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# Growth Potential of Indian Power Sector in Global Scenario - An Evaluative Study in Post Reform Period

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#### Abstract

The present paper highlights the growth of power sector in India in post reform period. This paper examines the journey of Indian power sector after LPG reforms with a comparative study with the growing economies of the world. An attempt is made to forecast the growth of India's power generation capacity with alternative modes. The paper also aims to assess the capacity of the country for renewable energy through various projects in the near future. The nation's ambitious plans also include the attraction of huge investments through different modes from private investors. Reforms and policy decisions are required for tackling the transmission and distribution losses and improving the distribution network in the country. India's energy need is increasing and to keep pace with demand, its dependency on imports is also increasing. To be self reliant, India needs immediate government initiatives as well as effective administrative reforms in power sector. An evaluative study has been done for solar and wind energy potential in India in the present paper.

**Keywords-** Power sector reforms, performance, transmission, energy gap, efficiency, subsidy, renewable sources and distribution losses

#### Introduction & Literature review

Indian economy has emerged as one of the fastest growing economy in global scenario. It has witnessed various economic and technological changes in the post reform period. Power sector is one major dynamic sector that has contributed in strengthening and transforming the economy. In recent years, the share of India in power generation has increased significantly. India is the fourth largest generator of electricity after Japan, United States and China in the world. An attempt is made to study the potential of Indian power sector in global scenario.

In the present paper secondary data has been used to study the growth of power sector in India and for comparative analysis with the growing economies of the world. Data of various years is compiled from the reports of Planning Commission, World Bank, International Energy Agency and Ministry of New and Renewable Energy to study the growth. The report of World Economic Forum -Future of Electricity in Fast-Growing Economies has been used. Further the annual performance reports and e-books published by power sector have been considered.

#### Indian power sector-An overview

The power sector in India has undergone a dynamic change after the enactment of the Electricity Act 2003. With the enactment of the Electricity Act, the sector has shifted from regulated business to competitive business. This was essential for generation and increasingly for transmission. The power distribution network remained the weakest link. Distribution segment in India has been plagued by various problems including financial restrictions, tariff, supply to un-metered, agriculture

consumers, theft and high aggregate technical & commercial losses. These factors have weakened the finances of state utilities and the growth prospects of Indian power sector. This has also adversely affected the private investments, performance and subsidy receipts of this sector. Thus the distribution channel needs to be reformed.

In addition to the rise in urban, industrial and agriculture demand for power, the demand for rural areas is also increasing day by day due to increase in customers, changes in life and consumption pattern. The supply of power remained short due to various reasons. Due to poor financial health of the distribution utilities there stood an under-investment in the distribution network leading to poor upkeep and maintenance of assets particularly in rural areas. Thus strengthening of sub transmission & distribution infrastructure is considered mandatory for ensuring reliable and quality power supply in rural areas. Moreover to facilitate sustainable commercial operations of electricity distribution, it is important to focus on metering at consumer end for all categories of consumers in both rural and urban areas. Apart from metering at consumer end the metering arrangement at distribution transformers and feeders shall facilitate building up a mechanism for proper energy accounting. This will help in identifying high loss pockets and initiating remedial measures towards reduction of losses.

### **Objectives of the Study**

- To study the need of power sector in economy
- To facilitate comparison with growing economies of world
- To study the growth prospects of Indian power sector
- To analyze India's power generation capacity
- To evaluate the transmission and distribution losses in Indian power sector
- To study the potential of solar and wind energy in India

#### Present scenario of Indian Power sector

India is now the fourth-largest generator of electricity after Japan, United States and China though still comparatively low on per capita basis and with a relatively low electrification rate of 81% (in the year 2013) leaving about 240 million people without reliable access to power. However, government through its various projects is making the provision for power to all. Government has launched the Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) in December 2014 with a goal to provide continuous supply of electricity to rural India.

India's access to Power (As per Data 2013)-in percentage		
<b>Total Population</b>	Urban	Rural
81	96	74

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Indian Power sector in global scenario- A comparative analysis



### Indian Power sector in global scenario- A comparative analysis

Source- Euro monitor IEA WEO 2015/ IEA database, World Economic Forum

### Market Structure of Indian power sector-Transmission

The central and state governments are responsible for the development of power sector in India. The country is demarcated into five major transmission regions- Northern Eastern Western Southern and North Eastern. Indian power sector remained closed to private investments till 1991. Power generation was opened up for private participation in 1991. The Electricity (Amendment) Act 1998 defined transmission as a separate activity and led to the creation of the CTU (currently PGCIL) and STUs. The Regulatory Commission Act 1998 mandated the setting up of an independent regulatory mechanism at central (CERC) and state levels (SERCs). The Electricity Act 2003 further rationalized the approach for privatization of the power sector. The Transmission Market Structure of Indian power sector includes the following channels-

# • Ministry of Power

Planning, policy formulation, processing of projects for investment decisions, monitoring and ensuring implementation of power projects, training and manpower development and administration & enactment of legislation in regard to power generation, transmission and distribution

# • Central Electricity Authority of India

Advises the Government on matters relating to National Electricity Policy and formulates short term and perspective plans for the development of electricity systems

# Central Electricity Regulatory Commission

Regulates tariff, formulates policies regarding subsidies, promotion and ensuring the policies at central level

# • State Electricity Regulatory Commission Regulates tariff, formulates policies regarding subsidies, promotion and ensuring the policies at state level

# • Central Transmission Utility

Ensures development of an efficient, coordinated and economical system of inter-state transmission lines and undertakes inter-state transmission

