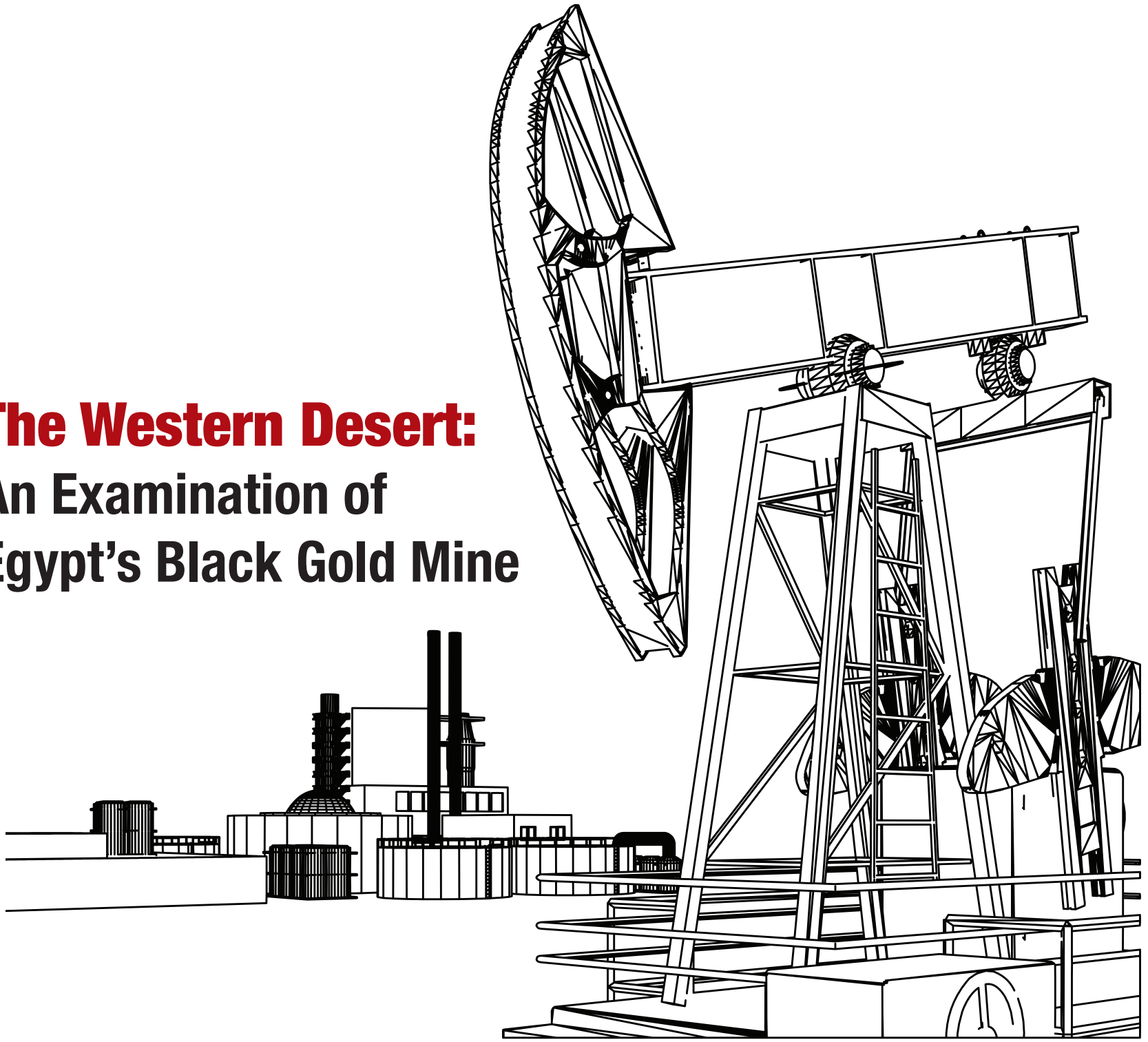
EGYPT OIL&GAS NEWSPAPER

The Western Desert:
An Examination of Egypt's Black Gold Mine

December 2017





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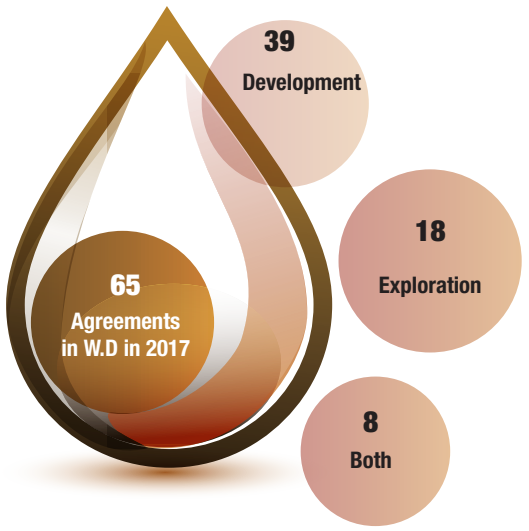
By Tamer Mahfouz

In terms of exploration, Egypt's Western Desert has always had the spotlight, with significant production rates, especially in terms of crude. The area accounted for 55%, 49.3% and 56.3% of the country's total oil, natural gas, and condensate production, respectively by the end of fiscal year (FY) 2016/2017, according to data reported by Egypt Oil and Gas in November. This equated to roughly 344,000 barrels a day (b/d) of crude oil and condensates during FY 2016/2017. New investments in this highly attractive, 700,000 square-kilometer area are forecasted to boost production to 368,500 b/d by the end of FY 2017/2018, according to data from EGPC.

This new production will be the result of expansions in the second half of 2017 as well as new investments and expansions of existing operations that will come online during the first half of 2018. According to the Central Bank of Egypt (CBE), crude oil investments in FY 2015/2016 were EGP 4.1 billion while natural gas investments topped EGP 42.2 billion. This compares to EGP 23.59 billion and EGP 31.62 billion, respectively, in FY2014/2015.

Activity Overview

The Western Desert has seen a steady decline in the number of active wells since FY2012/2013 when there were 101 exploration wells and 231 development wells. By FY2015/2016, the numbers had dropped to 41 exploration wells and 120 development wells, representing 59% and 48% decreases, according to data from EGPC. Currently, the number of active rigs in the Western Desert is 64 as of October, down from 75 rigs in 2012. However, it is worth noting that the relative percentage of the distribution of rigs throughout Egypt has been relatively steady; as



