Energy Economics and Resources in India: An Overview

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ABSTRACT

'Energy economics' is a branch of applied economics. In this paper, energy economics tools are used to analysis demand, supply and other aspects of energy sector in India. Issue of non-renewable resources and increasing gap between demand and supply in the major concern of today. India has to tackle this problem with diversification in energy mix and by increasing domestic production to decrease the rising bill of the import on the country. It has to lead with sustainable energy supply and rapidly increasing economic growth.

Keywords: Energy demand, energy supply, increasing gap, diversification, sustainable energy supply

JEL: Q, Z

Energy

Term 'Energy' is an ability to do work or produce heat. Ability is either in the form of capability i.e. potential of any substance which can produce heat or energy or in form of converted energy to motive power i.e. kinetic energy.

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Law of Energy

In physical term, energy follows the law of thermodynamic. Any science alumnus can understand the term 'thermodynamic', but for economic student, it is quite difficult. It is a field of science which deals with energy transfer and its effect on the physical properties of the substance.

The first law of Thermodynamic is also known as 'Law of Conservation' which means 'energy can neither be created nor destroyed'. The second law, on the other hand, introduces the concept of quality of energy

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Energy Economics

Energy economics is a branch of applied economics where economics principles and tools are applied to 'ask the right question'.[1] It concerned with basic economic issue of satisfying unlimited wants by allocating scarce resources of economy. Hence, energy economics gives entire understanding of all aspects of energy sector i.e. demand, supply, energy-economy interaction and its equilibrium or government policy toward energy sector problems and their solutions and so on.[2]

Dynamism of Energy Economics Concerns

In the beginning, scope of energy economics is related with energy-economy contraction. Concept of energy issue was developed in 1970's with oil price hikes.

In 1980's analysis diverge to environmental concerns of energy use and economic development. In 1990's, focus on liberalization and reconstruction added to energy issues.

Now, 'Energy Trilemma', i.e. Energy Security, Equitable energy access and environmental impact mitigation, is major concern of all energy economists.

Non-Renewable Energy Resources Demand

The term, 'energy demand' refers to the kind of energy used to satisfy individual energy needs for basic economic and household activities.[3] It is the sum of primary energy demand and final energy demand. Energy demand shows the relationship between independent variable such as price, income etc. and dependent variable such as demand for secondary energy and final use.

Demand for energy can arise for different reasons. Household consume energy to satisfy certain needs where as industries and commercial users demand energy as an input of production and then objectives to minimizes the total cost of production. Energy demand is mainly dominated by industrial sector and industrial sector. In case of coal, power sector is the largest consumer. On the other hand, transport sector is the largest and fastest growing consumer of oil and natural gas.

Energy Demand in India

There is a positive correlation between energy demand and economic growth or technical progress.

India is a seventh largest producer of energy and fifth largest consumer of energy. It will grow under 8-9% annually.[4] Moreover India's demand for energy tends to grow faster in upcoming decades. World Energy Outlook (2014) found that China dominates energy demand growth until the mid 2020's but its population level off and its economic growth shows around that time, India takes over as the leading engine of energy demand.[5]

In case of non-renewable resources, India's coal demand continues to rise and is the third largest consumer (see fig.1). It become second biggest coal consumer before 2020. Ministry of power estimates that demand for coal will grow 8-9% annually in the XIIth five years plan.[6]

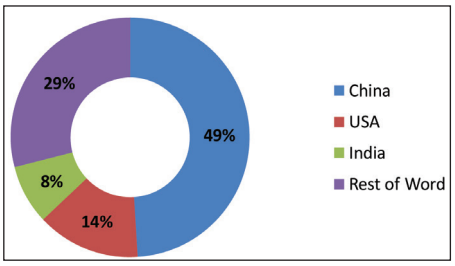

Fig. 1: distribution of coal consumption in the world, 2012

Source: Compiled from BP Statistics (2013).

After coal, oil and natural gas are another dominating fuels in India. India was 4th largest consumer of oil in 2012(see fig.2).[7] Over all consumption will grow by almost one half before 2020.