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### Public Private Partnership

Develops transmission lines on BOO model and charges for wheeling electricity within the tariffs specified by CERC/ SERCs

• State Transmission Utility Development of efficient, coordinated and economical system of intra-state transmission lines and undertakes intra-state transmission

#### Major milestones in Indian power sector- An overview

- 1991- Electricity Laws (Amendment) Act
  - Private participation allowed in generation
  - Up to 100% foreign ownership allowed
  - SEBs to be responsible for transmission and distribution of power
  - Operators and SEBs entered into power purchase agreements
- 1998- Electricity Laws (Amendment) Act
  - Private participation enabled in transmission
  - CTU and STUs set up Electricity Regulatory Commissions Act
  - CERC & SERCs formed
  - Regulator to protect & promote consumer interest
- 2003-The Electricity Act
  - Aiming to enable reforms & restructure power sector
  - National Electricity Policy brought out, mandatory creation of SERCs, emphasis in rural electrification and open access in transmission & distribution

• Introduction of a non-discriminatory open access in the transmission

- 2006- National Tariff Policy
  - Mandatory competitive bidding for all transmission projects after Jan 2011
  - Framework for determining tariffs and rate of return for projects under generation, transmission as well as distribution
- 2011- National Tariff Policy (Amendment)
  - Exemption to intra-state transmission sector from mandatory competitive bidding
  - Exemption of select experimental works/ urgent/ compressed time schedule work from tariff based competitive bidding
- 2016- Revised Tariff Policy
  - Contained new provisions such as compulsory procurement of 100% power produced from waste to energy plants by Discoms
  - Mandatory usage of treated sewage water by thermal plants and promotion to renewable energy.

These acts and amendments have boosted and encouraged the Indian power sector to be more dynamic and progressive. Further, private investment is promoted and the consumer, investors interests too. This made the channel more transparent and useful.

#### **Growth of India's Power Generation Capacity**

Power Generation Modes - Power generation falls under four broad categories

- Thermal power- Produced through centralized thermal power plants using coal as a fuel
- **Hydropower-** Produced by trapping river flows by construction of dams & hydro-electric power stations

### • Nuclear Power

• **Renewable sources** of power such as wind energy, solar energy and tidal power etc. Renewable sources of energy are the most environment-friendly where as thermal energy causes the greatest amount of pollution.

India's real GDP grew at 7% over the past decade and if it continues to meet its economic goals of 6% to 7% annual GDP growth, it will need nearly 800 Giga watts (GW) of additional capacity by the year 2040 according to the International Energy Agency.

### India's Power Generation Capacity

Despite of huge growth potential in Indian Power sector, investors are very cautious in investing in Indian power projects. One reason for this caution may be the events occurred in 1990 and 2003. India is increasingly dependent on private investors for fueling growth in the electricity sector. India's private installed capacity share has increased from 13% of total capacity in the year 2007 to 30% - 40% by the year ending 2017. In India, power generation captures most of the sector's \$27 billion profit pool while the transmission and distribution segment struggle a lot financially due to heavy non-technical losses in distribution – that is electricity taken off the grid and not been paid for.

### Position of India's transmission and distribution losses in global scenario

India's distribution losses are estimated at 27% in the year 2014 which are amongst the highest in the world. Despite successful programmes in different states this remained a significant issue requiring urgent attention. Through solving the financial viability of distribution companies the matter can be streamlined. This will attract new flow of funds in power sector and efficient consumption.



Source: US EIA/ The Economic Times, World Economic Forum

Transmission and distribution losses stand for amount of energy lost during transmission and distribution. The share of T&D losses of total power generated in the country is presented. India's losses are shown with a comparative evaluation with other fast growing economies for 2013-2014 fiscal year which ended on March 31 2014.

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#### Potential - India wind and solar generation

Coal is an important source of fuel for generating electricity in India for which its demand is rising continuously. Currently coal providers in the country are struggling hard in keeping pace with demand of coal and as a result country has to rely increasingly on imports. To reduce the reliance on coal imports, India needs to search new coal reservoirs and boost domestic coal supply. Private sector participation in coal supply will also be helpful in scaling up the industry. India has to increase its investments in renewable generation which will further support to attain country's goals of becoming energy self-sufficient.

The studies show that India has great potential. It aspires to become a global leader for renewable energy. India has an ambitious plan to install 175 GW of renewable energy by the year 2022 which includes 100 GW of solar and 60 GW from wind. For this in addition to government and administrative support, private hands are to be joined. India needs to attract great amount of private investment in renewable generation to meet the desired targets. However, looking to the present scenario, India's energy deficit is rising continuously. For this the country needs immediate implementation of reforms that will promote transmission and distribution operators to recoup costs & generate profits for maintaining and improving their networks. Indian power sector also need immediate attention towards financial issues.



Wind and solar PV generation capacity potential in Indian context

Source: Ministry of Energy, REN21, IEA, GWEC, World Economic Forum

### **Conclusion and Way forward**

To sum up, power sector is a critical enabler of economic growth. India needs promotion through private investment and adoption of progressive policies on renewable sources to cater future needs of energy. Government initiatives are needed to reform the distribution segment and improve the financial health of the sector to fill the gap between demand and supply. The public private partnerships and pilot projects are the need of the hour. Policies are to be made for country's renewable energy sources including solar and wind energy in India. As the paper explores there is huge potential for solar and wind energy in Indian scenario. Further, government efforts are needed in providing policy support to foster investment in solar and wind power projects.

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