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Present Scenario of Power Sector in India

Kamlesh Gakhar[a], Meetu[b] and Niyati Chaudhary [c]
[a] *Professor , Institute of Management Studies and Research, MAHARSHI DAYANAND UNIVERSITY,Rohtak-124001, Haryana, INDIA.*
[b] *SRF(Senior Research Fellow), Institute of Management Studies and Research, MAHARSHI DAYANAND UNIVERSITY, Rohtak-124001, Haryana, INDIA.*
[c] *JRF (Junior Research Fellow) ,Institute of Management Studies and Research, MAHARSHI DAYANAND UNIVERSITY, Rohtak-124001, Haryana, INDIA.*

Abstract: Infrastructure is a key requirement for the sustained growth of an economy. Within infrastructure, growth in the power sector is one of the most important requirements for such growth. Though, the installed generation capacity of Indian power sector increased over the years. Yet, the power sector lacked in quality, security and reliability. It was characterized by gross under-investments, serious under recoveries and had the highest contribution to the India's fiscal deficit. In the wake of all these difficulties, it was necessary to bring reforms in this sector. The present paper is an attempt to describe the efforts taken by Indian government for the overhauling of this sector since 1991, gaps in its implication and the need for future reforms.

Keywords: Reforms; Sustained Growth; Fiscal deficit

1. INTRODUCTION

Sustained growth in an economy comes with growth from all the sectors, among which growth in the infrastructure sector is a key requirement for growth in other sectors. Within infrastructure, growth in the power sector is one of the most important requirements for the sustained growth of a developing country like India.

The volume of power consumption in every sector of the economy and by all sections of the population of the society shows the sign of the development of the economy. Before the period of liberalization, the Indian power sector was characterized by gross under-investments in the generation sector. Though, the Installed generation capacity grew from 1362 MW at the time of Independence to over 66,086 MW in 1990-91, yet the Power situation lacked in quality, security and reliability (Kundu, 2007). The per capita average annual domestic electricity consumption in India in 2009 was 96 kWh in rural areas and 288 kWh in urban areas for those with access to electricity, in contrast to per capita annual average of 2600 kWh and 6200 kWh in the European Union.

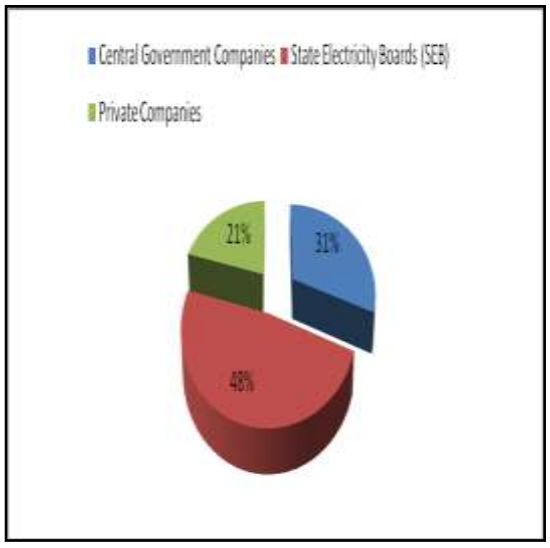
Despite a very low level of per capita consumption, the installed generation capacity was unable to meet the demand of the every sector of the economy. Moreover, transmission capacity bottlenecks were hindrances in the bulk transfer of power from surplus to deficient locations. The distribution sector was plagued by serious under-recoveries with transmission and distribution losses at the world highest level (Kundu, 2007). Revenue crunch made it difficult to make further investment in this sector and thus further increased the demand supply gap. All this made the Reforms in this sector imperative. This paper describes the need for economic reforms in the power sector, the efforts taken by the Indian Government to improve the performance of this sector

since1991, gaps in its implication and the need for future reforms. The present study is descriptive in nature and is based on the secondary data collected from various websites, the web portal of central electricity authority of India.

