

Chapter 3

Overview of Segments

October 2019

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Chapter 3

Overview of Segments

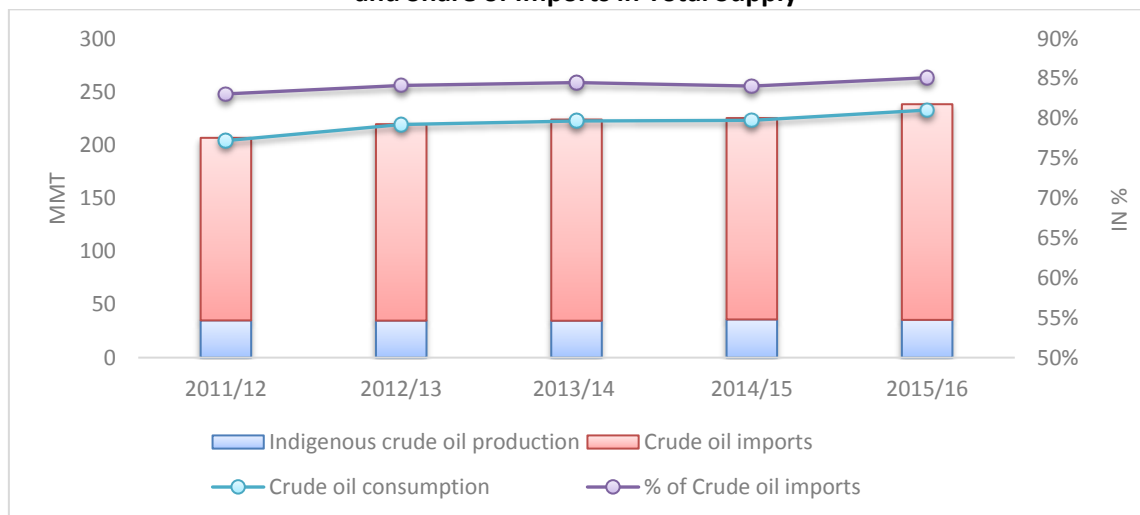
1.1. Crude Oil

India is the world's fourth-largest energy consumer with crude oil accounting 29% of the total primary energy consumption in 2015/16. The country has 0.5% of the oil and gas resources of the world and 15% of the world's population. The high economic growth in the past few years and the increasing industrialisation coupled with burgeoning population have created huge concerns in India's energy security scenario (India Chamber of Commerce, 2018).

Over the past 20 years, the domestic production of crude oil has not increased significantly (Figure 3.1) and remained at a plateau until 2015/16. On the other hand, the demand of crude oil grew at a compound annual growth rate (CAGR) of 5% between 2011/12 and 2015/16 (Figure 3.1). This makes the country more dependent on the import of crude oil, also evident from an increase in crude oil imports from 83% in 2011/12 to 85% in 2015/16.

Majority of inland crude oil transportation is through coastal shipping to the refineries located at the coastal areas and through dedicated pipelines, owned and operated either by the consumers (refiners/oil companies) or producers (ONGC/OIL). Railway wagons (Class 145) are also used to transport crude in very special situations where the freight charges were notified by the railways from time to time based on distance.

Figure 4.1. Trend in Indigenous Crude Oil Production, Imports, Consumption, and Share of Imports in Total Supply



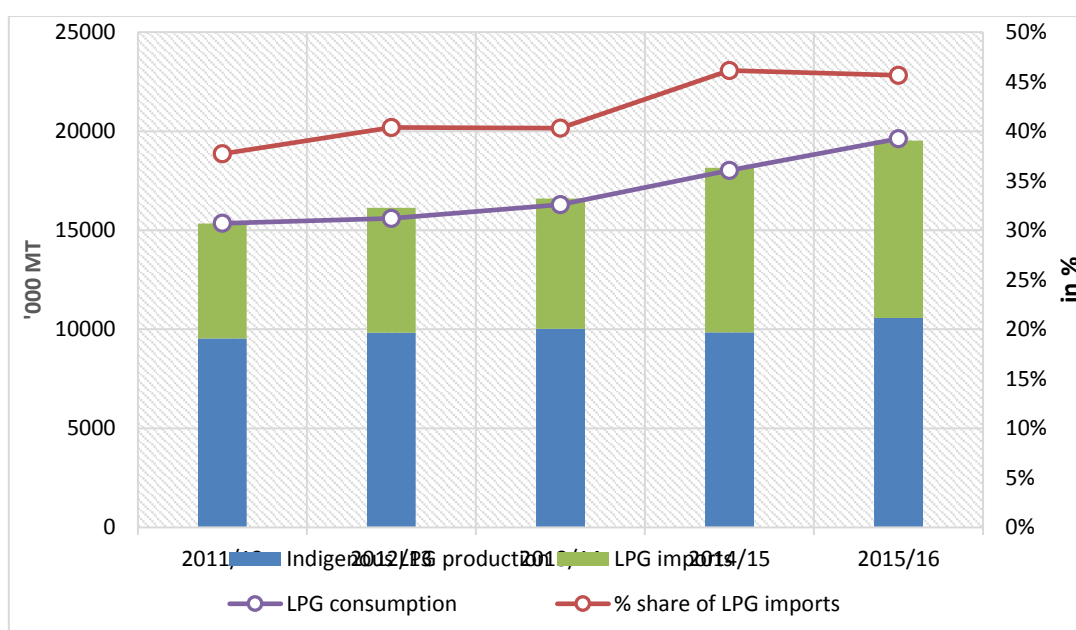
Source: MoPNG (2016a).

