Egypt

Bid to be a regional energy hub

Egypt has laid out its vision to become a regional energy hub following discoveries of large offshore gas reserves in the East Mediterranean. This vision is critical as the energy sector remains the major driver of the country's balance of payments. Recent developments suggest that Egypt has a clear potential to become a trading and export hub, notably for natural gas. However, the realisation of this ambition will depend on the country's capacity to mitigate geopolitical, financial and regulatory risks. This should go hand in hand with energy diversification to reduce dependence on gas and sustain anticipated exports.

Can Egypt become a net gas exporter again?

The hydrocarbon sector is a key force driving the economy. With total proven reserves of 65 trillion cubic feet (tcf) at end-2015, Egypt is the 16th largest gas reserve-holder globally and the second largest gas producer in Africa. It is viewed as a world-class hydrocarbon area with active drilling in four basins including offshore Mediterranean, which holds c.65% of the country's total gas reserves. The exploration and production (E&P) segment is critical for the balance of payments (BoP) as it typically contributes two-thirds of incoming gross foreign direct investments (FDI) with at least four oil majors among the top 10 foreign investors in Egypt. Hydrocarbons also underpin Egypt's trade balance and account for nearly half of total exports mainly in the form of light crudes and naphtha. Furthermore, as the largest source of corporate taxes in Egypt, the energy sector strengthens fiscal stability.

Egypt's energy sector boomed in the early 2000s, driven by strong domestic demand and Liquefied Natural Gas (LNG) exports. Gas production increased more than three-fold to 6bcf/d between 1999 and 2009. Since 2010, however, sharp macroeconomic deterioration and structural natural resource trends have pushed the sector into difficulties. The first hit was the decline in offshore Mediterranean gas production as a result of reservoir maturity and stalled investments. The production of four of Egypt's major offshore gas fields started to decline in 2012 as they had been discovered and developed at the same time in the mid-1990s. The second hit was the accumulation of Egyptian General Petroleum Corporation (EGPC) arrears to upstream investors peaking at USD 6.3bn in 2012 (2% of GDP) as a result of mounting fiscal deficits and deteriorating external liquidity during the political transition. The third hit came from the decline in crude prices in 2014-15, thereby discouraging foreign investment especially in high-risk deepwater exploration.

Egypt became a net gas importer in FY2015/16 with a hydrocarbon external deficit of USD 3.6bn compared with a surplus of USD 5.1bn in FY2009/10. During that period, the current account deficit was largely driven more by the negative hydrocarbon balance than by the decline in tourism. Real economic activity was also impacted as households and energy-intensive industries suffered from occasional fuel and power shortages.

A series of policy measures was undertaken to rebalance the energy sector. In the short term, the government secured concessional fuel supply agreements with GCC sovereigns and launched LNG imports fulfilling c.25% of domestic demand. In the medium term, the government repriced gas offtake from new blocks by 40-120% and upwards to incentivise production and auctioned

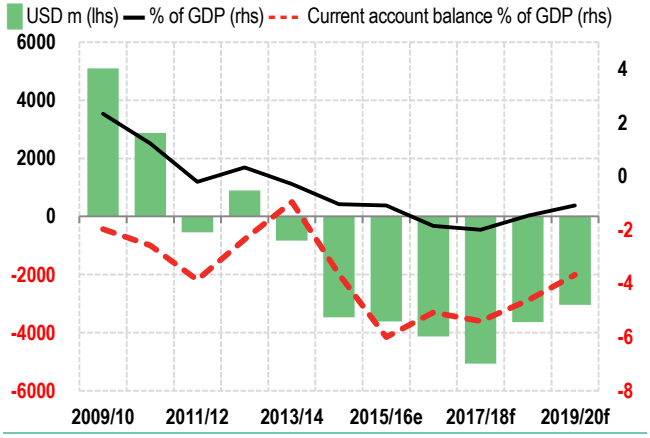
1- Forecasts

	2015	2016e	2017e	2018e
Real GDP growth (%)	4.1	4.3	3.8	4.5
Inflation (CPI, year average, %)	11.5	10.2	23.0	17.9
Gen. Gov. balance / GDP (%)	-11.4	-12.7	-9.6	-7.4
Gen. Gov. debt / GDP (%)	90.0	93.0	90.0	80.0
Current account balance / GDP (%)	-3.8	-6.0	-5.1	-5.4
External debt / GDP (%)	17.0	18.0	32.0	30.0
Forex reserves (USD bn)	20	18	29	31
Forex reserves, in months of imports	3.1	2.9	4.8	4.8
Exchange rate EGP/USD (year end)	7.4	8.2	18.0	16.5

