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India: new locus of gas-demand growth

A surge in Indian natural gas demand is imminent. Although gas still only accounts for around 6.5% of the primary energy mix, it remains the most obvious fix to a host of problems in Indian energy supply. As it replaces coal, air quality in polluted cities will improve. Gas will also offer a cheap source of power generation for urbanisation and a rising manufacturing base — while helping India meet its Paris Agreement targets. State-owned companies are expanding the pipeline network and underwriting more LNG-receiving capacity — a strategic decision reflecting the government's wider effort to gasify the economy. The federal government is also working with industry and state and local authorities to create new markets for gas. Rapidly rising Indian gas consumption will, in short, provide a new and dynamic source of demand for exporters.

Correcting earlier missteps

The coming wave of new Indian gas demand may startle a market that has grown doubtful of the country's potential. After all, despite the many advantages gas holds over other fossil fuels — not least environmental — and earlier governments' wishes to boost its share of the energy mix, development of India's market until now has been disappointing.

Consumption was 48.25bn cm in 2014-15, according to India's Central Statistics Office (CSO) — marginally ahead of the previous year's total (47.67bn cm), but sharply lower than 2010-11 (61.18bn cm). The fertiliser industry is the single biggest consumer of gas in India, with a 30% share, followed by power generation, with 21% (see Figure 1).

Coal consumption boomed as gas demand stagnated. In the 10 years to 2014-15, growth in coal use rose at twice the rate of gas use, by 6.7% a year compared with gas's meagre 2.9%. Government estimates in 2016 place gas's share of primary energy demand at a modest 6.5%. By contrast, in 2013, coal accounted for 44% of primary energy demand and over 70% of the country's electricity generation, according to the International Energy Agency (IEA).

How quickly can this change? The IEA's projection sees modest growth. In its New Policies Scenario, gas's share of primary energy rises from around 6% in 2013 to around 8% in 2040, with supply tripling to 175bn cm/y. Over the same period, its share of electricity generation rises from just over 5% in 2013 to just over 10%. If that represents the consensus view, the market could be in for a shock.

The Indian government and the country's industry bodies expect much more rapid growth. *Vision 2030 — Natural Gas Infrastructure in India*, a 2013 report commissioned by the Petroleum & Natural Gas Regulatory Board, sees gas's share of primary energy reaching 20% as soon as 2030. That target looks aggressive, but many government and industry sources remain adamant that a 20% share is feasible, if not by 2030, then soon after. The power sector will drive this rise in gas use, according to *Vision 2030*: electricity will increase its share of gas consumption to almost half. City gas's share will rise substantially too; the outcome of rapid urbanisation. The share of the fertiliser sector will fall, though, to around 15% by 2030.

FIGURE 01: INDIAN NATURAL GAS CONSUMPTION
BY SECTOR, 2014-15

SECTOR	%
Fertiliser industry	30%
Other	29%
Power generation	21%
Captive use	8%
Petrochemicals	6%
Industrial fuel	4%
LPG shrinkage	2%

Source: Central Statistics Office



Rising import dependency

Yet India's gas reserves are relatively modest. At the end of 2015 they amounted to 1.49 trillion cm, according to the CSO — Asia's third-largest endowment. Most of India's gas is offshore (around 37% off the eastern coast and around 29% off the western coast). The ageing Vasai field, on India's western coastal shelf, dominates conventional gas production. The most promising areas for new development are offshore — in particular, the east coast's deep-water Krishna-Godavari basin, where Reliance and ONGC have made discoveries.

Production has declined in recent years, partly as a result of well-performance problems at the offshore KG-D6 asset, where output fell more quickly than expected. Nationally, net gas output amounted to 32.78bn cm in 2014-15, compared with 34.64bn the year before and 51.25bn cm in 2010-11. Over the past decade net production rose by just 0.5% a year.

The government's new Hydrocarbon Exploration Licensing Policy (Help), which replaces the unpopular New Exploration Licensing Policy (Nelp) model, aims to revive the upstream. Where Nelp regulated the price at which developers could sell gas to local buyers, Help will let them sell production at market prices. Where Nelp required multiple licences, Help will offer a single licence to cover any type of hydrocarbons development — conventional, shale or coal-bed methane (CBM).

