



NATURAL GAS 2023 - The Year of Rebalancing

By Deepika Lal

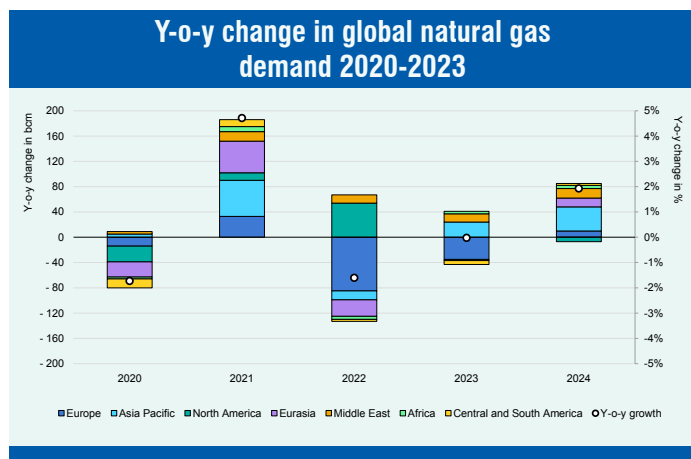
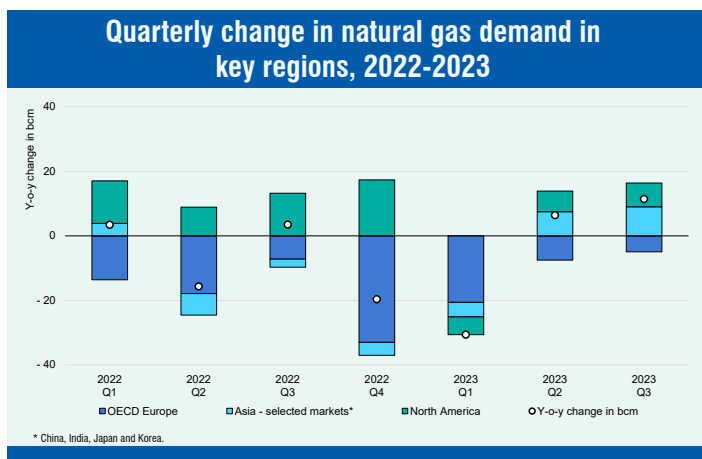
The gas supply shock of 2022 reinforced structural trends that are weighing on the longer-term prospects for global gas demand. At NGS, we analysed the global and Indian gas scenario in 2023, as compared to its preceding year. We provide you here with a brief snapshot of the same.

The energy crisis triggered by Russia’s invasion of Ukraine in early 2022 marked a turning point for global natural gas markets. The result was that the gas demand growth slowed down significantly in 2022 and 2023. The world saw greater focus on energy security by governments, energy companies, and financial institutions, with investments in infrastructure for source diversification and alternative energy sources. This helped to establish a new equilibrium in the gas market, although it remains unstable and seems already challenged by the new conflict in the Middle East between Israel and Hamas. Higher gas prices are reducing gas’ competitiveness vis-à-vis other fuels, while Russia’s steep supply cuts and the lack of LNG

availability in South Asian markets damaged the image of natural gas as a “reliable” fuel. This is in total contrast to a decade of strong expansion in which gas contributed around 40% of the growth in primary energy supply worldwide. Infact, overall, gas consumption across the mature markets of Asia Pacific, Europe and North America peaked in 2021.

GLOBAL GAS DEMAND MOVING TOWARDS GRADUAL REBALANCING

Global gas consumption contracted by an estimated 1.5% y-o-y (or 65 bcm) in 2022 at 3,995 bcm. This downward trend continued in the first quarter of 2023, when gas consumption declined in all key markets due to the continued impact of



high prices on gas use in the industrial and power sectors and unseasonably mild weather conditions. However, **gas demand returned to moderate growth in the second and third quarters** in North America and the rapidly growing markets of the Asia Pacific, while consumption continued to decline in Europe. Overall, gas consumption stayed flat in 2023 as increase in demand in Asia Pacific and the Middle East could be almost entirely offset by reduced demand from Europe, Central America and South America.

Region-wise, in **Europe**, the 2022 gas crisis reinforced the structural drivers accelerating the decline in gas demand over next few years. An increased deployment of renewables, higher energy efficiency standards and growing electrification in areas such as space heating will likely have an impact on gas consumption.

The **mature Asian markets (Japan and Korea)** also saw a decline in their gas consumption amid depressed electricity consumption and better nuclear availability. Going forward too, improving nuclear availability together with the continued expansion of renewables is expected to reduce the call on gas-fired power plants and drive down overall gas demand in these markets.

However, gas demand in the **Asia Pacific region** increased by an estimated 2.5% (or 12 bcm) in the first eight months of 2023, as the declines recorded in the first quarter were more than offset by rising consumption during the latter quarters. Demand growth was largely concentrated in China where estimated gas consumption rose by around 7% y-o-y in Q1-Q3 2023, supported by the industrial and power sectors. In the near term too, the bulk of demand growth is likely to be concentrated in Asia Pacific. Infact, **China is expected to be the main driver of the growth in global gas demand** with its power sector, industrial production and city gas networks being the major consumers.

In the Middle East, **production growth in Iran, Israel and Saudi Arabia** is expected to support the expansion of its gas-intensive industries and higher gas burn in the power sector. Africa's gas demand growth is expected to be driven by its rapidly rising population, improving energy access and economic growth. In the **United States too**, natural gas demand rose by an estimated 0.8% (or 5 bcm) in Q1-Q3 2023, with growth entirely driven by the power sector. Consequently, the share of natural gas in the power generation mix

rose from 34% in January 2021 to more than 45% in August 2023.

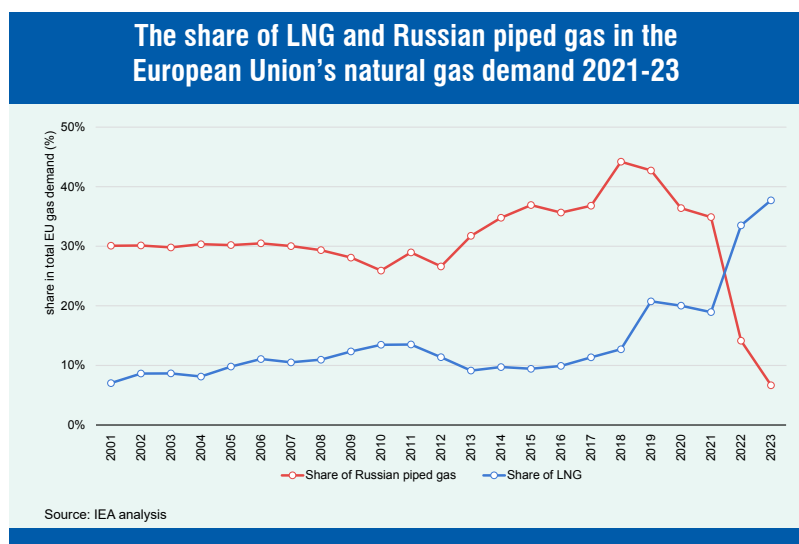
Emerging Asia's gas consumption also increased by an estimated 2% y-o-y in the first seven months of 2023, amid lower LNG spot prices. **Thailand** recorded 4% y-o-y growth in the first seven months of 2023, primarily driven by higher gas burn in the power sector. **Bangladesh and Pakistan** increased their LNG imports by 14% and 6% y-o-y in Q1-Q3 2023, respectively. This indicates a gradual recovery in the two countries' gas demand, driven by higher gas use in industry and the power sector.

