huge amounts of investments to its facilities' recovery infrastructure. Iran, for instance, announced in early January 2017 its intentions to increase recovery factors of oilfields by 14%, which would add \$400 billion to the worth of Iranian oil and gas reserves.

The National Iranian Oil Company's (NIOC) Deputy Head for Development and Engineering Affairs, Gholamreza Manouchehri, stated in a petroleum conference that the plan to boost the country's recovery factor is set to happen in a 30-year timeframe. "Assuming that the overall capacity is 800 billion barrels, the 30-year plan will add 1% equal to 8 billion barrels to Iran's oil reserves," Manouchehri further explained.

Monitoring Techniques

Although improvements in recovery infrastructure are a more direct approach to keep production levels high, infrastructure-monitoring technology is also a great strategy to be added to existing features to prevent risks and help the operator understand reservoir behavior.

By monitoring upstream facilities, it is possible to assure cost-effective flow of hydrocarbons from reservoir to refinery, as well as prevent oil and gas waste related to corrosion damage, leakage and equipment breakdowns – a prevention that would considerably reduce costs in the total infrastructure budget.

Vincent Vieugue, in his article "How Subsea Solutions Can Enhance Oil Recovery", which was written for Emerson Process Management, explained the monitoring benefits in the deep-water Independence Hub field in the Gulf of Mexico, which went through a production-flow-rate, measurement and hydrate prevention process. According to him, "the ability for the operator, Anadarko, to predict and measure the water production profile for subsea wells is critical for optimizing production, preventing hydrate, scaling corrosion in pipelines, providing input to hydrate prevention strategies, and ensuring reliability of supply."

Moreover, it is highly beneficial to establish a reservoir management protocol to create a sustainable production strategy. "This requires a balancing act between the need to enhance oil and gas recovery while at the same time ensuring that there are no significant risks of the premature shutin of wells" Vieugue explained in his article.

As an operational example, he mentioned the functionality of subsea multiphase and wet gas meters, as well as the downhole pressure and temperature tools. Vieugue stated that Egypt's offshore West Delta Deep Marine (WDDM) concession received 49 wet gas meters to monitor water production and optimize gas production within normal water rates.

He stated that, in a four-month period, the usage of the meters avoided two water breakthroughs,

identified zones for water production and helped the concession's operator, Burullus, optimize its gas production. "By providing early warnings of the water produced, the meters have helped Burullus and its partners save three wells from water breakthrough and resulted in a sustainable production strategy moving forward," he added.

Vieugue also mentioned how the advances in wireless technologies are helping operators generate information from reservoir areas of difficult access. The wireless tools are capable of providing pressure and temperature reports from behind offshore parts that other survey technologies cannot reach. This functionality is extremely helpful in the prevention of pressure build-up and shallow gas blowouts, fatalities that could completely drop output and result in a huge infrastructure maintenance cost.

Big Data Surveys

The huge numbers in oil and gas reservoir data are difficult to be managed, especially in long-term prospects. To support the real-time decision-making, the petroleum industry must have in hands a compilation of assets' information that is clear and fast to be interpreted.

According to a study presented in the 21st World Petroleum Congress in Moscow, Sonatrach's Cadre Supérieur, Abdelkader Baaziz, and the Professor at the University of Sud Toulon-Var, Luc Quoniam, stated that "being able to process Big Data makes it possible to derive insight from the relationships that will surface when all of these sources are processed as a whole." Furthermore, combining the information provided and advanced analytics in Exploration and Development activities enable risk-minimized strategic and operation decision-making.

As the two specialists suggested, "Big Data is of great interest to production and operation work. Being able to predict future performance based on historical results, or to identify sub-par production zones, can be used to shift assets to more productive areas." Accordingly, petroleum facilities experience a significant improvement in oil recovery rates.

Since boosting oil and gas recovery is a major goal for field operators, Big Data technologies are a huge asset for reservoir engineers as it shows seismic, drilling and production data at once in a very organized way. According to Baaziz and Quoniam, it helps reservoir engineers "map changes in the reservoir over time and provide decision support to production engineers for making changes in lifting methods."

Until the Last Drop

The impact of the oil and gas industry is enormous on almost every other commodity in world. Due to its huge responsibility in supporting key sectors of the global economy, it is critical to identify risk and solutions during oil and gas production.

Accordingly, investments in infrastructure and technology development to boost reservoir recovery are needful tools to eliminate oil and gas waste, ensure long-lasting supplies and significantly reduce production costs. Infrastructure is the basic physical system of a nation; therefore, its improvement and efficient management in the petroleum sector is the key to keep the industry alive.



Water is an important element in oil and gas production, both as a bi-product and a commonly used fluid to enhance well production. Water also plays a major role in unconventional oils, namely in the fracking process. As a result, the oil and gas industry simultaneously consumes and produces large amounts of water during the extraction stage. There are several focuses in water management for the oil and gas industry, such as water utilized in drilling, fracturing, and completion. This covers services required to treat, recycle, transport, and dispose of the resulting effluent, which include frack flowback. According to the Oil&Gas Financial Journal (OGFJ), Halliburton indicated in 2014 that on average 100,000 barrels of water is required for a "typical frac job", with frack flowback representing about 15% to 40% of this total. The article further explained that 65% to 80% of total oilfield water management expenditures are directed towards water supply, regulations, and transportation.

However, water as a natural resource is becoming ever more scarce. This has led many governments to implement strict guidelines on water treatments and disposal for upstream projects. Moreover, community concern is growing on the environmental impacts of water usage in the industry. As a result, oil companies allocate significant portions of their budget towards water management facilities and rely on water treatment specialists, both to come up with more efficient methods to treat water and mitigate environmental risks.

The main drive behind oil expenditure in water management is to minimize total water lifecycle costs in oilfields. One might perceive a dichotomy in spending money to minimize costs, however,

risks associated with ill managed water treatments and uncontrolled consumption at upstream projects outweigh current water management budgets. Nevertheless oil firms strive to find a right balance between the cost and benefits of water management.

Oil and Gas Water Management Needs

A 2015 report titled 'Oil and Gas Industry Guidance on Voluntary Sustainability Reporting', which was issued by the global oil and gas industry association for environmental and social issues (IPIECA), Energy API and the International Association of Oil & Gas Producers, indicated that global figures show the industry's freshwater consumption "is much less than in other sectors such as agriculture, municipal water supply and thermoelectric power generation." Nevertheless, oil production and water go handin-hand as upstream projects process water to injection wells and help recover crude oil and gas. Moreover, SUEZ eMAG stated that in every barrel of oil produced, between 3 and 10 barrels of water that was already present in the wells are recovered. Oil companies must treat the extracted water before recycling and re-injecting it, even if simply to comply with progressively strict discharge standards.

The increasing volumes of water produced during the lifetime of oil wells has created a need for constant water attention and treatment, even more as regulatory scrutiny tightens on oil and gas extraction. OGFJ informed that, "Outside North America, oil wells are producing in excess of 200 million barrels of water per day." Consequently, oil companies require improved fluids and water management for huge volumes of produced water. Moreover, these huge and steadily increasing volumes of water are in contact with hydrocarbons

across various geological formations and will likely be contaminated with "organic constituents such as grease, oil, benzene." Accordingly, the produced water must be treated before disposal.

Anadarko, an independent oil and natural gas exploration and production company that is based in Texas, stated that during the drilling process, oil firms typically access hydrocarbon resources at depths more than 6000 feet below ground level, while groundwater aquifers are generally located several hundred feet below the earth's surface, with thousands feet of solid and impermeable rock separating both natural resources. Nevertheless, Anadarko emphasis that well integrity is paramount in protecting groundwater. As a result, various governments have imposed strict regulations and industry standards on the environmental impacts of the drilling process. According to the company's US onshore operations, Anadarko uses multiple protective layers of steel pipe and cement to seal off the deepest known aquifer. These redundant protective boundaries are put in place to establish wellbore integrity. Additionally, across the production phase, oil companies continually collect and analysis water samples to ensure compliance with environmental standards. These measures all added, to impact operating costs at drilling and extraction sites.

Lost Opportunity Costs

Oil and gas companies make frequent decisions on the use of finite resources, with investments in water stewardship, while integrating water resource management and risk assessment throughout their operations. Companies divert funds to water management efforts to avoid the potential losses

due to lagged water management strategies or prosecution due to harmful environmental practices. Moreover, the importance of water related risks for the industry has driven companies and other stakeholders to focus on water technology development, improved water management, utilization of alternative water sources, and the development of collective solutions. Additionally, the link between energy and water is gaining significance as countries look to increase the diversity of energy supplies, including biofuels, which may require greater access to sources of water. As a potentially significant local user and producer of water, the oil and gas industry is vulnerable to water disruption in its operations and value chains. Therefore, investment in sound water management strategies is fundamental to sustain oil production.

As a result, oil and gas firms have incorporated sustainability reporting in their annual reports as a means to engage with stakeholders and help foster informed dialogue about the industry's environmental impacts and efforts. IPIECA's 'Oil and Gas Industry Guidance on Voluntary Sustainability Reporting' study explained that oil companies assess the impact of local water scarcity on facilities and projects located in certain geographical location. The report added that it is important for these companies to add "narrative" to their annual reports to describe their overall approach to water management and demonstrate responsible "stewardship approached to managing water demands and discharges in relevant operational locations, especially in places where water stress is recognized." Case in point, Anadarko takes numerous precautions to conserve and protect water by conducting "rigorous assessment" in order to determine suitable water storage solution. The company's facility in Pennsylvania uses pipelines to transport freshwater to the site. This strategy helped Anadarko reduce truck traffic and associated emissions, while minimizing earth disturbance and conserving available water resources. According to the company's website, under the Water Management section, "A closedloop system moves water from a pre-determined and approved source through pipelines to containment facilities for use in the hydraulic fracturing process. Anadarko has employed the use of temporary earthen impoundments and portable, above-ground holding ponds (PortaDams) to store water required for completion operations. The flow-back water from operations is collected in steel tanks and trucked to the next completion site. Here, the produced water is filtered and recycled using newly developed technologies. Additionally, we collect drill cuttings, or pieces of earth that return to the surface during drilling operations, in steel containers until they can be properly tested and disposed of in accordance with regulations."

Moreover, oil and gas companies employ water treatment activities to mitigate concerns of water aqua resources associated with the fracking process. In general the simplest methodology to dispose of frack flow-back and produced water is to pump volumes down into subsurface zones that are suitable for this kind of disposal, according to OGFJ. Yet these bi-products of the fracking process are becoming too valuable to waste. Therefore, organizations focus on water treatment and recycling methods to enable water volumes applicable for multiple purposes. Yet, oil companies must reflect on the tradeoff between investing in water treatment facilities and the benefit of recycling water resources, while accommodating environmental concerns.

Water Management Economics

A report published by Oilfield Review, titled 'Water Control' estimated that more than \$40 billion is spent dealing with unwanted water in the oil industry. Moreover, each horizontal well in North

America that uses hydraulic fracturing uses 2-6 million gallons of sweet fresh water. As a result multibillion dollar Water Services industry is emerging in the oil and gas community, as exploration and production (E&P) companies turn to outsourcing their water management needs to focus on reducing operational costs.

