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Shale gas in India: Does it hold the potential to change the outlook of gas availability in India from deficit to surplus?

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Abstracts

Executive Summary

The unlocking of domestic shale gas reserves could help India meet its growing energy demand, besides reducing its dependence on expensive energy imports. In addition, the development of the domestic shale gas industry could boost the economy. However, this emerging industry will have to be promoted by balancing economic benefits with environmental and social issues.

India’s natural gas market continues to be in a state of deficit, with demand far exceeding the supplies. In FY12, around 38% of the gas demand was unmet. As a result, the dependence on LNG imports has increased and there has been an underutilization of gas-consuming industries, particularly in the power and fertilizer sectors. For instance, the average plant load factor (PLF) of gas-based power plants has declined from 66% in FY11 to 59% in FY12.

Additionally, the existing gas-based units have to rely on expensive alternative fuels such as naphtha, diesel, furnace oil and LNG to meet demand. The gas shortage problem has been aggravated by dwindling production levels in the KG-D6 block. Therefore, the construction of new gas-based units, particularly in the power sector, which were allocated supplies from the block has been stalled.

According to the Government of India’s projections, the shortage of gas supplies is likely to continue during FY13–FY22. It is estimated to average around 72 mmscmd per annum. While the deficit as a percentage of demand is likely to decrease from 38.2% in FY12 to 12.4% in FY22, the country’s dependence on imported gas is likely to increase

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considerably. The share of imported gas in India's total gas supplies is likely to increase from 22.5% in FY12 to 54.2% in FY22. Out of this, LNG is likely to account for a major share, with LNG imports increasing from 38.5 mmscmd in FY12 to 258 mmscmd in FY22. This high dependence on imported gas could have significant implications on India's energy security and the overall trade deficit of the country.

Although the global LNG liquefaction capacity is projected to increase significantly over the next few years, gas prices under new LNG supply contracts are likely to remain high given the forecast of high crude oil prices. The sourcing of fresh LNG supplies at competitive rates has been a challenge on account of the intensifying competition among Asian companies. Competition is likely to further intensify due to an increased Japanese appetite for LNG for power generation after the shutdown of most of the country's nuclear power plants along with China's plans to augment its LNG imports. LNG supply projections for India depend upon the timely commissioning of the proposed LNG terminals (Ennore, Mundra, Paradip, Vizag, Mangalore and Dhamra). Additionally, the supply estimates assume the commencement of gas supplies from the Turkmenistan-Afghanistan-Pakistan-India (TAPI) pipeline in FY18.

Given the state of the supply deficit and heavy reliance on imports, it becomes imperative for India to harness all its energy resources, including shale gas, appropriately. The unlocking of domestic shale gas can help India meet its growing energy demand, besides reducing its dependence on expensive energy imports and the energy import bill. Taking a note from the impact of shale gas development in the US, the development of the sector can help increase economic activity in the country, thereby boosting government revenues and creating new jobs. Additional gas supplies can also spur investments in associated downstream segments, which cater to significant latent gas demand in the country. A case in point is Gujarat where the development of gas infrastructure led to the application of gas in new sectors such as industrial and commercial establishments in the ceramics, glass, chemicals, textiles, pharmaceuticals and diamond industries, among others. With some degree of intervention from the judiciary and local state governments, the household and automobile segments have the potential to further boost city gas demand as well. Initially, the prices of shale gas may not be economically viable for industries, such as power and fertilizers, where the prices of end products are regulated or price hikes are difficult to pass on to customers. However, it could be a viable alternative for meeting the needs of peak and captive power units and other sectors such as transportation, refineries and steel where it can substitute expensive liquid fuels. During FY13–FY22, gas demand from these sectors is estimated to increase at a CAGR of 7.6%, accounting for around 30% of the total gas demand in the country.

