



# A REVIEW OF NATURAL GAS MARKETS AND KEY PLAYERS: EGYPT

Cedigaz Insights N°6 – April 2010. By Didier Favreau (IFP).

We propose in this issue of “CEDIGAZ insights” a review of natural gas production and consumption in Egypt. The review is not exhaustive in terms of key players but intends to deal with the issues of the rapidly growing domestic demand and the potential for any growth of natural gas exports by the horizon 2015-2020.

For that purpose, the review will cover the aspects of reserves, production and demand and it will propose Cedigaz projections for the medium term regarding the Egyptian natural gas market.

The Egyptian gas market review will include the following elements:

- Natural gas sector organization.
- Natural gas producing areas.
- The energy mix and structure of natural gas demand (by main sectors).
- Natural gas exports.
- Impact of the economic crisis.
- Projections to the medium term (2015-2020).

## Natural gas in Egypt

Egypt's natural gas sector is expanding rapidly with production having more than doubled since 2003. It is one

of the most dynamic sectors of the Egyptian economy. Natural gas is a major component of Egypt's domestic energy balance and its growing availability has been driving the development of a flourishing petrochemical and fertilizer industry and is the firm support of the development of the electricity sector. Egypt has also been exporting natural gas since mid-2003, with the first deliveries of gas to Jordan through the Arab Gas Pipeline (AGP). 18 months later, it began exporting liquefied natural gas (LNG) as well. Egyptian gas exports totaled 18.3 billion m<sup>3</sup> (bcm) in 2009, with LNG accounting for 12.8 bcm.

With the continued expansion of the Arab Gas pipeline, which increased its exports to 5.5 bcm in 2009, Egypt is on the way to become a leading supplier of natural gas throughout the Mediterranean region. However, Egypt is facing and encouraging a spectacular growth in domestic demand, and in June 2008, the government announced a freeze on new gas export projects until 2010.

### Natural gas sector organisation

The state oil Egyptian General Petroleum Corporation (EGPC) was initially established in 1957 to manage the government's oil interests and undertake exploration on behalf of the state. The EGPC controls the various activities of the petroleum sector: licensing, exploration, production, refining, transportation and marketing. In 2001, the Government established the Egyptian National Gas Holding Company (EGAS) to encourage investments in natural gas activities, manage sales gas transmission and distribution systems, expand the Egyptian natural gas grid, participate in exploration, development and production from gas discoveries, in particular through the award of concessions on a number of new gas developments, and finally develop export pipelines and LNG projects individually or with national and international partners.

### Production framework

Production sharing contract are signed between EGPC and the contractor and, in the event of a commercial discovery a joint venture operating company, owned 50% by EGPC and 50% by the contractor, is established. The joint venture company is non-profit making and all of the exploration, capital and operating costs are funded by the contractor. The contractor receives its revenue through sales of the contractual cost recovery production and through its share of profit oil/gas production.

EGPC and EGAS are equity partners in all production joint ventures set up to develop and operate gas fields, in addition to which they are the main customers for the natural gas produced, since operators are required to sell part of their future output to the national companies for supplying the domestic market.

When gas is discovered in commercial quantities, EGPC and EGAS sign a gas sales agreement specifying the daily contract quantity (DCQ) and the purchase amount (e.g.75%) of the DCQ on a take or pay basis.

### Gas sales pricing

The pricing mechanism links the domestic gas price to Brent crude oil but incorporates a price floor and a ceiling. The gas price has proven to be very static and increased costs have led to difficulties in commercialising some gas discoveries. There has been pressure on EGAS to revise the gas price formula. In 2007 British Petroleum (BP) and its partner RWE DEA, were awarded a new gas pricing agreement on the North Alexandria concession. The new agreement has seen the price raised from US\$ 2.72/mcf to a ceiling of US\$ 4.84/mcf.

### Natural gas transmission and distribution

EGAS is the asset owner for all transmission and distribution networks and facilities in Egypt. A service company, GASCO, provides all transmission services, including construction activities and operational services. GASCO also operates most of the country's gas processing plants. GASCO shareholders are:

- The Egyptian General Petroleum Corporation (EGPC) 70%
- Petrojet 15%
- Egypt Gas 15% (a gas distribution company)

The distribution network currently supplies more than 2.4 million consumers. According to EGAS, there are 10 local distribution companies (LDCs) providing construction and operation services under local concession contracts. Most of the LDCs are private companies. Each LDC operates in a specific geographical area allocated by

EGAS. LDCs do not buy or sell gas, nor finance investments in gas infrastructure, nor do they market any gas although they are expected to promote connections and conversion to natural gas. According to GASCO, the national gas transmission and distribution networks total 17600 km long; it is the largest and longest gas distribution grid in Africa and the Middle East.

