Natural gas: Fuelling the future

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Preface

Deepak Mahurkar
Partner and Leader, Oil and Gas practice
PwC India

Climate change has forced countries worldwide to reengineer their energy mix in order to keep carbon and other emissions under check. A fuel for the future should satisfy three Ss: suitability, sustainability and sufficiency. In the last decade, significant strides have been made with renewable sources such as solar and wind. However, owing to concerns around the consistency of these sources, natural gas has become a reliable alternative, at least until other more clean and sustainable options like hydrogen become available commercially.

Natural gas as a fuel has finally come of age and the sector in India is ripe with opportunities. The commodity is available in abundance, and an increasing number of countries are trading gas in liquid form. India is the fourth largest importer of liquefied natural gas and a gas-based economy is emerging as a key pillar of India’s energy plan.

While policymakers have begun revamping the regulatory environment, the industry’s think tank is working towards retrofitting the gas supply chain with mobile, small-scale solutions alongside some large infrastructure creation. Amidst these developments, the role of technology as a key enabler for gas market operations, policy enforcement and monitoring cannot be overemphasised. There is an opportunity for policymakers to leverage technology in order to make regulatory procedures more swift, agile and transparent. Digitalisation is the future and the natural gas industry needs to embrace new technologies in order to become future ready.

Investments are flowing into the gas sector and excitement among stakeholders is touching new heights. The discussions at the 10th edition of the World PetroCoal Congress, which brings together stakeholders from the government, industry and academia, will focus on these trends. PwC is proud to be the knowledge partner for the event.

This paper examines the various dimensions of India’s natural gas sector. It analyses the current state of the sector and the measures that can be taken to secure the supply of natural gas in India. It is hoped that this paper will stimulate discussions among the stakeholders regarding the key issues of the gas industry.

I wish the World PetroCoal Congress 2020 great success!
Why natural gas?

Natural gas is the cleanest-burning hydrocarbon and the most preferred fossil fuel for this generation. Traditionally, India has relied heavily on coal and petroleum products as sources of energy. However, recently, India's growing carbon footprint has come under the spotlight. In 2018, India was behind only China and the USA in terms of CO2 emissions. There has been a growing self-realisation in India regarding the need to curb emissions and move towards a more environmentally sustainable fuel mix.

As a party to the COP21 agreement, India has committed to reduce the GHG emission intensity of its GDP by 33–35% below 2005 levels by 2030. However, this commitment poses a challenge to Indian consumers, who would prefer to continue using the cheapest fuel irrespective of the environmental impact. Natural gas fulfils the twin objectives of lower GHG emissions and lower cost compared to many of the conventional fuels and can thus act as a fuel for the future.

Gas consumption in India – aspirations vs reality

Buoyed by the Government of India’s (GoI) push towards a gas-based economy and the global liquefied natural gas (LNG) supply glut, natural gas is gaining substantial momentum in India. As of December 2019, India consumed around 156 MMSCMD of natural gas, 58% of which was met through imported LNG and the rest by domestically produced gas. Overall, in 2018–19, India consumed around 81 BCM of natural gas, 54% of which was supplied by domestic conventional and unconventional Coal Bed Methane (CBM) fields. From FY15 to FY19, the overall gas consumption has increased by around 18.7%, while domestic gas production dropped by 2%. LNG imports have thus become extremely critical and, fortunately, convenient as spot prices have nosedived in recent years.

The GoI has set an ambitious target to raise the share of natural gas to 15% of the energy mix by 2030 from the existing 6.2%. To attain this target, gas consumption needs to increase by approximately 230% from the FY19 level by 2030. Demand growth has to clock a CAGR of around 11.4% from 2019 to 2030 as against a CAGR of around 4.4% over the previous 11 years. Only a few countries such as China, Israel, Iraq, Turkmenistan and Peru have sustained these growth rates over such a long period of time. Consumption in Israel, Iraq and Peru has, however, been supported by an increase in domestic production. India is also pushing aggressively to increase the exploration and production of gas and, at the same time, is building infrastructure and importing LNG to create a natural gas ecosystem in the country. The climb is steep, but the government is upbeat about achieving these targets with massive investments in the sector.

