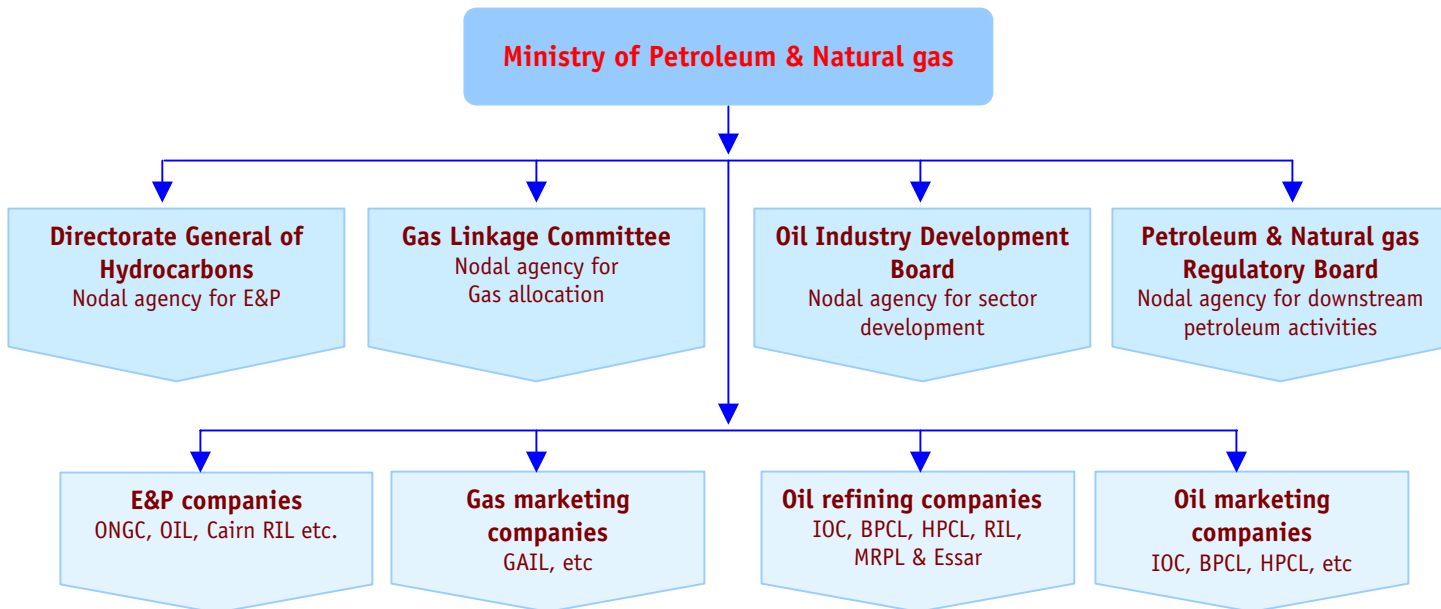


Natural Gas as a Fuel - Sector update

Current Scenario

Natural gas is the fastest growing primary energy source amongst all the fossil fuel. It being one of the cleanest source of fuel, is also one of the most economical raw material for various applications. Traditionally, in India, this sector has been under tight regulations with government deciding the quantity of gas to be supplied to priority sectors as well as its pricing through Administered Price Mechanism (APM). Following is the overview of the regulations applicable to the sector currently.