1.2. Liquefied Petroleum Gas (LPG)

LPG is a light distillate obtained from crude oil and from the processing of natural gas. The Indian LPG story has been an exemplary case of making clean cooking fuel available, accessible, and affordable to all classes of people, thereby preventing indoor air pollution, arresting deforestation, and mitigating greenhouse gas emissions.

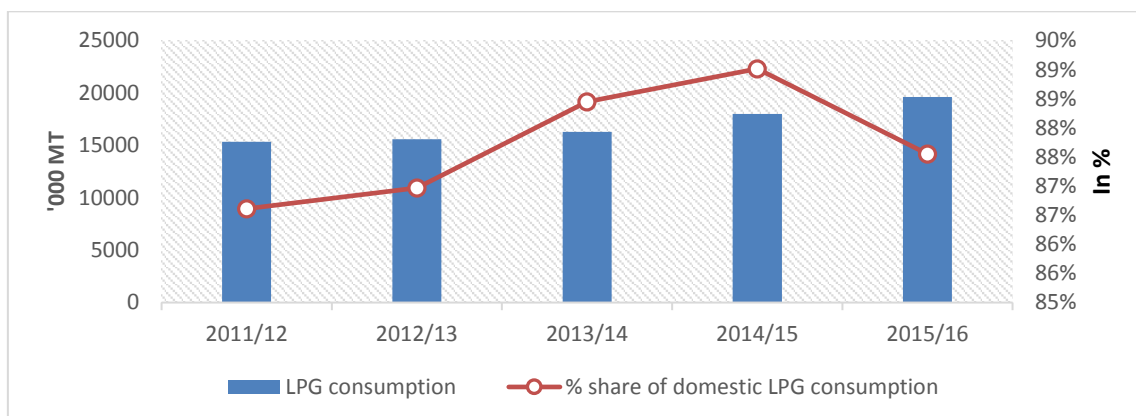
LPG consumption in India has more than doubled in the 2000s, especially for domestic purposes. Supported by a massive transformation in rural penetration of LPG, LPG recorded a CAGR of 4% between 2011/12 and 2015/16 (Figure 3.2). The stakeholder meetings revealed that, out of the total LPG consumption, domestic LPG accounted for 88%, that is, 17.2 MMT; within that, subsidised LPG accounted for about 88% in 2015/2016 (Figure 3.3). The sector-wise consumption of LPG is shown in Figure 3.4. On the other hand, the indigenous production of LPG remained at the same level during 2011/12 to 2015/16, leaving the rest of the LPG demand to be met through imports. During 2012/13 to 2015/16, the share of LPG imports grew by 8%.

Figure 3.2. Trend in LPG Marketing in India



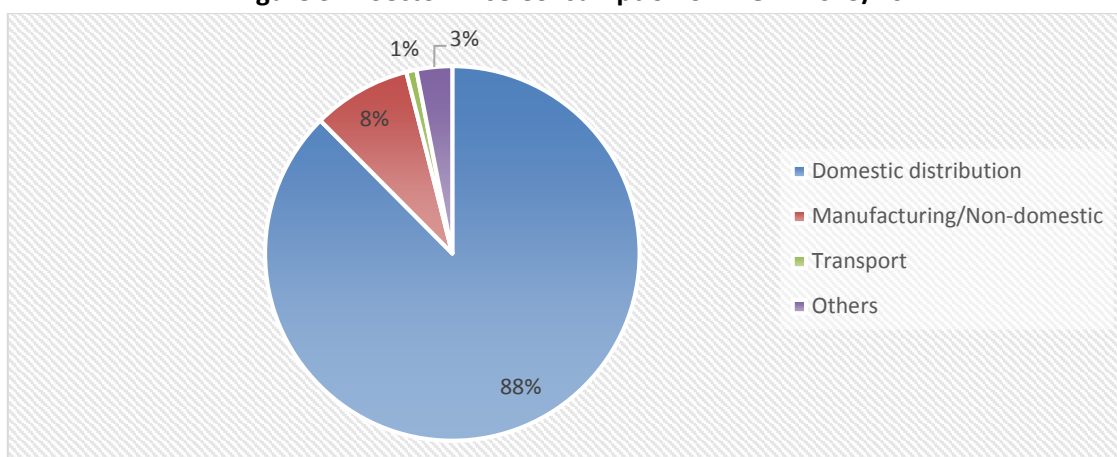
Source: MoPNG (2016a).

Figure 3.3. Trend in the Share of Domestic LPG in Total Consumption



Source: MoPNG (2016a).

Figure 3.4. Sector-wise Consumption of LPG in 2015/16



Source: MOSPI (2017).

In India, domestic LPG is primarily marketed by the three public sector OMCs: Indian Oil Corporation Ltd (IOCL), Bharat Petroleum Corporation Ltd, and Hindustan Petroleum Corporation Ltd. The private refineries are mandated to sell the LPG they produce to public sector OMCs according to their requirement before the LPG is exported. Domestic LPG is largely supplied in 14.2 kg cylinders and is sold both at subsidised and commercial rates. Direct purchase of LPG cylinders requires possession of a registered LPG connection at an LPG distributorship, which is run by the OMCs. LPG distributors are weighted more towards urban areas with OMCs reporting urban enrolment accounts' share of more than 50% out of the total connections in 2015/16. Further, there have been efforts to increase the LPG coverage throughout the rural population to improve access to clean energy.