(*) Fiscal years T-1/T (July-June)

e: BNP Paribas Group Economic Research estimates and forecasts

2- Hydrocarbon external balance



Sources: CBE, BNP Paribas estimates and forecasts

large exploration acreage at competitive terms to accelerate reserve replacement. On the financial side, the government allowed some onshore producers to export 50-75% of their equity oil, the share by which the state can claim entitlement right, in order to decelerate the build-up of arrears. That, combined with a series of material payments to targeted E&P operators, has indeed halved EGPC arrears to USD 3.5bn. However, outstanding receivables continue to be a major constraint for new E&P investments primarily in gassy portfolios.

The turning point was the discovery of the Zohr jumbo gasfield (Eni) in August 2015. This gasfield, with its recoverable reserves of 22tcf, has not only replenished Egypt's total gas resources by one third, but has also been fast-tracked to start production in 2H2017. Egypt is currently replenishing most of its gas production with new discoveries

and is likely to achieve self-sufficiency by 2019. These new discoveries are comprised of two large offshore projects, Zohr and West Nile Delta (BP), in addition to the smaller Noroos (Eni) and Atoll (BP) fields that should jointly produce c.5bcf/d at plateau representing 1.1x Egypt's current total gas production. Further discoveries of small and fast-to-plug plays such as Noroos and North Alam El Shawish (Shell) have boosted investor confidence and attracted new entrants to the sector such as frontier national oil companies and private equity funds.

The first and foremost constraint is large domestic demand that caps the gas surplus available for export. While Egypt is on track to regain a gas surplus by 2019, the challenging question is how long it can remain a gas exporter. The prime consumer of gas is electricity generation, which burns c.60-65% of Egypt's gas output. Gas consumption is dependent on both structural trends in demand and availability of energy for end-users. While gas consumption markedly rose during the first half of the 2000s (+12% CAGR in 2000-05), it has been almost stable since 2011 given shortages (+1% CAGR in 2011-15). In the short term, domestic consumption should rise substantially due to the commissioning of Siemens' mega 14.4GW combined-cycle generation plants that would add 37% to national installed power capacity.

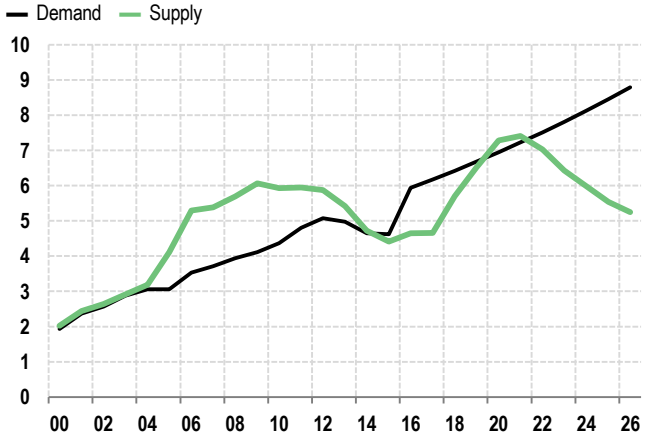
The key factor driving electricity consumption is population growth because two-thirds of power output is consumed by residential and commercial customers. Population growth (+2.2% annual average in 2000-15) is one of the highest in the MENA region, a trend that is likely to last beyond the medium term due to Egypt's youth boom (one-third of total population is under 14).

Another source of gas demand is gas-intensive industry (steel, fertilizers), which is expected to return to full utilisation in step with the economic recovery. Here, Egypt has to choose between exporting surplus gas in either LNG in order to accumulate fx reserves or industrial forms in a way that maximises factors of economic development such as employment and industrial integration.

Pursuant to demand management, Egypt is challenged to manage gas supply. Some producing legacy gasfields suffer from high rates of decline in production (12% annual average). While the four key offshore discoveries are being fast-tracked, they have varying production plateaus ranging from 11-18 years (Atoll, Zohr) to much shorter 3-5 years (Noroos, West Nile Delta). Replacing declining offshore production necessitates further exploration investments to proactively sustain Western Desert production that should start naturally declining in 2-3 years, albeit at smoother rate.
Under the conservative assumption that gas consumption will grow by 4% per annum on average in the medium term and based on Wood Mackenzie's gas production forecasts (production to peak in 2021 and decline afterwards), Egypt's capacity to export gas may not last beyond 2022. Even if such production forecasts are considered conservative, we believe that Egypt can sustain gas exportation only if further discoveries are made and subsequently developed. That is partly achievable if EGPC arrears are repaid on a regular basis to provide the needed certainty for private E&P investments.

