EGYPT OIL&GAS NEWSPAPER

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GAS FLARING REDUCTION IS POSSIBLE

Zero Gas Flare Prospects for Egypt

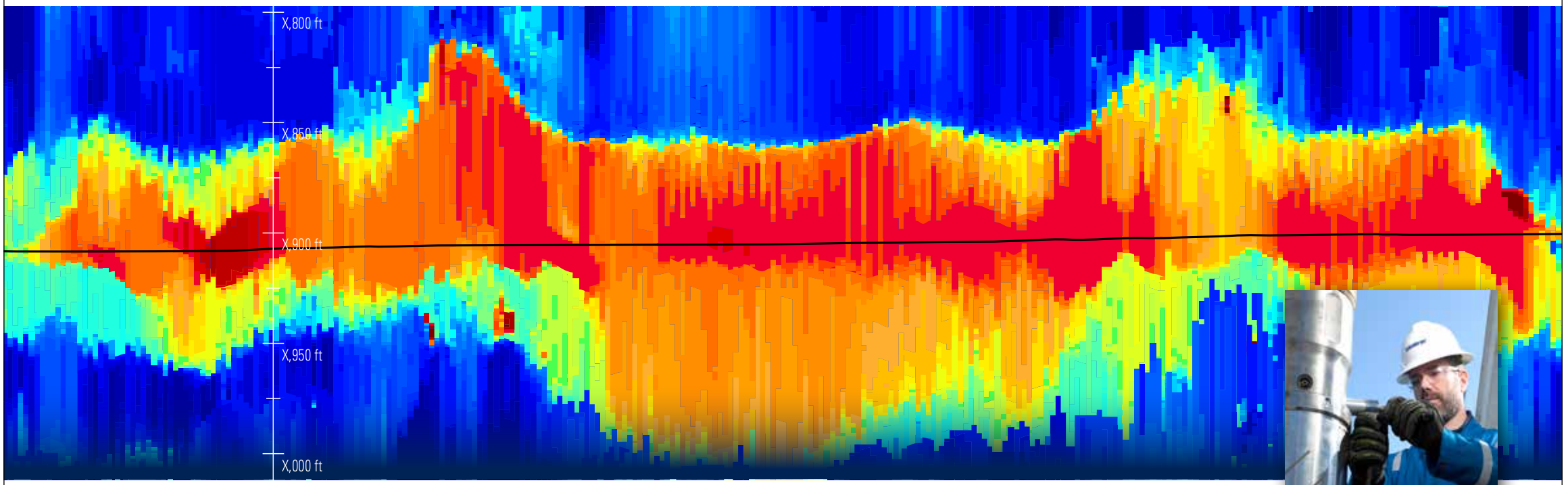
Burning Gas, Burning Money

Fading Environmentally Destructive Flames

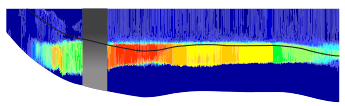
MOC 2016: Egypt Offers Efficient Investment Model

GeoSphere

RESERVOIR MAPPING-WHILE-DRILLING SERVICE



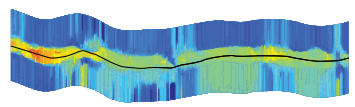
With a depth of investigation exceeding 100 ft [30 m], the GeoSphere reservoir mapping-while-drilling service reveals subsurface layers and fluid contacts to increase production potential.



Maximize Reservoir Exposure

Detection of reservoir top and subsurface layers tens of feet before intersecting the reservoir enables operators to

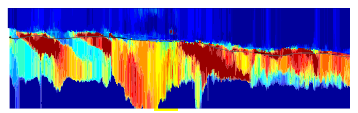
- land with precision
- prevent reservoir lateral loss
- avoid early water breakthrough
- reduce number of pilot holes.



Steer Within Sweet Spot

Real-time mapping data enables operators to steer well strategically to

- avoid unplanned reservoir exits
- eliminate geological sidetracks
- predict oncoming strata and formations
- avoid drilling hazards
- drill smoother wellbores.



Update Field Development Plans

Asset teams can integrate mapping data detailing the presence of lateral heterogeneities, subsurface unconformities, and reservoir geometry to

- update reservoir models
- improve reservoir characterization
- refine field development plans
- optimize production potential.

www.slb.com/GeoSphere

Schlumberger

EDITOR'S NOTE

The 2016 Mediterranean Offshore Conference attracted all focus of the oil sector in April, which was clearly nothing unexpected. The MOC lured global oil majors as well as smaller players in the offshore sector to Alexandria for a three-day event with enormous exhibiting potential. Egypt's recent offshore discoveries stood in the center of attention. With the presence of Egypt's Oil Minister, Tarek El Molla, the event launched a new beginning for the country in terms of global cooperation. Egypt Oil&Gas is bringing you the highlights.

In April, EOG team focused on a theme that poses urgent and major challenges to the oil and gas industry, namely flaring of associated petroleum gas. We have examined the issue from the environmental, economic, and international perspective as it has become highly prominent in the past two years in the sector's debates about the enhancement of economics, outputs, and deliveries.

In this issue, we discuss prospects for Egypt with regard to the country's intention to eliminate gas flaring and maximize utilization of natural gas reserves. Further, EOG had a unique opportunity to speak with experts and oil sector professionals to explore the global initiative in zero gas flare. In an interview with EBRD Associate Director it was concluded that eliminating gas flaring is possible given the existing structural tools, available financial assistance, and emerging innovative technologies in the market.

We also look at success stories of companies operating in Egypt in their attempts to improve their economics by finding alternative channels to utilize associated gas from their oil fields.

As the major destruction related to gas flaring is seen in the environment, threatening harm to ecosystems, air pollution, water intoxication, and health deterioration, we are exploring what is a common rationale behind continuous gas flaring and gas venting, and how it can be amended to everyone's benefit.

With an aim to offer you a comparative perspective to the gas flaring situation in Egypt, we also researched lessons learned from other gas flarers in the world. A country that represents an example of zero routine flaring, Norway, shows that a systemic approach is needed to tackle the practice. On the other hand, Nigeria is a country that despite efforts and clearly defined legal framework banning gas flare is still continuing due to a number of reasons.

Gas flaring reduction is equally fascinating as it is alarming. And we all hope that you will enjoy reading about it in this new issue.

Thank you for your support and readership.

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ENI to Launch Gas Production from Zohr by End 2017

Italy's ENI is focused on starting production at its giant offshore Zohr gas field in Egypt by the end of 2017, the company's CEO, Claudio Descalzi, said at an International Energy Agency event in Paris, Reuters reported.

Descalzi added that ENI was moving fast on the project although there were some challenges. "We have already started the civil work. It is challenging but we are focused," Descalzi noted.

Meanwhile, ENI has completed the drilling of the third gas well, Daily News Egypt wrote. A senior official from ENI said that the initial production from the third gas well is very promising and the company is determining the volume of the new reserves. He added that ENI will start drilling the fourth gas well in the Shorouk concession in the second half of April and will complete drilling within 40 days. The initial estimations of the third deepwater well are larger than the first and the second, with estimated total reserves of 30tcf.

ENI wants to finish the first stage of the Zohr development lease, which includes drilling six gas wells, by the end of 2016, the cited official added. He also explained that the initial results shown in the second well indicate an estimated 20% increase in the gas reserves. This translates into an increase in the total production after the end of the development process, with investments of approximately $12b.

ENI has begun the implementation of a treatment plant for the gas produced from the recently discovered Zohr field, estimated to be 1bBTU/d in the primary phase. This plant will be a subsidiary of Petrobel's facilities in Port Said governorate. Additionally, the official said the first phase of Shorouk plant will be completed by December 2017 after which production will gradually begin. The official added that $5b will be invested for the implementation of the first phase of the Shorouk concession in the Mediterranean deep waters.

The company aims to complete linking Zohr gas field production in two phases. The first phase includes preparing four wells for production by mid-2018, and the second phase will add 16 wells to production by 2020.

BP to Establish Natural Gas Processing Plant

British Petroleum (BP) has started preparing the land allocated to establishing a natural gas processing plant in the city of Rosetta, with a capacity ranging from 600 to 700mcf/d, Daily News Egypt reported.

A senior official from the Egyptian Natural Gas Holding Company (EGAS) said that BP will complete the production facilities of the plant by the end of 2020. However, the convention stipulates that the gas production from the project would be ready by January 2020 and produce 1bcf/d for five years.

Article 10 of the convention states that in the case the contractor fails to complete the project by the set deadline, a six-month grace period would be allowed. After that, a penalty mechanism will be applied if there are no compelling circumstances preventing the contractor from completing the project. The convention includes the expected plan for producing natural gas in the project during the coming years, starting from July 2017.

The official pointed out that the project will have a trial period from 1 July 2017 until 30 September 2017, with a daily average of 200mcf of gas. It will be linked to the natural gas processing plant of Burullus, affiliated to BP.

Oil Ministry to Allow BG to Export Liquefied Gas

Egypt's Ministry of Petroleum vowed to allow British Gas Group (BG), now a subsidiary of Shell, to export liquefied gas through the infrastructure of the Abu Dhabi Company for Onshore Petroleum Operations (ADCO), a ministry official told Daily News Egypt. Currently, the ADCO receives 1.13bcf/d of gas.

The decision comes after BG informed the Egyptian General Petroleum Corporation (EGPC) that work on the 9B phase of the Burullus field would resume if the company was allowed to export 100cf/d to 150cf/d of gas and increase the price of gas.

BG halted work and withdrew its oil drill from the field in February due to the Egyptian's government's failure to pay the money due to the company. The ministry informed BG that the payment of their dues is subject to the Central Bank of Egypt's (CBE) decision to allocate the required funds. In regard to the gas price, the ministry asserted that it will not exceed $5.88 per 1m thermal units.

The company stated that it was losing 20mcf of gas of its monthly production due to a lack of compensatory wells. The total production of the Burullus and Rosetta gas fields is estimated at 700mcf/d of gas.

Egypt's Arrears to Foreign Oil Companies Rose to $3.2b in March

Egypt's outstanding arrears to foreign oil companies increased to $3.2b at the end of March, up from $3b at the end of December, an official at the Ministry of Petroleum told Reuters. The ministry said last September that Egypt was aiming at reducing the arrears owed to foreign oil companies to $2.5b by the end of 2015 and to pay them off completely by the end of 2016, Ahram Online informed. Previously, in July last year, Reuters reported quoting an official at the state-owned Egyptian General Petroleum Corporation (EGPC), that Egypt's debts to foreign oil companies stood at $3.5b at the end of June, which was a 6.1% increase from March 2015.

Gasco Distributed 48bcm of Gas in 2015

Egyptian Natural Gas Company's (Gasco) Chairman and Managing Director, Karem Mahmoud, said the company has managed to distribute 48bcm of gas in Egypt in 2015 through the national network of natural gas, according to a press release received by Egypt Oil&Gas. Mahmoud explained that the distribution of gas included different consumption sectors in the local market, adding that the electricity sector uses around 64% of Egypt's total consumption. Gasco is currently working on implementing a number of projects to strengthen the national network's capacity to transfer and distribute natural gas to consumers.

Emirates NBD Egypt Signs $225m Power Projects Loan

Emirates NBD Egypt has signed an agreement for a loan worth EGP2b ($225.25m) with the state-run Egyptian Electricity Holding Company to finance two major power projects, Amwal Al Ghad reported. The total capacity of the two power plants will be 4,800 MW each. The first project is located in Burullus, near the town of Kafr el Sheikh, some 210km north of Cairo, while the second plant is set to be in the Egyptian new administrative capital city. Emirates NBD affirmed its commitment to supporting mega national projects and securing the necessary financing, according to a bank statement.

Kuwait Energy Announces New Oil Exploration Investments

Kuwait Energy CEO, Eng. Sara Akbar, said the company plans to pump more investments in the development of oil exploration fields in Egypt during the coming period, in addition to its overall investment portfolio in the country amounting to $1b in total, Egypt Oil&Gas reported. The announcement came during the opening of Kuwait Energy's new branch in Egypt in the presence of Tarek El Molla, Minister of Petroleum and Mineral Resources; Dr. Mansour Abu Khamseen, the company's Chairman; and Salem Al-Zmannan, Kuwaiti Ambassador to Egypt.

Egypt, Saudi Arabia Sign 17 Cooperation Agreements

During Saudi King Salman's official visit to Egypt, Riyadh and Cairo have signed 17 cooperation agreements, memoranda of understanding, and executive programs covering a wide range of fields including electricity, energy, nuclear, trade, industry, and transport, wrote Saudi Gazette. The agreements are worth approximately $1.7b, an Egyptian government official told press.

In addition, Egyptian President Abdel Fattah al-Sisi and King Salman agreed to set up a $16b Saudi-Egyptian investment fund.

Saudi oil company Aramco and the Egyptian General Petroleum Corporation (EGPC) have agreed that Saudi Arabia will provide Egypt with 700,000 tons of petroleum products a month under a $23b deal over five years signed between the two entities, an EGPC official was quoted by Reuter as saying.

Further, Aramco and Egypt's SUMED signed an agreement to increase the former's oil pumping to its customers in Europe via SUMED's pipeline. The Aramco-SUMED agreement could turn the Sidi Kerir port on the Mediterranean coast into a regional hub for the sale of Saudi crude to Europe. SUMED is partly owned by the Egyptian General Petroleum Corp. (EGPC), Saudi Arabia, Kuwait, the UAE, while Qatar owns the rest.

Riyadh and Cairo were also seeking to settle a long-standing maritime dispute. Deputy Crown Prince Muhammad Bin Salman, Second Deputy Premier and Minister of Defense, and Sherif Ismail, Egyptian Prime Minister, signed an arrangement to demarcate maritime borders with Saudi Arabia, officially placing two islands in the Straits of Tiran – named Tiran and Sanafir – in the Saudi territory.

It was also reported that Egypt's Minister of International Cooperation, Sahar Nasr, and Saudi Finance Minister, Ibrahim al-Assaf, announced the signing of an agreement for $100m worth of funding for the West Cairo Power Station project, which is set to open in 2019.

Saudi Arabia is among Egypt's top investors with an estimated $27b. Their trade exchange reached $4.9b last year, as Saudi Gazette informed, while the total volume of trade exchange amounted to $6.35b, according to Saudi-Egyptian Business Council Deputy Chairperson, Abdullah bin Mahfouz, quoted by Daily News Egypt.

Egypt, France Signed 11 MoUs in Electricity Sector

The Egyptian Ministry of Electricity has signed 11 memoranda of understanding (MoU) and cooperation agreements with France during French President's, François Hollande's, visit to Cairo, according to government sources cited by Daily News Egypt.

Two letters of intent were also signed focused on the development of the electricity sector with a goal to improve the efficiency of transmission and distribution networks and on the establishment of new renewable energy projects with a total production capacity of 1,000 MW.

Furthermore, the French Development Agency (AFD) was to authorize an agreement worth $56.5m with the Egyptian Ministry of Finance for the construction of a wind farm in the Gabal Elzeit area. The agency was expected to sign two other agreements to finance the Delta Electricity Control Center amounting to $56.5m for the construction of a solar power plant.

In addition, Électricité de France S.A (EDF) was reported as prepared to negotiate the signing of two MoUs with the Egyptian Electricity Holding Company (EEHC) and the New and Renewable Energy Authority (NREA) for the exchange of expertise.

The Egyptian-French Business Council expects French investments in Egypt to increase by 10% in 2017. According to a government statement, Egyptian President Abdal Fattah Al-Sisi stated at a joint press conference that the bilateral French-Egyptian talks addressed cooperation in the fields of traditional and renewable energy.

Oil Minister, Italian Edison Discuss Abu Qir Field

Tarek El Molla, Minister of Petroleum and Mineral Resources, met with Mr. Marc Benayoun, CEO of Edison International Group and President of the Board of Directors, to discuss the development of the second phase of Abu Qir gas production field in its concession areas in the Mediterranean. It is estimated that investments in the concession area amounted to more than $220m. The development is projected to add 150mcf of natural gas, 4,000 barrels of condensates, and 1,500 b/d of crude oil to the current output, Egypt Oil&Gas reported. In addition, they discussed the agreement signed for the establishment of a power plant between Edison and the Egyptian Company, El Qalaa Holdings, by which Edison will inject additional investments to increase gas production from the Abu Qir field for generating power.

EGAS Resumes 90% Gas Supply to Fertilizers

The Egyptian Natural Gas Holding Company (EGAS) has resumed providing gas to all fertilizer plants at about 90% of the contracted amount, currently estimated at 600mcf/d, according to Daily News Egypt. EGAS, however, stated it cannot fulfill fertilizers' total expected needs due to the high consumption of gas by power plants. An EGAS official said that power plants' consumption of natural gas rose to about 2.8bcf/d due to the increase in weather temperatures. EGAS provides 1.2bcf/d of gas for homes, cars, and low-consumption industries, in addition to 60mcf/d for National Cement (NCEM), Helwan cement plant, and Katameya cement factory, according to the official.

Oil Minister: Apache to Invest $1b in Egypt in FY 2016-17

Apache Corporation has allocated $1b in new investments in Egypt in the fiscal year 2016/17, Tarek El Molla, Minister of Petroleum and Mineral Resources, announced, following a meeting in Cairo with Apache CEO, John Christmann, according to a press release received by Egypt Oil&Gas.

El Molla added that the company's delegation's visit to Egypt confirms Apache's trust in Egypt's economic climate and its interest in continuing exploration and development operations; the visit also bodes well for investments in the oil and gas sector.

The meeting also discussed development projects conducted by Apache's joint ventures with the Egyptian General Petroleum Corporation (EGPC), Khalda Petroleum Company, and Qarun Petroleum Company.

Apache has been working in Egypt's petroleum sector for over 20 years, during which the companies' investments have exceeded $12b in 23 concession areas. Furthermore, the company's production has reached 212,500b/d of crude oil and condensates and 883mcf/d of natural gas.

In order to counter the oil price weakness, Apache has focused on prioritizing spending in areas with higher rates of returns such as Egypt and the North Sea, informed Seeking Alpha. Apache's assets in Egypt are able to realize a cash margin of $26 per barrel of oil equivalent at an average realized price of $37 per barrel of oil, which means that operating costs are just $11 per barrel.

EGPC, EGAS, BP Sign Atoll Gas Production Agreement

The Egyptian General Petroleum Corporation (EGPC), the Egyptian Natural Gas Holding Company (EGAS), and British company BP have signed agreements to facilitate gas production from the Atoll field, Tarek El Molla, Minister of Petroleum and Mineral Resources, said, according to a press release received by Egypt Oil & Gas. These agreements conclude the construction, transportation, and processing of gas produced from the well which belongs to the Pharaonic Petroleum Company.

El Molla had also reviewed the development plan and the early production programs of the Atoll well. Head of BP's upstream division, Bernard Looney, added that the company is eyeing the boost of its investments in Egypt. The country is thus envisioned to become the largest recipient of BP's finances by 2020, informed Al Mal News. Looney further explained that the company's total investment to date exceeds $25b, noting that 40% of Egypt's production of hydrocarbons are from the company's operations in the Gulf of Suez and Western Sahara, in addition to its work in the waters of the Mediterranean.

According to a recent report by Global Data, Egypt's Atoll gas discovery is of national significance for the county as it is expected to reduce the country's gas deficit with a required investment of $945m estimated for the development of the first phase, reported Offshore Technology.

Egypt to Reduce Fuel Subsidies by 43% in 2016/2017 FY

Egypt will reduce spending on fuel subsidies by nearly 43% in the 2016/17 budget due mainly to lower global energy costs, officials told Reuters.

President Abdel Fattah al-Sisi has already approved a draft state budget that reduces the budget deficit in the 2016/17 fiscal year to 9.8% of gross domestic product (GDP) from the current 11.5%. Finance Minister, Amr al-Garhy, told a news conference that state energy subsidies would fall to EGP 35b ($3.94b) from about EGP61b in the 2015/16 fiscal year.

The government has been trying to cut subsidies, which eat up a big chunk of the budget. However, in mid-2014, attempts to make cuts were met with anger by consumers as the measure caused domestic prices of natural gas, diesel, and other fuels to rise by as much as 78%.

The Deputy Finance Minister for Fiscal Policy, Ahmed Kojak, added that a decline in international oil prices would account for the bulk of the reduced subsidy spending in the next fiscal year, according to Daily Star.

Egypt is struggling to revive its economy since a popular uprising in 2011 shook investors' confidence and drove tourists and foreign investors away.

Oil Minister Reviewed SCADA System Project

Tarek El Molla, Minister of Petroleum, has reviewed the project concerned with the expansion and development of the SCADA System project at the National Advanced Control Center (NATA), according to a ministry's press release. El Molla met with Karem Mahmoud, Gasco's Chairman and MD, to discuss project development. The minister explained that the company will replace the current SCADA System with a more modern one to meet the needs of safe operations and to accommodate the increase in the number of natural gas consumers. El Molla also added that the first phase of the project has been completed, which includes connecting 110 new locations through modern communication systems, while work on connecting remaining sites is underway.

DRILLING

QARUN

Qarun, a joint venture between EGPC and Apache, has completed drilling a new oil development well in its concession area in the Western Desert. The production rate of Qarun in March 2016 was 1,222,337 barrels of oil.

WON X-2

The well was drilled at a depth of 6,788ft utilizing the EDC-63 rig. Investments surrounding the project are estimated at $1.432m.

NED-36

The well was drilled at a depth of 6,500ft utilizing the EDC-64 rig. Investments surrounding the project are estimated at $890,000.

HEBA-408

The well was drilled at a depth of 6,725ft utilizing the ST-2 rig. Investments surrounding the project are estimated at $700,000.

ASALA-68

The well was drilled at a depth of 5,960ft utilizing the EDC-17 rig. Investments surrounding the project are estimated at $1.1m.

BP

BP, a search and exploration company, has completed drilling a new gas development well in its concession area in the Mediterranean Sea.

TAURUS W-3

The well was drilled at a depth of 7,349ft utilizing the DISCOV-2 rig. Investments surrounding the project are estimated at $17.109m.

KHALDA

Khalda, a joint venture between EGPC and Apache, has completed drilling new oil exploration and development wells in its concession area in the Western Desert. The production rate of Khalda in March 2016 was 4,710,173 barrels of oil.

MRZK-136

The well was drilled at a depth of 6,800ft utilizing the EDC-61 rig. Investments surrounding the project are estimated at $1m.

MRZK-152

The development well was drilled at a depth of 6,811ft utilizing the EDC-66 rig. Investments surrounding the project are estimated to be $1.2m.

WD 33-11

The development well was drilled at a depth of 12,600ft utilizing the EDC-50 rig. Investments surrounding the project are estimated to be $2.009m.

BERENICE-1X

The exploration well was drilled at a depth of 14,155ft utilizing the EDC-48 rig. Investments surrounding the project are estimated to be $2.906m.

PETROBEL

PETROBEL, a joint venture between EGPC and ENI, has recently completed drilling new oil development wells in its concession area in Sinai. The production rate of PETROBEL was 2,960,979 barrels of oil in March 2016.