In January 2008, the World Bank agreed to advance to GASCO a US\$ 75 million loan to support the expansion program, which calls for another 2 million inhabitants to be connected to the town gas distribution network by the end of 2013.

### Transmission and

### distribution companies:

- Egyptian Natural Gas Company (GASCO).
- Egypt Gas.
- National Gas S.A.E.
- Egyptian Town Gas (ETG): the concession areas of Town gas are in the governorates Cairo, Giza, Alex, Portsaid and Ismaillia.
- Fayum Gas Company (governorate of Fayum).
- National Gas Company (NATGAS).
- TAQA Group including: REPCO Gas, Nile Valley Gas Company (NVGC), City Gas Company.
- TRANS Gas Company.
- Nubaria Gas Company.
- Regions Company (REGAS).
- Cairo Gas.

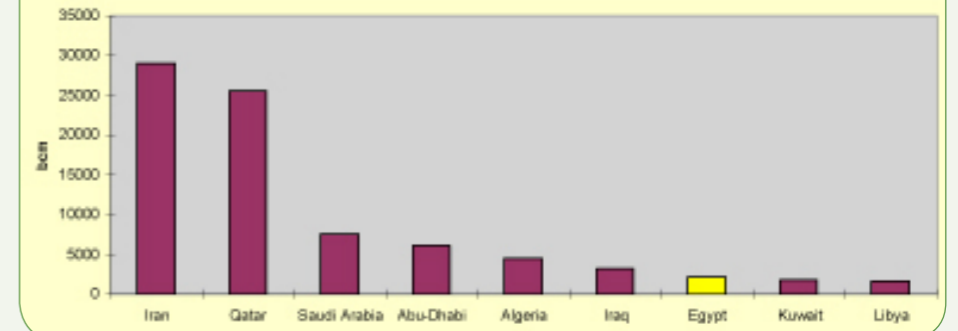
### Notes:

- The National Gas Company (Natgas) supplies gas to the six governorates of Cairo, Giza, Alexandria, Beheira, the 6<sup>th</sup> October Industrial City and the Burg Al-Arab Industrial City. The shareholders of Natgas are: Egypt Kuwait Holding Company (EKH), SHELL, Gas Authority of India Limited (GAIL), Petrogas
- The Egyptian Town Gas concession areas are in the governorates Cairo, Giza, Alex, Portsaid and Ismaillia.
- The City Gas Company operates in Suez, South-Sinai and the Red Sea region.

Figure-1: Location of Egypt's gas reserves (June 2009)



Figure-2: Proven natural gas reserves at 01.01.2009 in major Northern Africa & Middle East producing countries



- The Nile Valley Gas Company (NVGC) is to distribute gas in Upper Egypt (from the south of Cairo to Asyut and further to Aswan).

... Egypt's natural gas sector is expanding rapidly with production having more than doubled since 2003.

It is one of the most dynamic sectors of the Egyptian economy ...

Egypt is facing and encouraging a spectacular growth in domestic demand ...



## Natural gas reserves

Proven natural gas reserves were revised up to a record 2161 bcm as of 30 June 2009, taking account of output, domestic consumption and exports during 2008 - 09. The Higher Oil Resources Committee attributes this increase to the large number of oil and gas agreements signed during the early years of the present decade (Ref: "Natural gas in the world", Cedigaz edition 2009).

Approximately 81% of these reserves are located in the Mediterranean area, followed by the Western Desert (11%), the Gulf of Suez (6%) and the Nile Delta (2%). Proven gas reserves in Egypt soared by 5.0%/year since 2003. This rise can be attributed to the application of new state-of-the-art technology in exploration, development and production, especially in the deep waters of the Mediterranean, with the assistance of international companies. Gas reserves yet to prove are estimated to be 3360 bcm. (Figures 1, 2, 4, source: Cedigaz).

## Natural gas production

In Egypt, marketed production was estimated at 62.9 bcm in 2009, up 6.3% from 2008, mainly due to the growing production from the Western Desert and the growing

Figure-3: Egypt marketed natural gas



call to the Mediterranean Area (mainly Ras El Barr concession). This growth served essentially the growing domestic demand and additional pipeline exports.

About 70% of national production is covered by Mediterranean fields. The largest of them lie in the West Delta Deep Marine (WDDM) concession, where five reservoirs - Scarab, Saffron, Simian, Sienna and Sapphire - were brought into production between 2003 and 2005. Other major producing areas include the Western Desert (17%), the (on-shore) Nile Delta (8%) and others (5%): Gulf of Suez oil fields, Sinai and Eastern Desert.

