



كلية الآداب والعلوم  
College of Arts and Sciences  
QATAR UNIVERSITY جامعة قطر

مركز دراسات الخليج  
Gulf Studies Center

**Natural Gas in the Gulf: From a Failed Regional Gas Grid to  
an Emerging Intra-Gulf LNG Market?**  
Naji Abi-Aad

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## **Natural Gas in the Gulf: From a Failed Regional Gas Grid to an Emerging Intra-Gulf LNG Market?**

**Naji Abi-Aad**

### *Introduction*

The Gulf countries and Yemen hold large proven reserves and undiscovered resources of natural gas, and include both big gas producers as well as large gas consumers. The region, which recently increased its share in the world's gas market, started to play a growing gas consuming and importing role. In fact, at a time when huge volumes of liquefied natural gas (LNG) have been exported from the region, many countries there, in deep deficit of gas, started importing piped gas from neighbouring states, and LNG from the international market.

### *Huge Gas Reserves*

The nine Gulf countries under study hold huge volumes of proven conventional natural gas reserves, estimated in early 2019 by BP Statistical Review of World Energy at an aggregate figure of 74,800 billion cubic metres (bcm). This accounts for around 38% of the world's total, while the region's population represents less than 4% on a global scale.

A major portion of conventional gas reserves in the Gulf is concentrated in a small number of super giant fields, a fact making the

development of those structures easier and cheaper. The region has two such accumulations (including the North Field in Qatar, the world's largest non-associated gas structure, and the South Pars field, offshore Iran), out of ten such structures in our planet.

The size of proven conventional natural gas reserves widely differs from one Gulf country to another, from as low as 200 bcm in Bahrain to as large as 24,700 bcm in Qatar. What must be mentioned hereby, however, is that all Gulf countries under study — with the exception of Qatar and to lesser extent Iran — have most of their proven reserves in associated form, found and eventually produced together with oil. Natural gas output in these countries is thus closely linked to that of crude oil. That leaves, in the Gulf, only Qatar with a huge scope for expanding gas output and export. Iran, to a lesser extent, could also be a major player on the international gas market, although it has first to fulfil its huge growing domestic needs (including gas reinjection), and to put an end to the sanctions affecting its petroleum industry.

In the Gulf countries under study, the reserves-to-production average ratio for conventional natural gas, a measure often used as an indication of near-term supply

capability, is extremely high, estimated at around 109 years in 2018, as compared to the global average of 51 years. It is also interesting to note that the total conventional proven reserves of natural gas in the region, as estimated in early 2019, are alone sufficient, even if no further discoveries are made, to satisfy current worldwide gas consumption for more than 19 years.

### *Mounting Gas Demand*

A major portion of the Gulf gas output has been consumed locally. Gas has been increasingly used as fuel and feedstock in many vital and essential applications such as power generation, water desalination, petrochemicals and fertilisers, gas-condensate recycling, oil lifting, and enhanced recovery. New gas applications, such as the use of compressed natural gas (CNG) in the transport sector, have been increasingly introduced in the region.

The potential for future expansion in natural gas demand in the Gulf is considerable, as the region continues to witness economic and population growth at rates in excess of those in other areas of the world. Gas use by the power generation and water desalination sector is expected to keep growing at a high rate in parallel with the increase in electricity demand (around 8-10% annually) in most of the region's countries at least until the middle of the new decade.

Power generation and water desalination will continue to absorb about half of the total demand for natural gas in the Gulf, with the industrial sector accounting for nearly 35%, and the balance (some 15%) being needed for petroleum operations and pressure maintenance in oil wells. In fact, the required re-injection of natural gas to maintain pressure in mature oil fields in the region, many of which have been in production for 60 years or more, has been a urgent necessity growing with every passing year.

### *Growing Gas Deficit*

Nevertheless, in those Gulf countries with modest gas reserves, or where such reserves and output are in associated form, and where crude oil production and the subsequent output of associated gas are not anticipated to grow in the foreseeable future at the same rate as domestic gas demand, growing gas deficits are taking place. To face this mounting challenge, these countries are exploring for and developing their conventional and unconventional gas reserves or increasingly relying on import.

In fact, some Gulf countries (Saudi Arabia and to a lesser extent Kuwait) have been aggressively exploring for new conventional gas resources, especially in non-associated form, while developing their dry gas reserves, which are relatively modest, located in dispersed, small fields, or in over-pressured, highly

corrosive and deep Khuff reservoirs, usually found under oil structures. They are, therefore, expensive to develop, especially when their development costs are compared to the current domestic gas price in the region (between \$1 and \$1.5 per million British thermal units (MBtu)).

Meanwhile, Gulf countries started to be interested in exploring and developing unconventional gas resources. This is especially the case of Saudi Arabia, where vast potential for unconventional gas is believed to exist, and where Saudi Aramco has multiplied efforts in deploying state of the art hydraulic fracturing technology.