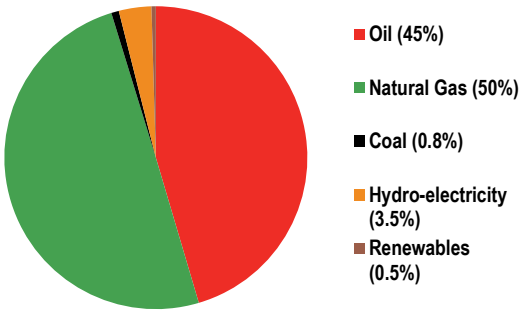
To free up gas capacity for export, Egypt has to diversify the energy mix away from fossil fuels. Hydrocarbons made up more than 95% of

3- Gas balance
Bcf/d



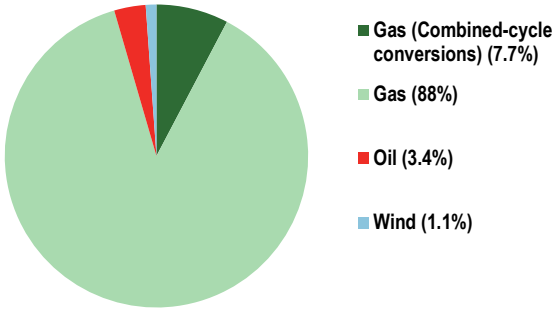
Sources: BP (Statistical review 2016), Wood Mackenzie, BNP Paribas estimates and forecasts

4- Energy consumption by fuel (2015)
% of total



Source: BP (Statistical review 2016)

5- Power project pipeline by fuel (19.4 GW under construction)
% of total



Sources: Egyptian Electricity Holding Co, BNP Paribas

primary energy consumption in 2015. Although Egypt launched an ambitious renewables strategy aiming to increase the contribution of solar and wind resources to 20% of power output by 2022, progress has been rather slow and restricted to public projects rather than independent power producers (IPPs). As renewables accounted for only 0.5% of Egypt's power generation mix, it will effectively take a long time for the country to reduce its dependence on gas for power generation.

Can Egypt become a East Med gas hub?

Simultaneous gas discoveries in offshore Egypt, Israel and Cyprus have opened a new opportunity for regional integration because discovered volumes seem to exceed domestic market capacities in the respective countries. Egypt's bid to become a regional energy hub is built on three pillars: strategic location on key trade routes, proximity to resource-rich countries with relatively saturated domestic markets and advanced export infrastructure. This last factor, in our view, is the defining pillar of Egypt's regional hub strategy.

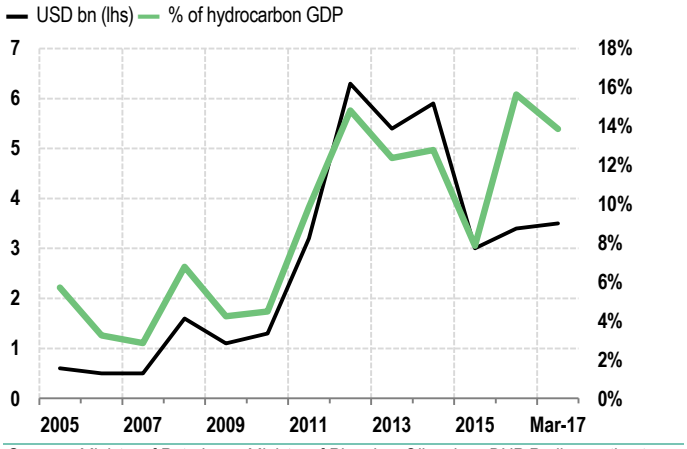
Our understanding of the gas hub approach entails trading and export dimensions. The trading dimension positions Egypt as a deep and open gas market where sellers and buyers transact freely under efficient regulatory conditions. Although this is an important dimension to developing gas-intensive industries such as petrochemicals, it would require ample time and continuous regulatory adaptation to evolve. The second dimension positions Egypt as a gas export hub not only for its own surplus domestic production, but also for the excess output of other East Med basin countries.