Simplified permitting arrangements could support development of India's large CBM and shale gas resources. Nonetheless, barriers still include the high development costs of CBM, and land-use, water availability and local-acceptance issues in shale. Shale is unlikely to become a significant supplier for at least 10 years.

Virtually stagnant production and rapid growth in demand imply a growing need for imports and deteriorating energy security. Strategically, this is a compelling reason for the country to favour LNG over piped imports, given LNG's flexibility in sourcing energy from multiple sources.

Price, pollution and power

But India's strategic decision to use more gas in its economy has other imperatives too. Reducing pollution is chief among them. Indian cities are already among the world's most polluted. With mass urbanisation under way, increasing retail gas distribution would improve urban air quality and provide a safer source of fuel for cooking. Increasingly, the Smart Cities programme is likely to favour gas over coal and oil.

Somewhat linked to this is the country's strategy on climate change. India is the world's third-largest greenhouse-gas (GHG) emitter, accounting for 4.1% of the world total. Its Intended Nationally Determined Contribution under the Paris Agreement — which New Delhi ratified on 2 October — does not involve an outright cap on emissions, but commits India to reduce its GHG emissions per unit of GDP by 2030 by 33-35%. Switching from coal and oil to gas in power generation,

petrochemicals, refineries and industry in general will support this objective, as would a large-scale switch from oil to gas in transport.

Just as significant are the government's efforts to restructure the economy. The strategy is a reversal of that underway in China, which is seeking to shift its economy from dependence on export-oriented manufacturing to services. By contrast, India has set a target of increasing manufacturing's share of GDP to 25% by 2022, compared with 16% now — all under the auspices of the Make in India programme. The target is unreachable without a substantial increase in supplies of affordable energy. As more use of coal is incompatible with pollution reduction and decarbonisation, this is an opportunity for gas, which will support the government's economic and environmental goals.

Price is another factor. While coal remains cheap, gas can substitute oil in many end-use applications, especially when commodity prices are elevated. The government expects imported gas to remain cost-competitive, making it a viable alternative to oil in transport and in power generation.

Virtually stagnant production in the context of rapid growth in demand implies a growing import burden

Gas's flexibility in power generation is also attractive compared with other fuels, especially as India's renewable-energy capacity grows apace. The government is planning a fivefold increase in installed renewable-energy capacity by 2022 — to 175 gigawatts, including 100GW of solar capacity and 60GW of wind power. By 2030, it aims to source at least 40% of its electricity from renewables. As well as a more resilient power grid, this will require fuels capable of balancing the power system. Given its other advantages, gas is the government's obvious choice. Indeed, the combination of gas and renewables has the potential to challenge coal's dominance of baseload generation in India, says the IEA.

Lastly, India also hopes to increase the consumption of gas in the fertiliser sector. Demand for fertilisers will rise as agriculture expands. Although agriculture's share of the economy has been in long-term decline, it remains an important contributor to GDP and a large employer.