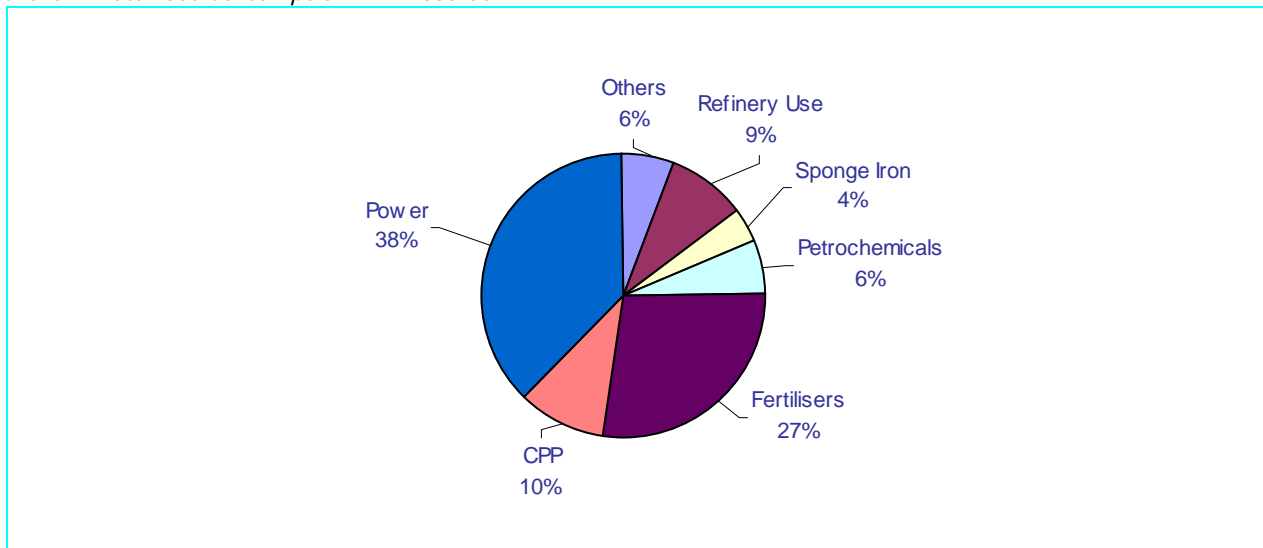
- ❏ **Directorate General of Hydrocarbons (DGH):** The government set up the DGH under the MoP&NG to be an upstream advisory & technical body. The functions of DGH include regulation and overseeing of upstream activities in the energy sector besides providing technical advice to the government regarding various matters like offering acreage under NELP, evaluation of bidding rounds as well as assessment of hydrocarbon reserves in the country.
- ❏ **Gas Linkage Committee (GLC) :** With the increase in gas availability at market price, the allocation and monitoring of gas at APM prices to priority sector became imperative. Hence, GLC was set up with primary functions to re-assess the priority of gas supply to various projects and monitoring the usage of the resources.
- ❏ **Petroleum & Natural Gas Regulatory Board (PNGRB) :** PNGRB was set up under the erstwhile PNGRB Act, 2006 to oversee the developments and regulate the growth of the downstream sector. The main functions of PNGRB include to facilitate open access pipeline networks for all the players and regulation of tariffs, exclusivity as well as setting up of city gas and pipeline infrastructure networks.

With the setting up of PNGRB and maturing of the natural gas markets in India, we are likely to witness emergence of a competitive sector going forward. Unbundling of accounting separation of transmission and distribution functions by various players is just the beginning of many other reforms to follow in this sector.

DEMAND SIDE

Currently, amongst the major consumers of gas, the power sector as well as fertilizer sector remains most buoyant. Their demand of the total natural gas demand pie is pegged at 38% and 27% respectively. Amongst other consumers of natural gas include Refineries and petrochemicals, Sponge Iron and other miscellaneous users including city gas distribution.

Chart 1: Total Gas Consumption Mix: 2005-06



Source: CRISIL Research

Power Sector:

- Currently, total thermal power generation is about 90,800 MW of which 12% is natural gas based power plants. This roughly accounts for 8% of the total power generated in the country.
- As per the report of Working Group on power for XI th plan, a capacity addition of 41,110 MW was planned in the Xth plan. However, an actual addition of 30,641 MW has been projected to be achieved. The balance unachieved planned capacities of ~ 10,469 MW are likely to be slipped to XI th plan, along with a planned capacity additions of 68,869 MW of the XI th plan. These numbers indicate robust growth lined up in the sector in next 5 years which will keep the demand for raw material including natural gas upbeat.

	Units in MW
Planned Capacity Addition during 10 th Plan	41, 110
Projected capacity addition during 10 th Plan	30, 641
Slippages to XI th Plan	10, 469
Planned capacity addition during 11 th Plan	68, 869
Total target capacity addition during 11 th Plan	79, 338

Source: Report of the Working group on Power for XI th Plan

- Natural gas is considered to be a greener fuel and hence we expect many capacities to switch to this source of fuel subject to its availability. Also, natural gas is quite economical as compared to naphtha as well as fuel oil. Further, the gas based stations comparatively have shorter gestation period and are easier to operate. Considering these various benefits of natural gas, we believe the power sector demand to consume natural gas to show a continuous growth.
- We project, by the end of XI th plan, the share of natural gas in power sector to grow from current 8% to ~11%, generating an additional capacity of more than 10,100 MW due to switch capacities as well as fresh capacities becoming operational.