Shale Play Water Management states that upfront investments for saltwater disposal (SWD) include the acquisition of land, drilling wells, the construction of buildings, tanks and sometimes ponds. Companies must also invest in equipment for unloading, treating and injecting the water. These capital expenditures (CAPEX) can range from \$2 million to upward of \$7 million. For successful multi-rig operations, the number of water treatment assists must also be multiply by the number of SWD wells needed to efficiently service the field. Once drilling and production commence, companies incur further operating expenditure (OPEX). These amounts vary depending on "proximity of water-disposal facilities to producing wells, volumes of wastewater production, the means of transportation and the supply-demand situation for water-operating assets in each region." According to Shale Play Water Management magazine, 60% to 80% of disposal costs are water-hauling expense, which can differ from location to location. Additionally, oil firms that in-house their own water-disposal services incur added CAPEX for trucks.

As the industry adjusts to new commodity prices, with Brent reaching about \$53 per barrel at the time of the article, oil and gas operators can no longer ignore operating inefficiencies. E&P firms struggle to economize operations and sustain production, as tradeoff decisions are made daily to balance their returns. For many organizations, revisiting water management strategies makes sense from both an operating and a balance-sheet perspective despite oil-and-gas prices. Respectively, Water Management service providers have been growing in popularity since the early 2010s, according to Shale Play Water Management, as oil firms enhance their performance and returns on investments by categorizing water management as a separate activity within the E&P process, while turning to service providers as needed during oilfield life cycle. Moreover, service provides offer further savings by spreading the fixed costs of water handling over many customers. This is an appealing option for small E&P operators who have limited capital to expend on the production process.

Water is the most commonly used fluid in the oil and gas business, making its usage and management critical to the petroleum industry. More than ever, water is an integral part of the success of oil and gas operations. Without adequate supplies of water, there is no multistage hydraulic fracturing, and without fracturing, there are no oil or gas resource plays. And of course, without resource plays, the trend lines on domestic oil and natural gas supplies would look very different. Therefore, it is in the interest of oil companies to implement sound business practices in handling unwanted water and managing water facilities related to upstream projects. If oil companies can reach a win/win situation in terms of efficient and sustainable operations that don't negatively impact the surrounding environment, they can augment their bottom-line.

As more oil companies move towards shale production, the topic of water management in the oil and gas industry is becoming even more prevalent. With traditional water souring constricting and wastewater treatment regulations tightening, the oil and gas global communities, together with local environment watch groups, should strive to develop appropriate infrastructure networks needed to deal with water related issues. This is crucial for oil and gas producer to effectively manage well operations while maximizing profits. Moreover, the involvement of governments in water disposal can prove beneficial for indigenous societies, as centralized water management allows wastewater processing to be implemented on an economy of scale, while ensure compliance with environmental regulations. Thus, establishing an advantage for oil and gas firms in terms of lowering operating costs and benefiting local communities under the scope of a sustaining supply of fuel and lessening contaminated environments.



The Wise Choice for Infrastructure: METAL AND NON-METAL PIPELINES

By Nouran Ashraf

Pipelines are one of the main elements of the oil and gas infrastructure. It acts as the main transportation system for all kinds of energy products; natural gas, biofuels, and liquid petroleum. There are two main types of materials in which pipelines are made of metal, such as Steel, or non-metal, such as plastic. Both kinds of Pipelines serve the same purpose, however, steel pipelines are the type commonly used worldwide. The development of non-metal pipelines may lead to the question of whether oil field operators should use plastic pipelines to structure their infrastructure instead of steel.

Pipelines exist throughout the world; they vary by size, types of products transported, and the material they're made of. Pipelines serve three main purposes: gathering lines, which bring crude oil or natural gas from nearby wells to a treatment plant or processing facility, transportation pipelines that transit the outcome products like oil, gas and refined product between cities or countries, and distribution pipelines which convey the products to the end users.

Pipelines weren't always used as a means of transporting energy products. Long before wood and steel pipelines were introduced to the public, oil was maintained in whiskey barrels and transported from wells to railway stations using horses. In 1865, wood and metal pipelines were introduced as a replacement of barrels. Later, in the beginning of the 20th century, cast iron was used in creating the pipelines for the oil and gas infrastructure that was later again replaced by steel as the material of choice, mainly because of steel's strength and flexible nature. The main types of metal steel pipelines mostly used in the oil and gas industry are carbon steel, killed carbon, alloy steel and stainless steel. The main differences between each type depend on the traces of elements within each type and the temperature, pressure, and corrosion conditions where they would be placed. Non-Metal Plastic pipelines started to gain popularity in the 1990s since the interest in non-corrosive pipelines to be used in a lower pressure and temperature conditions has arisen

Non-Metal Pipelines Introduction

Plastic pipelines are characterized by corrosion resistance, light weight, and is commonly used in moderate temperature and pressure applications. The most popular types of non-metal plastic pipelines are polyethylene, polypropylene, UPVC and HDPE. They provide a corrosive-resistant pipe for oil and gas applications with the strength for replacing steel pipelines in low- and mediumpressure circumstances. Even though Metal steel pipelines are still the main type of pipelines widely used worldwide and may still be the first choice for oil and gas companies, plastic pipelines are starting to be favorable to the oil and gas field operators within the applicable environments.

Elements to Consider

There are many elements to be considered while building the pipeline's infrastructure within the oil and gas industry, the geographical and environmental conditions including the temperature and pressure where the pipelines would be placed, type of fluids that the pipelines carry, the means of transportation to be used, the financial capabilities of the oil and gas company and its budget for the planned projects, the lifespan of the pipelines that ensures



the sustainability of the project without the need for replacement.

BOP Piping Planning Management Team at Siemens AG Mohamed Noaman explained to Egypt Oil&Gas that "choosing the material of the pipeline's infrastructure within the oil and gas industry depends on many parameters including the project's budget, design, type of the process, location, and integrity and lifetime."

Geographical Conditions Temperature and Pressure

Metal pipelines have the ability to withstand low and high pressure and temperature ranges. They can survive a pressure range from 30 up to 40 bars and temperature ranges up to up to 100° C, while the non-metal plastic pipelines have a lower tolerance to higher pressure and temperature in comparison to its metal alternatives. There are some applications where they can be used for fairly higher temperatures, but metallic pipelines such as steel pipelines can withstand much higher temperature. The plastic pipelines can't be used in very high-pressure applications also since they have weak intermolecular structure.

Chemical Resistance

Metal Steel pipelines are suitable for both hot and wet applications such as river crossings and rough terrain but the most significant disadvantage of steel pipelines is corrosion; external corrosion affects both buried pipelines and above-ground pipelines. Internal corrosion of steel pipelines is a major dilemma in the oil and gas sector due to the high level of environmental costs and repercussions of spillage of the oil. The Canadian Energy Pipeline Association (CEPA) released a report stating that in 2015 about 16 barrels of crude oil spilled from pipelines, meanwhile, 121.3 million cubic feet of natural gas leaked due to corrosion related reasons in Canada.

Since replacement of pipelines can be financially challenging for the operator, companies have been solving corrosion by different methods mostly coating the steel pipelines with anticorrosive materials that provide an effective insulation against

the environment which must be strong enough to tolerate the operating temperatures, show resistance to the soil, and have the ability to withstand physical handling.

Senior Pipeline Design Engineer at Petrojet, Mr. Farouk el Batawy noted to Egypt Oil&Gas that "Corrosion is one of the main challenges that face the metal pipelines infrastructure; there are four different methods that oil and gas companies adapt to fight it which are protective coatings and linings, cathodic protection, materials selection, and inhibitors. Coatings and linings are often executed in parallel with cathodic protection systems to achieve the most cost-effective protection for pipelines. Evaluating the environment in which a pipeline is or will be placed is essential to corrosion control since modifying the environment in the first place by reducing moisture or improving drainage, can be a simple and effective way to reduce the potential for corrosion while using corrosion inhibitors can extend the lifespan of the pipelines, prevent system shutdowns and failures, and avoid product contamination"

Meanwhile, using non-metal pipelines like HDPE can avoid the corrosion issue in the first place as it is rustproof, break-resistant, and corrosion-free. The water leakage percentage is zero. PE Pipelines

"Choosing the material of the pipeline, within the oil and gas industry, depends on many parameters including the project's budget, design, type of the process, location, integrity and lifetime."

BOP PIPING PLANNING MANAGEMENT TEAM AT SIEMENS AG MOHAMED NOAMAN have a geographical advantage that allows them to withstand harsh chemical environments since they are abrasion resistant and are suitable for the solid environment in mining fields. It provides long-term resistance to a temperature and soil shifts, bending, weathering, internal pressure, direct burial, point loading and squeeze-off. HDPE is resistant to hydrous solutions of acids, alkalis, and salts as well as to a large number of organic solvents. Plastic pipelines are also known for their flexible nature: Gas distribution systems are capable of surviving severe ground shifts, especially from earthquakes, when they are made from fused PE pipelines.

According to EL Battawy, in 2010, Qarun Petroleum Company replaced all the carbon steel wellheads water injection systems with HDPE, GRE (Glass reinforced epoxy) as the carbon steel wellheads were damaged due to the saline water and the higher corrosion rates.

Technical Conditions

Strength

Metal pipelines has higher strength when compared to plastic pipelines which have lower strength since the support span for these pipelines is not relatively high, which may lead to the placing of additional civil structure for proper support of these pipelines.

Design Considerations

Plastic pipelines including HDPE and other thermoplastic piping does not work well when exposed to ultraviolet light. This effect is commonly called ultraviolet (UV) degradation. If plastic pipes are stored outdoors, they may require protection from weathering. On the other hand, Metal steel pipelines have excellent benefits including excellent stress crack resistance to natural gas and its contaminants, low permeation to methane and hydrogen, high Hydrostatic Design basis rating at 20°C, 60°C and 80°C, superior impact resistance, squeeze off, and dependable Ultra-Violet performance for outside storage.

Transportation

When it comes to transportation the main challenge facing the steel pipelines operators is its heavy weight that makes it more difficult to transport and install. It requires more manpower, equipment, and energy, while non-metal pipelines lightweight is often more cost effective to transport and install and requires less manpower since non-metal pipelines like PE is easily installed without heavy lifting equipment joined by heat fusion or mechanical fitting. PE pipe is produced in straight lengths up to 50 feet long and coiled in diameters up through 6-inches, making it easy to install and reduces the numbers of joints used in the piping system.

Safety

The metallic materials used in creating pipelines like the Carbon steel have the ability to withstand the heat from the higher temperature environments that give it the ability to withstand fire hazards, while using plastic pipelines can subject the operator to higher risks of fire hazards due to the static charge accumulation. "The metallic materials (Carbon steel, low temp., Alloy Steel and S. Steel) is prioritized in the oil and gas pipelines infrastructure due to the codes obligated by The American Society of Mechanical Engineers (ASME) and The National Fire Protection Association (NFPA) that indicates the mandatory usage of the Carbon steel in all the main oil and gas processes, firefighting systems, some different utility systems too, since the carbon steel has the ability to withstand higher temperatures in case of fires to limit safety risks" explained El Battawy to Egypt Oil&Gas.

