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STUDY

“Natural Gas: The Next Crisis”

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INTRODUCTION

Natural gas has emerged as the most preferred fuel due to its inherent environmentally benign nature, greater efficiency and cost effectiveness. The demand of natural gas has sharply increased in the last two decades at the global level. In India too, the natural gas sector has gained importance, particularly over the last decade, and is being termed as the Fuel of the 21st Century.

Natural gas is often termed as the cleanest fossil fuel, producing less carbon dioxide per joule delivered than either coal or oil hence plays a crucial role in the primary energy basket of India.

Between 2003 and 2007, the consumption of natural gas in India grew at a compounded annual growth rate (CAGR) of 7.5 per cent while its production growth was at 1.8 per cent. The expanding gap between the production and consumption of natural gas could have severe implications on the economic activity as the fuel is used in number of industries like power, fertilizer, refineries/petrochemical, sponge iron, etc.

PARAMETERS

The AEP study has taken into account parameters relating to the demand and supply of natural gas along with the data pertaining to natural gas reserves, production, consumption and Reserve-Production (R/P) ratio. The study also incorporates geopolitical factors affecting the two proposed pipelines namely Iran-Pakistan-India (IPI) and Turkmenistan-Afghanistan-Pakistan-India (TAPI).

DATA SOURCE

The data for natural gas reserves, production, consumption and Reserve-Production (R/P) ratio for India and China has been taken from BP statistical review. Data relating to the international price movement on commodity exchanges namely: New York Mercantile Exchange (NYMEX), Intercontinental Exchange (ICE) have been taken from their

respective websites while for domestic commodity exchange data, Multi Commodity Exchange (MCX) has been taken.

METHODOLOGY

I. A cross country comparison of India and China has been done for the following parameters:

- i. Natural Gas Reserves
- ii. Production
- iii. Consumption
- iv. Reserve-Production Ratio

Compounded Annual Growth Rate (CAGR) has been derived on these parameters for data available for latest 5 years (2003-2007).

II. Data for price and turnover volumes from International Commodity Exchanges like New York Mercantile Exchange (NYMEX), Intercontinental Exchange (ICE) has been compared with Multi Commodity Exchange (MCX), India's largest commodity exchange. The annual growth rate for 2008 has been derived to show the trade dynamics on commodity exchanges.

III. To illustrate the possible impact of geopolitical factors on two of India's proposed international pipelines (IPI & TAPI) involving Pakistan as a party to contract, the recent Russia-Ukraine gas dispute has been analyzed.

EXECUTIVE SUMMARY

- Despite the likely commencement of natural gas production from KG basin later this year, Indian economy could face severe supply crunch in the long run due to spurt in demand, shift in energy mix preferences and mounting geopolitical tensions.
- Of the targeted natural gas production of 42.28 billion cubic metre (bcm) in FY 2008-09, only 31 per cent has been achieved during H1 FY 2008-09. This signals to a strong likelihood of possible big shortfall in the targeted production goals this fiscal.
- Rapidly rising import of Liquefied Natural Gas (LNG) over the past few years also signals the scarcity of the fuel. Between 2004-05 & 2007-08 LNG imports grew at 153 per cent CAGR.
- The demand and supply gap for natural gas is likely to more than double from 16 million metric standard cubic meter per day (mmscmd) in 2008-09 to 33 mmscmd in 2011-12. The demand is likely to be pushed rapidly from the power and fertilizer sector along with the city gas distribution system.
- India lags behind China in every key aspect relating to growth in proved reserves, production and consumption of the cleaner fuel. India is much more vulnerable to a natural gas crisis than China as the consumption and production growth rate differential (CAGR for 2003-07) at 5.7 per cent is much higher than China's 2.7 per cent.
- Scrapping the two proposed international natural gas pipelines (IPI & TAPI) involving Pakistan could aggravate the already grim gas supplies. The long run loss on the supply side could range between 4 – 5 billion cubic feet per day (bcfd) if India opts to de-link itself from these projects.
- At New York Mercantile Exchange (NYMEX), the natural gas price averaged at USD 9.04 in 2008. The natural gas price was up 31 per cent against 2007 average price and 19 per cent against five year moving average.
- In terms of Volumes traded at the NYMEX in 2008, natural gas registered a higher growth rate of 30 per cent against 10.8 per cent increase in crude oil; while domestically, at Multi Commodity Exchange (MCX)-India's largest commodity exchange, total turnover of natural gas in 2008 registered an increase of 90 per cent over 2007.