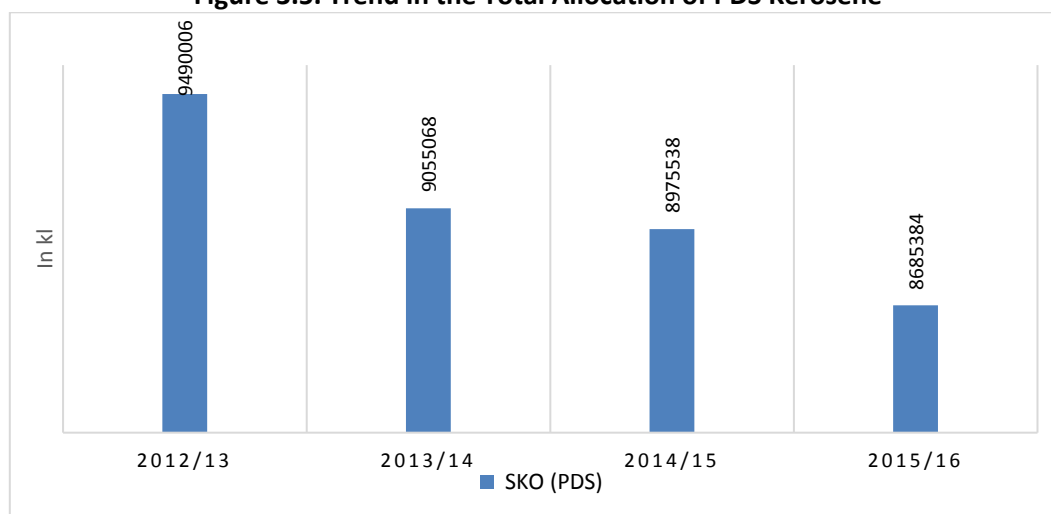
1.3. Kerosene

Kerosene or 'superior kerosene oil' (SKO) is primarily used by households for lighting and cooking, with additional uses for industrial purposes and as fuel for generators, pump sets, freight and passenger vehicles, and agricultural machinery. Over the last 60 years, the

kerosene sold through the public distribution system is used mostly for household purposes and continued as a subsidised commodity (IISD, 2016).

In India, kerosene is a dying fuel as the government is promoting the use of cleaner fuels, such as LPG for cooking and solar lamps and electricity for lighting purposes. Over the past 3 years, the average rate of reduction in the total annual kerosene allocation has increased significantly, with allocations falling by 4.5%, 1.1%, and 3.7% in 2013/14, 2014/15, 2015/16, respectively. In 2015/16, the total allocation of PDS kerosene recorded a decline of 8.5% over the last 3 years, only 8,685,384 KL which was 9,490,006 KL in 2012/13 (Figure 3.5). The sector-wise consumption of kerosene during the period 2015/16 is shown in Figure 3.6.

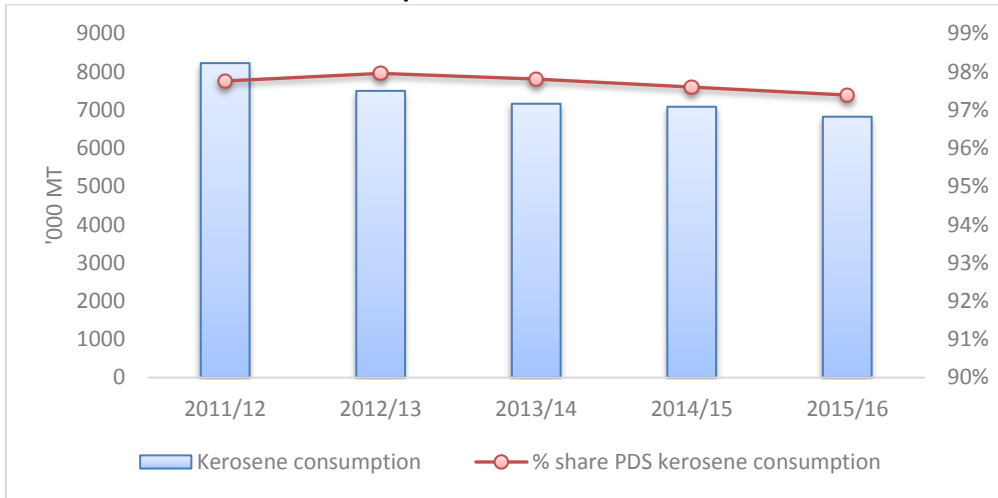
Figure 3.5. Trend in the Total Allocation of PDS Kerosene



PDS = public distribution system, SKO = superior kerosene oil.
Source: MoPNG (2016a).

Subsidised kerosene (domestic purpose), which constitutes the majority of the consumption (Figures 3.6 and 3.7), is provided through the PDS, a nationwide system of predominantly third party-run fair price shops (administered at the state level) through which the central and state governments distribute subsidised food, kerosene, and other commodities based on household ration card allocations. Unlike the other designated 'sensitive' petroleum products subject to price regulation (LPG and previously diesel and petrol), the central government predetermines and allocates a volume of PDS kerosene for consumption for each state. The states' allocation of PDS kerosene is calculated by the MoPNG and released quarterly for delivery. The delivery is in coordination with the Department of Food and Civil Supplies within each state and union territory which is responsible for uplifting the allotted quota and distribution to retailers. The concerned state governments/union territories allocate the quantity of kerosene to individuals through a ration card system.