Financial Conditions

Oil and gas companies looking for cost reduction solutions while developing their oil and gas infrastructure within low and medium temperature and pressure conditions might consider non-metal pipelines such as high-density polyethylene (HDPE) pipelines as an alternative to steel pipelines within

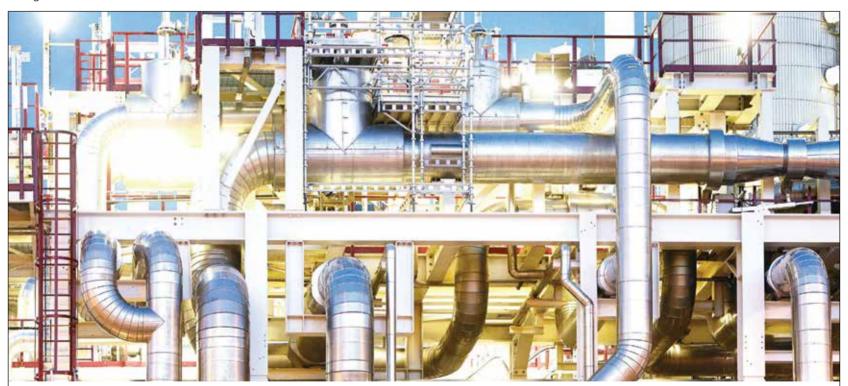
the applicable conditions. PE pipe installations have long- term cost advantages due to its physical properties, leak-free joints, and low maintenance costs also the life cycle for PE pipe can extend from 50-100 years, which gives it a long term sustainable advantage as the operators can avoid replacement of the pipelines for generations to come.

Proposals and Contracts Engineer at Enppi Ahmed Salah Eldin, noted to Egypt Oil&Gas that "the choice between metal and non-metal pipelines depends on many technical factors but if the technical factors allows the operator to choose between both materials and the company is looking for a cost effective solution for their pipelines infrastructure, plastic pipelines will be the matter of choice as it costs less than its metal alternatives."

Environmental Conditions

Non-metal plastic pipelines like PE doesn't produce hazardous levels of toxins into the air during production, fusion or into the ground or water when operated, making it eco-friendly. Meanwhile, metal pipelines that suffer from corrosion can lead to spillage of oil that releases toxic chemicals negatively affecting the surrounding environment.

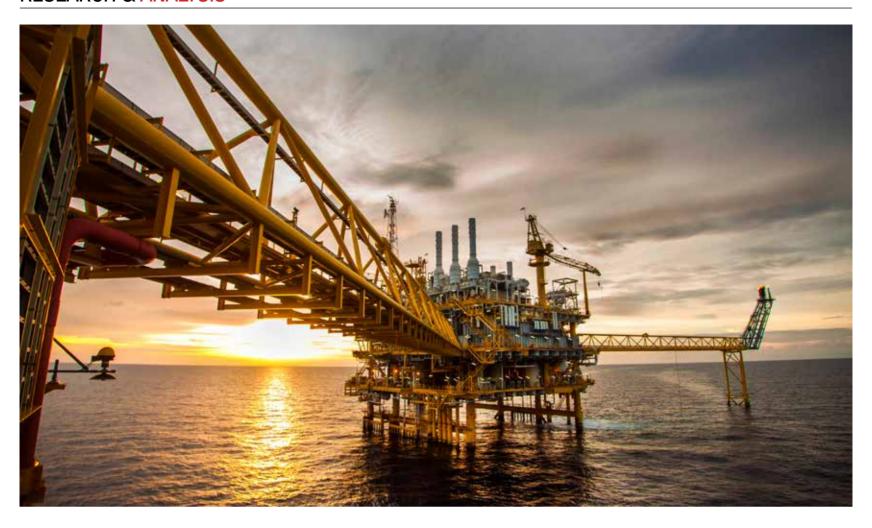
At the end, Non- Metal plastic pipelines can't replace steel pipelines in higher temperature and pressure environments, but they can work efficiently within medium and low temperature and pressure providing an alternative for metal pipelines operators' struggling with issues like corrosion. Metal pipelines provide a great range of benefits due to their higher strength and flexibility and ability to withstand higher pressure and temperature while non-metal pipelines have the advantage of the corrosion resistance, light weight, cost reduction and long-term sustainable advantage that will enhance the strength of the oil and gas infrastructure of the oil and gas corporation.



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UPSTREAM INFRASTRUCTURE, EGYPT'S FUTURE OF LNG EXPORTS

By Mahinaz El Baz

ith an opportunity cost in international markets, Egyptian natural gas contains a price advantage, cleaner emissions than oil, and is more environment-friendly. Egyptian natural gas is also a domestic consumption substitute for petroleum products since that it is highly tradable. Moreover, it is considered predominantly a fuel for power generation and industrial plants in Egypt; hence its significance for the economic development of the country is unquestionable.

For gas, the situation differs from that of oil; gas exports require a specific infrastructure such as pipelines and liquefaction plants for LNG. Egypt's natural gas export infrastructure consists of a pipeline and three LNG trains. For oil, refineries are needed, but if their domestic capacity is smaller than the size of the national market, a balance can be achieved by exporting crude and importing petroleum products. There are two LNG facilities in Egypt; one in Damietta with one train and the other LNG facility in Edku to the west of Damietta with two trains.

Offshore Opportunities

Offshore facilities play a very important role in strengthening the oil and gas sector and raising its productivity. Accordingly, offshore pipelines are considered one of the most important upstream gas infrastructure in Egypt as it supports the country's role in shaping the oil and gas landscape in the MENA region.

Egypt used to be a vital natural gas exporter due to its transmission pipelines system along with the Liquefied Natural Gas (LNG) facilities situated on the coast of the Mediterranean Sea. This gas infrastructure has been extended and upgraded on a regular basis to serve the national plan of expanding gas utilization in the

residential sector. However, the decline in oil production has coincided with a natural gas boom induced by the significant discovery of Zohr field, which is an offshore natural gas field located in the Egyptian sector of the Mediterranean Sea discovered by Italy's Eni. In addition, the development of Zohr will primarily serve the Egyptian domestic gas market, making up for a rapid decline in gas production, which has left the country relying on imports as it increasingly struggles to meet domestic demand. The discovery will also strengthen a wider recovery in interest and investment that Egypt's oil and gas sector has benefitted from over 2015.

In the same context, British Petroleum (BP) has recently announced a gas discovery as part of its North Damietta offshore concession in Egypt's Nile Delta, which is the third such discovery in two years in the same block. "This latest discovery confirms our belief that the Nile Delta is a world-class basin," BP, Chief Executive, Bob Dudley said in the company's official press release. Commenting on BP's discovery, BP North Africa Regional President, Hesham Mekawi, said "We are delighted to sustain our success in these shallow Pliocene targets. We believe development of Qattameya could help unlock the resources in other nearby discoveries with similar shallow low pressure characteristics. This is part of our long-standing commitment to Egypt and to unlocking Egypt's energy potential."

On account of the recent discoveries by Eni and BP, Egypt's natural gas production is expected to boost substantially over the coming few years. Consequently, there is an urgent need to develop the equipment and facilities, especially offshore pipelines for Zohr and other expected BP gas fields in order to meet any possible

delays or barriers to the production phase on the short run, and successfully meet the goal of being an energy hub on the long run.

In a previously published article on Egypt Oil&Gas, Egypt's Minister of Petroleum and Mineral Resources, Tarek El Molla stated in his speech at the October,2016 Forum "The Hub strategy relies heavily on the infrastructures in place such as that of Suez Canal, SUMED, LNG facilities, and pipelines".

Moreover, Egypt is currently developing multiple infrastructure projects in Port Said with plans to rely on the existing LNG export facilities in Idku and Damietta for liquefaction, which have been sitting idle.

"The Hub strategy relies heavily on the infrastructures in place such as that of Suez Canal, SUMED, LNG facilities, and pipelines"

TAREK EL MOLLA

Minister of Petroleum and Mineral Resources

Gas Export Challenges

Critics mainly argue that exporting gas will deplete gas resources too quickly and constrain the use of gas domestically. The claim that reserves are large is, therefore, meant to support the export policy. Egypt stopped exporting gas since 2012 and began importing LNG in 2015 via two floating storage and regasification units (FSRU) launched at the country's eastern shore in 2012 for the purpose of importing LNG. In 2016, Egypt has launched a tender to hire a third FSRU to LNG. The country has been forced to import gas from global markets to ease immediate supply shortfalls and the decision to purchase gas from Zohr and BP's West Nile Delta at higher rates will weigh on already high trade and budget deficits. An uncertain financial outlook as well as the potential for a reduction in financing form Egypt's oil exporting Gulf allies, could undermine the country's ability to meet financial commitments to International Oil Companies (OCs).

It is worth noting that BG used to be the main LNG exporter in Egypt, purchasing the entire output from the two-train Idku LNG plant. However, the plant has been operating significantly below capacity since 2010 when more gas started to be diverted to the domestic market due to increase in local consumption and decreased exports. Egypt used to export its gas via two LNG terminals. The first one is Damietta terminal, which had an annual capacity of five million tons and became operational in 2004. Around 80% of the terminal is owned by Union Fenosa Gas, which is a joint venture between Italy's Eni and Spain's Gas Natural, with the rest belonging to EGAS and EGPC. Union Fenosa Gas and BP have long-term contracts for purchasing its LNG.

The other LNG terminal is Idku terminal, which had an annual capacity of seven million tons and started operating in 2005. Idku is owned by BG (35.5%), Petronas (35.5%), GDF Suez (5%) and EGAS & EGPC (24%). The entire output from the train one is purchased by GDF Suez and that of the train two by BG. Due to lack of gas, the Damietta plant has been idle since 2012 and the output of the Idku facility has decreased steadily over the last few years.

Egypt barely has gas export infrastructure challenges as it already has LNG export infrastructure in Idku and Damietta, which is currently sitting idle. Putting this into use would allow gas to be exported from Zohr and other Egyptian fields not used in the home market. Furthermore, the main challenge facing Egypt's natural gas exports is how fast can Zohr field become operational, and at what investment cost, and more importantly how exactly the revenues from the field will be distributed.

In addition to these concerns, LNG prices have been falling due to a variety of international factors. "First, Japan, which had become one of the world's largest LNG consumers after its Fukushima nuclear disaster, began restarting its nuclear reactors, thereby reducing demand. Second, there is also increased supply capacity coming online around the world that is likely to put further pressure on prices. As prices become lower, the prospective returns from the new discovery would already be under pressure. Finally, with the Iranian nuclear deal being completed, Iran will be likely to increase investment in its LNG capabilities to become a larger regional gas producer" according to Adel Abdel Ghafar's article for Brookings-Egypt's new gas discovery: Opportunities and challenges.

Policy Considerations & Way Forward

The development of the domestic gas infrastructure in Egypt has always been through the investment and control mainly of the Egyptian Gas & Petroleum Corporation (EGPC) and, subsequently, the Egyptian Gas Holding company (EGAS). Liberalization of the domestic market and encouraging the private sector to participate became a must to overcome the current hardships. EGAS would better be concerned with setting policy, establishing price formulas and



mechanisms that encourage private companies to invest, as well as controlling standards, procedures, and competency levels.

Furthermore, enhancing the governance of the gas sector is very important to reach sustainability. "The government is planning to carry out certain sectorial reforms and to eventually limit its role to simply regulating the sector, and eliminate the dual role currently played by some government bodies as both producer and regulator," explained Karim Hegazy in his research for Energy Charter Secretariat Knowledge Centre-Egypt's Energy Sector: Regional Cooperation Outlook and Prospects of Furthering Engagement with the Energy Charter.

In addition, technology transfer has always been an embedded characteristic of oil and gas upstream infrastructure development. However, the present circumstances are different in a sense that technology is being developed on a fast track and needs to be transferred in the same manner. New technologies are underway for almost all aspects of the sector, particularly the renewable energy and the LNG infrastructure both of which are very relevant to Egypt.

Egypt should consider signing more upstream agreements, issuing upstream bid rounds, agreeing new upstream gas prices, accelerating field development projects and expanding and upgrading pipelines networks to facilitate LNG movements and improve efficiency.

