Performance Evaluation of Power Sector: Pre & Post Electricity Act, 2003 and Their Implications

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Abstract - Structure of power sector all around the world is changing from regulated to deregulated environment to enhance the technical efficiency and financial viability through private sector participation. This paper discusses the major policy and regulatory changes occurred in Indian power industry and also evaluates the implication of the provisions of the Electricity Act 2003 for Indian power sector.

Keywords - Restructuring, Electricity Act 2003, Power generation, Transmission and distribution.

I. INTRODUCTION

Electricity industry, throughout the world, is currently undergoing restructuring and adopting the deregulated industry structure for better utilization of the resources and for providing choice and quality service to the consumers at economical prices. The objective of reformation is to discover market oriented measures for electricity generation and supply to increase the efficiency of natural monopoly activities of transmission and distribution [1]. Performance evaluation plays vital role in structural reforms in facilitating an understanding of the behaviour of electric utilities. Organizations can compare themselves with the best in the class through benchmarking, and this will help them to develop strategic plans for the improvement in their performance [2].

The electricity Act 2003 provides the paradigm shift that was required by the power sector in India for encouraging competition and private participation and introduce innovative concept like power trading, open access, appellate tribunal and special provision for rural electrification. Due to this act single buyer model adopted for reforms is to be replaced by multiple buyer model, their by transforming the Indian power sector.

The Act is made it mandatory for all the states to restructure their SEBs which are previously unviable and inefficient [3]. However these reform steps were not sufficient to bring about commercial viability of SEBs. This called for focus attention to problems affecting the customers and utilities inter-face.

This paper presents a brief account on the implication in generation, transmission and distribution system and major policy and regulatory changes in power sector under taken by central and state governments for the development of power sector of India.

II. OVERVIEW OF INDIAN POWER SECTOR

The Indian power sector has made remarkable progress since Independence. The total installed capacity has gone up from 1,362 MW in 1947 to more than 2,00,000 MW in 2012 and the transmission network has increased from the isolated system concentrated around urban and industrial areas to country wide National Grid. However, the demand of electricity has always been overstepping the supply. The importance of electricity as a prime mover of growth is very well acknowledged and in order to boost the development of power system the Indian government has participated in a big way through creation of various corporations viz State Electricity Boards (SEB), National Thermal Power Corporation (NTPC), National Hydro-Electric Power Corporation (NHPC) and Power Grid Corporation Limited (PGCL) etc. However, even after this the country is facing power shortage in terms of energy as well as peak demand to the tune of 10.9% and 13.8% respectively.

III. ELECTRICITY ACT 2003

The Electricity bill 2003, which replaced the earlier act, approved in Indian parliament in May 2003, aims to enhance the scope of power sector reforms. This Act consolidates all existing laws and introduces provisions with respect to new developments in the power sector to improve competition, end-use efficiency as well as reliability.

Salient Features [4]

Some of the major provisions of Electricity Act 2003 are:

1. Generation has been delicensed and captive generation is being freely encouraged and permitted. For hydro projects, an approval of state government and clearance from the CEA are needed to check the safety aspects and optimum utilization of water resources.
2. There will be government owned transmission utilities at the central as well as state level, having the responsibility of ensuring that the transmission network is developed in a planned and coordinated manner to meet the requirements of the sector. The load dispatch function can be integrated with or separated from the transmission utilities and in either case it will remain under government control.

3. Provision for private transmission licensee has been made in this Act.

4. Open access in transmission with provision of surcharge for cross subsidy and this surcharge will be gradually phased out.

5. Distribution licensees are free to undertake generation and generating companies are free to take up distribution licences.

6. For rural and remote areas stand alone systems for generation and distribution would be permitted. This provision seems to be aimed at encouraging captive power plant and distributed generation.

7. For rural areas delicensed management of distribution through panchayats cooperatives, etc. Would be permitted.

8. Regulatory commission are authorized to issue a licence for power trading and they will fix up the upper limit on power trading margins.

9. If there is directly commercial agreement between a consumer and generating company or trader, the price of power would not be regulated and only the transmission and wheeling charges with surcharge would be regulated.

10. State governments can convert SEBs into companies or continue them as distribution licensees.

11. An appellate tribunal has been created for disposal of appeals against the decision of CERC and SERC so that there is speedy disposal of such matters.

IV. INDIAN POWER SECTOR MODELS

1. Pre-2003 Model

The efforts to restructure the power sector in India formally commenced in the year 1991. Act 1991 allowed private sector & Independent power producer (IPP) participation in power generation and also permitted foreign companies to build up power projects in India. This increases power generation capacity due to IPPs, private licences & captive generation. These were regulated by a regulator known as regulatory Commission. Also transmission & distribution are regulated b same regulator. The regulations were government undertaking bodies such as Central Electricity Regulation Commission (CERC) & State Electricity Regulation Commission (SERC).

