

CITY GAS DISTRIBUTION (CGD):

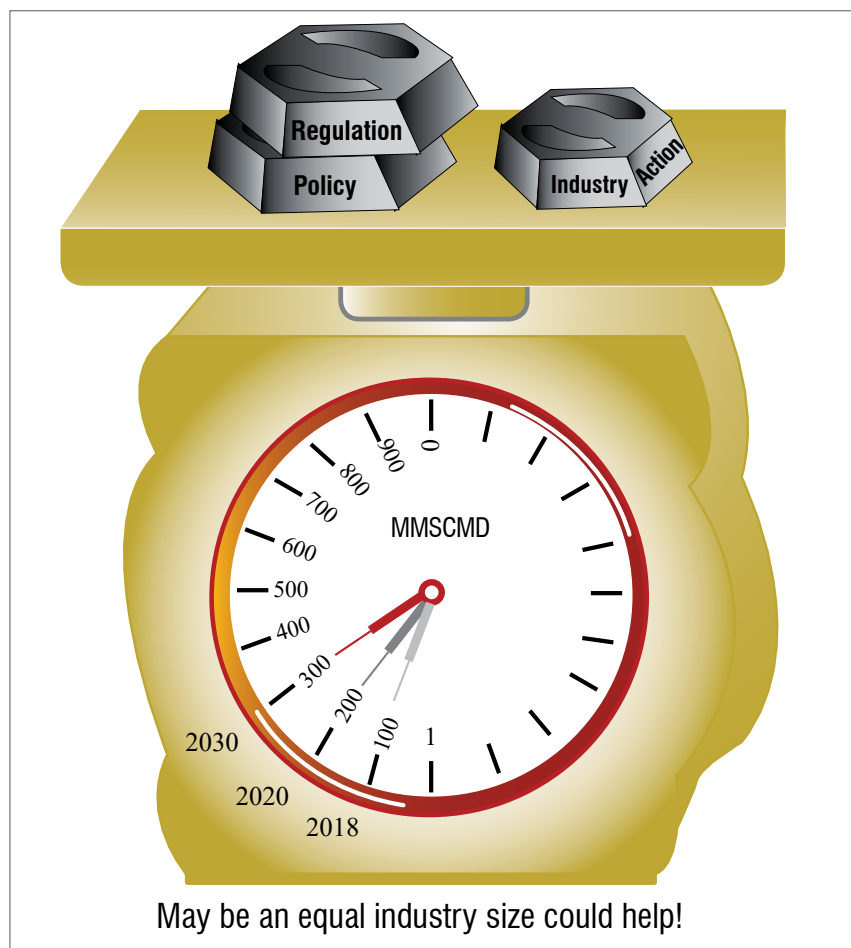
A Potential Game Changer in the Push for Increased Gas Use

by Afsir Ahmad & Deepika Lal

Ever since the announcement of the Government's aim for a 15 per cent share of gas in the energy basket, most discussions have generally been around this at any conference, round table or seminar. However, with the advent of the spread of City Gas, an increasing number of analysts and study groups have been looking at the demand numbers in the natural gas sector.

At NGS too, we decided to take a look at the emerging scenario keeping in mind the city gas distribution sector. We were not surprised by what emerged as it is consistent with the existing trends. CGD segment is projected to have an increasing impact on the natural gas share in the energy basket. And on the other hand the share of the traditional anchor load providers, Power and Fertiliser, is projected to shrink together with the increasing role of the Industry, Refining and Petrochemicals and the long haul transport segment on LNG. To put this in perspective, our study shows that Power and Fertiliser, which constituted almost 70 per cent of the consumption not too long ago and currently almost down to 50 per cent, is likely to further drop to about 38 per cent by 2030. The decline in growth in traditional sectors is being mainly offset by the City Gas segment with the Industrial, Refinery and Petrochemical sectors also providing a consumption boost.

Like other countries, India's natural gas ambitions are one part economic and one part political. Over the years natural gas consumption in India has shown a steady but slow increase to 145 million standard cubic meters per day (MMSCMD) from 140 MMSCMD in 2016-17 with almost equal contribution coming from LNG im-



ports and indigenous domestic production. Clean environment would dictate the gas potential but then renewables also come into play and can be a spoil sport impacting future gas potential.