HIGH EUROPEAN INVENTORIES EASE MARKET FUNDAMENTALS

By September 2023, European storage levels exceeded required capacity, thanks to expanded import infrastructure, massive additional LNG inflows, and increased production of domestic natural gas. High storage levels were seen in the European Union (storage sites opened the 2023-24 heating season at 96% of full capacity and 10 bcm above their five-year average).

The commercial start-up of several new floating storage and regasification units (FSRUs) facilitated European LNG import growth. Altogether, 30 bcm/yr of regasification capacity has been added in Germany, Italy, Finland, the Netherlands and Türkiye since Russia's invasion of Ukraine. This incremental regasification capacity allows for a more optimal inflow of LNG into the European market and lowered the utilisation rate of the existing LNG import terminals.

Consequently, the role of LNG in the European market has drastically shifted. While in the past,



LNG cargoes supplied the marginal molecule, LNG is now acting as baseload, in a similar fashion as Norwegian or North African piped gas. The share of LNG in the European Union’s gas demand rose from an average of 12% over the 2010s to close to 35% in 2022 – a share similar to Russia’s piped gas before the invasion of Ukraine.

GLOBAL SUPPLIES REMAIN TIGHT; US TO BE MAIN EXPORTER

Global gas production in 2022 was relatively flat, increasing by about 8.3 bcm or less than 0.5%. The first half of 2023 saw a mild revival in the global gas supply, yet the net result of the year is still to be out.

Global LNG supply expanded by 3% y-o-y (or 11 bcm) in Q1-Q3 2023 primarily supported by the United States and Algeria, together accounting for 85% of the incremental global LNG supply. Dry natural gas production in the United States increased by an estimated 5% y-o-y (about 32 bcm) in the first nine months of 2023, primarily due to an increase in the output of associated gas production from oil- driven shale plays.

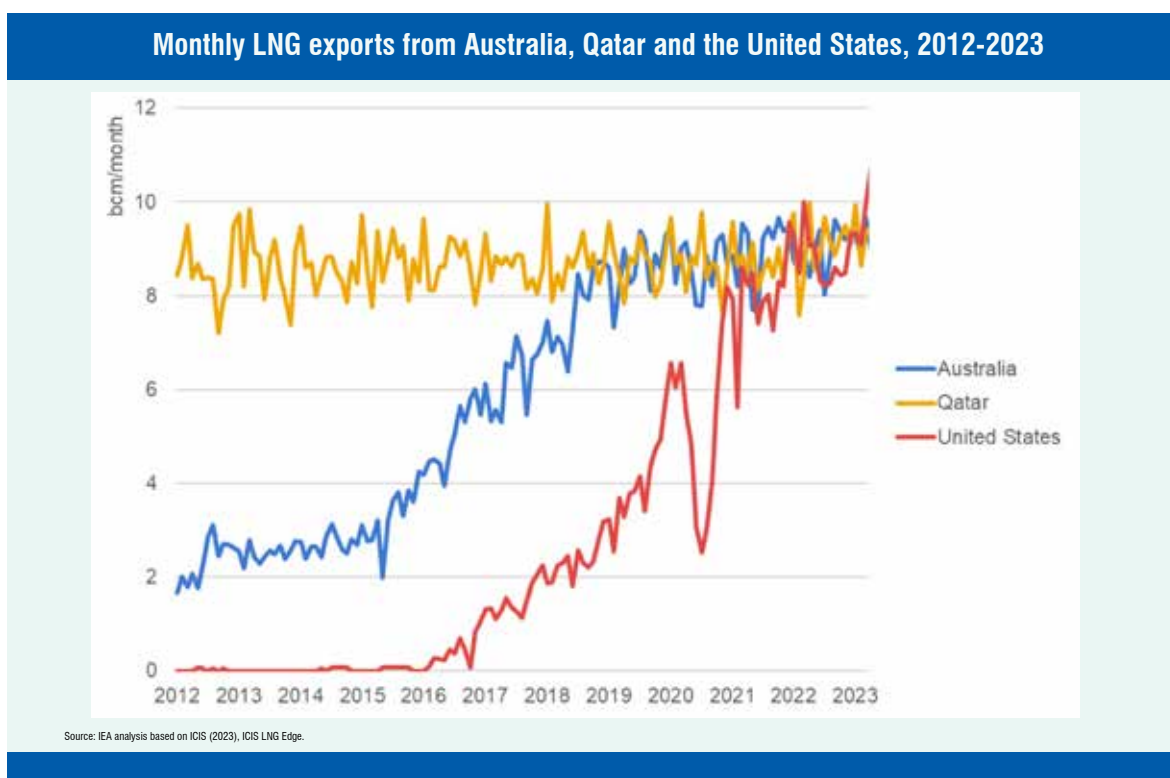
However, **gas supplies still remained tight in the first three quarters of 2023**, as the above LNG supply addition was insufficient to offset the steep decline in Russian piped gas deliveries to the European Union (-38 bcm). Europe’s total gas

| Global LNG Status | |
|---|-------------|
| Global liquefaction capacity (December 2022 end) | 478.4 MMTPA |
| Global regasification capacity (April 2023 end) | 970.6 MMTPA |
| Global floating and offshore regasification capacity (April 2023 end) | 177.2 MMTPA |
| LNG fleet (April 2023 end) | 668 vessels |

supply dropped by an estimated 13% (or 54 bcm) y-o-y in Q1-Q3 2023. Lower pipeline flows from Russia, unplanned outages in Norway, phasing-out of the Groningen field in Netherlands all contributed to lower availability of primary gas supply.

Disruption in gas supply from Australia due to rolling strikes, work bans and stoppages at the Gorgon and Wheatstone LNG facilities affected around 5% of global LNG production, impacting volatility and level of international gas price indexes.

In the short term too, gas supplies are expected to remain relatively tight. As the new LNG supplies are added over the next few years from the ongoing and planned projects, they may unlock



FEATURE STORY

price sensitive demand in emerging markets in Asia.

