Natural Gas April- October 2018 update

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Domestic Natural Gas production, consumption and imports during FY19 (April- October)

Domestic natural gas output has declined marginally by 0.6% during the current fiscal year. Fall in production can be mainly attributed to the decline in production from fields operated by Oil India and private or Joint Venture operators (PSC fields).

During the current fiscal year, ONGC has contributed around 74% of the total domestic output while Oil India and PSC* fields have contributed around 8% and 17% respectively.

Onshore fields make up 31% (CBM is 6% of the total onshore natural gas production) of the total natural gas output and offshore fields constituted 69% of the total domestic natural gas output.

PSC* Production Sharing Contract

Consumption of natural gas has increased by 17.1% on a y-o-y basis during FY19 (April-October period). Natural gas is used as a fuel (energy) and feedstock (non-energy) by the respective end user industries. Demand for natural gas in the domestic market is largely dependent on the fertilizer (28%), power (23%), CGD entities (16%), refinery (12%) and petrochemicals (8%) industries.

Increase in demand and fall in domestic production has led to the increase of imports of natural gas in the form of LNG by 12.7%. During the current fiscal year, India has imported LNG mainly from Qatar (47%), Nigeria (17%), USA (6%), Angola (6%) and Australia (6%). R-LNG has catered to 47% of the natural gas consumption during the FY19 April-October period.

Table 1: Domestic Production, Consumption and Imports of Natural Gas (BCM)

	Production*	Change (%)	Consumption**	Change (%)	Imports (LNG)	Change (%)
FY17 (April-October)	18	-3.7%	29	7.3%	15	24.4%
FY18 (April-October)	19	4.7%	30	2.3%	15	-1.5%
FY19 (April-October)	19	-0.6%	35	17.1%	16	12.7%

Source: PPAC

*The production numbers are net production figures **w**hich are derived by deducting from gross production, the quantity of gas flared/loss by producing companies i.e. natural gas available for consumption.

**Includes internal consumption.

Review of the Natural Gas Infrastructure

R-LNG

Petronet's Dahej Terminal has a long term LNG sourcing contact with RasGas and with ExxonMobil for the Kochi Terminal. GAIL (Dhabol) has a 20- year contract with Cheniere Energy. Hazira LNG (A joint venture between Shell Gas BV and Total Gaz Electricité Holdings France) has sourced cargoes from 17 liquefaction facilities across the globe, ranging from Peru LNG at the extreme west to Sakhalin LNG in the extreme east. Unlike Dahej, Kochi and Dhabol, Hazira's business model is geared more towards short and mid-term contracts instead of long-term contracts.

Table 2: R-LNG terminals operational as on 01.04.2018

Location	Owner	Terminal Capacity (in MMTPA)	Capacity Utilization (%)
Dahej (Gujarat)	PLL	15	105.3%
Hazira (Gujarat)	Hazira LNG	5	58.9%
Kochi (Kerela)	PLL	5	12.2%
Dhabol (Maharashtra)	JV b/w GAIL & NTPC	1.69	64.9%
		26.7	
	MMSCMD	**94.6**	

Source: Ministry of Petroleum and Natural Gas

Note: Though the existing installed capacity of Dabhol is 5 MMPTA, however, due to absence of breakwater facility the available capacity is 1.69MMPTA

India is scheduled to add 27.5 MMTPA (99 mmscmd) additional R-LNG terminal capacity in the coming few years depending on the techno-feasibility of the project. The current regasification facilities are all located on the west coast of the country. With the proposed new plants which will be set up on the east coast of India the disparity in the supply of LNG to its end users in all parts of the country should diminish.

Natural Gas pipelines

At present, India has a gas pipeline network length of 16,226 km having capacity of 368 MMSCMD spread over 15 States & UTs. GAIL is operating Hazira-Vijaipur-Jagdishpur (HVJ) pipeline, which was the country's first cross country pipeline, and DVPL trunk Pipeline to evacuate gas like domestic gas/ joint venture gas from ONGC and R-LNG from PLL. Overall GAIL has a pipeline network of about 11,410 km (about 70% market share of current pipelines in operation) including Dabhol-Bengaluru Pipeline.