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In order to replicate the shale gas experience of the US, the country will need strong service and infrastructure capabilities along with a favourable regulatory regime, which not only promotes E&P activities, but also addresses environmental and social concerns. The prerequisites for developing the domestic shale gas industry include:

Supportive regulatory policies: There is need to have a favourable regulatory framework, which will incentivize companies to invest in shale gas activities. A liberal fiscal regime can be considered for shale gas operations as the industry is still in its infancy stage of development and the cost of operations are expected to be higher than conventional oil and gas operations. The need for a favorable pricing mechanism for shale gas operations has surfaced due to the initial high costs of production. The International Energy Agency (IEA) estimates shale gas production costs between US$3/mmbtu and US$7/mmbtu in North America. Production costs in India are likely to be higher, given the relatively unknown geological terrain, water disposal costs, inadequate domestic service industry and other expenses. Gas gathering and processing costs are also likely to be on the higher side. However, operational costs have substantially reduced in the US with the application of new and advanced technology. For instance, breakeven costs have reduced by around 40% during the past few years and a similar trend could be expected in India, with the implementation of advanced technology.

Promote the development of service capabilities: The inadequate oilfield service sector capacity and suitable equipment are potential bottlenecks preventing the faster development of shale gas in the country. This is one of the challenges that India will need to address to develop its unconventional resource potential. The service level intensity for shale gas development is typically higher than that of conventional oil and gas activities. In the US, the domestic service industry played a pivotal role in supporting the country’s shale industry. In comparison, there is a shortage of critical oilfield equipment in India. Moreover, equipment imported from other countries will have to be modified to suit local conditions due to differences in terrain. The geological characteristics of shale gas plays vary across regions. Therefore, the exact replication of technologies and techniques employed in the US may be not possible in India. As such, there is a need to foster an environment, which is conducive for investment in development of high specification equipment required to conduct shale gas operations. With many oilfield service companies looking to export the techniques they have used successfully in North America to international

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markets, the Government of India can encourage their participation in India. For instance, China-based Anton Oilfield Services recently offered Schlumberger a 20% stake, which will enable the latter to consolidate its presence in China.

Address environmental concerns: Before initiating shale gas development in the country, it is necessary to learn the lessons from studies underway on the environmental and public health impact of shale gas development in the US and use them to shape appropriate regulation. With the increase in shale gas production brought about by the application of hydraulic fracturing “commonly termed as fracing” techniques, there has been a corresponding increase in concerns about the potential impact of the process on public health, drinking water and the environment. The issue has become increasingly contentious in the US, which has had several years of shale gas production experience, largely pertaining to the parameters against which the impact needs to be assessed. In response to raised public concerns, various studies are underway on the environmental and public health impact of shale gas development in the US. Many states in the US are deliberating to impose a moratorium on drilling activities until the results of the study are released and robust measures are implemented. Currently, most countries in Europe appear to be adopting a “wait and see” approach on the issue. Even South Africa, with significant shale gas reserves, has suspended drilling activities in the region. The extensive use of water, especially in water-deficient countries such as India, may put severe pressure on water supplies. The efficient disposal of waste-water from drilling operations is likely to be another debatable issue. Moreover, the exploitation of shale reserves in ecologically sensitive areas may lead to public opposition.

Address social concerns: The availability of land is not a major challenge in the US, given its vast open spaces; however it may be a vital issue in countries such as India, where population density is relatively higher. The physical footprint related to shale gas activities is considerably larger than that of the exploitation of conventional oil and gas. The typical well pad needs to be large enough to contain the drilling rig equipment, wastewater ponds, storage and pipeline infrastructure and facilities for staff and contractors.

Credible and factual information on shale gas resources, relevant technologies for developing these resources, the regulatory framework under which development takes place, and the practices necessary to mitigate potential impacts on the environment and communities, is required before any significant advance is made in the area. While geo-

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technical and geo-physical surveys need to be conducted to further delineate potential shale deposits, extensive R&D efforts need to be made in order to better understand technological, policy, and environmental imperatives.

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