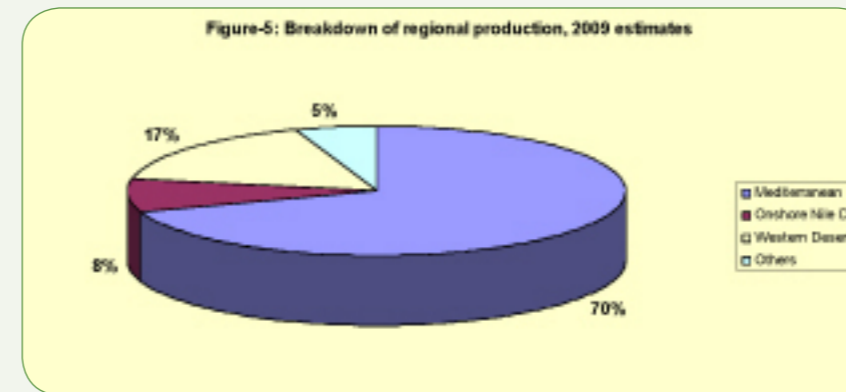
In the Western Desert, the Khalda Area and Obaiyed fields are the most important natural gas areas. They have lower development and operating costs than fields in the Mediterranean region due to the network of pipelines and processing plants. Most of the production is piped to Alexandria via the 280 km pipeline.

Major foreign companies involved in natural gas production in Egypt include British Gas, British Petroleum, ENI-Agip, and Shell. Apache also produces gas from its concessions in the Western Desert. This list is not exhaustive and other players are also involved in gas exploration/production in Egypt (Centurion, Edison, Hess, Melrose Resources, Perenco, Petronas, RWE Dea, etc.).

In 2009, Eni was the most important international hydrocarbon operator in Egypt. Eni's share of hydrocarbon production amounted to 230,000 bpd of oil equivalent, including 91,000 bpd of crude oil and condensates and 22.5 million m<sup>3</sup>/day of natural gas. Egypt is the most important gas producing country for the Eni group, closely followed by Libya. It represents about 18% of the group's natural gas production.

British Petroleum (BP) has major interests in gas-producing ventures; with its partners, BP produced in 2009 about 30% of Egypt natural gas marketed production. Its own share of natural gas production amounted to about 4.8 bcm in 2009. BP is the single largest investor in Egypt and it has a large investment program of several billions USD.

British Gas (BG) is the operator for two joint ventures: Rashpetco and Burullus Gas Company producing offshore the Nile Delta. The company's work programme up to 2015 calls for important investments of several billion US dollars with the objective to discover additional gas reserves.



Apache Corporation is the leading producer in the Western Desert and the most active operator in terms of exploration activity.

## Major Mediterranean fields

In 2009, about 70% of national production is covered by offshore Mediterranean fields.

- The largest of them lie in the West Delta Deep Marine (WDDM) concession operated by Burullus Gas Company, the joint venture between British Gas (25%), Petronas (25%) and EGPC (50%). The producing fields include Scarab and Saffron which are located 90 km from the coast in water depth between 250 and 850 m; they went to production in 2003. A part of the production is supplied to the Segas liquefaction plant in Damietta (2.3 bcm in 2009, to be reduced to 1.5 bcm in 2010). Three other fields went to production in 2005: Simian, Sienna and Sapphire with water depth between 700 and 1000 m (production in 2005). Most of their production (about 11.7 bcm/yr in 2009) supply the two trains of the Idku gas liquefaction plant (Egyptian LNG). Total production of Burullus Gas Company amounted to about 20.5 bcm in 2009. It is likely on a plateau up to 2015.
- The Rosetta concession located in the offshore Nile Delta is operated by Rashpetco, the joint venture between BG (40%), Edison (10%) and EGPC (50%). Rosetta produced about 4 bcm in 2009, scheduled to be more or less steady up to 2015. Natural gas from Rosetta is treated in the Idku processing plant (east of Alexandria) and fed to the national network. Rashpetco is also developing the Sequoia field between the West Mediterranean Deep Water (WMDW) and Rosetta concessions. The field is to produce about 5.7 bcm in 2010.
- The Ras el-Barr concession (including the Ha'py field) is located in the Mediterranean Sea immediately north of the onshore portion of the Eastern Nile Delta. It is operated by British Petroleum (BP) in association (50/50) with IEOC, the subsidiary of the ENI. Production in 2009 was estimated at about 5.6 bcm of natural gas and 6 million bbl of condensate. Production is scheduled to grow slightly over the next three years. Natural gas is processed in an onshore plant located west of Port Said.
- The Baltim block, located in the offshore Nile Delta area, north of the onshore Abu Madi field, is operated by the Mediterranean Gas Company (MedGas), the joint venture company set up between EGPC (50%), IEOC (25%) and BP (25%). The first field was brought onstream in February 1997. Production in 2009 is estimated at 2.7 bcm of gas and 2.5 million bbl of LPG and condensate.
- The Abu Madi field is located in the northeastern area of the Nile Delta, 40 km north of the city of Mansoura. It is operated by Petrobel, the operating company for EGPC and IEOC Production is estimated at 0.9 bcm in 2009 and is set to slowly decline to 2020.
- The Port Fouad fields, offshore Port Said is also operated by Petrobel. Natural gas production is estimated at 5.7 bcm in 2009. Production is slightly declining but remaining discovered (non-allocated) reserves are important.
- The Tensah concession is located under 85 m of water 65 km north of Port Said. It is operated by PetroTensah, the joint venture company set up between EGPC (50%), IEOC (25%) and BP (25%). Production is estimated at 7.3 bcm of natural gas and 8 million bbl of condensate in 2009 and is scheduled to grow slightly in the next three years. Some of the Tensah fields have supplied the Damietta LNG facility since 2008.
- The Abu Qir fields are located 40 km northeast of Alexandria in the Abu Qir Bay. The Abu Qir Petroleum Company (EGPC 50%, Edison 50%) was formed in January 2009 to operate the fields. Production during 2009 was estimated at 1.5 bcm but is expected to rise over the next years with the objective to double.

