

THE MEDITERRANEAN SEA: EGYPT'S NATURAL GAS TROVE

BY AMINA HUSSIEN, REHAM GAMAL & TASNEEM MADI

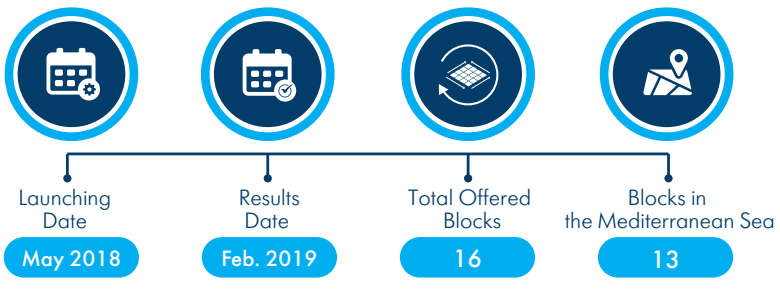
The Mediterranean Sea has the lion's share in Egypt's total natural gas production. In fact, on average, the region's offshore fields produce more than 50% of Egypt's production. When Egypt turned from natural gas exporter to importer in 2016, the Mediterranean's largest natural gas discovery, Zohr, changed the rules of the game in favor of Egypt. The discovery helped Egypt maintain self-sufficiency of natural gas in September 2018. Furthermore, the developments in the region supported the country to resume exports with trial quantities to Jordan in October 2018, according to a report entitled "Petroleum Sector in a Year" published by Egypt Oil and Gas in cooperation with the Ministry of Petroleum and Mineral Resources (MoP).

The Mediterranean Sea witnessed remarkable changes and updates during Fiscal Years (FYs) 2017/18 and 2018/19 concerning different aspects, such as bid rounds, discoveries, and production.

BID ROUNDS

In May 2018, the Egyptian Natural Gas Holding Company (EGAS) announced an international bid round. The company offered a total of 16 blocks in the bid round, of which, 13 blocks are located in the Mediterranean Sea, according to EGAS annual report 2017/18.

EGAS INTERNATIONAL BID ROUND IN 2018

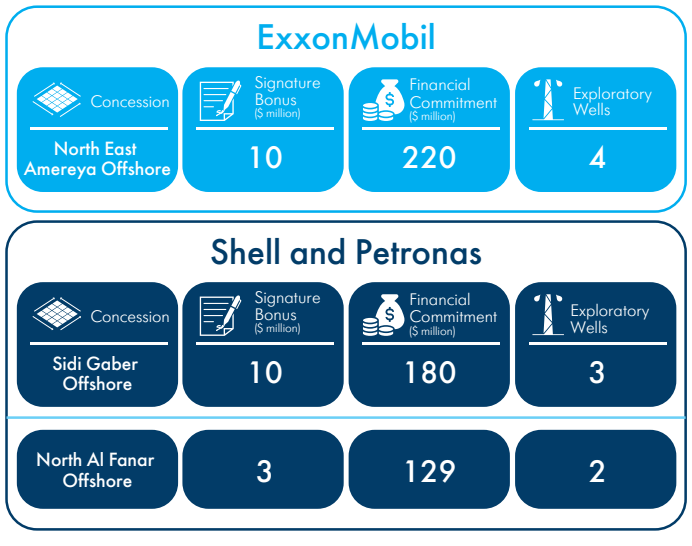


The bid round results were announced in February 2019, on the sidelines of the Egypt Petroleum Show (EGYPS 2019). The bid round resulted in the awarding of five blocks, of which; three are located in the Mediterranean Sea, stated in EGAS annual report 2018/19.

The bid round witnessed the entrance of Exxon Mobil in Egyptian upstream activities for the first time as it was awarded North East Amereya Offshore, according to EGAS annual report 2018/19.

The signature bonus of the three concessions totaled $23 million. In addition, the total financial commitments recorded $529 million to drill nine wells, according to the MoP's website.