While sectors such as Power rely heavily on the domestic gas because of its af-

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fordability, sectors such as Petrochemicals, Refineries, Sponge iron etc. can afford relatively higher priced gas and therefore, most of their supply comes from LNG. Fertilizer, City Gas and Miscellaneous/ Others source their gas requirements almost equally from both sources although priority in allocation of domestic gas is accorded to City Gas for CNG and residential segment. We have examined the trend of gas consumption in various sectors and have tried to ascertain potential demand in each of the consuming sectors separately to arrive at the universe of demand. In the past few years, the City Gas Distribution sector has grown significantly on the back of priority allocation of domestic gas and the policy and regulatory support provided by the Government and the Petroleum & Natural Gas Regulatory Board. Given the significant growth in the CGD sector in the past few years and the expectations from the sector, the study has flagged the sector for special attention.

■ City Gas Distribution

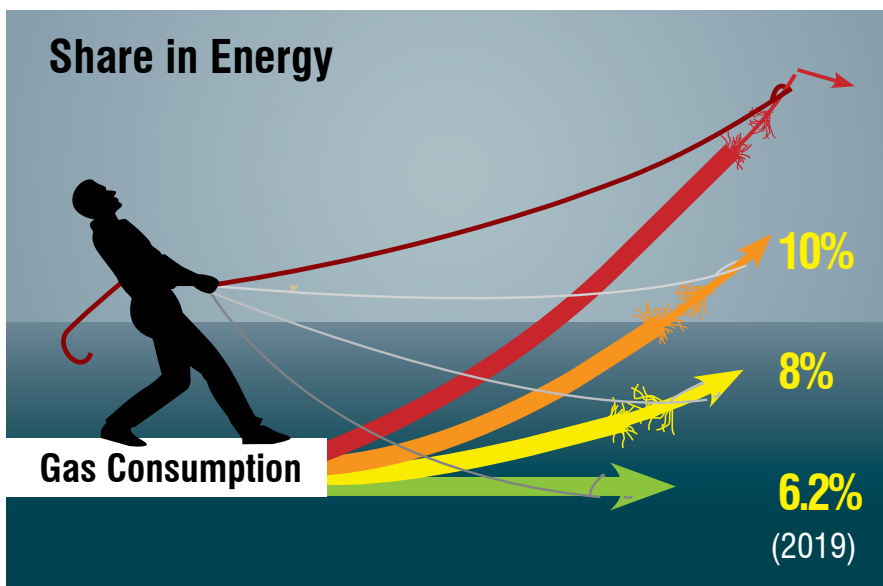
Before the onset of the 9th and 10th Rounds, there were 93 authorized CGD networks in India. Many of these are operational while many are still under construction. The city gas sector consumed about 24.45 MMSCMD in 2017-18. Prior to the Tenth Round of Bidding, CGD authorisation has been given by PNGRB for

178 geographical areas (GAs) covering 280 districts (263 complete and 17 parts) spread over 26 States and Union Territories. These cover approx. 50% of India’s population and 35% of its geographical area. However with the completion of 10th CGD Bidding Round, CGD would now be available in 228 GAs comprising 402 districts spread over 27 States and Union Territories covering approximately 70% of India’s population and 53% of its geographical area. The commitment made by the successful entities in the Tenth Round is to connect 2,02,92,760 residential units and install 3,578 CNG stations over a period of eight years from start of project. This is a huge number following the commitments made by entities in the Ninth Round of Bidding.

We are quite optimistic about the CGD sector given the positives during the last couple of years; such as ban on dirty fuel, like, pet coke and furnace oil in NCR and some other States (to be followed pan India hopefully), a very well received Ninth and Tenth round of bidding including some concrete steps being taken on establishing LNG corridor etc. With all this, the CGD sector could emerge as a potential game changer. There is little doubt that given the right eco system, growth rates could accelerate during the last couple of years to 2030 but for that a better assessment would be possible after seeing the on ground implementation over the next couple of years as infrastructure and supply systems develop and take shape. If everything goes according to plan and commitments, and the PNGRB is able to monitor and course correct, we are looking at significant demand from this segment by 2030. However, using the recent past growth trends, as of today our realistic assessment, would point to around 65 MMSCMD of gas demand by 2030.