of October the number of rigs in the Western Desert accounted for 65% of all rigs in Egypt, which is relatively close to the 63% recorded in 2012. As of FY 2015/2016, there were 65 active agreements. Out of these active agreements, 18 were exclusive development deals, 39 were development deals, and eight were hybrid exploration/development deals.

Despite fewer wells and rigs, reserves of oil, condensate, and natural gas in the Western Desert have been dropping significantly since FY 2011/2012 with new investments and expansions focused more on production than exploration. For oil, reserves went from 912 million barrels in FY2011/2012 to 665 million barrels in FY 2015/2016, close to a 27% drop. Meanwhile, natural gas reserves fell from nearly 8,000 billion cubic feet (bcf) in FY 2011/2012 to just over 5,500 bcf in FY 2014/2015, a 29.5% decline. Lastly, condensate reserves dropped 48.3% to 126 million barrels. By the end of FY 2015/2016, Egypt's oil and condensate reserves were estimated at 2.4 billion barrels, compared to 3.57 billion barrels previously. As it stands, natural gas reserves are hovering around the 60 TCF, an increase from last year's the 50s.

Western Desert Production

Date	Crude Oil	Equivalent Gas	Liquified Gas	Condensate
Sep-16	9,299,999	7,255,714	679,271	1,428,603
Oct-16	9,534,872	7,646,429	758,131	1,481,052
Nov-16	9,100,251	6,966,607	672,119	1,340,746
Dec-16	9,100,251	6,966,607	672,119	1,340,746
Jan-17	9,156,664	7,781,786	718,062	1,399,238
Feb-17	8,135,625	6,923,929	588,192	1,273,650
Mar-17	8,938,146	7,212,857	609,294	1,279,819
Apr-17	8,663,986	7,380,000	693,316	1,338,110
May-17	9,045,214	7,725,253	669,333	1,379,633
Jun-17	8,992,506	8,201,302	666,806	1,512,321
Jul-17	9,428,766	8,600,941	634,156	1,512,253
Aug-17	9,385,426	7,748,503	701,523	1,520,214
Sep-17	9,216,732	7,748,503	619,021	1,434,526