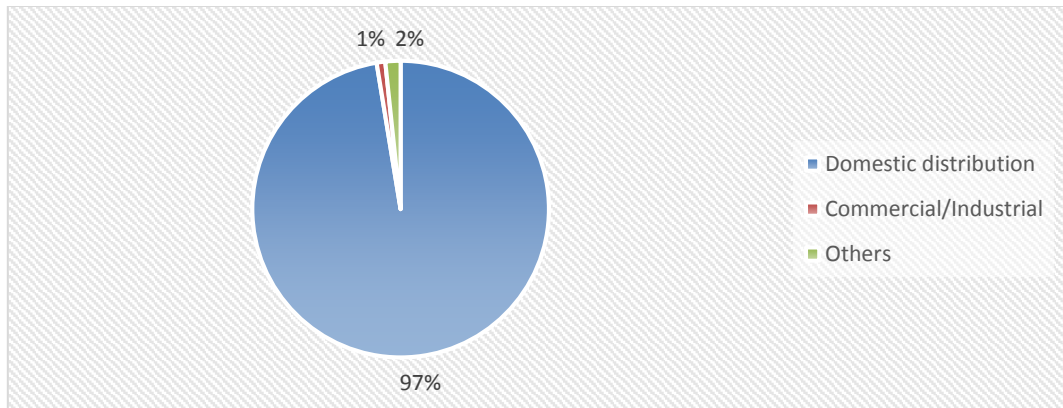
Figure 3.6. Trend in Kerosene Consumption and Share of PDS Kerosene in Total Consumption



Source: MoPNG (2016a).

Also, there is an increased effort by the government to phase out subsidy on kerosene. In line with this, the government also announced the monthly increase in the price of PDS kerosene and to provide financial benefits to states that surrender or reduce their off-take of allocated kerosene. To reduce the leakage and to target the subsidy to the beneficiaries, the government also announced the implementation of the direct benefit transfer for kerosene across India.

Figure 3.7. Sector-wise Consumption of Kerosene (SKO) in 2015/16



SKO = superior kerosene oil.

Source: MOSPI (2017a).

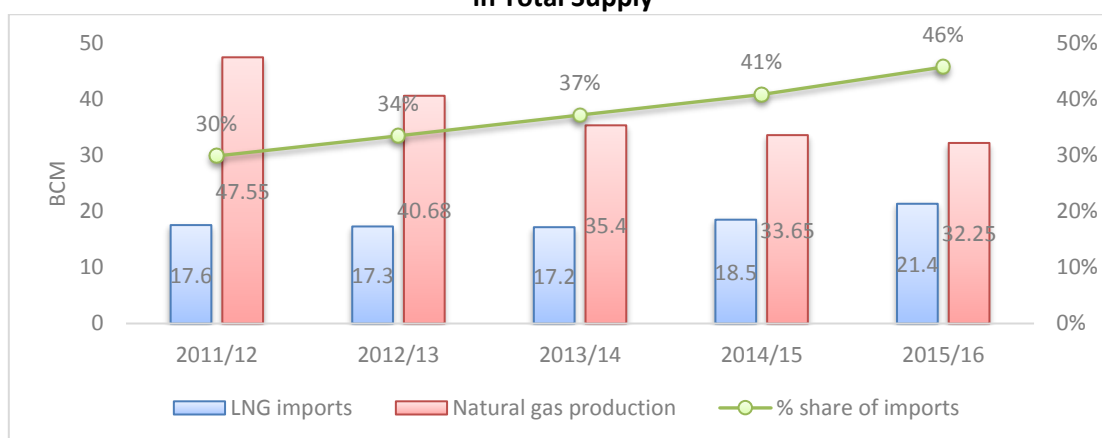
1.4. Natural Gas

In India, natural gas contributed only 6.7% of the total primary energy requirements as of 2015/16 and declined from 11% in 2011/12. The downward trend is mainly due to the reduced production from the existing fields (KG-D6 basin) and lack of new developments. After 2010/11, when the production of natural gas peaked (52.21 BCM), it started declining at a CAGR of 9.2% between 2010/11 and 2014/15, and further dropped to 32.25 BCM in 2015/16 (Figure 3.8). This gradually increased import dependency; now, the shares of domestic natural gas and imports account for nearly equal the total natural gas supply. Out of the domestic gas

production share, production from the offshore region accounts almost 72%. The government has put lots of efforts to enhance production and consumption through the introduction of new policies and implementation of necessary regulatory changes. The power, industry (including refinery), and city gas distribution sectors together contribute around 83% out of the gas consumption for energy. Of the total gas consumption in the country, fertilisers (mainly urea based) and power together accounted for about 60% of the total natural gas supply during 2015/16 (Figure 3.9).