EGAS BID ROUND RESULTS IN 2019



ACTIVE AGREEMENTS

Seven agreements are still active, in the Mediterranean, since signature data to June 2019. The seven agreements cover a total area of 16,099 km^2, of which 13,573 km^2 is allocated area used for exploration activities. The oldest agreement to take place was the Shorouk Offshore Concession, where the giant Zohr was discovered by Eni. The agreement has been in effect since January 2014. Nevertheless, the most recent agreement was the Nour Offshore Concession, which has been in effect since August 2018, according to EGAS data.

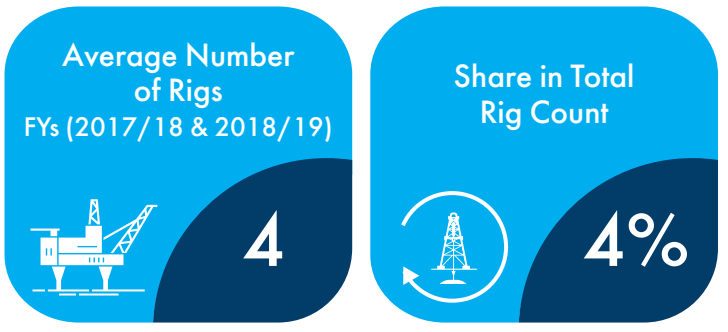
ACTIVE AGREEMENTS IN THE MEDITERRANEAN SEA TO JUNE 2019

Concession	Operators	Total Area (km²)	Exploration Area (km²)	Effective Date
Shorouk Offshore	10% Mubadala, 10% BP, 30% Rosneft, 50% Eni	3,752	2,351.4	Jan. 2014
North Thekah Offshore	100% Edison	3,750	2,625	Feb. 2014
North El Tabia Offshore	100% BP	2,084	2,084	Dec. 2016
North Ras El Esh	50% BP, 50% Eni	1,389	1,389	Dec. 2016
North El Hammad Offshore	37.5% BP, 25% Total, 37.5% Eni	1,927	1,927	Dec. 2016
Northeast Hapy Offshore	30% BP, 70% Eni	2,458	2,458	Jan. 2017
Nour Offshore	20% Mubadala, 15% Tharwa, 25% BP, 40% Eni	739	739	Aug. 2018

DRILLING ACTIVITIES

The average number of drilling rigs in the Mediterranean Sea in FY 2017/18 and 2018/19 was almost the same with approximately four rigs working in the region. The Mediterranean has a 4% share in Egypt's total drilling rigs in the two referred years, according to Egyptian General Petroleum Corporation (EGPC) data.

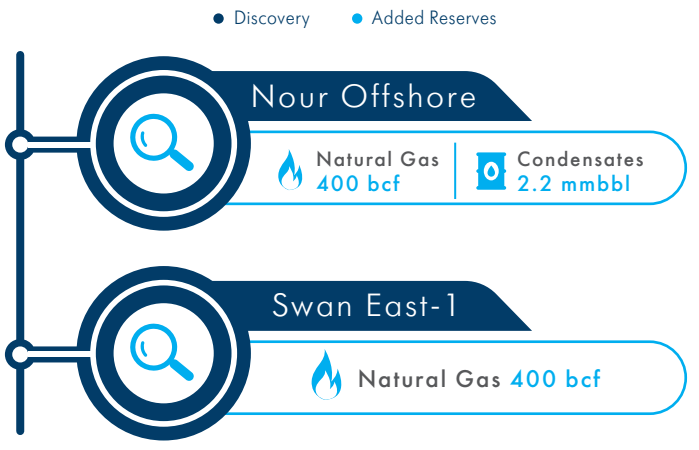
THE MEDITERRANEAN SEA'S RIG COUNT



In FY 2018/19, the drilling activities in the Mediterranean resulted in achieving five natural gas discoveries, representing around 34% of natural gas discoveries that year, according to EGAS annual report FY 2018/19. This development marked a significant increase in exploration activities, especially when compared to FY 2017/18, in which no discoveries were announced in the region.

