Gas-to-power in North Africa: Implications for gas exports and supply

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The power sector in North African gas exporters Algeria, Egypt and Libya, as well as in transit countries Tunisia and Morocco, has been the main driver of growth in gas consumption since the introduction of the fuel in the respective energy balances of these countries. With demand for electricity expected to show no signs of abating in the medium term, the exporting countries are facing added pressure on their gas export expansion plans, while Morocco and to a lesser extent Tunisia are having to make tough decisions with regard to future gas supply options. Issues of artificially low domestic prices, endemic to the gas-and-power sector across the region, lie at the heart of these challenges.

Growing Importance of Gas

The use of natural gas and the extent of its penetration of North African energy markets reflect the availability of this resource in countries of the region as well as relevant government policies.

In Algeria, the region's biggest reserve-holder, gas consumption has been actively encouraged by government policy from the early 1970s, both as feedstock for a growing industrial base and the 'fuel of choice' for power generation. In the case of the latter energy-transformation industry, the aim behind this policy was to release higher value oil products for exports by using a fuel that had hitherto been flared. As a result, the power sector has become almost entirely dependent on natural gas, which represents 97 percent of its fuel input.

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Similarly, with the expansion of Egypt's gas reserve base from the early 1990s, demand for gas was boosted by the government's policy of substituting gas for oil in the power generation sector and the consolidation of the petrochemical industry's capacity around gas-prone areas. In 2009, over 80 percent of Egypt's electricity output was generated from gas-fired power plants, compared to around 30 percent in 1989.

In Libya, gas consumption has remained flat at around 5–6 Bcm/yr over the last decade, despite the government's plan to expand the use of gas domestically, capitalising on the country's relatively large reserves and its growing output since 2005. The return of foreign investors to the country following the lifting of UN and US sanctions in 2003–4 has allowed the government to convert a reasonable number of power plants from heavy fuel to natural gas, pushing up to 45 percent the share of gas in power generation. However, a real 'dash for gas' is expected to take place in the course of this decade with the coming online of a string of new power, desalination and petrochemical projects.

Tunisia has made full use of its status as transit country for Algerian gas to Italy through the Trans-Med pipeline. It chose early on to take its transit fees in kind and to contract additional imports from Algeria to supplement its own modest production. This means that the country's power sector has benefited from the availability of relatively cheap gas supplies, upon which it now depends for about 83 percent of its fuel input.

By contrast, Morocco – a country with negligible hydrocarbon reserves – only introduced gas in its energy mix in 2005, using part of its transit allowance to fuel the country's first CCGT power plant at Tahaddart, in the northwest of the country. For almost ten years following the entry into operation of the GME pipeline in 1996, the Moroccan government remained politically averse to developing any dependence on Algerian gas supplies, in spite of the country's growing energy needs and the increasingly burdensome fiscal weight of other fossil fuel imports. This apparent change of attitude paved the way to further domestic use of natural gas, with the country's second gas-fired power plant in Aïn Beni Mathar using since May 2010 the remainder of transit royalties, leading to an increase of the fuel's share in power generation to about 14 percent.

Soaring Demand and Domestic Price Subsidies

Over the last decade, power demand in the region has surged at an average annual rate of 6–8 percent, with Egypt, Morocco and Algeria experiencing the highest levels of growth. This upward trend was unaffected by the recent global downturn, which had a relatively limited impact on the North African economies. Local demand for energy is fuelled by economic and population growth, but it is also a reflection of distorted consumption patterns stimulated by subsidised prices of gas and power.

Artificially low prices of gas feedstock are a structural feature of energy markets in the region. Prices of gas sold to industrial end-users are thought to be generally lower than delivery costs, causing heavy fiscal burdens for government budgets across the board and resulting in a higher opportunity cost for gas exporters in particular, not to mention the implications for upstream development in producing countries. In 2008, energy subsidies in Egypt and Morocco amounted to 8 percent and 4 percent of GDP, respectively.

As far as natural gas is concerned, these pricing practices originate in the fact that, as a by-product of oil, as a payment for NOCs' share under PSAs or for transit fees for pipeline shipments, the fuel was considered a 'free good'. However, with time these subsidies have become an integral part of the

'social pacts' that underpin the often-problematic state-social relations in the region and that the increasingly unpopular governments have found daunting to revise.