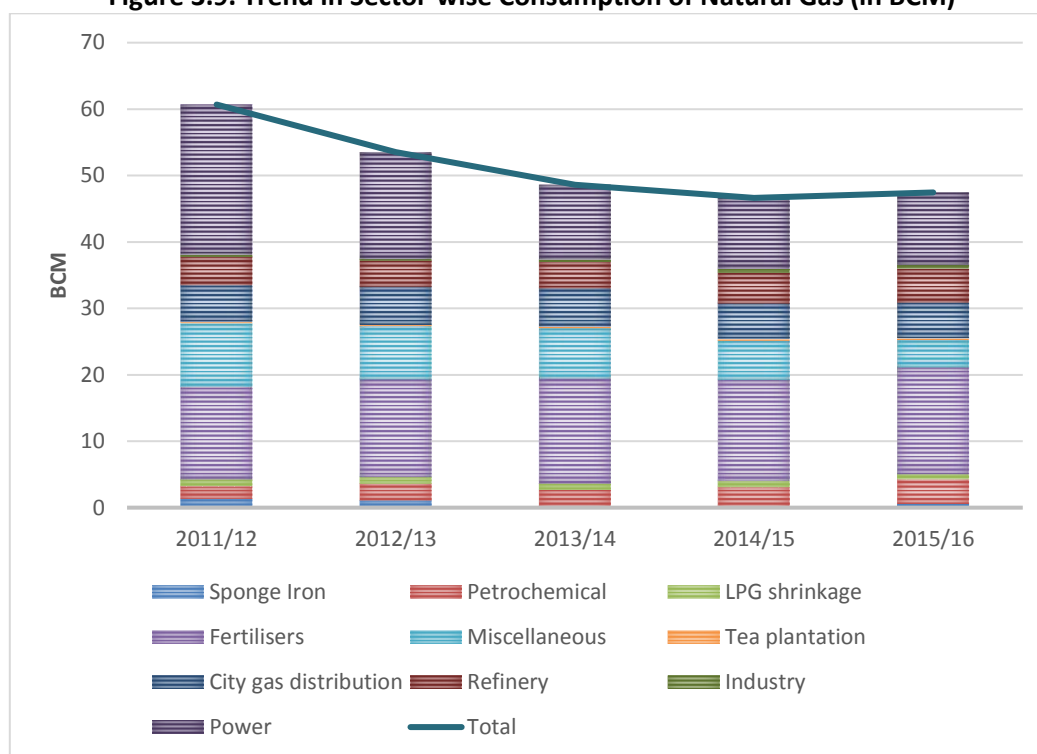
The domestic gas produced from the nominated fields is sold through an agreement between buyers and sellers called ‘Gas Sales and Transmission Agreement’. The transmission of natural gas is mainly through the pipelines and the tariff has been set on a zonal basis, which increases according to the distance. GAIL India Ltd, the largest entity in the country, owns and operates about 70% of the pipeline capacity and acts as marketer and transporter of gas to the consumers along with other entities, such as the Gujarat State Petroleum Corporation and Reliance Gas Transportation and Infrastructure Ltd. In the midstream part of gas infrastructure are four regasification terminals located at the west coast of India with an aggregate capacity of 26.5 MMT per year as of 31 March 2016.

Figure 3.8. Trend in Domestic Production of Natural Gas, Imports, and Share of Imports in Total Supply



Source: MoPNG (2016a).

Figure 3.9. Trend in Sector-wise Consumption of Natural Gas (in BCM)



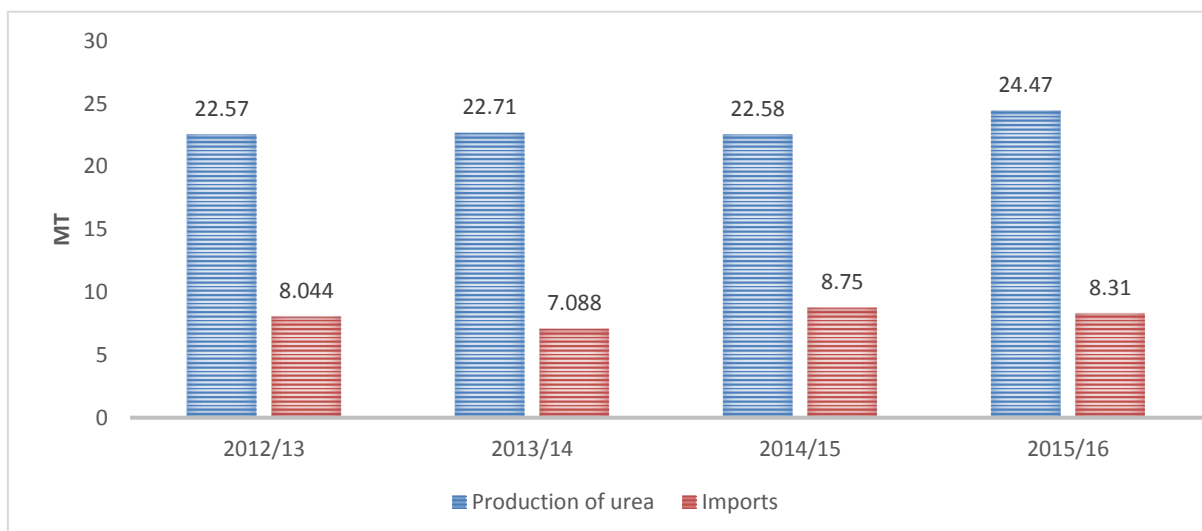
Source: MOSPI (2017).

Fertiliser sector

The fertiliser industry is an allied activity of the agriculture sector. The farming and the ancillary activities contribute to about one-sixth of India's gross domestic product (GDP). Since the agriculture sector is an important sector of the Indian economy, the government has ensured the availability of adequate quantity and quality of fertilisers to farmers. Out of the total fertiliser production in the country, urea dominates with about 60% during 2015/16. India is the world's second-largest consumer of urea, and the government is working towards increasing the domestic production of urea to reduce the imports and attain self-sufficiency by 2022. In 2015/16, urea production in the country was approximately 24.5 MMT (Figure 3.10), leaving a gap of 8.5 MMT with respect to the consumption; the same was met through imports from China, Iran, and Oman.

Due to the support offered by the government towards the growth of the fertiliser industry, there had been a rapid build-up of manufacturing units of urea. As of 31 March 2016, there were 30 large-scale urea-manufacturing plants, 27 of which are gas based and the remaining ones are naphtha based. Natural gas is the preferred feedstock for the fertiliser sector and access to reasonably priced-natural gas is a key concern, given the conversion of the country's urea-manufacturing plants from naphtha to natural gas. Urea is the only 'controlled fertiliser', whose price the government controls. Since 2002, the urea farm gate price is capped at Rs5,360/MT (excluding excise duty for domestic production, countervailing duty for imports (1% during 2015/16), and the sales tax/VAT which differs from state to state). Any variation in the cost of production is absorbed by the government through subsidy.