## Major Nile Delta fields (onshore)

- The El-Manzala (El-Wastani field) and South Manzala onshore concessions in the south of the Nile delta are operated by Centurion Energy International, a subsidiary of the UAE-based company Dana Gas. Production in 2009 was estimated at 1.1 bcm of natural gas and about 1.4 million bbl of LPG and condensate. Contracted production is steadily declining to 2020.
- The Qantara, El Mansoura and South Mansoura production concessions in the Nile delta are operated by Melrose Resources (Edinburgh-based exploration company). Production amounted to about 1.5 bcm in 2009. The company also produced 3.2 million bbl of oil and condensates in 2009.

## Major Western Desert fields

- The Khalda concession and the Khalda Offset lease (including the Qasr field) are operated by Khalda Petroleum Company: a 50:50% joint venture between Apache Corporation and EGPC. Production in 2009 is estimated at 6.7 bcm, scheduled to grow slightly over the next years. Production of oil and condensate from the Khalda area is estimated to 30 million bbl in 2009.
- The Obayed field in the north of the Western Desert, located 70 km south of the town of Mersa Matruh is operated by Bapetco, the 50:50 joint venture between Shell Egypt and EGPC. Production in 2009 was estimated at 1.5 bcm. Contracted production is steadily declining/ vanishing to 2020. Natural gas is processed at the Obayed plant and piped to Alexandria.
- The Badr El Din concession is located in the Abu Gharadig basin of the Western Desert northwest of the Abu Al Gharadig field and 300 km west of Cairo; the Badr Petroleum Company (Bapetco) was formed in January 1983

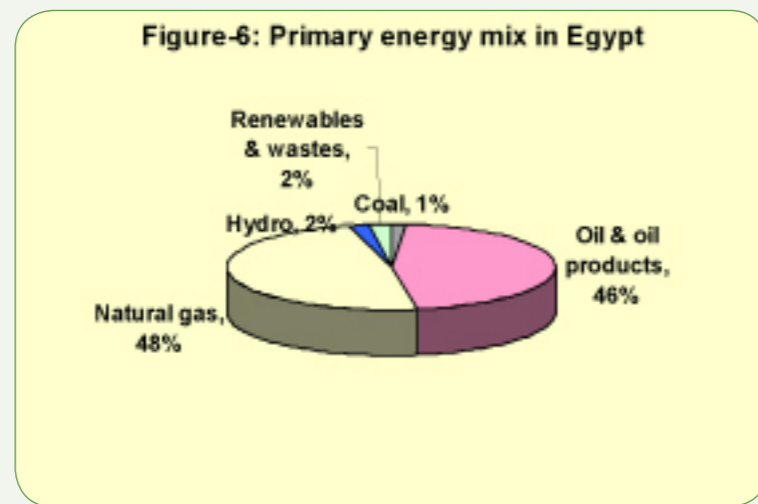
... Proven gas reserves in Egypt soared by 5.0%/year since 2003. This rise can be attributed to the application of new state-of-the-art technology in exploration, development and production, especially in the deep waters of the Mediterranean, with the assistance of international companies ...

as the joint venture operating company between EGPC and Shell in the Western Desert. Production is estimated at 1.5 bcm of natural gas and about 4 million bbl of oil and condensate in 2009. Contracted production is declining to 2015.

### Natural gas demand

The demand of natural gas has been firmly growing for the last ten years at an average rate of 9.3% per year reflecting the population growth and strong economic growth. Cedigaz estimates the primary natural gas demand at 44.5 bcm in 2009 (including the auto-consumption of the gas sector), a 5.5% increase over 2008. The most important demand driver of gas consumption in Egypt has been power generation, which will continue to be the largest gas consumer in the country (about 23.8 bcm in 2009). The vast majority of thermal power stations have already been converted to natural gas, and the power sector accounts for about 54% of total Egyptian gas consumption in 2009.