■ Power Sector

The share of gas in generation has declined over the years with continuously declining PLF (from 66.97% in 2009-10 to 22.51% in 2016-17). Given the current



scenario, there are no new capacities being planned on gas. In line with the Government's philosophy, we have not considered any new capacity additions till 2030. The gas consumption was about 33 MMSCMD in 2017-18. In the first scenario, we can expect some additional gas supply to go to power sector and accordingly the PLF levels may improve (we assume a 5-10% addition in PLF subsequently), the current consumption is estimated to increase to 58.6 MMSCMD in the year 2029-30 on the back of increased PLF from existing plants. In the second scenario, we have considered the same PLF level for the entire period of ten years until 2029-30; accordingly gas demand would be 33 MMSCMD in 2029-30 at 22.55 PLF. We have considered scenario-I for arriving at the universal demand. The re-introduction of the PSDF scheme or any other to de-stress the gas-based capacity could potentially change these demand estimates but these by nature cannot be permanent.

■ Fertilizer

There are about 31 urea plants with installed capacity of about 21 MMTA. Of these plants, 27 use gas as feedstock and 4 use naphtha. The imports stood at 5.48 MMT being largely sourced from Oman, Iran and China. The process of reviving ailing plants, restarting closed units, expanding existing projects and building new ones has been going on and the emphasis is on reducing imports. Proposals are on ground to revive loss-making Madras Fertilizers Ltd. and Fertilizers & Chemicals Travancore Ltd. The Government is also planning to restart five idle facilities owned by FCI and HFCL. However, there are still doubts about the HFCL's Haldia and Durgapur plants. New demand from revamped projects as well as conversion from naphtha, have been considered while estimating the total demand from the sector. The current consumption of 40 MMSCMD is expected to increase to 52.64 MMSCMD by the year 2029-30.

■ Industrial Sector

The small and medium industrial sector could form part of the growing CGD sector. However to get a flavor of the use of natural gas in the various sectors of our industry, it would be prudent to examine its consumption in Industrial estates, Petrochemicals, Captive power requirements of Industries, Refineries, Sponge iron/Steel plants, internal use for pipelines operations, LPG shrinkage etc. Past trends could be considered for the future but it may not be true for all the sectors. Therefore, each sector has been examined independently and demand estimated considering greenfield and brownfield projects. The absence of pipeline connectivity in parts of the eastern sector and unavailability of gas has been restricting factor in the use of gas in these areas. Therefore a straight line growth based upon historical consumption may not be the best idea to project demand. In the future, the upcoming Petroleum, Chemicals and Petrochemical Investment Regions (PCPIRs), Special Economic Zones (SEZ) and National Investment and Manufacturing Zones (NIMZ) could provide the backbone for industrial development. We expect infrastructure facilities under development or being planned like, SEZs, NIMZ, PCPIRs, industrial clusters and mega food parks could contribute to gas demand. Since these are mostly new sectors being considered for gas demand estimates and in the absence of historical numbers, we have worked the demand projections for the above based upon various factors including their timely implementation. The estimated demand from these segments of the industrial sector has been assessed as 35.22 MMSCMD in the concluding year of the study.

■ Petrochemicals/Refineries/ Sponge Iron/Steel

In Petrochemicals, Reliance, GAIL and IOC have facilities which have been operational since a long time at Hazira, Jamnagar, Vadodra, Nagothane, Patalgan-

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Recent developments in the E&P sector has been encouraging with both the public sector and the private sector announcing huge investments (\$11-12 billion, just from ONGC and RIL) in the upstream sector which are expected to increase indigenous production of natural gas.

ga, Pata, Koyali and also have plans for expansion. Between the years 2011-12 to 2016-17 the consumption in the sector has grown by 6.33 MMSCMD from 5.03 MMSCMD to 11.42 MMSCMD which is a healthy 107%. This has been mostly on account of expansions at Jamnagar and GAIL's PATA complexes. Compared to 10.23 MMSCMD in 2015-16, the consumption in the year 2016-17 was 11.42 (+11.62%). However, this trend is unlikely to continue once the naphtha based petrochemical complexes are aligned with the refinery operations to take advantage of the internal fuel produced. Demand from the petchem sector has been estimated on the back of the existing plants.

Similarly, it is unlikely that additional capacity will come up in the Refining sector in medium term over and above the current capacity of 230.066 MMTPA, except for Kochi refinery which is expected to increase capacity to 15.5 MMTPA from the current level of 9.5 MMTPA. With the expansion of pipeline infrastructure, additional demand can be expected from IOC Barauni, IOC Haldia, IOC Paradip,

BPCL JV Bina, Mittal-HPCL Bhatinda, IOC Karnal, CRLKochi, HPCL Vizag. The proposed West Coast refinery has not been considered in the demand projections, because there are still some major issues surrounding the proposed refinery to be resolved.