2. CURRENT STATUS OF INDIAN POWER SECTOR: Indian Power sector, the world's fifth largest sector, had an installed capacity of 205.34 Gigawatt (GW) as of June 2012. An additional 31.5 GW is generated by the Captive power plants. In December 2011, electricity was inaccessible to over 300 million Indian citizens. Over 33% percent of India's rural population lacked electricity, with 6% of the urban population. Of those who had access to electricity, the supply was intermittent and unreliable. In 2010, blackouts and power shedding interrupted manufacturing and irrigation across the country.

2.1 Structure : The majority of generation, transmission and distribution capabilities are either with public sector companies like NTPC having 31% share, State Electricity Boards (SEBs) having 48% share (figure 1). Rest is being dominated by the private companies with 21% of the total capacity.

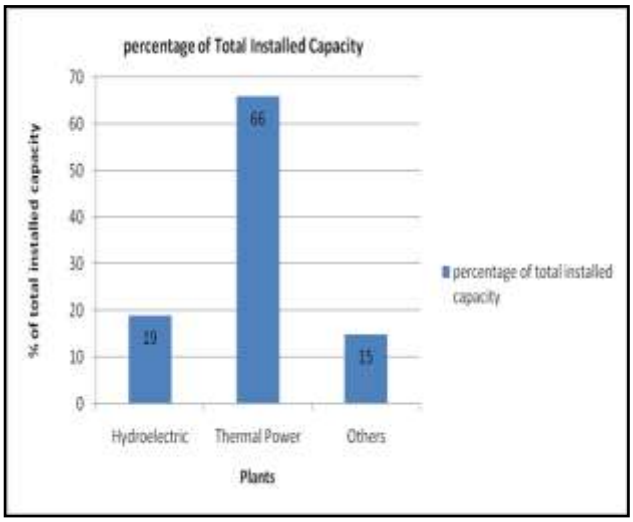
Figure 1: Structure of Power sector



Source: Central Electricity Authority

India has adopted a blend of thermal, hydro and nuclear sources with a view to increasing the availability of electricity. Out of the total installed capacity, thermal power plants constitute 66%, hydroelectric about 19% and rest being a combination of wind, small hydro, biomass, waste-to-electricity, and nuclear. India generated 855 BU (855 000 MU i.e. 855 TWh) electricity during 2011-12 fiscal (figure 2).

Figure 2: Percentage of Total Installed Capacity

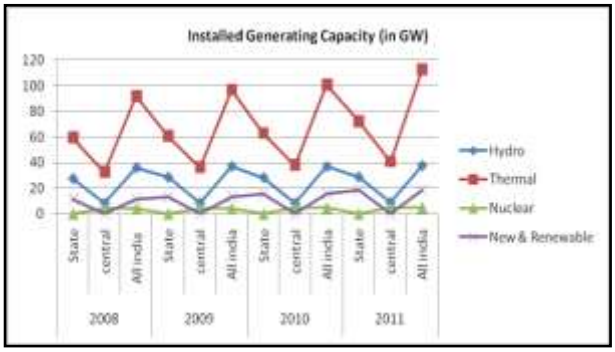


Source: Central Electricity Authority

Thermal mode of electricity is in highest usage (112.82GW) as shown in table 1 and its usage has increased over 2010 by 12% approximately. Nuclear energy is used only at the central level in all years. New & renewable energy is used only at the state level as well as steadily increasing. At the state level thermal power generated is more than the Central level (Table 1).

By having a look on the table 1, we can analyze that the compound annual growth rate of the installed capacity of new & renewable energy has increased by 65.74% at the all India level. After the renewable energy, installed capacity of thermal energy has increased. Its installed capacity has been increased by 22.76%. CAGR in Hydro and nuclear energy‘s capacity has increased 4.62% and 16%Respectively.Reason for less percentage increase in nuclear energy, in comparison to thermal and renewable energy, may be the high cost of uranium. But the usage of hydro utilities should be increased keeping in mind its environment friendly nature.

Figure 3: Installed Generating Capacity of Electricity (Utilities) in India (In GW)



Source: Central Electricity Authority

The consumption of all resources for generation of capacity has depicted an increasing trend in all the years. Now a day's Thermal is at the top for the generation of electricity followed by Hydro. Nuclear is least consumable utility for the generation of electricity (figure 3). The projected generating capacity of all the utilities by the year 2020 will be 42 GW in hydro (figure 4), approximately 170 GW in thermal (figure 5), 7 GW in nuclear (figure 6), 40 GW in New & Renewable (figure 7). As per expectation, thermal source will be used more for the generation of electricity in comparison to the current scenario.