ARM-36

The well was drilled at the depth of 13,044ft utilizing the ST-3 rig. Investments surrounding the project are estimated at $5.3m. It is worth noting that the well is being placed on production.

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 2016 was 1,863,061 barrels of oil.

E.AGHAR-34

The well was drilled at a depth of 6,505ft utilizing the WF-161 rig. Investments surrounding the project are estimated at $1m.

FARAS-54

The well was drilled at a depth of 6,509ft utilizing the WF-161 rig. Investments surrounding the project are estimated at $1.002m.

GPC/SCIMITAR

GPC/SCIMITAR has completed drilling a new crude oil development well in its concession area in the Eastern Desert. The production rate of GPC in March 2016 was 1,296,875 barrels of oil.

ISS-146

The well was drilled at a depth of 1,866ft utilizing the SHAMS-1 rig. Investments surrounding the project are estimated at $1.5m.

Oil Output Freeze Deal Falls Apart

A deal to freeze oil output by OPEC and non-OPEC producers fell apart on April 17th after Saudi Arabia demanded that Iran join in despite calls on Riyadh to save the agreement and help prop up crude prices, Reuters reported. Some 18 oil nations, including non-OPEC Russia, gathered in the Qatari capital of Doha for what was expected to be the rubber-stamping of a deal to stabilize output at January levels until October 2016.

The development will, however, revive oil industry fears that major producers are embarking again on a battle for market share, especially after Riyadh threatened to raise output steeply if no freeze deal were reached. Similarly, Iran has been pledging to ramp up production in the post-sanctions period, making a compromise with Riyadh almost impossible.

After five hours of fierce debate between Saudi Arabia and Russia, delegates and ministers announced no deal had been reached. Russian Oil Minister, Alexander Novak, called the Saudi demand "unreasonable" and added that Moscow would not restrain output for now.

"We concluded we all need time to consult further," Qatar's Energy Minister, Mohammed al-Sada, said. Several OPEC sources said if Iran agreed to join the freeze at the next OPEC meeting on June 2nd, talks with non-OPEC producers could resume.

The failure likely means that oil prices will drop again, wrote AP citing analysts, even though oil prices rose by 5% in the week ahead of the meeting in anticipation of some action to freeze production.

The Telegraph added that demand for oil shows no sign of perking up, meaning the oil producers are not likely to be bailed out by enthusiastic customers. In addition, the market is growing more slowly in 2016 than in recent years, meaning spare capacity will not be used

up quickly. Analysts at the International Energy Agency estimated that by the end of 2016 oil demand will have grown by 1.2mb/d, which is one-third slower than the growth of 1.8m per day week in 2015.

MENA's Energy Investments to Reach $900b By 2020

he MENA region's total committed and planned energy investments will reach $900b over the next five years, according to a new report published by the Arab Petroleum Investments Corporation (APICORP), Arab News reported. Saudi Gazette explained that 38% of investments will go to the oil sector, 28% to power generation, 26% to gas, and 8% to the chemical sector.

The multilateral development bank's report, MENA Investment Outlook - Big plans in uncertain times, reveals that despite uncertainties in the region's investment outlook, APICORP estimates a 19% increase in total energy investment activity in the given period, representing an increase of $145b from the year before.

APICORP states that $289b of investment has already been committed to projects under execution in the region, while an additional $611b worth of development is planned.

Leading the investment drive will be Saudi Arabia, along with the UAE and Kuwait, which will look to invest across the energy value chain. Iraq and Iran will play catch-up and are determined to push their ambitious oil and gas plans forward, wrote Al Bawaba.

In North Africa, Algeria has vowed to pump billions into its upstream sector. It was also reported that much is expected of Egypt as its recent gas finds promise to meet rapidly rising power demand.

Renewable-energy projects will be at the forefront of efforts to meet rising power demand in Morocco, Tunisia, and Jordan.

Tehran to Ink Gas Oil Export Deal with Iraq

Iran and Iraq are expected to sign an agreement for export of 2m tons of gas oil to Iraq, which will turn the neighboring country into largest buyer of the Iranian oil product, the Mehr News Agency reported.

National Iranian Oil Products Distribution Company's Director for Export and Import, Esmaeil Hasham Firouz, pointed out that "the new deal for gas oil exports to the neighboring company will be extended."

In time with the deployment of gas oil to Iraq, export of the gas product to the Iraqi Kurdistan also marks Iran's priority this year aiming at boosting the 2015 levels of more than 5m liters of gas oil exported to the region, Hellenic Shipping News informed.

Overall, Iran shipped near 2b liters of gas oil to various world countries in the previous year including Iraq, Iraqi Kurdistan, Pakistan, Afghanistan, Tajikistan, and some African countries.

Nevertheless, the fall in global oil prices has brought about numerous problems for Iran's export of oil products particularly gas oil and fuel gas as the price of Iran's gas oil has dropped from $970 to

Algeria's Sonatrach Signs Deal with Japanese JGC

Sonatrach group, Algerian national company for transportation and marketing of hydrocarbons inked a study, supply, construction and commissioning contract with the Japanese company JGC Corporation and JGC Algeria Spa, the group announced, according to All Africa.

The contract provides for revamping and implementation of a new production system at the satellite units in Hassi Messaoud, three satellite units at the southeast of the country and four satellite units in the southwest. The project will enable the group to avoid a daily gas flare of 2mm3, strengthen recuperation and compression of associated gases transferred to the processing center in south, and successively increase crude production by 20,000b/d, TSA wrote.

Iran's Oil Exports Surpass 2mb/d

Iran's oil exports have surpassed 2mb/d following the lifting of sanctions, Oil Minister Bijan Zanganeh said, as Press TV reported, citing figures released by Bloomberg. According to the released data, Iran's overall crude output now stands at 3.2mb/d, the highest level since May 2012. "Iran's oil and gas condensate exports are now at more than 2mb/d" after rising by 250,000b/d since March 1st, the ministry's Shana news service quoted Zanganeh as saying, Daily Mail wrote. As Iran doubles its exports since January 16th, when international sanctions against the country were lifted, Tehran maintains its position in regard to oil production freeze plan seeking to regain country's lost market share.

Wintershall Sees Drop in Yielded Oil in Libya

Germany-based largest chemical producer BASF's subsidiary unit, Wintershall, cannot forecast oil production in troubled Libya this year after producing only 125 days in 2015, its FCO, Ties Tiessen, told press, Reuters informed. Libya only yielded 35,000b/d of oil for Wintershall, which has been active there for more than 60 years and in peaceful times produced up to 100,000b/d, said Tiessen. Company's CEO, Mario Mehren, said the company's profile would remain gas pipeline oriented despite the global gas market change towards more liquefied natural gas (LNG). As Bloomberg wrote, BASF was also expecting that its earnings would drop as much as 10% this year as the crash in crude prices hurts its oil-and-gas unit and erodes margins in petrochemicals.

Five Libyan Oilfields Closed over IS Attack Threats

Four Libyan oilfields – Bayda, Tibisti, Samah, and Waha – have closed and were evacuated over pending threat of militant attacks from Islamic State (ISIS), whereby workers of the fifth went on strike, Al Arabiya reported.

"Four oilfields were evacuated in the oil basin in Merada, 800 km southeast of the capital Tripoli," a military source said. The evacuation came after "the collapse of security and low daily production rate due to difficult security conditions", said the source, who is part of a brigade protecting the oilfields that is loyal to the recognized parliament.

Further, workers of the fifth Zaltan oil field of Sirte Company for producing oil and gas, which is located 50 km to the south of Marada, have gone into a full strike due to deterioration of security inside the field and for fear of possible attacks. In a statement, the workers said they evacuated the field and stopped work upon low security in the oil fields located some 300 km to the southeast of Sirte, The Libya Observer informed.

Meanwhile, Libya's National Oil Corporation (NOC) said it was working with the U.N.-backed unity government to coordinate future oil sales and "put a period of divisions and rivalry behind us," according to Reuters.

The unity government also won the support of the PFG, a semi-official armed guard faction that secures the country's key oil terminals, the latest pledge of loyalty for a cabinet facing strong opposition from rival political forces, the Jordan Times reported.

Western nations expressed hopes that a unity government led by Fayez Serraj can bring Libya together and combat a local IS branch that has seized the central city of Sirte.

Since IS attack campaigns on oil storage tanks as of January 2016 production has dropped again to about 350,000b/d.

Therefore, the UN Security Council (UNSC) has extended the ban on crude oil shipment from the Libyan territories controlled by the institutions not related to country's Government of National Accord until end July 2017, Sputnik Newswrote.

Libya's oil production has been slashed to less than 25% of the 1.6mb/d production levels before the uprising in 2011.

Riyadh Likely to Increase Sovereign Loan to $10b

Saudi Arabia has seen substantial demand for its first foreign borrowing in more than a decade, and looks likely to increase the size of the loan, banking sources told Reuters. Demand for Saudi Arabia's first sovereign loan in at least 15 years was so high that the government will probably boost the size of the transaction to about $10b, according to sources cited by Bloomberg.

The world's top crude oil exporter initially sought a loan worth between $6b and $8b that would run for five years, sources told Reuters. The Saudi government decided to increase the size of the syndicated loan because of the oversubscription, as the kingdom seeks to plug a record budget deficit caused by low oil prices.

Banks from the US, Europe, Japan, and China responded to the loan request, while the pricing and final allocation still has to be completed.

The loan issue reflects the effect of the oil slump on the finances, having registered a record budget deficit of nearly $100b in 2015. In its efforts to narrow the gap, the government has planned to boost non-oil revenues with taxes, but that will take years to have much impact, leaving spending cuts as the main way to bring state finances under control, wrote Arabian Business.

Iran, Norway to Build FLNG Facility in Persian Gulf

Iran and Norway plan to build a floating facility for liquefied natural gas in the Persian Gulf with a help of a yet unidentified Norwegian company, according to a report by Press TV.

The project, technically referred to as FLNG will be used to support Iran's exports of liquefied natural gas (LNG) to Europe and the Far East, as Vice President for Finance and Investment Affairs of the National Iranian Oil Company (NIOC), Ali Kardor, said.

No further details have been revealed on the project, except that the Norwegian firm will send a ship "that will specialize for the same type of project to Iran's ports in the Persian Gulf by March 2017," according to Kardor, Offshore Energy Today wrote.

Iran previously pursued three key LNG projects – Iran LNG, Pars LNG, and Persian LNG, however, they were abandoned over the past few years.

NIOC Chief, Rokneddin Javadi, said in October that LNG has returned to Iran's energy agenda, stressing that the country has devised serious plans to launch its first liquefaction project by April 2018.

In line with the country's gas strategy, the country is already working on a plan to pipe natural gas to Oman and use the liquefaction facilities of the Persian Gulf sultanate to export LNG to overseas markets, informed Trade Arabia.

Oman Records 166% Rise in Petrol Production

Oman recorded a 166% year-on-year increase in the production of regular petrol 90 and super petrol 95 during the first two months of 2016, according to the latest data released by the National Center for Statistics and Information (NCSI), Times of Oman informed. Output of regular petrol 90 has surged to 1.03m barrels compared to 388,100 barrels produced last year, while super petrol 95 output logged a 2.1% growth over the period to touch 3.43m barrels in comparison with 3.36m barrels in 2015. Additionally, the first two months of 2016 registered an increase in the output of petroleum products – petrol, jet fuel, oils, LPG, propylene, and others – with production rising to 13.90m barrels, compared to 12.32m barrels achieved in 2015.

Kuwait Signs Three LNG Import Deals Through 2020

Kuwait's state-run oil firm has signed three contracts to import 2.5m tons of liquefied natural gas (LNG) a year through 2020 to meet the country's needs, a company official said, according to Gulf News. Kuwait Petroleum Corp. signed a contract with British Petroleum and another deal with Royal Dutch Shell to buy 1m tons a year from each company, its marketing chief, Nabil Buresli, told the official KUNA news agency. The country also inked a third contract with Qatar Gas to import 500,000 tons a year. After 2020, KPC plans to sign long-term contracts of up to 15 years to import 6-7m tons of LNG a year.

Tehran, Riyadh Competing over Indian Energy Market

Tehran is hoping to increase its crude oil exports to India from the current 350,000b/d, Iranian Oil Minister, Bijan Zanganeh, was quoted as saying after meeting his Indian counterpart, Dharmendra Pradhan, wrote the Economic Times.

The two ministers signed a cooperation agreement covering oil exports, the petrochemical sector, and the development of a gas field.

In addition, Indian Oil Minister, Dharmendra Pradhan, was expected to visit Iran for talks including the purchase of oil, development of a giant gas field – Farzad-B, and investment in petrochemical projects. The Farzad-B field in the offshore Farsi block is estimated to hold 12.8tcf of in-place gas reserves. In March, Pradhan said he was "hopeful" a deal on Farzad-B could be concluded.

Further, Pradhan said India was ready to invest $20b in the port of Chabahar port in southeastern Iran, adding that "Iran and India's energy ties are no longer limited to crude oil imports."

In return, the Iranian oil minister stressed that the Islamic Republic is ready to provide natural gas to Indian petrochemical projects, as reported by Press Tv.

Similarly, Saudi Arabia and India have vowed to substantially boost investments and their trade ties as Prime Minister, Narendra Modi, invited cash-rich Saudi firms - ARAMCO, SABIC - to invest in infrastructure and form joint ventures for oil exploration and petrochemical complex, reported NDTV.

The two countries have signed a series of energy cooperation accords, wrote Al Arabiya.

Inviting Saudi Arabia to be a partner in India's growth story, Modi encouraged Saudi companies to invest in the infrastructure sector and to participate in projects creating mega industrial manufacturing corridors, smart cities as well as the Digital India and Start up India programs.

According to Oil&Gas Journal, Saudi Arabia is the largest supplier of crude oil to India, where oil demand grew by 5.7% last year and is expected by the International Energy Agency to increase 6.3% this year.

There has also been a steady increase in bilateral trade, which stood at $39b in 2014-15, which Riyadh seeks to boost further encountering its Iranian rival's plans to expand the energy cooperation with New Delhi as well, as Press TV informed previously.

Iran Breaking Crude Export Pricing Tradition

Iran is seeking to enter an oil price war with its rivals in crude exports to Asia. Tehran ratcheted up its offense in the oil market by breaking a pricing tradition, signaling it is determined to win its market share, wrote Bloomberg. State-run National Iranian Oil Co. announced that it will sell the Forozan Blend crude to Asia below the level offered by rival Saudi Aramco for Arab Medium in May. Iran will offer the price at $2.43 a barrel which is below the average of the Oman and Dubai benchmark grades and $0.3 lower than Saudi Aramco's price for the similar Arab Medium variety. This is the third month the Persian Gulf state is giving the discount.

BP, KPC Sign New Framework Agreement

UK's oil and gas major BP and the state-run Kuwait Petroleum Corporation (KPC) have signed a framework agreement to explore possible joint opportunities for investment and cooperation in future oil, gas, trading and petrochemicals ventures, World Oil informed. In addition to enhancing oil and gas recovery from Kuwait's existing resource base, the agreement also includes the intention to study opportunities for joint investment in future oil and gas exploration both inside Kuwait and globally. Opportunities for cooperation and investment in midstream and petrochemical projects globally will also be considered under the agreement, including potentially deploying BP's proprietary paraxylene technology as part of KPC's petrochemicals projects.

Algeria Reinstated Security in Oil&Gas Fields

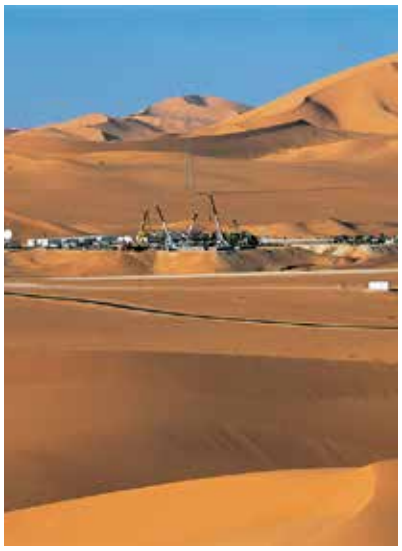
Algerian Energy Minister, Salah Khebri, reaffirmed that the nation's oil and gas fields are fully protected from potential terrorist attacks. "Authorities have taken the necessary measures around the sites," Khebri told reporters in Algiers, wrote All Africa.

The Algerian authorities provided the means and the conditions to ensure the security of the foreigners working in the oil and gas fields in the south of the country, the minister told the press.

Khebri declared that the Krechba gas field production is currently protected by the state-run energy giant Sonatrach. The site is jointly operated by BP, Statoil and Sonatrach.

The confirmation came in response to a recent decision by British Petroleum (BP) and Statoil energy giants to withdraw their staff from the Krechba gas field, 700 km in southern Algiers, over a minor rocket-attack in March, for which al-Qaida in the Arab Maghreb Union countries claimed responsibility.

Meanwhile, the Dublin-based Petroceltic International had successfully drilled the first of 24 new development wells on its Ain Tsila gas and condensate field in Algeria.



The AT-10 well, which was spud by the Sinopec Rig in February and completed in mid March, reached a total depth of 2005 meters, Energy Voice reported.

According to Petroactive Investors, the Ain Tsila development is designed to establish a plateau production rate of 355mcf/d.

Kuwait Seeking Crude Output Boost by 2017

Kuwait Oil Company will soon offer contracts for offshore rigs and support services to drill its first undersea wells as the Gulf nation tries to boost crude output to the highest level in more than four decades, Times of Oman reported.

Kuwait is targeting production of 3.165mb/d this year or in 2017, up from the current 3mb/d, CEO Jamal Jaafar said. He made the comments a day after fellow Organization of Petroleum Exporting Countries' (OPEC) member, Iraq, reported a record level of production.

Meanwhile, thousands of workers at Kuwait's state-owned oil, gas and petrochemical companies began an open-ended strike on 17th April as a dispute over government plans to cut their benefits and wages continues, according to Middle East Monitor.

Oil workers in the country fear cuts to jobs, salaries and benefits packages will come from a planned government overhaul of the public sector payroll system. They are also protesting plans to privatize part of the oil sector.

Production and exports would not be affected by the strike, Kuwait's national oil company KNPC confirmed. Nonetheless, as The National informed, Kuwait is deploying national guard units to run and protect some oil facilities operations amid the strike.

Austrian OMV to Develop Iranian Cheshmeh Khosh Oilfield

Austrian energy company, OMV, announced it was ready to resume developing the Cheshmeh Khosh oilfield in western Iran, Press TV reported. Already in February, OMV CEO, Rainer Seele, said the company was evaluating the opportunities in at least two separate oilfield development projects in Iran without naming them. OMV is pushing to boost its upstream portfolio. Seele added that the company would use at least 90% of its investments for exploration and production through 2020. OMV withdrew from the field in the Ilam province along with Spain's CEPSA in 2008 when Iran was hit with the first wave of US-led sanctions. The company also left the Mehr block in western Iran, where it had struck oil.

ENI Planning $22.5b Investment in Africa

The Italian multinational oil and gas company ENI revealed its plan to invest about $22.5b in Africa over the next four years, mostly in the oil and gas industry. In words of the company's CEO, Claudio Descalzi, the amount represents about 60% of the company's investments over the given period, Reuters reported.

"In the long-term we are going to invest much more to develop the giant gas fields that we have found," he said. ENI has made major gas discoveries especially in Mozambique and recently in Egypt. However, it was reported previously that the oil major was in talks to sell shares of the assets it owns in Mozambique to US group ExxonMobil.

Descalzi lamented that despite these discoveries, the abundant energy potential and Africa's steady economic growth, access to energy on the continent remained poor. Currently, the Italian company is involved in projects in 15 African countries, and it is seeking to boost and diversify the continent's energy mix through investments in renewables. In fact, Africa's energy mix has remained unchanged over the past 10 years and it is unsustainable, with biomass used for cooking still being the main source, Descalzi said, as The Africa Report wrote.

Meanwhile, the group's CEO explained that ENI is ready to spend hundreds of millions of euros in developing solar power projects in Africa. The group is already working on two solar projects in mature fields close to depletion. In addition, the company has a project on greenfield off-grid solutions in areas that are not easy to access, with the idea to create small hubs that could be interconnected.

In April, the Italian company was awarded an exploration license off the coast of Ghana, in the prolific Tano basin, which is expected to start producing oil in 2017 and gas the following year, according to News Ghana. Meanwhile, it has also bought the majority of the stakes from Chariot Oil&Gas Limited in the Rabat Deep exploration project, offshore Morocco, Proactive Investors reported. In consequence, ENI has currently a 40% stake of the license area.

Tanzania to Export Electricity to Kenya, Zambia

Tanzania is planning a $300m energy project to export electricity to Kenya and Zambia, which is expected to be completed within the next two years, All Africa reported.

Project work, financed by the African Development Bank (AfDB), consists of developing the interconnection between the Tanzanian town of Iringa and Kenya's Shinyanga in one project and between the town of Iringa and Zambia's Mbeya, both scheduled for completion between 2018 and 2019.

Tanzania Electric Supply Company's (Tanesco) Deputy MD, Deckian Mhaiki, explained that part of the project will involve a 2,000MW supply line to Kenya, to be in place by 2018. Tanesco is in the final stage of floating a tender for the design and construction of the line to a border town in Kenya, which requires a capacity of about 1,000MW through a double traffic line. This means that an extension of 1,600km long backbone electricity transmission is needed between Iringa and Shinyanga.

Deputy Permanent Secretary at the Tanzanian Ministry of Energy and Minerals, Juliana Pallangyo, said that the country was missing a chance to trade power with other members countries of the Southern Africa Development Community (SADC) due to not being interconnected and with Southern Africa Power Pool members (SAPP).

Angola to Negotiate Three-Year Loan With IMF

Angola is the latest oil-producing country seeking international help to cope with the fallout from low crude prices. As Reuters wrote, the country will begin loan negotiations with the International Monetary Fund (IMF) on a three-year Extended Fund Facility, the Finance Ministry and the IMF said.

According to the fund, the southern African nation is eligible for a little over $500m in assistance annually unless it receives special waivers. The move marks the second time in seven years when Angola has turned to the IMF for help. Angola produces some 1.6mb/d of oil, which is the second largest oil producing country on the African continent after Nigeria. In 2009, the country secured a $1.4b emergency loan which it is still in the process of repaying, according to The Financial Times.

Furthermore, it was also reported by MacauHub that Sonangol, the state oil company, found new oil and natural gas reserves in the basins of the Kwanza and Congo rivers that may total 2.2bboe. If confirmed, the reserves will be sufficient for the production of 2mb/d for three years and, in this period, allow Angola to reach its production target of 2mb/p.

Kenya to Construct New Mombasa Oil Terminal

Kenya Ports Authority is set to start construction work on a new oil terminal in Mombasa from October 2016 to December 2019, and the state agency published a notice inviting bidders to apply for the project before April 29th. As MediaMax informed, the project will involve the decommissioning of the existing Kipevu Oil Terminal and construction of an offshore jetty near Dongo Kundu. The terminal will have a crude oil pipeline connecting it with the Changamwe-based Kenya Petroleum Refineries Ltd (KPRL), and four other pipelines to pump heavy fuel oil, dual purpose kerosene, diesel, and petrol to the Kipevu storage facility.

