



EGYPT

SECOND EDITION

THE FUTURE REGIONAL NATURAL GAS HUB REPORT

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MARCH - 2019



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Egypt Oil & Gas Research & Analysis division is aiming to provide petroleum industry stakeholders with different types of information covering the latest updates in the promising sector.

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ABOUT THIS REPORT

Egypt is closer than ever to becoming the Eastern Mediterranean's natural gas energy hub. Ahead of this historic milestone, Egypt Oil & Gas Research & Analysis has dug deeper into the available natural gas data from 2010-2018. This comprehensive analysis of the domestic gas market will enable our clients to track even the smallest changes in the sector, and help forecast its future prospects. This will enable them to make more precise decisions, placing them in the best possible position to take advantage of future developments in the sector.

This report was written by **Amina Hussein** and **Mahinaz El Baz**.

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LIST OF ABBREVIATIONS

bcf/d	Billion cubic feet per day
bcm/y	Billion cubic meters per year
bcf/y	Billion cubic feet per year
BP	British Petroleum
CNG	Compressed Natural Gas
EGPC	Egyptian General Petroleum Corporation
ELNG	Egyptian Liquefied Natural Gas Company
GASCO	Egyptian Natural Gas Company
EGAS	Egyptian Natural Gas Holding Company
EBRD	European Bank for Reconstruction and Development
E&P	Exploration and Production
FY	Fiscal Year
FSRUs	Floating Storage and Regasification Units
FDI	Foreign Direct Investment
GECF	Gas Exporting Countries Forum
GMRA	Gas Market Regulatory Authority
GGFR	Global Gas Flaring Reduction Partnership
GDP	Gross Domestic Product
IEA	International Energy Agency
IOCs	International Oil Companies
LNG	Liquefied Natural Gas
LDCs	Local Distribution Companies
MENA	Middle East and North Africa
mmscf/d	Million standard cubic feet per day
mtoe/y	Million tons equivalent per year
MoP	Ministry of Petroleum and Mineral Resources
MoU	Memorandum of understanding
MPMAR	Ministry of Planning, Monitoring and Administrative Reform
O & M	Operation and Maintenance
OAPEC	Organization of Arab Petroleum Exporting Countries
SEGAS	Spanish Egyptian Gas Company
tcf/y	Trillion cubic feet per year
WDDM	West Delta Deep Marine
WND	West Nile Delta
WB	World Bank



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INTRODUCTION

Egypt is among the top 20 countries when it comes to proven natural reserves, production and consumption worldwide, which indicates the importance of the commodity in the different aspects of Egypt's economic activities.

Natural gas has been a crucial component of Egypt's energy mix since 1967, after the country's first natural gas discovery, Abu Madi field. In 2017, natural gas represented 53% of Egypt's energy mix, according to the British Petroleum (BP) 2018 Statistical Review.

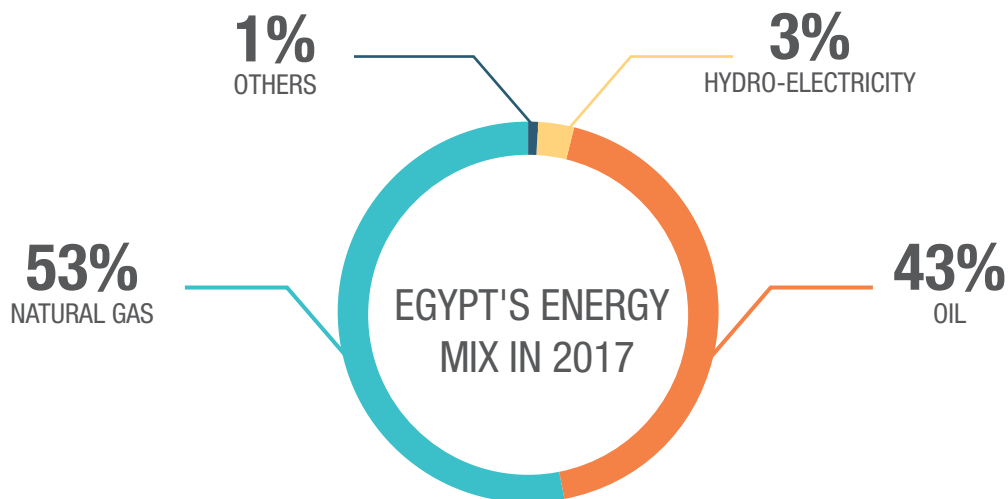
Egypt's natural gas market witnessed fluctuations during the past nine years. The country shifted from being one of the region's largest liquefied natural gas (LNG) exporters in 2009 to a net importer in 2016 due to upstream underinvestment and increasing demand.

However, 2015 witnessed the discovery of the giant Zohr field, which changed the rules of the game. Zohr's rich reserves are vital for the country if it is to achieve energy independence and become a regional energy hub. New developments such as Nooros and West Nile Delta fields have additionally helped redress gas shortfalls. Yet, Zohr will ensure the market's balance in the short term.

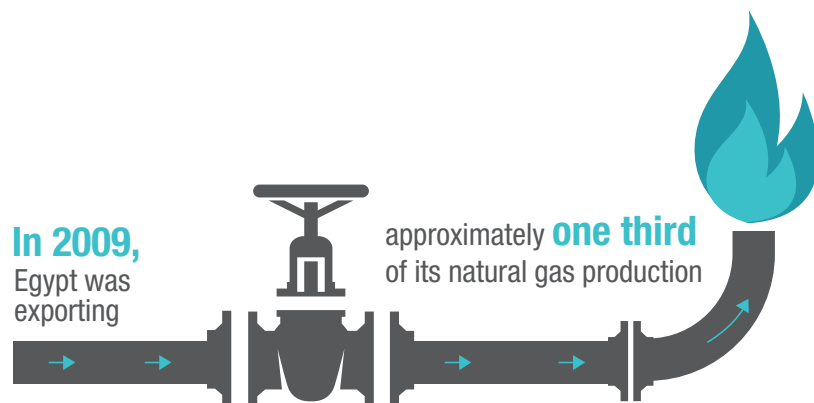
In addition to the new gas discoveries, the state is taking steps towards reforming the sector. It is liberalizing market dynamics through the new gas law and its regulatory authority. The authority is expected to set the market mechanism for most of the country's natural gas activities.

As for attracting investments, the sector's arrears to international oil companies (IOCs) have now fallen to \$1.2 billion, surpassing 2010's record low of \$1.35 billion, according to the Ministry of Petroleum and Mineral Resources (MoP).

KEY FACTS



Source: BP



Source: Gas Exporting Countries Forum (GECF)

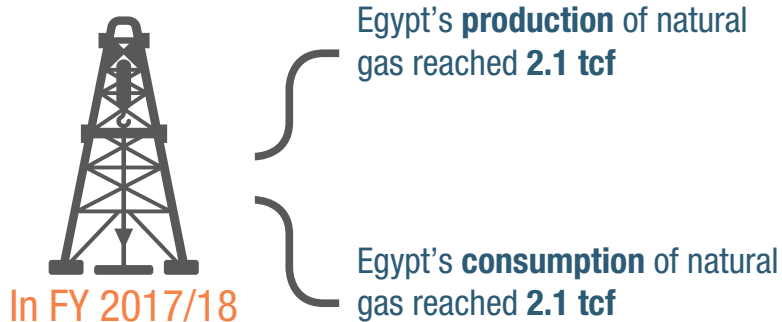
During 2018
there were **18**
natural gas **discoveries**

Source: MoP



Egypt Exported **40 BCF**
of LNG in **FY 2017/18**

Source: EGAS



Source: EGAS



In FY 2017/18

total investment in natural gas activities was around **EGP 750,13 million** representing **10.4%** of the total investments in Egypt

Source: MPMAR



Natural gas represented

92% of Egypt's **total petroleum inwards investment FY 2017/18**

Source: MPMAR



NATURAL GAS SUBSIDY CUTS (EGP) 2018



Source: The Egyptian Cabinet







MARKET FEATURES

1. MAIN PRODUCTION AREAS

Egypt's production of natural gas comes mainly from the Mediterranean Sea, which possesses around 87% of the country's total proven gas reserves. On average, the Mediterranean's natural gas production represented 60.5% of Egypt's annual production between 2010 and 2018.

Moreover, Egypt has more than 40 producing wells in the Mediterranean Sea. In 2018, Mediterranean fields produced around 1162 billion cubic feet per year (bcf/y), according to the Egyptian General Petroleum Corporation (EGPC) and the Egyptian Natural Gas Holding Company (EGAS).



Natural Gas in The Mediterranean Sea

60.5% of Egypt's annual production between 2010 & 2018

More than **40** producing wells

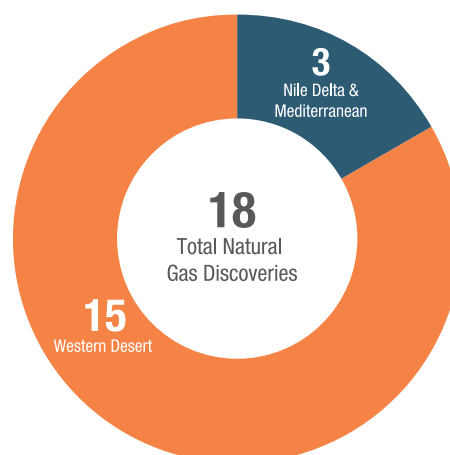
In 2018, the Mediterranean fields produced around **1162 bcf**

Source: EGPC and EGAS

In 2012, the Mediterranean Sea and the Western Desert regions produced 94% of Egypt's natural gas. Over time, this share declined in favor of production coming from the Nile Delta. During fiscal year (FY) 2017/18, 18 new natural gas discoveries were announced.

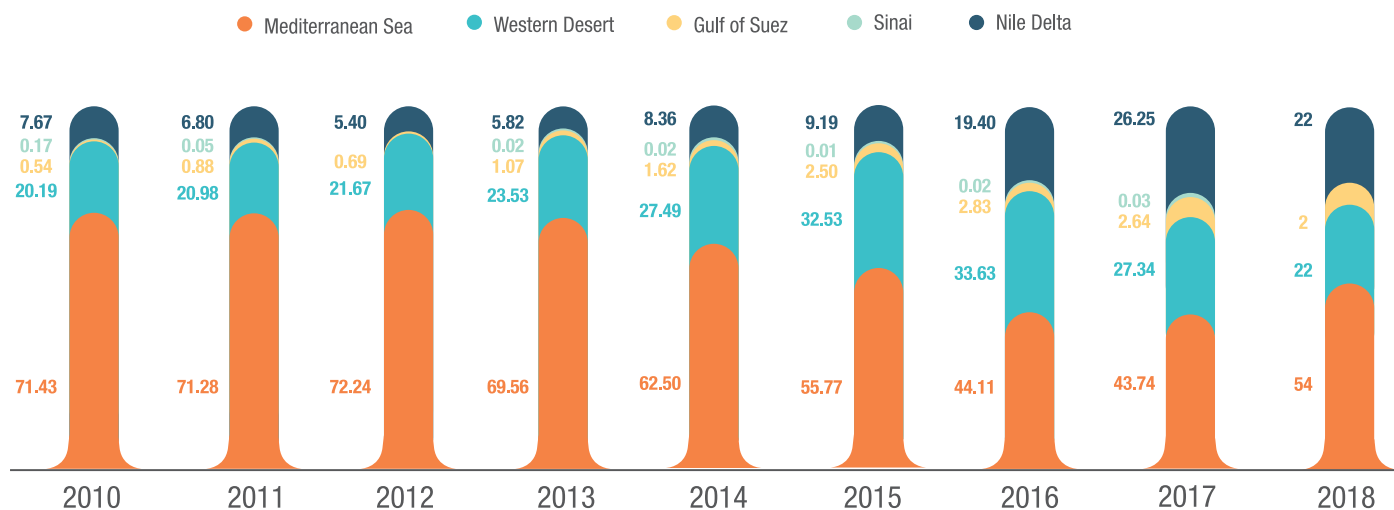
Meanwhile, Egypt's share of natural gas production from Sinai and the Eastern Desert is nearly zero. Natural gas wells in these regions participate annually with 0.01% and 0.08% of the total natural gas production in Egypt, respectively.

NATURAL GAS DISCOVERIES IN 2018



Source: MoP

NATURAL GAS PRODUCTION BY AREA (2010-2018)^(%)



Source: EGPC and EGAS

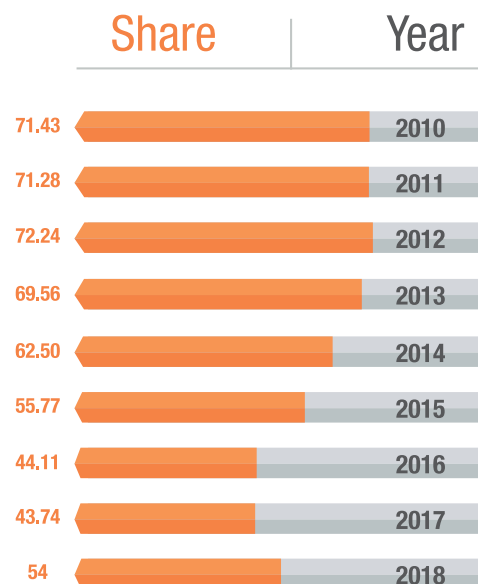


THE MEDITERRANEAN SEA

Most of Egypt's natural gas production comes from offshore fields located in the Mediterranean Sea. Zohr field is, so far, the largest gas field in the Mediterranean. According to Eni's conservative estimates the field contains 30 trillion cubic feet per year (tcf/y) of natural gas deposits.

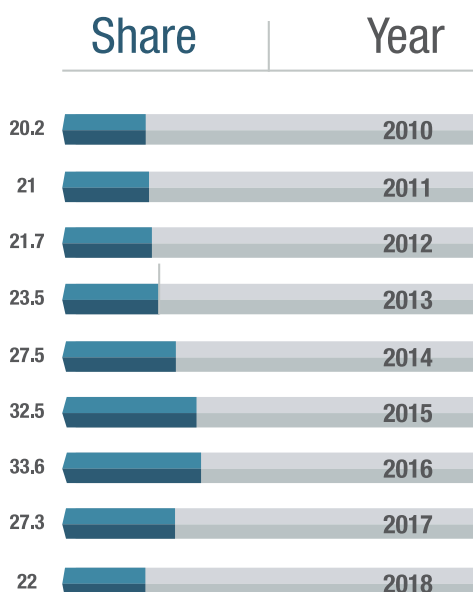
Over the course of the past nine years, the region's share of national gas production has experienced a continuous decline. This was mainly due to the increasing number of mature fields. After peaking at 72.24% in 2012, the Mediterranean's production share fell each year before hitting a low of 43.74% in 2017. The recorded increases in the comparison period came in 2012 and 2018 when it increased by almost 10 percentage points.

MEDITERRANEAN SEA SHARE IN NATURAL GAS PRODUCTION (2010-2018)(%)



Source: EGPC and EGAS

WESTERN DESERT SHARE IN NATURAL GAS PRODUCTION (2010-2018)(%)



Source: EGPC and EGAS

THE WESTERN DESERT

Known for its oil fields, the Western Desert is also a significant natural gas production area in Egypt. On average, the Western Desert accounted for 25.5% of Egypt's natural gas production during the comparison period.

Contrary to the Mediterranean Sea, the Western Desert's share of Egypt's natural gas production witnessed an increasing trend. From 2010-2016 production increased continuously from 20.2% in 2010 to 33.6% in 2016. However, the production sharply declined by 34.5% from 2016-2018.

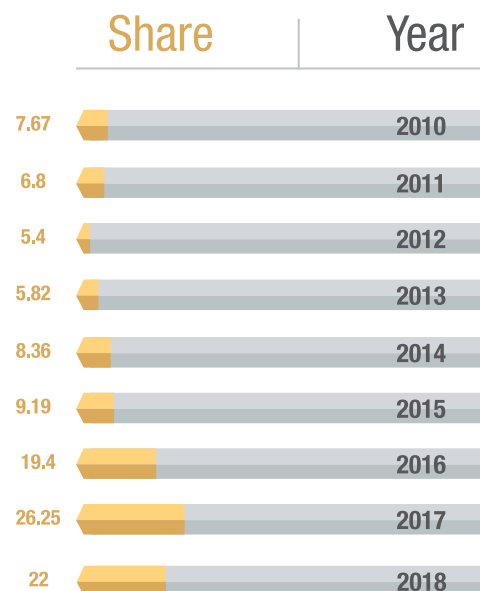


THE NILE DELTA

The Nile Delta has witnessed major developments concerning natural gas discoveries and production. Currently, there are several projects taking place in the area, including the West Nile Delta (WND) development project, Nooros, Atoll, and the West Delta Deep Marine (WDDM) concession.