Fertilizer Sector:

- It has been well established that natural gas is the most cost effective fuel vis-à-vis other liquid fuels for fertilizer plants. Requirement of gas for fertilizer sector is expected to increase in the years to come, not only for meeting the current shortfall being faced by the existing gas based urea units but also on account of conversion of Naphtha and FO/LSHS based units to NG/LNG, de-bottlenecking of existing urea units, setting up of new and expansion of existing

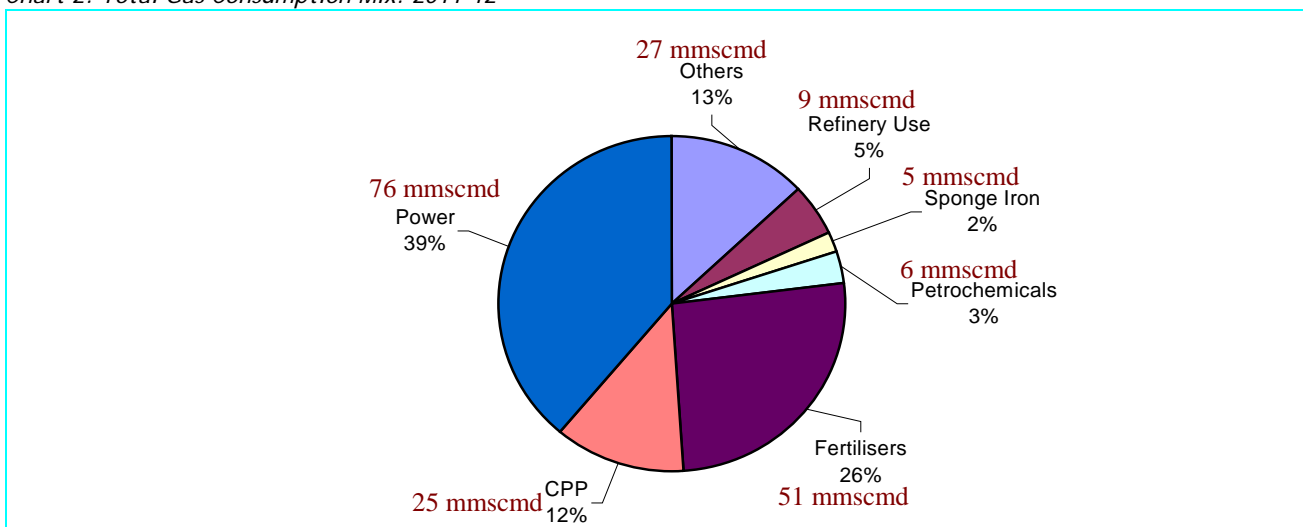
urea units and revival of closed urea units such as Hindustan Fertilizers Corporation Ltd (HFCL) and Fertilizer Corporation of India (FCI).

- ⌘ All non gas based urea units will be converted to gas within the next three years. Under the above scenario, the total requirement of gas for the fertilizer sector by the end of XI Plan period is expected to be 18736 mcm as against current requirement of 9469 mcm, projecting a CAGR of 12.05%.
- ⌘ The revival of fertilizer sector due to various sectoral reforms and majorly due to availability of natural gas as feedstock shall be positive for large fertilizer players in the country like RCF, GNFC as well as GSFC.

City Gas Distribution:

- ⌘ This is another sector which has a high growth potential. Globally city gas distribution has grown in tandem with the gas sector development in terms of supply infrastructure and transmission infrastructure. With the expected growth in the gas supply and the simultaneous creation of gas inter-state transmission infrastructure in India, this sector is bound to grow in the XI Plan period.
- ⌘ With the emphasis on clean environment, this sector would get the necessary thrust in the coming years. In line with this, various players, primarily led by GAIL, have drawn up ambitious plans to roll out city gas infrastructure across a number of cities in the country. From the existing coverage of 10 cities, the coverage is expected to grow to 40 cities in the next 5-7 years. This sector can be expected to grow at double digit rates in the later part of the XI Plan period.
- ⌘ With the Petroleum and Natural Gas Board becoming effective from 1st October 2007, it has laid out various Draft Regulations for authorizing development, determination of Network Tariff and exclusivity of City or Local Natural Gas Distribution Networks. With these regulatory reforms shaping up within the time frame of availability of domestic gas supplies, we believe this shall make the sector look more competitive for players in CGD and CNG business like Indraprastha Gas Ltd, Gujarat Gas Ltd as well as Gujarat State Petronet Ltd.