Unit: barrel

Output, however, has stayed fairly stable since 2015, according to official figures. Oil production increased from 99.36 million barrels in 2012 –an average of272,000 b/d— to 114.4 million barrels in 2016 –an average of 312,870 b/d. This is slightly lower than in 2015 when oil production topped 118.7 million barrels, averaging at a daily production rate of 325,000 b/d. During the same timeframe, natural gas production went from 463 bcf in 2012 to 494 bcf in 2016—nearly equal to production in 2015. Condensate production has recovered from a low of 16.5 million barrels in 2013 to reach 18.2 million barrels in 2015 and 18.07 million barrels in 2016.

Faghur Basin: Kalabsha Development

The Kalabsha region covers 830 square meters in the Faghur Basin, which is one of the biggest basins with proven oil reserves and active investments in the Western Desert.

"The Faghur Basin continues to be a successful focus area for Apache, with prolific oil and gas production from the AEB, Safa, and Paleozoic reservoirs that demonstrates the multiple-pay potential of this area of the Western Desert," Tom Voytovich, Vice President of Apache's Egypt Region, noted in a press release in 2011.

Among the first wells dug in the development was West Kalabsha-C-1X, which was announced in 2008. Its production tests demonstrated a maximum oil production capacity of 4,746 b/d of oil and 4.4 mcf/d of natural gas. In 2009, West Kalabsha A-1X was dug. Its capacity reached 2,906 b/d of oil and 16 mcf/d of natural gas. One year later, Apache announced the successful drilling of West Kalabsha-A-2X. The new well had a tested maximum capacity of 5,085 b/d and 130,000 cf/d. It was the fourth exploration test in the West Kalabsha Concession and Apache's sixth in the Faghur Basin.

The West Kalabsha Tayim South development was announced in the fourth quarter of 2011. The main well, Tayim South 1-X, produces 8,196 barrels of oil a day. Also in 2011, West Kalabsha-I-4 tested for a maximum production of 7,150 b/d of oil and 11.4 mcf/d of gas. Faghur Deep-1X is also in West Kalabsha. Its capacity is 6,671 b/d of oil with 2.76 mcf/d of natural. This well is Egypt's farthest west oil and gas discovery. West Kalabsha South-1X was dug in 2012 with a resulting maximum capacity of 2,244 b/d of oil and 4.3 mcf/d of natural gas. Around the same time, West Kalabsha North-1X field started production with a capacity of nearly 5,000 b/d of oil and 4.7 mcf/d of natural gas.

Faghur Basin: Other regions

Outside the Kalabsha Concession, but still within the Faghur Basin are several other concessions. The Heqet Safa oil accumulation in the Greater Khalda Concession in the Faghur Basin is one of the oldest-discovered reservoirs. The first well dug in it was Haqet-1X in 1991, but the well is no longer active. The Haqet-2X well was drilled in 2008, producing 2,100 barrels of oil a day. Since then, Apache said it was going to drill four "wildcats targeting Jurassic oil pools," according to a press release in 2008. However, no more wells have been reported since then.

The Neith Concession

In the Neith Concession, Neith South-1X was tested in 2000, recording a flow rate of 2,778 b/d of oil and 4.5 mcf/d of natural gas. Huni-1X, another well in the Neith Concession, was dug in 2011. It has a tested capacity of 970 b/d of oil. Neith North-1X was dug in 2013, but no test results from the well have been published.

The Faghur Concession

In the Faghur Concession, Faghur-8X demonstrated an average production rate of just under 3,000 b/d of oil in 2011. In the same year, tests at Faghur North-1X demonstrated a capacity to produce 1,444 b/d of oil and 3.9 mcf/d of natural gas. Also in 2011, Faghur South-1X was producing 2,768 b/d of oil and 4 mcf/d of natural gas. Buchis West 2X was announced in 2013, lying along the northeastern region of the Faghur Basin. Its maximum production capacity is 1,700 b/d of oil.

