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India's current and future energy situation

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Abstract
During the case two decades the energy demand in India has grown rapidly. The Indian population do not have access to commercial energy. Hence India has to depend on foreign powers to meet her energy requirements. India had been quite aware of the enormous energy reserves within its geographically proximate neighbours. The recent visit by Indian Prime Minister to these countries has payed the way for India to meet her energy demands. An effort has been made to discusses energy utilization in India to become self-sufficient and also makes her presence in these countries so that it could benefit maximum from exploring various sources of energy from these countries.

Keywords: commercial energy, energy utilization, oil and gas, OPEC, GAIL, ONGC, CNG, LNG

Introduction
Although commercial energy in India has grown rapidly over the last two decades a large part of India's population has been denied of commercial energy. India accounts for only around 3.4 percent of total world primary energy consumption. India till now was been dependent for its oil imports on highly volitale and uncertain sources Iraq and other Middle Eastern countries. The growing dependence of the country on energy imports has serious security implications. It is now well accepted that there is a need for India need to diversify both its source of oil imports and its energy consumption portfolio. The choices available to India to strengthen its energy sources are: domestic oil and gas base; improved efficiency of energy use; and diversify energy import options.

Energy utilization in India
India is the fourth biggest consumer of energy after China, USA and Russia. The total primary energy consumption from crude oil (29.45%), natural gas (7.7%), coal (54.5%), nuclear energy (1.26%), hydro-electricity (5.0%), wind power, biomass electricity and solar power is 595 Mtoe in the year 2013 [1]. In the year 2013, India's net imports were nearly 144.3 million tons of crude oil, 16 Mtoe of LNG and 95 Mtoe coal totaling to 255.3 Mtoe of primary energy which is equal to 42.9% of total primary energy consumption.2 About 70% of India's electricity generation capacity is from fossil fuels, with coal accounting for 40% of India' total energy consumption followed by crude oil and natural gas at 28% and 6% respectively. India largely depend on fossil fuel imports to meet its energy demands – by 2030. India's dependence on energy imports expected to is excepted to exceed 53% of the country's total energy consumption. In 2009-10, the country imported 159.29 million tonnes of crude oil which amount to 80% of its domestic crude oil which amounts to 80% of its domestic crude oil consumption and 31% of the country's total imports of oil imports. The growth of electricity generation in India has been hindered by domestic coal shortages and as a consequence, India's coal imports for electricity generation increased by 18% in 2010 [3].
Due to rapid economic expansion, India has become one of the world's fastest growing energy markets and expect to be the second-largest contributor to the increase in global energy demand by 2035. It will account to 18% of the rise in global energy consumption. Given India's growing energy demands and limited domestic fossil fuel reserves, the country has ambitious plans to expand its renewable and nuclear power industries. Being the world's fifth largest wind power market India to add about 100GW of solar power capacity by 2022. India is also expected to increase the contribution of nuclear power from 4.2% to 9% within 25 years for the generation of electricity. The country has five nuclear reactors under construction (third highest in the world) and plans to construct 18 additional nuclear reactors (second highest in the world) by 2025.

Oil and Gas
India imports have reached nearly 75 % of its 4.3 million barrels per day crude oil needs but exports nearly 1.25 million barrels per day of refined petroleum products. It I almost equal to which is 30% of its total production of refined oil products. India has built surplus world class refining capacity using imported crude oil for exporting refined petroleum products. The net imports of crude oil is lesser by one fourth after accounting exports and imports of refined petroleum products [4].
During the financial year 2012-2013, the production of crude oil is 37.86 million tons and 40,679 million standard cubic meters (nearly 26.85 million tons) natural gas. The net import of crude oil & petroleum products is 146.70 million tons worth of Rs 5611.40 billions. This includes 9.534 million tons of LNG imports worth of Rs. 282.15 billion [5]. Internationally, LNG price (One mmBtu of LNG=0.18 barrels of crude oil=28 cubic meters of natural gas) is fixed below crude oil price in terms of heating value. LNG is slowly gaining its role as direct use fuel in road and marine transport

without regasification. In the year 2012-2013, India consumptions of portal and diesel were 15.744 and 69.171 million tons respectively. Use of natural gas for heating, cooking and electricity generation is generally regarded as economical because more and more locally produced natural gas will be converted into LNG for use in transport sector to reduced crude oil imports. In addition to the conventional natural gas production, coal gasification, coal bed methane, coal mine methane and biogas digesters/renewable natural gas will also become source of LNG forming decentralised base for production of LNG to cater to the widely distributed demand. There is possibility to convert most of the heavy duty vehicles (including diesel driven rail engines) into LNG fuelled vehicles to reduce diesel consumption drastically with operational cost and least pollution benefits [6].

The state-owned Oil and Natural Gas Corporation (ONGC) acquired shares in oil fields in countries like Sudan, Syria, Iran and Nigeria – investments that have led to diplomatic tensions with the United States [7]. Disturbances in the Middle East and increasing domestic demand for energy, India has shown its keenness to decrease its dependency on OPEC. Several Indian oil companies, primarily led by ONGC and Reliance Industries, have started a massive exploration for oil in several regions in India including Rajasthan, Krishan Godavari Basin and north – eastern Himalayas. The proposed Iran – Pakistan – India pipeline is also part of India's strategy to meet its increasing energy demand.