Chart 2: Total Gas Consumption Mix: 2011-12

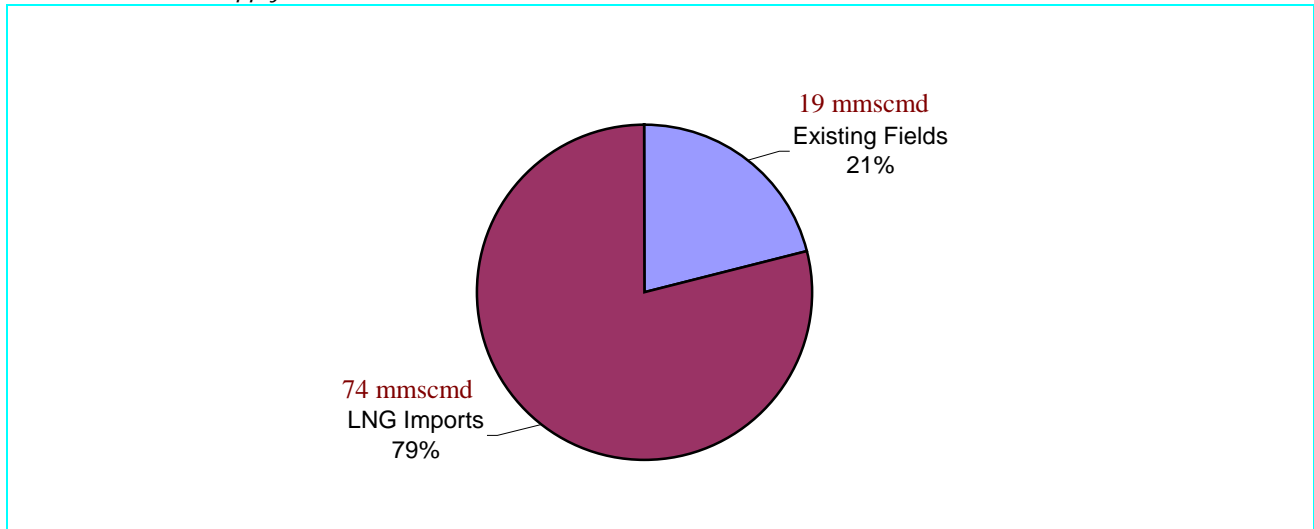


Source: CRISIL Research

SUPPLY SIDE

The supply scene is currently dominated by domestic supplies contributing almost 79% of current supplies, the balance being sourced as LNG imports. As the existing fields mature, there is likely to be a decline in their production. Usage of enhanced recovery methods by various players will help arrest the decline marginally. As new sources of supply of natural gas emerge, the supply side of the chain is likely to witness good shift from old to new fields.