Figure 4: Projected generation capacity of Hydro Power

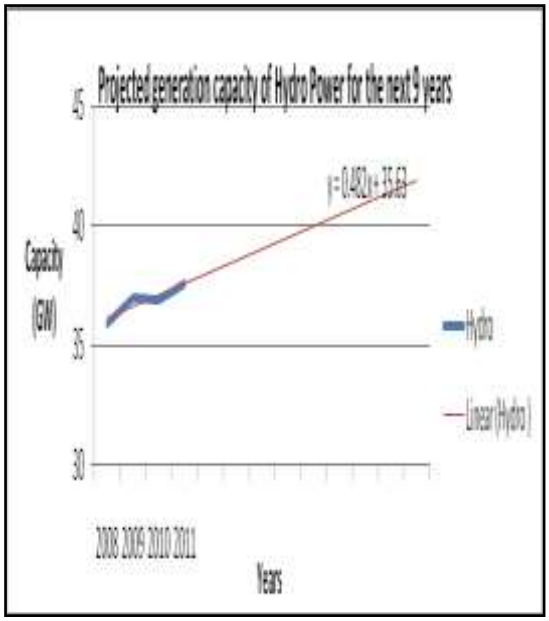


Figure 5: Projected generation capacity of Thermal Power

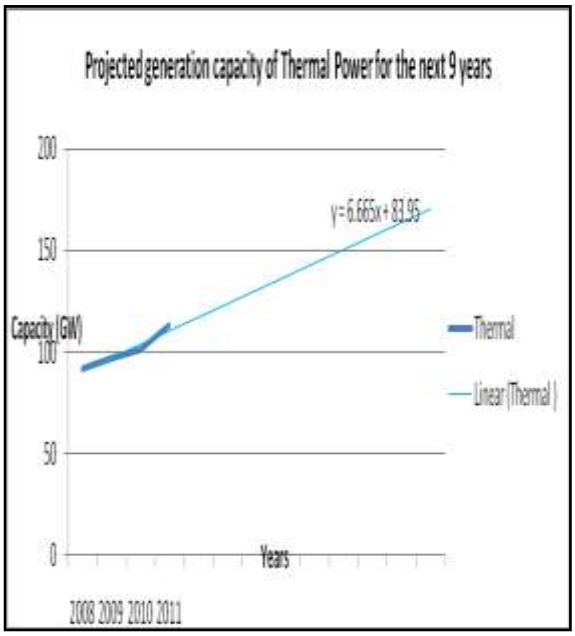


Figure 6: Projected generation capacity of Nuclear Power

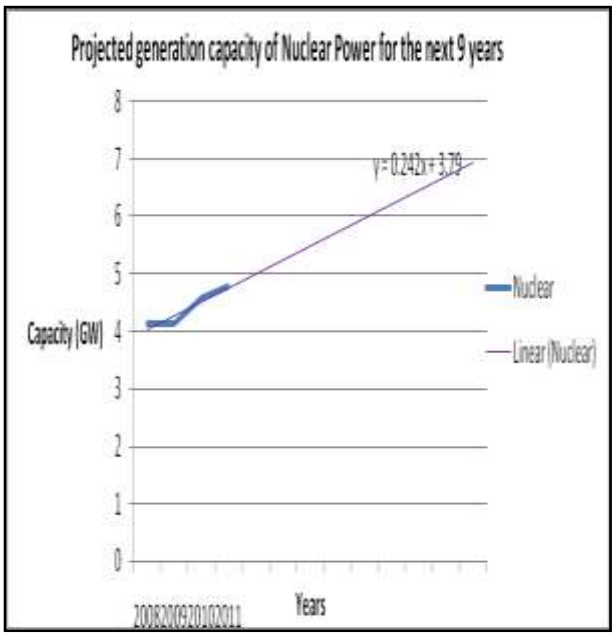
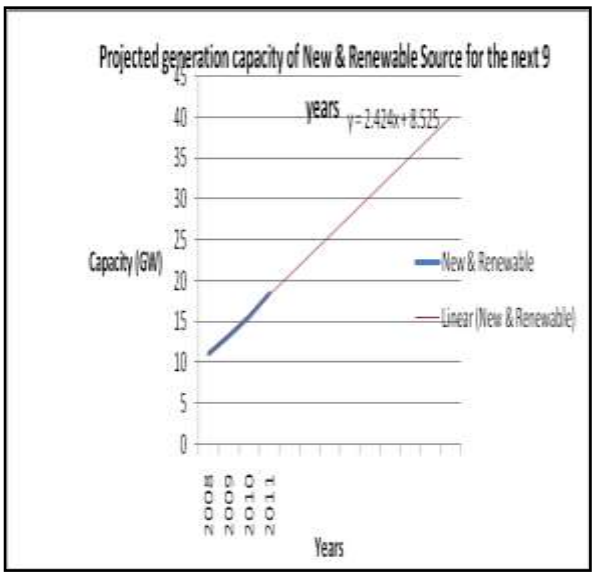
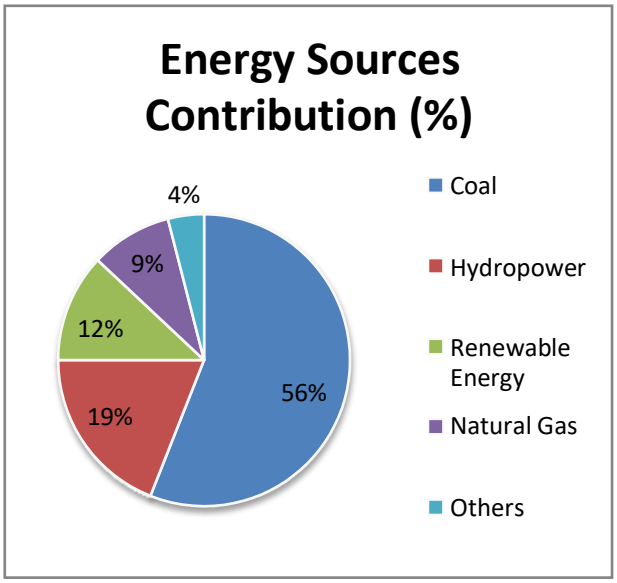


Figure 7: Projected generation capacity of New & Renewable Source



In terms of fuel, coal-fired plants account for 56% of India's installed electricity capacity. After coal, renewal hydropower accounts for 19%, renewable energy for 12% and natural gas for about 9% (Figure 8).

Figure 8: Energy Source Contribution



Sources: Central Electricity Authority

3. INDIAN POWER SECTOR REGULATION:

Prior to the Enactment of Electricity Act 2003, the electricity supply in the country was governed by three enactments namely: the Indian Electricity Act, 1910, the Electricity (Supply) Act, 1948, the Electricity Regulatory Commissions Act, 1998.

The Indian Electricity Act, 1910 provided basic framework for electric supply industry in India through private licensees. It laid down legal framework for lying down of wires and other works and provisions for relationship between licensee and consumer.

The Electricity (Supply) Act, 1948 mandated creation of State Electricity Boards (SEBs) and the need for the state interference for electrification all across the country.

The Electricity Regulatory Commissions Act, 1998 provided the provision for setting up of Central / State Electricity Regulatory Commission with powers to determine tariffs and distancing of Govt. from tariff determination.

The Electricity Act, 2003 encouraged Private Sector participation in Generation, Transmission & Distribution. It suggested the distancing of regulatory responsibilities of Government to Regulatory Commission a need for harmonizing and rationalizing the provision in the Indian Electricity Act 1910, Electricity (Supply) Act 1948 & Electricity Regulatory Commissions Act 1998.