The Siwa Concession

The first well in the Siwa Concession in the Faghur Basin was the Siwa-D-1X well, dug in 2011. Its tested capacity is 4,500 b/d of oil. Siwa L-1X was dug in 2013. It has a capacity of over 2,000 b/d of oil. In the same year, testing demonstrated SIWA-R-1X had a capacity 1,900 b/d of oil. The Siwa Concession is equally owned by Apache and state-owned Tharwa Petroleum Company.

The Khalda Offset Concession

In the Khalda Offset Concession is the Hathor Deep-1X well, discovered in 2007. It has a tested capacity of 12 mcf/d of natural gas and 1,237 b/d of oil. In the same concession is the Narmer-1X well, which was dug in 2013. Narmer-1X has a flow rate of 1,200 b/d of oil and 400 mcf/d of natural gas. It taps into oil reserves spread between the Faghur Basin and the northern coastal Shushan Basin. This field is not yet fully explored. Initial testing estimates that the reservoir covers 1,000 acres, making it one of the biggest fields in the Western Desert. Its production can also be easily fast-tracked because it is close to existing infrastructure.

The latest discoveries in the Faghur Basin are the Bernice and Ptah fields in 2015. They are still in the exploratory phase, but Ptah is expected to be the largest new field discovered over the past few years, according to an Apache press release at the time.

Other Basins

The Shushan Basin

In the Shushan Basin is the Apries-1X well, which was dug in 2014. Its tests show a flow of 4,389 b/d of oil and 14.2 mcf/d of natural gas. Another well is Bat-1X, dug in 2014. It is part of the Khepri-Sethos Development Lease. It has a tested capacity of 390 b/d of condensate and 31 mcf/d of natural gas. Meanwhile, the Ozoris Development in the same basin has the Ozoris-4 well, which was announced in mid-2004. It has a capacity of 29.4 mcf of natural gas and 1,775 b/d of oil. These development wells are part of the Greater Khalda Concession, which is 100 percent owned by Apache. The Shu-1X and Geb-1X wells in the Shushan Basin are still exploratory wells.

The Matruh Basin

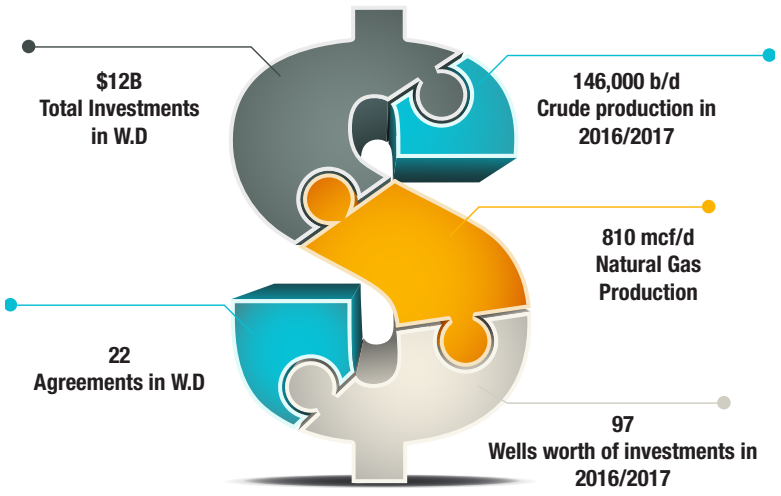
The NTRK-H-1X well is located in the North Tarek Concession of the Matruh Basin. In 2014,

it had a tested capacity of 20 mcf/d of natural gas and 250 b/d of condensate. The other well in the basin is the Herunefer-1X well, which was also dug in 2014. It is in the eastern portion of the Khalda Offset Concession. Tests show that its can produce up to 49 mcf of natural gas and 7,700 barrels of condensate per day.

The Alamein Basin

The NRQ 3151-1X well is located in the Alamein Basin, east of the Matruh Basin. It was dug in 2013 and is part of the North Ras Qattara Concession. The well tested a flow rate is 1,625 b/d of oil and 18.7 mcf/d of natural gas.