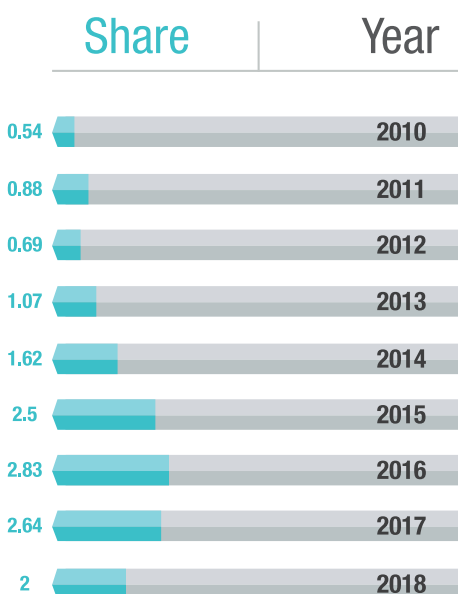
Over the comparison period, the Nile Delta produces an average of 12.3% of Egypt's natural gas production. Between 2010 and 2015, the Delta's share did not exceed 9% of the country's total production. However, in 2016 this increased remarkably to 19.4%. This was followed by another dramatic increase in 2017, recording 26.25%. This significant increase in production is mainly due to the bringing-to stream of the 1 billion cubic feet per day (bcf/d) Nooros field in 2016, and the Taurus and Libra fields in the WND in May 2017.

THE NILE DELTA SHARE IN NATURAL GAS PRODUCTION (2010-2018)^(%)



Source: EGPC and EGAS

GULF OF SUEZ SHARE IN NATURAL GAS PRODUCTION (2010-2018)^(%)



Source: EGPC and EGAS

THE GULF OF SUEZ

In comparison to other areas of the country, the Gulf of Suez contributes little to national production, averaging just 1.6% over the comparison period. Despite being relatively insignificant, the area's contribution to national production has nevertheless experienced an upward trend over recent years. Only producing 0.54% of total production in 2010, The Gulf of Suez's share rose to a peak of 2.83% in 2016, before falling back to 2% in 2018.

Gas production in the Gulf of Suez may yet have a promising future. The MoP recently signed three agreements to start oil and natural gas exploration and production (E&P) activities in the area.

2. KEY MARKET PLAYERS

The natural gas supply chain consists of three main activities. These activities are production, transmission and distribution. In Egypt, the supply chain in the natural gas market operates under the direction and supervision of the MoP, which also operates the oil, petrochemicals, and mining industries.

I. EGAS AND EGPC

The Egyptian natural gas market was first managed by EGPC, before moving under the supervision of EGAS. A law passed in 1957 gave EGPC the power to direct the petroleum products supply chain. EGPC was assigned to handle the exploration, production, processing, as well as transport and distribution activities of petroleum products. After that, EGAS was created with the aim of organizing and managing natural gas developments in Egypt. EGAS was established in 2001 in accordance with the provisions of the Public Enterprise Sector Law No. 203 (1991).

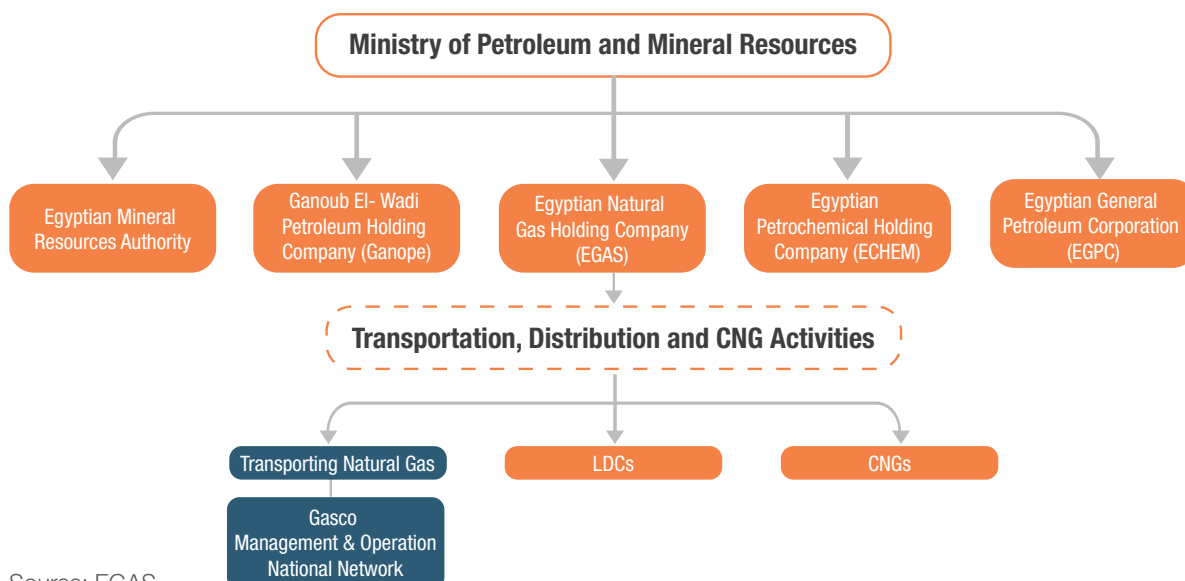
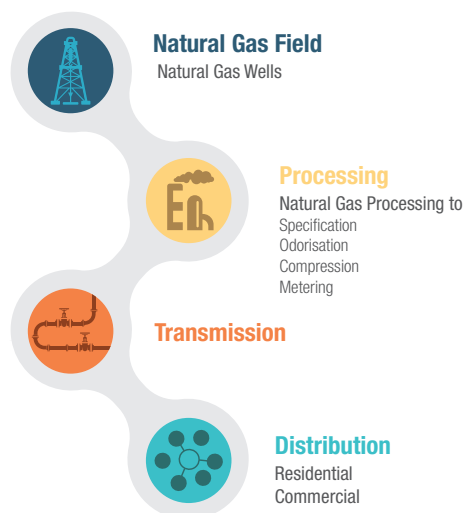
EGPC - the owner of EGAS - has been gradually transferring natural gas activities management to EGAS, including those

in domestic gas transportation, LNG exports, and more recently upstream gas exploration.

EGAS is the main owner of Egypt's domestic natural gas pipeline grid. Until recently, EGAS's major revenue stream came from exporting LNG. Due to the small 2% share of the residential sector in natural gas local consumption, the gas transportation and distribution to households has been carried out on a non-profit, cost-recovery basis.

EGAS has increased its engagement with natural gas exploration activities over the past few years. Its role has expanded to include responsibility for active exploration concessions in Egypt in partnership with IOCs.

NATURAL GAS SUPPLY CHAIN



Source: EGAS

II. EGAS'S AFFILIATE COMPANIES

Unlike the upstream sector, the downstream sector has been state-controlled and did not have any private contributors, with the exception of marketing and storage activities, leaving EGAS and its affiliate companies as the sole players. Recently however, the 2017 gas regulation law has allowed private companies to apply for licenses to import and sell natural gas in the local market. Since the passage of the law, three companies have been given initial approval on their applications to distribute natural gas. The first licenses are expected to be approved before the end of 2018.

The Egyptian Natural Gas Company (GASCO) is responsible for managing, operating, and maintaining the national gas transmission network. However, EGAS maintains ownership of the transmission and distribution assets, including the natural gas grid.

The private sector's participation in the natural gas market is limited to the operations and maintenance (O&M) of the distribution system. The private sector was approved to participate in the O&M of the distribution activities in 1997, and the system was then divided into a number of concession areas.

Sixteen Local Distribution Companies (LDCs) were awarded concessions, nine of which are privately owned. However, the two largest LDCs with respect to number of consumers - Town Gas and Egypt Gas - are publicly owned.

While EGAS finances the expansion of the natural gas distribution grid, the LDCs are responsible for providing the distribution grid's O&M services, as well as for extending access to households and commercial units.

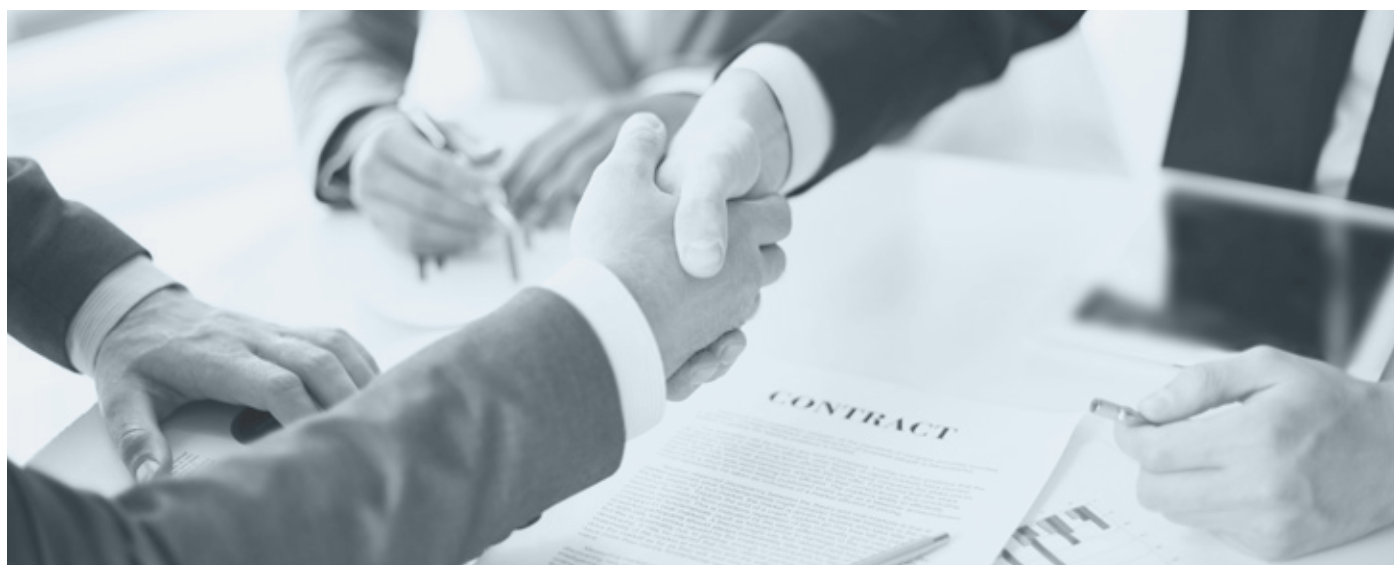
III. INTERNATIONAL OIL COMPANIES

International Oil Companies (IOCs) play a significant role in Egypt's upstream natural gas sector, as they hold shares in producing assets in partnership with EGAS. There are about 40 IOCs working in the Egyptian natural gas sector, and the government continues to encourage IOCs to participate. BP, Eni and Royal Dutch Shell (through the acquisition of BG) are the major natural gas companies currently active in Egypt.

So far, Egypt's hydrocarbon E&P activities have attracted significant amounts of foreign direct investment (FDI) into the

country. According to the Ministry of Planning, Monitoring and Administrative Reform (MPMAR), E&P represents approximately 10% of the country's gross domestic product (GDP) in FY 2017/18.

IOCs are awarded natural gas exploration licenses through EGAS. The company is responsible for organizing international exploration bid rounds and awarding exploration licenses. In addition to organizing the market, EGAS helps international companies to develop and operate natural gas fields.



3. NATURAL GAS INFRASTRUCTURE

Egypt occupies a central position within the current phase of Eastern Mediterranean natural gas development. It has a relatively large and well-developed natural gas infrastructure, which includes exporting facilities (although these are currently idle). The country's infrastructure is by far the largest in the Eastern Mediterranean area and consists of 29 gas treatment facilities, two world-class LNG facilities, two Floating Storage and Regasification Units (FSRUs), two cross-border gas pipelines, and several domestic pipelines. The continuous discoveries of new natural gas fields and the ongoing development projects would optimize the use of the country's infrastructure. Moreover, this would help to generate transportation revenues for the Egyptian economy and potentially increase natural gas supply to the domestic market.

I. DOMESTIC PIPELINES

Egypt has pipelines installed in four different regions: the Gulf of Suez, the Nile Delta, the Western Desert and the Nile Valley, according to Wood Mackenzie.

THE GULF OF SUEZ

- West Bank of the Gulf of Suez to Suez City (16-inch gas trunk line, Capacity: 160 million cubic feet per day (mmcf))
- Suez– Cairo (10-inch line)
- Suez - Port Said (16-inch line)
- Belayim and October - Ras Bakr via a series of onshore (Sinai) and offshore (12-inch pipelines, Capacity: 110 mmcf)
- Ras Shukheir - Suez (16-inch line)
- Zaafarana - Korimat (16-inch line)
- Korimat power station - Al Tebbin power station - South-East of Cairo (65 kilometer, 22-inch line)
- Zeit Bay - Ras Shukheir (40 kilometer, 16-inch, cost of US \$ 9 million)
- Ras Shukheir - Suez - bottling plant at Al Kattamia (10-inch Liquid Petroleum Gas (LPG) line)

NILE DELTA/CAIRO

- From Abu Madi, Qara, Nidoco and Baltim South gas fields to the Nile Delta gas network via two routes:
 - a) The main route is via two parallel 12-inch and 22-inch lines to the distribution center at Talkha, where some gas is extracted for power and industrial use, and the majority is diverted through a 28-inch line to Cairo via Tanta
 - b) An 8-inch condensate line runs parallel to these gas pipelines to Tanta. Some gas from the Abu Madi area is also diverted to the power station at Damietta through a 24-inch line.
- From Abu Qir and North Abu Qir fields to Damanhur via a 20-inch line and then joins the 28-inch line at the Tanta distribution center to Cairo.
- From Alexandria network to Cairo via the Damanhur station.
- From the International Egyptian Oil Company's (IEOC) Port Fouad field to the West Port Said facilities and delivered to Port Said via a 20-kilometer, 16-inch line.
- From Port Said to El Arish on the northern Sinai coast (16-kilometer, 42-inch line via a 175-kilometer, 36-inch diameter section)



WESTERN DESERT

Natural gas from the Western Desert fields is currently supplied to end users around Cairo and Alexandria via three main routes.

- Badr El Din
 - a) From Abu Sennan and Badr El Din to Alexandria (a 16-inch line and 20-inch line, respectively, then 160-kilometer, 24-inch pipeline, nominal capacity of 350 mmcfd)
- Obaiyed/Khalda

The route from Obaiyed is broken into three distinct pipeline sections:

 - a) From Obaiyed to the junction of the Salam/Khalda spur line (a 41.5-kilometer, 26-inch pipeline)
 - b) From the junction of the Salam/Khalda to Ras Kanayes and Tarekgas (49.5 kilometers via a 32-inch line)
 - c) From Ras Kanayes and Tarekgas to the LPG plant at Ameryia near Alexandria (34-inch, 231-kilometer pipeline)
- Abu Gharadig
 - a) From Abu Gharadig to Dashour facilities outside Cairo (260-kilometer, 24-inch with a capacity of 150 mmcfd)

NILE VALLEY DISTRIBUTION SYSTEM

In 1998, a consortium consisting of Shell, Edison International, Orascom and Middle East Gas signed a 25-year franchise agreement with EGPC for the rights to develop the gas market in Upper Egypt. A new company was formed, the Nile Valley Gas company (NVGC).

The franchise agreement involves the extension of the existing gas transmission network in four phases:

- a) From South of Korimat to Beni Suef (involving a capital expenditure of \$50 million)
- b) From Beni Suef to Asyut (involving a capital expenditure of \$170 million, 270 kilometers)
- c) From Asyut to Qena (260 kilometers).
- d) From Qena to Aswan (270 kilometers).





II. EXPORT PIPELINES

SINAI / EL ARISH PIPELINE

In 2000, IEOC completed the construction of a pipeline running south from Port Said, under the Suez Canal to the town of El Arish on the north Sinai coast to supply gas for local power needs in the El Arish area.

THE ARAB GAS PIPELINE PROJECT

- PHASE I

Phase I from El-Arish in the Sinai, to the Jordanian port of Aqaba (10 billion cubic meters per year (bcm/y), 965 mmcf/d capacity pipeline). This phase of the project encompassed the laying of a 36-inch overland pipeline, running for 248 kilometers from El Arish to the Gulf of Aqaba, a 26-inch, 18-kilometer subsea section to the Jordanian coast, and a 12-kilometer section running to the reception terminal close to the port of Aqaba.