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Widening demand-supply gap and mounting geopolitical tensions may trigger natural gas crisis: AEP

As the political tension with Pakistan heightens; disrupting the gas pipeline talks, natural gas as the clean energy option for Indian economy can become all the more challenging with demand and supply gap widening at 5.7 per cent and China setting its foot at a rapid pace in this sphere.

The Assocham Eco Pulse (AEP) paper on “**Natural Gas: The Next Crisis**” reveals that the widening gap between the natural gas production and consumption growth rates, mounting geopolitical tensions in the international natural gas market along with the long term need to substitute oil for a cleaner environment friendly fuel to adhere to global environmental concerns is likely to create a shortage of natural gas in the country.

Scrapping the two proposed international natural gas pipelines (IPI & TAPI) involving Pakistan could aggravate the already grim gas supplies. The long run loss on the supply side of natural gas could range between 4 – 5 billion cubic feet per day (bcfd) if India opts to de-link itself from these projects.

PRODUCTION:

Of the targeted natural gas production of 42.28 billion cubic metre (bcm) in FY 2008-09, only 31 per cent has been achieved during H1 FY 2008-09. This signals to a strong likelihood of possible big shortfall in the targeted production goals this fiscal.

LNG IMPORTS:

Rapidly rising import of Liquefied Natural Gas (LNG) over the past few years also signals the scarcity of the fuel. Between 2004-05 & 2007-08 LNG imports grew at 153 per cent CAGR.

DEMAND-SUPPLY:

The demand and supply gap for natural gas is likely to more than double from 16 mmscmd in 2008-09 to 33 mmscmd in 2011-12. The demand is likely to be pushed rapidly from the power and fertilizer sector along with the city gas distribution system.

Natural Gas (in mmscmd*)	2007-08	2008-09	2009-10	2010-11	2011-12
Demand	179	168	192	225	269
Supply	96	152	189	212	236

Source: Assocham & KPMG joint study on Indian Oil & Gas sector

* million metric standard cubic meter per day

India needs to ensure smooth natural gas supply to its industrial units in the power and fertilizer sector which would supplement the rising demand from the primary and secondary sector to keep the Indian economy growing at a robust pace.

The government has stressed the need for maintaining a 5.8 per cent annual growth rate of primary energy supply to sustain about 9 per cent economic growth for the next 25 years. The natural gas shortage in the coming years could dent the primary energy supply to the economy thereby having severe implication on the growth rate.

A drive towards cleaner global environment:

Due to its benign and environment friendly nature as compared to crude oil, the global demand for the fuel is likely to witness high growth rates. According to the World Bank, the share of natural gas in total energy supply is projected to rise from 20.6 per cent in 2005 to 21.2 per cent in 2015 and 22.3 per cent in 2030. On the other hand the share of Oil in total energy supply is expected to go down by 2.1 per cent during 2005 – 2015 and by 3.5 per cent during 2005 – 2030.

INDIA & CHINA: A Comparison

For past few years there has been a stark difference in the preference for energy mix of these two energy consuming giant economies. China is seen to be moving strategically ahead towards its pursue for cleaner natural environment. India lags behind China in every key aspect relating to growth in proved reserves, production and consumption of the cleaner fuel.

Country	CAGR - 2003-2007 (in %)			R/P ratio
	Reserves	Production	Consumption	
India	7.0	1.8	7.5	35.0
China	7.9	15.4	18.1	27.2

Source: BP Statistical Review & ASSOCHAM Research Bureau

It has also been found that India's reserve as a percentage of total world's reserve stood at 0.6 against China's share of 1.1 per cent at the end of 2007. However the only silver lining for India as compared to China falls on account of the Reserve to Production (R/P) ratio, a measure to gauge the expected time (in number of years) the gas reserves would last if the production continues to grow at the current rate.