Figure 3.10. Sector-wise Consumption of Raw Coal in India in 2015/16

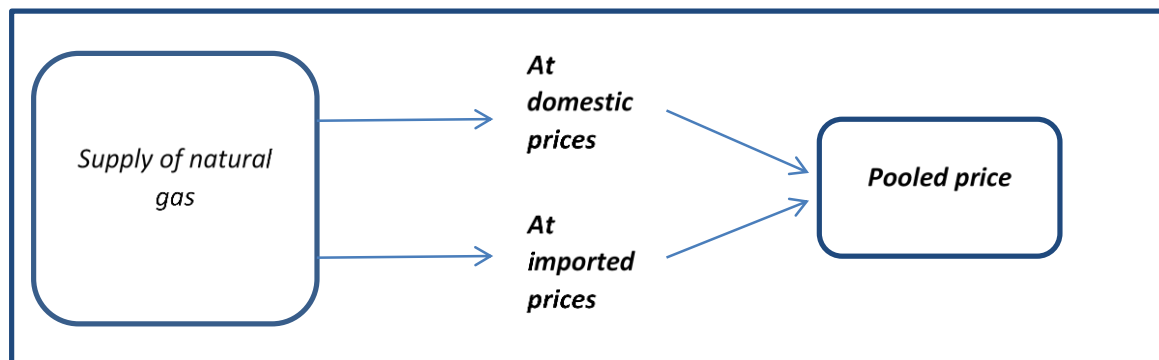


Source: Department of Fertilizers (2016).

After 1 July 2014, with the introduction of the gas pooling policy for urea-based fertilisers, the prices of natural gas required by urea-manufacturing plants became uniform. The fall in natural gas prices during 2014/15 and the introduction of the natural gas pooling policy boosted production of fertilisers and reduced subsidy allocation. In 2015/16, the pooled price of gas for fertiliser companies was assessed as US\$8–US\$9.

Box 2: Natural Gas Pooling in the Fertiliser Sector

The Cabinet Committee of Economic Affairs approved the pooling of natural gas for the fertiliser sector (urea) effective 1 July 2015 (Cabinet Committee on Economic Affairs, 2015). Under this policy, domestic gas is pooled with regasified LNG (RLNG) to provide natural gas at a uniform delivered price for grid-connected fertiliser plants for the manufacturing of urea (MoPNG, 2015). The pooling, carried out in two phases, is monitored by the Empowered Pool Management Committee (EPMC) comprising senior officers from the Ministry of Petroleum and Natural Gas, Department of Fertilizers, Department of Expenditure, Petroleum Planning and Analysis Cell, Fertiliser Industry Coordination Committee (FICC), and GAIL. GAIL has been designated as the pool operator. The EPMC is responsible for approving plant-wise gas supplies made under the pool mechanism and LNG purchase agreements for medium-term/spot LNG; monitoring optimum utilisation of domestic gas for the pool, as well as monitoring the operator's activities to ensure transparency; and deciding 'the rate of interest FICC shall charge on the amount paid by FICC to Pool Fund Account (PFA) on behalf of a fertiliser plant in case it fails to deposit full/part amount to PFA against debit note within due date'. The operator (GAIL) is responsible for collecting data on anticipated gas supplies to fertiliser units as per the existing contract on a quarterly basis; determining the additional quantity of RLNG required to meet the demand; determine plant-wise and uniform weighted average delivered cost of gas based on the anticipated supply, the additional quantity of RLNG decided by the EPMC, and the information submitted by the FICC; and procure LNG in a transparent manner. The gas price pooling mechanism is shown in the diagram.



Source: Authors' compilation.

Constraints in supply of domestic natural gas to the fertiliser sector

During 2015/16, the total demand of natural gas as feedstock for the urea manufacturing units was placed at 46.5 million metric standard cubic metre per day (MMSCMD), and 31.5 MMSCMD of domestic natural gas was allocated to these plants under the gas allocation policy. Out of the 31.5 MMSCMD allocated, only 26 MMSCMD was supplied because of the decline in production of domestic gas from the KG D6 of Reliance and Panna–Mukta and Tapti, which was a joint venture of British Gas, Reliance, and the ONGC. The major impact was the decline in output of the KG D6 basin, where production dropped from 60 MMSCMD in 2011/12

to 10 MMSCMD in 2015/16. This also impacted other sectors such as power, steel, and petrochemicals Department of Fertilizers (2016).

Gas-based power generation

As of 31 March 2016, India had 24.5 GW of natural gas-based installed power generation capacity of which almost 44% was in the western region. However, the plants were operating at very low plant load factor (PLF) of 0%–40% due to a reduced supply of domestic natural gas. The gas-based power plants were consuming for energy purposes almost 55% of the total natural gas in 2011/12; consumption dropped to 42% in 2015/16. With suboptimal capacity utilisation and supply-side bottlenecks, the present sunk investment in the gas-based power plants of over Rs64,000 crore is endangered of becoming non-performing assets. To revive and improve the utilisation of stressed and stranded power generation capacity, the government introduced a reverse e-bid scheme in 2015/16 along with subsidies (see table).

Box 3. Scheme for the Utilisation of Gas-based Generation Capacity

To revive the gas-based power-generating stations, the government formed an Empowered Pool Management Committee (EPMC). This EPMC scheme envisages supply of imported spot LNG (e-bid LNG) to the stranded gas-based power plants as well as the plants receiving domestic gas up to a target plant load factor (PLF) selected through reverse e-bidding process with the support of the Power System Development Fund (PSDF). The outlay of the support from the PSDF was fixed at Rs3,500 crore for fiscal year (FY) 2015–2016, where Rs500 crore would be kept aside for the plants receiving domestic gas and Rs3,000 crore for the stranded plants to revive up to the targeted PLF of 35%. The eligible gas-based power plants under this scheme were the stranded plants and the plants receiving the domestic gas whose actual average PLF achieved in April–Jan 2014/15 was below the target PLF (which was specified as 25% for the first 5 months of FY2015/16 and 30% for the remaining months of 2015/16 and the complete 2016/17). To achieve the target price of power (i.e. the net purchase price for the distribution companies which is set at Rs5.5/kWh for the stranded gas-based power plants and Rs4.19/kWh for the plants receiving domestic gas for the incremental generation up to the target PLF), the following interventions/sacrifices (see table 5.1) have been approved to be made by the central, state governments, power developers, and gas transporters collectively.