The five new discoveries added reserves of 598 billion cubic feet (bcf) of natural gas, and 2.2 million barrels (mmbbl) of condensates. Among the five discoveries, two were considered significant discoveries. The first discovery, Nour offshore, operated by Eni, added reserves of 400 bcf of natural gas and 2.2 mmbbl of condensates. Furthermore, the second discovery was announced in Swan East-1 in El Burullus in West Delta Deep Marine (WDDM). Swan East-1 added reserves of 114 bcf of natural gas, according to EGAS annual report 2018/19.

5 DISCOVERIES IN THE MEDITERRANEAN SEA IN FY 2018/19

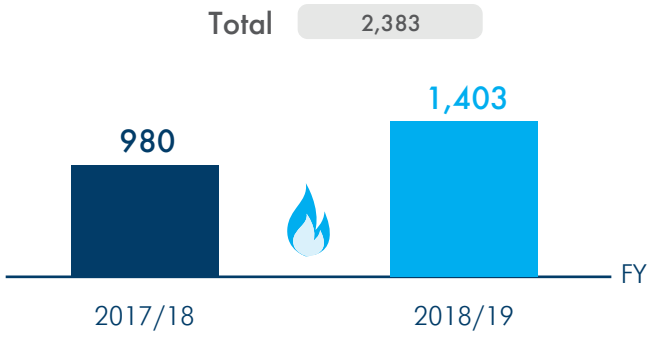


NATURAL GAS AND CONDENSATES PRODUCTION

Most of Egypt's natural gas production comes from offshore fields located in the Mediterranean Sea. Over the past two FYs, the Mediterranean's production of natural gas accounted for 2.4 trillion cubic feet (tcf), representing the area with the highest share of 53.8% of Egypt's natural gas production. The Nile Delta and the Western Desert's production came next, while the Gulf of Suez, the Eastern Desert and Sinai contributed by fewer natural gas productions, according to EGPC and EGAS.

In light of the Zohr field developments, the Mediterranean's production considerably witnessed a jump in FY 2018/19 by 43% to produce on average 82 billion cubic feet per meter (bcf/m) of natural gas, mentioned by EGPC and EGAS.

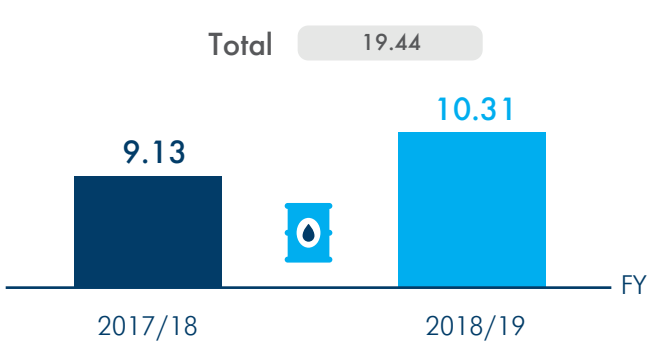
THE MEDITERRANEAN SEA'S NATURAL GAS PRODUCTION (BCF)



The Mediterranean Sea is considered the second largest condensates producing area following the Western Desert. Over the two FYs 2017/18 and 2018/19, the Mediterranean's condensates production recorded about 19 mmbbl, representing 31% of condensates produced all over Egypt. Sinai's condensates production contributed almost equally to that of the Mediterranean. On the other hand, the Nile Delta, the Gulf of Suez, and the Eastern Desert shared by lower condensates production rates, respectively, according to EGPC and EGAS.