Reliance Gas Transportation Infrastructure Ltd is operating 1,784 km (about 11%) East West Pipeline (EWPL) to evacuate gas from KG-D6 in Andhra Pradesh. This pipeline passes through Andhra Pradesh, Maharashtra and Gujarat and is integrated with GAIL's and GSPL's network to reach Northern and Western Indian market. GSPL is mainly focused in the Gujarat consisting of about 2618 km (about 16%). In addition GAIL also operates regional gas pipeline networks across India in Maharashtra, K.G.Basin, Cauvery Basin and South Gujarat.

Table 3: Gas Pipeline Network as on 01.10.2018

Entity	Length (kms)	Design Capacity (mmscmd)	Average flow April- Sept 2018 (P) (mmscmd)	% Capacity utilisation April- Sept 2018 (P)
GAIL	11410	230	110.3	48%
Reliance	1784	84	21	25%
GSPL	2593	43	25.3	59%
AGCL, DNPL	298.7	3	1.7	61%
IOCL	140	10	5.1	55%
Total	**16226**	**368**	**370**	**44%**

Source: PPAC

Table 4: Gas Pipeline under Execution / Construction as on 01.10.2018

NETWORK/REGION	Entity	Length (kms)	Design Capacity (mmscmd)	Status of Pipeline laid (km)
Kochi - Kottanad - Bengaluru - Mangalore	GAIL	1,056	16	312
Dabhol -Bengaluru (DBPL) Spur Lines, Phase-2	GAIL	302	16	56
Jagdishpur- Haldia-Bokaro-Dhamra (JHBDPL) (Phase-I, 755 Km, 7.44 MMSCMD Capacity)	GAIL	2,539	16	603
Mallavaram - Bhilwada*	GSPC India Transco	1,881	78.3	52
Mehsana - Bathinda *	GSPC India Gasnet	2,052	77.1	340
Bathinda -Jammu-Srinagar*	GSPC India Gasnet	725	42.4	102
Kakinada - Vizag-Srikakulam *	AP Gas Distribution Corporation.	391	90	0
Ennore- Nellore*	Gas Transmission India	250	36	0
Ennore-Thiruvallur-Bengaluru-Puducherry-Nagapattinam-Madurai-Tuticorin*	Indian Oil Corporation	1,385	84.7	13
Jaigarh-Mangalore*	H-Energy	635	17	0
Total		**11,377**		

Source: PPAC

*Competitive bidding

The existing trunk pipeline (excluding dedicated pipelines) capacity in India is 368 MMSCMD with a total length of 16226 Kms. With the pipeline projects under execution, this is expected to cross 28000 kms in the next few years

City Gas Distribution

The CGD system supplies gas to various consumers like industrial, domestic, commercial and transportation. Gas supplied to industrial, domestic and commercial customers is known as Piped Natural Gas (PNG), whereas gas dispensed through CNG refuelling stations to CNG vehicles (transportation) is known as Compressed Natural Gas (CNG).

The government has recently unveiled a Natural Gas Infrastructure Development Plan to set up 10,000 CNG stations over the next 10 years and the Petroleum and Natural Gas Regulatory Board (PNGRB) too has launched the 10th round of bidding for city gas distribution (CGD) in 50 geographical areas (GAs) spread over 14 states and 124 districts (112 full and 12 part), covering 24% of India's population and 18% of its area.