Khalda's Investments in W.D



Concessions in Different Basins

Another major concession in the Western Desert is the South Umbaraka Concession, almost four kilometers northwest of Kalabsha. Its most prominent well is Phiops-1X, dug in 2009. The tested capacity of the well is 2,278 b/d of oil and 5 mcf/d of natural gas. However, production is limited to 1,619 b/d of oil and 4.1 mcf/d of natural gas for undisclosed reasons. Phiops-2 and -5 are two appraisal wells currently being dug.

A major field in the Western Desert is the Qasr field, discovered in 2003. It has reserves of 40 to 50 million barrels of condensates and in excess of 2 tcf of natural gas. The field's total development cost is around $5.5 billion, as reported by Oil & Gas Journal in 2004. The field's biggest producing wells are Qasr-1X (51.8 mcf/d of natural gas and 2,688 b/d of oil), Qasr-5 (53.5 mcf/d of natural gas and 1,739 b/d of condensate), and Qasr-6 (28.8 mcf/d of natural gas and 1,037 b/d of condensate). Meanwhile, the Qasr-7X well produces 1,579 b/d of oil and the Qasr-9X well produces 3,000 b/d of oil. Other producing wells are Qasr 34 (18.4 mcf/d of natural gas and 725 b/d of condensates), Qasr 36 (2,945 b/d of oil and 2.1 mcf/d of natural gas), and Qasr 40 (2,000 b/d of oil).

In FY 2016/2017, eight exploration wells in the Western Desert demonstrated proven oil, natural gas, and condensates reserves. These wells are located in the Menis, East-Scorpion, Bravo, and West-Heroniver development areas. Productivity tests are yet to be announced, but it is expected that the wells will yield 3 million barrels of reserve oil. All eight are in Apache-owned concessions.

Khalda Petroleum Company

By far, the biggest investor in the Western Desert is Khalda Petroleum Company, the joint venture established in 1995 by EGPC and US-based Apache Corporation. As of the end of 2016, the company had 22 concession agreements in the Western Desert covering 4.8 million acres.

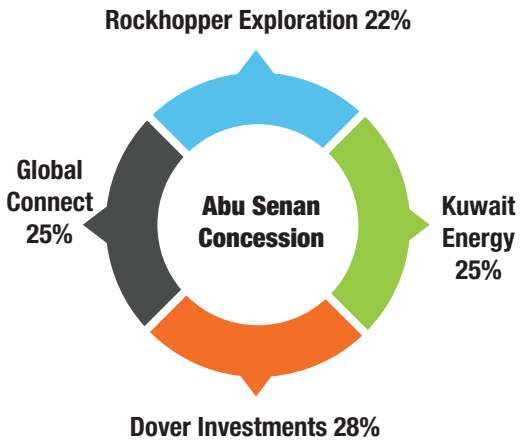
By the end of FY 2016/2017, production reached 146,000 barrels of oil a day (b/d) and 810 million cubic feet of natural gas per day (mcf/d) —the equivalent of approximately 17.7% of Egypt's oil production and 15.6%of Egypt's natural gas in FY 2016/2017, according to data published by Reuters in July. During the first quarter of FY2017/2018, Khalda Petroleum Company reported that it produced 93,749 barrels of oil a day, compared to 110,809 barrels a day during the third quarter of 2016. The company's natural gas production also declined in the first quarter of the current fiscal year to 378,426 mcf/d from 405,863 mcf/d a year earlier.

Khalda Petroleum Company's total investments are over $12 billion with the company spending close to $1 billion on exploration and development every year. In FY 2016/2017, Khalda Petroleum Company invested $552 million to drill 74 development wells and $346.4 million to drill 23 exploratory wells. Its plan for 2017 is to build eight to 10 drilling rigs and 90 to 100 wells.

