

A Study on Indian Energy Sector

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Abstract - The Indian energy sector is unique both in terms of its organization as well as complexity which results from the fact that India is a rapidly growing economy with huge disparity in income and lifestyles. About 68 percent of Indian population still lives in rural areas and depends upon non commercial sources of energy such as fuel wood, biomass and agricultural rest for their requirements of energy, like lighting and cooking. The present study has been conducted to discuss the policy framework and current status of Indian energy sector. In the results of the study, the concept of Indian energy sector has been discussed in detail. Further, various challenge in the way of Indian energy sector have also been discussed.

Keywords - Indian Energy Sector, Renewable Energy, Climate Change

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INTRODUCTION

The Indian energy sector is unique both in terms of its organization as well as complexity which results from the fact that India is a rapidly growing economy with huge disparity in income and lifestyles. About 68 percent of Indian population still lives in rural areas and depends upon non commercial sources of energy such as fuel wood, biomass and agricultural rest for their requirements of energy, like lighting and cooking. Energy consumption has been increasing rapidly due to meet the requirements of economic growth and different development objectives. Now on supply side of energy in India, the commercially energy supply in India is largely depends on fossil fuels, coal, oil and natural gas. There are various sources of energy in India like: coal and lignite, oil and natural gas, renewable energy sources and nuclear power. Various energy policies have been introduced in India for example Integrated Energy Policy 2008 and National Action Plan for climate change.

OBJECTIVES OF THE STUDY

- To explain the policy framework regarding Indian energy sector.
- To show the current status of Indian energy sector.
- To discuss the challenges for energy sector in India.

RESEARCH METHODOLOGY

The present paper is descriptive in nature. This study is based on the reviews of various research articles, books, news papers and websites. This is a theoretical paper about the term Indian energy sector. A huge amount of information is taken from the website of International energy agency (IEA). Various news items are studied for the purpose of current status of energy in India.

Introduction to international energy agency

The International Energy Agency (IEA), an independent agency was established in 1974. It provides trustworthy research and analysis on ways to ensure reliable, inexpensive and clean energy for its 28 member countries and beyond. The IEA carries out a complete programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The followings are the objectives of the agency:

- To maintain and improve systems for coping with oil supply disruptions.
- To promote rational energy policy in a global context so co-operative relations with non member countries, industries and international organizations.

- To operate a permanent information system on international oil market.
- To improve the world's energy supply and demand structures.
- By developing alternative energy sources and increasing the efficiency of energy use.
- To promote international collaborations on energy technology.
- To assist in the integration of energy policy.

Indian energy sector overview

As per the estimate by the international energy agency, fossil fuels accounted for 73% of the primary energy supply in India. Energy has been universally documented as one of the most important inputs for economic growth and human development. There is a strong two way relationship between economic development and energy consumption. On the one hand, growth of an economy, with its global competitiveness, hinges on the availability of cost effective and environmentally kind energy sources, and on the other hand the level of economic development has been observed to be reliant on the energy demand. India's energy intensity is also much higher than the emerging economies-the Asian countries, which include the ASEAN member countries as well as china. However, since 1999, India's energy intensity has been decreasing and is expected to continue to decrease. In the recent years India's energy consumption has been increasing at one of the fastest rates in the world due to population growth and economic development. Even after the global economic meltdown, India registered a GDP growth of 6.5% in 2011-12. Growth forecast for GDP for 2012-13 has been put at 6.7%, by the economic advisory council to prime minister, in their report of august 2012.

Players of Indian energy sector

Indian energy sector comprises the following players:

- **Power sector**

The problem of electricity is still a vast area of discussion. In India, electricity is not available to the entire population. Nearly 25% Indians lack access to electricity. As such the power sector has been at the center of India's energy policy. The development of power sector is coupled with India's energy policy objectives of universal energy access and energy

security. India had already built the world's fifth largest installed capacity for power generation as of 2009 and almost tripled electricity generation from 289 terawatt hour to 899 terawatt hour from 1990 to 2009. Power sector followed a number of new policies for example, Electricity Act 2003, Ultra Mega Power Projects 2005 and Rural Electrification Policy 2006 etc. The Bureau of Energy Efficiency, The National Thermal Power Corporation, Rural Electrification Corporation and Power Grid Corporation India are the key players in Indian power sector.