4. REVIEW OF LITERATURE:

Being one of the fastest growing economies and the second largest populated country, India represents an attractive destination for the power industry. Among all others sectors, power sector plays a crucial role in the development of an economy. But now a days, it has been suffering from various problems. Among all utilities, the power sector has been the highest contributor to the fiscal deficits of the country and the efforts to revert the situation have not been very successful so far (Singh and Srinivasan 2002). In the state of Assam, there is only less than 25% of the population which has access to electricity. The prevailing situation is one of less opposition to more drastic reforms due to the poor quality of power supply (Santhakumar, 2003c). Lack of funds for the electricity boards, and the use of government finance for the provision of subsidy to the connected consumers are major factors that work against the extension of electricity supply to these households (Santhakumar, 2003a; Energy Infrastructure Services Project, 2000). The public sector organizations, due to financial non viability, were unable to enhance capacity to the required levels, as done by the private companies (World Bank, 1996). This made the government to go for the privatization of the power sector.

In India, early policy reforms aimed at inviting private participation for investment in electricity industry failed to attract adequate investment (Dossani, 2004). Power sector reforms in India were initiated in the face of endemic capacity and energy shortages and increasing subsidy burden on the states (Santhakumar, 2003). A summary table having all relevant literature has been given in annexure 1.

5. NEED FOR THE REFORMS

All over the world, new regulatory schemes and organizational reforms were implemented to improve the incentives for efficient operation of electricity utilities. These reforms were introduced for bringing competition into the electricity supply industry. Reforms were initiated in Indian power sector due to commercial losses, due to poor fiscal health of State Utilities and increasing subsidy burden on the states. Kannan and Pillai (2001a) have argued that the reforms are driven by the demands of the intermediate classes within India and the external agencies on the other hand. Sagar (2004) states that the reforms in Delhi were not driven to do budgetary advantages to the state government, but to bring turnaround in power sector to improve the quality of service to the level expected by the electorate.

The Government of India, in 1991, introduced an ambitious program of reforms in this sector for achieving the following objectives:

- To improve the efficiency of Indian power sector so as to achieve the intended targets with the minimal wastage of time and efforts.
- Public sector utilities were suffering from the problem of financial non-viability. They had been the highest contribution to the fiscal deficits of the country. To make these public enterprises financial viability of the utilities. So, there was need to make these utilities financially viable.
- To make the utilities capable of investing for and providing the quantity and quality of electricity desired by the society.

- To provide autonomy and adequate incentives to the employees of power enterprise, and to make them accountable.
- To enable utilities to buy adequate power from generating companies.
- To increase the capability of public utilities to invest in power generation.
- To promote competitiveness and progressively involve the participation of the private sector, while ensuring a fair deal for consumers**.**
- To introduce competition in the power sector for removing monopoly.
- To promote efficiency, economy, and safety in the various stages of power generation and use of electricity in the State.

6. POWER SECTOR REFORMS:

Power Sector Reform Project was designed to undertake the following:

6.1 Reforms In Distribution:

India was facing its worst ever balance-of-payments crisis and was on the verge of defaulting which would have reduced India‘s bond rating in international credit markets. The Electricity Laws (Amendment) Act of 1991 was enacted to encourage the entry of privately owned generators. Further amendments were carried out in 1998 when the transmission sector was also opened for private investments subject to the approval of the Central Transmission Utility (CTU). The private investors were offered a guaranteed 16 percent return in equity with a full five year tax holiday. The required debt-equity ratio was also kept at 4:1. These projects were also given sovereign guarantees and escrow benefits in case there were defaults on part of the SEBs. Eight projects were brought on the ‒fast-track‖ route where Government approvals were quickly expedited. At national level 98% feeders and 88% of the consumer have been metered so far.

The overall distribution loss levels, while remaining high in absolute terms, have shown improvement on account of improvement in the areas of energy audit, system strengthening, rural load management, and prevention of theft.

After 1998 reforms, Electricity Act 2003 was constituted. It comprised regulations / policies such as provision / planning of electricity and network, shift from the single buyer model to the multi buyer model; delicensing of thermal generation; harnessing captive generation / renewable energy resources, grant of open access in transmission and distribution; identification of trading as a distinct activity; reorganization of the SEBs; supply of subsidized electricity only on timely payment by the State Government concerned; performance based cost of service regulation, competitive procurement of power, merit order dispatch / availability based Tariff, multi year tariff framework, transmission pricing framework, tariff rationalization through the phased reduction and elimination of cross – subsidies, trading margin, etc. Electricity Act 2003 was later amended in the year 2007, which primarily omitted the clause; ‗elimination of cross subsidies‘ while retaining the provision for reduction of cross subsidies. However, nothing really happened with this enactment. Even after the reforms, distribution segment has continued to be dominated by State distribution companies (DisComs).