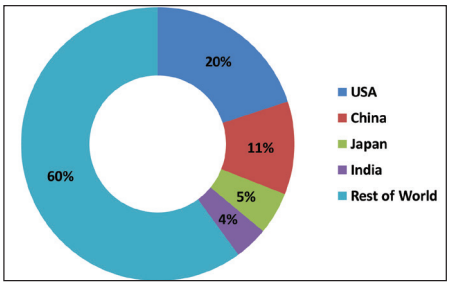

Fig. 2: Distribution of Oil Consumption Across the world (2012)

Source: BP Statistics (2013)

Natural gas, by contrast, will grow relative importance. Its demand grows strongest, increasingly replacing coal and oil in energy mix. Natural gas claim 9.4% consumption at the decade end i.e. 2020. According to BP statistic 2012, India ranks 11th among natural gas consumer of the world.

Supply of Non-Renewable Energy Resources

As coal, oil and natural gas are non-renewable, consumption of one unit of these sources implies foregoing its consumption at any future date. These bring a dimension of the decision making; whether to use the resource now or later.

Non-renewable energy supply system tends to follow several steps i.e. Exploration, Extraction, Transportation, Conversion, Distribution and End use.

Energy Supply in India

India's demand for energy will continue to expand rapidly, but domestic supply will be constrained by price distortion and other factors. India has to increase its primary energy efficiency in order to secure its resources to satisfy energy demand.

The commercial energy supply in India is largely dependent on fossil fuels. Coal, oil and natural gas accounted for 90-91% of the total primary energy supply. Share of coal production in India during 2011-12 was 51.03% whereas share in production of crude petroleum and natural gas during 2011-12 was 39.3% and 8% respectively. Renewable energy sources accounts for only 1.65% of total primary energy supply

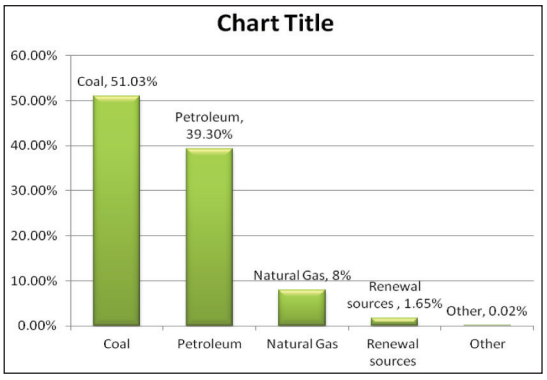

Fig. 3: Share of Resources of Primary Energy Supply

Despite of abundant reserves, India seems to be in shaky boat. Domestic supply will not be able to meet growing demand as share of coal and petroleum in energy mix is stagnated at 40-45% and 0.3-0.5% respectively in last ten years. Thus, India has to rely upon expensive import, which add monetary as well as real burden to the economy.

World energy outlook has estimated that rising crude oil import needs of China and India, from Middle East and other region increase their vulnerability to implication of a possible Short fall in investment or disruption to oil supply.

Demand – Supply Management in India

As the price hikes of petroleum in 1970's, Government has to check the consumption of POL (Petroleum, Oil and Lubricant). Government has taken various measures to increase domestic production of petroleum, however did not succeed fully.

It is recognized that primary sources of energy in India will have to be coal for some decades. Reorganization of old mines, introduction of new methods and techniques in the development of new mines and standardization of plant and equipment are some initiatives adopted by government to increase coal production.

Conclusion

Energy access is closely associated with human development. In case of increasing demand supply gap of energy, it appears that India walking on energy tight rope. If plans for rapid growth and expansion go ahead, growth rate of 8 or 9% annually cannot be achieved without cleaning up the policy maze in power sector.

A growing reliance on import of coal as well as oil and gas, will exacerbate energy worries in the coming decade. Renewable energy provides only a little relief, but nuclear could be the energy of future.

India has to diversify its energy mix through nuclear technology and other non-conventional resources to produce more sustainable energy system as well as make security of energy supply and environmental concern of energy use. In order to do so, government

need to establish coherent, predictable and transparent energy policy.

India has to ensure also about adequate financing developing energy infrastructure. On the other hand, India has to select and build the right kind of energy infrastructure in order to diversify and modernize the country's energy mix that will meet the current as well as future needs. Such as approach in the long term will lead to more sustainable energy supply that will deliver the growth to which India aspire.

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