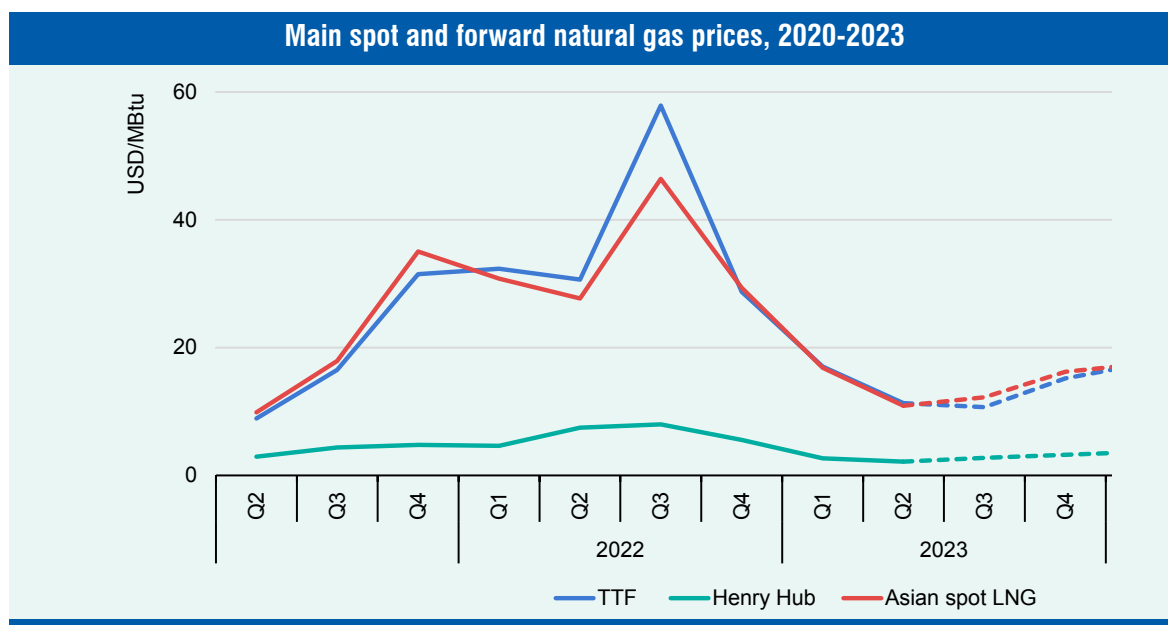
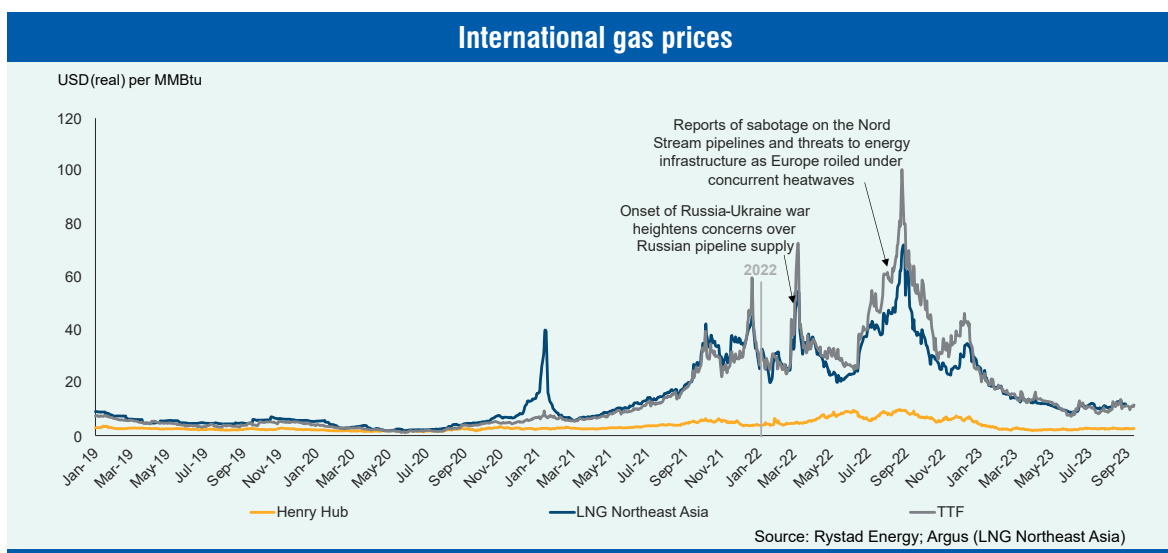
The United States alone is set to contribute for around half of the incremental LNG supply, reinforcing its position as the world's largest LNG exporter. Considering the contractual terms underpinning US LNG supply (hub-indexed pricing mechanisms and destination-free shipping arrangements), the liquidity and the flexibility of global LNG trade is set to increase over the medium-term. Additional supply is expected from improved feed gas availability in Algeria, the start-up of Tangguh Train 3 in Indonesia and the continued ramp-up of Coral South FLNG in Mozambique. Some countries have committed to attracting upstream investment climate to increase its domestic production of gas. Indonesia, for example, has announced an ambitious target to increase its domestic gas production from 58 bcm

in 2022 to 124 bcm by 2030.

From the beginning of 2022 to September 2023, about 81.2 MTPA of new liquefaction capacity reached FID or construction, with the United States and Qatar representing about 70.6% and 19.2% of the additions respectively. In 2023, there has been a remarkable surge in newly installed capacity, as the installations by September already exceeded the totals for each of the individual full years of 2020, 2021, and 2022.

GLOBAL GAS PRICES SOFTENED BUT REMAIN VOLATILE

Easing of market fundamentals also put a downward pressure on prices during the year. In the first three quarters, European hub and Asian spot LNG prices averaged 70% and 60% below their 2022 levels, respectively. In **Europe**, TTF spot prices declined by 8% on the quarter to an average



of just over USD 10/MMBtu in Q3 2023, standing 80% below previous year's levels. Continued demand reduction and high inventory levels put downward pressure on European hub prices in Q3. In **Asia**, JKM prices increased by 15% on the quarter to an average of USD 12.5/MMBtu in Q3 2023, albeit 70% lower than the same period last year. In the **United States**, Henry Hub prices increased by 20% on the quarter to an average of USD 2.6/MMBtu in Q2 2023, albeit down by 65% compared with last year's levels.

That said, the prices have remained well above their historical averages with high volatility. Outages in Norway and the risk of strikes at LNG plants in Australia fuelled strong price volatility during August and September.

Going forward, prices will likely continue to experience strong volatility, reflecting a fragile balance in global gas markets. A range of risk factors such as a cold winter, lower LNG availability and a further decline in Russian piped gas deliveries could easily renew market tensions.

SYSTEM INTEGRATION OF LOW EMISSION GASES IMPORTANT GOING FORWARD

Natural gas has an emissions profile that is about 50% lower than coal and about 20% lower than liquids, making switching from coal and liquids to natural gas in power generation a way to significantly reduce emissions. There are multiple pathways to drive down the emissions in natural gas further or decarbonise the gas. One primary method involves implementing carbon capture technologies (CCS and CCUS), which are pivotal for the success of the energy transition at large. Another pathway is reducing the carbon content of the fuel through the deployment of green or low carbon gas technologies. This includes the utilisation of renewable natural gas or biomethane, hydrogen, and other potential emerging forms of low-emission gaseous fuels. Existing natural gas infrastructure can play a key role in enabling the more rapid and cost-effective deployment of low-emission gases while facilitating their integration into the broader energy system.