No one can deny that a number of policy decisions have led to the prominent rise in domestic gas consumption in Egypt. Although domestic gas prices were low, the government offered the upstream producers substantially higher prices in order to create the incentives necessary for upstream producers to develop existing reserves and explore for new gas reserves.

"However, while invigorating foreign investment in the gas sector, Egypt realizes that such an objective could not be achieved in one fell swoop. The low gas price causes a bias in favor of gas export projects while at the same time reduces investors' interest in the upstream and downstream gas sector. This requires Egypt to revisit its gas allocation policy, especially if the government is trying to de-link investors' interest from domestic gas prices," according to Mr. Hegazy.

Egypt is planning to achieve self-sufficiency in natural gas by the end of 2018, which creates an urgent need to develop the natural gas upstream infrastructure and facilities to be able to get back on the LNG exporting track as soon as the domestic needs are fulfilled.

Arab Gas Pipeline

Gas trade in the Arab world has been known for exporting gas in the form of LNG to points in Asia, Europe, and North America. Inaugurated in July 2003, the Arab Gas Pipeline (AGP), which is a trans-regional gas export pipeline aims to link Egypt to Jordan and there are plans to extend it to Syria and Lebanon and ultimately to Turkey. The pipeline was built at a cost of approximately \$1.2billion.

Accordingly, Egypt is considered as a major player in the regional gas trade, because theonly cross-border gas pipeline system in the Mashreq region is the AGP, which was conceived as an international gas infrastructure from Egypt to Turkey via Jordan and Syria, with the ultimate objective of enabling Egyptian gas to reach the European markets.

Meanwhile, there are many economic and geopolitical challenges facing the AGP such as Turkey's claims to become a regional hub and Israel becoming non-dependent on Egypt's natural gas supply and reaching self-sufficiency in gas from its Tamar field, operated by Noble and Delek.

However, with challenges come opportunities and the Egyptian government should take advantage of these opportunities and restore the AGP to life to encourage and support inking more Arab bilateral and multilateral oil and gas agreements. The AGP members should also consider the importance of investing in upstream infrastructure renovation to establish a healthy environment for the oil and gas activities in the region. It is, therefore, unavoidable to set up a plan and long-term vision through which the pipeline's situation would improve. Arab cooperation is needed at this critical point as Egypt is moving forward with the economic reform plan, which includes restructuring the energy sector along with oil and gas industry to overcome the current shortage.



INFRASTRUCTURE PROMOTING ECONOMY

By Sarah Samir

For a more aspiring and accomplished upstream business, the oil and gas wealth owning countries have long been involved with developing grand infrastructure projects. It has emerged as a primary need for world governments to ameliorate infrastructure conditions given the fierce energy market competition. On its part, the Egyptian Ministry of Petroleum and Mineral Resources is keen on upgrading, expanding, and developing its infrastructure facilities in efforts of enhancing the country's oil and gas exploration and production projects.

Furthermore, in 2016/2017, several countries are aiming to stand as energy hubs in their regions. This goal is perceived as a way to flourish the country's economy even if the country is not an energy producer or a petroleum wealth owner. Therefore, those countries pay severe attention to the upstream infrastructure and to developing this infrastructure in order to be able to contain oil and gas amounts that are enough to transfer the country into a hub serving the surrounding region.

Infrastructure Flourishing Egypt's Oil and Gas

For years, Egypt has been trying to improve its upstream infrastructure and develop its pipelines to transport oil and gas from fields to land processing units, and then to refineries, to storage tanks, eventually reaching exporting ports. This network of pipelines provides an easy access to petroleum exports. Meanwhile, the Egyptian Importing ports and Floating Storage Regasification Unit (FSRU) helps bring in liquefied natural gas (LNG) needed to meet local market demands. These export and import activities boost the Egyptian economy through keeping the trade cycle on the move.

In relation to other countries in the area, who are still also trying to achieve the goal of being the Energy Hub for the region, Turkey is "fully aware of the importance of suppling security to become an energy hub in the region," according to Elif Binici's article, entitled Turkey's Strategic Position in Energy Transit Gains Prominence. Hence; the country "is working on ensuring supply

"The infrastructure in the oil and gas business is also great." He added that in Egypt "[investors] have huge resources potential, human resources, the investment environment and the infrastructure in Egypt"

EGYPT'S COUNTRY MANAGER OF ROCKHOPPER, **SAMIR ABDELMOATY.** diversity through facilities such as storage, LNG and or to the nearest point of the grid." **FSRU** added Flif"

The North African country is working on raising the storage capacity in the Egyptian Red Sea ports and the Egyptian Mediterranean Sea Ports in order to make the best use of the country's Infrastructure in transporting the oil and gas products. This comes in line with the government's efforts to boost the performance of Egypt's energy sector and further help bolster its international position by offering more linkages to other international markets

"[gas firms] can use liquefaction plants upon reaching an agreement directly with the plant's owner, not the country. based on certain specifications of the gas processed in it"

SENIOR ASSOCIATE AT ZAKI HASHEM & PARTNERS, ESSAM HAMDY.

In this regards, Egypt's Country Manager of Rockhopper, Samir Abdelmoaty, stated in an interview with The Oil and Gas Year that "the oil and gas business is also great." He added that in Egypt "[investors] have huge resources potential, human resources, the investment environment and the infrastructure in Egypt.'

In 2007, Robert Mabro's book, Egypt's Oil and Gas: Some Crucial Issues, stated that Egypt was keen on developing the liquefied natural gas (LNG) exporting infrastructure as this is the type of infrastructure development foreign investors will be interested to finance. However, as investors may be willing to fund export infrastructure systems, facilities developed for serving the domestic market may be deemed discouraging.

The Egyptian government owns most of the upstream infrastructure. Senior Associate at Zaki Hashem & Partners, Essam Hamdy, told Egypt Oil&Gas that "pipelines form a national network that is owned by the country. The liquefaction plants are owned by private sector. Meanwhile, the FSRUs are owned by the country itself." He explained that the country awarded the 2 liquefaction plants to private sector as "at the time of building the two plants, the country did not have enough money to cover their high costs. Additionally; the companies that built the plants had excess production that is exceeding the market needs. Therefore; the best solution was to export the production of gas."

The Egyptian oil and gas sector, including the government owned institutions, as well as the international oil companies working in Egypt use the privately owned plants to export their gas. Hamdy explained that "[gas firms] can use liquefaction plants upon reaching an agreement directly with the plant's owner, not the country, based on certain specifications of the gas processed in it," adding that "if the country wants to use the liquefaction plants it should reach an agreement with the plants' operators and pay a certain fee as well."

Meanwhile, the oil and gas firms can use the state owned upstream infrastructure as per the concession agreement as Hamdy pointed out that "the operator can pump production from the field to the natural grid,

In order to execute state-owned upstream required infrastructure and to perform its maintenance work, the Egyptian government contracts service companies. For example; in 2016, the Ministry of Petroleum signed a deal with Sainem to develop the infrastructure of Zohr gas field through installing a gas export trunkline that is 26-inch and establishing additional 14-inch as well as 8-inch service trunklines. The contract with Saipem included the field's Engineering, Procurement, Construction & Installation (EPCI) work which will be executed in up to 1700 meters deep water of 6 wells. The company is also required to place the umbilical system. Saipem had already finalized installing its floating pipe layer platform Castoro Sei (Beaver Six) at the Cypriot Limassol Port in order to be able to process its work in Zohr field.

In this case, Egypt is using Saipem's upstream infrastructure in Cyprus for the development of its Zohr field. Yet, if Egypt installed a floating pipe layer platform it wouldn't have to use the platform in another country which will save money and would help Egypt to offer the platform facility for other countries to develop offshore fields in the Mediterranean Sea.

Hence, the Egyptian Ministry of Petroleum has to sign contracts and to find financing institutions in order to be able to improve of the infrastructure.

Egypt as Energy Hub

In a region where top oil producing countries possess a huge share in the global energy market, the Egyptian government does not fail to notice the inevitability of bolstering its oil and gas sector. Egypt's geographical location offers a huge advantage as the Arab republic is at crossroads with Asia, Europe, and Africa. This can achieve Egypt's aspiration to become a regional energy hub where the country's infrastructure facilities including pipelines, storage tankers, and terminal will be at the crossroad of several markets.

Egypt aims to be a hub that will receive gas from different source countries, a hub that will transform natural gas into liquefied natural gas (LNG) using the Egypt located EDCO liquefaction plant owned by Royal Dutch Shell and the Damietta liquefaction plant owned by Segas. According to Egypt hub plans, the country will then deliver LNG to the importing countries.

The Egyptian government is working on becoming a prominent energy hub in the surrounding region. This comes as Egypt is adopting a strategy to make use of its location in order to not only be an energy producer, but to become an energy transit country.

Energy producing countries and non-energy producing countries tend to use their geographical location to become hubs for energy. For example; Turkey is not one of the major oil and gas producers, yet its geographical locations serves as a bridge between the east and the west. According to the book, entitled the Oil & Gas Year Turkey 2010, "Turkey plays a vital transit role connecting producers in Russia, the Caspian and the Middle East to world markets."

Egypt and Neighbors for a Shared Infrastructure

An example for Egypt's strategy is its signing of a deal with Cyprus in 2016 to receive gas via an undersea pipeline which is located in the eastern Mediterranean. The agreement is a part of Egypt's plans to have a shared infrastructure with its neighboring countries to import and export energy. The Minister stated to Pipeline Journal: "this is part of the development of the east Mediterranean gas as a whole and I think our strategy optimally is to position ourselves as an energy hub in the region."

In his interview with BP Magazine, El Molla said that "we've signed agreements with Cyprus to bring their gas here, whether for our domestic use or to export on their behalf through our LNG facilities. There's an

opportunity to do the same with any other gas [sic] in the Eastern Mediterranean basin."

Egypt has offshore pipelines connecting it with Cyprus; that is why the two countries had signed a memorandum of understanding (MoU) in 2015 to send gas from Cypriot Aphrodite field to Egypt to be re-exported. Early 2017, Egyptian Natural Gas Holding Company's (EGAS) Chairperson, Mohamed El Masry, told Daily News Egypt that Egypt will start exporting natural gas in the second half of year 2019. El Masry explained that Egypt own infrastructure that enables the country to distribute around 9bcf/d of gas and to export 1.88bcf/d.

