

Natural Gas Business and Market in India

Subrat Sahu and Varun Singh

Abstract—Due to recent change in policy and establishment of regulatory board along with advancement in technology and emergence of innovative practice has paved the way for standardization in Natural Gas business. The potential has been recognized by many companies for developing their business and market particularly in India. Attempts have been made to discuss the business and market implications of technology, innovative practices and development which result in outcome of shaping of natural gas business in India.

Index Terms—CNG market, domestic applications, industrial & commercial applications, PNG market.

I. INTRODUCTION

India's gas consumption increased from 78.23 MMSCMD in 2003-04 to 161.51 MMSCMD in 2011-12 and recorded a CAGR of 8.39%. Power sector has been the largest consumer of natural gas accounting for 33% consumption followed by fertilizer sector accounting for 28% [1]. Table-1 below shows the growth rate in Natural gas consumption in India in last decade.

TABLE I: NATURAL GAS CONSUMPTION IN INDIA

Supply Year	Indigenous supply		LNG Imports		Total Consumption		Growth rate
	BCM	MMSCMD	Trillion btu	MMSCMD	MMSCMD		
2003-04	26.71	77.20	12.68	1.04	78.23		
2004-05	26.51	76.60	128.35	10.50	87.10		11.34%
2005-06	26.86	77.62	256.62	20.99	98.61		13.22%
2006-07	26.77	77.37	352.35	28.82	106.19		7.69%
2007-08	26.97	77.96	425.10	34.77	112.73		6.16%
2008-09	27.06	78.22	410.28	33.56	111.77		-0.85%
2009-10	40.83	118.01	459.95	37.62	155.63		39.24%
2010-11	46.04	133.07	454.07	37.14	170.21		9.37%
2011-12	41.03	118.57	524.95	42.94	161.51		-5.11%

(Source: Petroleum Planning & Analysis Cell 2011)

II. PNG AND CNG MARKET

The availability of piped natural gas to many households leads to several value added applications. It also started catering to multiple industries. Use of PNG is now not limited for cooking application but widen the area of applications. New applications of PNG, a one stop solution for entire domestic need with a concept of 'One Switch Solution' may be adopted in the household in near future in India.

Manuscript received January 11, 2013; revised February 28, 2013.

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A. Domestic Applications

1) Cooking

Use of Natural Gas has not only given comfort to housewives, hotels, hospitals, and restaurants etc. but also contributes to a greater extent saving the environment, these appliances are available for single stove to commercial size cooking ranges[2].

2) Space heating/ gas heat pump (GHP)

The small size gas driven Gas Heat pump (GHP) are gaining ground and becoming more efficient around the world, as they offer significant amount of energy efficiency and carry additional environmental benefits. The Natural Gas is burned in special burners which heat the coils. The blower from behind throws the air in these coils. This, in turn, provides hot air for the house, office or other buildings. Depending on the size of the space to be warmed, the size of the space heater can be selected. The gas fired space heater are also suitable for outdoor insulation like clubs, banquets lawn etc. [3].

3) Geyser/ hot water supply

As in normal electric geysers, here the water is stored in the insulated vessel. The burner at the bottom space lit as soon as the water starts circulating in the geyser. That is, the ignition starts automatically when water tap to/from geyser is open. The water storage and the heating system are contained in two different annulus. The inner one contains the burner system and the outer one the water storage. Tankless gas heaters can produce 6 liters of hot water every minute. Unlike storage water heaters, these heaters heat running water flowing through a thin duct wrapped around a combustion chamber which is fuelled by natural gas.

The instant type water heaters are also available based on gas firing. The geysers are mounted on wall similar to electric geyser. There is no requirement of electricity since the ignition is through battery.

4) CNG dispensing at residence

CNG Dispensing at home is another area which provides hassle free refueling of cars or other transport vehicles of an individual. The extension of PNG is connected to a machine called fuel maker which has a compressor capable of compressing small volumes from milli bars pressure to 230 bar. The vehicle is connected through a mass flow meter. The fuel maker can fill a car over night. A safety connector is also provided between the vehicle and fuel maker. In the event the vehicle is tried to be driven off without disconnecting the fuel maker from the vehicle re-filling point, the connection will get disconnected with small pull from the vehicle.

The feature of fuel maker is similar to CNG dispenser except that it also houses a compressor; its size is similar to commercially available select branded washing machine [4].

5) Power generation using micro turbine

A small gas turbine can be used by a house owner to make himself sufficient for his/her electric requirements. In fact, there could be complete solution for all energy requirements of the house whether cooking, space heating, geyser, fuelling, air conditioning etc.[4].

B. Industrial & Commercial Applications

1) Yarn heat setting

The Yarn Setting process is the process in textile industry that take place between yarn twisting & cloth weaving. The polyester yarn (POY) purchased from bulk producers like Reliance, JCT etc. needs to be twisted before the cloth is weaved. This requires controlled and uniform heating application. Natural gas gives them good quality [5].

2) Prime mover

Compressed air is regarded as utility in plant. At present, the compressed air is produced by using conventional air compressor system driven by electric motors. However, gas engine driven air compressor is more economical and effective. The function is similar to electric motor of providing shaft work for process applications. Shaft work includes turning a shaft to operate a compressor.