Coal

India has the world's 4th largest coal reserves. India is the third top coal producer in 2013 with 7.6% production share of coal (including lignite) in the world. Top five hard and brown coal producing countries in 2013 (2012) are (million tons): China 3,680 (3,645), United States 893 (922), India 605 (607), Australia 478 (453) and Indonesia 421 (386). However, India ranks fifth in global coal production at 228 mtoe (5.9%) in the year 2013 when its inferior quality coal tonnage is converted into tons of oil equivalent. Coal – fired power plants account for 59% of India's installed electricity capacity. After electricity production, coal is also used for cement production in substantial quantity. In the year 2013, India imported nearly 95 Mtoe of steam coal and cooking coal which is 29% of total consumption to meet the demand in electricity, cement and steel production [8].

CNG and LNG have thus emerg as economical alternatives to diesel oil with the escalation in international crude oil prices. Synthetic natural gas production technologies have tremendous scope to meet the transport sector requirements fully using the locally available coal in India. Dankuni coal complex is producing syngas which is piped to the industrial users in Calcutta [9]. Many coal based fertilizer plants which are shut down can be made workable to produce SNG as LNG and CNG fetch good price by substituting imports. In recent year, Indian government has fixed the natural gas price at producer end as 5.61 US$ per mmbtu on net calorific value (NCV) basis which is at per with the estimated SNG price from coal.

Central Asia has a diversified energy resource base. But it is not equally spread across the territory. Besides extensive explored recoverable reserves of hydrocarbon fuel, the region has significant hydro energy potential, large uranium deposits, and also good opportunities for developing renewable energy sources. It is estimated that natural gas reserves within Azerbaijan, Uzbekistan, Turkmenistan and Kazakhstan equal more than 236 trillion cubic feet. The region's total oil reserves could reach more than 60 billion barrels of oil. This could be enough to services Europe's oil needs for 11 years. Some estimates are as high as 200 billion barrels. In 1995, the region was producing only 870,000 barrels per day (44 million tones per year (Mt/y) [10].

India has certain options to engage the Central Asia Region. First is through Pakistan and Afghanistan; Second Xinjiang (China) and; third is, through Iran. Though negotiations have taken place to explore all the options to transport energy from Central Asia to India but the current geo-political scenario in India's neighborhood are conducive because of explosive situation there.

Though negotiations have revived on building a gas pipeline from Turkmenistan to Pakistan through Afghanistan, it has become a great problem that it will be extended to India. The Indian government is quite apprehensive about it because of the disturbed. The flow of gas will run through Pakistan and relations between the two countries, India does not want its energy security to be jeopardized, in case of an Indo-Pakistan conflict. Also, the current political instability in Afghanistan does not guarantee the safety of the pipeline.

The second option of building a pipeline through Xinjiang seems to be promising but studies on the technical feasibility of such an ambitious project have not been conducive because of the ongoing border disputes between India and China more important China has to express a willingness to have any energy cooperation with India.

The last option that involves energy transport is from Central Asia to Iran and then from Iran to India's west coast through sea. In this regard, the proposed highway from Chah Bahar through Afghanistan to Tajikistan will enable India to have a transport corridor to the otherwise inaccessible Central Asia region. However, this option is only left with India and Iran has accepted participate as it may want to sell its own energy to India [11].

Deiplomacy as an effective tool has played it role in where India could India sign of some economic cooperation agreements. India has taken several trade initiatives. The Indian government has signed a framework agreement in the field of oil and gas exploration and production with Kazakhstan, Uzbekistan and Turkmenistan. On April 26, 2009 India (Gas Authority of India - GAIL) and Uzbekistan (Uzbekneftegaz) signed seven Memorandums of Understanding (MoUs), including in the fields of petroleum and natural gas. The Government of India is also engaged funding various development assistance programmes in Central Asia. In Central Asia, Kazakhstan is the most abundant in energy resources, having 89 percent of CAR's coal; 93 percent of its oil; 30 percent of its gas; and 88 percent of its uranium. Kazakhstan has in the past blocked the Oil and Natural Gas Cooperation (ONGC) – Mittal's joint bid for a US$ 48 bn takeover of petro Kazakhstan in favour of China in 2005 [12].

Conclusion

India know will about the enormous energy reserves within its geographically proximate neighbours. They could meet India energy demands. The recent visit by Indian Prime Minister to these countries has proved crucial to meet India's energy demand. There is an good opportunity for India to increase her presence in these regions. The Central Asian region energy reserves will no doubt make a positive contribution to its growing demands. More important the present government seems to have realized that India's internal turmoil cannot be treated in isolation. The present government has tried to widen the scope of geo-political engagement. In the current scenario, USA, Russia and China will definitely like to play more assertive role to product their interests. In such power game, Russia will support India to India for the simple reason that the chances of clash between China and Russia may again in future resurface. Hence, India should take full advantage of this position and meet her energy demand from the conflict prone regions of the world.

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