6.2 Reforms In Regulatory Development: Recent regulatory developments are highlighted below:

6.2.1 Changes in Mega Power Policy:

It includes, extension of customs duty / tax benefits to expansion projects, relaxation in terms of power supply to more than one State, relaxation on procurement of power equipment through international competitive bidding, extension of benefits to supercritical technology, etc.

6.2.2 New Tariff Regulations For Generation & Transmission Projects For Next Five Years (2009-14):

The Central Electricity Regulatory Commission (CERC) issued new tariff regulation including raising of base rate of return on equity for central sector projects, revision / rationalization of various financial and operational norms / factors / parameters pertaining to tariff computation, incentives peak load generation & protection of hydrological risk in case of hydro power projects, etc. The new regulations will also be the guiding principle for the State Electricity Regulatory commissions in arriving at tariffs for their respective state generation / transmission companies / projects.

6.2.3 Competitive Procurement Of Power For All New Power Projects:

The existing public & state power generating companies & Hydropower projects have been exempted to supply power to the distribution utilities through competitive route till January 2011. Thereafter, all the generating companies need to compete through competitive tariff bidding route to supply power to the distribution licensees.

6.2.4. Amendments In Competitive Bidding Tariff Guidelines:

Ministry of power has recently amended the guidelines for tariff determination for procurement of power by distribution licensees through competitive bidding. The amended guidelines aim to attract serious players, to bring about greater efficiency and transparency in the tariff determination process and also promote development of power market.

6.2.5 Tariff Regulations For Renewable Energy (Wind, Small Hydro, Biomass, Co Generation, Solar Pv And Solar Thermal):

These regulations include specifying capital cost norms and fixing tariff upfront for the whole tariff period for the above renewable sources.

6.2.6 Introduction Of Renewable Energy Certificate (Rec):

As per the REC mechanism, there will be a central level agency to be designated by the Central Commission for registration of Re Generators participating in the scheme. The RE generators will have two options – either a) to sell the renewable energy at preferential tariff fixed by the concerned Electricity Regulatory Commission or b) to sell the electricity generation at average cost of power supply and environmental attributes associated with RE generation separately. On choosing the second option, the environmental attributes can be exchanged in the form of REC.

6.2.7 Gbis For Wind Projects:

Government of India has extended the Generation based incentive scheme for grid connected wind energy projects to maximum capacity limit of 4000 MW, wherein an incentive of Rs. 0.5 per unit above the fee in tariff is provided.

6.2.8 Grant Of Connectivity Long Term And Medium Term Open Access In Inter State Transmission, 2009 (Amendment Sept. 2010):

Any generating plant having installed capacity of at least 250 MW (50MW is case of Hydro) and any bulk consumer can seek connectivity to interstate transmission system. Medium term open access would be available for any period between three months to three years and it shall be provided on the basis of availability of transmission capacity in the existing transmission system. No augmentation of transmission system is envisaged for granting medium term open access. Long term access can be availed for any period between 12 years to 25 years and might require construction of new transmission capacities.

6.2.9 New Transmission Tariff Mechanism:

In accordance with the Electricity Act 2003, National Electricity Policy 2005 and National Tariff Policy 2006, CERC recently notified regulation pertaining to sharing of interstate charges and losses that is sensitive to distance, direction and quantum of flow. These regulations would implement point of connection method of sharing the cost of inter state transmission services as well losses among the users in India, replacing the present system of regional postage stamps.

6.2.10 Amendment To Inter State Open Access Regulations:

CERC has amended the inter state open access regulations in a bid to streamline and rationalize the processes involved in obtaining open access which is likely to benefit power deficit states, consumers as well as trading companies.