- **Compressed Natural Gas (CNG)**

Table 5: No of CNG Stations

State	As on 1.04.2017	As on 1.04.2018	Increase in absolute terms	As on 1.10.18	Increase in absolute terms
Gujarat	396	457	61	469	12
Delhi / NCR	421	444	23	450	6
Maharashtra	245	275	30	276	1
Andhra Pradesh / Telangana	42	55	13	59	4
Rajasthan	3	3	0	5	2
Uttar Pradesh	54	79	25	92	13
Tripura	5	6	1	8	2
Madhya Pradesh	24	31	7	32	1
Haryana	31	47	16	54	7
West Bengal	7	7	0	7	0
Karnataka	3	5	2	6	1
Chandigarh	2	4	2	4	0
Daman	-	2	2	2	0
Kerala	-	4	4	4	0
Dadra & Nagar Haveli	-	3	3	3	0
Odisha	-	2	2	4	2
Punjab	-	-	-	1	1
Uttarakand	-	-	-	1	1
All India	**1233**	**1424**	**191**	**1477**	**53**

Source: PPAC

As per table no 5 all over India there has been an increase of additional 191 CNG refuelling stations during FY18 with Gujarat leading across all the states. Gujarat also has the most number of CNG stations as of a date.

As of 1.10.2018 there are 1477 CNG stations resulting in the deployment of additional 53 CNG stations all over the country.

Nearly 97% of India's CNG vehicles ply in the 5 states: Delhi (including Noida and Ghaziabad), Gujarat, Maharashtra, UP and Haryana. Around 87% of these are in the 3 states of Delhi, Gujarat and Maharashtra.

Table 6: CNG Sales trend in India (Sales in TMT)

	FY16	FY17	FY18
Overall CNG Sales	2,155	2,365	2,638
YOY Change	5.8%	9.7%	11.5%

Source: PPAC

Overall the sales volume of CNG has been increasing on a y-o-y basis. The growth in sales is due to the increase in demand for CNG vehicles given the constant increase in petrol and diesel prices. CNG is 60% cheaper than petrol and 45% cheaper than diesel.

- **Piped Natural Gas (PNG)**

PNG is supplied to residential, commercial and industrial users through extensive network of pipelines. Gas sales to commercial and industrial users are achieved through long-term gas sales agreement, whereas residential users are charged on usage basis. Supplying PNG to industrial users can further be categorized into large-scale industries and small/medium-scale industries.

Table 7: Number of Piped Natural Gas connection data as of 1.10.2018

State	Domestic connection	Commercial connection	Industrial connection
Haryana	88,817	256	396
Andhra Pradesh	16,493	74	2
Telangana	8,168	9	13
Assam	31,996	1,061	412
Gujarat	19,36,754	18,153	4,675
Madhya Pradesh	37,282	111	158
Maharashtra	13,13,502	3,923	237
Delhi/NCR	9,70,849	2,350	1,429
Rajasthan	679	4	12
Tripura	36,774	415	49
Karnataka	8,493	89	46
Uttar Pradesh	1,35,321	410	658
Chandigarh	45,006	-	-
Kerala	12,060	2	-
Dadra & Nagar Haveli	1,223	9	11
Daman and Diu	2,755	23	9
Odisha	161	-	-
Punjab	120	1	4
Uttarakand	2,120	-	1
Total	46,48,573	26,890	8,112

Source: PPAC

As on 1.10.2018 (**46,83,575 connections**) the total number of PNG connections have increased by 8.9% compared with the PNG connections on 1.04.2018 (there were 42,99,016 connections in the start of the fiscal year). Domestic connections, commercial connections and industrial connections have increased by 9%, 2.9% and 6.7% respectively. Out of the total PNG

connections domestic connections constitute 99.3% share followed by commercial connections having a 0.6% share and industrial connections having a 0.2% share.

Natural Gas (as PNG) is cheaper by 40% as compared with market price of LPG and the price of PNG almost matches with that of subsidised LPG (based on prices in Delhi).