While low carbon gases are still small in scale, growth has been improving. The supply

of low-emission gases is expected to increase going forward led primarily by Europe and North America. The development of low-emissions gases in these markets benefits from a wide range of policies, increasingly sophisticated subsidy schemes and well-developed, interconnected gas networks. Besides Europe and North America, a number of emerging low-emissions gas producers are expected to scale up their output.

Blue hydrogen projects financed in 2023 are on average 59% cheaper to produce than green hydrogen according to the latest analysis. This has driven European corporations to include blue hydrogen in their hydrogen strategies, where for instance RWE announced plans to offtake blue hydrogen from Equinor in January 2023. Significant green- field blue hydrogen projects are also emerging in other parts of the world, seen by projects like Baytown CCS and H2OK in the US, H2Perth in Australia, and Hydrogen to Humber Saltend in the United Kingdom. During the first half of 2023, a total of around 1.4 MTPA of nameplate capacity for blue hydrogen projects has been announced.

As of September 2023, blue hydrogen remains small but with significant potential, both through retrofitting of grey hydrogen facilities and greenfield projects. Most of the blue hydrogen nameplate capacity is concentrated in the United States and Canada, with 49.7% and 24.6% of total annual blue hydrogen production, respectively.

Green hydrogen current nameplate capacity remains relatively small-scale, accounting for about 2.1% of decarbonised hydrogen capacity in 2022. From January to September 2023, roughly 30 kilo-tonnes of new capacity have been added, all from assets in China, with the Kuqa Green Hydrogen Project accounting for 20 kilo-tonnes of this increase.

Globally, **estimated biomethane nameplate capacity** stood at around 7 Bcm in 2022, accounting for about 0.2% of global gas demand this year. However, the potential is much greater. As of September 2023, Europe is still the most dominant region in the market, with more than 1200 operating plants representing almost 4 Bcm of yearly supply. As of September 2023, the United States operates around 1000 plants producing about 4 Bcm yearly.

India's Gas Story

HIGH PRICES AFFECT INDIA'S CONSUMPTION OF GAS

India's growing primary energy needs have been supported by urbanisation, a growing middle-class, and large-scale infrastructure expansion efforts. To help keeping its emissions low, the government wants to increase the natural gas in the primary energy mix to 15% from the current 6.5% by 2030. However, in spite of its large gas reserves, E&P challenges have limited domestic production to ~50% of India's natural gas consumption and balance has to be met through LNG imports. Consequently, high international gas prices impact India's consumption of gas by

| INDIA'S GAS DEMAND | | | | |
|--------------------|-----------------------------|----------------------|--------------------------------|-----------------------|
| Year | Net gas production (mmscmd) | LNG imports (mmscmd) | Total gas consumption (mmscmd) | Import dependency (%) |
| 2020-21 | 76.12 | 90.95 | 167.07 | 54.44 |
| 2021-22 | 90.77 | 85.01 | 175.78 | 48.36 |
| 2022-23 | 92.23 | 72.07 | 164.30 | 43.86 |
| Apr-23 | 89.03 | 83.81 | 172.84 | 48.49 |
| May-23 | 91.55 | 92.06 | 183.61 | 50.14 |
| Jun-23 | 94.80 | 79.32 | 174.12 | 45.55 |
| Jul-23 | 98.81 | 72.05 | 170.86 | 42.17 |
| Aug-23 | 100.35 | 88.03 | 188.39 | 46.73 |
| Sep-23 | 99.20 | 75.93 | 175.13 | 43.36 |

its price sensitive consumers. During 2022-23 too, India's gas consumption fell 6% to approximately 165 mmscmd owing to high LNG import prices while its domestic production (net) was about 93 mmscmd with public sector majors ONGC and OIL producing a major part. The consumption however has been recovering in 2023 (check April 2023 onwards) due to stabilising gas prices.

GROWING LNG INFRASTRUCTURE

LNG import declined 14% to 26,647 MMSCM during 2022-23 owing to high gas prices. However, LNG imports increased by 8% (up by 1.4 bcm) during the first three quarters of 2023 compared

EXISTING LNG INFRASTRUCTURE

| Location | Promoters | Capacity (mmtpa) on 1.08.2023 |
|-----------------------|----------------|-------------------------------|
| Dahej | Petronet LNG | 17.5 |
| Hazira | Shell Energy | 5.2 |
| Dabhol* | Konkan LNG | 5 |
| Kochi | Petronet LNG | 5 |
| Mundra | GSPC LNG | 5 |
| Ennore | Indian Oil LNG | 5 |
| Dhamra | Adani Total | 5 |
| Total capacity | | 47.7 |

* to be increased to 5 mmtpa with breakwater; only HP stream of capacity of 2.9 MMTPA is commissioned

with Q1- Q3 2022. Lower spot LNG prices since Q2 (below the USD 15/MBtu threshold) spurred a positive demand response from industry and the power sector.

Since half of its needs are met through imports, domestic LNG infrastructure is growing. In April 2023, the country commissioned its 7th LNG terminal, the 5 MMTPA Dhamra LNG import terminal taking India's existing regasification capacity to 47.7 MMTPA. This is India's second import facility on the east coast, along with Ennore. But the existing regasification capacity is only half utilised right now and has scope to handle additional demand for gas from growth sectors. Sourcing of LNG has also become difficult and complex. India has about 22 MMTPA of long-term LNG contracts but it has had to buy LNG at high prices in international prices (due to Russia-Ukraine conflict) to cater to the increasing demand. Therefore, India has lately diversified from its traditional gas trading partners to include significant imports from the UAE and the US. In July, Indian Oil signed Heads of Agreement (HOA) with Total Energies Gas and Power for supply of up to 0.8 MMTPA for a period of 10 years starting from 2026. It also signed another such pact with Abu Dhabi Gas Liquefaction Company Ltd. (ADNOC LNG) for supply of up to 1.2 million metric tonne per annum for a period of 14 years starting from 2026.

CITY GAS – THE PRIMARY GROWTH DRIVER

Sectorally, natural gas consumption has expanded in the city gas distribution and fertiliser sectors, with domestic gas connections almost doubling in past three years. Gas has increased its acceptance in the transport sector and the natural gas vehicles have been steadily growing, evident from CNG vehicles sales seen across segments which has spiked in the post-COVID recovery period. Steady growth in the CGD coverage & network and increasing number of CNG stations is supporting the value proposition of NGVs in India. By 2022-23, 300 Geographical Areas (GAs) were authorized to develop gas distribution systems (plus the 8 GAs of upcoming round 12).

FERTILISER IS THE TOP GAS CONSUMER

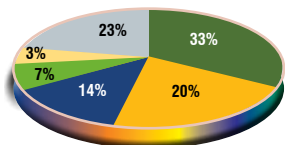
Demand for regasified LNG in the fertiliser sector almost tripled during the first eight months of 2023 compared with the same period in 2022. It was largely due to government subsidies and improved connectivity for fertiliser plants in southern India. The fertiliser sector is set to be a key driver behind India's growing industrial gas demand, as urea imports are planned to be phased out by 2025-end.