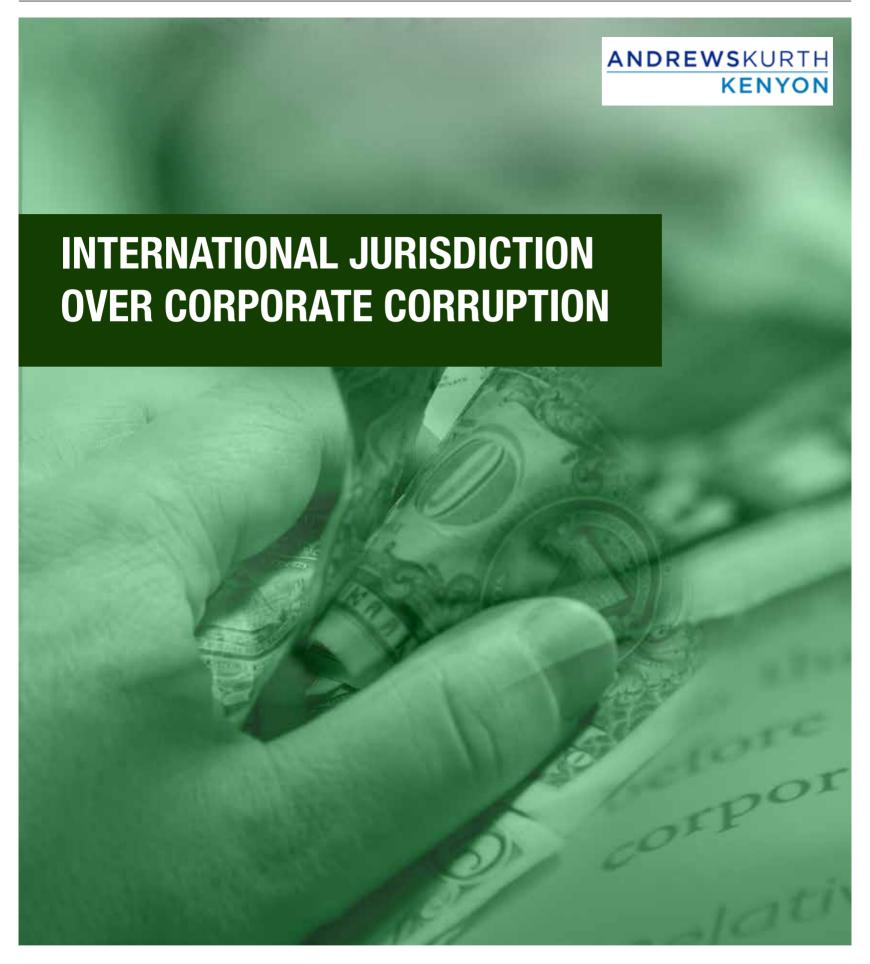
Egypt has also pipelines that help in increasing the country's export and in connecting it to other countries. The country shares the Arab Gas Pipeline with Jordan and Syria, which has been executed over four phases. The Egyptian Ministry of Petroleum's Website explains that the first phase of the pipeline is a 265 km length pipeline that extends from Egypt's Arish to Jordan's Agaba port with a total capacity of 10 bcm per year. The second phase consists of a 390 km pipeline that goes from Agaba port to El Rehab in Jordan. The third phase is a 30 km pipeline that runs from El Rehab in Jordan to the Jordan-Syria borders. While the fourth phase is a 330 km pipeline that extends from Jordan-Syria borders to Homs with the possibility to be extended to Syria-Turkey borders.

"The Egyptian government is working on becoming a prominent energy hub in the surrounding region. This comes as Egypt is adapting a strategy to make use of its location in order to not only be an energy producer, but to become an energy transit country."

Like Egypt, Turkey has the potential to become oil and gas regional hub as it has gas pipeline projects between the east and west that are envisaged and are designed to deliver gas from Caspian and the Middle East to Europe through Turkey. These pipelines are known as the "Southern Gas Corridor" (SGC). In addition, the country's pipelines include the South Caucasus Pipeline (SCP), Baku-Tbilisi-Erzurum Natural Gas Pipeline (BTE), and Turkey-Greece Interconnector (ITG). Turkey further has a number of planned pipelines including the Trans-Anatolian Natural Gas Pipeline (TANAP), going from Azerbaijan to Europe via Turkey and Georgia, and the Trans-Adriatic-Pipeline (TAP) that will be executed within the context of Southern Gas Corridor. The delivery of gas to Turkey through TANAP will start in mid-2018 and to Europe in 2020, according to the official website of the Republic of Turkey's Ministry of Foreign Affairs.

Egypt, as well as Turkey, can enjoy the benefits of its perfect geographical location to become a regional hub for oil and gas which are representing an important factor for the flourishing economy.

The Egyptian infrastructure is already promoting Egypt to be an oil and gas transit country which is a part of its vision to become an regional energy hub. Therefore; the Egyptian government should keep maintaining the infrastructure and improving it to achieve the country's goals and to enable it to export gas in the future.



Written by Mark Thurber is a partner in the Dubai and Beijing offices of Andrews Kurth Kenyon LLP, specializing in oil and gas, infrastructure and power development and project finance.

Imost every international business person is aware of the United States Foreign Corrupt Practices Act (US FCPA) and the more recently enacted UK Anti-Bribery Act (UK Act). Less clear and more challenging, however, is determining what is required to comply with the myriad anti-bribery statutes to which that person and his or her company may find itself subject, particularly in attempting to reconcile differences among the anti-fraud laws, rules and regulations that exist in

each jurisdiction which the company touches. This challenge extends not only to understanding the content of such statutes, but the extent to which they might apply to a business enterprise that is remote from the U.S. or Europe. In recent years the jurisprudence around such statutes has begun to evolve more rapidly; more importantly, the reach of the statutes has expanded to the extent that few businesses operating in the international arena can safely ignore them, even if their connections to the

United States or to Great Britain are attenuated.

While this article will criticize many of the current methods being developed and applied by enforcement agencies, it is important to note at the outset that such measures address critical public policy issues. Corruption, particularly bribery, leads to many social and economic ills, including political instability, reduced confidence in institutions, demoralized culture, arrested economic

development and foreign capital flight. Systemic bribery existing in many countries throughout the world is perhaps the greatest impediment to economic progress, creating in each country where it exists a non-level playing field and fostering bureaucratic intransigence. Once embedded within a country, reversing course and cleaning up can prove daunting. Whether the statutes currently in place are both effective and fair in the objective of deterring and punishing corruption can be debated, but it is without argument that corruption has no proper place in the world's economy or within any individual country aspiring to attract foreign capital.

A business operating in the international arena is positioned between two opposing forces -- public officials within a particular country who might be soliciting unauthorized payments as the price of doing business, and the enforcement institutions in the international community, increasingly universal in scope, that prohibit any such payments, often at the expense of forfeiture not only of financial gains but personal freedom. It is thus paramount to understand what will and will not pass muster, what is and is not permissible, and to understand the importance of taking the most conservative steps possible to avoid confrontation with increasingly aggressive international enforcement agencies.

The most prominent anti-corruption statutes currently in effect are the US FCPA and the UK Act. Combined with various local statutes and backed by international enforcement action, these statutes in recent years have become daunting forces seeking to push the international community toward international compliance and away from acquiescence to local custom. In doing so, enforcement agencies, particularly the SEC and the DOJ in the US, have begun to take aggressive positions that may or may not be valid under the statute itself or under larger constitutional protections afforded to defendants, but which to date have been largely unchallenged. The reluctance of defendants to challenge the broadening jurisdictional territory being staked out by these agencies lies in the heavy downside, which is the threat of jail time for officers at "uncooperative" companies under siege. By placing a premium on cooperation and willingness to disclose everything to the enforcement agency, a culture of making large monetary payments to avoid criminal sanctions has begun to develop in the international community. The funds paid in by defendants have been used by enforcement agencies to increase their size and breadth, and ultimately their ability to uncover and investigate alleged fraud across a broad spectrum of jurisdictions and industries.

The US FCPA and the UK Act are similar in many respects, but there are key differences. For instance:

- The UK Act prohibits payments to private individuals, whereas the FCPA is, on its face at least, limited to public officials.
- The UK Act is based on strict liability, whereas the FCPA requires criminal intent. For instance, though complete defenses are available through implementing certain prescribed mitigatory measures, UK companies are strictly liable for the actions of their agents and subsidiaries.
- The UK Act includes as a crime a person asking for or receiving a bribe, not merely offering or paying one. This provision does not have significant importance, however, because of the problems in obtaining jurisdiction over foreign individuals who may solicit bribes, and because of the problems in obtaining sufficient background and objective evidence to prove up the allegation of wrongdoing.
- The UK Act includes no exemptions for

facilitation payments, which are payments made to government officials to perform acts that are required by law. It has been questioned how vigorously this is currently being enforced. Further, the guidelines themselves, as published by the UK government, have stated that prosecutions will not be pursued in the cases of facilitation payments made under threat to life or limb.

Aside from the substantive differences in the statutes, there are key differences in the ways that they are administered by their respective governments. The DOJ and SEC of the United States in recent years have embarked on an expansion of enforcement policies in historic proportion. As a result, foreign companies who have no operations or management in the U.S. can no longer be comfortable that they are immune from attempts by the United States government to reach their assets, wherever they may be located. A few highlights include:

- The United States has asserted FCPA jurisdiction over foreign individuals who (i) sent e-mails that touched a U.S. server en-route to a foreign recipient and (ii) wired monies from one foreign bank to another, if the funds were merely cleared through a U.S. bank.
- Extending jurisdiction to bribery over private individuals, despite clear language in the FCPA to the contrary.
- Expanding the reach of the FCPA to include socalled public organizations, such as multi-lateral lenders and NGOs.
- Imputing parent/subsidiary liability on a strict liability basis, rather than proving up deleterious actions at the parent level.

Other countries are falling into line. In the past year France and South Korea, sometimes criticized for lax anti-bribery prosecution policies, have instituted new and enhanced statutory measures to combat corruption. Many other countries, including China and Brazil, have likewise added anti-corruption legislation and have stepped up enforcement efforts

Egypt likewise has anti-bribery statutes and constitutional prohibitions against corrupt public acts. Egypt has recently improved its anti-bribery rankings, reaching 88 out of 175 in Transparency International's Corruption Perceptions Index. Though still not consistently enforced, giving and accepting bribes are both criminal acts in Egypt, under Articles 103 to 112 of the Panel Law. Egypt's statutes include particular emphasis on the solicitation of bribes by public officers, a group which is broadly defined to include anybody associated with a company in which some or all shares are owned directly or indirectly by the government. In addition to its own legislation, Egypt has ratified the United Nations Convention Against Corruption, though to date it has not acceded to the OECD Convention on Combating Bribery or to any other regional anticorruption convention. Egypt's current government is vocal and active against corruption. Though much progress is needed, it is fair to anticipate that enforcement efforts will continue to be vigorous, and that continued pressure on various bureaucratic regimes is providing the opportunity to progressively reduce corruption levels in the country.

A review of the various anti-fraud statutes in place throughout the world and which affect companies participating in international business transactions will show many similarities and a few key differences. That said, a company should not structure its compliance policies around the provisions of a single statute, regardless of the reach of its business or the jurisdictions in which it has a presence. Aside from the difficulties of predicting exactly how and to what extent a particular government will assert jurisdiction

over that company, a new complication is that governments are recently cooperating to a greater extent than before on prosecutions. As a result, a defendant whose assets are situate comfortably away from the reach of the United States, for instance, may find itself fully exposed as a result of correlative actions by several states, ultimately becoming subject to the harshest provisions of each statute.

The case of the Brazilian construction contractor Odebrecht is illustrative. Odebrecht is the giant Brazilian construction company which participated in a bribery scheme in a highly organized fashion. A report from December, 2016 indicates that the fine agreed by Odebrecht was \$3.5 billion, an amount that has called into question the continued viability of the company. Most remarkable about the action. in addition to the size of the fine, was the degree of cooperation among prosecuting authorities in the U.S., Switzerland and Brazil. Odebrecht could not claim defenses under one statute, e.g., size of fines, jurisdictional limitations, lack of knowledge, unless the same defenses were available under all of the statutes. In other words, by combining forces and pre-agreeing as to the apportionment of the fine, the three sovereign governments were able to use the most stringent provisions of each statute against Odebrecht, at the same time avoiding various limitations in scope, liability and jurisdiction that might otherwise restrict enforcement strategies under the statutes of an individual country.