- **Coal sector**

Coal is primary source of energy in India. Representing over 40% of India's energy mix in 2009, 56% of installed power capacity and nearly 70% of generated electricity in 2012, coal is key keystone of India's energy supply. Share of coal and petroleum is expected to be about 66.8 percent in total commercial energy produced and about 56.9 percent in total commercial energy supply by 2021-22. The demand of coal is projected to reach 980 MT during twelfth plan period, whereas domestic production is expected to touch 795 MT in the terminal year (2016-17). Even the demand gap will need to be met through imports, domestic coal production will also need to grow at an average rate of 8 percent compared to about 4.6 percent in the eleventh five year plan.

- **Oil and natural gas sector**

Since the liberalization of the Indian economy the oil and natural gas sector is comparably more open and competitive than other energy sectors in India. It is open to 100% FDI and a number of private and foreign companies are actively operating. In 2011-12, India was the fourth largest consumer in the world of crude oil and natural gas, after the United States, China and Russia. Petroleum demand in the transport sector is expected to grow rapidly in the coming years with rapid expansion of vehicle ownership. While India's domestic energy resource base is substantial, the country relies on imports for a considerable amount of its energy use, particularly for crude petroleum.

- **Renewable sector**

As per March 2012, the per capita total consumption in India was estimated to be 879 kWh. India's electricity sector is amongst the world's most active players in renewable energy

utilization, especially wind energy as of March 2012, India had an installed capacity of about 24.9GW of new and renewable technology based electricity. Renewable energy is no longer seen as an alternate energy source to conventional energy, but as a critical element in pursuit of key policy objectives. The share of renewables in India's energy mix, combining biomass, hydro and other renewables was approximately 26% in 2009, which biomass accounted for the largest share. India has the fifth largest capacity for wind energy in the world India launched an ambitious plan to significantly augment its capacity of solar power. Although installed solar capacity remains quite small, it has promising potential for growth. Private investment has been the key driver behind the growth of renewable in India.

- **Nuclear sector**

India was one of the few countries to achieve the complete fuel cycle from uranium exploration, mining, fuel fabrication and electricity generation, to reprocessing and waste management by the 1960s. India's current nuclear generation capacity is 4.8 GW and rank 13 in the world, which account only 1.2 percent of global nuclear capacity. The share of nuclear was one percent in India's total energy mix in 2009 and 2 percent in electricity generation capacity in 2012. This is the result of India's long isolation from the global nuclear energy regime and its emphasis on a thorium based nuclear development programme.

Indian energy policy

The Indian government as a whole plays an indispensable role in the energy sector through state owned enterprises, public policy and market regulation, indirect guidance and personal networks. India's energy policy framework, comprehending not only the individual role of each ministry and government agency but also their interaction and co-ordination with other energy players is essential. There are three main policy objectives that India pursues: energy access, energy security and mitigation of climate change. All three objectives are closely related, but sometimes conflict with one another and are derived from reality in India. Thus, it is challenging for India to maintain a balanced approach in pursuit of these three objectives. The detail of these three objectives is given below:

- **Energy access**

It is estimated that the one quarter of India's population lack access to electricity. Access to modern energy services is a prerequisite for economic growth and human development and is critical in fulfilling basic needs such as cooking, lighting, mobility and water pumping etc. energy access can broadly be defined as the physical availability of modern energy carriers and improved end use devices at the household level at affordable prices.

- **Energy security**

Energy security takes a place in government policy making. Energy security is the term for an association between national security and the availability of natural resources for energy consumption. Access to cheap energy has become essential to the functioning of modern economies. However, the uneven distribution of energy supplies among countries has led to significant vulnerabilities. The emphasis of energy policy until the 1990 was on electricity shortage and unsatisfied energy needs. However, increasing dependency on imported energy sources like oil but also natural gas and coal resulted in greater government attention to the subject. Energy security is defined comprehensively in India as "we are energy secure when we can supply lifeline energy to all our citizens irrespective of their ability to pay it as well as meet their effective demand for safe and convenient energy to satisfy their various needs at competitive prices, at all times and with a prescribed confidence level considering shocks and disruption that can be reasonably expected."

- **Climate change**

Climate change is a problem that is affecting people and the environment. Greater energy efficiency and new technologies hold promise for reducing greenhouse gases and solve this global challenge. Regarding international attempts to establish an internationally binding regime to curb carbon emissions, India finds it unacceptable, stating that most emissions were produced by developed countries that India need economic developments and industrialization.