These GAs, spread across the country, cover over 98% of India's population and about 88% of the country's geographical area. Over 280 GAs are already operational with over 50 entities operating in the sector.

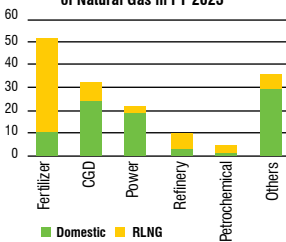
The gas consumption in the CGD sector in FY 22-23 was 35 MMSCMD, 20% of the total gas consumption in India. The sector boasts of over 10,000 employees, 50,000+ labour and 1000+ vendors. At the end of 2022-23, the number of

Last year, India consumed around 160 mmscmd of natural gas with fertiliser and CGD as key sectors

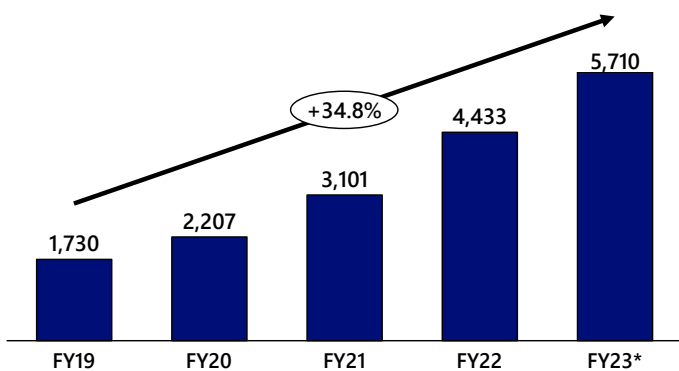
Sector-wise Consumption of Natural Gas in FY 2023 (Total consumption of 161 MMSCMD)



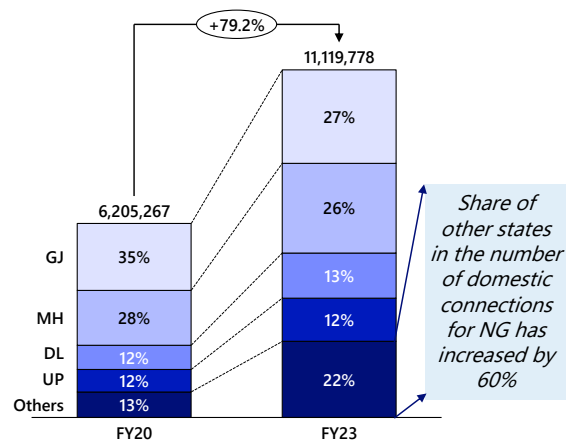
Sector-wise Break up and Supply Sources of Natural Gas in FY 2023



CNG Stations in India [FY 19-FY 23]



Growth in domestic PNG connections



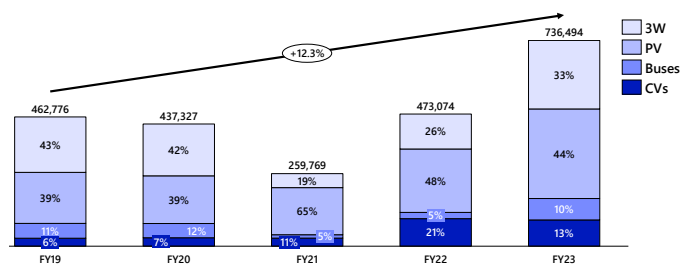
Projected Growth in CNG Stations

| MWP | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|--------------------------------------|------|------|-------|-------|-------|-------|-------|
| Up to 10 th round bidding | 5943 | 7132 | 7924 | | | | |
| 11 th & 11A round | 1308 | 2616 | 3924 | 5233 | 6541 | 7849 | 8721 |
| Cumulative Total | 7251 | 9748 | 11848 | 13157 | 14465 | 15773 | 16645 |

5710 Completed as of 04/2023

*as of 30/04/2023 Source: PIB MoPNG statistics, news articles

Growth in CNG vehicle registrations by segment



FEATURE STORY

CNG retail stations had reached 5,710 (which has already crossed 6,000 mark now) from 4,433 last year servicing 6 million vehicles. Despite the various hindering factors, domestic piped gas connections reached 11.11 million in 2022-23 from 9.3 million a year back.

Driven by growing demand for more CNG vehicles, the CNG vehicle registrations has seen an average growth of over 12% since 2018-19. Fuel price difference leading to lesser cost of ownership of cars is a key reason for the rise in demand for CNG vehicles. The demand for CNG cars is particularly high in the affordable segment.

FOCUSED REGULATORY PUSH

The government is doing its bit to push natural gas consumption and increasing its share in our energy mix. In 2023, the government reinforced its commitment to natural gas by further approving two of the most awaited reforms to open up the sector – the government’s approval of the Kirit Parikh-led panel’s recommendations on gas pricing as well as the roll-out of a unified tariff for transmission infrastructure. The government approved new APM gas pricing mechanism that supports both producers and consumers. Now, the primary domestic producers ONGC and OIL will be encouraged to keep producing gas from APM fields, even in low international LNG price scenario (also low oil scenario). Also, the new



mechanism supports the key gas consumers (such as CNG, power) that are allocated APM gas by reducing volatility and keeping price affordable. The government has also recently approved one nation-one grid-one tariff or unified tariff mechanism for its gas pipelines. Under this regime, 20 interconnected gas pipelines and regional gas networks have been combined as a unified network called “National Gas Grid System” (NGGS) vis-à-vis these pipelines operating as independent systems in the additive tariff regime earlier. The country currently has 32,000 km of authorised gas pipelines out of which 23,298 km of pipelines are operational while the balance are under construction or partially commissioned. Apart from this, in city gas, it has 2.25 lakh inch km of steel pipelines and 3.57 lakh inch km of MDPE pipelines.

LNG FOR TRANSPORT

LNG for transport continued to be developed upon, both globally and in India. The global LNG shipping and bunkering industry got affected after the LNG prices touched record levels last year knocking out the use of the fuel to those with dual-fuelled tonnage. However, LNG as a marine fuel is starting to make more positive noises again after the prices have touched down again this year. The global LNG fleet of all sizes was 668 vessels at end of April 2023, following the 34 additions in 2022 and a record 60 in 2021. LNG as road transport is also picking up momentum with European network of LNG fuelling stations for vehicles at 635 stations in January 2023, as it continued

to grow despite high prices.

LNG as a transportation fuel in India has also caught the attention as an ideal fuel and for on-road and off-road applications in the transport sector. The Government too has announced plans to develop 1000 odd retail stations. There has been much talk about making LNG a transportation fuel for heavy duty vehicles but substantive progress is yet to be made in this direction. Natural gas trucks offer a viable alternative to diesel, which is a mainstay of commercial vehicle sector due to lower price of fuel and favourable power characteristics. The Blue Energy Motors company rolled out the 100th LNG truck from their Pune facility and we are sure this is only the beginning.