Chart 3: Total Gas Supply Mix: 2005-06

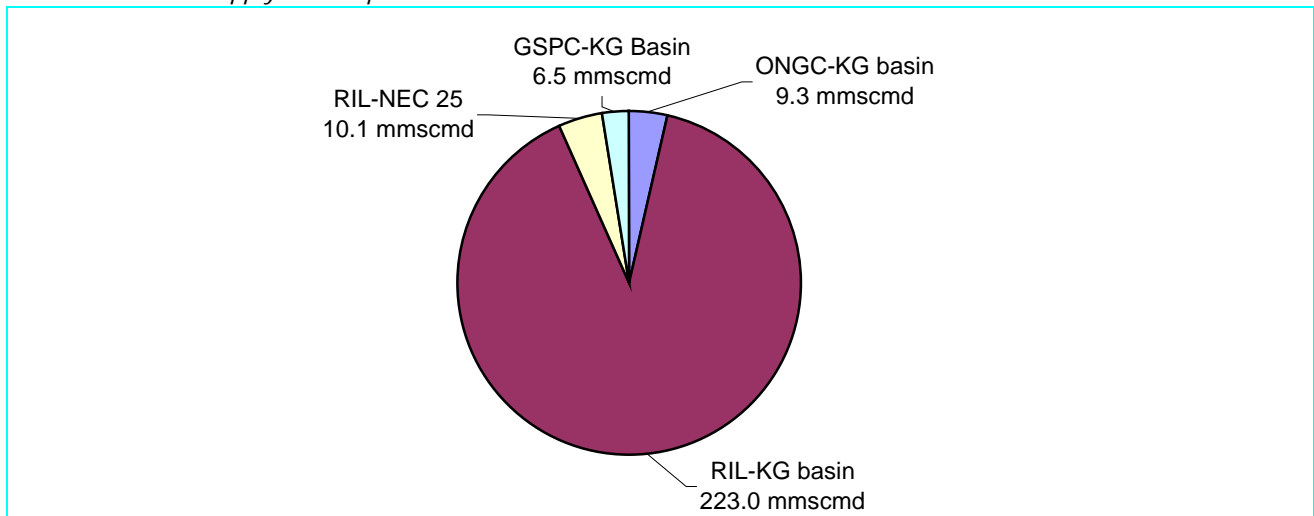


Source: CRISIL Research

Supply from new discoveries

- With the nation aiming at energy security soon, the government has taken aggressive steps in awarding blocks under NELP. It has already awarded 165 blocks till NELP VI and has identified 60 blocks to be awarded in NELP VII. With new gas fields being discovered, this will augment the gas supply scene favourably towards new finds.
- The KG basin, which has been one of the largest gas finds in the country, is scheduled to go onstream with production from late 2008. We believe many more gas finds happening during the period 2007-2011 by players like ONGC, RIL as well as GSPC shall augur well with the gas deficit situation of India currently.

Chart 4: Domestic supply break-up of new finds from 2008 - 2012



Source: CRISIL Research

Coal Bed Methane

- Government has actively pursued this source to reduce import bills as well as dependence on various imported energy resources. 23 CBM blocks have been awarded under 3 rounds of CBM licensing. Further initiatives are likely to be taken in the form of awarding many more CBM blocks. Going forward, we expect CBM to contribute ~2% of the total gas supply mix in 2011-12.

Liquefied Natural Gas

- Currently, LNG imports are resorted to meet the balance demand for natural gas in the country. There are 2 regasification terminals and storage facilities operational in India viz. Petronet LNG's Dahej Facility and Shell's Hazira facility.
- There have been good expansion plans charted out by Petronet LNG Ltd looking at the demand dynamics of the country. PLNG Ltd has planned to expand its Dahej facility from current capacity of 5MMTPA to 10 MMTPA scalable to 12.5 MMTPA by 2009. Further, it has also plans of setting up Greenfield LNG facility at Kochi with a capacity of 2.5MMTPA, which is expected to start by 2011-12.

	Current Capacity	Expanded/ New Capacities
Petronet LNG – Dahej	5 MMTPA	10 MMTPA
Petronet LNG - Kochi	--	2.5 MMTPA
Shell Hazira	2.5 MMTPA	2.5 MMTPA
Dabhol (RGPPL)	--	5 MMTPA
Total Capacity Available	7.5 MMTPA	20 MMTPA