According to available data published by the IEA, natural gas represents about 48% of total energy demand in Egypt, with its share having increased from a lower 39%, in the year 2000. Share gains in the primary energy demand have been taken to the oil sector. The authorities still have a policy of encouraging the substitution of gas for oil in order to release a maximum volume of oil for export and limit the import of petroleum products such as diesel and LPG. Figure 6 is estimated by Cedigaz from IEA latest available data.



Power generation has grown in Egypt at the average annual rate of 5.6% during the last five years. For the fiscal year 2007 - 2008, the Egyptian Electricity Holding Company reported that natural gas has represented 82% of generated power (Figure 7). The other sources of generated power include hydro (12.4%), fuel-oil (4.9%) and wind (0.7%).

In the industry sector, Cedigaz estimates the natural gas consumption by various industries (iron and steel and other industries, cements and refractories and fertilisers) at 12.9 bcm in 2009, representing about 29% of Egypt's domestic consumption.

- The fertilisers industry is totally dependent on natural gas, where it is used as fuel and feed stock for production of ammonia and urea. Fertilisers industry consumption is estimated at 4.8 bcm in 2009.
  - Natural gas is also used as feedstock and fuel for iron and steel industry as well as several other industries with a total consumption estimated at 4.5 bcm in 2009.
  - Cements and refractories are estimated at 3.6 bcm in 2009.
  - The self-consumption of the natural gas sector, including gas plants, gas compression stations, LNG plants and network losses, is estimated to 6 bcm in 2009 representing about 13% of the natural gas domestic consumption.
  - In the residential and trade and services sector, natural gas consumption is estimated at 1.1 bcm in 2009, representing 2.6% of the total natural gas consumption. Petroleum products still represent about 47% of the sector's demand. One of the missions of EGAS is to expand natural gas use in houses in various governorates as the best alternative to liquid petroleum products.
- Figure 7 is calculated by Cedigaz from EEHC annual report.
- Compressed Natural Gas (CNG) consumption has reached 0.6 bcm representing

1.4% of domestic consumption through about 120 natural gas fueling stations spread over the different regions. It is also an objective of EGAS to promote the expansion of CNG in vehicles, to preserve and protect the environment from pollution.

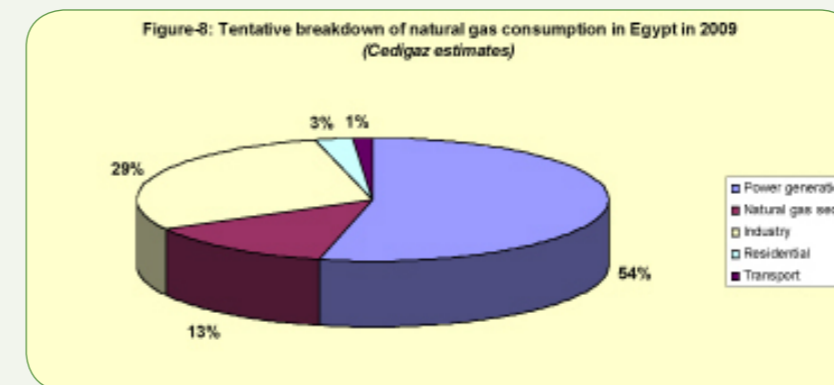
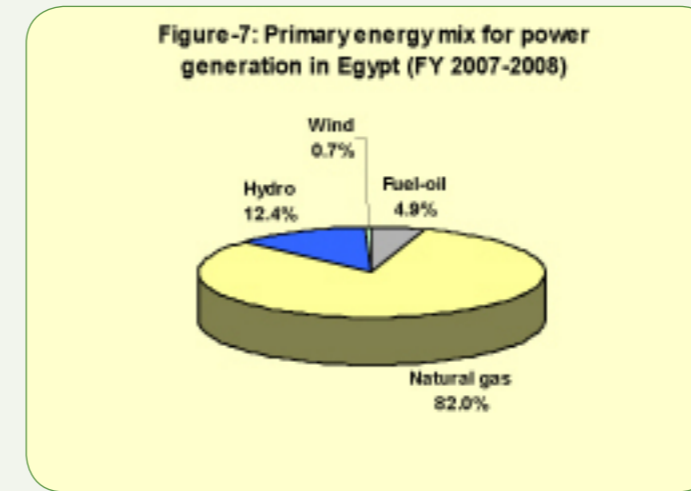
### Natural gas exports

In 2009, Egypt exported 12.8 bcm as LNG and 5.5 bcm through pipelines. Pipeline exports significantly increased compared to 2008 (2.9 bcm). Egypt is the EU's sixth largest natural gas supplier (6.7 bcm LNG in 2009) and a key transit country between the Middle East, Africa, and the EU according to the European Commission.