- PHASE II

Phase II from Aqaba to the city of El Rehab on the Jordan-Syria border (36-inch, 393-kilometer pipeline)

The pipeline has a capacity of 6.6 bcm/y (640 mmcf/d) and cost \$300-350 million to construct.

- PHASE III

Phase III to the Deir Ali power station in Syria (342-kilometer pipeline). The pipeline was completed in Q1 2008 at an estimated cost of \$400 million. Initial gas sales along this section are estimated at 1bcm/y (100 mmcf/d).

- PHASE IV

Phase IV is yet to be agreed. It was envisaged that the pipeline would be extended through Syria and on into Lebanon and Turkey, possibly reaching other Arab and European destinations. However, following changing supply/demand dynamics, Egypt's domestic market will take priority.

EAST MEDITERRANEAN GAS PIPELINE

In June 2005, Egypt signed a memorandum of understanding (MoU) to supply Israel with 1.7 bcm/y (165 mmcf/d) of natural gas for a 15-year period, with an option for a five-year extension. This was later increased to around 200 mmcf/d up to 2028. In order to facilitate the exports to Israel, a new \$2.5 billion subsea pipeline was constructed from the Egyptian town of El Arish to the Israeli coastal city of Ashkelon.

Sales commenced in May 2008, but were the subject of significant price revisions, which came into effect on June 1, 2009. Following regime change in Egypt in 2011, the pipeline was subject to repeated sabotage around the El Arish area in Sinai. The deal was widely unpopular in Egypt and was eventually cancelled in 2012.

The pipeline is currently under arbitration with a Swiss court upholding a ruling that EGPC and EGAS would have to pay \$ 2 billion to the Israel Electric Corporation. In 2018, Delek announced its intension to purchase a stake in the East Mediterranean Gas (EMG) pipeline as a way of securing an import route for Leviathan and Tamar gas into Egypt.



III. LNG EXPORTS

Egypt and Algeria are the only two North African countries that have LNG terminals. In Egypt, there are two LNG facilities, both of which have been inactive since 2013 as the government chose to use its natural gas for domestic purposes.

The LNG facilities are controlled by the **Spanish Egyptian Gas Company (SEGAS)** and the **Egyptian Liquefied Natural Gas Company (ELNG)**. The two facilities are located in Damietta and Idku, east of Alexandria, respectively.

SEGAS's Damietta plant operates as an LNG tolling facility. Gas supplies were initially provided by the Temsah fields and Ha'py Development Area operated by BP and Eni via the national gas grid. In addition, Scarab and Saffron fields in the West Delta, owned by Shell/Petronas, have also supplied the facility. The Abu Qir field, operated by Edison, was also expected to send gas to Damietta from 2012; however, supply was diverted to the domestic market due to local demand.

ELNG was created in 2001 when EGPC and Edison signed an agreement with Shell to develop an integrated LNG



export project in Egypt. Shell and Edison's proposal was strengthened by the significant undeveloped gas fields in the WDDM block established by them.

The project is a two-train LNG facility on the Mediterranean Coast with a capacity of 10 bcm/y to export the Egyptian LNG to France, Europe and USA. The first cargo from ELNG was shipped on May 29, 2005. ELNG acts as a tolling facility with the upstream suppliers paying a tariff for the liquefaction service.



It is worth mentioning that the Idku facility came back to work, as Shell started exporting natural gas from its offshore Burullus and Rosetta fields. In February 2019, the LNG exports from Idku facility increased reaching 800 mcf/d, El Molla told the local media.

Despite Egypt's history of being a natural gas exporting country, it turned into an importing country for four years. As a result, FSRUs have become an asset for its natural gas imports.

Following the political unrest in 2012, Egypt issued an initial tender to import LNG. This tender was reissued and Höegh Gallant was selected to be the first FSRU to arrive in 2015. EGAS approved short-term supply contracts with traders and international companies for LNG deliveries in 2015 and 2016. Höegh Gallant was located at the port of Sokhna in the Red Sea with a regasification capacity of 0.5 bcf/d.

With the increasing need to import LNG, the second FSRU, BW Singapore, was delivered in September 2015 with a maximum regasification capacity of 0.75 bcf/d. The two

units combined have a total rental value of \$320,000 per day.

In June 2016, EGAS launched a tender for a third FSRU with 0.75 bcf/d capacity, before later putting it on hold. In 2017, Egypt used only 50% of the FSRUs combined capacity, which was expected to decrease by time.

In October, Höegh Gallant FSRU left the Egyptian coast heading to the US Sabine Pass production facility. The company agreed with Egypt on an early termination of the rent contract. Egypt was using the Höegh Gallant as a FSRU, while the new renter will be using it as a regular LNG carrier.

In order to charter the unit as an LNG carrier to a third party, Höegh LNG and EGAS have agreed that the Egyptian company will compensate for the rate difference between the original FSRU contract and the new LNG carrier time charter.

Egypt was previously using two FSRUs. However, following the country's plan to halt LNG imports, the MoP announced that only one FSRU would remain in Egypt, which would be used as part of the ministry's strategy to secure energy supplies.

4. LEGAL FRAMEWORK

Prior to 2017, the natural gas activities in Egypt were covered by law No. 217 of 1980. Under this law, EGAS was responsible for all operations relating to transportation and domestic supply of natural gas to different sectors. Private companies were allowed to construct and operate gas pipelines as well; however, carrying out these activities depended on EGAS's approval and monitoring.

The decreasing domestic supply and the growing domestic demand of natural gas forced Egypt to start importing natural gas. Over the past few years, the state has invested billions to close this supply-demand gap. As a result, the government made the decision to liberalize the natural gas market. EGAS and EGPC announced in May 2015 the decision to allow private companies to use the state-owned national gas grid to import, transfer, and distribute natural gas to the local market.

The decision to liberalize was enshrined in law in July 2017, when EGAS and EGPC declared the issuance of the Gas Market Law No. 196 for 2017. At the same time, it was announced that the market would be fully liberalized by 2022. In February 2018, the law was followed by the promulgation of the executive regulation to implement the law.

The new Gas Market Law includes 53 articles divided into five sections. The first section includes definitions of the terminologies mentioned in the law and their field of application. The second section refers to the establishment of an independent regulatory body, called the Gas Market Regulatory Authority (GMRA), while the third section of the law breaks down the rules governing the different activities of the gas market and the obligations on different parties. The fourth section, explains the penalties in case of violations of the provisions of the law, in addition to granting the status of judicial control officers to the employees of the authority. Finally, the fifth section includes transactional regulations.

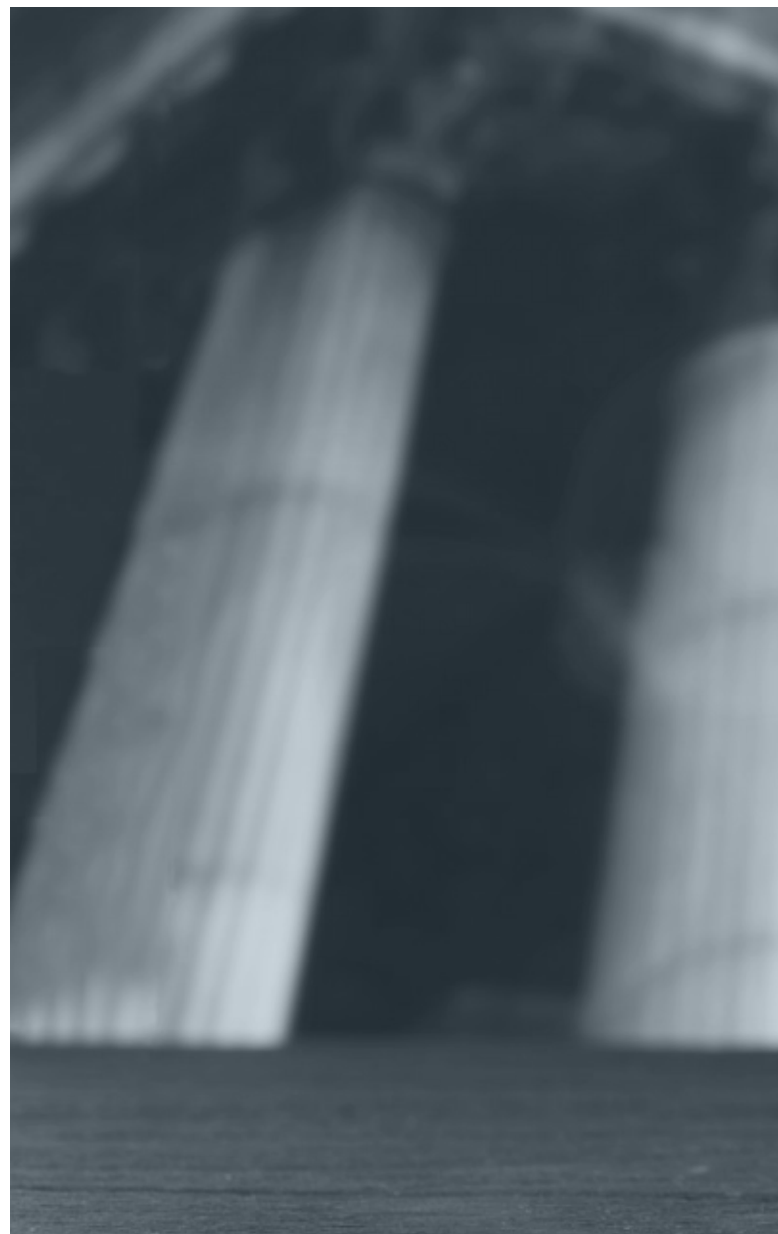
The GMRA, which held its first meeting in February 2018, was established by the law to regulate, follow up, and control all activities related to the natural gas market in Egypt. According to the Gas Market law, the authority's responsibilities include ensuring that natural gas infrastructure remains functional, and maintaining a competitive market, free of monopolistic practices.

The second section of the law gives further explanation on the authority's mandate. It is responsible for granting and renewing operation licenses, establishing regulations for the

use of the national gas grid, facilitating the transportation process of natural gas, and establishing mechanisms for calculating tariffs.

The authority will set the market mechanism for the importing, re-gasification, transportation, distribution, and storage of natural gas, as well as setting its own financial resources and revenue streams.

Companies wanting to import and sell natural gas in the



domestic market have to submit natural gas purchasing documentation from a supplier, a proof of composition of the natural gas imported, a contract with a local buyer, and financial documentation proving the strong standing of the importing company for the previous three years. If the company provides this required documentation, the authority gives it a six-month initial approval. During the six months, the company has to obtain final approval, or the process starts from scratch again.

The issuance of the law should encourage private companies to enter the game of importing natural gas. By October 2017, three companies were able to achieve the initial approval needed to import and distribute natural gas in the domestic market, according to Amira El Mazni, former vice chairman for the gas regulatory affairs. The companies that were given the approval were TAQA Arabia, Fleet Energy, and BB Energy. At the same time, another four companies were in the process of obtaining the initial approval, one of which was Toyota.





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RESEARCH & ANALYSIS





NATURAL GAS & THE ECONOMY

Egypt is one of the biggest energy markets in the Middle East and North Africa (MENA) region. Energy is one of Egypt's leading economic sectors, and the country has a relatively well-developed energy infrastructure - especially for natural gas. Natural gas

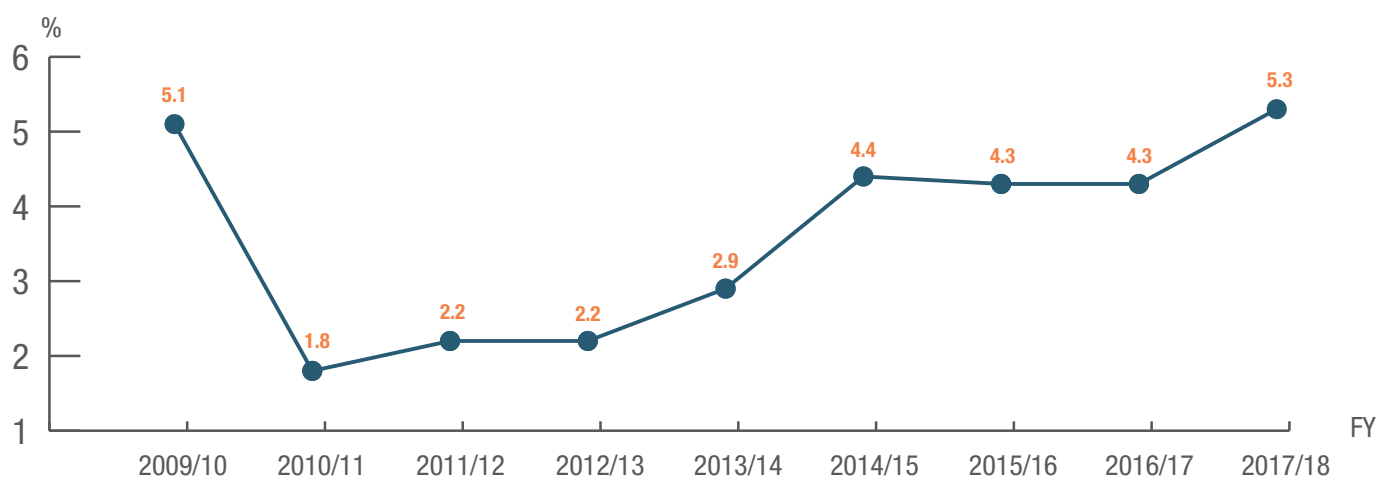
contributed an average of 5.9% to the country's GDP between FY 2010/11 and FY 2017/18, according to MPMAR figures. Moreover, it represents an average of 12% of the total investments in Egypt according to the MPMAR.

1. NATURAL GAS' CONTRIBUTION TO GDP

Egypt's real GDP has fluctuated greatly since 2010 due to the dramatic political, economic, and social changes experienced by the country. It sharply declined from 5.1% in FY 2009/10 to around 1.8% in the following fiscal year. Real GDP slightly increased to 2.2% in FY 2011/12, and continued to slowly rise over the next two financial years.

During the comparison period, the country has seen two major growth surges. The first came in FY 2014/15 when GDP increased dramatically from 2.9% to 4.4%. The second saw growth rise from 4.3% to 5.3% in FY 2017/18.

REAL GDP GROWTH RATE FY (2009/10-2017/18)

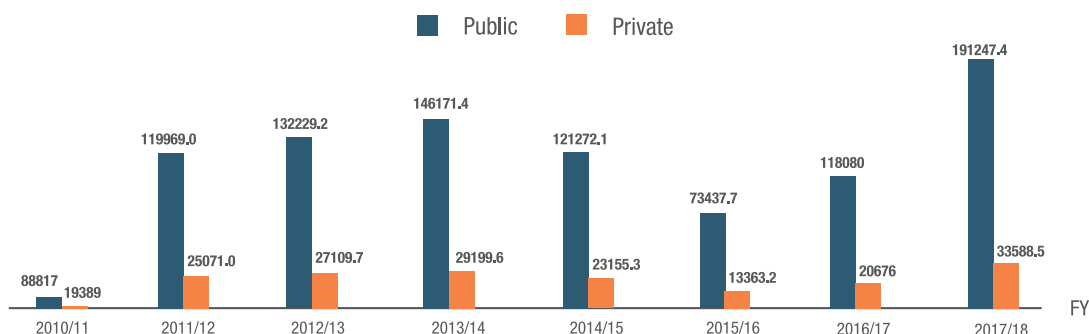


Source: MPMAR

Natural gas contributed more to the GDP of the public sector than to the private one during the comparison period. During FY 2010/11, natural gas activities contributed with EGP 88817 million to the public sector's GDP and EGP 19389 million to the private sector's GDP. In FY 2013/14, public sector production had risen by 64.6% and private sector GDP contribution had grown by 50.6%.