Investments by Other Players in the Western Desert

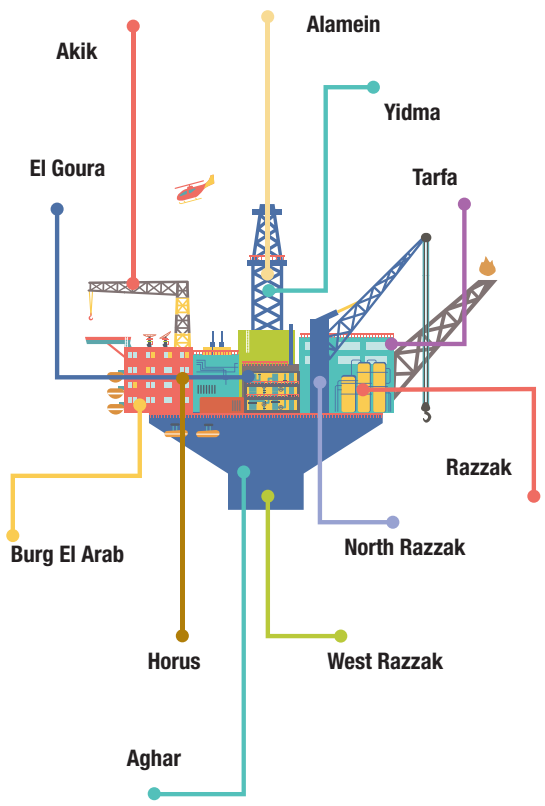
Kuwait Energy

Outside Apache-owned concessions, Kuwait Energy in 2016 announced that its Jahraa SE-1X well in the Abu Sennan Concession had started producing 410 b/d of oil. In April, the concession co-owner, Rockhopper Exploration, and Kuwait Energy started drilling Al Jahraa SE-2X in the Al Jahraa Southeast field. Tests are still being conducted, but company officials estimate that the well will access 20 million barrels in oil reserves. Another well in the Abu Sennan Concession is Al-Ahmadi-1X. Announced in late 2001, it produces 800 b/d of oil and 13.5 mcf/d of natural gas. The other well is GPZZ-4. Its initial flow from the Abu Roash "G" Member and the Upper Bahariya Formation was approximately 150 b/d of condensate and 1.6 mcf/d of natural gas, as reported in October by Egypt Oil & Gas. A new entrant to the Egyptian oil sector, GlobalConnect, bought a 25% stake in the Abu Sennan Concession, halving Kuwait Energy's share. Co-owners are Dover Investments (28%) and Rockhopper Exploration (22%). All investments in the concession are executed by Borg El-Arab Petroleum Company, a joint venture between Kuwait Energy and EGPC. The company is already producing a total of 3,860 b/d of oil and 3.03 Mcf of natural gas a day.



IPR Group

Active Fields in North Ras Qattara Concession



In the first five months of 2017, IPR Group dug 23 exploratory wells. In June, the company announced two discoveries: NRQ-11X and NRQ-9-2X. The two well have respective capacities of 715 and 3,700 b/d of oil. Both wells are located in IPR Group's 100-percent-owned North Ras Qattara Concession in the Alamein Basin. The discovery will increase the company's output by 60%, according to company officials. Development in the North Ras Qattara Concession started in 2006. Active fields include Alamein, Yidma, Tarfa, Razzak, North Razzak, West Razzak, Aghar, Horus, Burg El Arab, El Goura and Akik. Future wells to be dug in the concession are NRQ-3151 and NRQ-8X – both natural gas and condensate wells.

Cheiron PICO

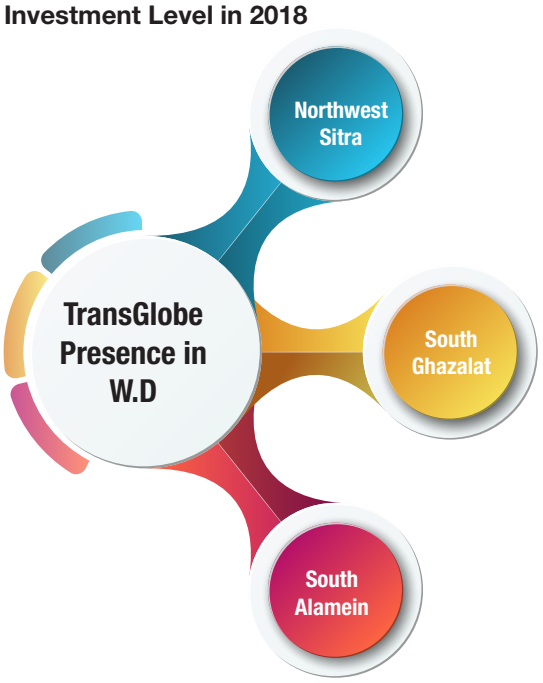
Also in 2017, Cheiron PICO acquired a 50% stake of Saharan North Bahariya, which was a 100%-owned subsidiary of EFG Capital Partners, for $83 million. Saharan North Bahariya Company owns the North Bahariya Concession with its Abrar, Fardous, Jana, Rawda, Sedar, and Rayan wells with their combined production of over 8,000 b/d of oil.