Israel became gas-rich as result of Tamar and Leviathan discoveries in 2009-2010. Tamar (10tcf reserves) is currently in production, supplying 100% to domestic buyers. Tamar's production remains below full capacity, which is estimated to be 1.2bcf/d. Leviathan (22tcf reserves, the equivalent of Zohr's) should start marketing its production by 2020. The two fields combined comprise a total Israeli production capacity of 2.5bcf/d. The consortium in charge of Leviathan development has signed a contract with Jordan's National Electric Power Company to supply 45bcm of gas over 15 years, thus completing phase I of the project.

In Cyprus, Aphrodite (4.5tcf reserves) was discovered in 2011, but a development concept is yet to be introduced. Nevertheless, there is no clear timeline, and the political specificities of Cyprus could slow the development of the project. There is further potential for a Zohr-like 'exploration tail' in the promising Block 11 that will be drilled in Cypriot waters in mid-2017, a few kilometres northwest of the Zohr formation. Lebanon has offshore gas reserves, but their development remains at an early stage and dependent on the domestic political process. It should be noted that there is a high potential for new discoveries across the four basin countries, which not only creates integration opportunity, but also overhang on development plans in anticipation of the location and volume of the next gas find.

Egypt's existing LNG terminals on the two flanks of Nile Delta seem to be the answer to the East Med gas surplus question. The two plants, which are currently nearly idle due to gas diversion to the domestic grid have an aggregate export capacity of c.12mtpa and are capable of exporting 1.7bcf/d with limited mothballing requirements. That theoretical export capacity provides a platform to handle combined production of Leviathan (phase II) and Aphrodite at mature levels as well as Egypt's peak exportable surplus in 2021 based on our own forecast. Moreover, connecting Mediterranean discoveries to Egyptian infrastructure requires substantially lower investment than construction of greenfield LNG facilities in Cyprus or Israel.

6- EGPC arrears



Sources: Ministry of Petroleum, Ministry of Planning, Oil majors, BNP Paribas estimates

Excess reserves in both countries are, nonetheless, not material enough to justify new LNG investments on a standalone basis.

Egypt's hub position would bring the region substantial benefits, such as optimising resources and investments, alleviating external balances in Egypt and Cyprus, diversifying gas supply to Europe and deepening the global LNG market.

Nevertheless, there are three constraints for the development of the Egyptian gas hub. The first constraint to East Med gas integration is geopolitical sensitivity between Egypt and Israel on the one hand and Cyprus and Turkey on the other. Development of cross-border energy projects faces a web of complex political risks that have to be negotiated and documented by host countries as well as various upstream and downstream partners through inter-government agreements (IGA) and host-government agreements (HGA). Those documents would have to reflect acceptable terms with long horizons amidst changing geopolitical and industry environments. We single out two specific political risks to the hub strategy. The first risk is classic political reservation between Egypt and Israel linked to limited bilateral economic cooperation since the Peace Accords as well as pending arbitrations on previous energy disputes. The second and emerging risk is the complexity of Turkey's political situation in the region.

Turkey, which relies on Russia for 56% of its natural gas supply, could be willing to diversify its supply sources. With the recent restoration of diplomatic ties between Turkey and Israel, talks related to gas supply have progressed. In the short term, there could be an agreement on a gas pipeline linking the two countries. Nevertheless, according to the Israeli energy minister, the possibility of Turkish gas imports from Leviathan is compatible with exports to the Egypt's LNG terminals.

The second constraint is limited financial capacity to invest in a regional hub strategy. Boosting Egypt's gas production and integrating Cypriot/Israeli gas into LNG infrastructure require significant public investment. This investment entails settling EGPC arrears and increasing the gas price payable to oil majors in order to drill costlier deepwater wells. The increase has to be partly passed on to end-users in the form of higher prices at the pump. Linking East Med gas fields to Egypt also entails laying multi-billion dollar subsea

pipelines that could be co-sponsored by the national oil companies of host countries, including Egypt, hence requiring large capex outlays. It is worth mentioning that even if the EGP devaluation has resulted in a substantial improvement in external liquidity, Egypt's balance of payments remains a source of vulnerability. Given that current account deficits are expected to last in the medium term, Egypt's external liquidity situation will remain dependent on the capacity to attract foreign investment. It should also be noted that external support for Egypt has shifted from grants to loans in the past two years, which increases external debt and further pressures the BoP.