1. BP Statistics 2019
2. Petroleum Planning & Analysis Cell (PPAC)
Despite being one of the fastest growing economies, India ranks far behind most of its BRICS (except South Africa), BIMSTEC and ASEAN counterparts in terms of natural gas share in the energy mix. Even in terms of growth rate of consumption, India lags behind the average rate of 4.7% registered by developing nations. The USD 5 trillion economy goal will drive tremendous growth in energy consumption and, at the same time, as a responsible nation, India will need to reduce its carbon footprint to ensure that the growth is both economically feasible and environmentally sustainable. While technologies related to solar and wind energy and electric vehicles are maturing, India will still need natural gas for transition from dirtier fossil fuels to cleaner renewable ones. The least India can do at this stage is to set an ambitious target and strive towards achieving the same.

Which sectors will be fuelled by gas?

The fertiliser, refinery, power and petrochemicals sectors are currently the major consumers of natural gas in India. Together, these sectors account for more than 80% of the total demand for natural gas in India. Apart from these major sectors, industries such as ceramics and glass, sponge, iron, pharmaceuticals and chemicals have also contributed significantly to the demand. The fertiliser and petrochemicals sectors use natural gas primarily as a feedstock, while the refinery and power sectors use gas as a fuel. Over the last decade, the fertiliser sector has slowly replaced the power sector as the largest consumer of natural gas in India. The power sector currently uses gas only for peak shaving purposes and most of the around 25 GW of gas-based capacity is sitting idle due to non-availability of domestic gas and non-affordability of LNG. In 2018–19, around 94 MMSCMD of gas was planned to be supplied to the power sector, out of which 92% comprised of allocated domestic gas. The actual consumption/ supply of natural gas in this sector was only around 31 MMSCMD. The power sector is gradually shifting towards solar and wind energy; however, gas will remain a more reliable fuel, since, unlike solar or wind, it doesn’t depend upon robust weather forecasting, a competency that India is still developing.

While the fertiliser, power and petrochemical sectors have supported the growth of gas consumption in the last decade, sectors such as city gas distribution (CGD) are expected to remain the central driver of gas demand over the next decade. CGD received a significant boost in recent years due to the GoI’s aim of providing clean fuel for domestic usage and transportation. After the latest bidding rounds, with a total of 228 geographical areas (GAs), 70% of India’s population and 53% of the country’s geographical area is expected to be covered with the CGD network. CNG for vehicles will gain further traction as more fuelling stations come up, CNG kits become cheaper, auto manufacturers roll out new CNG variants and, most importantly, as CNG becomes compatible for long-haul transportation. Recently, a CGD company in NCR launched an intra-city CNG bus which needs refuelling only after 1,000 km, up from around 250–300 km previously.

### Natural gas consumption in various sectors in India (Units: BCM)

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<th>Sector</th>
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<th>FY11</th>
<th>FY12</th>
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</tbody>
</table>

Source: MoSPI

3. PPAC
4. CEA: Fuel management division (Annual report 2018–19)
Are domestic gas and LNG going to be enough?

During 2018–19, India produced around 32 BCM of natural gas, with the production levels having seen no substantial increase in the last decade. After a six-year decline since 2011–12, gas production increased very slightly in the last couple of years. Even after considering a highly optimistic scenario of a 30% increase in production by 2030, India may produce merely 21% of the volume required to reach the 15% target. India has around 34 MMTPA of operational LNG import capacity, around 23.5 MMTPA of capacity is under construction and expected to come online in the next few years, and another approximately 15 MMTPA capacity is proposed on the eastern coast. Together, these existing, upcoming and proposed LNG terminals can supply up to 48% of the target even at 100% utilisation.