Although the Odebrecht case is the largest to date in terms of amounts of money involved, it is not an outlier. It represents a new frontier of government cooperation, a methodology which governments are adopting with increasing enthusiasm because of the large amounts of money involved. At the conclusion of the case, enforcement agencies proudly proclaimed in a press release, "This case illustrates the importance of our partnerships and the dedicated personnel who work to bring to justice those who are motivated by greed and act in their own best interest." As we move past the record 2016 enforcement year, it seems probable that inter-governmental consortium approach will be increasingly employed -- it creates an international super-authority which is more powerful than any of its component sovereigns, leaving defendants with few defenses which might otherwise be available against the individual reach of a distant government.

The best defense available to companies going forward is to implement conforming internal fraud monitoring and prevention procedures. Both the United States and UK governments have recommended the types of procedures that should be put in place. They emphasize such measures as regular employee education, vetting of agents, independent reporting channels, anonymous whistle-blower protections and promotion of proper corporate culture. These measures should be followed by responsible companies in any event, but they are also effective in most jurisdictions in preventing or limiting liability. In the UK, for instance, such measures constitute an affirmative defense against allegations that a company failed to prevent bribery. Even in the U.S., pro-active measures will significantly alleviate the consequences of certain FCPA violations.

Moving forward, companies will find it increasingly prudent to not only root out corruption within their organizations, but to affirmatively structure their procedures and culture, both within and at their outside partners and consultants, in order to minimize from the outset any occurrences of illegal behavior.



By Salma Essam

ver since Algeria seized independence in 1962, the country has maintained a level of relative stability despite the propagating waves of the 2011 Arab spring. The North African republic is rich with abundant natural resources such as petroleum, zinc, natural gas, uranium, iron, and phosphate. In fact, the economy of Algeria is heavily reliant on the energy sector, forming around 35% of the country total GDP and an average of 65% of its exports. As the French colonization has seceded off the Algerian lands, the country has commenced hydrocarbon extraction activities that transformed the agriculture-based economy to industrialization.

With a population of around 40 million people across the biggest state in Africa, Algeria is one of the few African members to join the Organization for Petroleum along with Nigeria, Angola, and Libya. The energy sector proves, therefore, to be the cardinal organ for Algeria's economy. With that said; it becomes essential to observe the factors that pull the strings of Algerian oil and gas industry.

Energy Security in a Regional Context

Although the proliferating waves of the Arab spring originated close to the Algerian borders, particularly across Tunisia, Algeria remained resistant to the rampant unstable conditions in the Arab world. But this does not corner Algeria in a no-uprising state. In fact, the Algerian government has initially realized the risk on its petroleum sector should the nation become destabilized. With this, the democratic republic, headed by Abdelaziz Bouteflika, has ensured border control since 2011 by doubling its border police (Groupement des Gardes- Frontières, GGF) to reach 135,000 men. Center of Global Energy Policy Paper - The Impact of Low Oil Prices on Algeria, published in October 2016, explained that the military spending of the North African state increased by 175% between 2004 and 2014. Bilateral Security ties were manifested in the provision of logistic support by the US and the EU as the strategic relevance of Algeria has grown in the presence of ISIS militants in Libya. For the European continent, a weakened Algeria

incapable of securing its territory can create tough spillovers to the EU's energy security reliant on its southern neighbor.

Still, Algeria's energy sector was jeopardized in spite of the strict security measures Bouteflika has adopted. The Algerian energy fields have fell victim for security threats and political rivalries. The prominent In Amenas gas plant attack marks the most spectacular gas field attack in the North Africa's modern history. In January 2013, around 32 terrorists launched an attack on the Tingantourine gas facility at the major In Amenas gas field, taking more than 100 expatriate personnel hostage. As the motives of the attack remain in question, operations in the field that produced 9 billion cubic meters of natural gas annually were halted, taking it three years to return to its full production capacity in 2016. This has largely influenced the gas supply in Algeria as In Amenas provided around 11.5 % of Algeria's total natural gas output before the attack.

Algeria's Production and Exports

It goes without doubt that Algeria's production and export capacities have been the operator engine for its economy ever since the former French colony has gained independence. The Energy Ministry has been ramping up its efforts to increase production throughout the past few decades. In 1960, average daily crude oil production stood at 181.1 thousand barrels per day. This number has gradually increased to reach 1,157.1 thousand barrels per day in 2015. This has paved the way for Algeria to be an energy exporting country and one of the main oil and gas producers in the world. But the situation in Algeria has been affected by different factors that stood as obstacles for the industry.

Beside the regional security threats surrounding the Algerian economy, the increasing number of inhabitant has had a dramatic effect on the country's exports and the energy sector as a whole. In 2017, the United Nations estimated the Algerian population to have reached around 41 million, which has inevitably influenced consumption patterns. As a matter of fact, domestic consumption is witnessing a steady rise, eating up around half of the total production. "Consumption of oil more than doubled in the past 15 years, passing from 0.19 mb/d in 2000 to 0.39 in 2013; over the same period, gas consumption experienced a 70% increase, from 19.8 to 33.4 Bcm/y," stated Economics PHD Candidate Nicolo Rosetto, in his article Algerian Hydrocarbon Sector Struggles to Meet Expectations and Country Requirements published by Institute for International Political Studies in March 2016.

Center of Global Energy Report said that the country's oil production has declined after witnessing a peak in the mid-2000s, whereas OPEC Statistics Bulletin depicts a notable decline in Algeria's value of petroleum exports, falling from \$51,409 million in 2011 to \$21,751 million in 2015. These numbers, in fact, affirm that the rising domestic consumption has been eroding Algeria's exporting capacity, and further

hints to the unlikelihood of raising oil and gas exports potential of the country.

With this situation at hand, it becomes essential for the Algerian government to take the necessary steps to enhance its energy industry and maintain a strong stature in the oil market.

Energy Sector Reforms: Opportunities and Risks

The decline in export revenues and the increase in the domestic consumption fashion are not the sole challenges facing the Algerian government. In fact, Algeria needs to offset the sharp decline in global oil prices that has largely slashed the government finances.

Bolstering the Algerian energy sector can play a key role in thrusting the country's economy forwards. The government needs to consider venturing new exploration and production agreements, especially as the country has the potential to produce more. But in order to increase production, Algeria will need to consider new exploration and production activities that can encourage foreign investors to bring in cash flow to the Algerian industry. The Algerian government has realized the essentiality of reforming the energy sector amid an increasingly competitive energy market. In fact, Algerian Energy Minister Noureddin Bouterfa said in early April 2017 that "Algeria could change its hydrocarbons law to boost energy partnerships with foreign firms and draw more investment into its oil and gas sector," according to Reuters. Even though the hydrocarbon law was amended in 2013 by offering incentives to foreign companies in unconventional resources, the foreign partners have deemed the changes unsatisfactory and non-enticing to subsequent public bid rounds. Since then, foreign companies have been dealing with giant state-owned company, Sonatrach, on a bilateral-basis. This means that the government's attempt to re-address the law became indispensable and should be acted upon in a timely-manner.

While pressures are mounting to adopt reforms to draw foreign investment, such changes would

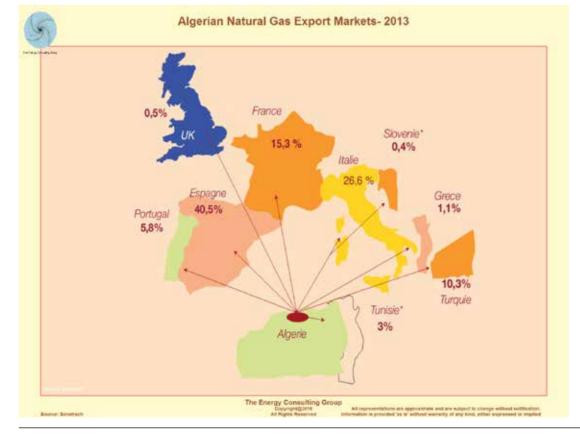
require a solid strategy to involve the European Union boosting the energy industry. This leads to the fundamental question of whether the EU would be interested in doing energy business in Algeria or not. From Europe's perspective, investment influx in Algeria's energy sector is a mutual advantage for Algeria and the EU. Not only does this enhance the North African economy but further protects the southern border for the EU since that extending investments increases the country's stability. Further, the European Union's unstable political relation with Russia prompts Europe's member states to find a lasting supply, of which Algeria can play the leading role.

But consolidating energy ties between the EU and Algeria entails a closer look at the Algerian pipelines' capacity to transmit gas. Indeed, the lack of wide access to the European market has notably reduced Algeria's ability to reach significant parts there. This has further contributed to the increase in the amount of unused imports capacity there. Spain has the Maghreb-Europe pipeline that supplies gas from Algeria through Morocco and the Medgaz pipeline that connects both countries directly with a combined capacity of 23 billion cubic meters. Both Spain and Portugal combined imported 15 billion cubic meters in 2015, leaving more than 8 billion cubic meters of capacity idle. This diminishes the capacity of a pipeline and further makes it hard to allocate the maximum amount of gas flow potential the pipeline is designed for. The Center of Global Policy paper explained that the addition of a new compressor becomes essential and "can easily increase the medgaz pipeline capacity by some 4 bcm," turning the idle capacity to a spare capacity of around 12 billion cubic meters.

Unarguably, strengthening ties with the EU for gas exports will help, but with the rising domestic consumption, the government needs to put into consideration the amount of gas that the country can be capable to export. If Algeria's population continues to increase, its energy export capacity will sharply decline, putting self-sufficiency as a priority over exports revenues.

It is true that the Algerian government has recently embarked upon policy reforms, including the subsidy system and the financial framework, yet Algeria's energy-reliant economy is less likely to grow as the oil prices will continue to roam around \$50 per barrel. Responding to the magnitude and the persistence of the oil slump is a pivotal step for the government. Thus, the country needs to address the long standing vulnerabilities by bringing forward robust strategies to diversify the economy away from hydrocarbon dependence. This can be achieved by drafting new investment laws that can secure an encouraging business environment for investors in the non-oil industries.

Revenue-generating sectors such as Agriculture and tourism should be expanded, bureaucratic hurdles should be removed and the private sector should be given more space. With broader reforms, Algeria's economy can witness a boost, resist a sharp slump in oil prices, and the economic model will see major changes.



BREXIT: CURRENT AND POTENTIAL RAMIFICATIONS ON THE ENERGY MARKET

By Salma Essam

Britain's Exit from the European Union has sparked conflicting debates among world leaders, signaling huge economic and political consequences that render the future of the UK obscure. In late March 2017. British Prime Minister Theresa May has invoked article 50 of the EU law that triggers the start of the two-year process for a country ditching its European membership. Brexit's lengthy and complex negotiations on UK's relationship with Europe and its trade agreements are still in question. However, the repercussion of a Brexit 'Yes' vote on the energy market has been felt across the country even before the prime minister starts the exit process, and will likely continue to have a sounding effect on the industry.

Energy Supply

As a matter of course, Brexit creates uncertainties regarding the UK energy supply, as inferred from Premier Global Consultancy in their article – Brexit Effects on Oil and Gas Industry. The United Kingdom became a net importer of petroleum products in 2013, with the Netherlands and France being its major oil suppliers. Inevitably, Leaving the EU will affect UK's relation with other EU member states and could hamper smooth export endeavors.

But Energy supply to the UK is not solely tied with its relation with other countries. The value of the country's currency plays a key role in affecting the supply of petroleum products. The British Pound did slump a day following the referendum and stayed around 15% lower against the dollar and 10% less against the euro as of late March. The depreciation of the British sterling against the Euro currency, undoubtedly, bears within gross consequences on the oil import matrix, resulting in hiking costs for the British oil market. It further places huge burdens on the British government finances with regards to its petroleum expenses.