3) COGEN

Combined Heat and Power (CHP) or Cogeneration is the simultaneous generation of usable heat and electricity in a single process. It uses exhaust heat from conventional power generation to produce thermal energy. This heat energy with help of equipment can be converted into more usable forms such as steam, chilled water or hot water that can be utilized in the process requirement by industrial facilities, commercial establishment etc. The gas based CHP technology is robust and the Gensets are designed to operate continuously for a minimum of 8000 to 8300 hours per annum [6].

4) Gas fired genset

Unlike Generator sets which use Diesel for electricity generation. Gas Gensets use Natural Gas for power generation. Recent developments in retrofitter technology has now made it possible to run diesel engines on Bi fuel setup where a mix of Diesel and Natural Gas is injected into engines for running them. Ranges availability in market are from 2.5 to 15 KVA for domestic and commercial use.

5) Genset for weaving

The State of Gujarat in India has a long tradition of textiles and account for almost 35% of woven fabrics. In order to provide economical and reliable power solutions to weaving industry, Gujarat Gas has taken initiative to develop gas based generator sets in the range of 40 KVA to 125 KVA.

6) Gases fired air conditioner/ vapor adsorption mechanism (VAM)/vapour adsorption chillers (VAC)/ vapour adsorption refrigerant (VAR)

The gas based Air Conditioner works on the principle of vapour absorption refrigeration (VAR). It works by vaporizing refrigerant (normally Ammonia) at very low pressures by the heat provided by burning of gas. These vapours are then expended which in turn provides the cooling effect. The vapours are then getting absorbed in a solution. The circle gets completed when the refrigerant in liquid form is received. This system of refrigerant is very cost effective

(almost 25% of the alternative compression refrigerant system). The most economical is 35 ton and above. The range from 7.5 to 35 ton is also commercially economical and payback period is higher than that of above 35 ton [7].

C. CNG Applications

The CNG Infrastructure Development is a slow process, where co-ordination takes considerable time and efforts. The development of the infrastructure takes precedence over the CNG vehicle conversion once certain amount of infrastructure is developed. A few recent developments in CNG markets as evidences are highlighted below:

1) CNG application in transportation

Auto, Buses and Cars have already started converting to CNG in spite of switching cost. There has been significant development of CNG markets in many cities such as Mumbai, Surat, Ahmadabad and Delhi in India [8].

2) CNG application in Indian railways

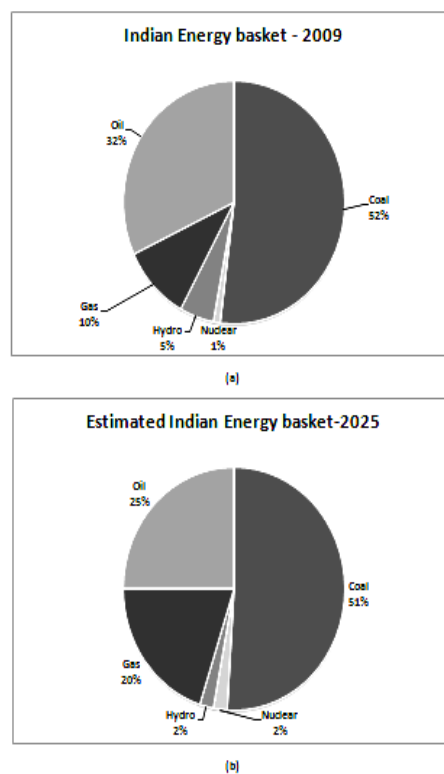
Indian Railway requires cleaner and cheaper solution to adapt developing surroundings. Railway is conducting few pilot projects on CNG applications in India.

3) CNG in marine applications

Commercial cargo vessel handling was conventionally handled by diesel driven engine. Gas as a best suitable replacement in the form of CNG may soon commercially be available for this market.

III. CONCLUSION

A paradigm shift is being observed in Natural Gas market replacing around 10% in next 15 years. The emerging applications of Natural Gas are the evidences for the acceptance of this fuel in Indian market [9]. Fig. 1. represents the same.



(Source: Indian Energy Book, 2012; Indian Natural Gas Sector)

Fig. 1. Shift expected in natural gas sector

Technology, Innovative Practices and Development are responsible for such improvement in demand in the Natural Gas business and market.

IV. FUTURE OUTLOOK

Natural gas demand is expected to grow at 8.8% CAGR from 189 MMSCMD in 2010-11 to 311.6 MMSCMD in 2014-15 and 473 MMSCMD in 2016-17[10]. Demand is likely to increase due to the expected commissioning of certain power projects, re-opening of some closed fertilizer units and continued investments in CGD. However, despite the significantly high potential across several sectors, the realizable demand for natural gas will be the function of supplies in market, the price competitiveness of gas as compared to alternative fuels, and timely commissioning of the proposed transmission pipeline infrastructure.

Domestic gas supply is expected to grow at a best case scenario of 10 % CAGR for the same period. The 1,680 km Turkmenistan-Afghanistan-Pakistan-India pipeline, being led by Asian Development Bank, promises to bring in additional 38 MMSCMD gas into country by 2016. Until then demand supply gap has been well taken care by LNG business [11].

In a nutshell, the outlook for Indian natural gas sector is very robust and mostly driven by a strong domestic demand. However, policy issues related to marketing freedom of private gas producers and long-term pricing policies need urgent attention of the Indian Government.

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