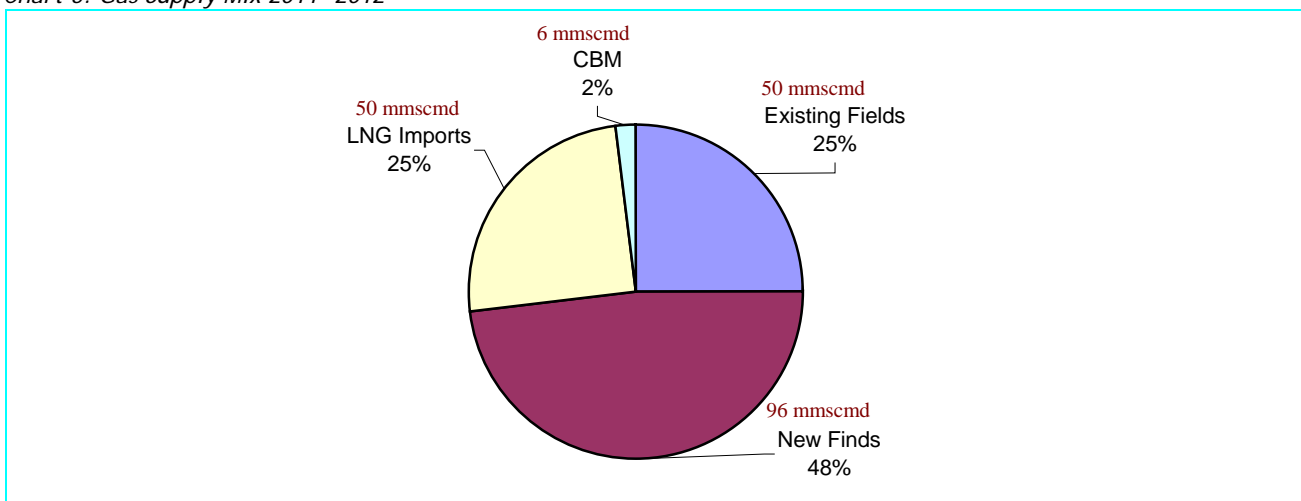
Source: Industry, LKP Research

- Many industries like ceramics, paper, chemicals and textiles use either naphtha or fuel oil for heating purposes, raw material or feedstock. These industries are likely to shift to usage of costlier imported LNG available at over \$7/ mmbtu, subject to its availability, as that is still cheaper compared to these fuels available at \$8-\$12/ mmbtu.
- However, LNG will not be price competitive vis- a- vis domestic gas for usage in power plants. We believe, LNG will be used only to satisfy the peaking demand of the power sector due to input related inflationary pressures.

Trans National Pipelines

- Looking at the geo-politics involved in setting up trans national pipelines, the laying up of infrastructure and actual transmissions to begin shall take some risk assessment as well as time by the players as well as respective governments involved. We believe that these pipelines, after being set up, can prove to be a good uninterrupted source of energy supply for the nation. However, we do not expect any gas flows to start from these projects during 2007-2011.

Chart 5: Gas Supply Mix 2011- 2012

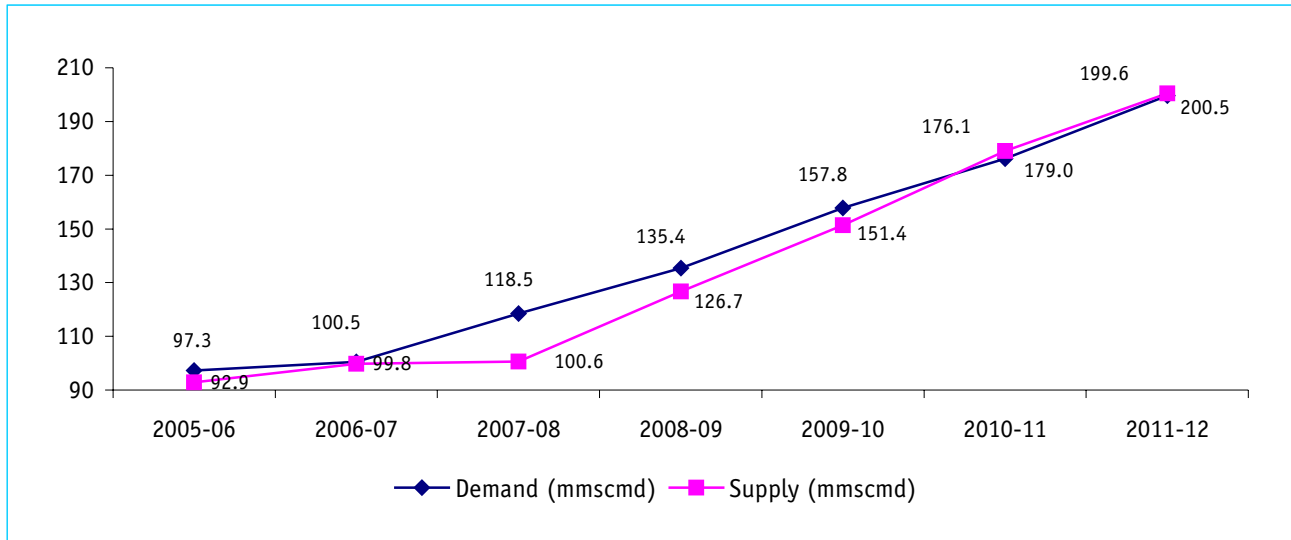


Source: CRISIL Research

DEMAND v/s. SUPPLY

Historically, India has been gas deficit due to demand growth outpacing supply growth. We believe, the robustness in demand from various sectors, primarily power and fertilizers to continue. Also, the supply scene is likely to be augmented with new finds flowing in the supply chain from late 2008. However, we still believe that the demand supply gap will be maintained with the tilt more in favour of demand and any balanced situation in demand supply gap will be a temporary phenomenon.