Croatia Eyeing Floating LNG Terminal by 2018

Croatia intends to complete the construction of a floating LNG terminal in the northern Adriatic Sea by 2018, Economy Minister, Tomislav Panenić, told Reuters. The initial capacity would be about 2bcm of gas annually. "It does not mean we are giving up a land-based LNG terminal altogether, but at the moment we think that we can secure stability on the markets with a floating terminal," the minister stated. Total Croatia News wrote that the original plans included a land terminal with a capacity of 6bcm of gas, with the aim of supplying the countries of Central and Eastern Europe.

Nigeria to Set Up $150m Solar Power Plant

Nigerian Panyam community, in Mangu Local Government Area of Plateau State, is to benefit from a $150m solar power plant project expected to take off before the end of this year, All Africa reported. When completed, it is estimated to generate over 70MW of electricity, which will be sufficient to sustain Plateau and neighboring states. As This Day Live wrote, Siemens is the technical partner of the solar farm, which is expected to be completed in about 18 months, and will cover a land space of about 103 hectares, where the solar radiation is excellent.

Schlumberger Reduces Operations in Venezuela

Schlumberger will reduce its activities in Venezuela after the world's largest oil services provider failed to collect enough payments from the national oil company, Fuel Fix reported. The reduction will take place in April, the Houston- and Paris-based contractor said. Venezuela has been battered by the collapse of prices as most of the government's revenue comes from petrodollars. Schlumberger is estimated to have generated the most sales in Venezuela, with the country accounting for about 3% of company's $35.5b total revenue last year, an analyst at RBC Capital Markets, wrote.

Nigeria Negotiates Oil Majors' Financial Assistance

Nigeria's Oil Minister, Emmanuel Ibe Kachikwu, said that the government was in talks with the oil majors Chevron, French Total, and Italian ENI to receive their assistance for revamping country's oil sector including ailing refineries, Reuters informed.

The West African nation has been trying to restart its outdated refineries in Port Harcourt, Warri, and Kaduna to end its dependency on costly fuel imports. The minister informed that so far they have gotten "commitments from some of the majors. ENI's Agip has indicated interest to work with us on Port Harcourt, Chevron on Warri, [and] we are talking to Total on Kaduna," he told the Senate that had summoned him to explain how he intends to solve a fuel shortage.

Nigeria is thus seeking to also heal country's damaged foreign currency reserves. The Petroleum Minister said that Nigeria would get $200m from oil majors to pay for fuel imports and ease petrol shortage that has hit the OPEC producer. Specifically, Total and Exxon Mobil will provide dollars to their local retails units, Total Nigeria and Mobil Oil Nigeria, while Royal Dutch Shell has been paired with local oil importer Conoil and ENI with Oando, according to Bloomberg."For the first time in this country I have been able to convince the upstream companies to provide some FX buffer over the next one year for those who are bringing in products," Kachikwu said.

Further, it was reported that China had offered Nigeria a loan worth $6b to fund its infrastructure projects, according to the Nigerian foreign ministry. The announcement came as both countries signed a currency swap deal to boost trade, reported Reuters. "It will not need an agreement to be signed. It is just to identify the projects and we access it," said Nigerian Foreign Minister, Geoffrey Onyeama. "It is a credit that is on the table as soon as we identify the projects," Onyeama, told reporters after a meeting between Nigerian President, Muhammadu Buhari, and Chinese President, Xi Jinping.

BP to Pay $20b in Damage over 2010 Oil Spill

In the largest environmental settlement in the US history, oil and gas giant BP will pay over $20b to the American government over damages caused by a rig explosion and oil spill on April 20th, 2010 in the Gulf of Mexico. A US judge approved the settlement deal, resolving years of litigation.

The settlement, first announced in July, includes $5.5b in civil Clean Water Act penalties and billions of dollars more to cover environmental damage and other claims by the five Gulf states and local governments. The money is to be paid out over roughly 16 years, according to CBS News.

The worst offshore oil disaster in the US history killed 11 workers and spewed millions of barrels of oil onto the shorelines of several states for nearly three months. Oil from the spill was deposited onto at least 1,036 sq km of the sea bedrock and washed up onto more than 2,092 km of shoreline from Texas to Florida. The oil was toxic to fish, birds, plankton, turtles, and mammals, causing death and diseases.

BP has estimated that its costs related to the spill, including its initial cleanup work, various settlements as well as criminal and civil penalties, will exceed $53b.

Mexico to Support Pemex with $4.2b

Mexico's finance ministry announced a series of measures to improve national oil company Pemex's ailing finances, one of them being a $4.2b liquidity boost. As Reuters reported, the amount includes a capital injection and a credit facility to pay down company's pension costs this year. The support also includes tax breaks that will allow Pemex to deduct more of its exploration and production costs.

However, government support for Pemex, which last year had a record after-tax loss of $30b, is conditioned to the implementation of an austerity plan to reduce wasteful spending and operational inefficiencies. Pemex has committed to cutting spending by around $5.7b this year, Nasdaq informed. Deputy Finance Minister, Miguel Messmacher, said that the oil company will have less of a need to further tap credit markets following the liquidity injection. In addition, the government stated the support does not threaten goals to reduce the public deficit this year to 3.5% of gross domestic product, down from 4.1% last year, as the government will receive around $13.6b in excess funds from the Central Bank, which will be used to lower the public debt.

Pemex lost its decades-long monopoly in the market with a constitutional energy overhaul passed in 2013.

SkyPower Seeking Partners for India Solar Projects

Canadian solar company SkyPower is looking for partners for its India projects and will start building them in the fall of this year, its CEO told Reuters. Kerry Adler denied a report in the business daily Economic Times that the company could exit India, saying that SkyPower considers the country to be one of its core markets. "We do plan to announce in the days ahead the award of the [engineering, procurement, construction] contracts for 7 projects in India and are excited to commence construction of these projects we successfully won in the fall of this year," Adler said.

BP, CNPC Ink Shale Gas Exploration Deal in China

The London-based explorer BP and China National Petroleum Corp. (CNPC) have signed a Production Sharing Contract (PSC) for shale gas exploration, development, and production in the Neijiang-Dazu block in the Sichuan Basin, China. BP is thus seeking to hit it big in China's shale gas fields where competitors including Royal Dutch Shell Plc have struck out, and to target the same areas that rival ConocoPhillips has walked away from, Bloomberg reported. The PSC comes after BP and CNPC signed a framework agreement on strategic cooperation last October during the visit to the UK of President of China, Xi Jinping.

Nigeria Halts Forcados Oil Pipeline

Repair work on the pipeline feeding Nigeria's Forcados crude oil to the export terminal is expected to take until June, Reuters reported. The grade has been under force majeure since mid February, a week after a pipeline leak forced a halt to loadings to the export platform. In consequence, no export programs were issued for April or May. The Forcados Terminal in Delta State, which is one of Nigeria's biggest terminals with the capacity to export about 400,000b/d of oil, was supposed to export merely 250,000b/d between February and May 2016, according to All Africa.

Kenya Receives Loan to Develop Geothermal Energy

Kenya has received a $29.65m loan to finance its drive for geothermal energy production, as the country aims to reach the targeted 5,000 MW of power with a minimal mix from thermal sources, All Africa reported. The capital will co-finance up to two geothermal projects in the Rift Valley. The funding comes from the Climate Investment Funds' Clean Technology Fund (CIF-CTF), which is a concessional loan secured with support from the African Development Bank (AfDB). The AfDB informed that the program will build on the energy advancements already underway in the successful development of the country's showcase Menengai Geothermal Field.

Gazprom Expects Record Gas Exports to Europe

The Russian energy giant Gazprom expects that its gas exports to Europe will reach record levels in 2016, as in March the export levels recorded a 9% increase year-on-year. Gazprom CEO, Alexey Miller, had said already in January that in 2015 the company saw an increase of its European gas exports by 8% reaching to 159.4bcm. However, as UPI wrote, the European Union has expressed concerns about Russia's control over the regional market as the company typically controls both the transit networks and the reserves they deliver.

In attempts to preserve its monopoly, Gazprom said that it would not be in accordance with Russia's national interest if also Novatek and Rosneft are allowed to be exporting gas to Europe, Reuters reported. The information came after Rosneft - Russia's top oil producer, and Novatek - a Russian independent gas producer asked the Energy Ministry to grant them access to the gas export pipelines.

It was also reported that Russia's oil output set a post-Soviet high in March. The production of crude and a light oil, called condensate, climbed 2.1% from a year earlier to 10.912mb/d, according to the Energy Ministry. The amount narrowly beat the previous high of 10.910mb/d in January.

Aminex Produces Gas from Tanzania's Kiliwani North Field

Africa-focused oil and gas production and development company, Aminex, announced that first gas production has been achieved from the Kiliwani North gas field in Tanzania. The company's CEO said it was a significant moment as it marked company's transition from a gas developer to a gas producer in Africa, Proactive Investors reported.

Initial production commenced from the Kiliwani North-1 well in April and output is expected to build up to an anticipated rate of between 25-30mcf/d – approximately 4,000 or 5,000boe/d gross – over the next 90 to 100 days, according to RigZone.

All gas produced during the build-up to full production rates will be paid for under the terms of a recently signed gas sales agreement with Tanzania Petroleum Development Corporation. Aminex will receive approximately $3.07 per 1mcf of gas, with expected net cash revenues of $10-15m per annum.

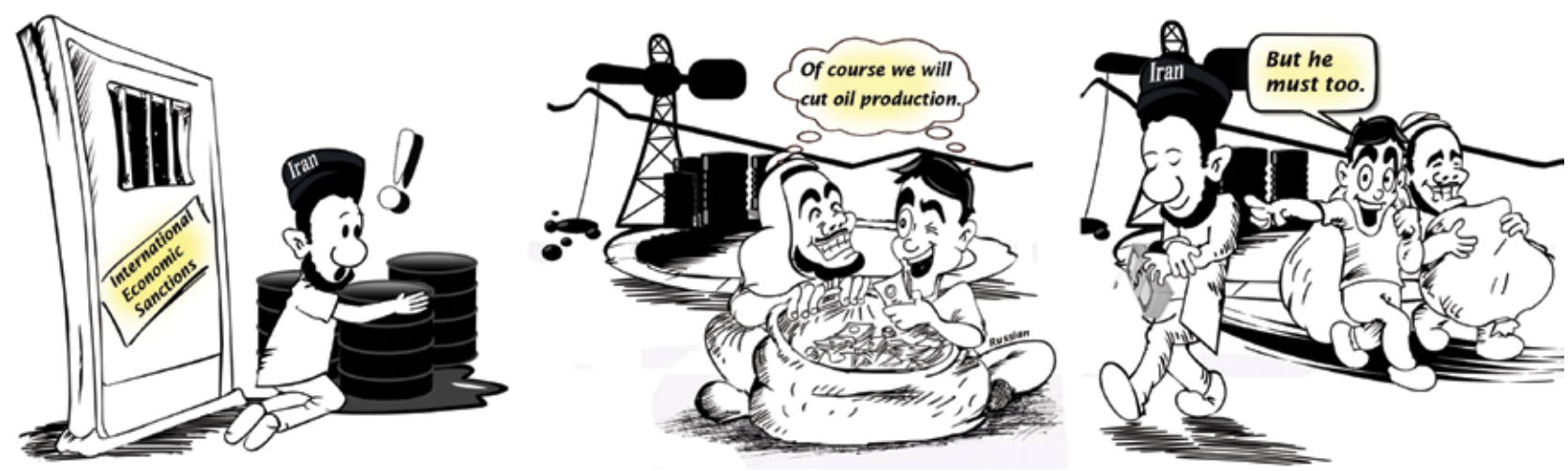
Aminex has a 55.75% working interest in the field in Tanzania though this will reduce to 51.75% following a recent stake sale to partner Solo Oil, Energy Voice explained. Aminex is also partnering with Solo on the Ruvuma PSC, with 75% and 25% stakes, respectively.

Italy's Saipem to Work on Offshore Gas Pipeline

Italy's Saipem has bagged an order to lay the subsea Trans Adriatic Pipeline (TAP) that will bring Azeri gas into Italy, the oil contractor said, Reuters reported. The company, jointly controlled by Italian oil major Eni, and state lender CDP, said work on the 105km section running from Albania to southern Italy would begin this year.Although no financial details were provided, two analysts who asked not to be named said the contract was worth around $225m. In addition, other experts have expressed concern that with order books under pressure the Italian contractor might struggle to meet results forecasts. According to RigZone, the offshore installation works will be carried out using Saipem's Castoro Sei pipelay vessel and the trench/pipelay barge Castoro 10.

French Engie, Gazprom to Adapt Gas Contracts Prices

French gas and power group Engie and Russia's Gazprom Export have agreed to adapt the price of its long-term gas supply contracts to fit market conditions, Reuters reported. "With this agreement, Engie has de-risked its long-term supply contracts for the next years by adjusting their pricing to market conditions," Engie Executive Vice-President, Pierre Chareyre, said in a statement. Gazprom informed that Engie was suing the Gazprom Export unit to revise prices on a natural gas supply contract. Engie had initiated arbitration proceedings against the Russian holding in February 2016 for the purpose of revising the contracted natural gas price, according to the Russian News Agency TASS Gazprom later confirmed it had reached an agreement with Engie and that the French energy group had halted arbitration proceedings.



ZERO GAS FLARE PROSPECTS FOR Egypt

By Nataša Kubíková

When environmental improvement promises economic prospect, the hesitation is hardly in place. An assumption that environmental responsibility is unattractive as it comes with higher investments has already been shattered. This is particularly visible in the practices of associated petroleum gas (APG) flaring, which is truly a global conundrum.

With some 143bcm of gas being flared annually, the world suffers from 350m tons of CO2 being emitted to the atmosphere, which significantly contributes to black carbon, while the burned gas could instead be utilized to generate 750 billion kW/h of electricity. On a global gas flaring map the Middle East and North Africa region accounts for the second highest regional concentration of gas flaring, after Russia and the Caspian Sea, with about 30bcm of gas wasted annually to burning.

The 1.7bcm Challenge

In the region, Egypt contributes to total gas flaring with almost 2bcm every year, out of which 1.7bcm come from oil fields. The country ranks among the top twenty gas-flaring nations in the world. If we translate this to energy calculations and economic figures, Egypt burns away gas worth 5% of the country's national energy needs, which would add between $300 and $500 million to its economy.

While the Egyptian oil sector is making some efforts to curb gas flaring, reduction plans urgently call for new complex solutions. Egypt's gas flaring rates were declining only at a slow pace over the past decade. But if Egypt hopes to move out of the top 20 flarers list, spare much needed energy resources, and protect its investments, then there is lots of work that still needs to be done.

Satellite images of gas flaring in Egypt from 2012, cited by the European Bank for Reconstruction and Development (EBRD), show that the highest concentration of gas flaring is in North West and the Gulf of Suez fields with approximately 0.6bcm/year of burned gas at each site, while West records 0.5bcm/year. Uncertainty about the identified flaring posts prevails, however, as the Egyptian General Petroleum Company (EGPC) reports lower numbers, and the developments in the oil fields are not being monitored efficiently.

Economic Prospect

Based on preliminary data, for Egypt, economic and environmental benefits, associated with the elimination of gas flaring, are significant, as an overview of an EBRD study on gas flaring in Egypt states. The study was commissioned by the Bank and conducted in association with the Norwegian company, Carbon Limits.

As presented at the EBRD workshop in Cairo, zero gas flare in Egypt would generate less resource waste, value of which could amount to $130m a year given the current domestic gas price levels. Equally so, Egypt's trade balance would be enhanced at a value of $600m if energy imports are avoided as country's existing reserves of natural gas are utilized in a more efficient way to the contrast from gas flaring and gas venting.

Environmental Concerns

In a climate change sensitive matrix, Torleif Haugland from Carbon Limits explained in a presentation at the Cairo thematic workshop in March this year, zero gas flaring in Egypt would reduce green house gasses (GHG) emissions by about 2% of the total national volume annually. This would necessarily be accompanied with lower local pollution, help improve health conditions, and eliminate devastating ecological impacts.

According to Haugland, "even with modest valuation, GHG benefits [from gas flaring elimination] are substantial compared to the value of recoverable gas." Utilizing APG to be transferred to the market, instead of being burned, would increase the value of GHG reduction by considerable 21%. In case of using gas for power being connected to the national grid, benefits of GHG reduction would increase by additional 19%. If APG is used for power supplies, the currently flared gas could generate some 7tWh/year, which is 5% of the domestic electricity demand. The option to utilize associated gas in substitution for diesel for powering oil fields would raise the contribution to GHG reduction even higher, by as much as 42%.

Obstacles Ahead

Even though enhancing oil sector operations by reducing gas flaring requires significant amount of investments, lack of funds is not the only obstacle that the environmentalists and energy ac-

"New technologies and business approaches are emerging that can make previously uneconomical investments commercially attractive as well as delivering good environmental impact."

Terry McCallion, EBRD Director for Energy Efficiency and Climate Change

tors face in Egypt. The situation is far more complex.

Barriers that hamper gas flaring elimination efforts in the country are strongly tied to geographical, technological, structural, economic, and regulatory factors, as the EBRD study indicates.

The satellite images of gas flaring in Egypt clearly reveal that the situation is rather tricky. A high number of small size gas flaring sites that are scattered in different locations distant from the national energy grid and produce variable volumes of gas flow weighs heavily on technological requirements that the oil field operators would need to tackle the challenge.

Projection of gas flaring reduction in Egypt further stumbles across complicated ownerships of production sites and gas infrastructure.

In addition, provided that the gas pricing environment does not change, the attractiveness of zero gas flare strategies is more difficult to achieve, because current gas prices do not reflect alternative value of gas that is being flared, according to the EBRD. Therefore, oil operators may find gas flaring and gas venting as an easy way out fast and instead they would choose to direct their investments elsewhere, targeting other areas of development such as technical improvements, human resources etc. As a result, the general trend towards ad-hoc flaring solutions in oil production fields in Egypt continues intensely.

This comes hand in hand with how the regulatory environment is set up. As experts noted at the workshop, state regulations for gas flaring in Egypt are still lagging behind in establishing a clear framework that would demand elimination of the practice.

Finding a financially viable path that would benefit the country in terms of environmental concerns, economic prospect, and social development may, nonetheless, be at hand.

Viable Solutions

Major challenges in gas flaring reduction that Egypt is currently facing relate primarily to investments.

EBRD's Senior Banker, Natural Resource, Gabriel de Lastours, speaking at the Egyptian Gas Association Executive Roundtable in Cairo in February, presented a viable business model that could resolve both economic and environmental concerns in the country's oil sector.

For the model to be effective, the EBRD suggests that improvements in regulatory framework would be needed to considerably boost foreign investments in gas flaring reduction. This implies to define specific flaring rules, establish strict monitoring, reporting, and verification mechanisms with independent supervisory bodies, and provide preferential access to gas infrastructure for operators in order to enable them to utilize associated gas in more efficient ways. In addition, Carbon Limits elaborated further that enforcement mechanisms are to be introduced based on site specific economic evaluations. The role of a mutual dialogue between companies and regulatory authorities cannot be emphasized more, especially in the crucial stage that the Egyptian oil sector is currently experiencing.

Further, experts pointed out that the success of gas flare elimination is closely related to the adopted gas pricing policies. The EBRD report calculated that the internal rate of return (IRR) on investments in gas flaring could improve by 10 to 15 percentage points if the domestic prices increased from the current $2.65/mBtu to $4/mBtu. Presenting at the Cairo-held Intergas VII conference in November 2015, EBRD Senior Banker, de Lastours, also stated that gas flaring reduction investments realistically project so far unfavorable 15% IRR with the current domestic gas price. It seems that there is a potential to balloon up expected IRR for operators to as high as 40% under the gas price levels of around $6/mBtu and thus secure required funding for the zero gas flaring strategy.

On technological level, given the countries specificity in terms of small scattered and distant flaring sites, Egypt would need to opt for deploying small-scale, cost-effective, and modular technologies, as opposed to building expensive gas pipeline infrastructure. Trucking of CNG is expected to become more important with shifts to stranded gas from the Western Desert, the EBRD preliminary findings project. These efforts would thus accompany ongoing projects in gas flaring reduction from large sites that the EBRD had funded in Egypt in the last two years, worth more than $200m in total.

As Terry McCallion, EBRD Director for Energy Efficiency and Climate Change, explained in a recent EBRD press release: "In the future, flaring in Egypt will increasingly come from smaller production sites, which are often in remote locations. This represents a challenge in terms of finding economically viable solutions. However, new technologies and business approaches are emerging that can make previously uneconomical investments commercially attractive as well as delivering good environmental impact."

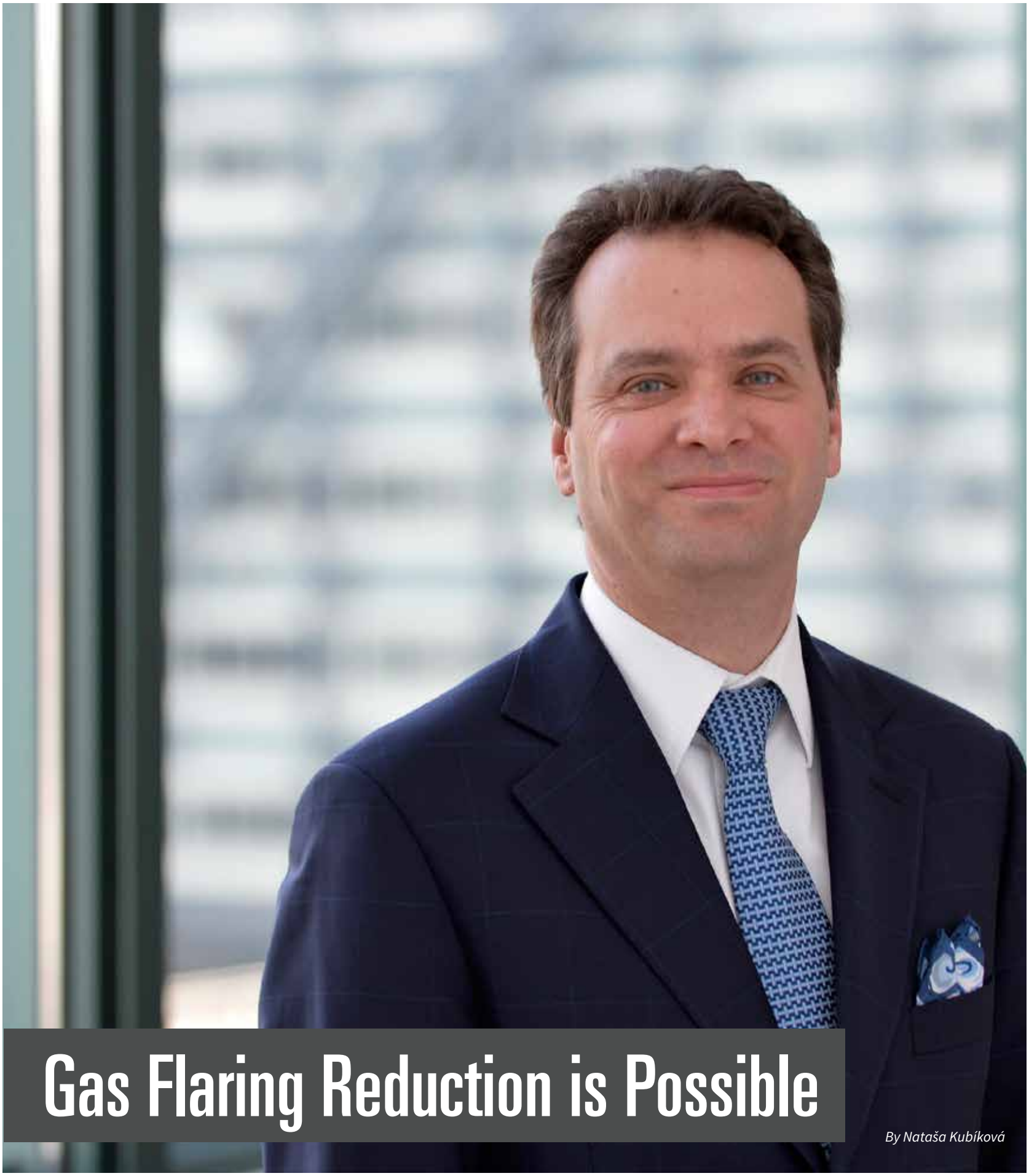
Zero Gas Flare Champion?