Transglobe

Meanwhile, Transglobe has 100% working rights in three exploratory concessions in the Western Desert: The Northwest Sitra, the South Ghazalat, and the South Alamein.The rights were acquired between 2012 and 2015. Tests are still

ongoing to measure production rates from the concessions.

Investment Level in 2018



Khalda

According to the Ministry of Petroleum and Mineral Resources, it has signed agreements worth $225 million in 2017 with petroleum companies for Western Desert exploration and development project to occur in 2018. According to an unnamed official from Khalda Petroleum Company, the company has allocated $810 million to invest in new wells during FY 2017/2018. It plans to dig 33 exploratory wells, mainly in the West Kalabsha and Khalda 3 regions. It will also dig 52 development wells to boost production to around 151,000 b/d of oil as well as maintain natural gas production at around 800 mcf/d. This is compared to the 146,000 b/d of oil and 810 mcf/d of natural gas produced at the end of FY2016/2017.

Also for 2018, the Ministry of Petroleum and Mineral Resources signed three exploration deals with Apache to dig 14 wells in the Western Desert. Apache will invest around $61 million in the exploration of the new Northwest Razzak Concession and $12 million in the South El Shawish Concession.

Royal Dutch Shell

Royal Dutch Shell signed an agreement with the ministry in August to begin exploration operations in the Western Desert in 2018. Per the agreement, the company will invest $64.2 million in drilling 63 wells in the region. Currently, Royal Dutch Shell owns the West Delta Concession and has invested $1.6 billion in it, according to the company's CEO, Andrew Brown. It has also invested $35.5 million in the North Um Baraka Concession through its joint venture with EGPC called Badr El Din Petroleum Company (BAPETCO). The joint venture only excavates oil and natural gas from the Western Desert. To date, BAPETCO's reserves have topped 238 million barrels of oil and 4.779 tcf of natural gas. The company signed a deal with French-based Vallourecfor the latter to provide tubular services for 60 to 70 natural gas wells in the Western Desert.

Apex International Energy

Meanwhile, Apex International Energy announced that it signed two agreements with EGPC to invest nearly $46 million in its Western Desert concessions, according to Tarek El Molla, Minister of Petroleum and Mineral Resources. Under the agreement, Apex International Energy will dig nine wells in the West Badr El Din Concession and Southeast Meleha Concession. The company currently has $26.5 million invested in the South East Meleiha Concession and $19.4 million invested in the West Badr El Din Concession. Both concessions are located in the Abu Gharadig Basin in the Western Desert.

Agiba Petroleum Company

Agiba Petroleum Company, a joint venture between EGPC (50% stake), Eni, Lukoil Overseas, and IFC, is expected to start shipping oil from its Meleiha field starting in the second quarter of 2018. In June it commissioned an engineering-services company, Enppi, to develop oil shipping systems from the aforementioned field in the Western Desert. The project will take nine months to complete. This year, Agiba Petroleum Company drilled the Rosa N 1X well in its Meleiha field, giving it access to up a 20 million barrels of oil reserves. However, the company said that only 5 million barrels can be excavated using current technology. Agiba Petroleum Company also discovered oil and natural gas reserves in the Ras El Qatara region. Testing demonstrates the region could produce 600 b/d of oil and 1 Mcf/d of natural gas. Deeper drilling can add 5,500 b/d of oil and around 14 Mcf/d of natural gas, according to company officials.

Merlon

Meanwhile, The Ministry of Petroleum and Mineral Resources signed an agreement with US-based Merlon. The company will invest $6 million in the Fayoum Concession during 2018. By the end of 2016, Merlon had 45 producing wells, producing 15.2 million barrels, in 11 development leases throughout its concession. Merlon can continue to operate in the Fayoum Concession until FY2034/2035.