These commissions were formed in 1998. Overall there was no competition in whole process.

The issue before the government was not the achievements in every sector; it was to achieve a benchmark or reformation so that the stakeholders of generation sector could be satisfied. The Government was therefore, inclined to take steps that would expedite the reforms and restructure the Power industry. Thus act 2003 was passed.

2. Post-2003 Model

Electricity Act 2003 was enacted on 10th June 2003. This act promotes competition, protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies, constitution of Central Electricity Authority (CEA), Regulatory Commission and establishment of Appellate Tribunal.

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CENTRE

The Ministry of Power is primarily responsible for perspective planning, policy formulation, processing & Monitoring of projects, training & manpower development, enactment of legislation with regards to thermal & hydropower generation, and transmission & distribution. Central Electricity Authority (CEA) has the responsibility of formulating the National Electricity Plan in accordance with the National Electricity Policy. CEA specifies the technical standards and safety requirements for power systems.

PGCIL, which is the central transmission utility (CTU), undertakes transmission of energy through inter-state Transmission system and discharges all functions of planning and coordination relating to inter-state transmission system with different utilities.

The CERC regulates the tariff of generating companies, governmental and private. For this, the commission is required to notify regulations, grant licenses and formulate a tariff setting mechanism.

As entrusted by the Electricity Act, 2003, CERC has the responsibility to:

- Regulate the tariff of generating companies;
- Regulate and determine the tariff for inter-State transmission;
- Issue licenses for transmission and electricity trading;
- Specify Grid Code with regard to Grid Standards;
- Specify and enforce standards with respect to quality, continuity and reliability of service.

The Commission advises on the formulation of National Electricity Policy and Tariff Policy. The Commission intends to promote competition, efficiency and economy in bulk power markets, improve quality of supply, promote least cost investments and thus, foster the interests of consumers.

The system operators monitor and command grid at national & regional level, National Load Dispatch Centre (NLDC) & Regional Load Dispatch Centre (RLDC) are system operators respectively.

The Tribunal is conferred with original jurisdiction to hear petitions and issue directions to all Commissions for the performance of their statutory functions.

STATE

The main function of State Electricity Board (SEBs) is to plan and implement power development programmes of generation, transmission, and distribution of electricity in their states. They undertake transmission of energy through intrastate transmission system and discharge all functions of planning and coordination relating to intrastate transmission system with central transmission utility, state governments, generating companies etc.

SERC function as CERC but at state level, it has responsibility of determination of tariff and grant of license at intra-State level. Similar to the CERC, SERCs have the responsibility to determine the tariff for generation, transmission, distribution and wheeling of electricity within the state. SERCs regulate electricity purchase and procurement process of distribution licensees including the price for distribution and supply within State. They are expected to promote cogeneration and generation from renewable sources of energy etc. The state commissions are required to follow same guidelines as framed by the central commission. This would ensure uniformity of methods at the cost of reduced autonomy.

In this way the Electricity Act 2003, which replaced the earlier act, also envisaged the development of independent regulatory commissions, open access in transmission, private investment in transmission, open access in distribution for large consumers and provision for multiple distribution licenses in the same area as shown fig. II

This act makes thermal power generation a delicenced activity, freely permits captive generation and energy is transferred by transmission line.

There has been an appreciable reduction in the bulk electricity tariff due to reduction in Return on Equity from 16% to 14% for the tariff period 2004-09 which directly reduced the cost of bulk power. The CERC has adopted a Debt Equity ratio of 70:30 for any new investment from an earlier ratio of 50:50 so as to reduce the cost of production for tariff purpose. Recovery of depreciation in tariff has been rationalized by linking it to useful life of the assets. The accelerated rate of depreciation of 7.5% allowed to thermal generating station has been dispensed with so as to reduce front loading of tariff and reduce price of electricity to the state utilities.
The transmission network is governed by CTU (or PGCIL) & RLDC. The Commission has categorized open access customers into two broad categories, Short Term and Long Term Customers. Allotment priority of long term open access customers is to be higher than the short term customers. The Commission has designated the nodal agency for long term access to be the Central Transmission Utility, PGCIL. For short term access, the nodal agency is regional load dispatch centre of the region in which the point of connection is located. These do not take part in trading of electricity.

National Tariff Policy expects transmission tariff framework to be sensitive to distance and direction. CEA had suggested a variant of incremental postage stamp method, whereby the country is demarcated into 14 zones. Charges between various zones would be counted by the physical distance and the mode of transmission (i.e. actual flow or displacement). A matrix of stamps between various zones, also based on notional distances had been suggested.