Table: Subsidy by Various Stakeholders under the Gas-based Capacity Revival Scheme

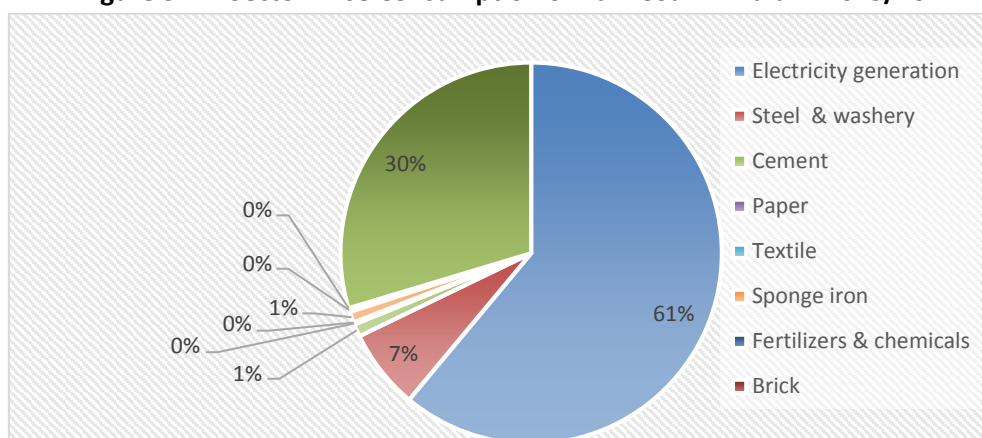
Subsidy	Description
Waiver of customs duty	The Government of India already exempted customs duty on imported LNG used for power generation.
Waiver of value added tax (VAT) on the e-bid RLNG	The concerned state governments are required to waive VAT on the e-bid RLNG consumed in power generation, based on the invoice.
Waiver of central sales tax (CST), octroi, entry tax on the e-bid RLNG	CST, octroi, and entry tax shall be exempted by the concerned states on the e-bid RLNG. Further, in case of the CST on the sale of RLNG, the entry tax being levied by states shall be exempted by the respective states on the e-bid RLNG.
Waiver on service tax on regasification and transportation of the e-bid RLNG	The service tax on regasification and on transportation of e-bid RLNG was waived off, for which the Department of Revenue, Ministry of Finance shall issue appropriate notification.
Reduction in regasification charges by regasification agencies on the e-bid RLNG	The regasification agencies shall reduce the regasification charges by 50% on the e-bid RLNG.
Reduction in pipeline tariff charges by GAIL/transporters on the e-bid RLNG	GAIL/other transporters such as RGTIL and GSPCL shall reduce the pipeline tariff by 50% on e-bid RLNG.
Reduction in marketing margin by GAIL/GSPCL on the e-bid RLNG	The GAIL/GSPCL shall reduce marketing margin by 75% on the sale of e-bid RLNG.

GAIL = Gas Authority of India Ltd, currently GAIL India Ltd; GSPCL = Gujarat State Petroleum Corporation Ltd ; RGTIL = Reliance Gas Transportation and Infrastructure Ltd; RLNG = regasified liquefied natural gas. Source: MoP (2015).

1.5. Coal

The coal mining and coal-fired thermal power generation sectors are two of the core industries that together contribute approximately 10% to India’s Index of Industrial Production, affirming their importance to the economy (CIL, 2018). The coal reserves are concentrated in a few small regions (mainly in the east) while consumers are spread across the country. The major coal fields are in the states, such as Odisha, Jharkhand, Chhattisgarh, West Bengal, and Madhya Pradesh. The power sector remains the key consumer segment contributing almost 60% of the coal demand during 2015/16 (Figure 3.11). The demand for coal has increased one third between 2012 and 2016 (Figure 3.12).

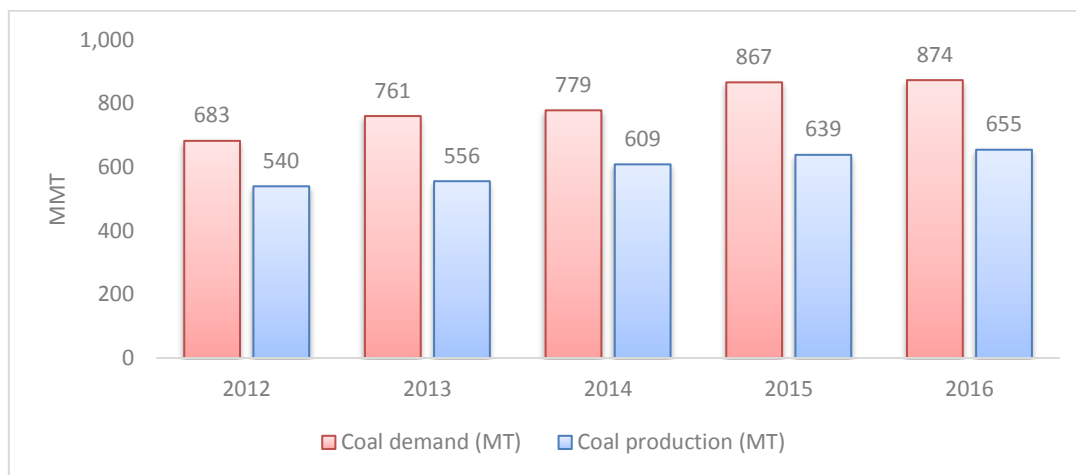
Figure 3.11. Sector-wise Consumption of Raw Coal in India in 2015/16



Source: MOSPI (2017).