EXPERT OPINION

Natural Gas Society spoke to some top players from the gas industry to seek their opinion on the future of gas in India and globally. Here are the excerpts...

What is your take on gas in India and globally going forward considering the geopolitical changes and increasing adoption of alternate clean sources?



Deepak Gupta,
Director (Projects), GAIL India

A global trend is visible to shift from fossil fuel based energy consumption pattern towards alternate clean energy sources and a journey toward energy transition has begun worldwide with lot of clean energy investment happening globally. In the wake of this, India is poised with dual challenge of economic development and reducing carbon footprints of its economy. It is widely recognised that economic growth is increasingly intertwined with energy consumption. This relationship is clearly exemplified in the case of India which has ascended to become the world's third-largest consumer of energy and has continued on a high trajectory of growth spurred by rapid urbanization and industrialization to become a USD 5 trillion economy by 2027. India's demand for energy is bound to grow exponentially. OPEC World Oil Outlook 2023 forecasted that India would be the fastest-growing major developing economy with an average long-term growth of 6.1% between 2022-2045. India would account for over 28% of incremental global energy demand during the same period. BP Energy Outlook 2023 also estimates that India's energy demand share in global energy consumption will rise from 6% (2022) to 14% (2050). It is the largest incremental share by any nation.

Our hon'ble prime minister had announced in COP 26 through Panchamrit that the country will raise the non-fossil fuel based energy capacity of the country to 500 GW by 2030 and 50% of the country's energy requirements would be met using renewable energy sources to reduce emissions by one billion tonnes between now and the year 2030 along with reduction in carbon intensity of the Indian economy to less than 45% by 2030. This will surely put pressure on the use of all fossil fuels. Contribution of coal energy in

primary energy mix is already seeing a downward trend and oil consumption may peak around 2030. However, as highlighted in BP Outlook 2023, the share of natural gas in primary energy mix is forecasted to rise up to 7-11% by 2050. Most of this growth in India is anticipated to come from CGD sector. Due to intermittency of renewable energy sources such as solar, wind and energy storages systems are not still in picture very widely, natural gas based power plants may play a crucial role to meet both the objectives of increasing energy demand of the country and reducing GHG emissions as natural gas will be a bridging fuel. Therefore, at least in next two decades, there is positive outlook for natural gas consumption in India.



Sandeep Jain,
Executive Director (Gas), IOCL

Amidst global decarbonisation targets, gas is currently positioned as a vital element in India's and the global energy landscape due to its lower emissions compared to other fossil fuels.

Last year, the global LNG trade surged by 6.8%, reaching about 401.5 million tonnes (MT). However, India witnessed a significant drop of 13-14% in imported LNG during this period. The Russia-Ukraine conflict caused a pipeline gas supply shock, driving up LNG demand in Europe. Consequently, high prices diverted marginal cargoes from Asia to Europe.

At the end of 2022, the global liquefaction capacity stood at 478.4 MTPA, while an impressive 997.1 MTPA of aspirational liquefaction capacity is currently in the pre-FID stage. This reflects investors' confidence in the future demand for LNG worldwide. Going forward we need to build a strategic approach, emphasising technological innovation, sustainable

practices, and collaborative efforts to navigate towards a balanced and resilient energy future. Natural gas will be a key part of this plan.

Geopolitical alterations can significantly influence gas supply chains, potentially leading to fluctuations in prices, accessibility, and reliability of gas resources both in India and globally. As we have seen in recent years, benchmark prices fluctuated from \$2 to \$84/MMbtu, it's crucial to maintain a balanced portfolio of long-term supplies to minimise risks. Changes in geopolitics can also raise concerns about energy security, prompting nations to reassess their reliance on gas imports and the stability of supply sources. In the evolving landscape, strategic focus will revolve around diversifying gas procurement across various global regions. Additionally, governmental interventions and investments in upstream ventures across the globe will emerge as crucial areas for the future of the gas sector.

The increasing adoption of clean energy sources, especially renewables, poses a considerable challenge to gas's predominant role in the energy mix worldwide. However, in growing nations like India, where power needs are projected to double in the coming decades, there's ample opportunity for natural gas to expand alongside renewables. Besides, natural gas faces competition from many substitute fuel sources that offer cheaper energy options, especially in price-sensitive markets like India. The emergence of a carbon pricing market in emerging nations holds the potential to bolster natural gas's position, enabling it to better compete with alternative fuels.

The approach ahead could involve striking a balance between leveraging natural gas as a transitional fuel while integrating cleaner energy. This involves strategizing the energy mix to meet both sustainability and economic growth objectives. Encouraging technological advancements, particularly in gas-based technologies and renewable energy systems, can also shape a more sustainable energy landscape. Development of compact and efficient liquefaction and regasification technologies can help in optimising LNG storage and transport. International cooperation and policy frameworks are essential in fostering a conducive environment for optimising natural gas supply chains. India sources most of its gas from the Middle East. A cross-country pipeline from Middle East can offer potential benefits, not only reducing logistics costs but also curbing emissions generated by vessels.



Ashu Shinghal,
Managing Director, MGL

I think the future of natural gas will depend on various factors including government policies, technological advancements and market dynamics. While natural gas may face challenges from cleaner energy sources, it will likely continue to play a significant role in India's and the world's energy mix for the foreseeable future. Here are some key points to consider:

Geopolitical Changes: With the Russia-Ukraine war which started in February 2022, natural gas is turning into a global and interconnected market, affected by events and dynamics that are far beyond its traditional physical scope. Natural gas is now a global commodity via LNG and has a much higher geopolitical significance because of the recent geopolitical upheaval.

Clean Energy Transition: The global shift toward cleaner energy sources, driven by concerns about climate change and air quality, has led to the development of renewable energy technologies, such as wind and solar power. These alternatives are becoming more cost-competitive and are gradually reducing the share of fossil fuels, including natural gas, in energy portfolios. The energy crisis hit while EU lawmakers were already discussing ambitious renewables targets under the Fit for 55 package. The European Commission's REPowerEU plan, released in May 2022, proposed ending the bloc's reliance on Russian fossil fuels by 2027. Among other goals, the plan aims to increase the share of renewables in final energy consumption to 45% by 2030, exceeding the 40% target previously under negotiation.

LNG and Infrastructure: Europe is moving away from its reliance on Russian natural gas imports and replacing it with LNG, which could be supplied from multiple locations, including the US, Qatar, Nigeria and many more. The EU has greater near-term potential to ramp up its LNG imports, considering its ample access to spare regasification capacity. LNG's share in European gas supply rose to 33% in 2022 from just 19% in 2021. This is likely to rise further in 2023, as LNG climbed 38% in March 2023 after a record high of 40% seen in February 2023.

Europe has been investing heavily into LNG infrastructure even before the invasion of Ukraine, with the pace picking up as the war escalated. Germany – until recently the most reliant on Russian

pipeline gas – now has plans to build at least six floating storage and regasification units and three shore terminals, which will eventually replace FSRUs.