Investments in the Natural Gas domain

- The Oil Ministry plans to set up bio-CNG (compressed natural gas) plants and allied infrastructure at a cost of Rs 7,000 crore (US$ 1.10 billion) to promote the use of clean fuel.
- The government plans to spend Rs 70,000 crore to spread natural gas pipelines across the country and working out to expand gas networks to Myanmar through Bangladesh.
- Oil and Natural Gas Corporation (ONGC) plans to invest US$ 11 billion in exploration and development of blocks in the Krishna Godavari (KG)basin, which is expected to increase gas production by around 30% over the next three-four years.
- ONGC has signed an agreement with the Government of Andhra Pradesh to invest around Rs 78,000 crore (US$ 11.7 billion) in the Krishna Godavari basin for producing hydrocarbons by FY22.
- Larsen & Toubro's (L&T) subsidiary, L&T Hydrocarbon Engineering has bagged an order relating to Oil and Natural Gas Corporation's (ONGC) Neelam Re-Development and B173AC projects worth Rs 1,656 crore (US$ 257 million) which involves building four new platforms, a 32 kilometre pipeline and modification work on existing platforms in the India's western off shore basin, Neelam Field. The project is expected to be completed by 2019 and would result in incremental gain of 2.76 million ton crude oil and 4.786 BCM gas until 2034-35.
- The Adani group has entered into an agreement with France's Total to jointly develop multi-energy offerings in the Indian market which include fuel retail and liquefied natural gas. Total and Adani will create a joint venture with an objective to build a retail network of 1,500 service stations over a period of 10 years. Adani is also building a 5 million tonne LNG import terminal at Dhamra in Odisha at a cost of Rs 5,100 crore.

Prices

The domestic natural gas price is determined by the formula which has been decided according to the New Domestic Gas price formula, which considers the prices of natural gas in USA (Henry Hub), UK (New Balancing Point), Canada (Alberta Gas) and Russia (Russian Natural Gas). Prices of gas in these hubs are market linked.

Table 8: Domestic Gas price (USD /mmBtu) on a Gross Calorific Value (GCV) basis

	Domestic Natural Gas Price	% change (+/-)
1st Nov'14 – 31st Mar'15	5.05	-
1st Apr'15 – 30th Sep'15	4.66	-7.7%
1st Oct'15 – 31st Mar'16	3.82	-18.0%
1st Apr'16 – 30th Sep'16	3.06	-19.9%
1st Oct'16 – 31st Mar'17	2.5	-18.3%
1st Apr'17 – 30th Sep'17	2.48	-0.8%
1st Oct'17 – 31st Mar'18	2.89	16.5%
1st Apr'18 – 30th Sep'18	3.06	5.9%
1st Oct'18 – 31st Mar'19	3.36	9.8%

Source: PPAC

Table 9: Domestic Gas price for gas produced from difficult fields (USD/mmBtu) on a Gross Calorific Value (GCV) basis

	Ceiling Prices for Gas from HP-HT/Deep/Ultradeepwater	% change (+/-)
1st Apr'16 – 30th Sep'16	6.61	
1st Oct'16 – 31st Mar'17	5.30	-19.8%
1st Apr'17 – 30th Sep'17	5.56	4.9%
1st Oct'17 – 31st Mar'18	6.30	13.3%
1st Apr'18 – 30th Sep'18	6.78	7.6%
1st Oct'18 – 31st Mar'19	7.67	13.1%

Source: PPAC

The government has revised the domestic natural gas price as per the New Domestic Gas policy, 2014. Currently the price for gas produced from local fields is USD 3.36/mmBtu a 9.8% increase from USD 3.06/mmBtu and the ceiling price for gas produced from difficult fields is USD 7.67/mmBtu a 13.1% increase from USD 6.78/mmBtu.

The current domestic natural gas prices prevailing in the markets have been the third consecutive increase in the domestic natural gas price since the inception of the New Domestic Gas Price Policy.

Rise in the price of domestic natural gas leads to an increase in the cost of manufacturing of urea and petrochemicals where natural gas is used as a feedstock, rise in the prices of CNG and PNG which eventually affects the consumers and also affects the margins of the power sector and sponge iron industry where natural gas is used for the generation of energy.

CARE Ratings Outlook

India's energy demand is expected to rise as the economy expands and more people have access to power, cooking gas and personal transport. Currently India is the 3rd largest energy consumer after China and the US its energy demand is expected to grow three-fold by 2040.