Egypt plans to increase export capacities via both the addition of new LNG trains and expansion of the Arab gas pipeline. However, government's concerns about expanding domestic consumption, together with public controversies in late 2007 and 2008 over the low price of gas sold to Israel and Jordan, caused the petroleum minister Sameh Fahmi to pronounce a moratorium on new gas export deals until 2010.

### Pipeline exports

The Arab gas pipeline which has now a capacity of about 10 bcm/yr transports gas to Jordan, Syria and Lebanon. Egypt began exporting gas to Syria in July 2008, and according to reports, it was expected to export some 0.9 bcm in the first year of operations, rising to 2.2 bcm/year over the next nine years. In October 2009, gas was also delivered to Lebanon Dair 'Ammar power plant (about 0.3 bcm/year to be raised rapidly to 0.6 bcm/year) by means of the spur line from AGP to the Syrian-Lebanese border.



Egypt also holds a contract with Israel, for deliveries of 1.7 bcm/year (with an optional increase to 2.1 bcm/year). The Arish-Ashkelon gas pipeline to Israel became operational in 2008. However, this contract went to court, as it was criticized by the opposition on pricing issues and not approved by the parliament. Although contested, the exports have been declared to continue by the country's Higher Administrative Court in February 2009.

Extension of the Arab Gas Pipeline to the Turkish border: In January 2008, Turkey and Syria signed an agreement to construct a 63 km pipeline between Aleppo and Kilis (Turkish border) as a first segment of the Syria-Turkey connection of the Arab Gas Pipeline. The connection is expected to be ready by 2011. From Kilis, a 15 km long pipeline with a diameter of 12 in. will connect the pipeline with the Turkish grid. It allows to supply the Turkish grid via the Syrian grid even before completing the Homs-Allepo segment. In May 2008, the EU, Turkey, Iraq and Mashreq countries (Egypt, Jordan, Lebanon and Syria) reached a consensus to connect the AGP to Turkey, Iraq and the EU through Nabucco and other pipelines at a European Commission meeting in Brussels. The consensus aimed to develop regional co-operation in the natural gas sector through the Euro-Arab Mashreq gas market centre and extending its participation to Iraq and Turkey. Turkey is expecting to buy 2 - 4 bcm of gas annually from the Arab Gas Pipeline. The EU on its side has been expecting about 2 bcm/year of pipeline gas from Egypt through the AGP. It is more likely that Egypt gas will be made available to Europe in the medium/long term only (10 years). There was also a discussion of connecting the pipeline to Cyprus but no progress has been made so far.

### LNG exports

Egypt has three LNG trains and in 2009, LNG exports amounted to 12.8 bcm:

- The single-train liquefaction plant of the Spanish-Egyptian gas Company at Damietta (SEGAS), which started production in late 2004 and which has a capacity of 5.5 million tpy (7.4 bcm/yr). Eni, BP and Union Fenosa are willing to expand the plant with a second train. The project has been delayed because of the moratorium imposed on new export projects until 2010.
- The second LNG plant in Idku, 50km East of Alexandria, was developed by Egyptian LNG, (ELNG); it has two trains with a total capacity of 7.2 million tpy (9.6 bcm/yr). Shareholders include EGPC, EGAS, BG Group plc, PETRONAS and GDF Suez. Production started in 2005 and the plant is supplied from the West Delta Deep Marine (WDDM) concession (Simian/Sienna and further Sapphire offshore fields). A possible third train is considered in Idku.

Note: Both LNG plants in Egypt are tolling facilities. The contractor constructs, owns and operates the plants in return for a processing tariff from which it recovers its costs and makes its return. The upstream supply partners retain ownership of the gas and LNG.

... The demand of natural gas has been firmly growing for the last ten years at an average rate of 9.3% per year reflecting the population growth and strong economic growth. Cedigaz estimates the primary natural gas demand at 44.5 bcm in 2009 ...



Figure 9: The Arab Gas Pipeline. Source: Cedigaz based on EGAS mapping.



Table 1: LNG export destinations. Source: Cedigaz

LNG export destinations	2008	2009
Canada		0.08
USA	1.56	4.54
Mexico	1.12	0.34
Argentina	0.08	0.16
Belgium	0.08	0.09
France	1.06	1.63
Greece	0.16	0.17
Italy		0.08
Spain	4.91	4.10
Turkey	0.08	0.08
UK	0.08	0.51
China	0.25	0.08
India	0.26	0.33
Japan	2.21	0.24
South Korea	2.13	0.31
Taiwan	0.08	0.08
	14.06	12.83

### Threats on natural gas exports

Production growth for export gas has been compromised by the government authorities, which has decided to assign in priority national resources to the fast-growing domestic demand. The moratorium imposed on new export projects until 2010 was introduced, following public controversy over Egyptian gas sales prices amidst concern of adequate supplies for future Egyptian generations. Exports are generally formally restricted to

one third of the reserve base.