As for the gas-based sponge iron plants, all are located in the west, in Gujarat and Maharashtra. Their current requirement of gas is about 3.4 MMSCMD whereas the plants have consumed 1.49 MMSCMD in 2015-16 and 2.42 MMSCMD in 2016-17. Essar has already downsized its capacity and is up for sale. It is unlikely that the sponge iron capacity based upon gas would be expanded or new capacity added. We expect 4MMSCMD of gas requirement emanating from existing steel plants starting with 2022-23 (2022-23 1MMSCMD; 2023-24 1MMSCMD; 2025-26 1MMSCMD; 2027-28 1MMSCMD). Eastern located steel plants are all on blast furnace technology and therefore, have been considered as a candidate to replace their primary fuel (fuel oil) only with natural gas.

Consolidated Gas - Demand

After considering potential demand from all sectors, we see that it could possibly grow by 35% to about 187 MMSC-

MD by 2020-21, 70% at 242 MMSCMD by 2025 and more than double at 302 MMSCMD by 2030.

Demand MMSCMD	2015-16 A	2016-17 A	2017-18**	2018-19	2019-20	2020-21	2021-22	2024-25	2029-30
Power	29.83	31.83	33.0	36.6	36.6	51.3	51.3	58.6	58.6
Fertilizer	44.2	42.27	40.00	40.00	43.48	43.48	45.14	50.04	52.64
CGD	14.97	20.14	24.00	26.08	28.34	30.79	33.46	42.92	65.02
Total Industrial ^	12.76	12.44	13.31	14.24	15.24	16.81	20.98	25.7	35.22
Refineries	13.91	14.72	15.75	16.85	18.53	22.33	23.89	33.41	45.78
Petrochemicals	10.23	11.42	12.22	13.07	13.99	14.97	16.02	19.62	26.88
LPG Shrinkage	2.07	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08
Internal Consumption	1.12	1.29	1.38	1.48	1.58	1.69	1.81	2.22	3.04
Tea Plantation	0.52	0.5	0.54	0.57	0.61	0.66	0.7	0.86	1.18
Sponge Iron/Steel	1.49	2.42	2.59	2.77	2.96	3.17	3.39	6.37	11.15
Grand Total (NGS)	131.1	139.11	144.87	153.74	163.41	187.28	198.77	241.82	301.59

A-Actual ^ Total industrial includes PCPIR, SEZ, NIMZ, industrial, Misc, Manufacture and Captive

** Actuals for fertilizer, power, CGD and projected for all others.

What others say

Demand MMSCMD	2017-18	2018-19	2019-20	2020-21	2021-22	2024-25	2029-30
PNGRB Vision 2030	409	438	465	491	517	598	746
IEA			176				313

Gas Supply

Domestic gas supply has always been a challenge and would continue to be one in the future. Recent developments in the E&P sector has been encouraging with both the public sector and the private sector announcing huge investments (\$11-12 billion, just from ONGC and RIL) in the upstream sector which are expected to increase indigenous production of natural gas. It is estimated that the domestic supply of gas will increase by almost 64% by 2020-21 after accounting for the depletion in the ageing fields (about 22 MMSCMD); and is likely to almost double by 2030 if the recent announcements of the ministry and key E&P players are to be carried forward. India's natural gas production grew for the first time in six years in 2017-18, albeit marginally. Gas output (gross) grew 2.35% to 32,649 Million Standard Cubic Meter (MMSCM) or 89.45 MMSCMD primarily due to production from onshore blocks offsetting a decline in production from offshore blocks.

Gas availability from various domestic sources have been evaluated including CBM, marginal fields, ONGC, Reliance

Industries/BP ventures in the KG Basin and other private and public sector companies. A slew of new announcements from ONGC and RIL to invest significantly in the existing fields have suddenly raised the prospective gas production numbers in the coming years. ONGC currently produces around 62-63 MMSCMD of gas, which is expected to go up to 82 MMSCMD in four years. However, gas production at some existing fields is projected to drop to 32 MMSCMD in four years from the current 54 MMSCMD. We expect domestic supply to increase from the current level of 87 MMSCMD to 171 MMSCMD by 2030. A comparison of the projections made by other agencies is placed below for a better appreciation of the estimates of NGS (Table 1).