Hence, there may be a shortfall of 31% with India’s current gas portfolio. The gap may be sourced from unconventional sources like CBM, shale and gas hydrates and more easily from renewable sources such as bio-CNG.

Gas production – the role of unconventional sources

As of 2018, India had 106 BCM of balance recoverable CBM reserves, 62% of which are located in West Bengal, 30% in Madhya Pradesh and the rest in Jharkhand, while the prognosticated CBM resources amount to a whopping 2,600 BCM spread across 12 states. Several companies are actively exploring and producing from CBM blocks and are also looking to tap the shale gas lying adjacent to the CBM reservoirs. Gas hydrates are another potential source of gas being explored in India under the National Gas Hydrate Programme started in 1997. Gas hydrate potential has been established in the KG, Mahanadi and Andaman basins and further exploration is underway to assess the actual recoverable reserves. The trio of CBM, shale gas and gas hydrates is likely to be closely watched by the Indian gas sector. The government has facilitated the production of unconventional gas from a block through the Uniform licensing policy under HELP. Even if 50% of the unconventional potential is realised, India will have enough gas to safely transit to the age of renewables.
Gas imports – LNG to the rescue

The cross-border TAPI pipeline is not expected to be built soon and the natural gas pipelines from Iran or Myanmar are yet to cross the concept phase. In the absence of pipeline imports, LNG may play a key role as India marches towards becoming a gas-based economy. New terminals are coming up and an increasing number of companies are venturing into the LNG space in India. The incumbents are diversifying their portfolio and looking to invest across the LNG value chain to source the cheapest LNG for India. The volumes imported from Qatar, Australia and the USA are turning out to be cost-prohibitive, especially since LNG is available at extremely low prices in the spot market. New players are leveraging the cheap spot prices to supply spot volumes at affordable prices to the customers. The market is currently oversupplied, and the status quo is expected to be maintained in the near future as a number of liquefaction projects take FID. Hence, there is a lot of optimism about the future of LNG even in a price-sensitive market like India.

The idea of LNG as a transport fuel for heavy commercial vehicles is gaining popularity in India. LNG is a Euro VI compliant fuel and the Central Motor Vehicle Rules have been amended to recognise LNG as a transport fuel. LNG can be a much cheaper alternative to diesel even at delivered prices of above USD 13 per MMBtu. China, the USA and some countries in Europe have adopted LNG as a transportation fuel and India is expected to follow suit as a blue corridor (a.k.a. LNG highway) is expected to come up along the Delhi-Mumbai expressway. Shipping is another sector which may support gas/ LNG demand, especially as the new IMO norms on sulphur emissions have been enforced.

Is the gas infrastructure adequate?

Currently, LNG import terminals are heavily concentrated on the western coast. If the proposed terminals are realised, then the import capacity will be spread out across India's coastline. However, large-scale terminals are not commercially viable everywhere. In a bid to set up projects that have a quick turnaround and ensure fast-track access to gas, small-scale LNG (SSLNG) is gaining popularity across the globe. Power plants or other bulk customers in India may explore this route to optimise the delivered cost of regasified LNG. Pipeline infrastructure and secondary market demand are also critical for the success of this concept. The SSLNG route may also be used to supply small cargoes to neighbouring countries, which will generate a synergy between the gas markets of India, Bangladesh, Sri Lanka, etc.

The current import capacity is enough to meet the current demand; however, it is equally important to have sufficient pipeline connectivity to evacuate gas from each terminal. The repercussions of the insufficiency of the pipeline network are clearly evident from the low utilisation rates of LNG terminals in southern India. India currently has around 16,300 km of natural gas pipelines and the recent budget has proposed to augment the capacity by another 65%. The National Gas Grid is the foundation which all the ambitious gas-based projects in India will rely upon. The pipeline is currently concentrated in western and some parts of northern India. It will be critical to ensure pan-India coverage of the gas grid to tap into the potential market in eastern, northeastern and southern India. The Urja Ganga Project, Barauni-Guwahati pipeline, Northeast Gas Grid and Ennore-Tuticorin pipeline are some of the key projects which need to be executed urgently to deepen the gas market in India.