Role of Natural Gas: Natural gas is often seen as a bridge fuel that can help transition from more carbon-intensive sources like coal to cleaner energy options. It is considered relatively cleaner than coal and can complement intermittent renewable energy sources by providing a stable energy supply. In India, the increased use of natural gas can help reduce air pollution and greenhouse gas emissions.



Pawan Kumar,
Director (Commercial), IGL

Indian government has been emphasising on the expansion of natural gas infrastructure and usage to meet growing energy demands and reduce carbon emissions. The geopolitical changes can significantly impact the dynamics of the natural gas sector, which is evident from the recent events of Russia-Ukraine War and Israel-Hamas conflicts. These changes affect the production, transportation, and pricing of natural gas.

The natural gas import dependency of India lies between 40% to 50%. India is making plans to establish a strategic natural gas reserve that can store up to 4 BCM of imported gas which will serve as a backup in case of supply emergencies and help to stabilize the domestic market, with an estimated CAPEX of \$1-2 billion. GAIL and ONGC have been directed to prepare a detailed feasibility report for the same. India aims to act as a regional hub of natural gas, supplying gas to countries like Sri Lanka, Myanmar, in the future. These initiatives are indicative that India’s natural gas market will be flourishing in the near future. Although as the world is moving towards Net Zero, adoption of alternate clean sources is very much required. This is both challenging and opportunistic for natural gas. There are challenges such as “loss of natural gas market share to renewable energies and government push for adoption of renewable energy sources but on the other natural gas can play a crucial role as a transition fuel. Its lower carbon emissions compared to traditional fossil fuels make it an attractive option as a bridge fuel while renewable technologies continue to develop.

Also, the existing natural gas infrastructure can

be repurposed to support the transportation and distribution of cleaner gases such as hydrogen or bio-methane. Long haul transportation, domestic and industrial sectors are the huge growing sectors which can grow natural gas share in India. The continued advancements in technologies such as carbon capture and storage (CCS), can enhance the environmental credentials of natural gas. Innovations that reduce methane emissions during production and transportation also contribute to a more sustainable natural gas industry.



S K Jha, Executive
Director (CGD), IOCL

Global LNG trade grew by an impressive 6.8% last year reaching a new record of 401.5 million tonnes (MT). Global LNG trade network connected 20 exporting markets with 48 importing markets, including first-time LNG importers Germany and the Philippines. Mozambique joined the LNG exporters club with the long waited start-up of Coral South FLNG. In the midst of the crisis, many European markets imported LNG at maximum capacity to meet demand and replace lost Russian pipeline gas. France ran its LNG import terminals at full capacity for most of 2022 and 2023, and Belgium’s terminals regularly exceeded capacity. Spiking LNG demand from Europe and a lack of growth in global LNG supplies resulted in soaring gas prices amidst a tight market in 2022. Finally, the prices eased in 2023. Since the conflict between Russia and Ukraine broke out, more than 10 European markets initiated remarkable new regasification terminal construction plans with 26 projects totalling 104.5 MMTPA. Nearly 70% of the new capacity will come from floating terminals, which can be brought online faster and relocated when needed.

The ongoing global energy crisis has reminded the world about the critical importance of energy security and the high cost of its absence. LNG has played a crucial role bolstering energy security and delivering energy to the European consumers when they were faced with a sudden supply shock amidst the Russia-Ukraine conflict. The industry demonstrated incredible flexibility and agility again, delivering an additional ~70% of LNG to Europe in 2022 and 2023 to replace the lost Russian pipeline gas. The competitive global gas market played a key conducting role to redirect global energy flows at

possibly the biggest scale ever seen in such a short period. This was a great demonstration of the working market’s value for energy security.

The level of risk and uncertainty remains high in the gas market; the market is still out of balance and the crisis is not yet over. In this moment of respite, it is imperative that governments around the world better define their long-term energy security plans – both in the coming two to three years and after 2030 as the world will continue to demand more energy.

While the world is looking at alternate clean sources such as solar, EV, wind, etc. to meet the energy needs, the alternative clean sources are cost intensive and alone they are not sufficient to fulfil the energy needs. Therefore, in the short to medium-term, while the installed capacity of other alternate clean sources is enhanced, gas will be at centre stage to drive the

energy demand of the world in coming decade.



Subodh Kumar Jain,
Director, South Asia Gas
Enterprise Pvt. Ltd. (SAGE India)

India’s gas use will surely increase in future, provided LNG prices do not go into double digits. Fortunately, India is surrounded by 3000 TCF of gas in Gulf/CIS/Iran, some of which could be piped to India and create the much desired connectivity, at reasonable cost (like in China/Europe). Atleast 100 mmscmd of gas could be piped to India by building three undersea gas pipeline via Oman route (considering that onland pipelines cannot be built due to Pakistan/Afghanistan factor; pipeline tariff from Oman to Gujarat is below 2 USD/mmbtu).

Do you think it will be possible to achieve the Indian Government’s target of 15% share of gas in the energy basket of the country by 2030?



Deepak Gupta,
Director (Projects), GAIL India

India has planned to increase the share of natural gas in the primary energy mix from the current share of 6% to 15% in the primary energy mix with an approximate investment of \$60 billion in natural gas infrastructure by the next 5-6 years. This translates into an increase in gas consumption by over three-fold, from the present level of around 165 MMSCMD to over 500 MMSCMD by the year 2030. India is leaving no stone unturned to achieve this objective. It is focused on expanding demand centres, facilitating infrastructure development, enhancing domestic gas production and ensuring supply security through waste-to-wealth programs such as CBG. The increased gas consumption could be supported by the growing demand in the City Gas Distribution sector apart from other sectors. After the completion of the recently launched 12th round, almost the entire part of the country, except Mizoram, Andaman and Nicobar Islands and Lakshadweep will be covered under the CGD network.

The growth would also be supported by the development of National Gas Grid and LNG re-gasification capacity to cater to the incremental demand. Around 12,000 km of pipeline network

and 19 MMTPA LNG re-gasification capacity is under construction or announced. Initiatives are being undertaken to increase supplies by diversifying the imported gas portfolio and boosting domestic production simultaneously. India has taken a number of initiatives to reform its E&P Sector such as increasing area under exploration by reducing the No Go Areas by 99% resulting in an increase of ~ 1Mn sq Km for E&P, increased access to seismic data through the National Data Repository, making transformational changes in various legal and procedural systems etc. As a result, gross domestic gas production increased 9.3% in October 2023 as compared with the corresponding month of the previous year while cumulative gross production was higher by 4.8% during April-October 2023 as compared with the corresponding period of the previous year. India is also working towards development of the Compressed Biogas (CBG) wherein efforts are going to tap the potential of 15 MMT CBG production. Going ahead, India has recently announced the CBG Blending Obligation (CBO). A phase-wise introduction of mandatory blending of CBG in CNG (Transport) & PNG (Domestic) segments of CGD sector is also planned.

Therefore, we look forward to achievement of 15% target as it seems feasible.