Natural gas is sold to domestic consumers at low prices (noteworthy, the low prices have previously attracted major investments into energy-intensive industries). In parallel, the government has been reluctant to increase gas prices for electricity generation in an effort to contain the inflationary pressures. Due to the growing demand of the domestic market, EGAS must (and is entitled to) buy gas from the share of international partners but it has been difficult to increase the purchase price offered to IOCs. Despite of revisions, prices offered by the government have been much lower than export prices. The counterpart is that IOCs have limited incentives to expand exploration and production. As an example, according to the conditions of the former 2006 licensing round, EGAS has fixed the ceiling price of natural gas at US\$ 2.72/mcf. The IOCs have put the pressure on EGAS and, in 2007, BP and partner RWE DEA, were awarded a new gas pricing agreement on the North Alexandria concession. The new agreement sees the price raised from US\$ 2.72/mcf to a ceiling of US\$ 4.84/mcf. Further to the moratorium, the priority given by the government to meet the rapidly rising domestic demand has raised concerns about the security of supplies for new export projects. Current and future costly deepwater developments will certainly incite the government:

- To propose more favourable long-term sales deals.
- To continue the reform of the system for energy subsidies.

### Impact of the economic crisis

The diversified economy of Egypt felt the impact of the global economic crisis. Due to the developed alliances with Europe through export and tourism, the slowdown in countries' economies was notable early in FY2008/09. Although investment and activity softened in exposed sectors, growth still reached 4.7%. Resilient domestic consumption demand, and production in the construction, communications, and trade sectors, helped sustain growth (nearly 5% in the first half of FY2009/10).

According to the IMF, the government reacted quickly to the crisis by providing a sizable fiscal stimulus in the second half of FY2008/09 based mainly on accelerating investment projects. Key fiscal reforms such as introducing the property tax, broadening the Value Added Tax (VAT), and phasing out energy subsidies were postponed. The FY2009/10 budget continues to support economic activity and targets a wider deficit of 8.4% of GDP largely reflecting a substantial projected cyclical fall in revenue (particularly from trade and Suez Canal traffic), as well as the impact of wage increases adopted before the crisis and higher post-crisis debt service costs.

Regarding investment projects in the natural gas sector, in order to make further discoveries and increase production, the government has presented the 2010 work programme which includes:

- Drilling of 36 gas exploration and appraisal wells in the Nile delta and the Mediterranean at a cost of over US\$ 1 billion.
- Development of eight gas fields discovered in 2009, with the aim of bringing them into production as quickly as possible, at a cost of US\$ 3 billion.
- Organisation of an exploration bid round for the award of several blocks in the Mediterranean.
- Connection of 500,000 more households in different regions of the country to the national gas grid, including for the first time homes in the Beni Suef, Minia, Asyut, Sohag, Qana, Luxor and Aswan regions.
- Commissioning of two major petrochemical facilities that will have cost US\$ 1.7 billion between them. The first is the Damietta methanol plant, which has a capacity of 1.3 million tpy and cost US\$ 950 million (AOG, 1 Oct., 2009), while the second is the Port Said polypropylene plant, which has a capacity of 400,000 tpy and cost US\$ 790 million.
- Completion of several natural gas liquids (NGLs) recovery plants that are being built to increase the country's production of liquefied petroleum gas (LPG) and are costing an estimated US\$ 400 million.

### Tentative projections to 2020

Natural gas is a very important fuel for the domestic market, with about 82% of Egypt's electricity production relying on natural gas.

### Natural gas consumption for power generation

Access to reliable and affordable electricity services is indeed critical to achieve the sustainable growth and economic and social development goals of the Government in their five-year National Development Plan (2007/08-2011/12). Given the strong growth in demand, investment in new generation capacity of around 1500 MW/year is estimated to continue to meet the government's objectives. By the end of FY 2007/2008, the installed power generation capacity reached 22,853 MW for a peak demand of 19,738 MW. Further projections from Electricity Holding Company calls for a peak load of 29,860 MW in 2015, i.e. a growth of minimum 10,000 MW of additional capacity which will be mainly based on natural gas (minimum 80%) and a major wind project to the horizon 2015/2017.

In the FY 2007/2008, total electricity generated amounted to 125 TWh. It is estimated to reach 188 TWh in 2015 (6% annual growth rate). Assuming that 80% of the incremental demand is supplied from high efficiency gas fueled power-plants (efficiency 43.5%), Cedigaz estimates the additional natural gas demand at minimum 12 bcm until 2015 (in addition to 2008 consumption).

It is estimated (World Bank) that the power generation is to continue growing by 6% per year to the horizon 2020 reaching

... Natural gas is a very important fuel for the domestic market, with about 82% of Egypt's electricity production relying on natural gas ...

about 250 TWh of gross generated power. Cedigaz estimates the incremental gas consumption at 23 bcm until 2020 (in addition to 2008 consumption).