The gap between the production and consumption growth rate, signaling the prevailing demand-supply mismatch for the fuel, shows that China has outpaced India by a big margin on both these counts. India is much more vulnerable to a natural gas crisis than China as the consumption and production growth rate differential (CAGR for 2003-07) at 5.7 per cent is much higher than China's 2.7 per cent.

For the five years between 2003 and 2007, the natural gas consumption has increased substantially. Considering China's growth in consumption for the fuel at staggering 18.1 per cent (CAGR 2003-07) combined by the Indian growth of 7.5 per cent during the period, the coming years could see a similar jump in the natural gas consumption from the rest of the world in a drive towards a cleaner natural environment.

GEOPOLITICAL FACTORS:

India along with the world at large is likely to be hampered by the rising incidence of geopolitical tensions surmounting the cross-country transmission of natural gas. The proposed international gas pipelines including Iran-Pakistan-India (IPI) and Turkmenistan-Afghanistan-Pakistan-India (TAPI) are likely to remain in doldrums due to the mounting political tensions with Pakistan.

If political as well as financial matters are not resolved timely and India opts to de-link itself from these proposed international pipelines, the loss on the supply side of the natural gas could range between 4 – 5 billion cubic feet per day (bcfd); which is even higher than the total consumption level of 3.9 bcfd in 2007.

With respect to the proposed import of natural gas from Myanmar, China thwarted India's plan to import gas through the north-eastern states. China is all set to sign a 30 year mega deal to import natural gas from fields in Myanmar.

The recent row between Russia and Ukraine on contractual natural gas supply left 18 countries affected by the crisis situation. Reduced supplies of natural gas endangered the industrial and household activities of these countries.

Country	% of Annual Demand of Gas met by Russia (approx.)
Austria	60
Germany	42
Turkey	67
Greece	82
Italy	28
France	24
Hungary	60
Czech Republic	80
Slovakia	100
Bosnia	100

Source: Reuters

Such high level of dependence on a single country could pose significant threat on the energy security front. Compared to petroleum, reliance on imported natural gas creates significant short term vulnerabilities. Many European countries saw a similar immediate drop in supply in 2006 also when Russian gas supplies were halted during the Russia-Ukraine gas dispute.

Russia, Iran and Qatar jointly account for over 60 per cent of global natural gas reserves. Formation of a gas cartel on the line of the Organization of the Petroleum Exporting Countries (OPEC) by these major gas exporting countries could also play its role in skyrocketing natural gas prices threatening the global energy security.

COMMODITY EXCHANGE DYNAMICS:

International price movement

In 2008, if it was crude oil that made all the headlines witnessing upheavals, natural gas quietly ended the year with an increase of 12.5 per cent on top of a decline of 58 per cent in crude prices on Inter Continental Exchange (ICE).

Inter Continental Exchange Quarterly Price Variations - 2008			
Quarterly Change		Natural Gas	Brent
Q4	Oct-Dec 08	-43.53	-143.41
Q3	Jul-Sep 08	17.34	-30.96
Q2	Apr-Jun 08	26.71	36.57
Q1	Jan-Mar 08	11.43	10.47

Source: Inter Continental Exchange & Assocham Research Bureau

In terms of Volumes traded at the New York Mercantile Exchange (NYMEX), natural gas registered a higher growth rate of 30 per cent against 10.8 per cent increase in crude oil.

At NYMEX, the natural gas price averaged at USD 9.04 in 2008. The natural gas price was up 31 per cent against 2007 average price and 19 per cent against five year moving average.

Domestic trade

At Multi Commodity Exchange (MCX), India's largest commodity exchange, total turnover of natural gas amounted to Rs 267 million in 2008 registering an increase of 90 per cent over 2007. Such high level of turnover represents a case of increased interest in the commodity to support future energy needs. The exchange became the second largest Natural Gas Exchange globally, next to NYMEX within two months of its launch.