With funding and support, Egypt can join other countries in eliminating routine gas flaring, a goal which will benefit everyone.

Speaking at the EBRD workshop in March, Cristian Carraretto, EBRD Associate Director for Energy Efficiency and Climate Change, eloquently advocated for a much needed combined approach that would guarantee new industry standards in line with the goal aiming for energy efficiency and climate change improvements. Carraretto noted that "reduction of flaring is among the climate change mitigation opportunities raised by Egypt in the context of the COP21 in Paris, and energy efficiency and flaring reduction in the petroleum sector were announced in Egypt's Intended Nationally Determined Contributions (INDC) under the Climate Convention."

Egypt is doing its best to abide by the outlined climate change aware strategy, as Eng. Khaled Abdel Badie, the then-Chairman of the Egyptian Natural Gas Holding Company (EGAS) stated. According to Badie, the country aims at pursuing processes towards energy efficiency for a number of reasons, while environmental concerns are a major one. He added that another goal is to improve economics of gas processing facilities to preserve country's natural resources for its domestic supply and thus aspire for a role model in the region in gas flaring reduction program. According to expert estimations, Egypt will need a $2 billion investment to eliminate existing flares of the 2015 levels. Further, Carbon Limits stated that additional more than $2 billion in capital requirements would be sought for in order to curb routine gas flaring by 2020 if oil production levels stay constant at 700,000b/d. However, if Egypt marks a decline in produced oil to 500,000b/d, the actual investments would decrease to $1 billion. Similarly, investments in gas flaring reduction from new developments between 2020 and 2030 would rise to almost $3.5 billion, assuming unchanged oil production rates, but the required funds could drop to $2.5 billion if oil production decreases.

Having defined its clear targets in cooperation with international financial institutions, environmental firms, and oil companies, Egypt is still to adopt a full-fledged strategy and establish a clear framework, under which the country would aspire to become a zero gas flaring champion in the region and thus protect its financial reserves and the environment.



Gas Flaring Reduction is Possible

By Nataša Kubíková

The European Bank for Reconstruction and Development (EBRD) in cooperation with the Egyptian oil sector held a prominent workshop on gas flaring reduction in the oil and gas sector in March 2016. At the Cairo event, Egypt Oil&Gas had an opportunity to meet EBRD's Associate Director, Cristian Carraretto, to discuss the Bank's support for the country in - what has already become - a global initiative - Zero Routine Flaring by 2030 - to eliminate routine gas flaring detrimental to the oil and gas industry in economic terms, to the country's social development, and most alarmingly to environmental concerns.

The EBRD is a vocal advocate for the 2030 initiative launched in 2015 and led by the World Bank with an aim to "bring together all the stakeholders in the global oil sector to raise awareness about the urge to reduce flaring and seek voluntary commitments from all parties to act to eradicate the legacy of gas flaring before 2030," said Carraretto. While, so far, there are no binding obligations stemming from the initiative for involved countries and entities in terms of pushing the vision forward, the program entails, as Carraretto explained, that "state authorities and governments will show a willingness to improve regulations and applicable agreements to make sure that flaring is taken care of for all new fields and, when technically and economically justifiable, for existing fields."

Nonetheless, the burden rests not only on the governments, but also on other stakeholders such as private companies and developmental institutions. The initiative calls for oil companies to ensure that "[Associated Petroleum Gas] APG utilization plans to achieve zero routine flaring are in place for all new operations and that they will seek to implement viable flaring reduction investments in their existing operations," stated Carraretto. The developmental entities are expected to step in with a set of mechanisms such as financial assistance or expert debates in order to promote gas flaring reduction projects.

"Egypt could become a champion in the region."

Gas Flaring Matters

According to Carraretto, "it is very important and positive to note that most of the biggest flaring countries in the world have already endorsed the Initiative and that many oil companies, including a number with operations in Egypt, have followed the suit." While the initiative is becoming a global endeavor, Egypt has not yet joined the club.

"The World Bank and the GGFR are eager to get an endorsement from Egypt", said Carraretto, "as it would be an incremental element in the path the country has already undertaken in the reduction of flaring." And the EBRD has been present to assist in the attempts. The Bank has invested more than $200m in gas flaring reduction projects in Egypt in the last two years through four companies.

The Egyptian government and the oil sector authorities have repeatedly expressed their interest in similar projects. The issue is no longer lack of awareness regarding the routine gas flaring elimination. As Carraretto clearly stated in relation to various ongoing projects in the country, "[the Egyptian] institutions are aware that the legal/regulatory environment needs to be improved to make sure that more investments happen and the private oil companies are showing in the field that they are committed to implement cost-effective solutions."

Therefore, as he said, he was "very pleased to listen to the various speeches and interventions during the [March] workshop because they proved that flaring reduction matters in Egypt," which suggests that "the public institutions seem to be keen to maintain a lively dialogue with the operators."

Searching For Systemic Improvements

Routine gas flaring reduction projects, however, are not to be perceived as isolated elements of the oil and gas sector's operations. A more systemic and overhaul approach is needed to tackle the environmentally and economically challenging reality that Egypt currently faces and to achieve such an energy mix scheme that will be sustainable for the country.

While "the EBRD, EGPC, EGAS, and GANOPE have signed a Memorandum of Understanding (MoU) for the cooperation on gas flaring," according to Carraretto, "it encompasses a broader systemic cooperation on improving the energy and environmental sustainability of the whole value chain. It particularly includes cooperation on improving energy efficiency in the midstream and downstream sectors."

The EBRD has identified key issues that need to be addressed within reformative measures for Egypt. The Bank has defined priority areas in which it can positively intervene to contribute to gas flaring reduction successes in the future. Therefore, as Carraretto further stressed, the Bank is in particular interested to search for solutions in the segments that will remain the pillars of gas flaring elimination scheme. "The EBRD is willing to explore possibilities of effective cooperation for instance in improving the energy efficiency of the gas transmission segment and the oil refineries in the country," the Bank's Associate Director added.

Egypt's Tricky Situation

The EBRD had previously implemented a series of gas flaring projects in various countries such as Russia, Kazakhstan, Tunisia, Turkmenistan, and Azerbaijan, with positive achievements. While lessons learned from these countries are limited for Egypt due to specific conditions that the Egyptian oil and gas industry presents, "the general takeaway from our past experience is that flaring reduction is possible," emphasized Carraretto.

The optimism rests on the fact that the solutions exist, yet they are strongly tied to much needed "cooperation among the stakeholders, with the state providing the "enabling" environment - a combination of regulations and market conditions for the recovery products, and the oil operators giving higher priority to energy/environmental sustainability investments."

Egypt is "to some extent quite peculiar in comparison with the previous countries, because flaring is characterized by a significant number of small flares as 70% of flaring comes from sites with less than 5mscf/d, often far from existing infrastructure, whereby other countries have less flaring points, but with larger APG flaring volumes," clarified Carraretto. Nonetheless, solutions for this "tricky situation" are already commercially available, yet they "require a smaller and more distributed approach and higher efforts in gathering APG from different fields with different ownership," according to the Associate Director, and "some suitable technologies have been applied in other countries." In addition, "new business models are emerging to harness the challenge" as well, which will bone well for challenges that countries like Egypt currently encounter.

Egypt as a Role Model

With this on offer, Egypt's aspiration to become a role model in gas flaring reduction for other neighbors in the region may be achievable, despite the fact that with over 2.5bcm/year of flared gas, which is higher than Saudi Arabia, and about the same level as Libya and Oman, the country ranks above the global average in terms of flaring intensity i.e. flaring per unit of oil extracted, as Carraretto further explained. [The figures refer to the 2014 levels of flared gas volume recently published by the National Oceanic and Atmospheric Administration (NOAA). Estimates are based on the new VIIRS satellite images and computing methodology.]

Nonetheless, he also noted that according to "the estimates derived from satellite images, flaring in Egypt has been steadily in the given range over the last decade and that it is not a massive problem in Egypt in absolute terms as the country contributes just by 1.5% to global total annual flaring of 140bcm." It is therefore, Carraretto believes, that "Egypt could become a champion in the region," and it has a strong motivation to do so as gas flaring bears "a massive material significance for the country" on economic, physical, and environmental levels, as he further elaborated.

"There is no one-size-fits-all solution to harness gas flaring, a mix of different solutions and approaches are required."

Economically, the country records between $300-$500m per year in losses over wasting the natural resources that are being flared, depending on the price assumption of gas. Physically, if flared gas is instead used for power production, it could cover up to 5% of the annual electricity demand of Egypt. From the environmental point of view, flaring is responsible for more than 2% of the annual CO2 emissions of the country, concluded Carraretto, adding that "improving energy efficiency and reducing APG flaring can become important instruments to mitigate climate change" in line with Egypt's strategy to adopt the goals of the Paris COP21 Agreement.

The calculations were based on the existing flaring sites, yet precise estimations are to include possible contribution to gas flare coming from established new fields.

Flexibility For Market Conditions Enhancement

On the way, Egypt will need to expand its efforts in curbing flaring through a particular set of arrangements with regard to legal framework, investment environment, supervisory conditions etc.

According to Carraretto, the key priorities to eliminate flaring relate to

the monitoring, reporting and verification (MRV) structures and processes of gas flaring in the fields. "It is crucial to properly measure, with certainty and consistency, flaring, as it is not possible to control or reduce what is not measured." Another highly relevant step is to "improve the production agreements so that APG, when recovered, is shared by the JV [Joint Venture] parties, because by co-benefitting of the recovery products - the gas, the LNG, the electricity - the private operator can decide to invest in flaring reduction projects."

"New business models are emerging to harness the challenge."

In this regard, securing return of investments, which private firms would direct to routine gas flaring elimination, is achievable by amending and improving the present market conditions, stated Carraretto. He continued that "this entails pricing the APG or its products at suitable levels to ensure a fair return on the flaring reduction investments. Currently, a number of companies have agreed reasonable prices with the state institutions and as a consequence flaring reduction projects have been undertaken. But it is important to recognize a sustainable price given the peculiarity of flaring in Egypt which affects investment costs."

Additionally, Carraretto finds it most productive to pursue gas flaring initiative on a multilateral level where "a continued dialogue with the operators" may generate better systemic results than "a simple imposition." Therefore, he elaborated further, given the peculiarity of Egypt's flaring sites geographic distribution and their size, "it is important to give flexibility to an operator to do more in the fields where the boundary conditions are more favorable for flaring reduction and less in those fields where flaring reduction is conversely very difficult or a big cost hurdle, so that progress is achieved at least at a "corporate" level."

Simultaneously, it is crucial to ensure that new fields produce zero routine flaring, whereby "the existing fields are equally prioritized for economic tests to better assess the economics and feasibility of flaring reduction."

Steps In the Right Direction

Carraretto praised the measures that the Egyptian government had already taken by the adoption of the new Gas Law and the establishment of the Gas Regulatory Affairs as "steps in the right direction to improve the regulatory environment and support the transition towards lower flaring levels."

Nonetheless, the job is yet far from being accomplished. Further actions are required by all involved parties. Still, there is no "one-size-fits-all solution to harness gas flaring," confidently stated Carraretto, therefore "a mix of different solutions and approaches are required." Different factors such as the size of flaring sites, distance from infrastructure, maturity of the fields, physical/chemical characteristics influence the selection of a type of technology applied. Provided that various technological advancements in the field of gas flaring reduction from small sites are available, which would be suitable for Egypt, one way is to search for efficient alternative gas utilization schemes to enhance gas flare prospects in the country.

Carraretto explains that while "in some cases the size of a field is big enough to make viable a number of different alternative options, in other cases there could be a number of nearby fields, each of them too small if taken separately for any technology, but big enough as a cluster of fields so that a suitable-scale solution can be effective to process the APG from all those fields and bring it [the gas] to the market."

"The general takeaway from our past experience is that flaring reduction is possible."

Alternative Solutions Available

In a recent study on Egypt conducted by the EBRD, the Bank has learned that the country's operators "will have to deal less with big flares and more with rather smaller and sometimes even stranded sites. As a result, unless there is convenient proximity to an existing pipeline or processing plant, this might move focus towards smaller scale solutions such as gas-to-power, CNG, gas-to-liquids (mini GTL) etc.

The Bank has invested its share in the search for viable solutions in Egypt already under "the guiding principle of the EBRD to further progress towards 'market-oriented economies and the promotion of private and entrepreneurial initiative'." It is therefore that "the Bank has always been much more involved in private-sector projects than public ones, [yet] it remains open to invest in state-run projects as well."

In this respect, the EBRD has a comparative advantage to other commercial banks, as it "offers services tailored to the client's needs using its operational flexibility to provide the most suitable instruments to facilitate the implementation of gas flaring reduction projects," concluded Carraretto.

Best Practices for Economic Growth

According to the cited study, Egypt will need additional $4-$5b in investments in order to eliminate gas flaring completely in the given timeframe. The EBRD is prepared to play its part in the process.

"We have a long-term view to support the growth of the Egyptian economy and the transition towards best practice and higher levels of energy sustainability across the sectors," revealed Carraretto. At the same time, the responsibility rests on other stakeholders equally. "Removing gas flaring completely will require a commitment and contribution by all the parties involved, the institutions, the oil companies, and the financial institutions. The EBRD is committed to play its role in ensuring that good sustainable gas flaring reduction projects happen when companies decide to work along with the Bank on the implementation of their investment strategies" in any given environment, he added.

In the current global oil price environment, there is no doubt that oil companies' willingness to diversify their investments and constrain their operations will reflect negatively on gas flaring reduction activities. Delays in the global timeframe aiming for zero flaring by 2030 are likely to occur unless the conditions improve.

While "it is quite simple to forecast the future oil prices, what is difficult is to do it right," as Carraretto remembers an oil market analyst jokingly noting on an occasion. Therefore "prolonged periods of low prices, or uncertain market outlook, can delay investment decisions on their operations of financial institutions" as well as private companies and their investments planning. This is, however, no substantial reason to shy away from gas flaring reduction responsibilities.

In Egypt, Carraretto concluded, "there is a relatively positive attitude in the sector [towards curbing gas flaring], with some investments happening already and some under consideration. If more certainty is brought, I feel that many more good projects will happen in the years to come and flaring might be significantly reduced."

Presently, there exists no specific timeframe for efforts to move forward at a faster pace in the country, however, Carraretto hopes that "Egypt will endorse the [Zero Routine Flaring by 2030] initiative. It would be fantastic to receive it ahead of the first global workshop which the EBRD will host at its headquarter in June 2016."

Cristian Carraretto, *EBRD's Associate Director for Energy Efficiency and Climate Change, is in charge of the Bank's investment projects that include substantial energy efficiency and sustainable energy components across various energy and resource intensive sectors. In the oil&gas sector, he is responsible for sustainable energy projects in oil upstream, among all in gas flaring, and midstream, improvement of energy efficiency along the transmission chain. Carraretto is EBRD's representative in the World Bank's Global Gas Flaring Reduction Partnership (GGFR). He is a mechanical engineer with PhD in Energy Systems.*

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BURNING GAS, BURNING ***MONEY***

By Basma Mostafa

For a country that is already juggling several economic problems, the prospect of saving an additional $300m per year is an exciting piece of news. The amount corresponds with annual losses that Egypt suffers from as a result of 2.5bcm of gas being flared in the country every year, according to preliminary findings of a study conducted by the European Bank for Reconstruction and Development (EBRD).

The gas flaring practice in Egypt resonates with a case study conducted by the Canadian oil field technology company, Berg, which described gas flaring as "literally burning money." But it is not just the economy that gas flaring is taking a toll on. The practice has unrecoverable implications for the environment and for human health. More gas flaring means more anthropogenic green house gas (GHG) emissions. It poses a threat to human health and ecosystems not only at adjacent flaring sites. In Egypt, flaring leads to more that 3.5 million tons of CO2, or 2% of total annual national emissions. "Further reduction of gas flaring in Egypt can have not only significant economic benefits but will also contribute to meeting the best international environmental standards," said Philip ter Woort, Director of EBRD Operations in Egypt following a thematic workshop in Cairo in March 2016, the Bank informed in a press release.

The elimination of gas flaring can do more than provide additional money to the ailing Egyptian economy. Egypt has 1.8 trillion tons of natural gas reserves, in addition to the newly discovered Zohr. Demand for energy resources is on the rise. If gas reserves are properly utilized, they can satisfactorily supply country's growing need for energy, as capturing flared gas could provide the country with additional 5% of natural energy needs.

Boosting Companies' Economics

As the oil sector has experienced in the past, international institutions and partners are interested to contribute to

"Further reduction of gas flaring in Egypt can have not only significant economic benefits but will also contribute to meeting the best international environmental standards."

Philip ter Woort, Director of EBRD Operations in Egypt

industrial improvements in Egypt. The objectives of the EBRD was to assess the extent of gas flaring in the country, demonstrate the business case for associated petroleum gas (APG) recovery, and achieve zero flaring. To date, the Bank has financed over $200 million in projects to reduce flaring in Egypt and is committed to looking into further projects.

Four oil companies operating in Egypt - Merlon, PICO, IPR, and Kuwait Energy - have received EBRD funds to utilize associated gas to their benefit and thus significantly reduce gas flaring. The companies employed a variety of solutions including gas fired power generators, connecting pipeline to near-by processing plants, and LPG stripping units.

Each of those projects has demonstrated commercial viability of APG recovery with different methods and in different geographical/gas flaring areas.

If gas flaring has been dubbed the practice of burning money, it only makes sense that elimination of flaring would boost the economies of oil companies that choose to invest in using associated gas, a by-product of oil extraction, instead of flaring.

Kuwait Energy's Western Desert Fields

Kuwait Energy has received $40 million in EBRD financing to utilize APG methods in its Abu Sennan Concession, located in the Western Desert. To make the most of associated gas, Kuwait Energy opted for a strategy to optimize utilization of hydrocarbons in order to maximize its asset value, Mohamed Atwa, Kuwait Energy's Senior Production Technology Engineer, stated in a presentation at the Cairo EBRD workshop in March 2016. The company was to focus on capturing and processing associated gas with an aim to supply natural gas to the national power grid and utilize gas as a by-product, which would eliminate gas flaring. According to Atwa, Kuwait Energy's aim is to increase oil production through the expansion of new fields and meet production targets.

Initially in 2012, the company was awarded five 20-year development licenses in the concession area with four wells drilled. At the time, gas flaring limits at 1mscf/d per license had constrained oil production targets, as there were no gas processing facilities that could have treated associated petroleum gas. Production from those wells was lower than planned, even though the wells had a larger production capacity, but Kuwait Energy was unable to utilize it. The company started searching for ways, in which it could optimize oil production output without exceeding permitted gas flaring levels, and the options were clear. The company simply decided to minimize or eliminate gas flaring, which would translate into higher profits.

Kuwait Energy prepared plans for a project that would utilize APG better. Since calculations for the construction of a brand new gas plant together with the pipeline were estimated to amount to around $45m and work would have taken at least two years, it was evident that this was not a suitable choice.

Therefore, the company opted for an alternative solution. The plan was to use the already existing, but non-operational EGPC gas plant with the capacity of 24mscf/d of gas and a 250km long desert pipeline to transport associated gas from the fields between 2014 and 2015. It approached the EGPC to be allowed using the idle Qarun gas plant, which was constructed about 15 years ago, but left unused since and isolated for the previous eight years.

After the project was implemented, Kuwait Energy has begun seeing the benefits. In 2014, the daily average production from the concession area was 1,864boep/d. With the commissioning of the gas processing plant in April 2015, the production rate increased to 5,988boep/d.

The cost optimization, operational excellence, gas flaring reduction, and oil production boost was achieved. This evidently showed that the optimum utilization of hydrocarbon sources maximized the value of the company's assets in a long term.

Merlon in El Fayoum

Merlon is another company that the EBRD has supported with funds to reduce the flaring of associated gas. The Bank received $40 million to invest in the commercial recovery of APG in its three fields - Silah, North Silah, and North Silah Deep - located in El Fayoum.

As Carbon Limits stated in a study, presented by Torleif Haugland at a gas flaring workshop in Cairo, the gas utilization in the three oil fields focused on power generation and liquids extraction. The specificity of the locations is water flooding, which had to be calculated in the estimates of power demand at the sites. Carbon Limits' study concluded that the on-site use of associated gas would be highly profitable for the company as there was an increased demand on power supply due to water wells.

The presented study estimated that production of APG in the three locations was over 1mscf/d in 2015, while local demand for gas reached below 200,000scf/d last year. This means that only some 12% of total associated gas volume was to be consumed. As larger facilities, similar to the Merlon's fields, tend to have more associated gas than they in reality need for powering their operations, this opens up additional channels for associated gas utilization instead of flaring; such as NGL recovery, transfer of gas for power generation in the national power grid, and export of gas as CNG.

According to Carbon Limits, Merlon's prospect for the utilization of APG in the sites will increase in the coming years. But the consumption of gas for powering operations in the fields will hardly reach some 30% of produced associated gas until 2020. In 2016, Haugland explained, Merlon's three sites are estimated to produce 1.3mscf/d, while consume 15% of it, whereby in the future the difference between the amounts of produced and on the sites consumed APG will slowly shrink.

Another majorly available APG utilization option appeared to be NGL recovery in the Merlon's oil fields. In combination with export of gas as CNG, Carbon Limits calculated that the company will be able to recover up to 80% of associated gas with 262.6kt CO2 emission reduction in the next ten years. In comparison with another utilization mix, when the company would recover associated gas for NGL and electric generation together, the levels of energy recovered would go up as much as 50% and eliminate emissions by 228.1ktCO2 in the same period. In case Merlon would opt merely for substituting diesel with gas, this option promises least considerable results - with as little as 21% of recovered APG and 79.1kt CO2 reduction in emissions. Yet, Carbon Limits concluded that the highest IRR of 253% would actually come from this last mentioned option.