In addition, a vote for leaving the EU has had substantial ramifications that had struck the British economy. In February 2017, inflation rate in Britain has reached 2.3% - its highest rate for three and a half years. This is beside the decrease in oil prices and political disturbances. From this point, energy markets have been concerned with the potential negative outcomes of Brexit on the energy supply and operations in the UK and its British counterpart in other regions.

Trade Barriers & Loss of Free Movement

Trade barriers in the energy sector are likely to arise alongside other political and economic dilemmas. As a matter of fact, most workers in the UK-based oil and gas firms, whether British or not, are employed by European companies. Exiting the EU will influence the trade of manpower as it will increase the cost of hiring British nationals by EU entities, which will prompt major European companies to direct their attention to recruit workers from other EU areas at a lower cost. This will highly affect the UK since that it will struggle with its limited manpower, that long depended on nationals across Europe, and issues of capital mobility.



Britain, therefore, is likely to find a hard time to attract labor force in the oil and gas industry. In turn, the British energy markets may seem unappealing to many foreign IOCs, a fact that may impact the flow of foreign investments to the country in the medium and long term, especially with the emergence of developing energy markets in other parts of Europe and the Middle East.

A possible outcome for Brexit is the loss of free movement which adds up to the immensity of the trade barrier issue. An EU vote-out means that British nationals may not be able to travel freely to Europe without a visa and, in essence, would need to apply for a work permit before working in Europe, a procedure that is not required for EU citizens. In essence, UK workers will be denied free movement in the North Sea area, located between Great Britain Scandinavia, Germany, the Netherlands, Belgium, and France, where extensive drilling operations take place.

Oil Prices & Investments

A UK-Europe divorce has further extended to impact oil prices and foreign investments which have de facto reflected in the aftermath of a Brexit vote. This impact has been felt on the oil prices as the amount per barrel has slumped by \$2 reaching to \$48.30 per barrel, following the chaos caused by the referendum in the UK.

Even though in early 2016 the oil and gas market prices maintained a balance, Economists argue that financial changes caused by Brexit will continue to have an effect on the global oil prices. The long-term effect of the referendum and the price fluctuation will massively affect the oil and gas demand, which in turn can cause an economic slowdown and hamper energy investments in the UK. Being the cardinal element for major investment decisions, oil price instability has negatively influenced the confidence in the UK market and may, in the worst cases, lead to the cancellation of some major projects. Major companies such as British Petroleum said that the major investors may be reluctant over the situation in the UK until relative oil price stability is maintained. Investment tendencies may be further hampered as a result of political instability that will bring about unpredictability to the E & P market. Premier Global Consultancy article, in this sense, said that "long-term oil and gas market developments in the UK raise a big question mark, because the market has already begun to encounter difficulties."

"The depreciation of the British sterling against the Euro currency, undoubtedly, bears within gross consequences on the oil import matrix, resulting in hiking costs for the British oil market."

The effect of Brexit-ing the political scene will continue to reverberate through the coming years and the huge consequences are yet to be defined. Indeed, unpicking 43 years of EU-joint agreements and treaties covering political, economic, and security topics is not a straightforward task. Couple this with the fact that a historic decision as such has never been executed before and supervising committees will be negotiating means of leaving the EU for the first time. The post-Brexit economic climate is likely to be the most anticipated and exciting to observe. Trade agreements, closely-tied with the energy market, may be the most complex part of the negotiations because they require unanimous approval of more than 30 national and regional parliaments in Europe. Will the UK be able to mitigate these risks and maintain a stable market?



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INFRASTRUCTURE TO ACHIEVE SELF SUFFICIENCY

Egypt holds a key position in the MENA region and in Africa, being the most populated country in MENA and ranking second in Africa. Egypt is the largest oil producer in Africa outside of the Organization of the Petroleum Exporting Countries (OPEC), and the second-largest natural gas producer on the continent, behind Algeria. In addition, Egypt plays a vital role in international energy markets through the operation of the Suez Canal and Suez-Mediterranean (SUMED) Pipeline.

However, Egypt has also become in the recent past an emerging petroleum (and soon gas) importer after having developed internally the infrastructure of both a petroleum and gas producer and exporter. Opportunities for increasing oil and gas availability in the region should be favorable to the petroleum import needs of Egypt, and could also provide opportunities for arbitrage of crude oil qualities or optimization of LNG shipping routes and schedules.

In relation to the growth rate of the population of Egypt and of its economy, the country's energy demand has been growing strongly and steadily and is expected to continue on a similar trend.

On the energy supply side, Egypt has been depending on its own oil and gas resources for 96% of its energy needs. Egypt is today at the crossroads of several challenges faced by its energy sector:

The oil demand of the local market is now exceeding the oil production, and the need for oil imports is growing. And also gas demand of the local market

EGPC and EGAS are too dependent on international operators for the assessment and the inventory of the oil and gas reserves, thus the focus on proved reserves is suitable for short term and medium term

forecasting only. The long term strategic approach requires a deeper and clearer vision of the possible reserves. The inventory of these possible reserves will be necessary to build a strategic plan for future exploration and development of oil and gas resources in the future.

On the basis of the current vision, the incapacity of oil, and more importantly gas, to continue providing in the future 96% together of the total energy needs of the Egyptian market seems more than likely. Therefore the share of oil and gas in the Egyptian energy mix will have to decrease, opening a space to be filled by other energies that need to be developed such as renewables.

Thereafter we need to meet the demands of the Egyptian market in terms of petroleum products and investigate such options as:

- Needs for debottlenecking at existing refineries to increase throughput.
- Decommissioning of obsolete plants.
- New refining capacity versus revamping of existing refineries.
- Economics of tolling refineries.
- Need for additional conversion facilities such as Hydrocrackers, Reformers and Isomerization units (plus their support facilities such as Hydro treaters).
- Setting up of a "think tank" to further evaluate the potential for

Wael Essam El-Rayes

General Manager for Data & Information Analysis at EGPC

INFRASTRUCTURE DEVELOPMENT FOR THE UPSTREAM SECTOR

The oil and gas sector is the most important sector of foreign direct investment, and Egypt has been a major oil exporter for many years, and recently was achieving stable production output. In this sense the policy has been successful with substantial investments over the last 9 years compared to the 1990s – entering the sector.

By 2012, the total number of discoveries since 1999 has been over 450. Thus, the discoveries have overcompensated production and Egypt's remaining proved reserves have grown by 20% – i.e., 16 times the annual production, according to the 2009 BP Statistical Review of World Energy (BP, 2009). However, for a number of reasons, oil production is on a downward curve, and some estimates see a substantial reduction in the near future. The objective is therefore on slowing the decline – through enhanced recovery, reservoir management techniques, and possible development of oil shale resources.

Recently oil and gas exploration in Egypt has attracted an increasing number of mid-size petroleum companies. Even in offshore areas where drilling operation is quite expensive due to high costs of rigs services and logistics, the big majors form consortiums with smaller partner companies to share the costs, risks and opportunities. In onshore areas, mid-size operators have even taken large shares of the exploration activity and become leading producers. This has largely contributed to the sustained exploration drilling activity and to stable and rather high success factor of discoveries.

Similarly to oil reserves, the total oil production, made up of crude oil

and condensate, has remained fairly stable over the past ten years.

It is unlikely that domestic oil production will be able to cover the increasing energy demand. In the best case, the question is to estimate how much longer the current level of oil production can be sustained, although there are 8 Refineries and a large national pipeline grid covering almost all of Egypt.

Therefore Oil supply will be increasingly dependent on imports, the share of oil in the energy mix of Egypt will decrease, leaving more room for other energy sources, including renewables, hydro, coal and possible nuclear, and the contribution of energy efficiency gains to the supply/demand balance will also be needed.

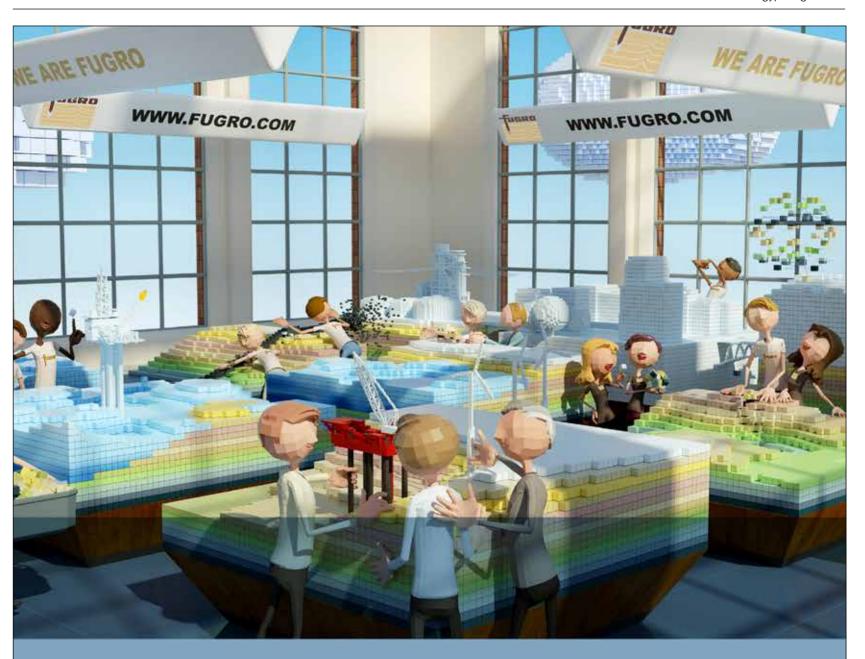
For all previously mentioned we believe that major upstream Sector Strategies should be adapted as follows:

- Manage Discovery and Development of New Petroleum Reserves:
- Maximize Recovery from All Producing Fields
- Adjustments to Legal and Contractual Policies

The proposed Upstream Oil Strategy is meant to meet these objectives by ensuring the best possible knowledge and forward vision of the petroleum resources of Egypt.

Eng. Alaa Hegazy

Deputy Chief Executive Officer for Planning & Projects at EGPC



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EGYPT OIL & GAS LAUNCHED 2ND AGREEMENTS TRAINING COURSE

By Sarah Samir

gypt Oil&Gas had cooperated with Andrews Kurth Legal Firm along with Open Chance Law Firm in order to inaugurate a training that casts more focus on the legality of the oil and gas field. The 2nd International Oil and Gas Law and Contracts Training Program was held on the 12th and 13th of April 2017, in Sky Executive Resort, in the attendance of the industry's leaders.

The training program addressed different subjects that were beneficial to industry leaders. The panelists led role plays and group discussion in most of the sessions to keep interaction with the attendees.

There were many topics that were discussed in the training program that the EOG found to be essential; among them were Farm-in and Farmout, and Mergers & Acquisitions. Andrews Kurth Keyon's Partner, Patricia Tiller, made a presentation on different types of contracts including concession agreements, service contracts and production sharing agreements. Tiller stated that the form of concession agreements adapted in Egypt is more like the production sharing agreement. TransGlobe Energy's Country Manager and Director, Brian Twaddle, commented "The problem with the production sharing agreement is that [the parties] spend too much time arguing." Meanwhile, Amr Ashraf, Part of the Technical Office of the Modernization Program at the Ministry of Petroleum, assured the attendees that "experts are currently studying [different] types of agreements other than the production sharing agreements."