During FY 2018/19, the Mediterranean's production of condensates saw an increase of about 13%, contributing 0.86 million barrels per meter (mmbbl/m) on average, according to EGPC and EGAS. This increase was mainly a result of the increase in Zohr's condensate production, which, in April 2019, increased by 14.29%, reaching around 0.029 million barrels per day (mmbbl/d).

THE MEDITERRANEAN SEA'S CONDENSATES PRODUCTION (MMBBL)



MAIN NATURAL GAS FIELDS

Egypt has a long history of natural gas discoveries especially in the Mediterranean Sea as it started in 1969 with the discovery of Abu Qir field. This discovery was followed by discovering other significant fields which contributed to the area's production of natural gas and condensates. Consequently, many projects were implemented to develop and increase production of these fields.

1. ABU QIR

Abu Qir concession is located offshore in the Idku Bay, 20 km Northeast of Alexandria. The concession consists of three gas and condensates fields which are: Abu Qir, North Abu Qir, and West Abu Qir. It was acquired by Edison in 2009 following an international tender of $1.4 million. Since then, Edison has doubled hydrocarbon production in this area by implementing a scheduled investment plan, until it sold its assets to Energean Oil and Gas, according to Edison's website.

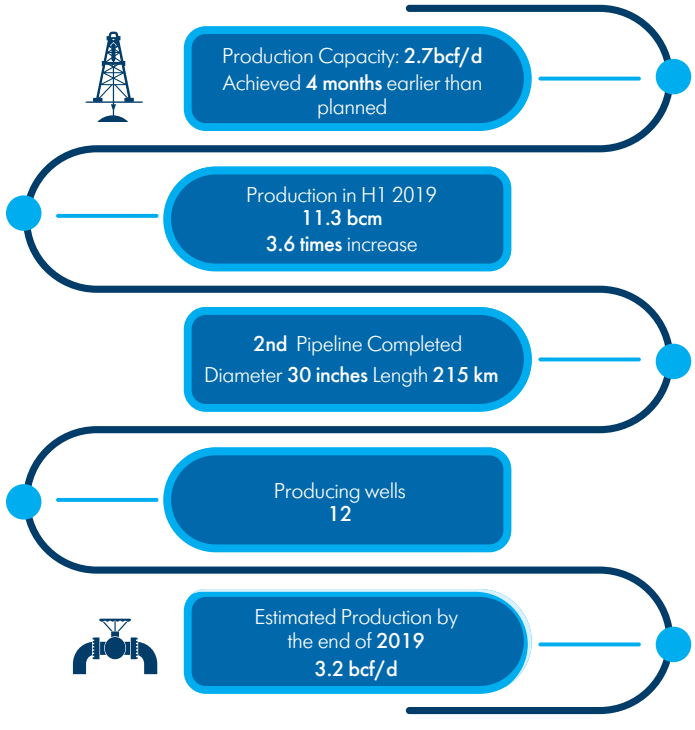
NORTH ABU QIR



2. ZOHR

By the end of August 2015, Eni announced that it made one of the most supergiant gas discoveries in the deep waters of Egypt. Zohr field is the largest gas discovery ever made in the Mediterranean Sea with conservative estimated reserves of 30 tcf. The discovery of well Zohr 1X NFW is at 4,757 feet of water depth (1,450 meters) in the Shorouk Block, stated in Eni's published press release, August 2015.