Natural Gas is emerging to be the gas of the future due to its clean burning properties and because is impact on the environment is not harmful. The Government is also working towards transforming India into a gas based economy and is actively working towards elevating its domestic production by introducing reforms such as the incentivize enhanced recovery methods for oil and gas in order to reduce the country's import dependence as well.

Domestic natural gas production had picked up during FY18 after a continuous decline in its production since FY11.

- In the current financial year, we believe the **production of domestic natural gas to be stable and reach the level of 34.2 BCM in the coming few months and reach a level of 36 BCM during FY20.**
- Domestic natural gas production (gross) during FY18 was 32.6 BCM and CARE Ratings had predicted production to be 32.6 BCM as well.
- Till date domestic production (gross) has been 19 BCM.

Natural Gas satisfies most of the fuel requirements in a modern day industrial society, being efficient, non-polluting and relatively economical. The periodic uncertainties and volatility in both the price and supply of oil have also helped natural gas emerge as a major fuel in the energy basket across countries. India plans to increase its gas usage in the energy mix to 15% from the current 6.5%. The world average of gas use in the total energy consumption is 24%.

We believe the demand of Natural Gas to reach the level of 54.8 BCM by the end of FY19 and 57.6 BCM by FY20. Domestic natural gas consumption during FY18 was 52.3 BCM and CARE Ratings had predicted production to be 52.2 BCM. Till date domestic consumption has been 35 BCM.

- The demand of natural gas in India is likely to depict a strong growth with major demand from Power, Fertilizer and CGD sectors.
- The Government along with cash rich PSUs in coal and oil sector are jointly investing over Rs. 50,000 crores to revive closed fertilizer plants and setting up gas pipelines which would make India self-sufficient in Urea manufacturing. Natural Gas is used as a feedstock for urea manufacturing. There are 31 urea manufacturing plants out of which 28 run on natural gas and according to the second phase of "Gas Pooling Policy" the remaining 3 plants will also be converted to gas based plants.
- Gas based Power units to witness a steady growth on the backing of Government initiatives for Cleaner Energy and Higher power demand due to power for all scheme.
- It is speculated that India's rapid expansion of Solar and Wind energy will also require use of natural gas for power generation which will ensure a smooth 24hour supply.
- CGD sector is expected to grow faster and its share in gas consumption will continuously increase over time as the number of CNG fuelling stations and PNG connections increases. Developing green corridor by setting up of CNG stations on National Highways/State Highways will push the setting of CNG stations. With the volatility in petrol and diesel prices we expect the number of CNG stations to increase as well.
- With the pollution levels increasing in the country we can expect the government making a shift towards the increase in usage of natural gas in the factories especially where coal is used (something like what China is implementing).

Imports of natural gas in the form of LNG are to continue to grow at the steady level i.e. to the extent of plugging in the structural gap between gas demand and domestic production.

- The current regasification facilities are all located on the west coast of the country. With the proposed new plants which will be set up on the east coast of India the disparity in supply of LNG to its end users in all parts of the country will diminish.
- Pipeline infrastructure expansion in East, North-East and Southern regions is in synchronization with market development expanding the development of the national gas grid.

India is to set up a Natural Gas Trading platform which would lead to market determined pricing of gas. This will be much similar to the global hubs such as Henry Hub of the US and New Balancing Point of the UK.

- Both LNG and domestically produced natural gas will be traded at the hub. This will enable market determination of the Indian price of Natural Gas.
- All new production will have marketing freedom. This move is to encourage more investments towards the exploration of natural gas.
- Pricing freedom is one of the biggest triggers for investor interest which could prompt foreign investors to partner with technology companies within India and outside to bring in expertise in the sector.
- We believe more investment towards the Natural Gas industry will help develop more infrastructure which will benefit the end users and help India move towards a "Gas Based Economy". For India to be a Gas Based economy, domestic gas production needs to be enhanced, regasification terminals of LNG should be erected with pipelines connecting to the end users all over the country.

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