Gas producing companies use some quantity of gas for their own internal consumption while some quantity is flared as part of technical requirement. Gas available for sale after taking into account technical and operational requirement has been generally at the level of 80% in the past as per Petroleum Planning and Analysis Cell (PPAC). Supply estimates for sale has been considered at 80% gross production (Table 2).

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Table 1

Supply forecasts (MMSCMD)	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2024-25	2029-30
NGS - Gross Production	87.4	93.05	102.01	112.25	143.12	171.12	171.12	171.12
IEA India Energy outlook 2015				104			123	150
Platts 5 year outlook @3% growth pa	87.4	90	92.7	95.5	98.4	101.3	104.4	107.5
NitiAayog Level 2	96.72					112.84	139.1 (2027)	170.04 (2032)

Table 2

MMSCMD	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2024-25	2029-30
CONSOLIDATED DEMAND	139.11	144.87	153.74	163.41	187.28	198.7761	241.82	301.59
GAS AVAILABLE FOR SALE FROM DOMESTIC SOURCES	69.92	74.44	81.61	89.80	114.50	136.90	136.90	136.90
BALANCE	69.19	70.43	72.13	73.61	72.78	61.87	104.92	164.69

...we not only need to focus on the domestic E&P sector but also on the LNG import facilities. The key, however, would be to mesh the supply resources with the pipeline infrastructure to deliver gas to the markets at an affordable price.

Gas Demand-Supply Balance

With the most optimistic supply scenario and a business as usual demand scenario we are looking at a demand-supply gap of about 72 MMSCMD in 2021, 104 MMSCMD in 2025 and 164 MMSCMD in 2030. The net balance demand is expected to be met with supplies through LNG imports and transnational pipelines supply.

The current demand is being partly met through import of LNG, however, the demand-supply gap is expected to widen in the future. Therefore, additional LNG will need to be imported through existing import facilities and new facilities being

developed on the west and east coast. The possibility of transnational pipeline gas supply is difficult to predict. Iran and Turkmenistan are potential sources of pipeline gas supply.

India will continue to import LNG in the long term with the ever growing demand coupled with inadequate domestic supply. Therefore, we not only need to focus on the domestic E&P sector but also on the LNG import facilities. The key, however, would be to mesh the supply resources with the pipeline infrastructure to deliver gas to the markets at an affordable price.

Demandscape at a glance

- The estimated projections for the year 2029-30 is 302 MMSCMD, however, if the CGD sector does not get impacted by e-mobility and PSDF or similar scheme is reintroduced in the power sector, we could see higher growth.
- LNG in the transport sector for long distance haul could be a significant contributor to growth in the later years of the study but requires strong market seeding efforts.
- PNGRB vision 2030 study estimate of 746 MMSCMD which was carried out in 2012, looks extremely ambitious as the power sector was considered to be the key driver of demand, however, the power sector has been a disappointment largely.
- The NGS estimate for gas demand in 2030 is close to the IEA projection of 313 MMSCMD.
- Petrochemicals, Refineries and the CGD sectors will be the key drivers of demand
- Fertilizer sector is likely to grow slowly - the sector growth will come on the back of revamping of closed units and conversion of naphtha based plants. No new plants have been considered.
- New industrial clusters/belts, like, PCPIRS, NIMZ, Mega Food Parks etc. being developed are expected to drive gas demand in the future.
- The Urja Ganga Gas Pipeline Project of GAIL to lay over 2600 Km of pipeline in the eastern sector will have a significant role in enhancing gas demand in the region
- E-mobility likely to impact CNG growth in urban areas - mainly public transport.
- Renewable, like solar and wind energy, with dropping cost and improved technology could impact both gas & coal based generation
- Gas share in the energy mix may increase from the current level of 6.2% to about 8.0% by 2030 – but unlikely to touch 15%.
- Supply projections of NGS are very much similar to the estimates of IEA and NitiAayog's for the year 2030.
- Platts has projected lower supply from domestic sources and are clearly on the conservative side.
- Domestic natural gas production unlikely to keep pace with the increasing demand
- LNG which constitutes almost 50% of the total gas consumption now – likely to grow with time.
- Additional LNG import facilities will be required besides the existing 26 MMTPA capacity and 5 MMTPA capacities each added recently at Ennore on the east coast and Mundhra on the west coast.