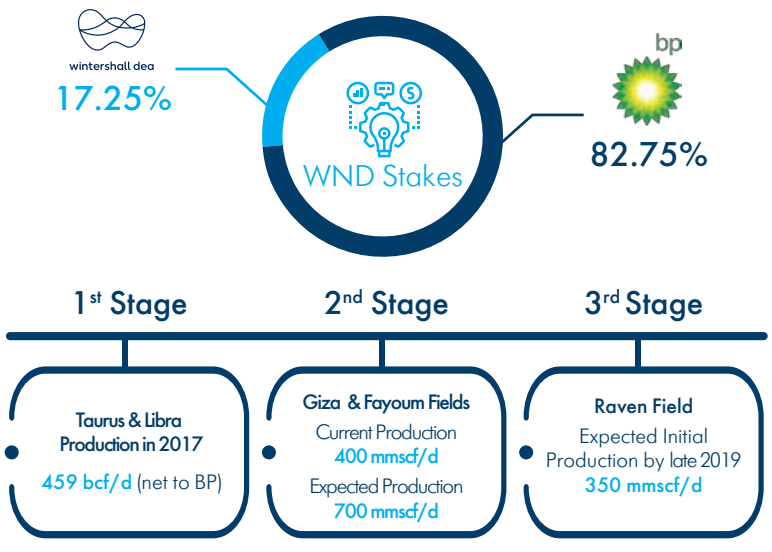
ZOHR FIELD UPDATES IN 2019



3. WEST NILE DELTA PROJECT

West Nile Delta (WND) Project includes a total of five gas fields across the North Alexandria and West Mediterranean Deepwater offshore concession blocks. The project was set to be completed in three stages instead so that the delivery of natural gas production commitments to Egypt will be accelerated, according to BP's website.

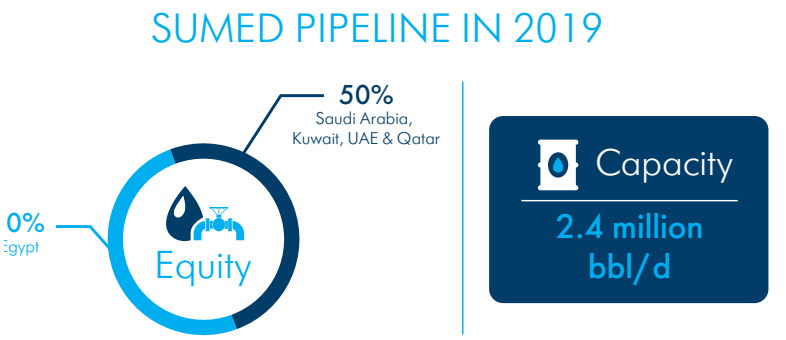
WEST NILE DELTA PROJECT



4. WEST DELTA DEEP MARINE

Since the 1990s, Shell has discovered 18 natural gas fields in the WDDM concession in the Mediterranean Sea. The fields are located at water depths ranging from 700 meters to 850 meters and about 90 km to 120 km away from the shore, according to a Global Portfolio Data Book 2014 by Shell.





5. ATOLL

Atoll offshore field was discovered in March 2015 and is located in the North Damietta area. Currently, the Atoll development is led by BP, but operated by the Pharaonic Petroleum Company (PhPC). PhPC is a joint venture between BP, Eni and EGAS.

Atoll field is a significant discovery, with a reservoir of 1.5 tcf. The field's first phase started producing 350 million cubic feet per day (mmcf/d) in February 2018, less than three years after its discovery and seven months forward ahead of its schedule, according to BP's website.

NATURAL GAS INFRASTRUCTURE

SUMED PIPELINE

The SUMED Pipeline lies between the Gulf of Suez and the Mediterranean Sea, and transports around 115 million tons (mmt) of crude oil, according to the MoP's website. The system is managed by the Petroleum Pipelines Company (PPC).

The Arab Petroleum Pipelines Company (SUMED) signed a cooperation agreement in February 2019, with Saudi Aramco Products Trading Company's (ATC) to secure 222,000 cubic meters (m^3) storage capacities for high quality Euro Standard diesel.