6.2.11 Restructuring Of Unscheduled Interchange (Ui) Mechanism:

CERC has come out with new regulations restructuring the UI mechanism to avoid UI as a trading route and promulgate discipline among distribution utilities to go for planned procurement of electricity and thereby creating environment for investors to set up new power plants. Presently, many utilities postpone setting up of power projects and rely on overdraw from the grid for meeting the consumers demand.

6.2.12 Grid Code Regulations 2010:

CERC has revised grid code which inter alia include the following revisions / additions;

a) The financial burden of all the fluctuations from schedule in case of new solar energy plants and the fluctuations within 30% of schedule in case of new wind energy plants will be borne by all the users of inter state grid.

b) The new grid code will also put in place a scheduling mechanism for renewable energy like solar and wind. It will enable the power plants to operate on –must run‖ principles, instead of –merit scheduling.

6.2.13 Ring Fencing Of Sldcs:

CERC has advised the Centre to take up with the states, the separation of management and controlling interests between entities operating SLDCs and the entities engaged in distribution / trading activities to have a non discriminatory open access.

6.2.14 New Interstate Trading Regulations 2009:

The new Trading regulations aim to tighten the term & conditions for grant of trading licence keeping in view current price of the trading power, liquidity requirements of the power trading business and to encourage the only serious players intending to undertake trading business. Power, having been imported from other countries fro resale in the domestic market is also covered under these regulations. As on FY 2009, CERC had issued trading licences to 42 companies such as Tata Power, Reliance Energy, RPG Power, GMR Energy and DLF Power, etc.

6.2.15 CERC Allows Term Ahead Contracts:

CERC has allowed the power exchange to launch term ahead contracts, which are likely to permit sale of energy over a longer period and thus facilitate better planning procurement and load management of power by distribution utilities / consumers.

6.2.16 Power Market Regulations:

The regulations inter alia comprise introducing concept of derivatives contracts, financial settled exchange traded derivatives and other innovative contracts like capacity and ancillary services contracts. However, derivatives would be introduced from a date to be notified when the supply deficit scenario improves and sufficient liquidity gathers in day ahead market.

6.2.17 Generating Company Permitted To Distribute Electricity In Rural Areas

Section 14 of the Electricity Act, 2003 allows any generator of electricity to distribute electricity in rural areas without the requirement of any license, subject to compliance with the measures as mainly specified by the Central Electricity Authority under section 53.

6.2.18 Third Power Exchange In The Country

Central Electricity Regulatory Commission has given its approval to set up third power exchange in the country which will be owned by National Thermal Power Corporation, National Hydro Power Corporation, Power Finance Corporation, and Tata Consultancy Services.

6.2.19 Automatic Approval For FDI

Automatic approval (RBI route) for 100% foreign equity is permitted in generation, transmission, and distribution and trading in power sector without any upper ceiling on the quantum of investment.

6.2.20 Captive Power Plants

The electricity Act, 2003 does away with the requirement of approval/clearance of any authority for setting up a captive generating plant. The new law also ensures non-discriminatory open access for

transmission of electricity generated from a captive generating plant to the destination of its use, subject to availability of transmission capacity.

6.2.21 Setting Up Of Ultra Mega Power Projects

The government of India had launched an initiative for the development of coal-based Ultra Mega Power Projects (UMPPs), each with a capacity of 4,000 MW. The objective of the initiative is to obtain tariffs utilizing economies of scale and to mitigate the risk relating to ties up of land, fuel, water and other statutory clearances.

6.3 Future Developments In Transmission

Government of India is planning to develop National Inter State transmission Grid with interregional transfer capacity of 37,700MW at an investment of Rs. 55,000 crore by FY 2012. The power grid of the future is expected to be more intelligent, effective and environmentally sensitive comprising of several elements such as Ultra High Voltage / HVDC (765KV ac, 800KV HVDC and 1200 KV AC) lines, flexible alternating current transmission system (FACTS), dynamic control systems, wide area monitoring system and distribution network management.