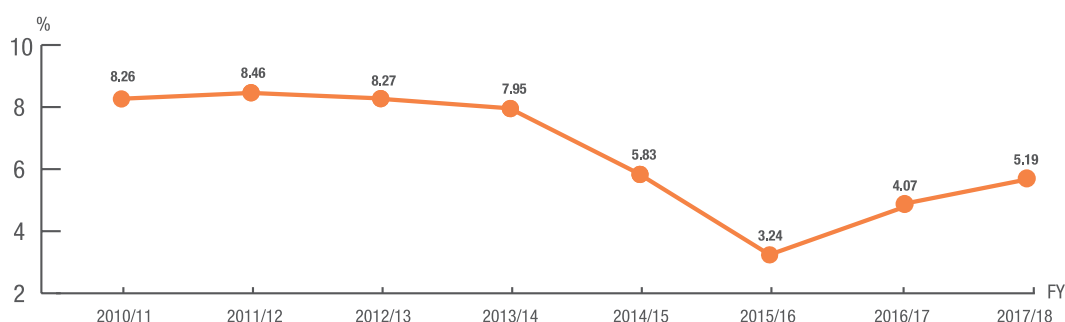
After reaching the peak during FY 2013/14, the natural gas activities for the public and private sectors dropped to EGP 73437.7 million and EGP 13363.2 million respectively in FY 2015/16. Meanwhile, this decline was erased during FY 2017/18 as the GDP reached its peak recording EGP 191247.4 million and EGP 33588.5 million in the public and private sectors respectively.

NATURAL GAS PUBLIC AND PRIVATE GDP (CURRENT PRICES/MILLION EGP) FY (2010/11-2017/18)



Source: MPMAR

NATURAL GAS CONTRIBUTION TO GDP (%)

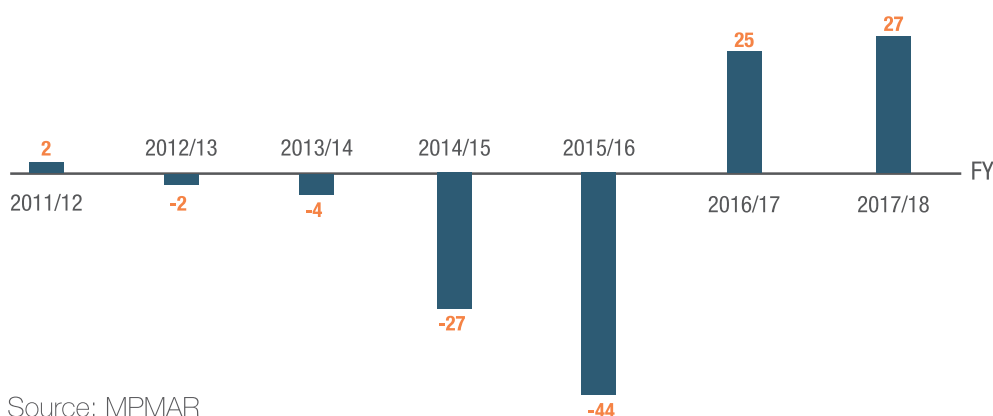


Source: MPMAR

The above percentages tell a different story than the absolute numbers. The percentage of natural gas share in GDP declined between 2012-14 despite the value growing as FY 2013/14 witnessed the highest absolute contribution of

natural gas activities in Egypt's GDP. However, FY 2011/12 recorded the highest proportional share with 8.27% of the GDP.

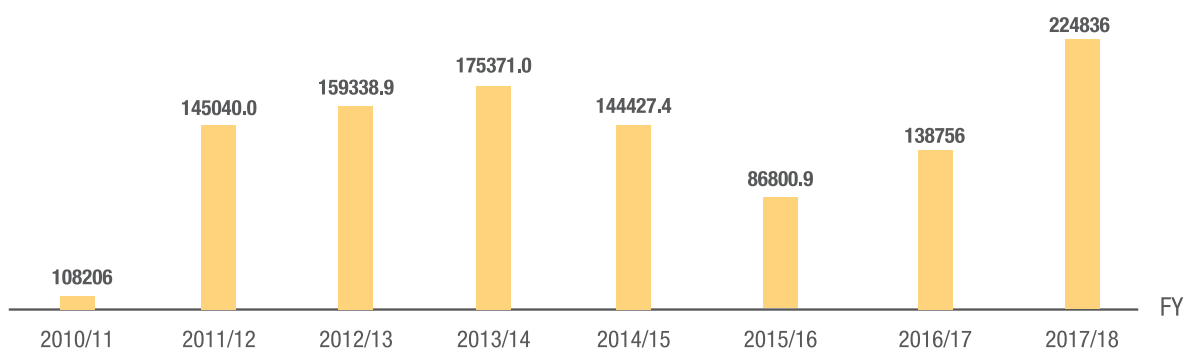
CHANGE IN NATURAL GAS CONTRIBUTION TO GDP (%)



Source: MPMAR

The general trend shows that the share of natural gas activities in GDP decreased at a growing rate from FY 2012/13 to FY 2015/16. The average contribution of natural gas activities to GDP from FY 2010/11 to FY 2017/18 was around 5.9%.

NATURAL GAS TOTAL GDP (CURRENT PRICES/MILLION EGP) FY (2010/11-2017/18)



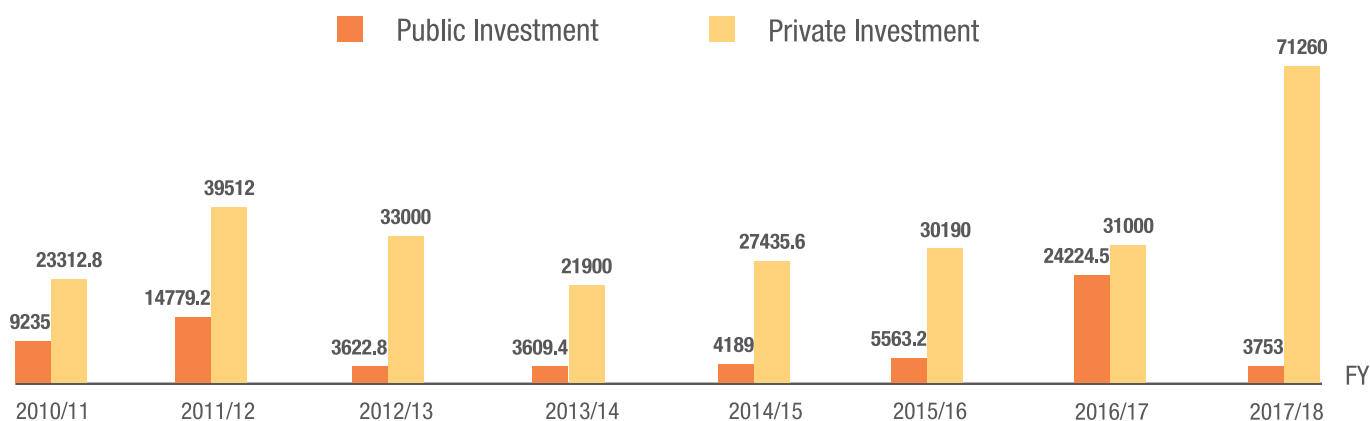
Source: MPMAR

2. NATURAL GAS SHARE IN INVESTMENT

Although natural gas activities in the public sector contributed more to real GDP during the period, the bulk of investment into the sector came from private source. In fact, over the

eight years natural gas activities received over four times more private investment than public investment.

NATURAL GAS PUBLIC AND PRIVATE INVESTMENTS (CURRENT PRICES/ MILLION EGP)

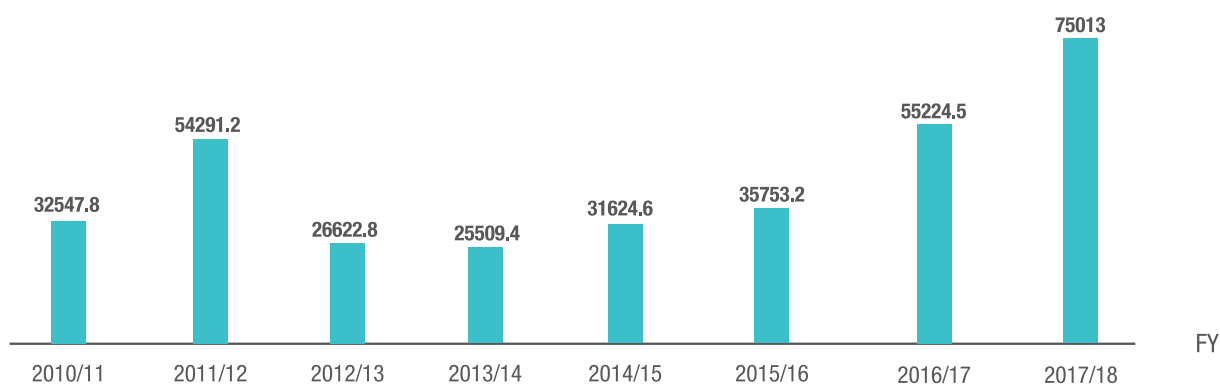


Source: MPMAR

Natural gas private investment declined to its lowest level during the comparison period in FY 2013/14, recording EGP 21900 million. Similarly, public investment reached its lowest level in the same year, contributing only EGP 3609.4 million. Overall investment, therefore, hit a low of EGP 25509.4 million in that year.

Private natural gas investments reached a peak in FY 2017/18, recording EGP 71260 million, while the public investments reached a peak of EGP 9235 million in FY 2010/11.

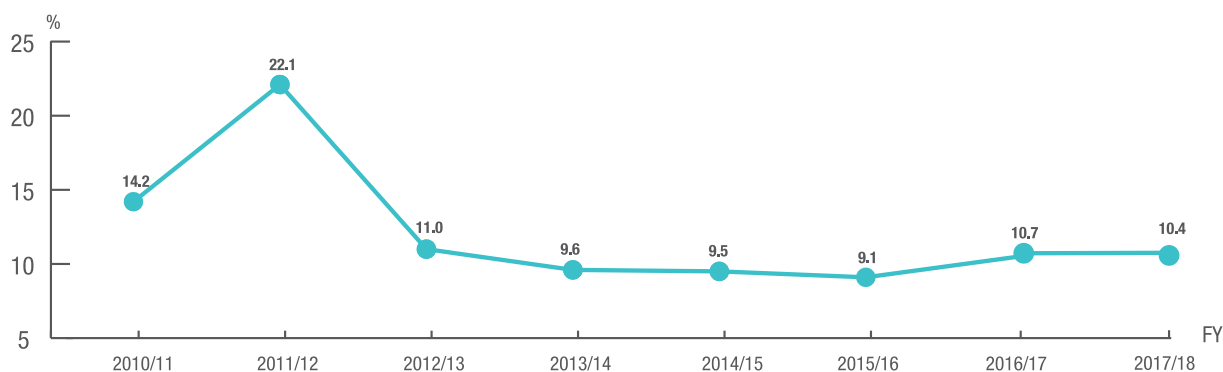
TOTAL INVESTMENT IN NATURAL GAS (CURRENT PRICES/ MILLION EGP)



Source: MPMAR

From FY 2010/11 to FY 2017/18, total natural gas public investment amounted to EGP 68976.1 million, while total natural gas private investment reached EGP 277610.4 million. Overall natural gas investments over the comparison period reached EGP 346586.5 million.

NATURAL GAS SHARE IN INVESTMENT (%)

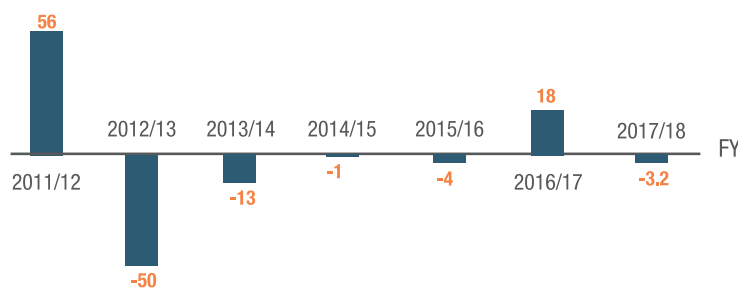


Source: MPMAR

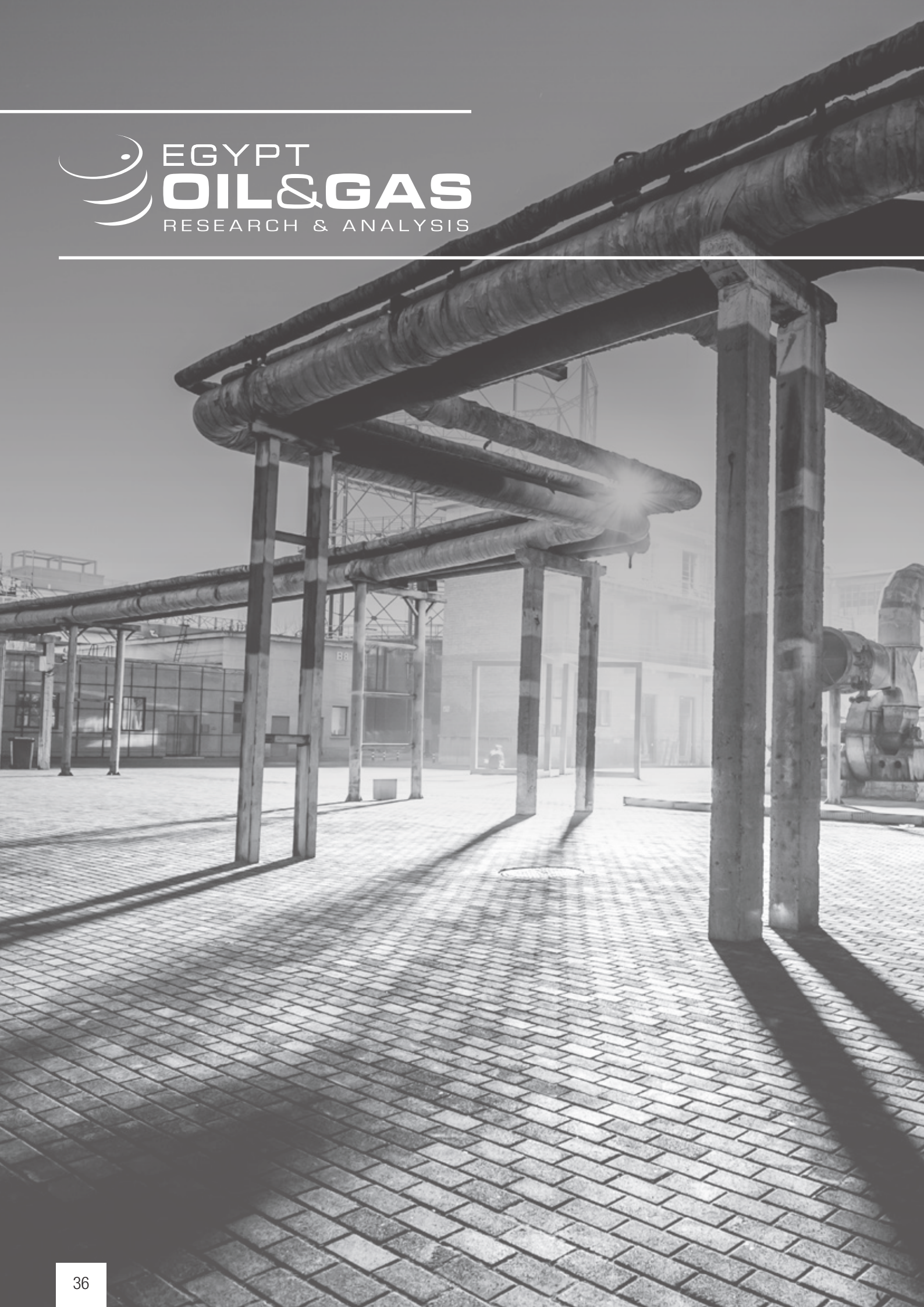
The highest percentage of natural gas investment as a share of the total inward investments in the Egyptian economy was achieved in FY 2011/12. Natural gas activities represented approximately 22% of the total investments that took place in Egypt in this fiscal year. Nevertheless, this declined dramatically in the following year, decreasing by 50% and representing only 11% of the total inward investments.

Moreover, the share of natural gas investments compared to other sectors hit a low of 9.1% in FY 2015/16. However, in FY 2016/17 and FY 2017/18, natural gas share started to increase to reach 10.74% and 10.4% respectively.

CHANGE IN NATURAL GAS CONTRIBUTION TO INVESTMENT (%)



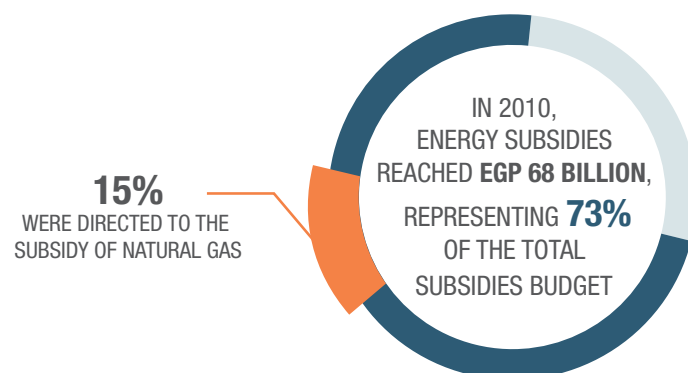
Source: MPMAR





MARKET DYNAMICS

1. NATURAL GAS SUPPLY



Source: African Development Bank

Egypt was once one of the most significant natural gas exporters in the Eastern Mediterranean region due to its supply surplus. However, the country's production has been continuously declining during recent years. This meant that Egypt was forced to transition from being a gas exporter to becoming a net importer between 2013 and 2015.