*While a Gulf Gas Grid did not come out from Regional Pipelines*

Other way to face the growing gas deficit has been to import it through regional pipelines. Hopes were raised at one time that these pipelines would be the precursor to establishing a Gulf gas grid. Such a wider network shall increase the resources available to the internal Gulf economy and shall create a strong development drive. It shall boost intra-regional trade and shall be an important step towards the long-sought public objective of political co-operation and economic integration of the Gulf countries. Those nations, which are already interlinked through various historical, cultural, economic and political relationships, will then be able to commonly enjoy the energy richness of their region in all its forms.

In reality, only few regional gas pipelines have been built in the Gulf. In addition to the short-lived Iraq-Kuwait pipeline, and the small gas link between Oman and Ras Al-Khaimah, the much larger Dolphin pipeline is supplying up to 20 bcm/year of Qatari gas to the UAE and Oman. Those pipelines were the ultimate result of political compromises and concessions, resulting in low prices for the pumped gas, prices that will be difficult to replicate considering the higher netback values of the gas resulted from other applications and uses.

The price issue is not the only one impeding the establishment of more regional gas pipelines (such as those once proposed between Qatar and Bahrain and Qatar and Kuwait) and an integrated gas grid. In fact, for those pipelines to properly operate, many issues have to be addressed. To begin with, there is the swing nature of gas demand in the area and the way to handle it. Demand for electric power (and consequently for natural gas) peaks in summer, when all households maximise their air-condition needs. There is therefore a huge swing between summer and winter power and gas demand. Options to manage this swing by either creating storage facilities at the upstream producing end, or at the downstream consuming one, should be evaluated together with their impacts on both the capital and operating costs.

Secondly, there is the issue of transit fees, especially when a link

between two countries passes through the territories of third ones. Those fees in money or nature terms, could well affect the whole economic feasibility of a pipeline network project, while indirectly helping to add more stability and security to the gas exchanges through what is called “the mutual dependency factor”.

One more important issue related to the transit of natural gas (or crude oil and petroleum products) through pipeline is connected to the agreements and terms of the World Trade Organization (WTO). In fact, each member of the WTO has to give the owner or operator of any pipeline passing through its territories full and free access to its own domestic market. In the case of gas pipelines in the Gulf, that right for market access has not always been accepted by all its countries, due to different reasons.

There is finally the question of “energy independence”. Usually, states do not want to depend on neighbouring countries for their fuel supplies. Another related element to be taken into consideration is that Gulf countries are oil producers and there is a psychological desire for self-sufficiency among them, which promotes a greater willingness to burn more liquid fuels despite their higher relative costs and damaging environmental impacts. In fact, many countries there, proud of their large hydrocarbon reserves (including huge associated gas resources), find it difficult to “import” gas (or any other energy sources) from anywhere.

### *Emergence of an Intra-Gulf LNG Market?*

Anyway, now that most of Qatar’s exports are in LNG form, the possibility of developing more gas reserves to pipe them into one or more regional pipelines would depend, among many other issues, on the will of Doha, being the only actual and potential large gas exporter, to develop more of its gas and pump it into regional pipelines.

With the prospects for reconsidering the pipeline schemes in the Gulf recently vanished with Kuwait, Dubai and Bahrain already operating LNG import terminals, and Sharjah and few others seriously considering putting similar facilities in place, an intra-Gulf LNG market, with Qatar supplying its neighbors with liquefied natural gas instead of the much cheaper piped gas could ultimately take shape.

In fact, with the possible global development of competing energy sources, especially unconventional gas, clean coal and renewables, especially in the main energy consuming markets (US, Europe, China, etc.), and the strong possibility for the LNG market to get more oversupplied in the coming years, and the re-emergence of security of supply issues (the possibility of the Strait of Hormuz’s closure), there could be a strong push for “reorienting” Gulf gas into the region itself to meet its growing energy needs. The early 2020 deal under which Qatar is to supply LNG to

Kuwait for 15 years could well be the first of many to come.

**About the author:**

Dr Naji Abi-Aad has built a long career as energy economist and strategist, with a special focus on the Middle East. In 2012, he started acting as COO to Petroleb, an oil company based in Beirut and active in petroleum exploration offshore the East Mediterranean and the Gulf. In 2016 he was appointed as the Senior Advisor to Tellurian Inc for the Middle East. Prior to his move to Lebanon, Dr Abi-Aad was serving for seven years in Qatar, first as Research Advisor for Qatar Petroleum (QP) and its Board of Directors Department, and as Media and Research Strategist in the Office of HE Qatar's Deputy Premier, Minister of Energy & Industry, before being appointed as Senior Advisor to the CEO of Qatar Petroleum International (QPI). Dr Abi-Aad studied at the American University of Beirut, and the got a Ph.D. degree in Energy Economics from Grenoble University in France.

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