Concepts in Indian energy policy

- **Self sufficiency**

Energy self sufficiency was identified as the major driver for new and renewable energy in the country

in the wake of the two oil shocks of the 1970s. Self sufficiency is a frequently occurring theme in the energy dialog in India. This is useful concept to understand India's approach to energy security. The pursuit of self sufficiency led to India current over reliance on state-owned enterprises in the energy sector, which was recognized by the Indian government.

- **Non interference**

As demonstrated by India's non participation in the non proliferation treaty to its reluctance to support US sanctions on Iran, non interference by outsiders and the protection of Indian sovereignty are fundamental features of Indian domestic and foreign policy.

- **Inclusive developments**

Inclusive growth can be broadly defined as "growth coupled with equal opportunities. Also called inclusive growth, inclusive development appears frequently in recent policy documents and policy discourses, which is attributable to the widening income inequality in the country not withstanding economic development.

Challenges for energy sector in India

- **Core capacity of players in Indian energy sector**

Energy players need to be commercially feasible with access to sufficient financial resources. Their managerial autonomy from central or state ministries is essential for timely investment; meanwhile ownership should be properly separated from management. Private vs. public owned is not the main issue rather ownership should not interfere the market principles. Management must be able to freely operate based on sound market analysis and economic deliberations. Financial ability is the most important requirement for players to fulfill their primary business objective by delivering energy to consumers. However many Indian energy players suffers from the financial weakness or availability of funds. They have limited financial resources and restricted investment ability. Financial weakness is derived from systematic failure to enforce lawful revenue collection. India's energy sector is dominated by public sector companies or public sector undertakings, that is why some parts of the energy sector have made very little progress in attracting private investment.

- **Pricing**

Pricing is the key to make sure the commercial viability of business entities and to attract investment into each fuel sector. Some parts of the energy sector in india where the prices are too low; for example power tariff for agriculture consumers and subsidized cooking and transport fuels etc. the problem is that these subsidies are untargeted and ineffective in terms of benefiting the poor, while the overall price level is not sufficient for companies to recover cost. Price mechanism should be supervised and adjusted in a timely manner and adequately by independent regulator to reflect changing costs, but in India regulators operates in a very rigid way because of political interference. In the petroleum and natural gas sector, there is no independent regulator and prices are changes by the government. In this sector price changes appear to be even more rigid. The inflexible pricing mechanism has led to distortion of fuel choices by consumers. Due to a pricing mechanism that is disconnected from the global market condition, it is very difficult to use pricing as a policy instrument for demand side management.

- **Investment**

Investment of private sector increased after the liberalization of the power, oil and gas sector. However, most of the major international companies are still in queue to invest in India's energy sector. Private participation in the coal sector stayed close that is urgently needed. India needs considerable investment to build a reliable and adequate energy supply. Ensuring the scale of investment for India in future will e a challenging situation. With failing gas production and faltering nuclear capacity, India's power generation is increasingly dependent on coal based capacity, which is less efficient and more carbon intensive compared to other fuels. The widespread consumption of biomass results in environmental deterioration including deforestation and air pollution. Thus it is critical to invest in the low carbon technology for its energy sector. Otherwise India could be locked into a coal dependent and higher than necessary carbon intensive path.

- **Policy**

A well designed policy is critical to guide and direct the overall energy sector and future investments. In India takes important steps in formulating of a comprehensive national energy policy, but it is very difficult to compiling all energy plans and target in one policy document itself is

not sufficient to assure integration of energy policy making and implementation. In case of five year plans sub groups consisting of multi ministry experts are set up to provide inputs to the plan, but many times their contributions are not fully incorporated into final policy document, and their reports on the different energy sub sectors can have inconsistent data and targets from one another. In short a truly integrated energy policy needs to reflect Indian long term vision in its short term energy policies.

- **Political will**

The energy sector is too important to be compromised by political interests and rent seeking behavior. Consent of all parties on energy policy should be sought in the national interest. So many important energy sector reforms are still pending due to political deadlock. For example Coal Mines Bill of 2000, which allows private companies to engage in commercial coal mining on par with Coal India limited. That is why some times political factor may create obstacle in the way of development of Indian energy sector.

CONCLUSION

For conclusion we can say that Indian energy sector is a vast field for study. In Indian energy sector 67 percent of non renewable sources of energy have been used so that the pressure is on the non renewable resources. A large part of Indian population has a very low energy access. Some of 400 million Indians live without electricity, and 700 millions still use traditional biomass for cooking. This has environmental and health implications.

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