Chart 6: Demand v/s Supply

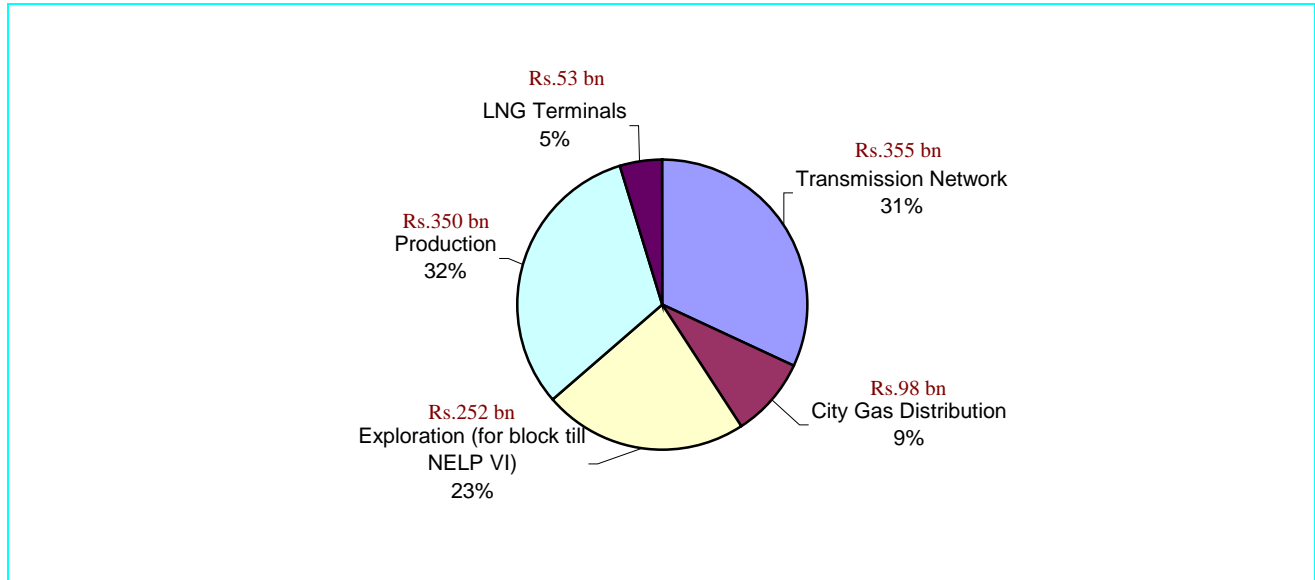


SOURCE: CRISIL RESEARCH, LKP RESEARCH

Infrastructure Investments

Natural gas sector in India is at an inflexion point with many regulatory reforms undertaken by government to make it more competitive. With these changes on the anvil, huge investments throughout the gas chain from upstream exploration and production to downstream activities have been lined up in the sector over a period of next 5 years.

Chart 7: Investment in Infrastructure in the Natural Gas Sector



Source: CRISIL Research

- ☞ With the distance spanning gas production sites and consumption sites widening, the pipeline infrastructure sector looks enticing. The KG basin finds located at the eastern coast are likely to feed the demands of the western coast of the country. Total investments to the tune of Rs. 453bn have been lined up for setting up new pipeline infrastructure as well as catering to the needs of city gas distribution needs. Other infrastructure investments envisaged are for setting up LNG Terminals, CGD networks as well as undertaking E&P activities.

With the new gas finds being reported by various players going on stream from late 2008, a supply starved India is likely to witness bouts of fresh supply to feed its economic growth. Also, the demand equation panning out well in favour of planned capacity additions in the power and fertilizer, the supply shall be more than absorbed. The city gas distribution and transmission networks are looking upbeat with the map of India being chequered by various pipelines being set up by existing as well as new players making it a more competitive market. Looking at the growth prospects of the sector, we remain positive for the upstream as well as downstream players in this sector like Petronet LNG Ltd, Indraprastha Gas Ltd, Gujarat Gas Ltd, Gujarat State Petronet Ltd as well as Cairn India Ltd.

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