Power Grid Corporation of India Ltd (PGCIL) is planning an additional investment of Rs. 80,000 crore over the next eight years to build transmission corridors and strengthen the grid in the country. PGCIL is planning to complete nine transmission corridors over next five years to evacuate 50,000 MW of upcoming projects by IPPs in various States. PGCIL is also exploring to set up transmission project to evacuate power from neighbouring countries such as Myanmar, Bangladesh, Nepal, Bhutan and Sri Lanka. Seven transmission projects with investment of Rs. 5000 crore have been planned during Eleventh Plan period, while 14 other (Ultra Mega Transmission Projects) at an investment of Rs. 20,000 crore have been identified by the empowered committee on transmission that are to be awarded through tariff based competitive bidding to the private sector.

More reforms in the field of administrative, legal, structural, and regulatory front are also required for fast completion of projects, higher ceiling on investment without approval, breaking down SEBs into manageable entities, and setting up of regulatory mechanism to rationalize power tariff and promote efficient policies.

7. WHAT REFORMS DON'T ADDRESS DIRECTLY

Though the reforms were targeted to bring an overall improvement in the power sector, yet there are still many areas where these reforms lagged behind. These are:

- Price fixation process by the utilities is not transparent.
- No accounting for variable costs by the utilities makes it difficult to fix the price for the electricity.
- There are still different regulations at the centre and the state level. Due to the lack of uniformity in legal rules, sometimes, clashes generate. This problem needs to be resolved.
- Without a load duration curve, all generators want to operate as much as they can. Moreover, plant load factor is a dangerous measure of performance.
- There is no single price fixation method for in-state (SEB) plants.

8. FUTURE REFORMS

There is a big gap between the suggested reform measures (privatization, tariff reform, anti-theft measures) and their implementation (Lal, 2005). Regulators have not been much successful in handling the problems of power supply to agriculture (Sinha, 2005). Therefore, there is a need to bring some future reforms in the power sector. These are:

- Open access philosophy need to be brought into the power sector.
- Government should make the private entities to operate on their own because helping private players and some consumers might hurt the SEBs/current utilities.
- Need for more transparency in power policies related to production/generation and distribution/transmission.

9. CONCLUSION AND RECOMMENDATIONS

On the basis of above analysis, we can conclude that many reforms have been introduced in the power sector like setting up of Ultra Mega Power Projects, new transmission tariff mechanism, automatic approval for FDI, restructuring of Unscheduled Interchange(UI) mechanism, but still there is need to amend the procedure of the power sector process in the context of tariff determination and procurement of power.

- Nuclear source is least preferred for the generation of the power. It should be used for the power generation.
- There is no transparency in the prices.
- New and renewable resources like wind are more economical, but their use is minimal. So these resources must be used for the economic generation and proper utilitisation of available resources.
- There is need for more options for power development in India in context of technology and economic growth.
- There is also need for more invention in the area of environmental and ecological aspects
- The global trend of fuel availability and its pricing must be taken into consideration
- There is still the need to increase the role of private sector in power generation and to encourage new Independent Power Producers (IPPs) in power generation sector.
- There is a requirement to expand domestic production in critical energy sub sectors, notably petroleum and gas & coal.
- Imports in energy sector needs to be encouraged to meet the mismatch between domestic demand and supply.

REFERENCES:

[1] Bhatia, Bhavna and Gulati, Mohinder 2004, Reforming the Power Sector:controlling electricity theft and improving revenue, the world bank group.

[2] Dossani, Rafiq 2004, ‐Reorganization of the power distribution sector in India‖, Energy Policy,Vol. 32, 1277-1289.

[3] Energy Infrastructure Services Project 2000. Social and Gender Impact Assessment of power Sector Reforms in Kerala, Trivandrum: Kerala State Electricity Board.

[4] Venugopal, K. 2011. Reforms in the Indian Power Sector: Status,Issues & the way forward, Tamil Nadu Electricity Regulatory Commission.

[5] Kannan, K.P. and Pillai, N.V. 2001a, ―Plight of the Power Sector in India‖, Economic and Political Weekly, January 13&20, 130-139; 234-246.

[6] Kundu, Sridhar 2007, ―Power Sector Reforms: Are They Headed in a Right Direction?‖, ORF Energy News Monitor, Vol. 40.