From 2011-2015, Egypt's natural gas market has faced sharp vicissitudes. The rapid changes in both natural gas supply and demand directly affected market dynamics as a result.

Natural gas supply was negatively affected after production was hit by the economic and political instability in the country, and investments in the upstream sector began to decline in FY 2012/13. In addition, the downstream sector experienced issues, as the natural gas supply flow decreased due to the national security hazards related to Egypt's eastern natural gas pipelines.

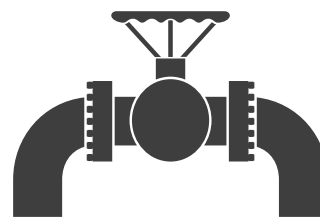
As well facing declining production, the natural gas market experienced increasing local demand. The energy subsidy program that caused relatively low prices of natural gas drove the local market to irrationally increase their consumption of natural gas and other energy sources, according to a paper published by the Oxford Institute for Energy Studies, in 2018.

Energy subsidies were a tool used by the government in order to relieve the financial burden from the low and middle-income classes. However by 2010, energy subsidies reached EGP 68 billion, representing 73% of the total subsidies budget - of which 15% were directed to the subsidy of natural gas, according to the African Development Bank.

The sections below provide a deeper look into the market movements by identifying and analyzing different trends in the natural gas market. This is backed up by analysis of natural gas discoveries.

I. NATURAL GAS PRODUCTION

According to official figures, Egypt's natural gas production was almost stable between FY 2010/11 and FY 2011/12, with a slight decrease from approximately 46.3 million tons equivalent per year (mtoe/y) to 46.07 mtoe/y. Since FY 2012/13, the level of production has been declining steadily. Annual production reached its lowest level of 31.3 mtoe/y in FY 2015/16, before recovering slightly in FY 2016/17 to reach 31.9 mtoe/y. The MoP succeeded to increase the average daily production to reach 6.6 bcf/d in 2018.



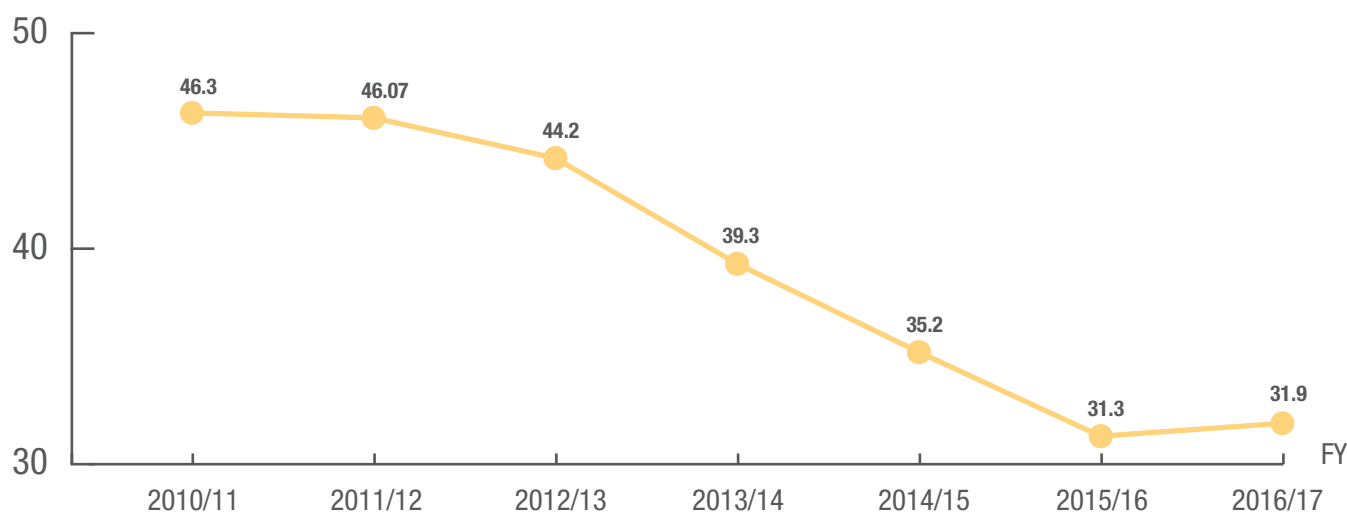
On average, Egypt produces approximately **39.2 mtoe/y** of natural gas

Source: Calculations Based on MPMAR Data

On average, Egypt produces approximately 39.2 mtoe/y of natural gas, which makes it the fifth largest natural gas producer in the Organization of Arab Petroleum Exporting

Countries (OAPEC) during the comparison period. In terms of percentage share, Egyptian production represents 8% of the total amount produced by OAPEC member states.

NATURAL GAS PRODUCTION (MILLION TONS EQUIVALENT/YEAR)



Source: MPMAR

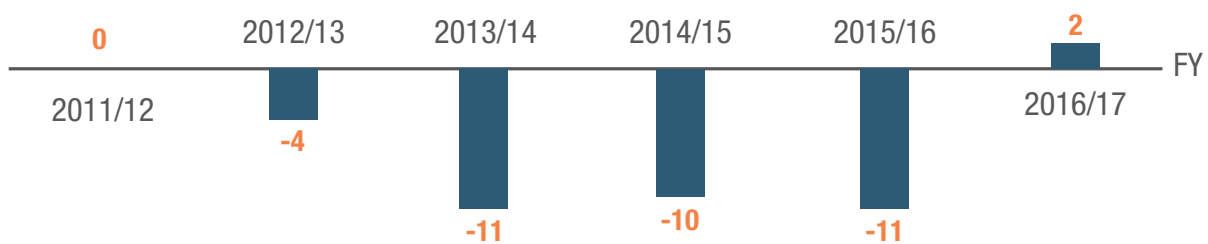
Figures show that Egypt's gas production has experienced negative growth rates. The sharpest falls in production occurred during FY 2013/14 and FY 2015/16, with production witnessed an 11% reduction. According to MPMAR, this took

place due to two main reasons: low underground pressure in specific fields and delays in the implementation of a number of planned development projects.

This period of decline ended in FY 2016/17 when production increased by 2%. This was mainly due to the launching of production from the North Alexandria field development projects in addition to five wells that were brought online in the Nooros field. In addition, the second well of Ras Al Bar

field development project (Phase III) was launched, and the first well of the North Abu Qir-3 rig project came on stream. Moreover, the Apollonia reservoir development project (Phase I) started production. The primary production rates of these projects reached 1410 million cubic feet per day (mcf/d).

NATURAL GAS PRODUCTION GROWTH RATE (%)



Source: Calculations Based on MPMAR Data

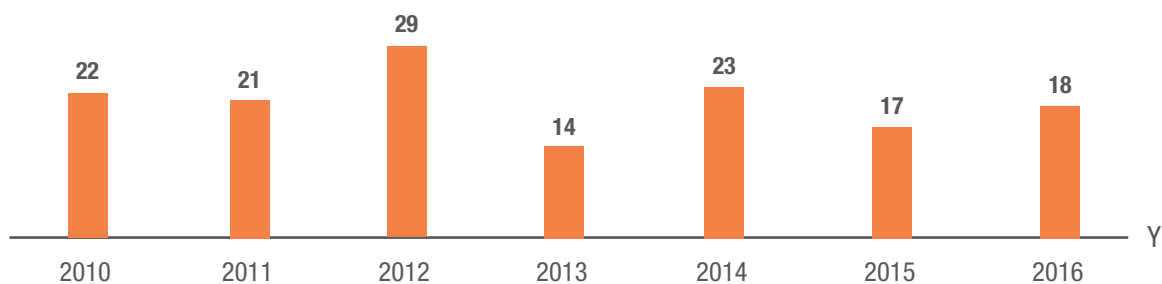
II. NATURAL GAS DISCOVERIES

Egypt made a record 29 natural gas discoveries in 2012, before recording its lowest annual discovery levels in 2013 with only 14, according to MPMAR. During the comparison period, Egypt made on average 21 natural gas discoveries annually, which makes Egypt the highest ranking OAPC country in terms of natural gas findings. Egypt's accounts

for 52% of the OAPC natural gas discoveries, according to OAPC data.

The contradiction in Egypt's position concerning natural gas production and discoveries is mainly due to the capacity of these discoveries or the amount produced by each discovery.

NATURAL GAS DISCOVERIES (DISCOVERIES/YEAR)

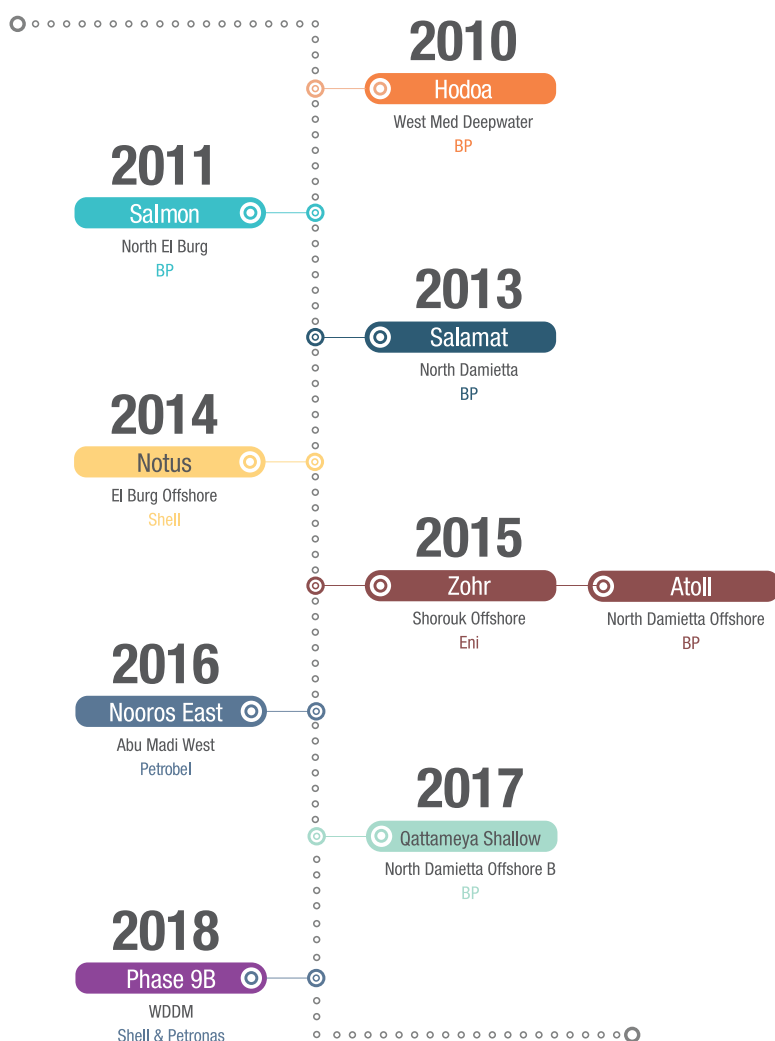


Source: MPMAR

On average, Egypt makes
21 natural gas discoveries
annually

Source: Calculations Based on MPMAR Data

LARGEST NATURAL GAS DISCOVERIES (2010-2018)



Production from Nooros, the Nile Delta offshore field, started in August 2015 and by 2016, the average daily production of the field reached 900 million cubic feet per day (mmcf/d).

In 2017, the level of production recorded the targeted production of one billion cubic feet per day (bcf/d) and it continued to increase in 2018.



The production of Nooros Field increased to reach **1.2 bcf/d**

Source: MoP

One of the promising upstream gas developments is that of the Atoll offshore field. The field was discovered in March 2015 and located in the North Damietta area.

It started producing 300 mmscf/d in December 2017 and increased to 350 mmscf/d in February 2018, less than three years after discovery and seven months ahead of schedule.

Atoll Field

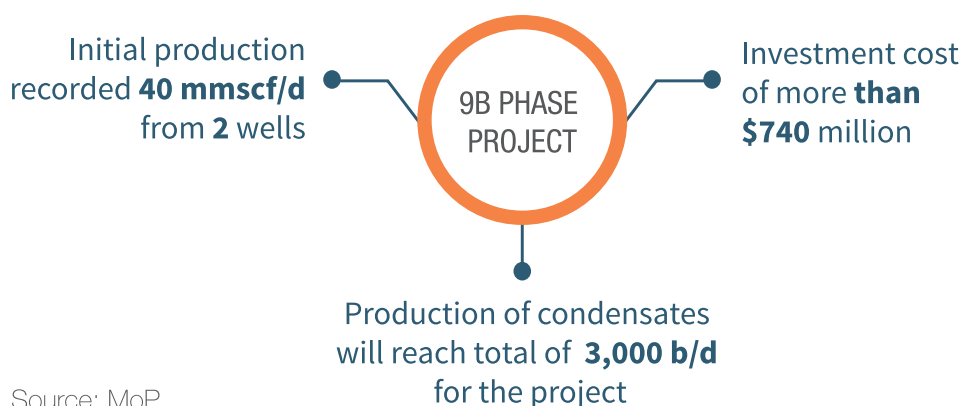
Started operating in **2017**, in **North Damietta deepwater**

Initial production reached **350 mmscf/d** of natural gas and **9,000 b/d** of condensates

Source: MoP

Among the key expansion projects under consideration is the Burullus Phase 9B project in the WDDM concession. The field was added to the production map in 2018 where its initial production recorded 40 mmscf/d, from two wells, out

of total production of 400 mmscf/d. As for the condensates, the production will reach total of 3,000 b/d, for the project, through eight developments wells and two exploratory wells.



Source: MoP

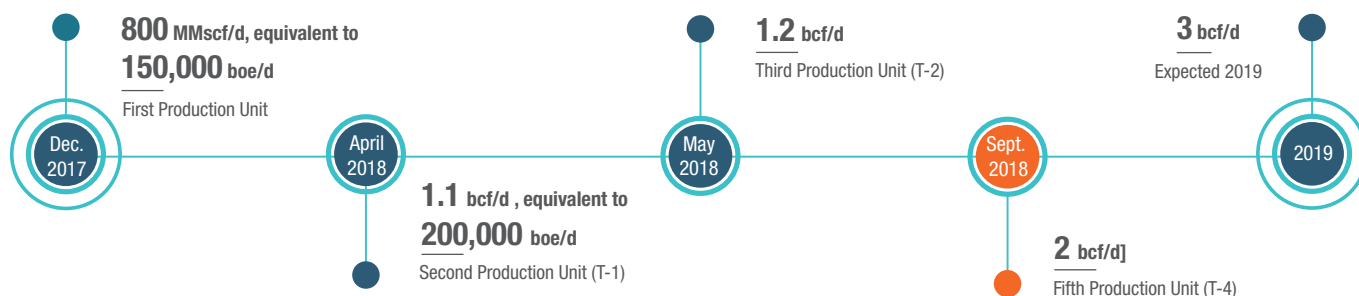
III. ZOHR: THE GAME CHANGER

The discovery of Zohr, in particular, has raised prospects for a rapid turnaround in the country's natural gas reserves and production. The field is located offshore in the Shorouk Block, and was discovered in August 2015. It holds the largest natural gas reserves in the Mediterranean.

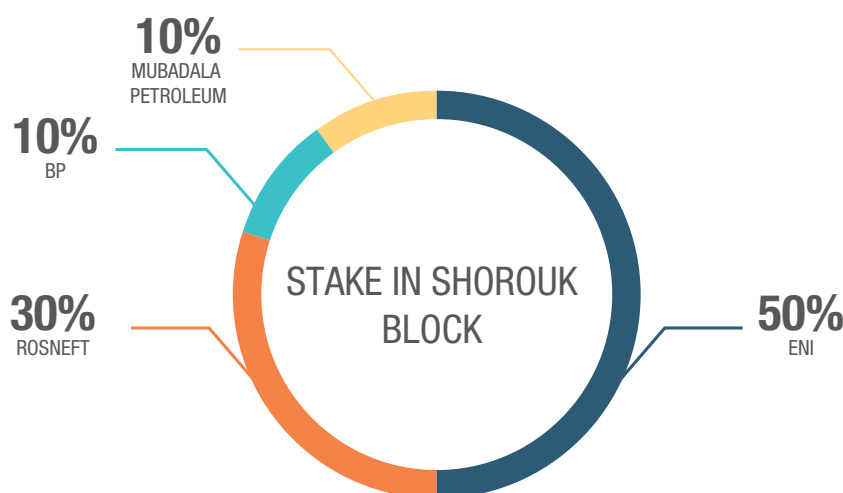
Field operator and majority stakeholder Eni estimates that Zohr could potentially hold around 30 tcf of gas. Thus, the field is expected to satisfy part of Egypt's natural gas demand for decades to come. The Italian company began production from the field in December 2017.