After these companies implemented specific measures to eliminate flaring generating economic benefits, it is also expected that this success would lead to improvements in the environmental segment. Kuwait Energy has managed not only to increase oil production from its existing wells, but also to reduce GHG emissions, company's Senior Engineer Atwa added at the March workshop. Similarly, Merlon has been aiming for the same target. The EBRD's website clarifies that the replacement of diesel with gas generators at the sites is expected to reduce the flaring of APG and diesel fuel consumption, which will cause GHG emissions to drop by approximately 15,000 tCO2e per year, once the project is completed.

PICO Petroleum and IPR are two other companies with operations in Egypt that have received financial assistance from the EBRD, each with a loan of $50 million for gas flaring elimination projects, as Gabriel de Lastours, Senior Banker, said at a Egyptian Gas Association's roundtable in February 2016.

Condensates & Reinjection

Although the economics and environmental benefits are rather self-explanatory, complex technological requirements for gas flare elimination strategies vary from site to site, which further impacts the selection of viable options.

Utilizing associated gas for the production of condensate through Low Temperature System (LTS) units to separate heavy components from the gas, power generation via 4 MW gas generators, and liquefaction and transportation with the use of 250 tons capacity storage tanks were implemented by the Tanmia Petroleum Company at its ESHPETCO project, explained a company's representative, Atef Khattab, at the March workshop.

In addition, the reinjection approach was adopted by the General Petroleum Company aiming at gas flaring reduction at its 13 oil gathering sites in Eastern Desert concession fields, which produced 17mscf/d of associated gas. The company applied gas utilization project focusing on reinjecting 9mscf/d of associated gas into oil fields to preserve reservoirs' capacity, as company's Gas GM, Engineer Ehab M. El Sherbini, said at the thematic gas flaring workshop. Additional 2mscf/d were used as fuel gas for crude oil processing heaters. GPC aims at further decreasing the flare levels and maximizing the added value of APG by utilizing up to 15mscf/d of total associated gas through LNG, propane, condensate, and pure sulphur production, before the residue gas is reinjected into the field, El Sherbini elaborated. The project thus seeks to reduce gas flare by more than 50%.

Gas Flaring Beneficiaries

For the companies, utilizing flared gas would not only save money but in certain cases also lead to increasing field output. Efficient utilization of APG can provide enough energy to run the fields, while saving liquid fuels such as diesel for other uses. The companies will be major beneficiaries of flaring reduction, but it has to be kept in mind that flaring elimination will have an impact on the environment, and protecting eco-systems as well.

For Egypt, these projects represent merely a starting point to solving the gas flaring conundrum. Therefore, in these days, the government needs to encourage investments in the sector through improving regulations. This could be achieved in different ways, concluded experts, for instance by introducing "gas clauses" in all existing permits.

Fading Environmentally Destructive Flames

By Ahnie Litecky

Gas flaring, a long-standing practice in the oil and gas industry, has come under harsh criticism. It not only wastes valuable resources and billions of dollars annually, it also has a severe impact on the environment. Efforts to curb gas flaring around the world are slowly gaining support, and if pursued efficiently, the end of this practice, harmful to our health, may come true by the envisioned 2030.

Gas flaring is the burning of unwanted gas that is extracted as part of oil/gas exploration, production, and processing operations. Sometimes non-waste gases are also flared to protect processing equipments in exceedingly high-pressure conditions. The industry also relies on gas venting, which is the direct release of gases into the atmosphere and it usually occurs for safety reasons. However, flaring is preferred over venting, because less methane is released by burning the gas. Gas flaring and venting are common practices among oil companies because capturing and using the natural gas is often expensive and appears impractical. As the reasoning stands, financial practicalities seem to have been taken priority over destructive effects that gas flaring has on the environment.

Roasting the Sky, Poisoning the Air

"Gas flares are nothing short of crimes against humanity," Nnimmo Bassey, the then-Director of Lagos-based Environmental Rights Action and Chair of Friends of the Earth International, told The Guardian in 2011. "They roast the skies, kill crops and poison the air. These gas stacks pump up greenhouse gases into the atmosphere, impacting the climate, placing everyone at risk."

Flaring can create five forms of pollution: noise, light, thermal radiation, particulates (soot), and emissions. If flaring is conducted properly, with a complete burn of the emitted natural gas, then particulate and emissions are minimized. However, variable environmental conditions mean that the gas is rarely fully combusted and instead releases a plethora of toxic substances into the air.

Gas flaring thus contributes dramatically to climate change. Gas venting releases methane and gas flaring emits both carbon dioxide and methane. These two major greenhouse gases have contributed to about 80% of global warming to date. Annually, gas flaring releases about 350 million tons of CO_2 into the atmosphere worldwide. The oil and gas industry is also responsible for about 20% of global methane emissions.

Flaring also produces black carbon particles which strongly absorb sunlight and generate atmospheric heat. These particles can warm the air, and influence regional cloud formation and precipitation patterns. If black carbon particles fall onto snow or ice, it can absorb sunlight and accelerate melting, which further negatively contributes to global warming. According to environmental reports, the Arctic region is warming twice as fast as the rest of the world, which can be partly attributed to the increased presence of black carbon. A. Stohl led a study, published in 2013 in Atmospheric Chemistry and Physics, which showed that gas flaring contributed 42% to the annual mean black carbon surface concentrations in the Arctic.

"Gas flares are nothing short of crimes against humanity."

Nnimmo Bassey, former Director of Lagos-based Environmental Rights Action and Chair of Friends of the Earth International

Scientific research on the environmental effects of gas flaring is further supported by a wealth of research on the specific compounds that are released in the process. The exact combination of emissions depends on several factors, including the burning temperature, the composition of the waste gases, and wind speed. As O. Saheed Ismail, and G. Ezaina Umukoro demonstrated in a 2014 article from the Journal of King Saud University, gas flares contaminate the atmosphere with a range of harmful contaminants such as nitrogen dioxide, carbon dioxide, carbon monoxide, sulphur dioxide, particulate matter, hydrocarbons, ash, photochemical oxidants, and hydrogen sulphide. All of these compounds are shown to harm human health. In total, there have been over 250 identified toxins associated with flaring.

People breathe in these contaminants, but the toxic mixtures also make their way into water and soil. Drinking water and agricultural soil are affected, making areas near gas flare sites sometimes uninhabitable.

Water bodies in gas-flared environments have been shown to contain increased levels of heavy metals, such as lead, cadmium, copper, manganese, and nitrates. C. N. Nwankwo and D. O. Ogagarue demonstrated the presence of such heavy metals in a 2011 study published in the Journal of Geology and Mining Research. According to their research, the heat generated from gas flaring can kill nearby vegetation, destroy swamps and marshes, suppress the growth and flowering of some plants, degrade soil, and decrease agricultural productivity.

Crops located near gas flare sites have reduced nutritional value. In a 2013 study published in Journal of Environment Pollution and Human Health, author Anslem O. Ajugwo compiled data and information from a variety of research sources to craft a case study of Nigeria. He argued that gas flaring has "impoverished the communities where it is practiced, with attendant environmental, economic and health challenges."

Acid rain has also been linked to gas flares, as Akobundu Amadi demonstrated in a 2014 Journal of Geosciences and Geomatics article. Acid rain makes water bodies such as lakes and streams more acidic, damages vegetation, causes roof erosion, and kills aquatic animals, harms local populations. In effect, soils near gas flaring sites become more acidic from acid rain and cannot support agriculture.

Health Diseases on Display

The environmental issues are further exacerbated by the direct impact that gas flaring has on population's health, and not exclusively of those living in proximity to gas flares.

Most scholarly research about the

"If converted to power, the flared gas can produce electricity to light up the African continent."

Anita Marangoly George, World Bank Senior Director for Energy and Extractive Industries

health effects of living near gas flare sites has been conducted in Nigeria, where the gas flaring has been in widespread use for decades. For example, A.E. Gobo, G. Richard, and I.U. Ubong from Rivers State University of Science and Technology in Nigeria demonstrated in a 2009 paper published in the Journal of Applied Sciences and Environmental Management that certain respiratory diseases were more prevalent in gas flaring areas than in areas without gas flaring. In a 2013 study published in the International Research Journal of Medical Sciences, J.N. Egwuruwu, et.al. showed that rates of kidney disease increased near gas flaring sites. Two years later, T.E. Ogbija, A.O. Atubi, and V.N. Ojeh used questionnaires, oil spill records, and gas flare data to argue that environmental degradation of air, water, and land in the Nigerian Delta caused a variety of health, economic, and agricultural problems. Their research was published in the Journal of Environment and Earth Science.

These three studies are just a sample of the extensive research demonstrating an alarming link between gas flaring and a myriad of health problems. Lung damage, anemia, nausea, headache, fatigue, leukemia, birth defects, wake-sleep disturbances, respiratory problems, skin/eye irritation, cancer, skin disorders, and kidney disease, are merely some of the health issues associated with gas flaring emissions. People who live near gas flaring sites also deal with loud noise from the gas emissions and bright lights given off by the flames.

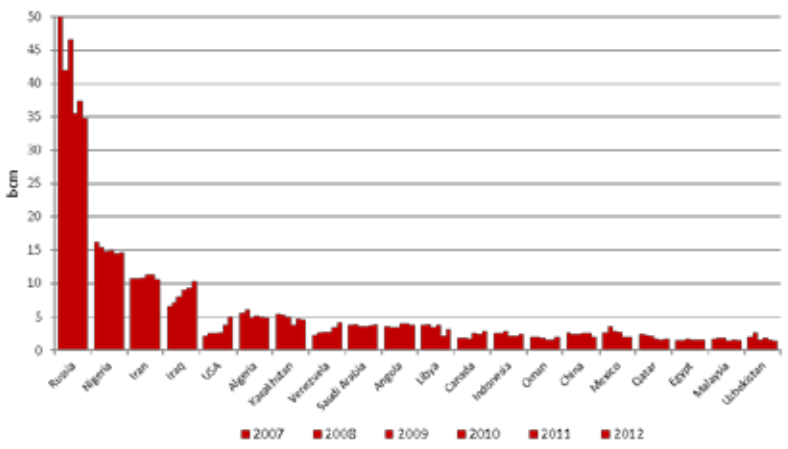
People in other countries with high rates of gas flaring have also complained of negative health effects from gas flares. Iraqis who live near gas flare sites have complained of infected skin, allergies, asthma, and other respiratory problems. Similarly, in 2013, residents of a Canadian town reported an increase in hair loss, skin rashes, and respiratory issues such as coughing after several years of increased gas flaring nearby.

Furthermore, flaring negatively affects animals as well. Several instances of mass bird deaths at gas flare sites have been reported in Canada, Nigeria, and the North Sea. In 2013, approximately 7,500 migrating birds were killed at a gas plant in Canada. Of course, livestock and domesticated animals that live near gas flare sites ingest the same harmful contaminants that people do through the air, crops, and water. Scientific studies concerning the specific effects of gas flaring on animals are still scarce, but a 2000 Canadian study, led by C. L. Waldner and published in Preventative Veterinary Medicine, showed an increase in the risk of stillbirth and mortality in Canadian cattle near gas flaring locations.

There is a lot of anecdotal evidence that animals who live near gas flaring sites suffer from a variety of reproductive and health problems, while scientific studies support the findings about the negative health consequences for animals ingesting toxic chemicals.

Common Flaring Rationale

Gas flaring is bad. Everybody agrees. Scientists have produced a wealth of research that shows gas flaring is harmful. People who live near gas flaring sites can attest to the toxic air and scorched earth. Gas flaring contributes to climate change. The practice wastes huge amounts of a non-renewable resource. Worst of all, gas flaring is not necessary. The technology to reduce gas flaring is available, so why is gas flaring still so common?



The short answer is that gas flaring is cheap and easy. The long answer is, of course, much more complicated.

"Flaring continues because there are prevailing barriers that hinder investments in flare reduction," Torleif Haugland, Senior Partner at Carbon Limits, a Norwegian-based climate change consulting firm, told Egypt Oil & Gas. "Some are technical and economical and would need economic incentives or regulatory pressures and measures to be eliminated, while others are caused by lack of awareness and/or priority by corporate managers. Finally, distortive policies and regulations (e.g. pricing policies, and license terms) hinder many flare reduction projects which are profitable from a socio-economic perspective."

One important issue that Haugland raised is economics. Gas flaring is often considered the most economical thing to do with natural gas. Oil can be transported to refineries in trucks, even from very small and remote fields. However, gas requires pipelines to be moved to market and building pipeline infrastructure is costly. Companies do not want to invest lots of money to extract small amounts of gas from far-flung fields. Russia, who currently holds the unfortunate distinction of top natural gas flaring nation in the world, is an excellent example of the geographic reasons that flaring occurs. In Russia, most oil field are spread out across remote areas that are difficult to access, therefore building pipelines to move the associated natural gas is extremely costly and makes little economic sense for Russian oil companies.

Another significant reason why gas flaring continues is that many governments have not done enough to effectively regulate the practice. For instance, the Nigerian government outlawed gas flaring in 1984, but the country remains at the top of the gas flaring lists. Over the past few decades the government has struggled to enforce gas flaring laws, yet instead routinely succumbed to pressure from oil companies to push back deadlines and amend legislation.

The low price of natural gas also contributes to gas flaring. In the US, another major gas flaring country, natural gas prices remain low, despite a huge market for the resource. As in the case of Russia, American oil companies have little economic incentive to build costly infrastructure to capture and sell natural gas and instead routinely flare the gas.

Beyond the environmental impact of gas flaring, there are further huge economic ramifications. According to the World Bank, gas flares at oil production sites burn approximately 140 billion cubic meters of natural gas annually, which is about 4% of world production that remains unrecoverable amid growing global demand of gas.

Several countries have meanwhile set on a path towards ending gas flaring, yet only Norway seems to present a flaring reduction success story. The country has formulated a clear and detailed gas flaring and venting policy and the government works closely with oil companies to ensure compliance.

Efforts to Reduce Flaring

Despite the dire facts and statistics surrounding gas flaring, there are also plenty of reasons to hope that the practice will soon end globally. The World Bank has led global efforts to reduce gas flaring, most recently by introducing a Zero Routine Flaring by 2030 initiative last year. Governments, oil companies, and development institutions are signing on to support the legal, regulatory, and economic changes necessary to put an end to routine gas flaring.

"The rise of climate change on the international policy agenda implies that there will be much more attention and action directed toward the resource waste which flaring represents."

Torleif Haugland, Senior Partner at Carbon Limits

Haugland argues that the World Bank initiative is both realistic and achievable. "The target is for avoiding flaring at new production sites and seeking flare elimination from existing flare sites when such investments are economically viable," he said. Further, "the rise of climate change on the international policy agenda implies that there will be much more attention and action directed toward the resource waste which flaring represents. Given that 2030 still is more than 10 years away seen from a planning and project implementation perspective this target should be achievable and realistic."

"The oil and gas industry has a responsibility to cut routine gas flaring to zero," said Anita Marangoly George, World Bank Senior Director for Energy and Extractive Industries, in a statement in December 2015. She added that "ending routine gas flaring not only stops millions of tons of CO2 going into the atmosphere every year, it can contribute to improving the life of the people who live around gas flare sites."

Unlike the existing practice, destructive to the life on earth, a straightforward rationale should instead be advocated for in line with people's rights to clean environment, corporate and governmental obligations and global urgent demand for clean energy.

As Anita Marangoly George eloquently put it: "If converted to power, the flared gas can produce electricity to light up the African continent. So what are we waiting for?"

Nigeria's Unfulfilled Gas Flare Targets

By Amanda Figueras

Nigeria is an eloquent example of a gas flaring paradox. While exerting efforts in stopping routine gas flaring for decades, an end to this practice seems to be still distant for the country. It seems that Nigeria is taking one step forward and two steps back.

This case demonstrates evidently how adopted regulatory framework of gas flaring reduction could fail. Nigeria is the country "where stringent regulations are not implemented and the regulator is ineffective," as Frederik Beelitz, Managing Director of Economic Consulting Associates (ECA), presented in his paper at a Cairo workshop on gas flaring. He added that flaring in Nigeria is more economical than marketing gas due to the unviable domestic gas market.

The Cheapest Method

Nigeria is the largest oil producer in Africa and one of the world's top five exporters of liquefied natural gas (LNG). The country's industry first began to engage in gas flaring with the discovery of oil in commercial quantities in Oloibiri in 1956. Oil companies found this practice as the cheapest method of removing the associated petroleum gas (APG). At that time, relatively little demand for gas in many parts of the world made the prospect of investing in the harnessing, liquefaction, and export of natural gas less attractive than it is today, and the APG was usually burned off.

As the Nigerian economy is largely dependent on the oil and gas sector, which accounts for about 95% of its foreign exchange earnings, 40% of its GDP, and 75% of federal government total revenue, the federal government initiated gas flaring reduction policies to boost oil production while preserving natural gas resources. By creating a new regulatory framework for gas flaring reduction, the government was targeting gas sector's deficiencies, primarily the lack of infrastructure that has been continuously preventing monetizing flared natural gas from happening.

Oil flaring in Nigeria was thus formally banned in 1984 and declared "unconstitutional" by the Nigerian Supreme Court in 2005, but the federal and state authorities have been unable to enforce the regulations on oil companies to stop this practice. For years to come, flexible regulations were in place with no punishments being recorded.

The US Energy Information Administration (EIA) estimated that the country contributes about 13% to the global gas flaring total. While the volume of flared gas in the country slightly decreased due to a combination of several factors, still some 45% of Nigeria's gas was flared back in 2011. According to the latest estimates published recently by the National Oceanic and Atmospheric Administration (NOAA), Nigeria's upstream sector flared 9.4bcm in 2013 and 8.4bcm in 2014.

This raises critical questions as to which factors in reality could have contributed most to the decline. Some analysts point to the fact that the drop in gas flaring volumes reflected less the purposeful implementation of the county's strategy and was rather an outcome of the current problematic dynamics in the global oil market. Shrinking oil production in the country that was hampered by instability due to destructive militant attacks on the oil fields and pipelines that caused supply disruptions, partly contributed to the actual effect.

Formalized Inefficiency

Despite minor achievements, Nigeria, nonetheless, remains the biggest gas flarer on the continent and the sixth largest in the world. Given the country's decade-long efforts in curbing gas flaring, its overall performance is rather limited, a researcher, Dennis Otiotio, from the University of Tulsa, Oklahoma, US, concluded in a study in 2013.

Reasons? A mix of ineffective, inefficient, and non-transparent gas flaring legislation, a lack of political will to implement relevant policies, and the absence of capable, independent, and well-funded regulatory agencies.

Inefficiency in enforcing national gas flaring regulations was dubbed as the key factor. Hence, further formal efforts were adopted with a goal to stop the wasteful practice on a large scale. The federal government established the Department of Petroleum Resources (DPR) under the Ministry of Petroleum, which was to ensure the compliance of oil and gas companies' operations with the national industrial and environmental regulations. In spite of these massive formalized structures and processes in the country, it was reported that a general bureaucratic practice by the DPR undermined possible positive outcomes.

Nigeria is the country "where stringent regulations are not implemented and the regulator is ineffective." **Frederik Beelitz, Managing Director of Economic Consulting Associates**

Routine flare is still being allowed by the Department, which is believed to be raising operators' gas flaring limits in discretion. Issuing permits seems to be a mere formality. Operators are granted exceeding allowance based just on their merits. When their performance in relation to gas flaring reduction is considered satisfactory, the DPR is reported to be lenient.

The 2013 study by Otiotio also pointed to the conflict of interest on part of the government, regulatory officials, and the oil and gas companies, with large scale corruption penetrating all levels of the sector.

The problem is likely strongly tied to the fact that the Nigerian government has a double role in the system. It is both a regulator and an owner-operator in the oil and gas industry. The government owns the oil and gas in place, and through the Nigerian National Petroleum Corporation (NNPC), it has major shares in Joint Ventures (JV) with other oil and gas companies. Under this arrangement, regulating the oil and gas sector comes as an indirect imposition of restrictions on the NNPC itself. Moreover, oil and gas companies can usually blame their inability to meet the gas flaring deadlines and limits on NNPC's failure to meet its financial obligations towards JVs. Most importantly, since the government has the biggest share in oil revenues, a stringent enforcement of gas flaring regulations would adversely affect the state's income. Therefore, the rules are relaxed to allow for continuous production of oil and gas.

Gas for Power

The cited study further suggested it was necessary for the Nigerian government to encourage the construction of needed gas infrastructure, and improve the gas market climate in order to upgrade its gas flaring records. The measures are something that could be achieved by resorting to international financial institutions to raise required funds and by promoting public-private partnerships that would lead to collaboration in eliminating unsustainable practices.

In Nigeria, "historically, investment in the oil and gas sector has been focused on oil, to the detriment of gas," a liquefied natural gas producing company, Nigeria LNG Limited (NLNG) lamented the lack of accomplishments in gas flaring elimination. Another impediment to decreasing gas flaring, apart from the volatile security situation in Niger Delta, has been a lack of partner funding, stated Royal Shell Dutch, one of the largest gas producers in the country.

Despite that, the country has monetized over 4.7tcf of APG, which would have otherwise been flared and wasted, NLNG said in an email interview with Egypt Oil&Gas.

Nigeria's efforts to improve the gas sector reach back to 2008 when the government developed a Gas Master Plan that promoted investment in pipeline infrastructure and new gas-fired power plants. The aim was to help reduce gas flaring and provide more gas to fuel electricity generation in line with electricity sector's privatization, which was believed to increase efficiency.

The Nigerian government therefore prefers to utilize associated gas for domestic purposes with a focus on power generation, Carbon Limits Nigeria explained to Egypt Oil&Gas in an email. Nonetheless, progress has been limited, largely also on account of security risks in the Niger Delta that complicated the construction of infrastructure. In the end, according to a consultancy firm, Oxford Business Group, despite its hydrocarbon-rich economy, Nigeria produces less power than a medium-sized European city.

Gathering Associated Gas

Gas flare solutions vary by location and feasibility. International oil major companies such as Shell, ExxonMobil, Chevron, Total, and ENI have already developed similar projects in the country, some of which are specifically focused on monetizing the gas that is currently being flared.