A third constraint to regional energy integration is regulatory uncertainty in host countries. While Egypt has had a stable regulatory regime for the hydrocarbon sector since 1950s, upstream regulation has proved to be cumbersome in Israel and, at least, untested in Cyprus. An important milestone for Leviathan was the clearing up of anti-trust issues and announcement of the Final Investment Decision (FID) in early 2017. However, it is less clear how Cyprus's hydrocarbon laws will evolve given the industry's infancy and the absence of development of the Aphrodite discovery to date.

Prospects for the development of an energy hub

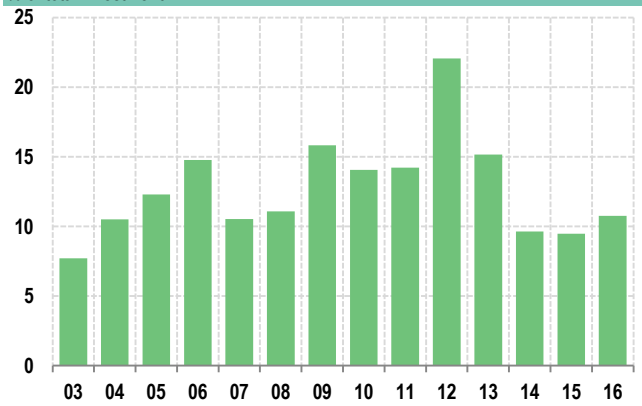
The power sector offers potential synergy with gas in Egypt's energy hub strategy. The country's power generation capacity, which is predominantly provided by gas-fired units, long suffered from underinvestment pre-2011, that resulted in unprecedented power outages in 2012-2013. Sector reform was made a presidential priority and led to the tendering of mega fast-track projects representing a 60% addition to net installed capacity such as that of Burullus/Beni Suef/New Capital 3x4.8 Giga Watt (GW) combined-cycle power plants. The power investment cycle is expected to boost generation capacity from 39GW in 2016 to 60GW in 2020. More importantly, the government is enhancing the efficiency of gas usage by increasing the contribution of combined-cycle gas-fired units in the total generation mix from 32% at present to c.50% by 2019. New capacity additions should increase overall gas consumption but, nonetheless, reduce gas burnt per megawatt produced, hence optimising energy usage. Power investments were coupled with sector deregulation and a 5-year tariff reform plan whose three rounds of hikes were implemented from 2014 to 2016.

Large public investment in the power sector should satisfy consumption in the medium term with a 15% reserve margin to support any sudden uptick in economic growth. The positions Egypt to extend its energy hub vision to electricity because the grid is currently generating daily an off-peak surplus of 4GW that will rise to 8GW with the full commissioning of mega plants in 2018. The surplus opens the way to export electricity to neighbouring countries as part of the energy hub plan.

But that ambition comes with strings attached as Egypt faces three constraints to exporting electricity. First, Egypt's power sector remains primarily dependent on gas feedstock. The major risk to becoming an electricity hub is delayed execution of the energy diversification strategy, which would pressure remaining gas reserves. The second risk is limited marketing destinations for Egypt's surplus electricity.

7- Investment in gas sector (public and private)

% of total investment



Sources: Ministry of Planning, BNP Paribas estimates

We expect the reserve margin to peak at 40% in 2019 before normalising, although the number of export markets that can absorb that surplus capacity is limited. This is due to political instability in Egypt's traditional export markets (Libya, Syria) and the expected power surplus in Israel. That leaves Egypt limited material options such as the 3GW interconnection with Saudi Arabia (under construction) but likely to trade electricity both ways. Also there is the 1GW interconnection with Cyprus and Greece, which are short of power but have to invest heavily in high-technology subsurface cables in order to plug with Egypt. The Egyptian government expects the Saudi interconnection to come online by 1H2019. The third risk is the limited financial capacity of the Egyptian power sector as it has just completed an unprecedented capex cycle in 2014-2016. That cycle has been largely financed by international ECA-backed debt whose amortisation should begin in late 2018. Egypt is also pursuing substantial investments in domestic transmission and distribution, thereby making further investment in export infrastructure rather constrained. These three risks should determine Egypt's chances to export excess electricity. However, there is also room for upside potential if Egypt outperforms on domestic growth and/or Libya stabilises faster than expected and can absorb excess power supply in the medium term.

Egypt is expected to become a net gas exporter by 2019. But the answer to the question of for how long depends on the management of domestic demand and supply mainly through diversification of energy sources. This uncertain situation, in fact, underlies Egypt's ambition to become a regional export hub for all East Med gas owing to its factor Endowments. However, Egypt's ability to navigate through geopolitical and financial risks, including current account vulnerability, is what should eventually make its energy hub ambition a reality.

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