Four months after the field's start-up, Eni announced the start-up of the second production unit (T-1) of the Zohr project, which doubled the installed capacity to 800 million standard cubic feet per day (mmscf/d). One month later, the start-up of the third production unit (T-2) was announced, increasing the installed capacity to 1.2 bcf/d and producing 1.1 bcf/d in the ramp-up. The fifth production unit (T-4) was put online in September, increasing the production by 66.67%. The production ramp-up is planned to continue in order to plateau at 3 bcf/d in 2019.

ZOHR DEVELOPMENTS



Source: Eni and EGAS



Source: Eni

2. NATURAL GAS DEMAND

The continued rapid growth in domestic demand for natural gas represents a major challenge for the Egyptian government when it comes to maintaining the sustainability of its growth. Over the last decade, the shortage in natural gas supply

and the country's economic situation combined led to a decline in the Egyptian natural gas demand rates. However, the domestic Egyptian market still consumes large volumes of natural gas, especially for generating power.

I. NATURAL GAS CONSUMPTION

Egypt's gas consumption reached its highest level in FY 2016/17 with 41.5 mtoe/y. On the other hand, it reached the lowest level in FY 2010/11 with 35.2 mtoe/y, according

to MPMAR. The Egyptian domestic market, on average, consumes 37.8 mtoe annually which represents approximately 14% of the natural gas consumed across OAPPEC countries.



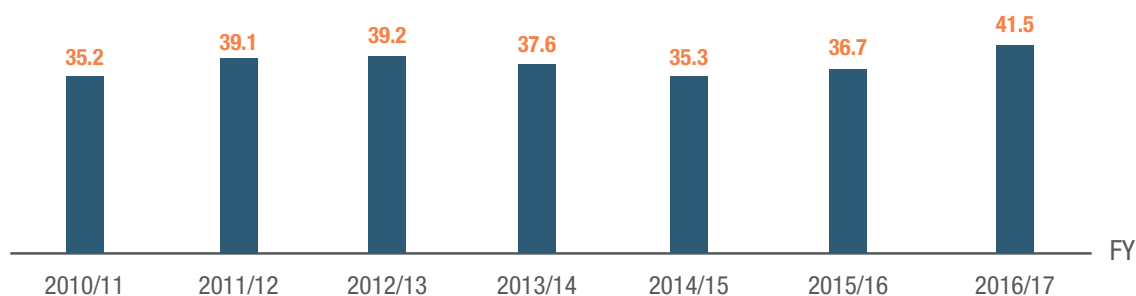
The Egyptian domestic market, on average, consumes
37.8 mtoe/y

Source: Calculations Based on MPMAR Data

Egypt is the fourth largest natural gas consumer in OAPPEC, following Saudi Arabia, the United Arab Emirates, and Qatar. Egyptian consumption significantly increased from FY

2010/11 to FY 2012/13 by 4 mtoe/y. After that, consumption witnessed a decline until FY 2014/15, and increased once more in FY 2015/16.

NATURAL GAS CONSUMPTION (MILLION TONS EQUIVALENT / YEAR)



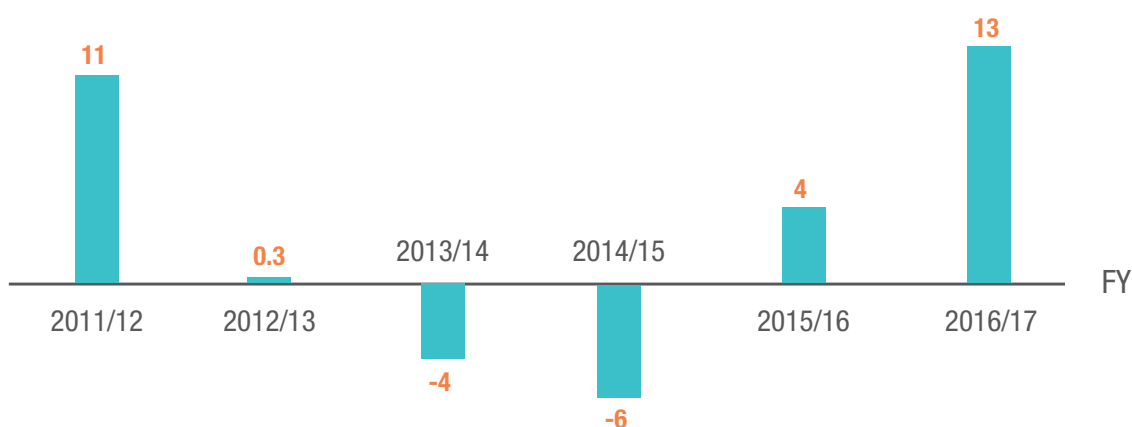
Source: MPMAR

Natural gas consumption increased by 11% from FY 2010/11 to FY 2011/12. This was a relatively remarkable increase in consumption compared to the petroleum products, which rose by only 1.3%, MPMAR reported.

Following FY 2011/12, consumption declined sharply as it reached the lowest growth rate in FY 2014/15 (-6%) due to

limitation in supply. Natural gas consumption recovered its growth rate in FY 2015/16, before reaching a peak of 13% in FY 2016/17. This peak was a result of the growing reliance on natural gas for generating electricity, in addition to the expansion of the natural gas grid to deliver natural gas to households and commercial units, Oxford Energy Institutes' paper noted.

NATURAL GAS CONSUMPTION GROWTH RATE (%)



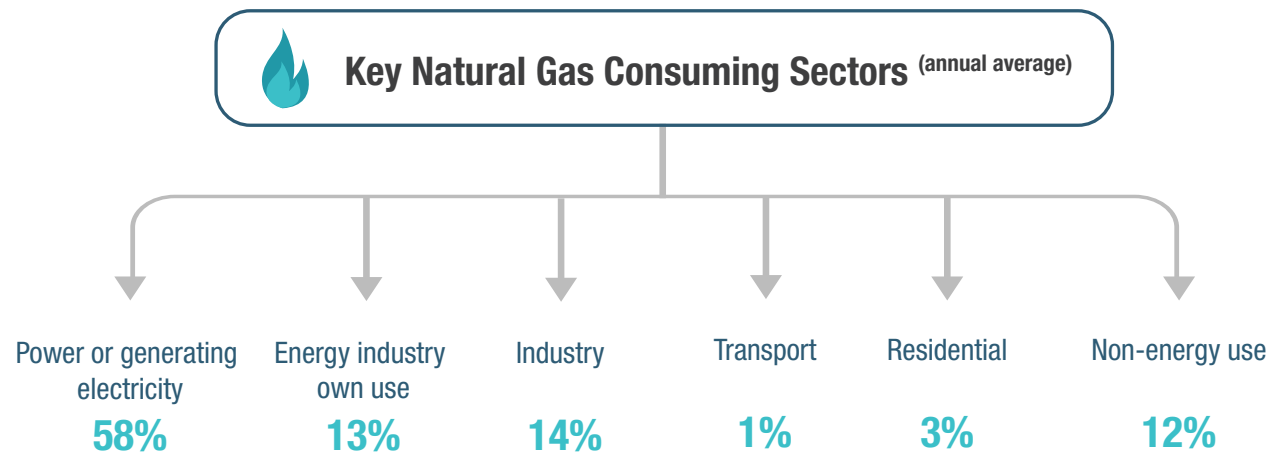
Source: Calculations Based on MPMAR Data



II. NATURAL GAS CONSUMPTION BY SECTOR

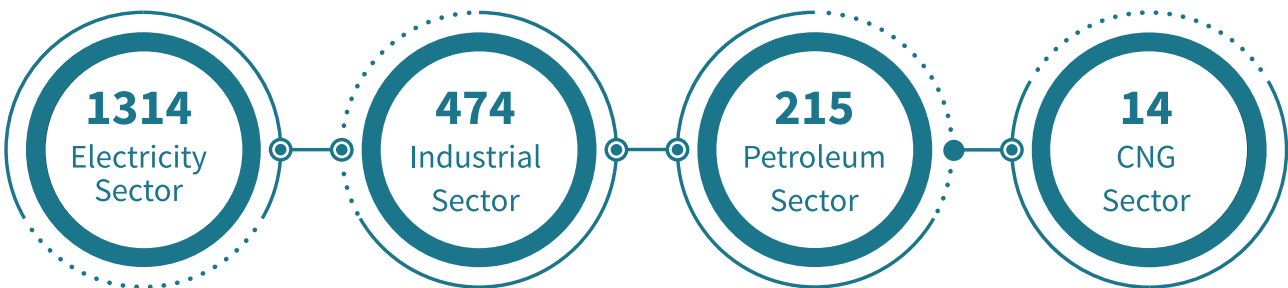
Natural gas in the Egyptian domestic market is mainly consumed by six sectors: electricity, energy, industry, transport, residential, and non-energy as feedstock in petrochemical industries.

During the period from 2010 to 2016, the electricity sector dominated natural gas consumption, followed by the industrial sector. The transport and residential sectors represented the smallest portions in natural gas consumption.



Source: EGAS & EIA

NATURAL GAS CONSUMPTION BY SECTOR IN FY2017/18 (BSCF)



Source: EGAS



POWER

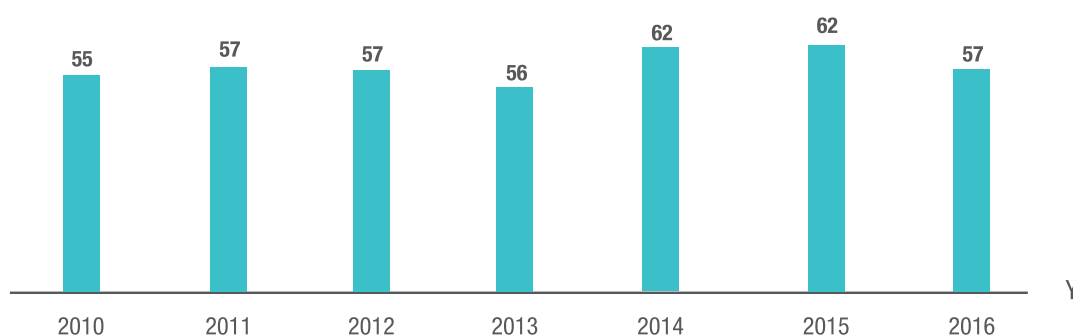
Despite the Egyptian government's plans to diversify the country's energy mix, it is expected that natural gas will remain the main energy source used to generate electricity at least in the next decade.

During FY 2017/18, power generation represented 63% of Egypt's total natural gas consumption. In 2016, the share of generating electricity in natural gas consumption reached 57%, which reflects a demand that is constrained by the

limited domestic supply. Therefore, the future of the natural gas balance depends mainly on the electricity sector's future natural gas demand.

The greatest demand for natural gas came in 2015 when electricity consumed almost two-thirds (62.4%) of the country's natural gas supply. On the other hand, the lowest share was in 2010 when it used slightly more than half (54.6%).

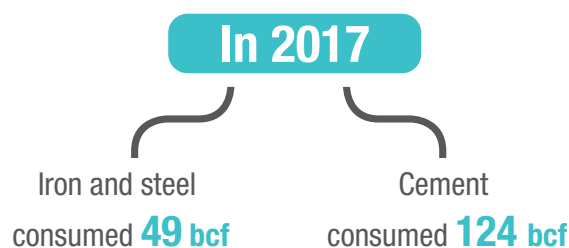
POWER CONSUMPTION OF NATURAL GAS (2010-2016)(%)



Source: Calculations Based on EIA Data

INDUSTRY

Energy-intensive industries consume the second-largest amount of natural gas. These include light industries like textiles and food, as well as heavy industries like steel and cement. According to EGAS, iron and steel manufacturers' used 49 bcf of gas in 2017, while cement consumed 124 bcf. This indicates the weight of both industries in consuming natural gas.



Source: EGAS



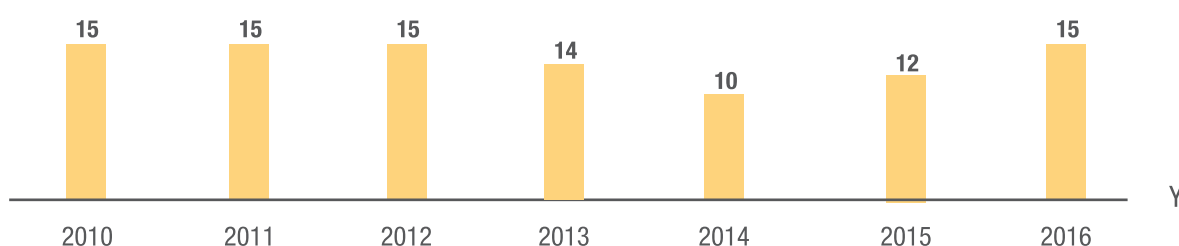


Concerning the cement industry, Egypt ranks as the 12th largest cement producer in the world and the largest producer in the MENA region. The recent gas supply shortage and the subsequent price rises pushed the cement and steel industries to reduce the production levels. Moreover, the cement industry started to convert to other energy sources such as coal.

The industrial consumption of natural gas as a fuel was similar during these years, although it dropped in 2014 and 2015.

The consumption of natural gas by industrial sectors reached 15% from 2010 to 2012, before decreasing slightly by 1% in 2013. The consumption declined sharply to reach 10% in 2014, and increased by 12% in 2015. In 2016, the natural gas consumption by industrial sector reclaimed its position with 15% of natural gas domestic consumption. According to EGAS, the industrial sector represented around 22% of the local natural gas consumption in FY 2017/18.

INDUSTRIAL SECTOR NATURAL GAS CONSUMPTION (2010-2016)^(%)



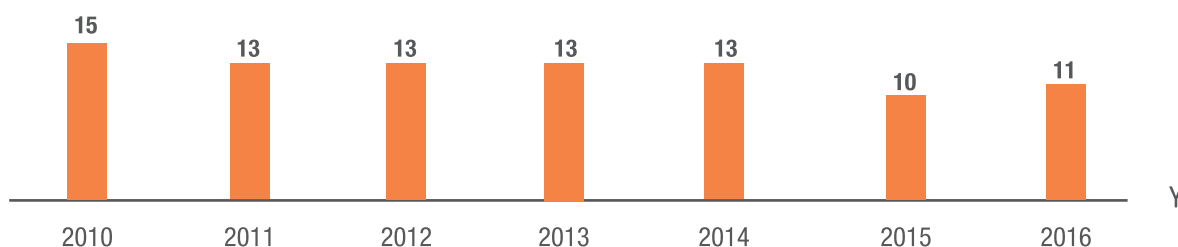
Source: Calculations Based on EIA Data

ENERGY INDUSTRY

The energy industry is the third most gas-intensive sector. Consumption remained almost constant between 2010 and 2014, using 14% of national gas supply annually. The share of the energy sector in natural gas consumption declined in 2015 to reach 10%, and then slightly increased by only

1% in 2016. This indicates the slowdown in hydrocarbon-based activities during this period, especially after the political unrest combined with the general slowdown in the Egyptian economy.

ENERGY SECTOR NATURAL GAS CONSUMPTION (2010-2016)^(%)



Source: Calculations Based on EIA Data



NON-ENERGY USE

Methane, the main component of natural gas, is used as a feedstock and as an input in petrochemical industries like fertilizers. Egypt is the largest producer and exporter of fertilizers in Africa. The latest available data shows that petrochemical industries used around 176.5 bcf for feedstock in 2016. The supply of natural gas to petrochemical factories was rationalized several times in order to meet the local demand on electricity.