Government Investments

The state-owned General Petroleum Company (GPC) has signed agreements with six local banks in 2017 to secure an EGP 2.3 billion syndicated-loan facility to fund its oil and natural gas explorations for the next seven years. GPC said in a press release that it will allocate EGP 1.75 billion for exploration and drilling projects and EGP 99.3 million for its renewal and replacement programs. The banks providing the funding are a mix of government-owned banks, local banks, and Arab banks. During FY 2016/2017, GPC made at least one oil discovery in the Western Desert. No details were made public.

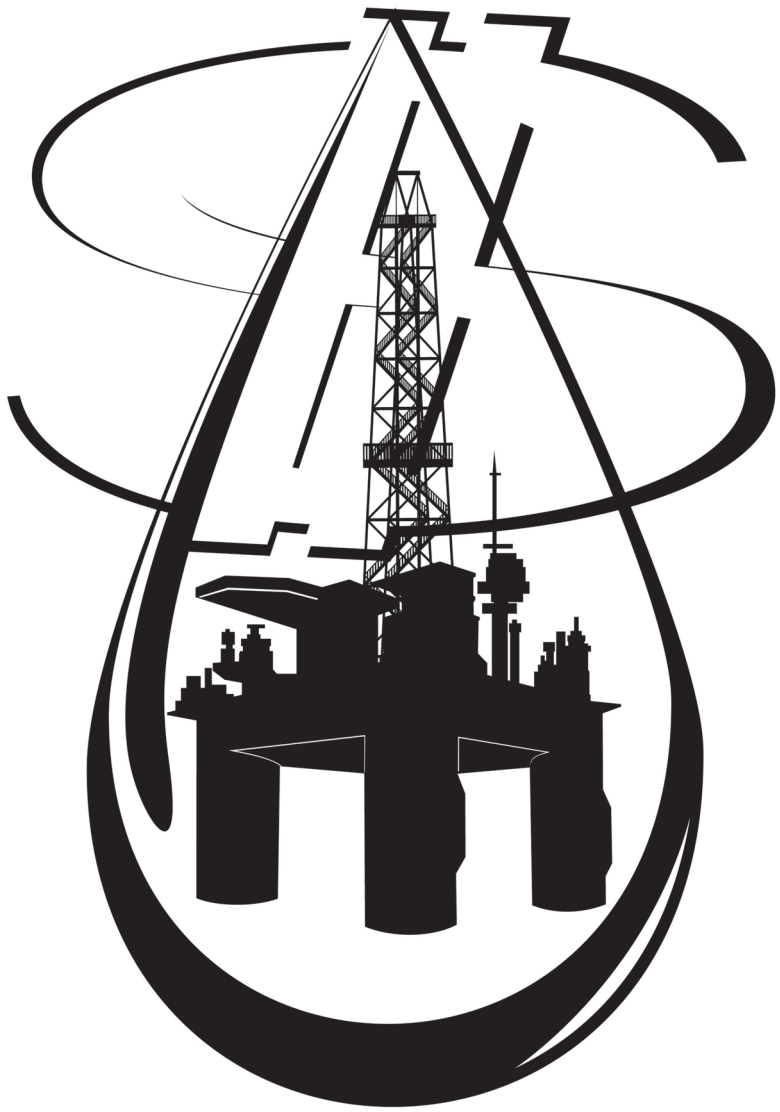


The ministry aims to increase national crude production beyond 700,000 b/d.



In 2017, the ministry has signed $255 M worth of exploration agreements in the W.D

Meanwhile, El Molla has prioritized oil excavations—especially in the Western Desert—in 2018 to reduce reliance on fuel imports. He aims to increasing national production beyond 700,000 b/d of oil—a production sum that has previously been achieved. "We are getting all the support we need from the presidency to expedite the execution of our investment plan," El Molla said after a March meeting with President Abdel Fattah El Sisi and several international oil and gas firms, including Eni and BP. "We now have a conducive oil investment environment in Egypt, which will allow us to reach fuel self-sufficiency in the near future."



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