Prices of gas feedstock in North Africa range from $0.2/MMBtu in Libya and $0.6/MMBtu in Algeria to around $1.25–3/MMBtu in Egypt, depending on users. By far the most populated country in the region, Egypt has shown the most urgency in recent years to come to terms with the issue of subsidies, though not without difficulty.

In 2004, the government decided for the first time in twelve years to hike electricity tariffs and to ensure that they remain cost-reflective for large users by increasing at an annual nominal rate of 7.5 percent. The bulk of electricity consumption is in the residential and commercial sector.

And in June 2008, the government fixed the price of natural gas for energy-intensive industries at $3/MMBtu, and decided to gradually increase it for other industrial users from $1.25 to $2.65/MMBtu by July 2010. The move followed an earlier decision to revise upwards the price paid by Egyptian NOCs EGAS and EGPC for the gas purchased from their foreign upstream partners to sell on the domestic market – normally two-thirds of IOC reserves. Prior to 2008, this price was capped at $2.65/MMBtu – the top of a sliding scale capped at a Brent price of $22/bbl – but the new cap ranges from $3.7–4.7/MMBtu depending on the concession and the position of the acreage.

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More recently, Egyptian government and BP/RWE Dea agreed to amend the terms of the existing PSA for gas produced from their joint North Alexandria and West Mediterranean Deep Water concessions, stipulating that the contractors will assume all investment costs, which are estimated at $9 billion, while Egyptian NOCs will have the right to buy all gas produced – instead of a limited share – at a price of $3/MMBtu at a floor of $50/bbl Brent, rising to a ceiling of $4.10/MMBtu at an oil price of $120/bbl. The deal was hailed as a groundbreaker in Egypt's struggle to come to terms with booming domestic demand, as it is expected to send a positive signal to investors and encourage more contractual flexibility within the PSA regime, which is likely to lead to more exploration in the Mediterranean. However, even with the 2008 price arrangement, selling volumes onto the domestic market at a heavily subsidised price – well below the price paid to IOCs, as discussed below – meant that Egyptian NOCs have on many occasions struggled to pay their dues to contractors on time, leading to further frustration amongst foreign investors and to decision delays for key upstream projects.

However, Egyptian government efforts to grapple with pricing issues were soon met with resistance from industrial lobbies, which can exert pressure on the government through representative tycoons with prominent influence on national politics. As a result, in January 2009 the price of gas for energy-intensive users was reduced to $1.7/MMBtu, while the incremental increase for other industries has yet to be implemented. The government used the pretext of deteriorating global economic conditions to effectively reverse its decision to adjust domestic prices, but many remain sceptical about the political will shown so far by decision-makers to deal with this longstanding issue. Yet, in the first half of 2010, the government seemed to have resumed the implementation of its subsidy-reduction plan, but promised to eliminate all energy subsidies by the end of 2011. This revised schedule is reflected in the 2010–11 spending budget, which provides for almost a $12 billion energy subsidy bill and confirms observers' prediction that the issue is too sensitive for the Egyptian government to tackle effectively before the presidential election of September 2011.

Across the region, governments are likely to continue ducking opportunities to grapple with the domestic pricing issue, which will remain a political hot potato at least in the short term. Questions of succession are not only the focus of current political debates in North Africa, but are also fuelling rising tension between supporters of incumbent leaders and opposition movements. In the absence of outside pressure and/or incentives to redress existing pricing policies, tackling the issues will not take precedence over pressing socio-political concerns.

Power Projects and Gas Supply

Across North Africa, the power sector accounts for the biggest chunk of domestic gas consumption: 45 percent in Algeria, 56 percent in Egypt, 65 percent in Libya, 74 percent in Tunisia, and over 95 percent in Morocco. As regional demand for power is expected to continue growing at a minimum rate of 6 percent per year to 2015, pressure on gas supply will be ratcheted up in view of the competing requirements of the industrial and export segments. This will especially be the result of the overwhelming reliance of the planned new generation capacity on gas-fired combined and steam cycle technologies.

Through its 6th five-year (2007–2011) investment programme, Egypt plans to add to the existing 23,500MW over 7,700MW of new generation capacity, expecting power demand to grow at an average annual rate of 6.4 percent. Another expansion plan for 2012–2017 has recently been sanctioned by the state-owned Egyptian Electricity Holding Company (EEHC), with the aim of installing over 11,000MW of new, mostly thermal capacity. Most of the new investment will be done through EEHC with the help of donor finance from IFIs, but the government has recently signalled that private investment will be resorted to in future. To this effect, new electricity legislation about to be ratified is expected to introduce greater liberalisation to the power sector and encourage IPP participation, following a hiatus since 2003 as a result of a local currency crisis.