Tiller's presentations further addressed risk sharing, taxes, royalties, customs, and fees. In addition, Karim Imam, of PricewaterhouseCoopers (PwC) and Attorney at Open Chance Law Firm, Marwan Al Ashaal, discussed the cost recovery legal framework with the attendees. They talked of operating expenses, development expenditure, exploration expenditure and accounting procedures.

Moreover, Andrews Kurth Kenyon's Partner, Mark J. Thurber, made a presentation on the Foreign Corrupt Practices Act (FCPA). He presented antibribery/anti-corruption acts of several countries including Canada, the United States and UK. His

presentation tackled FCPA enforcement actions, facilitation payments, FCPA penalties, and gifts and entertainment policy.

Thurber explained that if an IOC "applies with UK, US, or any other act, it should also comply with the Egyptian [anti-bribery] statute."

Accordingly, Hadir Helal, Partner at Open Chance Law Firm, stated to Egypt Oil&Gas "Gifts are penalized as offering bribery. All gifts for public officials are classified as bribery act and the law does not put any limit to the amounts of gifts, but basically it classifies it as bribery regardless of the amount." Helal added that "People who are holding any government posts are penalized for bribery acts, basically most of the people in the oil and gas sector [in JVs and IOCs as well] are dealing with the government, so they deal with EGPC. That's why when they are dealing with EGPC, they are under obligation to the act and they receive the same penalties as they are classified as public officials."

Helal explained that Egypt "does not have a strong rigid regime as to the laws when it comes to acts of anti-bribery."

Trainees further talked about the Egyptian Modernization Program and what needs to be addressed regarding the legal contracts. Rockhopper Egypt Country Manager, Samir Abdelmoaty, said during the training that the Egyptian oil and gas sector "does not only [need] to improve the current [agreement] model, but [the sector] also needs to look at different models."

The event covered several legal angles that are important for oil and gas investors. Apex's Accountant Manager, Ihab Ismail, told Egypt Oil&Gas "The training was amazing and the training materials were very informative."

In Addition Amr Ashraf from the Technical Team of the Ministry of Petroleum told Egypt Oil&Gas that "the event was very impressive. The most beneficial part of the event was having the chance to meet people from IOCs and to exchange contacts, having the opportunity to strengthened cooperation, and to hear the thoughts of the industry people, I sure do advice people to attend the upcoming event next









EPEX, ENAP SIPETROL BRING INSIGHTS TO EGYPT'S UNCONVENTIONAL GAS

By Mariana Somensi

he Egyptian oil and gas sector took an important step to boost its status as an energy hub as it moves forward with drilling operations in unconventional gas fields. To promote valuable insights and help the petroleum industry in its way towards unconventional, the Egyptian branch of Chile's Enap Sipetrol hosted a special event in partnership with the Egyptian Petroleum Exploration Society (EPEX) at Holiday Inn Cairo Maadi Hotel on April 4.

The event kicked off with a welcoming speech by EPEX' Chairman, Ahmed Abdel-Fattah, and counted with the presence of prominent figures of the Egyptian oil and gas sector. It is worth mentioning that EPEX is a geological society of a public-spirited, nonprofit organization funded in 1982, whose mission is to spread knowledge, share best practices, and apply new exploration ideas for enhancing innovation and for the improvement of the oil and gas business in Egypt.

In line with EPEX' vision, Enap Sipetrol's Exploration and Reservoir Manager, Lisandro Rojas Galliani, led a presentation entitled the "Challenges in going from a 'Conventional' to an 'Unconventional' Business Model: Experiences and Lessons from the ZG Tight Gas Project in Southern Chile."

In December 2013, Rojas, who has 37 years of experience in exploration projects in South and Central America and North Africa, presented in a conference held by EPEX the potential of Chile's unconventional production. In the recent event held early April, the expert geologist had the pleasure to disclose Enap Sipetrol's achievement in fulfilling Chile's potential and revitalizing the Magallanes basin, which had produced gas through conventional operations for more than 70 years.

Collecting Data

When moving to unconventional exploration, the petroleum companies should be prepared to face challenges that are different from the traditional ones. "If the field is unconventional, so the challenges and solutions should be unconventional as well," EPEX' Chairman, Ahmed Abdel-Fattah, commented on his opening speech.

As stated by Lisandro Rojas, the first problem to be overcome in a new project is the lack of data. "You suddenly realize that there is no reservoir data, and you need months or years of data to determine the quantity of resources available in the field," he explained.

In Egypt's Apollonia field, the companies involved in the unconventional project – Schlumberger, EGPC, Apache, Shell, Khalda, and Bapetco – have already managed this issue and drilled two vertical wells to collect data to characterize the reservoir, as well as two additional horizontal wells. The technical team also received a new technology integrated group and a technical expert assimilated in technical domain who has a lot of experience in unconventional work.

The Economics of the Field

Since unconventional wells require more data, special technology and some kind of stimulation, they are naturally more expensive than the ones in conventional fields. Therefore, it was highlighted in the event that, when engaging in unconventional projects, the companies must develop a massive cost-reduction scheme. "In Chile, 70% of the investment went to drilling, so if you save every penny on drilling, you will be saving a lot of money," Rojas noted.

In its transition, Chile succeeded in drastically



reducing its drilling costs. At the beginning of the scheme, Enap Sipetrol used to spend \$5 million to drill its wells, which was later reduced by 50%. Additionally, the company went from 32 drilling days down to only six days, another important achievement to maintain the unconventional project alive.

When Chile managed to reduce its drilling costs in half of the price, the company finally started to take profit from its activities. In the project's early days, this profit did not exist. "Because the income of each well is modest, these [unconventional] schemes are very sensitive to price and contract conditions. In unconventional, you can come from positive to negative very rapidly," Rojas noted.

Contract Adjustment

Conventional fields produce a big quantity of gas; however, in unconventional ones, production is smaller, and the income, the portion to share in royalty and taxes are also modest, while drilling and production costs are higher.

Accordingly, the importance of establishing new contract terms and how much from the project's budget will be available for shares to the government (royalties) was also pointed out during the presentation.

The solution presented to avoid having the project killed by economic struggle was the creation of a flexible government take that is adaptable to the project. "If the scheme is very profitable, the government takes a biggest share; if not, it takes a smaller one," Rojas said.

He further mentioned that the duration of unconventional contracts must be very large by default, since production requires more time due to the big amount of questions that must be answered in the project's early phases.

"This flexibility is the key to keep the project going. In Mexico, for example, there are no special contracts for unconventional gas. Despite having the potential and the resources, the price of gas is killing Mexico's potential. Since the country imports gas for a cheaper price than the unconventional one, there is no way of making it economical and profitable," Rojas explained.

Going from conventional to unconventional gas certainly grants a bigger amount of resources, which can really rejuvenate any basin. However, a country must go through a lot of effort to make it economical successful. "Unconventional represents a completely different business model. It requires

dedicated teams just to deal with costs, logistics and supplies, as well as some kind of special treatment from the government for contracts and taxes," he added.

Rojas stressed that what made the unconventional project in Chile successful was the possibility of modifying contracts. Instead of raising the gas prices abruptly, Chile managed to do it smoothly without severely affecting the economy with the business model transition. Moreover, the production increase was so significant and the economic environment so favorable that nowadays Chile is able to export its tight gas, and became a supplier to countries from which it originally used to import.

Each Country Has a Different Reality

Companies engaged in unconventional projects should not compare its costs with the ones in the United States, since no country has ever been able to duplicate the cheap way the US drill unconventional. Hence, different fields throughout the world are going to have their own reality of costs, but the American scheme should not be used as parameter to the oil and gas firms worldwide.

"There [the US], they drill really big wells for \$5 million; in Mexico, in the other side of the river, the same wells were costing more than \$10 million, according to Petróleos Mexicanos (PEMEX)," Rojas exemplified.

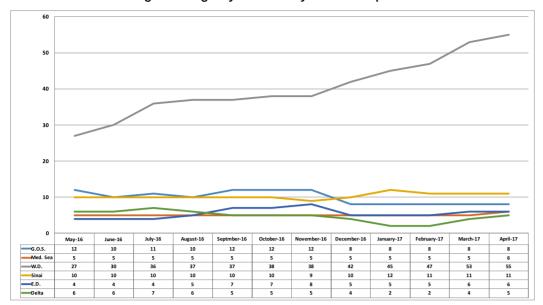
Egypt Is a Fruitful Land

Egypt's potential for unconventional gas represents a significant asset to remediate the country's current energy struggle and boost its status in the energy market. However, the Arab nation must adapt its conventional regulations to welcome the prospects of unconventional production.

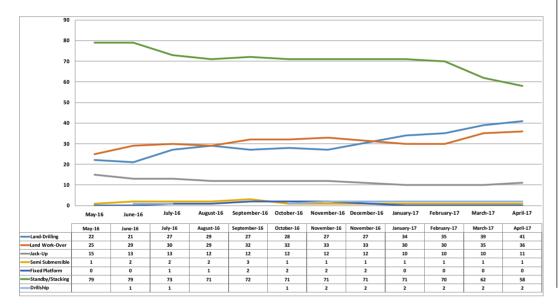
"There are no agreements or contract models for unconventional in Egypt. It should be created and for a long duration," EPEX' Chairman, Ahmed Abdel-Fattah, stated to Egypt Oil&Gas in the sidelines of the event.

The successful model applied in Chile served as an inspiration to the Egyptian petroleum experts attending to EPEX' event. Commenting on the projects being developed in Egypt, Rojas affirmed that "the main point is that each country will have its own particular situations and will have to develop its own particular solutions. However, if the unconventional potential is there, the project will need some help, otherwise the gas will stay in the ground."

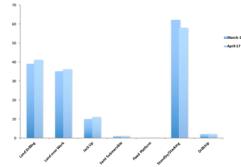
Changes in Rigs by Area- May 2016 to April 2017



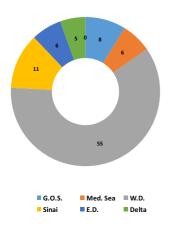
Changes in Rigs by Type - May 2016 to April 2017



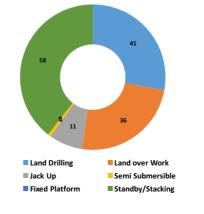
Rigs per Specification - March 2017 - April 2017



Rig Count per Area - April 2017 Rigs per Specification - April 2017



Rigs per Area - March 2017 - April 2017



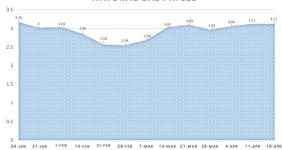
BRENT PRICES



OPEC BASKET PRICES



NATURAL GAS PRICES



PRODUCTION MARCH 2017

	Crude Oil	Equivalent Gas	Liquified Gas	Condensate
Med. Sea	_	9630893	133782	588032
E.D.	1976580	12679	2548	873
W.D.	8938146	7212857	609294	1279819
GOS	3948289	724286	262505	74906
Delta	30208	6980536	102668	445915
Sinai	1712336	2321	22892	18421
U.Egypt	7342	_	_	_
Total	16612901	24563572	1133689	2407966

RIGS PER SPECIFICATION MARCH 2017 - APRIL 2017

March-17	April-17
39	41
35	36
10	11
1	1
0	0
62	58
2	2
149	149
	39 35 10 1 0 62 2

RIGS PER AREA

MARCH 2017 - APRIL 2017

LOCATION	March-17	April-17
G.O.S.	8	8
Med. Sea	5	6
W.D.	53	55
Sinai	11	11
E.D.	6	6
Delta	4	5
G.W.	0	0
Total	87	91







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