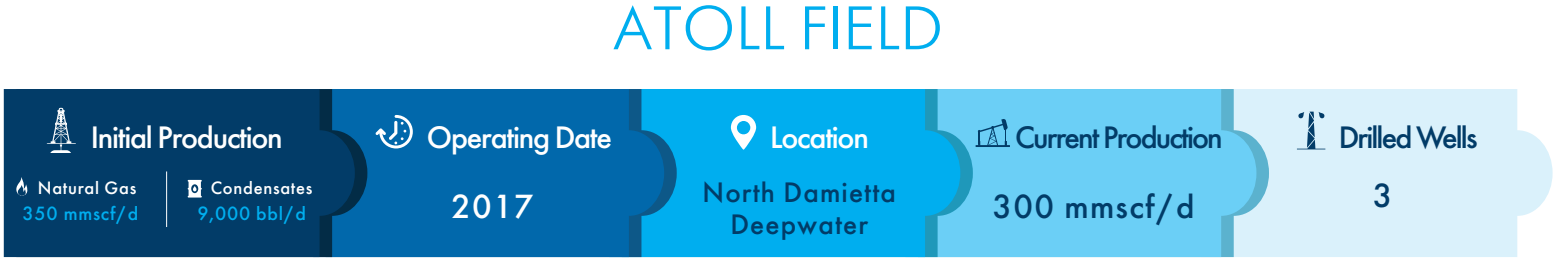
Moreover, Aramco and Saudi Basic Industries Corporation (SABIC) signed a $2 billion agreement with PPC to establish petrochemical projects in the Mediterranean region, stated by Abdullah bin Mahfouz, Vice Chairman of Saudi-Egyptian Business Council in a business forum in February 2019.

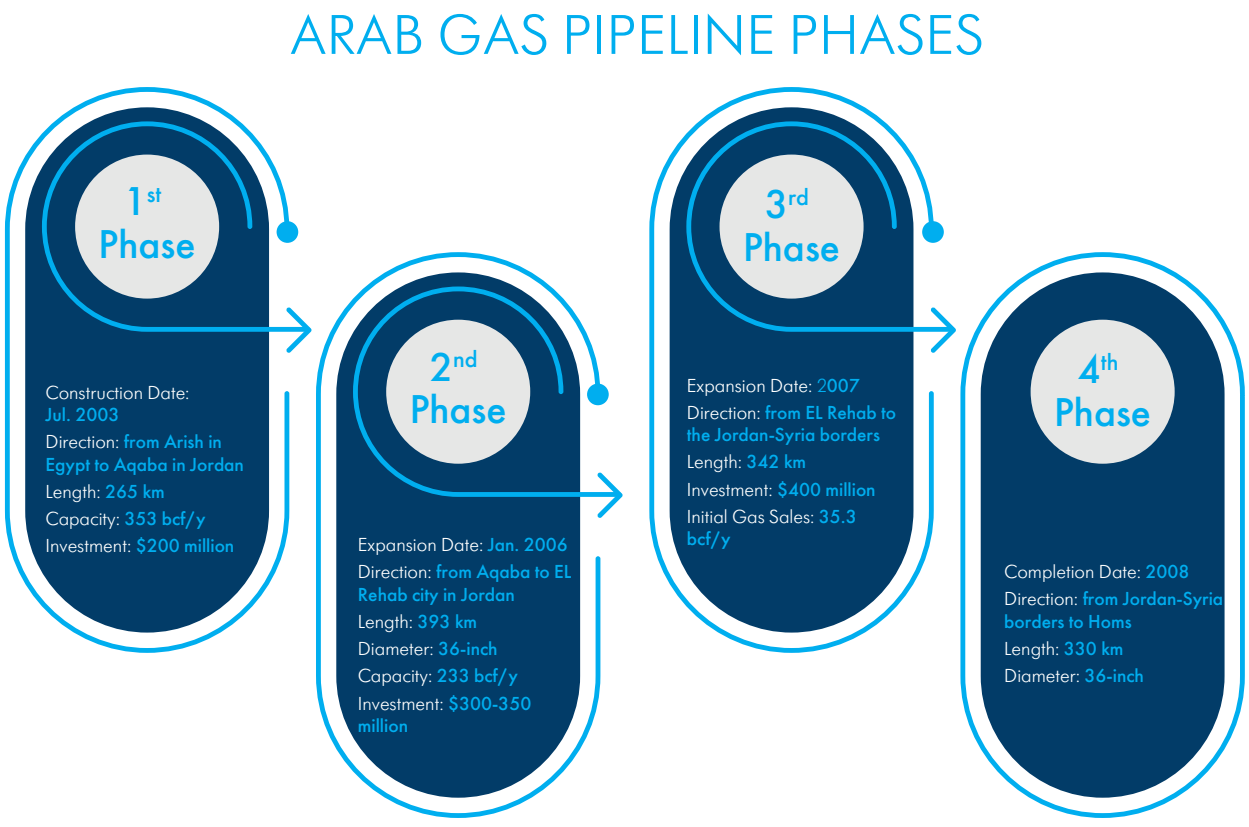
EAST MEDITERRANEAN GAS PIPELINE (EMG)