CONCLUSION

With lot of happening in the global energy sphere, Natural gas is likely to gain importance in the energy mix world over due to its inherent environmentally benign nature. The fuel has witnessed a decline in the average growth rate in proved reserves indicating a likelihood of strained future supplies.

The shift in energy consumption pattern across the globe is likely to contribute in soaring the fuel's demand. China is rapidly moving ahead by meeting its energy needs from this cleaner source of energy which is evident by an increase of around 20 per cent in natural gas consumption in 2007 over the previous year. China's share in world's natural gas consumption has increased to 2.3 per cent by registering a compounded annual growth rate (CAGR) of 18.1 per cent in natural gas consumption during the five years (2003-2007).

In India, natural gas consumption has grown at a CAGR of 7.5 per cent but in contrast to China, the production grew at much lower pace of 1.8 per cent which could make things difficult to address the growing demand for the fuel.

Growing volumes of trade in the commodity markets also signals the shifting preference to the commodity as a source of energy. Natural gas trade volumes outpacing crude oil at the NYMEX last year indicates a possibility of a jump in international price if the global economy stabilizes during the later half of 2009.

Geopolitical factors are also likely to contribute in sending natural gas prices at significantly higher levels. Russia cut off natural gas to Ukraine for a short period in January 2006, and for three weeks in 2009. Apart from leaving Ukraine desperate, the cutoff immediately affected the rest of Europe, as the natural gas supplies to Europe flows through Ukraine. This put the rest of Europe in a dangerous position, particularly in the face of bitterly cold weather in 2008-2009.

These rising geopolitical tensions between countries could endanger the global energy security and skyrocket the price. Hence it is imperative to India to consider the geopolitical factors while assessing the possibilities of the proposed international gas pipelines.

ANNEXURE:**Natural Gas Production (in billion cubic metres):**

Annual growth rate (2003-07)	2003	2004	2005	2006	2007	CAGR
India	7.05	-1.02	1.33	-0.94	2.83	1.81
China	7.21	18.41	18.96	18.72	18.37	15.40

Natural Gas Consumption (in billion cubic metres):

Annual growth rate (2003-07)	2003	2004	2005	2006	2007	CAGR
India	7.05	7.89	11.92	4.72	7.58	7.50
China	16.19	17.00	17.87	20.05	19.88	18.13

Natural Gas Proved Reserves (in trillion cubic metres):

Annual growth rate (2003-07)	2003	2004	2005	2006	2007	CAGR
India	13.76	8.08	19.28	-2.36	-1.86	7.04
China	5.37	8.39	5.97	9.71	11.92	7.92

Share in total energy supply (in %): World Bank estimates

Energy Source	1990	2005	2015	2030
Coal	25.3	25.3	27.8	28.2
Oil	36.7	35	32.9	31.5
Gas	19.1	20.6	21.2	22.3
Nuclear	6	6.3	5.6	4.8
Hydro	2.1	2.2	2.3	2.3
Biomass, waste	10.3	10.1	9.3	9.1
other renewables	0.4	0.5	1	1.7
Total	100	100	100	100

Natural Gas New York Mercantile Exchange (NYMEX) Settlement

Prices: The futures contract trades in units of 10,000 million British thermal units (mmBtu).

Month	2007	2008
January	\$5.84	\$7.17
February	\$6.92	\$8.00
March	\$7.55	\$8.93
April	\$7.56	\$9.58
May	\$7.51	\$11.28
June	\$7.59	\$12
July	\$6.93	\$13.11
August	\$6.11	\$9.22
September	\$5.43	\$8.39
October	\$6.42	\$7.47
November	\$7.27	\$6.47
December	\$7.20	\$6.89
Moving Average	2007	2008
1 Year Avg	\$6.86	\$9.04
2 Year Avg	\$7.04	\$7.95
3 Year Avg	\$7.57	\$7.71
4 Year Avg	\$7.21	\$7.93
5 year Avg	\$6.85	\$7.58