Domestic coal production also significantly increased in the same period. CIL remains the largest coal producer in the country followed by the SCCL.

Figure 3.12. Trend in Coal Demand vs Domestic Coal Production



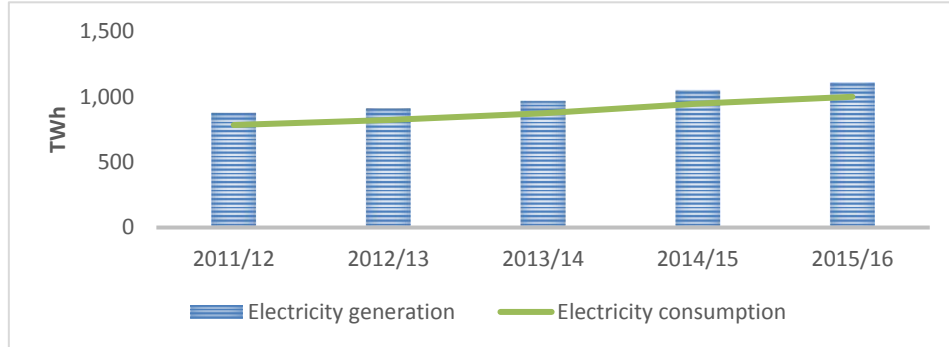
Source: CIL (2018).

One key aspect of coal supply in India is abundance of relatively lower grades of coal. In the case of thermal coal, coal pertaining to the GCV range of 3,400–4,600 kcal/kg (G10–G13) forms about 69% of the overall supply. In India, the cost of coal production is favourable as the estimated average cost of coal production (run of mine coal, excluding crushing, sizing, transportation charges, and all levies, duties, cess) is Rs,1,000 per ton. On the distribution side, coal evacuation is mainly conducted via railways, roadways, merry-go-round and belts, and conveyors and ropeways. The bulk of the coal transport from the pitheads is conducted by the Indian Railways. This study is limited to identifying the taxation of domestic non-coking coal and the imported coal consumed by the power sector, the largest consumer sector, as well as the subsidy incurred in the segment.

Coal-based power generation

Coal is the main and primary fuel source to produce electricity in India. In 2015/16, out of the total installed power generation capacity of about 305 GW, the share of coal-based power generation capacity was 61% (185 GW) (Figure 3.14). Electricity consumption in India grew at a CAGR of 4% between 2011/12 and 2015/16 and was expected to grow at a faster rate considering the efforts of the government to provide universal access to electricity to all households in the country 24/7 (Figure 3.13). This strengthens future growth in demand of non-coking coal in the power sector despite the growth of renewable energy.

Figure 3.13. Trend in Electricity Generation and Electricity Consumption (TWh)



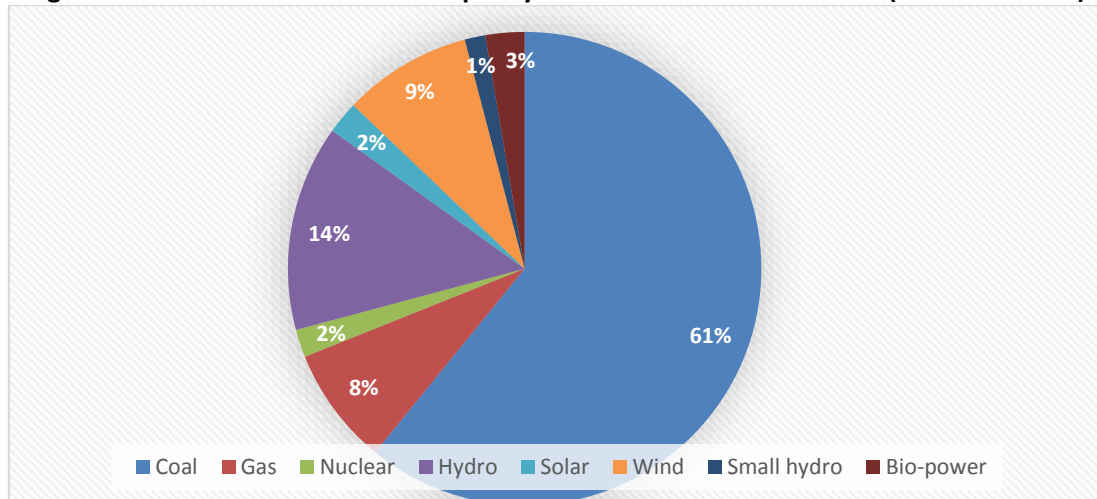
TWh = terawatt-hour.

Source: MoP (2017).

The power sector is extremely cost sensitive as consumers must bear the increase in fuel cost which is passed through the distribution companies that have to recover the same from their retail consumers. The retail tariff in agriculture and domestic categories is cross subsidised by industrial and commercial categories. Thus, the increase in the price at which coal is sold to the power sector has significant implications on the performance of distribution companies as well as in subsidising the consumer categories.

Thus, the GoI is keeping the domestic price of non-coking coal in the regulated sectors substantially below the market prices. The price of non-coking coal (Grades G6 and above) for the power sector has been kept low to convey a subsidy to the electricity consumer.

Figure 3.14. Installed Generation Capacity of the Power Sector in India (31 March 2016)



Source: CEA (2016a).