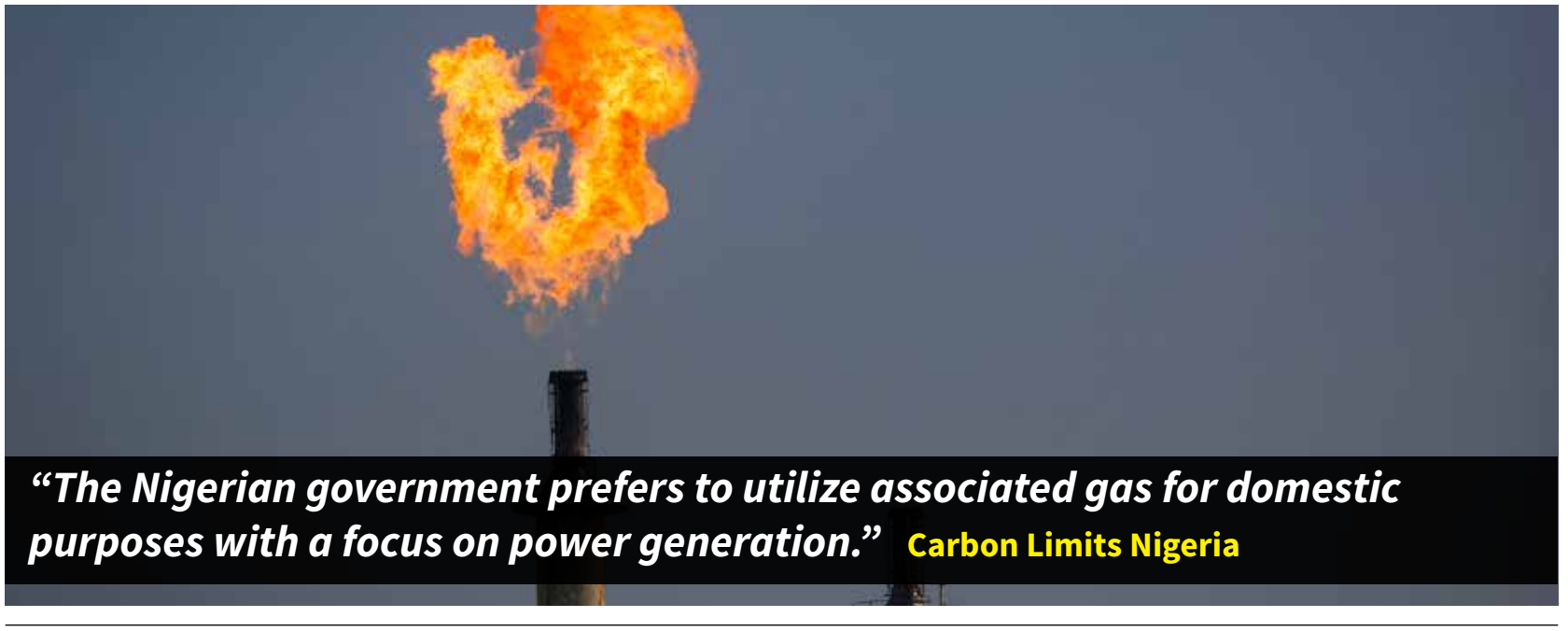
Amongst those projects, the Shell Petroleum Development Company of Nigeria Limited (SPDC) began a multi-year program in 2000 to install equipment to capture associated gas from its oil producing facilities. Its goal was to install Associated Gas Gathering (AGG) infrastructure to recover 90% of the associated gas produced in this process. The other 10% was to be dealt with via local gas offtake agreements with third parties for small-scale local projects. More than 40 Nigerian investors were interested in the scheme. Shell contended that the program was, however, sidelined due to external factors. Funding from the NNPC declined, security concerns made it unsafe for staff and contractors to work in large parts of the Delta for long periods of time, and contracts approval processes were delayed.

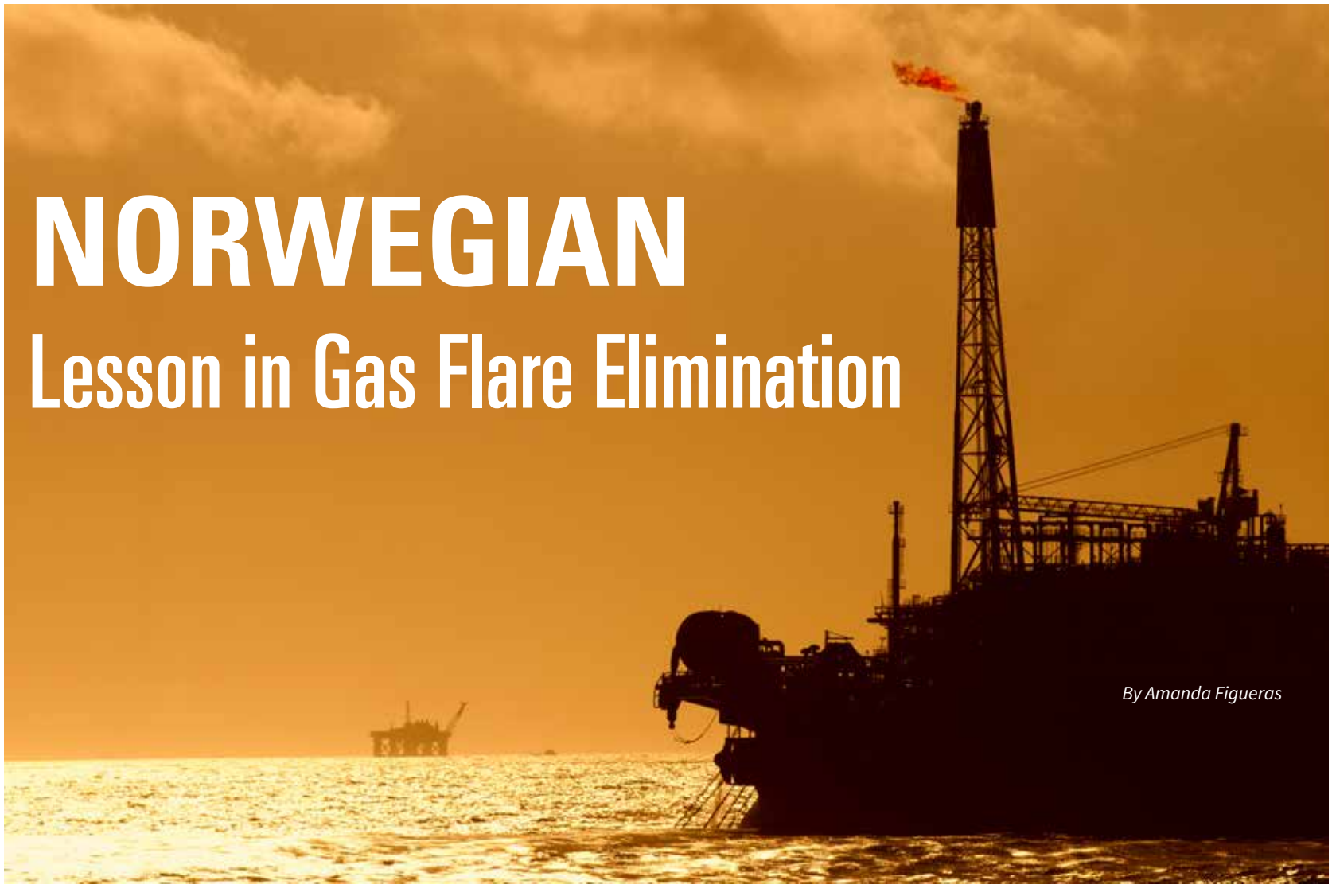
Despite these issues, between 2000 and 2012, SPDC managed to install AGG infrastructures at 37 sites covering about 66% of its APG. Unfortunately, 18 of these facilities were either vandalized or not commissioned because of the crisis in the Niger Delta stretching between 2006 and 2010. Notwithstanding, in total, the SPDC's flaring dropped by about 75% between 2003 and 2012 from over 0.66bcf/d to about 0.16bcf/d, and flaring intensity was reduced in the same period from about 0.74mscf/bbl to 0.40mscf/bbl.

In May 2010, following improvements in the security situation in the Niger Delta, the SPDC resumed work on additional gas-gathering projects. Later, in 2012, the SPDC committed to two big capital projects with a 30% share in both the Forcados Yokri and Southern Swamp projects. These were expected to gather additional 35% of flare gas in 2014/2015, thus taking the SPDC JV flaring intensity to below the current global average. Royal Dutch Shell estimates the entire AGG program will cost over $6 billion when complete.

In addition, the Southern Swamp Associated Gas Solutions Project will add 100mscf/d of gas to domestic supplies once completed in 2017, fed through the existing western pipeline system, the Escravos-Lagos Pipeline System (ELPS). Meanwhile, the Forcados Yokri Integrated Project will add additional 80mscf/d of shallow-water associated gas.

As these project mark considerable improvement on the road to zero gas flare, the support is needed also on the national level. In March, Nigerian President, Muhammadu Buhari was reported by national press as saying that his administration was working towards the endorsement of the 'Zero Routine Gas Flaring by 2030' initiative. He added that Nigeria will try to eliminate gas flaring already by 2020. However, this optimistic aspiration is seen by observers and experts alike as unreachable, given that the country has been unable to meet its objectives in several decades. Buhari's announcement is therefore believed to turn into yet another insignificant deadline that will never materialize.





NORWEGIAN
Lesson in Gas Flare Elimination

By Amanda Figueras

Routine gas flaring is a dramatic example of what should urgently be eliminated. There is no benefit to it from the monetary point of view, except in a rare number of cases. Given an enormous dimension of the problem, could routine gas flaring really end? Is it an issue of willingness, financing, or knowledge?

Norway has evidently demonstrated that the practice is possible to eradicate. In this Scandinavian country, flaring takes place occasionally, primarily for safety reasons both offshore and on land, but routine burning is banned since 1971. The country is a global positive example where direct state regulations and strict environmental mechanisms resulted in an extraordinary accomplishment.

The country instituted regulatory measures that have significantly reduced gas flaring while increasing oil production. A carbon tax, introduced in 1991, proved to be a successful incentive in establishing zero routine gas flare environment in the oil and gas industry.

Regulatory Measures

Norway was the first oil-producing country to announce its support for the World Bank's initiative to end routine gas flaring by 2030. The world's third largest exporter of gas and the largest oil producer in Western Europe transports most of its Associated Petroleum Gas (APG) produced in the country to neighboring markets through an extensive pipeline infrastructure that links it mainly to EU nations.

A total ban on non-emergency flaring in the Norwegian continental shelf was introduced in 1971 in order to avoid wasting resources. Later, when the effect of flaring on global warming was discovered, Norway strengthened its commitment to the ban with a policy that combines direct regulation with environmental schemes in order to address the issue. When the zero flare system was adopted, it has been implemented in nearly 30 Norwegian offshore installations.

Under the adopted measures, oil and gas developers are required to come to terms with gas utilization plans prior to carrying out any field development operations, and the responsibility of reporting and monitoring rests on their shoulders. They are, therefore, obliged to establish an internal control system that ensures compliance, and they also have the obligation to check sensor calibration regularly, every six months.

"Norway brings one of the best examples of successful oil production policies as well as environmental protection."
Gulzhan Nurakhmet, Academic Journal Oil, Gas & Energy Law

Fiscal Incentives

In addition to these measures, a CO2 tax and greenhouse trading scheme has added further direct costs that strongly advise against developers from engaging in flaring. The CO2 tax was first introduced in 1991 and the amount collected by the state authorities steadily increased over time. The tax is calculated based on the volume of gas flared and vented. In Norway, it comes at a rate of $120 per 1,000 cubic meters. This has been a driving force for the development of new technologies and operational procedures, for example the "closed flare system" that minimizes non-routine flaring.

Further, the tax, which is deductible as a cost from the corporate income tax, is in line with the Norwegian climate change policy and it is part of the country's commitment to the EU's Emissions Trading System (EU ETS). Moreover, hefty fines - far too large to be acceptable as "another part of doing business here," and punitive measures - including a temporary suspension of activities, jointly create an effective way to discourage operators from the flaring practices.

Investments for Permits

Permission to flare gas in Norway can be granted only by the Ministry of Petroleum and Energy. Nonetheless, in all cases, operators have to submit an APG utilization scheme prior to the approval of their Plan for Development and Operation of oil fields.

In fact, as the Norwegian consultancy company in emission reduction in traditional energy sectors, Carbon Limits, explained to Egypt Oil&Gas, "in a number of cases, major new developments were only approved after significant investments were made to avoid routine gas flaring and gas venting." For instance, at the Draugen field, gas was re-injected into a nearby aquifer, while a gas export pipeline was built, stated Carbon Limits and presented another example. For the Heidrun field, the development could have only proceeded in parallel with the construction of a methanol plant and connecting gas pipeline.

The supervisory and control role of the state institutions proved inevitable for the success of gas flaring reduction. Similarly, strict observation of the regulatory requirements and processes by operators contributed greatly to the achievements.

Associated Gas Utilized

As a result, most of Norway's recovered gas is exported, while the remnant of APG is, not surprisingly, re-injected.

Some examples of gas re-injection methods in the Norwegian oil fields include non-miscible injection method, which avoids mixing gas with oil. The method is employed in the Grane offshore oil field in the North Sea. Another way is to employ a more common, miscible injection method, in which gas is mixed with oil to reduce viscosity and increase pressure within reservoir for easing recovery. This allows developers to recover more oil than the previously mentioned option, and it is the method employed in the Straffjord field.

Meanwhile, in the Gullfaksoil field, the state company Statoil, following the 1991 CO2 tax introduction, developed a system to end continuous routine flaring by recycling APG. Instead of being flared, the gas routed to an existing gas export system through a pipeline network. The pipeline network has a valve which can quickly divert the flow to the flare stack if the pressure begins to increase.

In addition, the country also employs the Far North Liquids and Associated Gas System (FLAGS), a natural gas pipeline used to transport associated gas and liquids from multiple platforms in the North Sea. It extends over 450 km and is used to transport gas to the UK.

In Norway, the effects of the Enhanced Oil Recovery (EOR) schemes and the re-injection of APG have contributed to the extraction of additional 320mscm of oil and condensates as of 2010, according to a study published by the Columbia Center on Sustainable Investment.

Key to Success

In line with the Norwegian Energy Policy, the country has been able to merge its role as a large energy producer with a pioneering position in environmental issues in Europe and worldwide.

According to a study conducted by Gulzhan Nurakhmet from the Academic Journal Oil, Gas & Energy Law, "Norway brings one of the best examples of successful oil production policies as well as environmental protection."

As Bente Weisser, the Senior Adviser at the Norwegian Ministry of Foreign Affairs, said at the Global Gas Flaring Reduction (GGFR) Global Forum in 2015, amongst the reasons behind the Norwegian success in its struggle against gas flaring is its clear and unambiguous legislation on the treatment of associated gas from the start.

The governmental strategy in the energy sector with a commitment to climate change policies is one crucial element of the success. In order to establish a systematic practice without gas flaring, the stakeholders are also required to play their part, which Norway successfully achieved.

"In a number of cases, major new developments were only approved after significant investments were made to avoid routine gas flaring and gas venting."
Carbon Limits, Norway

According to Nurakhmet, "from the Norwegian experience we could draw conclusions that clear and detailed gas flaring and venting policy, careful evaluation and examination of the development plan, as well as cooperation of the Norwegian government with oil companies have been contributing factors to the successful Norwegian Gas Utilization Policy."

The consensus approach and collaboration between public authorities and main industry stakeholders is the necessary starting point to end gas flaring, Director of Economic Consulting Associates (ECA), Frederik Beelitz, affirmed at a presentation at a gas flaring workshop held in Egypt in March. In fact, volumes of gas flaring or venting are also strictly regulated at the production stage, and here is maybe the key of success.

In financial terms, the expert also emphasized the importance of fiscal incentives for associated gas investments, which are promoting technical innovations and the use of best possible technological practices.

Moreover, as Weisser pointed out, "the development of integrated network of gas pipelines, including for associated gas, has been a key factor to facilitate commercially viable markets where companies have an open and non discriminatory access to the infrastructure." In fact, "it is more expensive and often much more technically challenging to address flaring after production has started," added Weisser.

Gas flaring and venting in Norway is not only advanced with positive environmental protection policy, it itself drives the development of the gas transportation infrastructure, and contributes to the development of many oil fields, which became commercially viable thanks to the various associated gas utilization schemes.

MOBILE SOLUTIONS FOR GAS FLARE REDUCTION

By Nataša Kubíková

Innovative technologies for more efficient and environmentally friendly utilization of associated petroleum gas are flooding the market. There is a plethora of available products to choose from that will help replace gas flaring with other more economically viable and energy efficient alternatives. The technologies were developed for countries that cannot adopt standard solutions such as building expensive gas pipelines that would transport associated gas. Benefits that these products can deliver range from helping eliminate destructive gas flaring practices, improve operation sites economics, ensure energy efficiency, and achieve production optimization in oil fields.

Gas Pipelines Option

Egypt with its specificities - high number of small flaring sites with variable volume of associated gas in locations distant from national grid - has a plethora of technological products and schemes at hand to employ.

Primary gas utilization outlets at gas flaring sites in Egypt are not available, according to preliminary findings of a study commissioned by the European Bank for Reconstruction and Development. As Torleif Haugland, Senior Partner of Carbon Limits, an EBRD collaborator, explained at a gas flaring workshop held in Cairo in March, there are several options for efficient utilization of associated petroleum gas (APG) ranging from gas delivery via pipelines to the market, replacing diesel with gas to generate power at sites, gas delivery by mobile equipments – CNG, LNG, small size gas-to-liquid (GTL), production of condensate, and reinjection of gas to oil fields.

Although gas delivery via pipeline is a principal option for flare elimination, in Egypt, the distance of gas flare sites from the market and low volumes of gas are critical factors that suggest against it. Pipeline solutions define as a viable threshold of 15-20 km distances for small-sized fields with low volume of associated gas and a limit of 35-40 km for larger volumes. However, Egypt records 70% of flaring occurring at sites with less than 5mscf/d of associated gas, whereby only 7 sites flare more than 5mscf/d. In addition, a large number of small flaring sites is distant from the market. This would imply that heavy weigh conventional gas pipeline technologies are less economic and impractical with higher capital spending. Instead, other scalable and portable options would be a smarter choice for Egypt and a more viable business model for the country, experts at the workshop concluded.

Available Mobile Technologies

Torleif Haugland therefore stressed that other options for utilizing gas in oil fields may be more interesting for Egypt.

Utilizing gas for power at sites, when gas generators replace diesel, is economically much more attractive. Similarly, GTL's costs are coming down, which would offer another viable business opportunity, however, so far only few commercial projects are underway. Mobile LNG and CNG solutions may be yet another way to go for Egypt as these appear more suitable for small flaring sites and 'stranded gas,' of which Egypt has a high count.

As Filippo Munna, Hexagon Composites' Director of Sales Gas Distribution, told Egypt Oil&Gas, "small sites with a relatively brief life span - like the ones in Egypt - require the flexibility offered by a CNG Mobile Pipeline™ in order to be efficient. When an oil site is exhausted, gas transportation products can be moved elsewhere and continue the delivery. Hexagon Composites specializes in the gas transportation models focused on CNG."

Mobile pipeline solutions appear economically more viable also due to the fact that oil wells lifespan is rather short, rigs are moved at a fast pace as new wells are continuously drilled. As there is a limited time and capital for building intra-basin infrastructure, argued Munna at the workshop, and further restrictions are imposed on oil production over gas flare levels, flexible mobile solutions are more feasible to employ.

The advantages of scalable and mobile solutions thus outweigh complexities and financial costs of standard pipelines. Munna added that "a Mobile Pipeline™ can be put in place in as short time as nine months. Pipelines, on the other hand, require years to be built and are much more disruptive for the environment. This factor is to be considered in developing countries with their high demand for energy. The countries also need to take into account the fact that pipelines are an easy target for possible terrorist attacks and require expensive and extensive surveillance, whereas a trailer can be protected in a much easier fashion. A country as big as Egypt, has ideal conditions for light weight products that transport considerable amount of gas."

Yet, CNG and LNG technological processes also present some challenges.

CNG versus LNG

In the case of LNG there are various obstacles, as Tractebel Engineering's Head of Process Department, Xavier Sturbois, explained at the workshop. Flare gas comes with low pressure, heavy hydrocarbons content, variable flow with time, space availability limitations, and gas quality does not match requirements for liquefaction. Therefore, for the liquefaction processes to be successful and cost-effective, the gas is to be freed from CO2 and H2S, mercury and heavy hydrocarbons, and it is to be dehydrated with limited content of nitrogen. The associated gas is therefore to be pre-treated before being liquefied. A complex system of liquefaction of APG requires specialized technologies and needs higher capital investments. Presently there are several suppliers able to offer relevant technologies such as single mixed refrigerants, nitrogen based, and open cycles technologies.

The CNG option, on the other hand, may be a safer bet. Even though necessary gas pre-treatment requirements apply also in this case, onshore CNG transportation is already a rather mature technology. Sturbois therefore concluded that gas utilization via the CNG option is less demanding, yet comes with a higher safety risk. Regardless of this factor, according to Tractebel projections, CNG is more suitable for smaller capacity gas transportation on shorter distances of 800km and with up to 5mscf capacity.

As business rationale implies, gas flaring

reduction projects generate higher costs for small volume flaring sites at longer distances. This is one of the challenges that the Egyptian oil sector and foreign operators currently face.

Therefore, in a comparative perspective, CNG may become a more desirable option for Egypt than LNG thanks to being more cost-effective. Total costs consisting of gas treatment, processing, transportation, and delivery associated with LNG amount to $11.62/mBtu in the case of sites at longer distances, and $8.12/mBtu at shorter distances. In contrast, overall costs for CNG projects come down to $10.46/mBtu at longer distances and to surprisingly low $3.85/mBtu at shorter distances.

In addition, Hexagon Composites,the market leader in sustainable lightweight solutions for mobile pipeline applications, calculated that the energy cost differential represents a 10%-25% cost savings on fuel in total. There is no doubt that the pricing will likely be a primary motivating factor for gas conversions also in Egypt.

Moving Gas Not Steel

Innovative and tested technologies processing associated gas in the form of CNG could be the new hit in the country's petroleum industry.

Currently, there are several different products in the market, as Hexagon Composites' Director presented to the Egyptian oil sector representatives at the workshop in Cairo. The company specializes in mobile pipelines, developing composite pressure vessels, cylinders, and trailers. Hexagon's Mobile Pipeline technology is the largest Type 4 commercial pressure vessel worldwide offering high-capacity, low-weight, and cost-effective transportation of gas, explained Filippo Munna. It is ideal for large gas consumption businesses that come at a high flow rate, but are not operational via pipelines. The technological solution suggests a series of benefits for the Egyptian oil and gas sector, given the parameters of associated gas production in the country.

Further, APG can be also stored for future use. Hexagon's 20ft SMARTSTORE® and 40ft TITAN 4® modules can store and transport respectively 7,000 scm and 10,000 scm. Another attractive characteristic is that the TITAN 4®, an approved ISO container, can also be used for road, marine, and railway transportation. In case the need arises, there are also available technologies tested in harsh conditions in different volatile parts of the world.

As Munna further noted to Egypt Oil&Gas, Hexagon Composites' technology is designed for a wide use in the oil and gas upstream sector for drilling rigs, fracking fleets, and flare gas recovery. It offers composite material vessels as well as by far the largest composite material tanks currently available in the market. These technologies are able to accommodate APG in oil fields that are developed quickly without accompanying infrastructure to process and transport associated gas.

Further, these are also economically viable solutions. According to Hexagon's data, the available CNG scheme contributes to reducing emissions and generates savings on fuel costs. Savings of over $9 million can be easily achievable in a single project.

Potential of mobile technologies is huge. Companies have also developed mobile gas processing plants that can additionally help in eliminating gas flaring by producing NGLs such as ethane, propane, and butane and consumer quality dry natural gas such as methane.

In spite of the challenges, it is encouraging to know that technologies have been innovated to the level when companies, such as Hexagon Composites, serve the entire process-transportation of the CNG to be offloaded at different customers' decompression stations.