The natural gas produced from fields in the Eastern Mediterranean is mainly supplied through the EMG pipeline that connects the Israeli coastal city of Ashkelon and El-Arish in Egypt's Sinai Peninsula. The EMG pipeline ownership is currently transferred to Delek Drilling, Texas-based Noble Energy, and Egypt's East Gas.

ARAB GAS PIPELINE

The Arab Gas Pipeline (AGP) runs from the South of El Arish, which links in Northern Sinai to the North of Jordan. The AGP is a model for strategic Arab Cooperation projects, as it connects Egypt to Jordan, Syria, and Lebanon as well as other countries in Africa, Asia, and even Europe (in future phases). The project has four phases:





EXPORTING FACILITIES

Egypt has two Liquified Natural Gas (LNG) exporting facilities on the Mediterranean Coast. The two facilities are controlled by the Spanish Egyptian Gas Company (SEGAS) and the Egyptian Liquefied Natural Gas Company (ELNG).

SEGAS

Damietta plant, operated by SEGAS, act as an LNG tolling facility. Gas supplies were initially provided by the Temsah field and Ha'py Development Area operated by BP and Eni through the national gas grid, according to EGAS's website. Damietta LNG plant is expected to open before the end of this year, rather than during Q3. Damietta will start exporting 500 mmcf/d of LNG, before increasing exports to 700 mcf in 2020, as stated by Eng. Tarek El Molla in an interview at the World Energy Congress in September 2019.

ELNG

Egyptian LNG (ELNG) acts as a tolling facility with the upstream suppliers paying a tariff for the liquefaction service. ELNG is Egypt's largest LNG, a joint venture between EGPC, EGAS and foreign shareholders, such as Royal Dutch Shell, PETRONAS and Engie. ELNG was established when EGPC and Edison signed an agreement with Shell to develop an integrated LNG export project in Egypt in 2001. ELNG has two natural gas liquefaction trains with a combined capacity to produce 7.2 million tons per year (mmt/y) of LNG, according to the Ministry of Transportation's website.

It is worth mentioning that Shell shipped 12 LNG cargoes from the Idku plant in 2018 and ramps up production from the WDDM Phase 9B project. Shell's stake in Idku LNG terminal helped it to commercialize gas supply in Egypt's 2018 bid round, according to the IGU's World LNG report, in 2019.

LNG EXPORTING FACILITIES

	Location	Capacity (bcf/y)	Operating Year	Operation Status
SEGAS	Damietta	264.8	2004	Idle
Idku	Idku	353	2001	Operating

MAIN OPERATORS

Many International Oil Companies (IOCs) are granted concessions in the Mediterranean region. Among these IOCs, Eni was most famous for discovering the giant Zohr in 2015.

ENI

Eni has been operating in Egypt since 1954 through its subsidiary, the International Egyptian Oil Company (IEOC). It is one of the largest IOCs in Egypt and the global petroleum market.