Sandeep Jain,
Executive Director (Gas), IOCL

India's ambition to secure a 15% share of gas, from current 6%, in its energy mix reflects a transformative vision toward cleaner and more diversified energy sources. The target is ambitious, yet with focused and collective efforts, it stands within reach. Given the challenges of availability, accessibility and affordability are addressed, collaborative strategies, technological innovations, policy reforms, and sustained investments can collectively propel India toward this goal. Increased investments in the upstream sector are vital to reduce import reliance. Ensuring adequate long-term tie-ups for LNG sourcing, increasing Compressed Bio Gas production to complement domestic gas, and utilising stranded gas fields through virtual pipeline networks are some of the promising solutions.

The accessibility challenges within India's gas infrastructure span multiple crucial areas: a shortage of Auto-LNG stations compared to China and Europe; the pressing need to increase LNG regasification capacity to meet future demand, currently at 47.5 MMTPA; the expanded reach of CGD covering entire states; and the crucial development of regulations for LNG as a transport fuel, marking significant progress in India's gas infrastructure. Securing low-cost options like domestic gas allocation is crucial to stabilise prices and promote LNG usage in long-haul transport, at least for initial years for market seeding. Streamlining regulations for Mobile LNG dispensing becomes essential for efficient supply to areas like Industrial hubs or mining. Simultaneously, having plans in place to expand existing terminal capacities and identifying new coastal ports are pivotal steps to enhance gas penetration across India. Additionally, the establishment of strategic storage infrastructure for gas, particularly for priority sectors, remains crucial for ensuring access during uncertainties.

Addressing gas affordability needs collaboration on Industry level for creating a more liquid marketplace. Inclusion in a unified GST regime can streamline taxes across states for consistent pricing. Moreover considering a carbon pricing mechanism can leverage natural gas sustainability factor, enhancing its competitiveness against alternative fuels.



Ashu Shinghal,
Managing Director, MGL

I think the government's target of achieving a 15% share of gas in energy basket by 2030 is ambitious and forward looking considering the current level of consumption and yearly growth of primary energy in India. The share of gas in Indian energy basket was 5.6 % in 2012-13 and around 6.4% in 2021. Considering overall growth pattern in post-Covid energy consumption, in terms of volumes, natural gas consumption has to increase many times to occupy the share of 15% of primary energy mix. The government has taken several steps to achieve this ambitious target such as expansion of National Gas Grid Pipeline and the City Gas Distribution network, setting up of Liquefied Natural Gas terminals, allocation of domestic gas to CNG/ PNG on priority, allowing marketing and pricing freedom to gas produced from high pressure/ high temperature areas, deep water & ultra-deep water and from coal seams, sustainable Alternative Towards Affordable Transportation (SATAT) initiatives to promote Bio-CNG. PNGRB has also developed policy framework for supporting the expansion and increasing share of gas, including facilitating import under OGL category, FDI 100% through automatic route for LNG infrastructure, installation of gas exchange for trading etc.

But to meet the 15% goal, several actions are necessary such as expansion of infrastructure, a transparent and competitive gas pricing mechanism, streamlining of regulatory processes, ensuring ease of doing business, and addressing challenges like land acquisition and environmental clearances can facilitate the growth of the natural gas sector. Encouraging the use of natural gas in sectors like transportation and power generation can help reduce emissions. The adoption of cleaner technologies, such as natural gas-based vehicles and combined-cycle power plants, can support the 15% target. Also, LNG can be promoted for long haul trucks, tractors, other construction equipment and machinery. The current truck population in India is estimated at 4M which is expected to grow to 17M by 2050 as per a Niti Aayog report. The share of truck in the vehicle population accounts for 3%, however; it contributes to ~53% of PM emissions and ~34% of CO2 emissions. Shifting to LNG can help decarbonize the road transportation sector in India.

So, the 15% goal would require concerted efforts from the government, industry and stakeholders. It is possible with the right policies and investments and it aligns with the broader goal of reducing emissions and improving air quality in India. The higher gas penetration would not only de-carbonize the energy sector but also generate employment for the semi-skilled and skilled workforce.



Pawan Kumar,
Director (Commercial), IGL

The government’s focus on increasing the share of natural gas in the energy mix aligns with global efforts to transition towards cleaner and more sustainable energy sources. CNG is a much cleaner fuel in comparison to petrol or diesel and hence offers a compelling alternative fuel option. This aspect should also be seen in context of the country’s fossil fuel import bills which are projected to exceed Rs 25 lakh crore within the next five years, a significant increase from the current Rs 16 lakh crore.

India’s auto industry is about to see a big increase in the use of CNG over the next three to four years. One of the reasons for this optimism is the PNGRB’s distribution of the CGD network that has reached over 88 percent of the country’s land mass and 98 percent of the population, according to government statistics. At the same time, the government has a goal to increase the number of CNG stations from 6,000 to 17,700 by 2030. It is supporting the gas market by taking initiatives like One Nation One Grid, uniform CGD Policy and uniform pipeline tariff. The aim of India to achieve 15% share of gas in energy basket by 2030 is achievable, but it requires the collaboration of all the stakeholders, i.e. CGD companies, union and state governments, statutory authorities, investors, suppliers etc. In Tier II and tier III cities, to penetrate the market for adoption of natural gas is challenging and a government policy like “Ujjwala for LPG and FAME for EVs” is needed to spread awareness regarding natural gas. A uniform CGD policy may be implemented so that the process

for applying and taking the permissions and multiple clearances can be streamlined.



S K Jha, Executive
Director (CGD), IOCL

India has set an ambitious goal of increasing its current 6.7% share of natural gas in the energy mix to a robust 15% by 2030. The government along with other stakeholders has strategically implemented various measures to achieve this target by focusing on infrastructure expansion, policy reforms, and international partnerships. I think, India’s comprehensive strategy, encompassing infrastructure development, policy reforms, international collaborations and sustainable initiatives, is poised to drive a significant increase in the share of natural gas. To sustain higher investments in the gas chain including exploration, it is recommended that the GoI and PNGRB continue implementing supportive policies. This approach will foster sustained and healthy growth in the sector, positioning India to achieve its desired goal.



Subodh Kumar Jain,
Director, South Asia Gas Enterprise Pvt. Ltd. (SAGE India)

India would need 700-800 mmscmd gas annually in coming years. India can have a 15% share of gas in energy basket by 2031-2032, provided long term gas supply agreements are negotiated with nearby countries like Oman/UAE/Saudi Arabia/Iran/Turkmenistan for gas supplies piping the same to India to Gujarat coast by offshore route/gas swaps.

Currently, there is too much focus on LNG which will remain expensive and unaffordable for India in the long term when prices move above 7 to 8 USD per mmbtu. Just like oil, Indian companies, specially the public sector oil & gas companies, should invest in discovered and producing gas blocks in above countries for securing its long term energy/gas supplies at reasonable prices.

Disclaimer: The views and opinions on the gas sector are purely personal.



The author of this article is Deepika Lal. She has been the lead content writer for GSR since 2015. An economics graduate and an MBA (Finance), she has over 22 years of experience in research and analysis and content writing in the energy sector. She has produced several industry reports and research papers and has profiled many leading names in the oil and gas domain in her professional career.