Gas Flare Elimination Investments

Uncertainty about future gas volumes in Egypt poses a question for flare elimination investments, as Torleif Haugland emphasized, however, the growing market for rental of mobile equipments for the transportation of associated gas - as opposed to flaring - would improve the attractiveness of CNG in the near future.

In general, CNG is less sensitive to gas flow volumes than pipelines, for instance, but it is slightly more susceptible to gas price shifts than pipelines and highly sensitive to feed-in-tariffs. Therefore introducing the levels of feed-in-tariffs closer to renewables can make a difference, concluded Haugland.

The CNG option is currently employed only in few sites in Egypt. But in the conditions when small and medium fields decline rapidly, these mobile technologies could provide a viable solution for the country's oil industry.

GeoSphere Reservoir Mapping-While-Drilling System Improves Well Placement and Field Development

Schlumberger

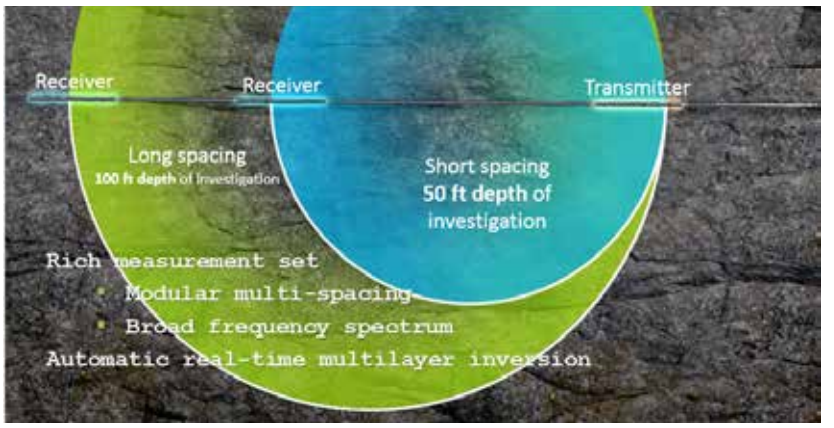
Safety, efficiency, and accuracy are fundamental goals of well construction. But as the search for new oil and gas resources pushes into deeper waters and increasingly complex reservoirs, meeting these goals has become more challenging.

A better understanding of the subsurface is one of the most efficient ways to mitigate drilling risk and optimize operations' performances. The ability to map the reservoir in real time, while drilling, contributes to step change, such as understanding sweep efficiency in horizontal wells, landing and maximizing the length of drain within the optimal zone of the reservoir, and avoiding time consuming sidetracks or pilot holes.

Schlumberger's GeoSphere reservoir mapping-while-drilling service was officially commercialized in May 2014. The service underwent several years of field testing, and it already has been run successfully in more than 220 wells in the North Sea, Europe, Africa, Russia, North America, South America, Australia and the Middle East. Key benefits include increasing potential production and ultimate recovery, unlocking access to new or marginal reserves, minimizing water production, avoiding drilling hazards, improving the accuracy of reserve estimates, eliminating geological sidetracks and refining seismic interpretations.

The technology uses a transmitter placed close to the drillbit on the bottomhole assembly (BHA) to send multifrequency EM signals into the formation at frequencies as much as 50 times lower than legacy technology.

Two receiver subs, with more directional antennas than previous tools, are placed on the BHA behind the transmitter at distances up to 30 m, depending on the thickness of the reservoir and the operator's specific drilling objectives. Increasing the spacing increases the tool's depth of investigation (DOI).

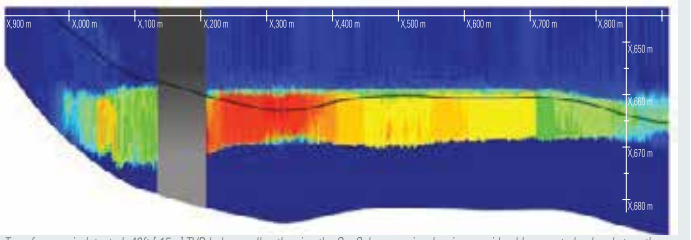


Each antenna receives deep EM signals from the formation, providing a unique set of azimuthal resistivity measurements at multiple depths of investigation while drilling. Readings are sent to the surface in real time through the MWD tool and fed into an advanced stochastic inversion algorithm. This novel proprietary technique automatically compares the measurements with hundreds of thousands of mathematical models.

When it finds a match, the inversion generates an interpretation, incrementally displaying a color-coded resistivity map that allows detection of multiple layers in and around the reservoir along the well trajectory in real time.

MAXIMIZE RESERVOIR EXPOSURE

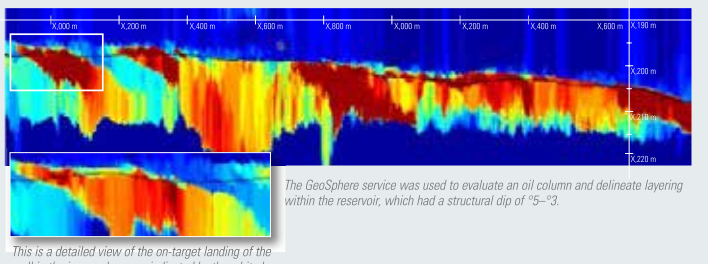
The GeoSphere service enables operators to precisely land wells by detecting the reservoir top and subsurface layers tens of feet before intersecting the reservoir without the use of a pilot hole. This maximizes reservoir exposure by preventing reservoir lateral loss and early water breakthrough.



Top of reservoir detected ~49ft [~15m] TVD below well path using the GeoSphere service, leaving considerable room to land and steer the well. Note: interval shown in gray drilled without use of the GeoSphere service.

STAY IN SWEET SPOT

Real-time mapping data enables operators to stay in the sweet spot by steering the well strategically and avoiding unplanned reservoir exits. In high-angle and horizontal wells, the GeoSphere service data can be combined with seismic interpretations to predict oncoming strata and formations.

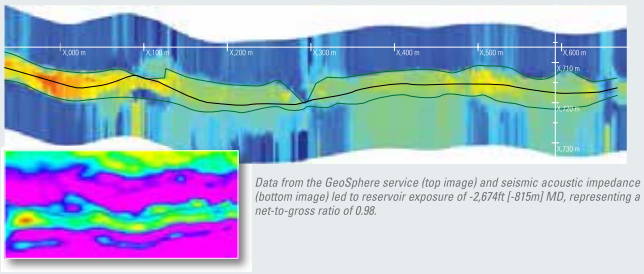


The GeoSphere service was used to evaluate an oil column and delineate layering within the reservoir, which had a structural dip of °5–°3.

This is a detailed view of the on-target landing of the well in the image above, as indicated by the white box.

REFINE FIELD DEVELOPMENT PLANS

Unlike the near-wellbore measurements of conventional LWD tools, the GeoSphere service's depth of investigation exceeds 100 ft [30 m]. By mapping multiple reservoir boundaries, this service enables operators to improve reservoir characterization, refine field development plans, and optimize production potential.



Data from the GeoSphere service (top image) and seismic acoustic impedance data (bottom image) led to reservoir exposure of ~2,674ft [~815m] MD, representing a net-to-gross ratio of 0.98.

The GeoSphere service has been successfully used on more than 220 jobs and counting to optimize landing, maximize reservoir exposure and increase production potential in onshore and offshore operations worldwide. Below are some of the areas where Geosphere was successfully deployed.

North Sea
- Shell Maximizes Potential Recovery with Optimized Landing
- DONG E&P Steers well 96% in Zone in Challenging Remobilized Sand Reservoir

Offshore Brazil
- Petrobas Lands Multiple-Target Wells Without Pilot Holes
- Shell Accurately Steers Horizontal Well Sections

Offshore Australia
- Santos Maps Top of Reservoir Determines Optimal Entry Point
- Apache Maximizes Reservoir Contact by Landing Four Wells on Target
- Operator Maps Complex Gas Sands and avoid risky sidetrack

To learn more about GeoSphere reservoir mapping while drilling service, visit www.slb.com/GeoSphere

El Molla's Decision to Halt Gas Flaring Saves $500m Annually

MOHAMMED ABDEL FATTAH Expert in International Petroleum and Natural Gas Affairs

The burning of crude oil and associated petroleum gas (APG) has many negative effects on Egypt, including economic, social, and environmental effects on the society, for which we will pay the heavy price if we keep flaring gas. The burning of gas makes up to one third of the annual natural gas consumption in the European Union (EU). Thus, we are wasting billions of dollars and causing emissions of carbon dioxide in the atmosphere, which damages our surrounding environment.

Strict international procedures must be imposed in any country that flares APG, especially that it destroys the countries' economies. The nations that need APG the most are the developing ones or the medium-income states, including Egypt, a country that is going through an energy crisis that will not be solved before 2019.

The decision of the Minister of Petroleum and Mineral Resources, Tarek El Molla, to execute an integrated program for utilizing APG in the oil producing fields instead of burning it and extracting oil derivatives, including butane gas and condensates of economic value, is a beneficial decision for the national economy. It is especially profitable for new developmental fields. However, the decision depends on the technical, environmental, safety, and professional health conditions which protect citizens from any risks.

The hampering of gas flaring in Egypt will save more than $300-$500 million annually and achieve economic earnings from gas derivatives, instead of burning gas. It also has negative impacts on citizens, as it blocks the sun rays and decreases airflow, significantly affecting the microbial activity for the decomposition of waste and organic residues. This leads to their accumulation and the rise of epidemics and diseases in the country.

The Middle East and North Africa (MENA) region is the second region internationally in terms of gas flaring rates, following Russia. Egypt has started to abolish these wrong decisions and is making attempts to take advantage of gas in light of the price fall in gas products in the global markets. The World Bank (WB) has confirmed that it will put an end to automatic gas burning in the oil-producing fields by 2030 at the latest. 40% of gas is being burnt internationally, enough to generate energy for the power plants of the whole African continent.

Utilizing APG is necessary for mega investments that Egypt is yet to have, in light of the financial crisis. The decision to utilize gas needs huge banking funds or foreign partners that would contribute to these projects in order to ensure their success and the extraction of large amounts of derivatives to be used in the local markets, instead of the costly imports.

Banning APG Flaring to Solve Power Crisis by 2019

ENGINEER AZIZ EFFAT Expert in Natural Gas Affairs

Imposing a ban on flaring of associated petroleum gas (APG) would help Egypt to completely solve its power crisis by 2019. The ban would also ensure the protection of the surrounding environment in the country and would benefit the economy as the volume of gas imports would decrease.

The Egyptian government has to put a new strategic plan in place that bans gas flaring in order to provide enough gas to energy generation stations in order to avoid power cuts.

It is well known that the European Union (EU) burns an equivalent of one-third of the natural gas consumption annually, and millions of dollars are wasted.

Steps towards solving the power crisis in Egypt start with banning APG flaring. Egypt already suffers from a 500mcf/d gas deficit, which has been the reason behind power outages during summer. Furthermore, there is a national plan to deliver gas to 5m housing units instead of dependence on butane gas cylinders. This plan combined with the extraction of gas from Zohr field in the Mediterranean Sea, whose reserves are estimated at 30tcf, would reduce the volumes of natural gas imported by the country.

I support the Minister of Petroleum and Mineral Resources, Tarek El Molla's decision to execute an integrated program in order to utilize the APG in the oil production fields, instead of flaring it, as well as extracting petroleum derivatives (butane gas and condensates) of high value to the national economy, especially as it could solve the gas crises in Egypt. It is important to stop providing heavy consumption plants with subsidized gas as they sell their products at prices. Moreover, oil derivatives can be extracted from APG and then used in local markets.

Lastly, utilizing APG needs support from foreign companies working in Egypt through investments in those projects in order to solve the local market crisis.

Under the High Patronage of **HE. ENG. TAREK EL MOLLA,**
Minister of Petroleum & Mineral Resources Arab Republic of Egypt

EGYPT OIL AND GAS
PEOPLE DEVELOPMENT
ROUNDTABLE

OCTOBER 2016

COMPETENCY AND DEVELOPMENT REQUIREMENTS FOR CAREER PROGRESSION
- Definitions of competency requirements for specific jobs.
- Competence and expertise assessments for individuals.
- Career path within organization.
- Retention of talented staff.

IOC/EGPC PARTNERSHIP
- Obligations within concession agreements.
- Defining roles of IOCs and government in people development within the JV environment.
- Barriers to personnel development.

DEVELOPMENT OF TECHNICAL AND NON-TECHNICAL STAFF
- Traditional focus is on professional level staff – G&G, Engineering etc.
- Field operations can also benefit from improved competence. How can that be achieved?
- Developing commercial and support staff such as contracting, agreements, finance, human resources and administration.

MAKING IN-COUNTRY TRAINING MORE EFFECTIVE
- The role of OGS.
- Support from international institutions.
- The role of academia in Egypt.

THE VALUE OF COMMUNICATION IN PEOPLE DEVELOPMENT

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OIL & GAS SKILLS

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EGYPT OIL&GAS NEWSPAPER

Renewable Energy for Egypt's Optimal Generating Mix

By Mark Thurber, Partner at Andrews Kurth LLP

The response of various governments and other policy makers and advocates to the worldwide emergence and ongoing development possibilities of renewable energy, particularly of the wind and solar variety, has been inconsistent. The spectrum of policy implementation ranges from ardent promotion to tepid indifference. Renewables' penetration into the various grids of the world appears, more often than not, to correspond to the degree of promotion of renewables extant in each locale. Thus Germany, cloudy and tilted away from the sun at an alarming angle, boasts not only a world-class economy but world-class renewables penetration, currently over one-third on the average and approaching 80% on certain summer days with wind in the north and sun in the south, an amazing result that reflects a conscious, orchestrated move away from nuclear after the Fukushima accident. Chile conversely, with clean, low-latitude deserts in the north backed by an impressive economic engine, comes in at 3% excluding hydro as recently as 2014, though it is now starting to catch up quite rapidly.

One might conclude that renewables development is driven by policy. Policy certainly is important, especially in a mature and strong economy where the voters have generally uniform priorities. But the full story behind the remarkable success of renewables in the last ten years is at once more complex and more interesting than policy alone -- examining other facets of the renewable development phenomenon yields additional insights which are relevant to the current mix of opportunities and challenges which Egypt faces.

We begin with the common response to the question, "Why renewables?", the answer being that greenhouse gases are unavoidably emitted in large quantities when fossil fuels are burned: burn less of them and release less CO2 into an atmosphere which is generally conceded as being unable to absorb unlimited greenhouse gases without unleashing climate catastrophe. But this is a policy answer, and not a complete answer. In many parts of the world, the belief that the planet will become uncomfortable or uninhabitable after 2 or 3 degrees Celsius of temperature rise is not the primary driver of individual choice. Rather, individual energy consumption choices have been, and probably will continue to be, driven largely by two factors.

The first is cost. The percentage of people in the world who not only are able but also willing to purchase expensive energy merely because it is the correct policy choice is lower, by orders of magnitude, than the percentage of people who choose, out of necessity or otherwise, to purchase the most economic energy available. Because of this reality, the most progress to date in moving the world toward a higher renewables mix has happened where the higher cost of renewables has been paid by somebody other than the final consumer. No doubt the consumer pays for it one way or another, either directly at the meter or indirectly by being taxed for the interest on the sovereign debt incurred to fund and subsidize it. But in the latter case the degree of angst does not rise to the level of resistance that would ensue if electricity consumers were forced to simply pony up for more expensive electricity because it is good for them. So without a cost solution, traditional thinking is that renewable energy will not prosper. But now another factor is in play.

The second factor is harder to define but can be illustrated. Solar panels have been in existence for more than 50 years; the underlying technology is not new, though it has been endlessly refined and streamlined to the point of near-parity with fossil-generated electricity. There have always been people willing to pay for renewable energy just because it is cool. Hobbyists with extra cash have been installing PV panels for decades, certainly not because of cost efficiency. In the United States, at times when the future of tax credits for wind energy were under partisan congressional review, several communities who fit in high on the economic spectrum offered to continue buying wind energy and make up the difference themselves if federal tax credits were not renewed, thus ensuring the continued development of a technology that was preferred on a basis other than economics. Similarly, The Economist recently published an article about manufacturing difficulties in the Tesla SUV model, citing growth pains in that company. A particular customer being interviewed said that she was willing to give Tesla plenty of opportunity to fix the falcon wing doors that would not open. Then she noted, with unusual candor, that she would have been furious if the same thing happened to her Cadillac Escalade. This even though the energy to charge her SUV's batteries is largely generated from fossil fuels, albeit somewhat more efficiently than the direct internal combustion of her more traditional vehicle. Tesla very cool; Cadillac a little less so. We can call this the T-factor.

So while it is undoubtedly true that the renewables industry has been able to find its way to near-parity to fossil generation costs on the basis of the support of certain governments in the developed world, such as Germany, and relentless pushing down of manufacturing costs in other countries, such as China, one could posit that without the T-factor such policies would not have been so firmly entrenched and so easily accepted by the taxpayers in the first instance.

Countries such as Egypt are placed to benefit from extensive development of renewable technologies. On the technical side, renewables are capable, over a large geographic area, by strategically deploying wind, PV and CSP, of mimicking a traditional base-load generation profile. (Renewable energy is not necessarily callable for peaking purposes, but midday loads can be at least partially served by PV, in some instances even backed by CSP on cloudy days.) These technologies have not been deployed on a consistent basis world-wide in combination and to that level, but the technical capability exists to achieve much higher levels of grid penetration than has been achieved to date.

On the economic side, the story is encouraging for developing economies, for which shortages of foreign reserves seem to consistently frustrate development efforts. Many economies throughout the world are hampered by persistent shortages of hard currency to pay for imported fossil fuel. For these economies, including Egypt, one alternative worth considering is that of widespread deployment of the three principal renewable energy technologies. Even at an increment in cost over fossil fuel options, there are appealing arguments for this approach.

Multilateral and other social lenders are driven by policy, and two prominent policies are served by such investments. The first is aid to developing countries. The very economies that face foreign reserve shortages are frequently eligible for assistance from institutions such as the World Bank and EBRD. Thus, the initial, higher up-front investment in renewable generation can be largely compensated for through enhanced financing alternatives. The second is to invest in technologies that minimize CO2 emissions. Though individuals, and even individual countries, may not place paramount importance on the green aspects of infrastructure development, these institutions are fiercely driven toward climate-friendly policies not only internally, but externally by the countries that sponsor them.

During operation, fossil-fueled power plants pose a continual drain on foreign reserves, either through direct purchase of imported fuel using hard currency, or through the lost opportunity cost of burning fossil fuels that could be exported to generate foreign currency reserves. Renewable energy generating facilities, of course, face no such limitations. Their fuel purchase costs by definition are nil.

Renewable energy development is not forecast to replace fossil fuels in the near future, though the conversion may occur faster than expected. Indeed, fossil fuel's share of the electricity generation market has not appreciably reduced in the last ten years, in large part due to the mothballing of nuclear plants. For the moment at least, there is room for all established technologies. In choosing the proper mix, Egypt finds itself in a position of benefitting from the path laid down by others, being able to replicate their successes and avoid their mistakes. In doing so, it should seriously consider an emphasis on renewables for a significant portion of its new generating capacity.

MOC 2016: Egypt Offers Efficient Investment Model

By Nataša Kubíková

The MOC 2016 Conference - Mediterranean Potentials - Unlocked Step 1 - has attracted a gigantic attention of current and new players in the industry. In the course of three days, more than 1,600 delegates from 23 countries gathered in the Bibliotheca Alexandria complex. Industry professionals and decision-makers presented their innovative ideas, new research, technologies, as well as the latest developments impacting the offshore exploration and production activities in the Mediterranean Sea.

Delegates the Middle East and North Africa, Europe, Asia, and America engaged together to discuss the latest discoveries in the oil and gas industry, outline their strategies and plans in the Mediterranean region, and forge partnerships seeking mutual benefits.

In the opening ceremony, the keynote speakers, both Egyptian and international, declared a joint objective to make Egypt become a regional energy hub in the foreseeable future though efforts in offshore exploration and production. Representatives of the Egyptian oil and gas sector confirmed country's commitment to create productive business environment which will allow IOCs and the Egyptian public and private sectors enhance the existing offshore potential.

The Head of the Organizing Committee, Eng. Osama El Bakly welcomed attendees together with Eng. Innocenzo Titone, the OMC 2017 Chairman.

According to El Bakly, the MOC 2016 carried an important message to the world which was that Egypt is currently working to achieve the hopes and aspirations of specialists in the oil industry ahead of a promising future.

Having highlighted the importance of Zohr gas field, Titone said that "the natural gas is the only fuel that we will see an increase in total consumption in the future." He added that "Egypt is experiencing a period of great optimism as it has the potential to become the largest gas hub in the Mediterranean to satisfy the European energy demand."

Titone further noted that natural gas is the most demanded fuel and that the recent success of Egypt to achieve a number of major gas discoveries, especially in the Mediterranean region, is a clear evidence of the ability to innovate and to use the latest technologies at the global level. This provides an opportunity to add more discoveries in the Mediterranean in the upcoming decades.

Egypt's Success Story

Egypt's Minister of Petroleum and Mineral Resources, Tarek El Molla, was welcomed by the audience to fully explain the country's achievements and vision in the nearest future based on the recent supergiant oil discoveries. In regard to MOC, El Molla said that "the MOC continues to provide a unique venue for discussing the latest developments in the oil&gas industry across the entire value chain, providing a platform for technical knowledge and network opportunities for all the attendees. Fortunately, this significant event coincides with the most recent gas discoveries in the Mediterranean, making it an excellent opportunity to share and to discuss the challenges ahead."

The oil minister reviewed a number of challenges ahead of the petroleum sector and stated that the most important one is the fuel subsidy bill, a significant increase in demand for energy, the current energy mix dependency on oil and gas, aging infrastructure, refineries, and the accumulation of entitlements to foreign partners.

El Molla explained that "fuel subsidies are resulting in an excessive and irrational energy demand and high energy intensity. From an economic point of view, energy subsidies represent a huge financial and fiscal burden for the state budget. They reduce the incentives for energy efficiency and send a wrong signal for investors. They have also consumed a great part of the oil sector revenue, thus making it difficult to attract investments, upgrade infrastructures, and to cooperate with an increasing demand."

As to the energy mix, El Molla confirmed that the country is highly dependent on oil and gas. Therefore, the Egyptian authorities have been searching for a more suitable way to define the energy mix with some achievements already. "The success of the government to adopt and implement new strategies to overcome current challenges and to secure sustainable energy supply for future need has been effective," said the minister.

He further acknowledged the country's pending commitments towards foreign partners and praised their understanding of the exceptional situation that Egypt is currently and temporarily facing.

In this area, Egypt has marked success. "The reduction of our IOC arrears by half, by around $3b in March 2016, compared to $6.3b in June 2012," as El Molla explained, serves as evidence of major improvements in the government's financial stability.

El Molla stressed that "Egypt is committed to continue the development of private investment climate in the oil and gas industry to support cooperation with international oil companies. This is an important factor to meet current requirements and secure the future of the energy needed to push the process of economic development." "The Egyptian oil sector is seeking to create an efficient model for investment", said El Molla, adding that "in light of challenges concerted efforts are needed to tackle them".