As a result of the EGAS 2015 international bid round, Eni signed two new concession agreements for the North El Hammad and North Ras El Esh, located in the shallow waters in Egyptian Mediterranean Sea. Eni is also operating in three concessions in the Mediterranean Sea: Al Shorouk, North Leil, and Karawan concessions in the west of Zohr field, according to Eni's website.

Nour New Field Wildcat (NFW), in Nour North Sinai concession, a new discovery announced by Eni in March 2019, according to the company's website. EGAS was a partner for Eni in the concession, where Eni holds 40% stake, BP holds a 25% stake, Mubadala Petroleum holds a 20% stake and Tharwa Petroleum Company holds a 15% stake of the contractor's share.

BP

Egypt is BP's largest country in Africa in terms of net production of natural gas. BP has been supporting the development of the country's natural gas market since the 1960s.

The company is working on three concession areas in the Mediterranean Sea; North Al-Maks area in the west of Zohr field, North El-Taneen, and Al-Tabya area in the south of Zohr field. Moreover, BP holds 100% interest in the Atoll concession.

DANA GAS

Dana Gas has been operating in Egypt through its subsidiary, Dana Gas Egypt (DGE) since 2007, mainly focused on providing natural gas. Since entering Egypt, it has become the country's fifth largest gas producer, explained in Dana Gas's website.

The company was awarded Block 6 North El-Arish exploration concession area in 2014, which was its first offshore Concession Area in Egypt, containing significant growth potential, according to Dana Gas's website.

The company confirmed its decision to sell its assets in Egypt to focus on development and increasing production from resources in the Kurdistan Region of Iraq (KRI), which contains more than 90% of the Company's 2P reserves, according to the company's press release in July 2019. It is worth noting that Dana Gas produced about 56% of its energy output, or 35,200 barrels of oil equivalent per day (boe/d) in Egypt, according to a company's press release published in September 2019.

EDISON

Edison became one of the prominent gas players in Egypt by Idku's the first LNG train development in 2001. Edison has been operating in Abu Qir since 2009, for more than 10 years. Edison currently operates nine concessions. The company held a 100% operated share in the Abu Qir concession. In July 2019, Edison announced selling its assets to Energean Oil and Gas, as explained on Edison's website.

SHELL

Shell is one of the main operating companies in Egypt which started its operations in 1911. Shell is working on new offshore activities, including WDDM Phase 9B project. The WDDM Phase 9B project includes eight new development wells, as mentioned by Khaled Kacem, Shell Egypt Country Chair on Shell's website in October 2019. In addition, in November 2019, Silva well in Phase 9B of the WDDM concession area in the Mediterranean added initial production of 60-80 mmcf/d. The Silva well was discovered and operated by Burullus Gas Company, a joint operating firm of EGPC and Shell, according to a Ministerial statement.

Over the past few years, exploration and drilling activities have stimulated natural gas production rates in the Mediterranean region. This helped Egypt to achieve self-sufficiency and even resume natural gas exports. EGAS announced the 2020 International Bid Round to exploit for natural gas and crude oil covering 11 Blocks in Egypt's Western Mediterranean.

Regionally, the East Mediterranean is regarded as a rich area in natural gas reserves. This accordingly has been strengthened in October 2018, when Egypt, Cyprus, Greece, Jordan, Palestine, Israel, and Italy formed the East Mediterranean Gas Forum (EMGF). The EMGF aims to accelerate the economic exploitation of existing natural gas reserves and benefit from existing infrastructure. With this regard, Egypt has signed many pipeline expansion contracts over the last couple of years. For instance, in September 2018, Egypt and Cyprus signed an agreement to build a Mediterranean pipeline which extends from Aphrodite to a liquefaction terminal in Egypt; the pipeline will then export to different markets, as stated on the MoP's website.

The second half of January 2020 is expected to witness the next EMGF meeting to be held in Cairo. This will encourage further upstream activities and enhance cooperation to promote the utilization of natural gas reserves in the Mediterranean region, explained in the MoP's website.