LNG can be transported by road through cryogenic tankers to reach customers who do not have access to gas pipelines. Satellite regasification plants (a.k.a. mobile regasification units) are popular in Europe and are slowly being adopted in India. Recently, one of the public sector units (PSUs) set up a small regasification facility in Bhubaneswar to supply LNG via trucks. A similar model is being considered by some of the CGD companies as well. Supply of LNG by road will be critical to cater to areas where pipeline construction is technically or economically unviable. Such a model will also allow flexibility to sellers to switch between markets.

Do we need strategic gas reserves?

If the ambition of a gas-based economy is to be achieved, it is critical for India to ensure uninterrupted availability of natural gas at an affordable price, thereby ensuring the proper functioning of the economy during a period of supply disruption. Strategic gas reserves are tailor-made for this very purpose. These reserves will be a key enabler for the gas-based economy and will provide the government the ability to manage external market influences and geopolitical tensions relatively easily. India has an attractive opportunity to manage supply security by converting its depleted gas reserves into strategic storage. However, storing natural gas in facilities has cost implications and a price-sensitive market like India will need to use cheaper alternatives when available under normal market conditions. The strategic reserves may also act as an enabler for the proposed gas hub. Such reserves will allow Indian importers to leverage the arbitrage opportunities arising from seasonal variation in LNG prices. A case-specific cost-benefit analysis may provide a better idea of the suitability of a reservoir and utility of the storage in its catchment area.
Gas hub – how to fuel the concept to reality?

Sectoral reforms are a prerequisite for establishing a gas hub in India and mere capacity expansion will not serve the purpose. A hub will make natural gas a more liquid commodity, which will help in its price discovery. However, this requires trade and trade requires open and honest disclosures. The PNGRB has already introduced a host of regulations for ensuring transparency, fair business conduct and third-party access to infrastructure.

Enforcement of the notified regulations and notification of draft regulations will go a long way in achieving the goal. Unbundling of transport and marketing functions may become necessary unless the regulator witnesses sufficient transparency. The Indian gas sector needs such reforms to lower the market entry barrier and allow a large number of buyers and sellers to trade both capacity and commodity – making it a gas hub.
Conclusion

The expansion in both the Indian and world economy is driving consumption of energy at unprecedented levels. A significant share of the energy pie is expected to be met by natural gas, which is a low-emission and easily available fuel (both in gaseous and liquefied forms) for homes, utilities and transportation. Prices have dipped, volumes are in surplus and the infrastructure capacity is expanding – all of these factors make natural gas an attractive and convenient fuel for the future.
About the event

The Energy And Environment Foundation organises the World PetroCoal Congress (15–17 February every year) with the objective of providing affordable energy to the masses by maximising efforts in petroleum, natural gas, bioenergy and coal sectors with a focus on technology, innovations and investments, especially in the areas of clean coal technologies, coal gasification, coal to liquid, and unconventional hydrocarbons like shale gas, shale oil, CBM, biofuel, hydrogen and gas hydrates.

Contact us

Dr. Anil K. Garg
CEO, Energy And Environment Foundation
President, World PetroCoal Congress
Ph: 91 9971500028, 91 11 22758149
E: dranilgarg2011@gmail.com
www.worldpetrocoal.in

About PwC India’s Oil and Gas practice

The Oil and Gas practice in India is led by Mr. Deepak Mahurkar. The team has diverse experience across the value chains of natural gas, LNG and biofuels, apart from conventional fossil fuels.

PwC’s Oil and Gas practice comprises a group of subject matter experts (SMEs) with deep knowledge about the market, competition, policy and regulations, trends and issues in the global and Indian oil and gas industry. We have extensive experience in working with ministries, regulatory bodies, industry federations as well as most public and private sector companies in the sector.