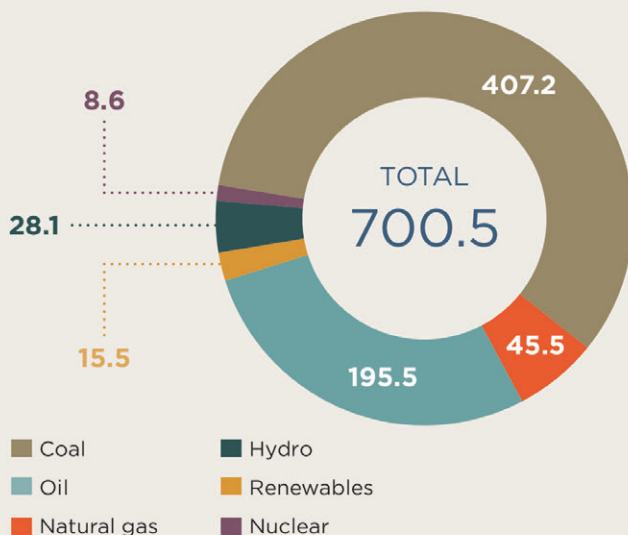
The infrastructure challenge

While the rationale is plain, in practice the gas sector remains stymied. This is either a sign that gas's potential will remain dormant — or, more likely, a reason why pent-up demand will translate into robust consumption growth. For now, infrastructure is deficient. India has limited gas-import facilities and insufficient capacity in internal pipelines to move gas around the country. Investors have historically been reluctant to risk capital to expand it, in the absence of large anchor customers willing to sign long-term off-take deals. Few consumption centres are grid-connected. The east is largely disconnected from gas supply, with no LNG-import facilities and virtually no pipelines.

This has suppressed the emergence of a liquid market. The low number of producers, shippers and consumers has stifled competition market-driven pricing along the supply chain. Misleading price signals have been the outcome. Government intervention has exacerbated this. It continues to subsidise fertiliser prices — despite knowing that removal of price controls would encourage investment and create additional gas demand.

Furthermore, despite the general thrust of policy, the government has not clearly articulated a plan for increasing gas use. Where the government has set targets and timelines for renewables, there is no equivalent nationwide plan for gas. Projections for rapid growth in the gas sector are anecdotal — not formal targets enshrined in a coherent and binding national strategy to coordinate federal, state and industry efforts.

FIGURE 02: INDIAN PRIMARY ENERGY CONSUMPTION BY FUEL, 2015
(MILLION TONNES OF OIL EQUIVALENT)



Source: BP Statistical Review of World Energy 2016

Making gasification work

Leaving gas development to the market has had limited results. Despite its versatility and low environmental footprint, compared with coal and oil, gas has not displaced them. But there are indications that the government is coordinating infrastructure development more closely than in the past, providing support in the form of public-private partnerships and viability gap funding. For example, the government is funding 40% of Gail's planned \$2bn, 2,539km Jagdishpur-Haldia and Bokaro-Dhamra Pipeline project — the first time it has extended a capital grant to a gas pipeline.

Separately, Indian Oil and Gail have said they will buy half of the equity in the planned Dhamra LNG facility. The companies, both state-owned, also said they would book regasification capacity of 3.0m tonnes a year (t/y) and 1.5m t/y respectively in the terminal — almost its entire output, effectively guaranteeing its off-take.

The government has also accorded city-gas distribution (CGD) networks public-utility status, placing them within the ambit of the Essential Commodities Act. This should streamline the process of securing licences and approvals from the federal and state governments, and local authorities. These were barriers to CGD development in the past.

Several government-industry pilot projects to retrofit trucks, mopeds and other vehicles to run on compressed natural gas and LNG are underway. Small-scale LNG presents an attractive growth pathway for India because it involves more moderate capital-cost requirements, compared with large-scale LNG; offers a modular, rapidly scalable nature; and can make gas available to smaller consumers or those unconnected to pipelines. The immediate outlook for small-scale LNG depends partly on the timely creation of safety and other regulations, and assistance for consumers with conversion to engines optimised for CNG or LNG. If such frameworks can be established, consumer appetite for gas will be underpinned by its cost: on an energy-equivalent basis, gas substantially undercuts oil products.

In September, the government also launched Gas4India, a media campaign to publicise the shift to gas. This reflects New Delhi's aspirations and sets the tone for the introduction of a programme incorporating specific targets for growth underpinned with a development roadmap. Statements on financial assistance for infrastructure developers — for instance, guarantees to compensate them for idle capacity while markets take root — and market-oriented reforms in consumer segments like power and fertilisers will help build confidence. Indeed, the prior absence of such a roadmap was a cause of past failures to invigorate the gas industry.

India's assumptions about LNG pricing for the next 10 years strongly favour the view that gas is set for an explosive period of growth

The government's assumptions about LNG pricing for the next 10 years strongly favour the view that gas is set for an explosive period of growth. This has been reinforced — from the buyer's perspective — by vastly improved commercial terms. For example, Petronet LNG, which buys around 8.5m t/y from Qatar's RasGas, recently renegotiated its 25-year supply contract achieving an effective price of about \$6-7/mmBtu.