### Industrial sector

In 2009, Cedigaz estimates the consumption of the industrial sector to 12.9 bcm (mainly energy-intensive industries including fertilisers, steel and cements). It is planned to develop further the industrial sector with petrochemical projects including methanol, polypropylene, etc and expansion of fertilisers plants. Cedigaz schedules a minimum 4.5% annual rate of gas consumption in this sector up to 2015 raising the demand to 16.8 bcm/yr, and a lower annual rate of 3.5% between 2015 and 2020, raising the natural gas demand to 19.9 bcm.

### Residential and commercial sector

There are about 2.4 million customers connected to the gas system in Egypt in 2008. The majority of residential households in the Nile Delta continue to use LPG to meet their domestic energy needs. In order to reduce the LPG subsidies (part of the LPG consumption has to be imported), the Government of Egypt has initially set an ambitious goal of having a total 6 million households connected to the gas network by 2012. Cedigaz estimates the consumption at 1.1 bcm in 2009 and projects a demand at 2.5 bcm in 2015 and 3.5 bcm in 2020.

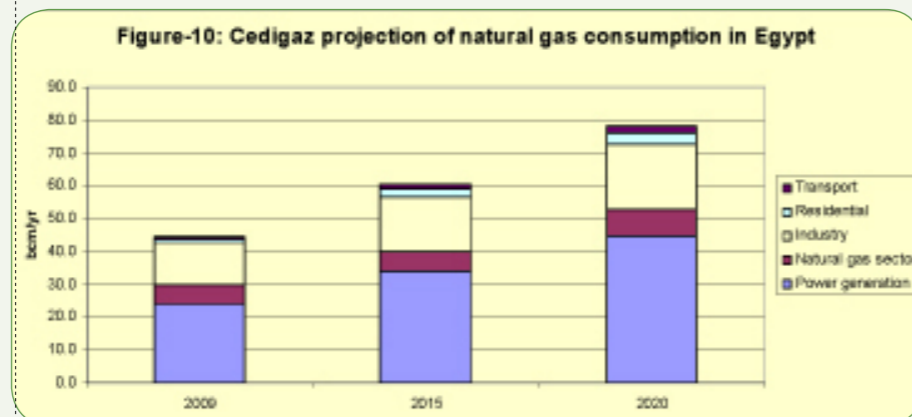
### Compressed Natural Gas (CNG)

Assuming a conversion of 10,000 heavy trucks or buses and 5000 small or medium vehicles per year, Cedigaz estimates a consumption of 1.3 bcm in 2015 and 1.9 bcm in 2020.

Table 2: Cedigaz projection of natural gas domestic demand.

	2009	2015	2020
Power generation	23.8	33.9	44.9
Natural gas sector	6.0	6.1	7.8
Industry	12.9	16.8	19.9
Residential	1.1	2.5	3.5
Transport	0.6	1.3	1.9
	44.5	60.5	78.0

Figure 10: Cedigaz projection of natural gas consumption in Egypt.



### Will the rapidly growing domestic demand allow for expansion of natural gas exports?

In 2009, total natural gas exports amounted to 18.3 bcm. To maintain both this level of exports and the planned domestic consumption, the Egyptian marketed production (62.9 bcm in 2009) should raise to 78.8 bcm in 2015 and about 96.3 bcm in 2020. The growth of marketed production should be:

- 15.9 bcm between 2009 and 2015 (about 2.6 bcm/yr as an average, annual growth

rate of 3.8%).

- 17.5 bcm between 2015 and 2020 (about 3.5 bcm/yr, annual growth rate of 4.1%).

It is expected that during the period 2010 - 2015 the currently contracted Egyptian production would be on a plateau, with the expected growth from Khalda area in the Western Desert, production from offshore North Idku, Ras-El-Barr concession, Tensah concession, fully compensating the slow decline of other contracted fields. The recently contracted discoveries of offshore North Alexandria and offshore West Mediterranean are not supposed to come on stream before 2015.

Considering that the growth of the domestic demand is given a priority, Cedigaz estimates that no significant expansion of natural gas exports is foreseeable to the horizon 2015. The tight balance between production and expected demand during that period calls for speeding-up the development of recorded new discoveries.

Further to 2015, global currently contracted production will start declining, making doubtful any significant growth of natural gas exports during that period (due to the growing domestic consumption). Nevertheless the potential of new discoveries remains high in Egypt. In addition, natural gas prices will need to be raised on the domestic market both to limit the burden of subsidies, to discourage energy usage inefficiencies and to give incentives for new upstream investments. In the more costly Mediterranean area, gas sales agreements will have to propose purchase prices well above 5 US\$/MBtu.

... Considering that the growth of the domestic demand is given a priority, Cedigaz estimates that no significant expansion of natural gas exports is foreseeable to the horizon 2015 ...