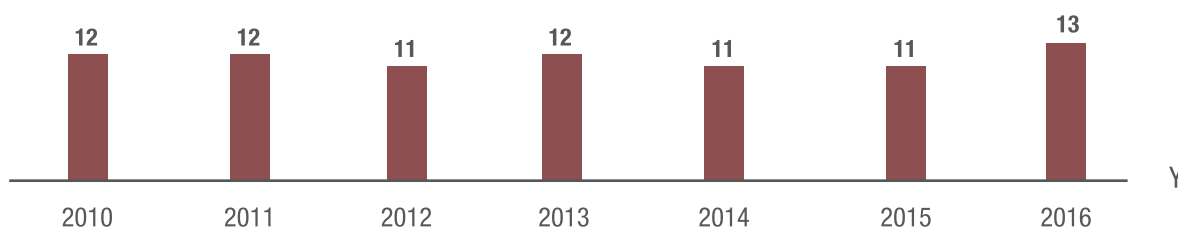
On average, petrochemical industries consume 12% of national gas supply each year. The consumption of natural gas was almost constant over the comparison period as

it faced very slight fluctuations that did not pass the unit percentage point.

It is worth noting that in FY 2017/18, the petroleum, gas derivatives and petrochemicals represented 10% of Egypt's domestic natural gas consumption.

The highest level of natural gas consumption by the petrochemical industry was in 2016, in which it reached 13% of the total natural gas domestic consumption. On the other hand, natural gas consumption by petrochemical industries reached its lowest level during 2014 and 2015, as it was 10.6% of the total domestic natural gas consumption.

NON-ENERGY USE CONSUMPTION OF NATURAL GAS (2010-2016)^(%)



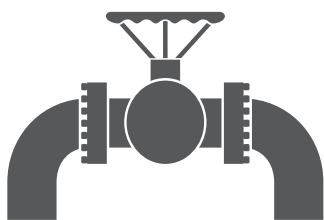
Source: Calculations Based on EIA Data



RESIDENTIAL AND TRANSPORTATION SECTORS

Transportation and residential sectors accounts only for about 5% of domestic natural gas consumption in Egypt. On average, the transport sector consumes 1% of the natural gas, while the residential sector consumes up to 4%.

The consumption of natural gas by the residential sector increased steadily from 2010 to 2015. This increase in natural gas consumption by households and commercial units was a result of several factors, including the growing population, the constant prices of gas, and government plans to link more households to the national grid. The number of households linked to the natural gas grid in Egypt exceeded a million in 2018. The residential sector represented 5% of the natural gas consumption in FY 2017/18.



72 city and village were connected to the national gas grid in **2018**

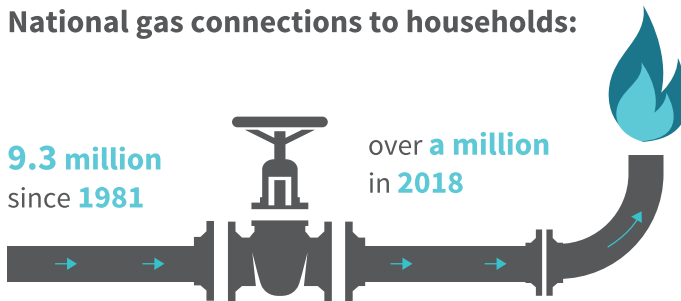
Source: MoP

The consumption of natural gas by households and commercial units increased over the years from approximately

National gas connections to households:

9.3 million
since **1981**

over **a million**
in **2018**



Source: MoP

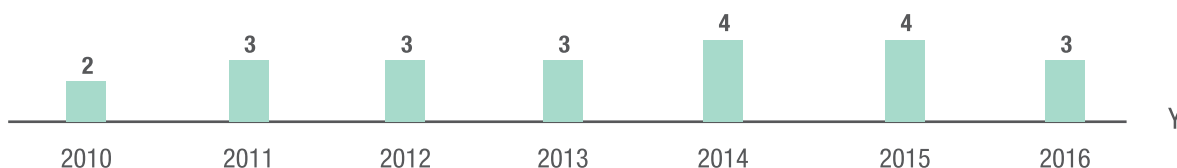


14,566 cars
have been converted into natural gas
from Jan- Dec **2018**

Source: MoP

2% in 2010 to reach 4.2% in 2015. In 2016, the share of the residential sector slightly decreased to reach 3%.

RESIDENTIAL SECTOR NATURAL GAS CONSUMPTION (2010-2016)^(%)

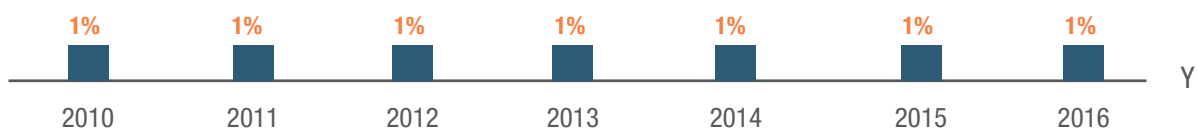


Source: Calculations Based on EIA Data

The share of transportation in national gas consumption was almost constant over the comparison period. This share did not pass 1%, except in 2012 when it reached a peak of 1.03%. On the other hand, the minimum share of transportation in natural gas consumption was in 2015, when it reached 0.86%. The usage of natural gas in the

transportation sector is very limited as, consuming only 17.65 bcf in 2016. This amount is relatively small in a country that suffers from extensive pollution problems. This is mainly derived by factors such as the high cost of conversion from regular fuel to natural gas, the lack of gas refueling stations, and the long time it takes to refuel.

TRANSPORTATION SECTOR NATURAL GAS CONSUMPTION (2010-2016)



Source: Calculations Based on EIA Data

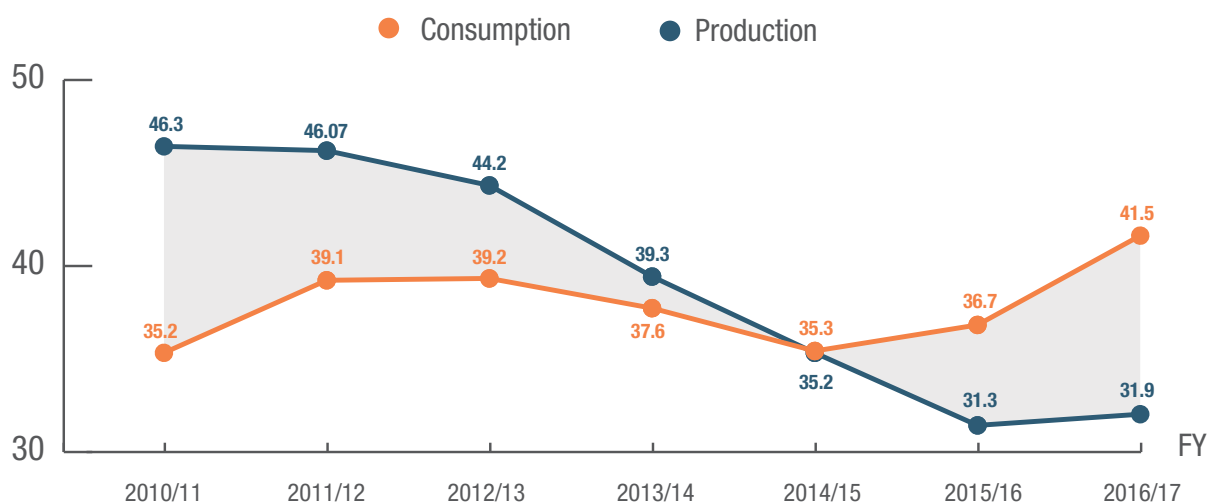
3. MARKET GAP

The production of natural gas mainly declined during the comparison period, while consumption tended to increase. This situation caused the market surplus to decline steadily, causing the shortage that led Egypt to import gas.

From FY 2010/11 to FY 2013/14, the natural gas market witnessed a positive market gap, meaning that the difference

between natural gas supply and demand was in favor of supply. However, the surplus declined from 11.1 mtoe/y in FY 2010/11 and reached 1.7 mtoe/y by FY 2013/14. The surplus turned to a deficit of -0.1 mtoe/y in FY 2014/15. This deficit continued to increase in the following years despite the rising gas production that happened in FY 2016/17.

NATURAL GAS MARKET GAP (MILLION TONS EQUIVALENT/YEAR)



Source: Calculations Based on MPMAR Data

4. GAS FLARING

Despite the shortage in the natural gas supply, Egypt continues to lose crucial amounts of natural gas. These losses come in the form of gas flaring.

Gas flaring, identified as the burning of natural gas associated with oil extraction, takes place due to several constraints including technical and economic constraints. Gas flaring causes millions of tons of CO₂ emissions annually. Moreover, it is considered a waste of important energy sources.

Egypt ranked 14th among the top 20 gas flaring countries in 2017, according to the World Bank's (WB) Global Gas Flaring Reduction Partnership (GGFR). While it continues to be a net natural gas importer, Egypt flares an annual average of 92.486 bcf of gas.



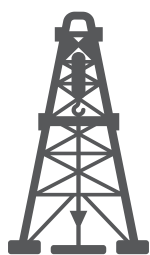
Egypt ranked the **14th** among the top **20** gas flaring countries in **2017**.

Source: The World Bank Global Gas Flaring Reduction Partnership (GGFR).



Egypt flares an annual average of **92.486 bcf** of natural gas.

Source: Calculations based on GGFR data

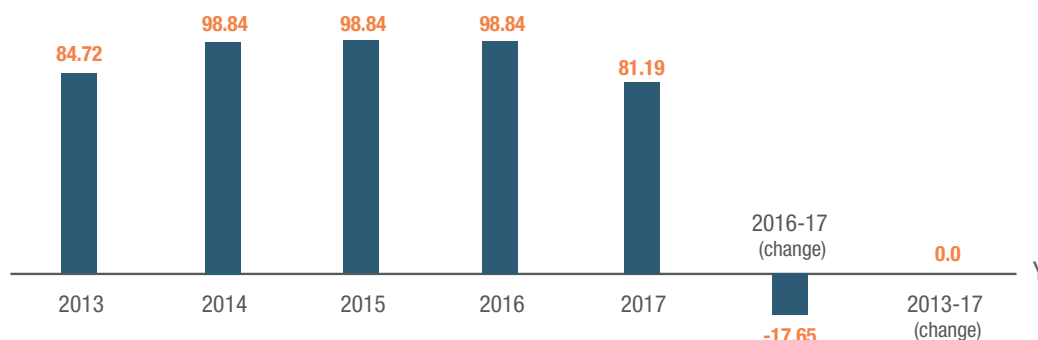


In 2017, Egypt recorded the **lowest gas** flaring level since 2013, burning **81.19 bcf** of natural gas, and losing the equivalent revenue of **\$ 250m**

Source: GGFR



GAS FLARING IN EGYPT (2013-2017) (BILLION CUBIC FEET/YEAR)



Source: GGFR



Capturing natural gas rather than burning it can help Egypt fulfill the growing demand energy, as it could cover **5%** of Egypt's energy needs.

Source: Calculations based on GGFR data

A study by the European Bank for Reconstruction and Development (EBRD) concluded that eliminating gas flare in Egypt would reduce waste equivalent to \$130 million annually. Moreover, Egypt's trade balance is expected to improve by \$600 million as a result of reduction in energy imports due to the improved utilization of natural gas reserves. The study estimated that Egypt needs to invest \$4-5 billion to completely eliminate gas flaring.

Eliminating gas flare in Egypt would reduce resources waste equivalent to

\$130 million annually.

Source: EBRD



5. SELF-SUFFICIENCY

After years of natural gas surplus, Egypt halted LNG exports in FY 2014/15 and turned into a net natural gas importer in FY 2015/16. In FY 2016/17, the deficit reached 376.3 bcf/y, according to MPMAR. This natural gas imbalance forced the government to pay a bill of about \$2.2 billion in FY 2016/17, according to the MoP.

Significant natural gas discoveries – Zohr field in particular – have encouraged Egypt to set plans to reclaim its old position as a natural gas exporter, and establish itself as a regional energy hub. The MoP has worked on a number of dimensions to succeed in this venture. These dimensions include speeding up output at newly-discovered natural gas fields, liberalizing the natural gas market, reducing gas flaring, and diversifying energy sources.

The Egyptian government was optimistic about achieving natural gas self-sufficiency, declaring that Egypt would no longer import gas by 2019. El Molla announced that the LNG shipment of September 2018 would be the country's last.

Several reports set scenarios for Egypt's journey to reclaim its position as natural gas exporter. BNP Paribas estimated that Egypt will reach self-sufficiency by 2019, which will help the government saving around \$ 1.8 billion annually.

From its side, CI Capital equally estimates that consumption levels will increase to 6.37 bcf/d, a close estimate to the planned production level of 6.2 bcf/d. This decline in the market gap would reduce the natural gas imports by 7.6% and 0.9% in 2018 and 2019 respectively. Furthermore, halting imports would reduce the import bill to around \$40 million

monthly. CI Capital finally concluded that Egypt would not reach self-sufficiency before 2020.

Unlike these estimations, Egypt was able to halt imports in 2018. Moreover, Egypt started exporting trial quantities to Jordan in October 2018, the exported natural gas quantities increased to reach 350 mmscf/d in February 2019 compared to 100 mmscf/d in the previous month.



In FY 2016/17, the deficit reached **376.3 bcf/y**. This natural gas imbalance forced the government to pay around **\$2.2 billion** in FY 2016/17.

Source: MPMAR, MoP



Resuming natural gas exports to Jordan with trial quantities in **October 2018**.

Source: MoP



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CONCLUSION

Over the past nine years, Egypt's natural gas market has witnessed fundamental changes. The country swung from being natural gas exporter to becoming a net importer. Egypt has succeeded to achieve self-sufficiency and even resume natural gas exports thanks to the impressive gas discoveries, especially in the Mediterranean's deep water. Despite the increasing reserves, all indicators support Egypt's aim of being a natural gas energy hub. The country's domestic energy sector has undergone several key reforms designed to liberalize the sector and make it easier for the private sector to engage with the gas market. These steps were taken in parallel with the country's economic reforms aiming to develop supply and demand dynamics. The reforms have included natural gas subsidy cuts, financing the expansion of the national gas grid, and reducing arrears to IOCs.

Regionally, Egypt has signed many pipeline expansion contracts over the last couple of years. In 2018 the agreement for the establishment of the subsea natural gas pipeline between Egypt and Cyprus's Aphrodite field was finalized.

Whether Egypt manages to sustain its regional position will depend on many factors. Most importantly, it will need to reduce its heavy dependence on natural gas to generate electricity in order to control the increasing demand and keep the market gap at its minimal level. Thus, the state is encouraged to intensify its efforts to develop a diversified mix of energy sources. This target is supported by both the state and international institutions through establishing a series of renewable energy projects that will contribute to this diversification effort. Despite the increasing consumption of natural gas in different sectors, the state is working hard to strengthen Egypt's energy security over the long term.