Nonetheless, even at new lower prices, government support is necessary if LNG is to compete with coal in power generation. To reach its gasification targets, the government must mandate gas use or offer incentives that encourage its growth. The immediate game changer could be environmental: the most urgent reason for increasing gas use in India at the expense of coal and oil is improving air quality. Strict enforcement of local controls on urban pollution would catalyse demand growth.



FIGURE 03: EXISTING INDIAN REGASIFICATION TERMINALS...

Project	Year started	Capacity (million t/y)	Shareholders
Dahej LNG*	2004	15	Petronet LNG 100%
Hazira LNG	2005	5	Shell 74%; Total 26%
Dabhol	2013	2	Gail 31.52%; NTPC 31.52%; Indian financial institutions 20.28%; MSEB Holding Co. 16.68%
Kochi LNG	2013	5	Petronet LNG 100%

* Petronet LNG has recently undertaken an expansion of Dahej to raise capacity from 10m t/y to 15m t/y.

... AND THOSE UNDER CONSTRUCTION

Project	Year started	Capacity (million t/y)	Shareholders
Mundra	2017	5	Adani Group 50%; GSPC 50%
Ennore LNG	2019	-	Indian Oil Corporation 95%; Tamil Nadu Industrial Development Corporation 5%

Source: IHS Energy, International Gas Union, companies

Conclusion: LNG infrastructure is critical

Imports will be important as India pursues its gasification goals and New Delhi is exploring several options. Pipelines are possible. The Turkmenistan-Afghanistan-Pakistan-India (Tapi) Pipeline remains one idea. India and Russia, which have increased relations with some upstream deals in the past year, have also discussed a supply pipeline of 4,500km to 6,000km. But, these projects are likely to be too expensive — costing up to \$25bn. Geography, security and engineering would all pose big obstacles too.

LNG is more feasible — and will be the priority. India has around 22m t/y of LNG-import capacity, spread across four terminals. This will rise imminently to 27m t/y, when an extra 5m t/y of capacity at Petronet LNG's Dahej terminal becomes fully functional. The four plants are: Dahej (15m t/y — including the 5m t/y expansion), in Gujarat state; Hazira (5m t/y), also in Gujarat; Dabhol (2m t/y), in Maharashtra state; and Kochi (5m t/y), in Kerala.

Utilisation has been persistently below nameplate capacity because of the lack of pipelines to ship gas inland. Kochi, for example, is only using around 5% of its capacity, because of delays in the development of pipelines to Bangalore and Mangalore. All four terminals are on the west coast, leaving eastern India virtually disconnected.

For exporters targeting the country, the news is good. Three new terminals in the east will address the geographical imbalance: Dhamra (5m t/y) in Odisha, northeastern India; Ennore (5m t/y) in Tamil Nadu, in the southeast; and Kakinada (1.75m t/y) in Andhra Pradesh, also in the southeast. These projects would bring LNG-import capacity, including the recent expansion at Dahej, to almost 40m t/y.

Even more LNG-import capacity will be needed. Dharmendra Pradhan, India's oil and gas minister, says that in addition to existing LNG imports of around 15m t/y, India has secured a further 15m-20m t/y under long-term deals with suppliers including Australia, the US, Canada and Mozambique. Beyond this, Pradhan has also indicated that a further 20m-30m t/y of gas imports may be needed. This suggests the government believes India — already the fourth-largest LNG consumer — may treble or quadruple its LNG-import needs within a few years. To support this, the government is also aware that more midstream development will be needed. Plans are underway to double India's gas pipeline network from the present 15,000km within 5-10 years.

In short, while earlier gasification efforts have stalled, a host of new forces now make the government's strategy to use more gas in the economy much more plausible. The country's climate commitments under the Paris Agreement; its campaign to expand the manufacturing base; its urgent efforts to control pollution; its stagnant domestic production; and the recent availability of cost-effective supplies of seaborne gas all suggest a period of rising gas consumption and imports is imminent. Crucially, the government is now taking seriously its need to adjust domestic pricing, support infrastructure development and promote this gasification. For LNG exporters seeking a way out of the current global glut, one road now leads to New Delhi.



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