Algeria, Libya and Tunisia are also pursuing ambitious

capacity expansion plans, almost all of which are based on gas-fired technology. Algeria aims to more than double its existing generation capacity by adding another 10,000MW between 2008 and 2017, in addition to a 2.3 million m^3 of water desalination programme by 2012. Libya for its part is constructing 4,500MW on top of the existing 6,000MW of generation capacity and the 400,000 m^3/day of desalination capacity. Finally, Tunisia plans to bring online one major combined cycle plant per year until 2015, increasing total installed capacity by an estimated 2,400MW.

Having over the last five years brought online two CCGT power stations with a combined capacity of 856MW, Morocco is now directing its attention towards expanding its Jorf Lasfar coal-fired power plant by installing two new 350MW units by 2012. Meanwhile, plans to convert to gas around 900MW of existing oil-fuelled capacity are still on hold, pending new gas supply.

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In all countries, power sector strategies have been devised on the basis that foreign investment should form an important part of expansion plans. So far, foreign interest in the power sector has largely been positive, and the share of IPP projects is likely to become more important as governments increasingly resort to outside investment to meet their growing requirements. Further reform of the power sector in North African countries as well as their access to project finance will be the main determinants of foreign investor interest in future. In Libya and Egypt, a lot more will hinge on the introduction of more attractive legal frameworks, which in the case of the former is still inexistent.

Despite holding ample natural gas reserves, North African countries – with the exception of Morocco – have seen the unrelenting demand for feedstock from the power sector exacerbate a constrained supply situation that is the result of a number of well-chronicled upstream impediments. This has cast uncertainty on the region's gas export expansion plans and is forcing gas-short countries to reconsider external supply options.

What Next for Gas Exports?

Unlike gas resource-holders in the Gulf, North African exporters are *not* facing a situation of gas shortage. These countries are tied by a string of long-term, gas pipeline and LNG export commitments, and all three have expressed plans to expand exports in the short to medium terms, going as far as building the necessary infrastructure in the case of Algeria. However, booming domestic requirements, driven largely by the power sector but also petrochemical industries, are forcing a re-think of these policies.

It has by now become evident that Algeria is unlikely to reach its 85 Bcm/yr export target, and if it did it would be after 2015. Gas consumption is expected to exceed 50 Bcm/yr by 2020, putting a heavy break on the possibility of monetising new gas supplies on export markets. This will have implications for planned export infrastructure such as the Galsi direct gasline to Italy, which will most likely be scrapped.

Egypt is doubling its efforts to boost gas supply from offshore reserves, but that will just be enough to maintain gas exports at their current level (18–19 Bcm/yr) to 2020. Domestic demand is projected to reach just under 80 Bcm/yr by 2020 and output to grow by an average annual rate of 4 percent. However, this hinges on the willingness of IOCs to continue investing in the upstream in the absence of further export prospects, and on the ability of the government to pay a higher price for gas to be sold on the domestic market. Constraints on gas feedstock experienced by power generators in summer 2010 suggest that the moratorium on new gas export projects is likely to be renewed at the end of the year.

Libya's gas potential remains elusive for now, but if and when new gas reserves are discovered the expansion of exports will be constrained by domestic demand – though a lot will depend on the size of eventual discoveries, the rate of utilisation and the commercial terms offered for foreign investors.

Transit countries Tunisia and Morocco could benefit a great deal from increased regional gas trade, but political tensions, in particular between Algeria and Morocco, continue to militate against further progress in this regard. There are questions about the ability of the Moroccan government to sustain its current policy of using oil and coal imports to supply its growing power sector, given the costs involved, but imports of Algerian gas beyond the transit royalties remains an unpalatable option. Instead, a 3.8 mtpa LNG receiving terminal and the introduction of reverse-flow technology to the GME to purchase gas from Spain are being considered by the Moroccan government as alternative, even if more costly, supply options.

Plans to develop alternative sources of power are being drawn up across the region, more tangibly in Morocco, Tunisia and Egypt. These consist of ambitious renewable (solar and wind) power projects, as well as nuclear technology, which some countries are hoping would account for at least 20 percent of their energy needs by 2020. However, in view of the funding and policy challenges these options present, as well as the long lead times they involve, action on the more immediate issues of pricing, upstream development and regional cooperation carries a better chance of addressing the region's power needs.