The future of the oil and gas industry in Egypt is promising. El Molla pointed out that the Ministry of Petroleum has adopted a number of measures and policies to support the energy sector in the framework of the government's new energy strategy aiming at ensuring security and sustainability.

The government is successfully amending the existing legal framework to boost international investments. Minister El Molla mentioned that the new gas law, which was recently adopted, is a real breakthrough in enhancing the regulatory framework, the major feature of which is the gradual liberalization of the gas market in Egypt.

The recent offshore discoveries were the result of a long journey that started back in the early 1990s. Being aware of the great assets we possess we have changed and improved concession agreements to further encourage investments in gas exploration, with more flexible gas prices, as El Molla explained, adding that "Zohr is indeed a success story on many levels." In relation to the Mediterranean offshore field of 30tcf, being one of the biggest gas finds in the world, the minister thanked ENI, BP, Apache and all other companies operating in the Mediterranean, the Western Desert, and the Gulf of Suez for their support.

Minister El Molla emphasized Egypt's commitment to open new bid rounds to expand the country's potential in natural resources. The bid rounds were expected to be announced already by the end of April. "I have to announce that the Egyptian petroleum sector represented by its executive arms - EGPC, EGAS and GANOPE - will be offering during 2016 new international bid rounds for oil and gas exploration in around 27 offshore and onshore blocks in Egypt. The EGPC's international bid rounds will be announced before the end of April, maybe during next week, and will include 11 blocks, 6 in the Western Desert and 5 in the Gulf of Suez, with a submission deadline on August 1st, 2016," the minister confirmed.

Among keynote speakers at the MOC's opening ceremony were executives of international companies. Eng. Luca Bartelli, Eni's Chief Officer for Exploration said that "in 2015, Eni's successful exploration opens up a new horizon for offshore operations in Egypt and Eastern Mediterranean. The discoveries will have an impact on Egyptian gas market." He added that the fast developments can deliver an immediate and important contribution to the satisfaction of the internal market.

Bartelli expressed confidence that Zohr can act as a catalyst for future Eastern Mediterranean activities in deep offshore gas explorations, which will help the country to become a potential future energy hub. For this to happen, Bartelli noted, all giant discoveries imply that the construction of new transportation infrastructures is needed.

He said that "Zohr will be a bridgehead for the development of the Egyptian deep water gas and an opportunity for other East Mediterranean gas" fields.

In a following speech, Hesham Mekawi, Regional President of BP in North Africa, said that "BP is committed to develop Egypt's oil and gas potential." "We are aiming to increase our gas supply to the Egyptian domestic market of about 1.2bcf/d to 2.5bcf/d by the end of 2020," Mekawi added.

With this ambition, the current oil and gas price environment is posing more challenges. Therefore, BP is aiming at prioritizing capital efficiencies and seeking to find a model in which sustainability of company's investments will be in focus. Nonetheless, as Mekawi put it, prices will not stay at the bottom forever; hence it is clear that the opportunities for growth are waiting.

In a final presentation, Nicola Monti, CEO of Edison International, emphasized the company's development commitment in the Abu Qir field, which so far produces 30% of the overall potential. Monti concluded with confidence that Egypt is ready to become a regional energy hub, to which Edison will direct its efforts.

Conference Brought Many Great News

Vivid discussions, productive negotiations, and optimism accompanied this year's edition of MOC. Egypt Oil&Gas spoke to conference presenters and attendees who were positive about the organization and deliveries of the event.

According to Senior Vice President for Exploration & Production of Tri-Ocean Energy, Mohamed Soliman, this year's conference "was very interesting because of giant discoveries in offshore Egypt during

"Zohr is indeed a success story on many levels."

"The Egyptian oil sector is seeking to create an efficient model for investment."

Tarek El Molla, Egypt's Minister of Petroleum and Mineral Resources

"Egypt is experiencing a period of great optimism as it has the potential to become the largest gas hub in the Mediterranean to satisfy the European energy demand."

Innocenzo Titone, OMC 2017 Chairman

"Zohr will be a bridgehead for the development of the Egyptian deep water gas and an opportunity for other East Mediterranean gas"

Luca Bartelli, Eni's Chief Officer for Exploration

the last year. It was a good opportunity to communicate with the colleagues, as this further helps to encourage other operators to follow the same steps and make their new discoveries." Soliman believes that the conference was fruitful. "There have been many technical materials presented this year, which have a very good chance to be shared for the benefit of future exploration and production in the petroleum sector in Egypt," he explained.

Engineer Shaheen E. Shaheen, IPR's Chairman's Assistant for Production MENA, spoke in superlatives. "We have seen a huge number of attendants for the first day [of the conference], while the minister of petroleum has shown strategies of the Egyptian petroleum sector, which has reflected the reality of Egypt. If we want to move ahead, go forward, we have to make use of such conferences and exchange ideas. This year, there were many excellent presentations that engineers and geologists have shared with us. It is like a milestone and it is positive that we do have this kind of conferences going forward from year to year. I think [MOC 2016] is a very successful event," said Shaheen.

The organization of MOC 2016 has been praised by a majority of participants. James Pendergrass from Merlon was not an exception. He stated that this year's MOC has been marked by exceptional discoveries. "There was a lot of great new news. The big news is the big discovery in the offshore, of course, but behind that, what is really big news is that we are finding new reservoirs under and above old fields in the Western Dessert. It is a whole new game out there," Pendergrass noted with enthusiasm.

With reference to ENI's presentation on its Emry deep oil field in the Western Dessert, Pendergrass pointed out that "everybody is now looking to add to their old reserves, as everything is in decline. All the reserves are going down and ENI found lovely deep field Emry. It is very exciting."

In his view, a shift to new dimensions is necessary to record further expansion of the oil sector in Egypt. "Different ideas and different ways are all available to us, and as long as people can think about something other than what they used to do, there is a lot of oil to find and it is very economic, even with prices at $50 a barrel," Pendergrass explained.

The conference has brought together experts, analysts, researchers and businessmen as the vision suggest that mutual collaboration may help the oil and gas sector in efforts to move forward. Soliman noted that "there is a lot of contribution from the academic sector to oil and gas players." At the event, "many universities from Egypt and researchers presented their technical expertise, which has had a direct impact on multinational companies that are working in Egypt. Cooperation between major companies like Shell and ENI, and oil research centers such as Cairo University may further enhance future prospects with help of recently developed new technologies. Some of them were already applied in the exploration activities in the Nile Delta. Service companies and technology providers are continuously demonstrating their will to progress by improving their complex programs and future plans," stated Soliman.

He also expressed interest in sharing research outcomes with counterparts from other countries across the Mediterranean. According to Soliman, "so far we have not seen much research cooperation with researchers from outside of Egypt, unfortunately. I personally wish to see some other Mediterranean countries - Cyprus, Italy - to share their information, knowledge, and discoveries with us as we are all in the same basin. I therefore wish in the future if other countries can become contributors to MOC with their ideas and information."

Business potential of the Mediterranean region is likely to balloon up if the political relations between the involved regional countries are stable. As Pendergrass put it, "the Mediterranean's Exclusive Economic Zones (EEZ) are pretty well defined and at the moment they seem very stable. One of the biggest points that Italians have made is that Zohr is all inside the Egyptian EEZ, which is good news."

The atmosphere in the exhibition space was greatly productive. Chairs in companies' booths were overcrowded in lively debates when representatives introduced their products, explained new potential and capacities. Talks about growing investments were heard in each and every corner.

IPR's President and COO, Sam M. Dabbous, said that "although there are many challenges, there is a great enthusiasm and interest by companies to invest in Egypt. One can see how many exhibitors are here in the MOC 2016 and the number of projects that are underway."

Talking about future prospects, Akram Abu El-Soud, Halliburton's Country Business Development Manager, said that "Egypt has a huge potential for growth because of its excellent location and the investment environment, which has already started expanding much more than ever before. This is why the oil minister is trying to hold events like this one and Egypt Show planned for Q1 next year." He added he was expecting "a very good year in 2016."

James Pendergrass concluded that Egypt has no real problems in the hydrocarbon business. In fact, "in the MENA region, Egypt is the most stable country. All things considered, Egypt is a garden compared to the rest of MENA," Pendergrass added enthusiastically and with all confidence.

There is no doubt that this year's MOC created an exclusive environment for international actors in the oil and gas industry. It allowed them to build a sustainable network of contacts with a key goal to boost efforts and maximize outputs of offshore exploration and production activities in the Mediterranean Sea for future generations.

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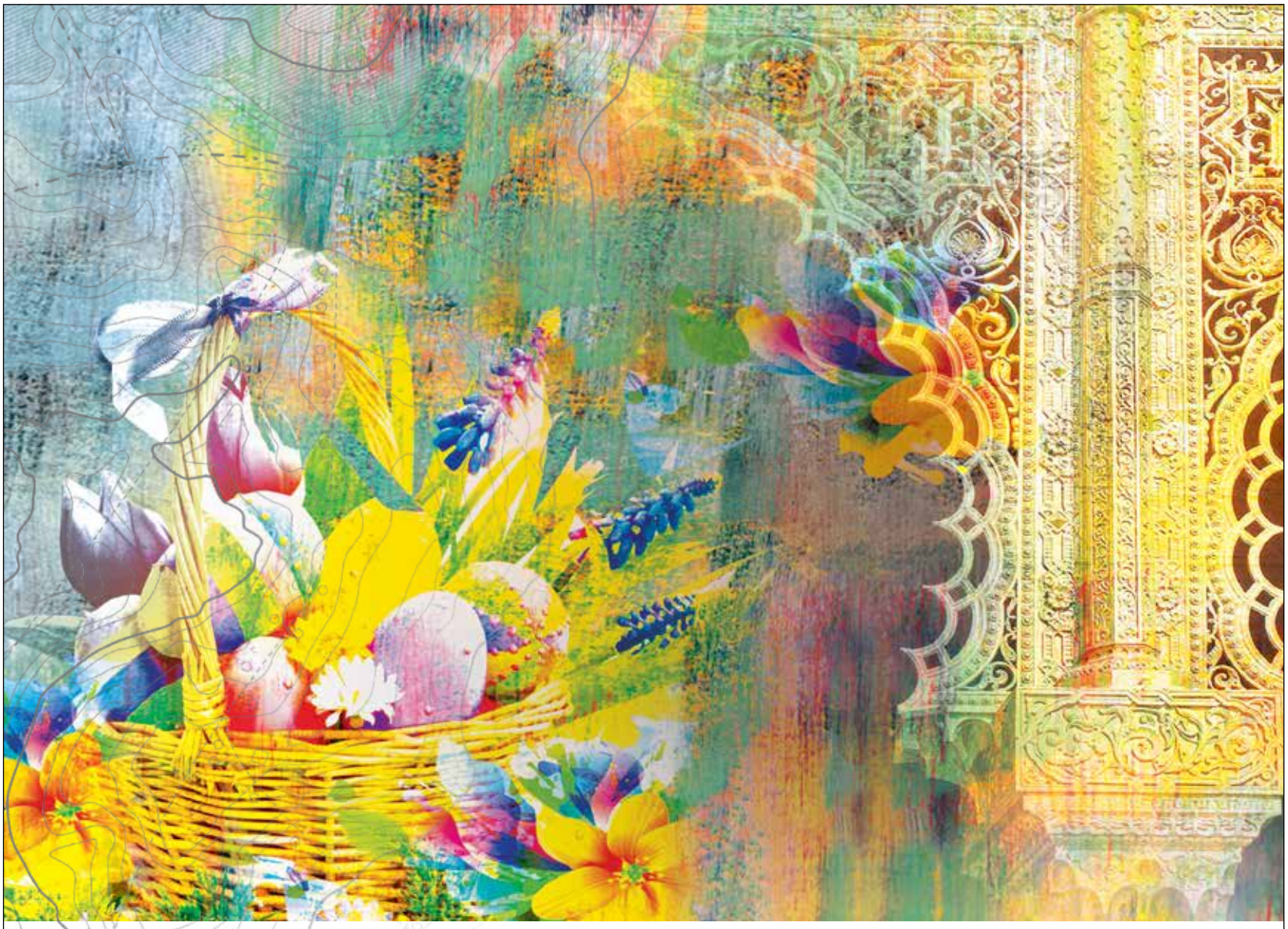

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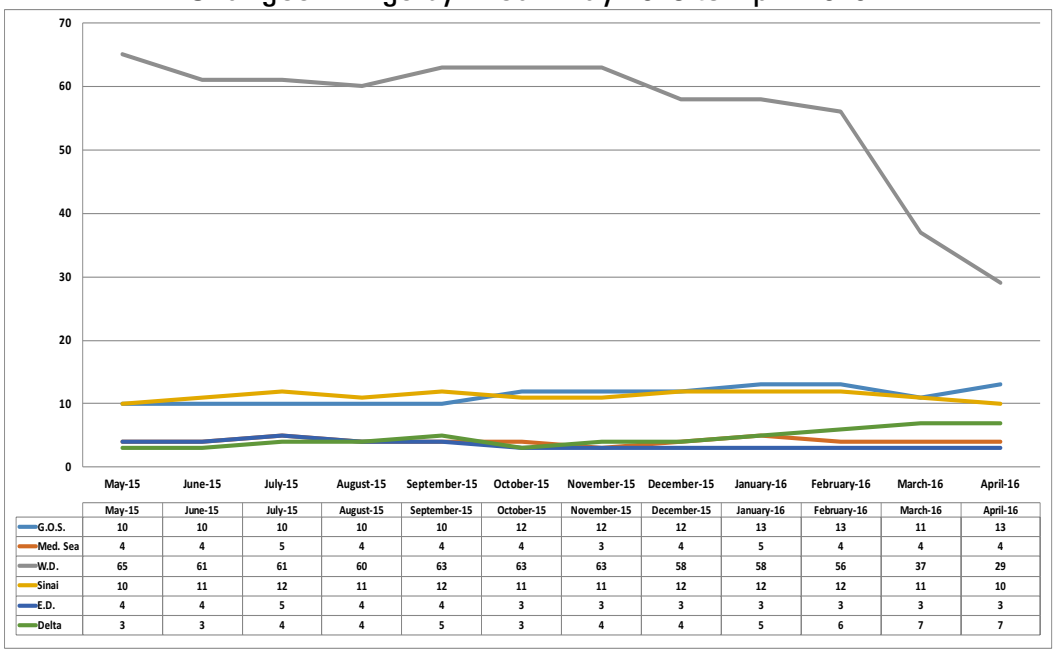
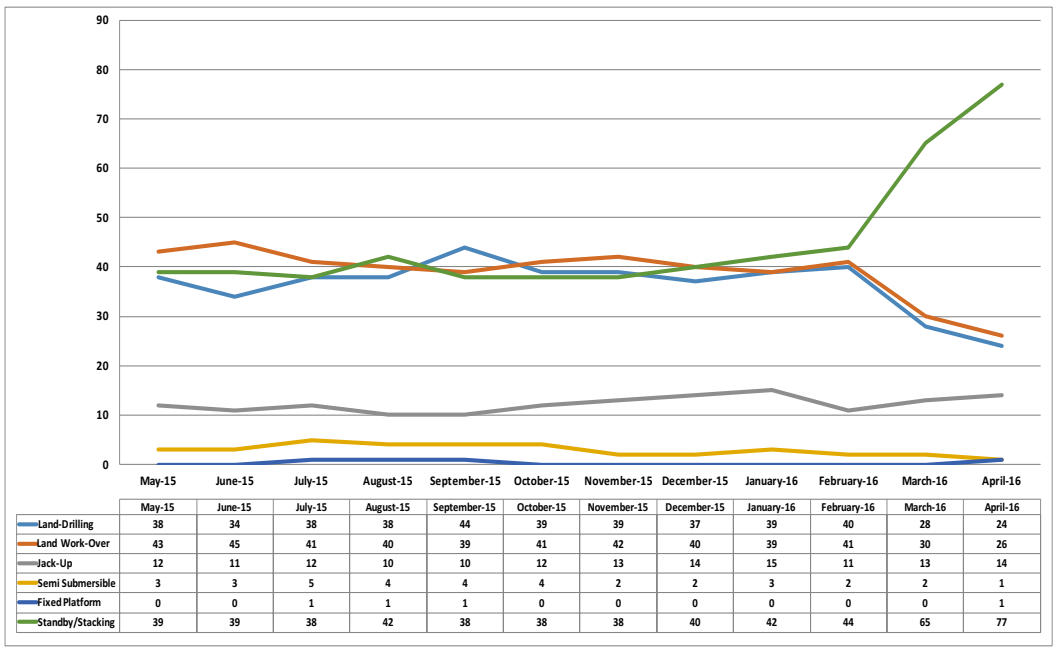
Changes in Rigs by Area- May 2015 to April 2016



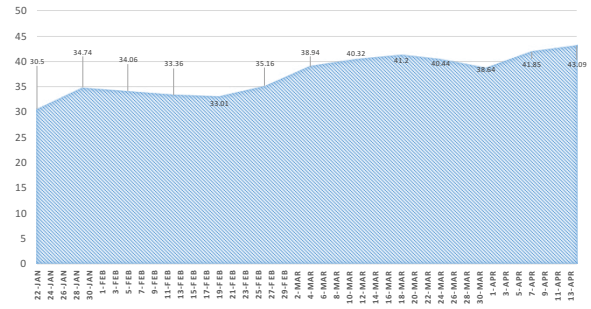
	May-15	June-15	July-15	August-15	September-15	October-15	November-15	December-15	January-16	February-16	March-16	April-16
G.O.S.	10	10	10	10	10	12	12	12	13	13	11	13
Med. Sea	4	4	5	4	4	4	3	4	5	4	4	4
W.D.	65	61	61	60	63	63	63	58	58	56	37	29
Sinai	10	11	12	11	12	11	11	12	12	12	11	10
E.D.	4	4	5	4	4	3	3	3	3	3	3	3
Delta	3	3	4	4	5	3	4	4	5	6	7	7

Changes in Rigs by Type - May 2015 - April 2016

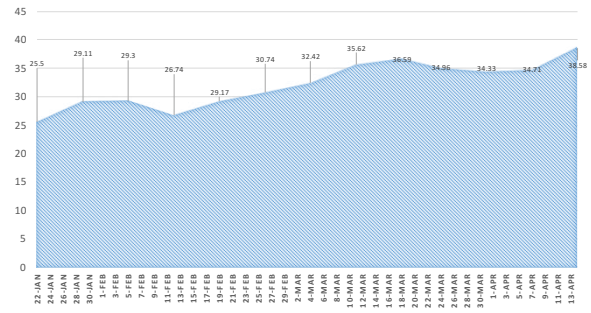


	May-15	June-15	July-15	August-15	September-15	October-15	November-15	December-15	January-16	February-16	March-16	April-16
Land-Drilling	38	34	38	38	44	39	39	37	39	40	28	24
Land Work-Over	43	45	41	40	39	41	42	40	39	41	30	26
Jack-Up	12	11	12	10	10	12	13	14	15	11	13	14
Semi Submersible	3	3	5	4	4	4	2	2	3	2	2	1
Fixed Platform	0	0	1	1	1	0	0	0	0	0	0	1
Standby/Stacking	39	39	38	42	38	38	38	40	42	44	65	77

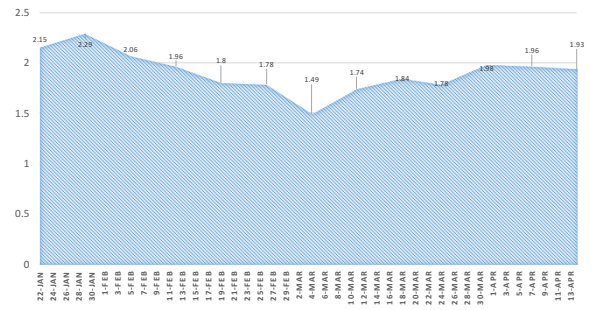
BRENT PRICES



OPEC BASKET PRICES



NATURAL GAS PRICES

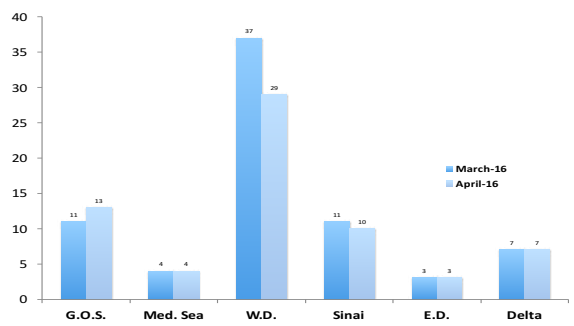


Production - March 2016

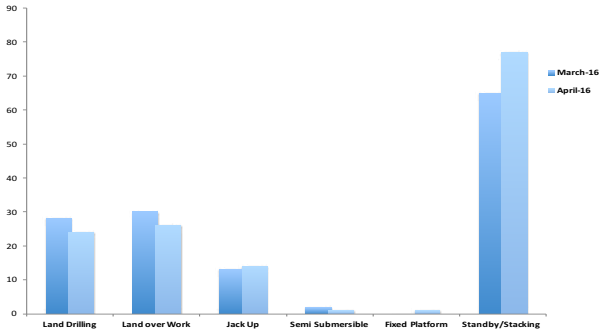
	Crude Oil	Equivalent Gas	Liquified Gas	Condensate
Med. Sea		10307500	200850	665535
E.D.	1960996	23571	4946	1689
W.D.	10104776	7533393	616447	1540024
GOS	4168222	578571	245560	70859
Delta	35895	2740357	134881	221680
Sinai	1985566		47304	24975
Total	18255455	21183392	1249988	2524762

Unit: Barrel

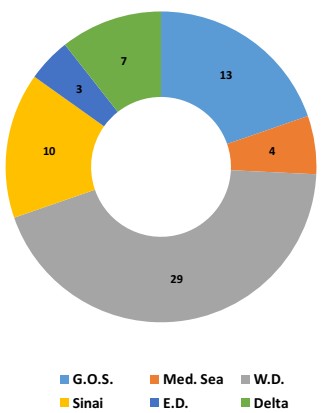
Rigs per Area - March - April 2016



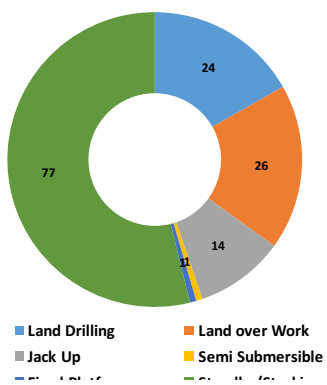
Rigs per Specification - March - April 2016



Rig Count per Area - April 2016



Rigs per Specification - April 2016



Rigs per Specification - April 2016

Location	March-16	April-16
Land Drilling	28	24
Land over Work	30	26
Jack Up	13	14
Semi Submersible	2	1
Fixed Platform	0	1
Standby/Stacking	65	77
Total	138	143

Rig Count per Area - April 2016

Location	March-16	April-16
G.O.S.	11	13
Med. Sea	4	4
W.D.	37	29
Sinai	11	10
E.D.	3	3
Delta	7	7
Total	73	66