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APPENDIX

A1: NATURAL GAS SUBSIDY CUTS (EGP)

Consumption	Price Before ^{Per Meter}	Price After ^{Per Meter}	Increase (%)
Up to 30 cubic meters	0.100	0.175	75
30-60 cubic meters	0.175	0.250	42.8
Over 60 cubic meters	0.225	0.300	33.3

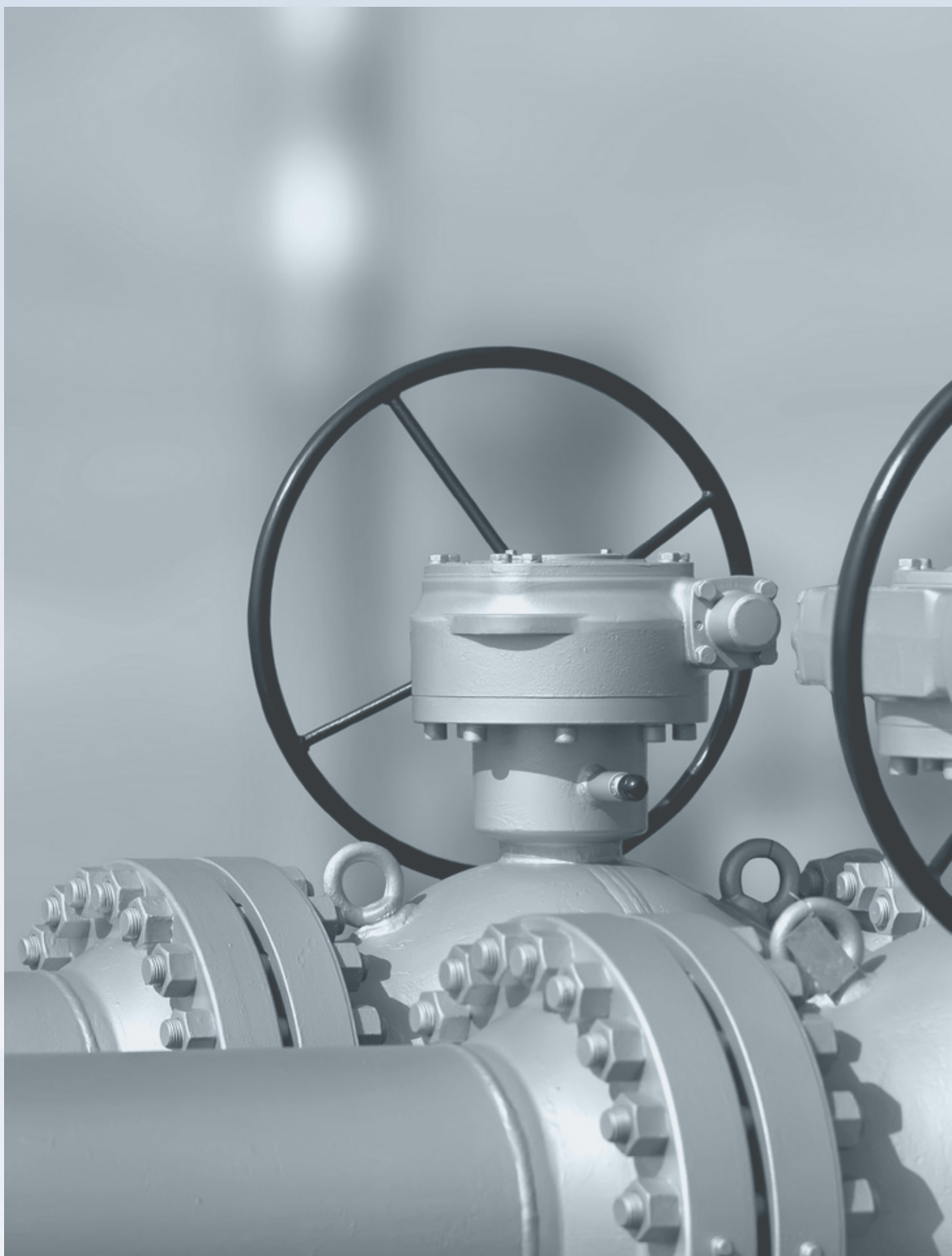
Source: The Egyptian Cabinet

A2: NATURAL GAS PRODUCTION BY AREA (2012-2018) (BILLION CUBIC FEET/YEAR)

Year	Mediterranean Sea	Western Desert	Gulf of Suez	Nile Delta	Sinai	Eastern Desert
2012	1554	463	14.22	116	0.092	0
2013	1382	462	17.68	116	0.422	2.8
2014	1078	473	27.66	144	0.41	2.4
2015	870	496	43.3	148	0.246	1.9
2016	661	494	44.1	280	0.066	1.34
2017	781	490	46.65	476.54	0.064	0
2018	1162	470	38	480	0	2

Source: EGPC and EGAS





A3: EGYPT'S NATURAL GAS PIPELINES

Pipeline	From	To	Length (km)	Diameter (inch)	Capacity (mcf/d)
Gulf of Suez/Sinai					
Trans Gulf Gas	Petresco Plant	Ras Bakr Transmission Station	75	12	110
Zaafarana-Korimat	Zaafarana	Korimat Power Station	163	18	105
Zeit Bay-Ras Shukheir	Zeit Bay (pre-2017)	Ras Shukheir	40	16	140
Ras Shukheir-Suez Gas	Trunk line Ras Shukheir	Suez	245	16	160
Suez-Cairo Ring	Suez	Cairo Ring	150	10	
Suez-Port Said	Suez	Port Said	160	16	
El Arish Gas Pipeline	Port Said	El Arish	185	36/42	
Nile Delta/Cairo/Nile Valley					
Abu Madi-Talkha I	Abu Madi	Talkha Distribution Station	35	12	
Abu Madi-Talkha II	Abu Madi	Talkha Distribution Station	35	22	
Talkha-Tanta-Cairo	Talkha Distribution Station	Cairo	125	28	400
Abu Madi-Damietta	Abu Madi	Damietta	42	16	
Meadia-Damanhur	Abu Qir Development Area	Damanhur	50	20	360
Alexandria Network-Damanhur	Alexandria	Damanhur	45	24	
Damanhur-Tanta	Damanhur	Tanta	60	28	
Cairo Ring-Port Said Line	Cairo Ring	Port Said	130	16	

Source: Wood Mackenzie Country Overview

Pipeline	From	To	Length (km)	Diameter (inch)	Capacity (mcf/d)
Nile Delta/Cairo/Nile Valley					
Korimat-Al Tebbin	Korimat Power Station	Al Tebbin Power Staation	60	22	110
Korimat-Beni Suef	Korimat Power Station	Beni Suef	30	32	
Western Desert – WDPG					
Tarek- Ameryia	Tarek	Ameryia	231	34	950
Obaiyed- Tarek	Obaiyed/Salam Connector	Tarek	49.5	32	600
Obaiyed Spurline	Obaiyed	Obaiyed/Salam Connector	41.5	26	480
Salam Spurline	Salam	Obaiyed/Salam Connector	35	22	250
Qasr-Shams	Qasr	Shams	40	24	350
Shams-Obaiyed	Shams	Obaiyed	42	18	240
Salam-Matruh Terminal	Salam	Matruh	75	10	22
Western Desert - Badr El Din/Abu Gharadig					
BED/AS-Ameryia	BED/Abu Sennan connector	Ameryia	160	24	350
Badr El Din Spur (1)	Badr El Din Fields	BED/Abu Sennan connector	130	20	180
Badr El Din Spur (2)	Badr El Din Fields	BED/Abu Sennan connector	130	16	
Abu Sennan Spur	GPT	BED/Abu Sennan connector	45	14	
Abu Gharadig-Dashour (1)	Abu Gharadig	Dashour	260	24	150
Salam-Abu Gharadig	Salam	Abu Gharadig	212	18	187

Source: Wood Mackenzie Country Overview

A4: NATURAL GAS PRODUCTION IN OAPEC COUNTRIES (MILLION CUBIC METER/YEAR)

Country	2010	2011	2012	2013	2014	2015	2016
Algeria	192,175.294	190,127.000	182,600.000	179,490.000	186,754.000	183,826.000	189,139.000
Bahrain	15,762.000	15,634.000	16,755.000	19,241.000	20,626.000	21,283.000	21,096.000
Egypt	66,405.000	66,440.000	66,016.000	61,431.000	54,057.000	49,338.100	46,829.900
Iraq	16,887.000	18,692.000	20,496.000	21,386.000	21,853.000	24,510.000	29,321.000
Kuwait	11,948.549	13,747.841	15,742.000	16,529.200	15,249.800	17,131.000	17,518.015
Libya	30,257.000	9,861.000	23,845.000	22,621.000	20,778.000	22,049.000	17,271.365
Qatar	187,460.000	207,190.000	208,796.000	198,590.000	198,996.000	211,983.000	213,907.000
Saudi Arabia	97,030.000	102,430.000	111,220.000	114,120.000	116,720.000	119,830.000	127,183.856
Syria	10,070.000	7,870.000	5,800.000	5,300.000	4,900.000	4,300.000	3,870.000
Tunisia	3,795.000	2,844.000	2,783.000	2,786.000	2,561.000	2,475.000	2,180.000
UAE	79,778.000	82,460.000	82,500.000	83,800.000	83,706.000	90,010.600	91,360.737
OAPEC	711,567.843	717,295.841	736,553.000	725,294.200	726,200.800	746,735.700	759,676.873

Source: OAPEC



A5: NATURAL GAS DISCOVERIES IN OAPEC COUNTRIES (DISCOVERIES/YEAR)

COUNTRIES	2010	2011	2012	2013	2014	2015	2016
Algeria	15	10	23	20	14	13	16
Bahrain	0	0	0	0	0	0	0
Egypt	22	21	29	14	23	17	18
Iraq	0	1	1	0	0	0	0
Kuwait	1	2	0	0	0	0	0
Libya	1	0	1	3	1	2	0
Qatar	0	0	0	1	0	0	0
Saudi Arabia	1	0	2	0	0	0	0
Syria	0	1	0	0	0	0	0
Tunisia	4	1	0	0	0	0	0
UAE	0	0	0	0	1	0	0
OAPEC	44	36	56	38	39	32	34

Source: OAPEC



A6: NATURAL GAS CONSUMPTION IN OAPEC COUNTRIES (MILLION CUBIC METER /YEAR)

Country	2010	2011	2012	2013	2014	2015	2016
Algeria	26,413.494	30,002.146	33,403.000	34,540.000	38,270.000	41,072.000	40,985.000
Bahrain	13,297.000	13,295.000	13,776.000	14,675.000	15,403.000	15,352.000	15,226.000
Egypt	46,404.209	51,970.000	54,675.450	53,691.405	48,779.800	48,131.001	51,349.580
Iraq	8,088.000	7,984.000	7,606.000	8,620.000	8,986.000	9,739.000	10,943.000
Kuwait	14,101.752	14,221.000	18,720.000	19,828.200	18,053.800	20,761.000	21,602.000
Libya	13,404.000	7,647.000	14,586.000	15,452.000	13,679.000	14,748.000	10,441.000
Qatar	70,774.000	69,692.000	70,494.000	36,553.000	35,236.000	41,953.000	46,593.000
Saudi Arabia	87,660.000	92,260.000	93,330.000	100,030.000	102,380.000	104,450.000	110,860.000
Syria	9,590.375	8,422.375	6,150.250	5,550.000	5,025.000	4,325.000	3,895.000
Tunisia	5,045.325	4,223.559	4,673.000	5,046.000	5,425.000	5,186.000	5,165.600
UAE	57,744.000	70,469.000	69,077.000	71,060.000	66,524.000	71,901.000	75,363.140
OAPEC	352,522.155	370,186.690	392,490.700	365,045.605	357,761.600	377,761.600	392,423.720

Source: OAPEC



A7: EGYPT'S GDP GROWTH RATE (FY 2009/10-2017/18)(%)

FY	GDP Growth %
2009/10	5.1
2010/11	1.8
2011/12	2.2
2012/13	2.2
2013/14	2.9
2014/15	4.4
2015/16	4.3
2016/17	4.3
2017/18	5.3

Source: MPMAR

A8: NATURAL GAS GDP (CURRENT PRICES/MILLION EGP)

FY	Public	Private	Total
2010/11	88817	19389	108206
2011/12	119969.0	25071.0	145040.0
2012/13	132229.2	27109.7	159338.9
2013/14	146171.4	29199.6	175371.0
2014/15	121272.1	23155.3	144427.4
2015/16	73437.7	13363.2	86800.9
2016/17	118080	20676	138756
2017/18	191247.4	33588.5	224836
Total	991223.8	191552.3	1182776.2

Source: MPMAR

A9: NATURAL GAS CONTRIBUTION TO GDP (%)

FY	Contribution of Natural Gas to GDP	Growth Rate of Natural Gas Contribution to GDP
2010/11	8.26	-
2011/12	8.46	2
2012/13	8.27	-2
2013/14	7.95	-4
2014/15	5.83	-27
2015/16	3.24	-44
2016/17	4.07	25
2017/18	5.19	27
Total	5.9	-

Source: Calculations Based on MPMAR Data

A10: NATURAL GAS INVESTMENTS (CURRENT PRICES/ MILLION EGP)

FY	Public Investment	Private Investment	Total Investments
2010/11	9235	23312.8	32547.8
2011/12	14779.2	39512	54291.2
2012/13	3622.8	33000	26622.8
2013/14	3609.4	21900	25509.4
2014/15	4189	27435.6	31624.6
2015/16	5563.2	30190	35753.2
2016/17	24224.5	31000	55224.5
2017/18	3753	71260	75013
Total	68976.1	277610.4	336586.5

Source: MPMAR



A11: CONTRIBUTION OF NATURAL GAS TO TOTAL INVESTMENTS (%)

FY	Natural Gas' Contribution to Total Investments	Growth Rate of Natural Gas Contribution to Investment
2010/11	14.2	-
2011/12	22.1	56
2012/13	11.0	-50
2013/14	9.6	-13
2014/15	9.5	-1
2015/16	9.1	-4
2016/17	10.7	18
2017/18	10.4	-3.2
Total	12	-

Source: Calculations Based on MPMAR Data

A12: NATURAL GAS PRODUCTION (MILLION TONS EQUIVALENT /YEAR)

FY	Production
2010/11	46.3
2011/12	46.07
2012/13	44.2
2013/14	39.3
2014/15	35.2
2015/16	31.3
2016/17	31.9

Source: MPMAR

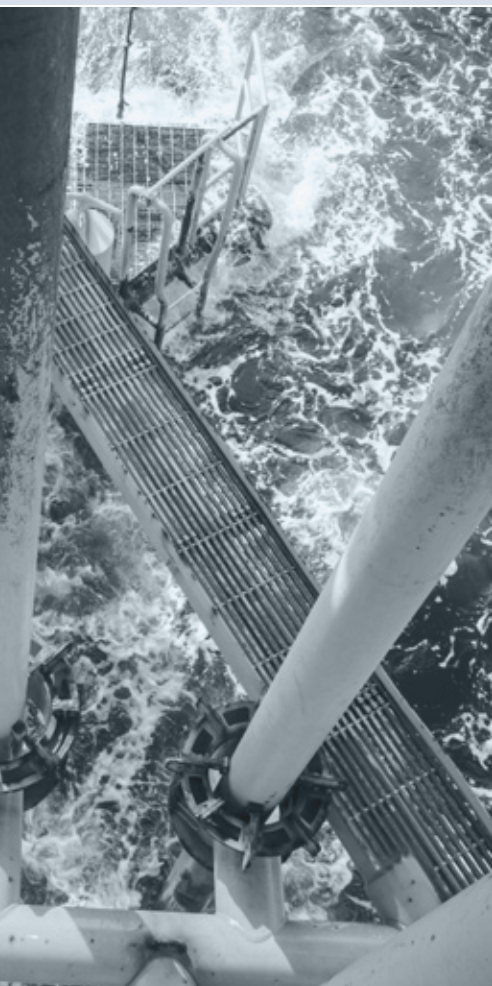
A13: NATURAL GAS PRODUCTION GROWTH RATE (%)

FY	Production Growth Rate
2011/12	-0.5%
2012/13	-4%
2013/14	-11%
2014/15	-10%
2015/16	-11%
2016/17	2%

Source: Calculations Based on MPMAR Data

**A14: LARGEST NATURAL GAS DISCOVERIES (2010-2018)**

Year	Field Name	Block Name	Operator Name
2010	Hodoa	West Med Deepwater	BP
2011	Salmon	North El Burg	BP
2013	Salamat	North Damietta	BP
2014	Notus	El Burg Offshore	Shell
2015	Zohr	Shorouk Offshore	Eni
2016	Nooros East	Abu Madi West	Petrobel
2017	Qattameya Shallow	North Damietta Offshore B	BP
2018	Phase 9B	WDDM	Shell & Petronas



A15: NATURAL GAS CONSUMPTION (MILLION TONS EQUIVALENT / YEAR)

FY	Consumption
2010/11	35.2
2011/12	39.1
2012/13	39.2
2013/14	37.6
2014/15	35.3
2015/16	36.7
2016/17	41.5

Source: MPMAR

A16: CONSUMPTION GROWTH RATE (%)

FY	Consumption Growth Rate (%)
2011/12	11
2012/13	0.3
2013/14	-4
2014/15	-6
2015/16	4
2016/17	13

Source: Calculations Based on MPMAR Data

A17: NATURAL GAS CONSUMPTION BY SECTOR (%)

Year	Power (%)	Energy industry own use (%)	Industry (%)	Transport (%)	Residential (%)	Non-energy use (%)
2010	55	15	15	1	2	12
2011	57	13	15	1	3	12
2012	57	13	15	1	3	11
2013	56	13	14	1	3	12
2014	62	13	10	1	4	11
2015	62	10	12	1	4	11
2016	57	11	15	1	3	13

Source: Calculations Based on EIA Data

A18: NATURAL GAS MARKET GAP (MILLION TONS EQUIVALENT /YEAR)

FY	Market Gap
2010/11	11.1
2011/12	6.97
2012/13	5
2013/14	1.7
2014/15	-0.1
2015/16	-5.4
2016/17	-9.6

Source: Calculations Based on MPMAR Data

A19: GAS FLARING IN EGYPT (2013-2017) (BILLION CUBIC FEET/YEAR)

Year	2013	2014	2015	2016	2017	2016-17 change	2013-17 change
Gas flaring	84.72	98.84	98.84	98.84	81.19	-17.65	0.0

Source: GGFR





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