The RLDCs are responsible for scheduling of central sector generating units only. SLDCs send the requisition to the RLDCs against their entitlements out of available power from central sector generation (CGS) and the RLDCs allocate total available power to various states in the ratio of their entitlements. Day-to-day operation of the regional grid is carried out by RLDCs, which are under the operational control of Central Transmission Utility (CTU), i.e. Power Grid Corporation of India Ltd.

State Load Dispatch Centre (SLDCs) are carrying out the optimum scheduling of the state generating Units. Further, the state allocates the total power received from RLDC to various DISCOs & bulk consumer according to their respective requirements.


Performance can be evaluated on the compare study in following areas:

1. Per capita electricity consumption.
2. Energy requirement, availability & shortage.
5. Transmission & distribution losses.

1. The power sector is a primary mover and an effective engine of economic growth. The country has been experiencing 8% GDP growth rate over the last few years and to sustain this pace of growth, contribution by power sector is substantially important. In the year 2004-05, per capita electricity consumption in India is 618, which is approximately only 24% of world’s average per capita consumption. It is also very low in comparison to the comparable developing countries e.g. China, Brazil etc.
2. The power sector faces high energy and peak demand shortages. Peaking shortage and energy shortage was 11.3% and 8.1% in the year 1997-1998 and has been increased to 11.9% and 11.1% respectively year 2008-09. In order to reduce energy and peak shortages and to meet the increasing demand in the coming years, during the 11th plan, another 62475 MW of generation capacity will have to be added.

3. The generation expansion programs during this decade suffered substantial slippage from targets. Capacity addition as a percentage of targets during the 8th, 9th and 10th five year plans of 54%, 47% and 75% respectively. However the shortfall in the 10th plan has been partly offset by improved plant performance and reduction of T&D losses.

4. In the year 2008-09, the overall PLF of power station is found to be 77.2% with the 84.3% central owned stations, 71.2% state owned stations and 91% private owned thermal stations which is presented in Fig. Private thermal stations and central thermal stations exhibited marked increase of 30.9% and 20.4% in PLF respectively during 1997-2009.

5. T&D losses were 24.79% in the year 1997-98 and increased to 28.65% in the year 2006-07 which is exhibited in Fig. No significant changes observed in T&D losses during period 1997 to 2007. Aggregate Technical and Commercial losses still prevail around 30% in SEBs.

6. The national average collection efficiency has also improved from 92.91% during 2002-03 to 94.72% during 2005-06. The reduction in theft and pilferage of power was an important activity, utilities had to undertake towards reducing AT&C losses and achieving the commercial viability.

V. ELECTRICITY ACT 2003 : IMPLICATIONS & ISSUES
A. Generation

The Indian Power Sector is plagued by demand-supply gaps. The demand has continued to grow at a compound annual rate of growth of nearly 8% and has outstripped the supply leading to energy shortages.
Electricity Act 1991, the Indian power sector was opened for Independent power producers (IPPs), but the results were not as desired. By March 2002 the private sector contribution stood at only 11% by way of the installed capacity, with negligible contributions of private sector through the diesel, hydro and nuclear route.

The pace of the reforms, therefore, required drastic acceleration as a consequence of which the Electricity Act 2003 has been introduced. As the IPPs will not be dealing with financially week State Electricity Boards (SEBs), as is the case now, the problem of timely recovery of dues will decrease, resulting in better payment security for the industry and marked improvement in the cash-flow status of the generating companies.

The Act is also likely to have a positive impact in the captive power generation. all the captive capacity in the country is thermal based, with hydel projects accounting for only about 1% of the total capacity. The policies so far were not properly defined and were non-uniform with considerable variation amongst various states. Substantial policy differences existed in terms of wheeling and banking charges, third party sales, and fuel use and size restrictions on CPPs, so that the overall scenario was confusing for any investor.

The Act in its present form does leave certain issues like likely dominance of few generators resulting in increased prices and absence of defined mechanisms for preventing such price increase as partly addressed.

### B. Transmission

With the introduction of the Electricity Act 2003, The Act permits multiple licenses in parallel transmission and distribution lines, thereby making a provision for private transmission licenses and in the process providing a fillip to power trading. Thus the Act will introduce non-discriminatory open access to network.

NLDCs shall be operated by Government but shall not engage in the business of trading in electricity. Similarly RLDCs and SLDCs will take care of Regional dispatch and intrastate dispatch respectively; they are also governed by Government and shall not be engaged in the business of trading of electricity.

The Act has entrusted the State Transmission Utilities (STUs) with critical planning function to ensure that congestion does not occur. The System Operators (SOs) need to implement the rules of open access but the ownership could be contentious issue. Separation of responsibilities between State transmission utility (STUs) and System Operator (SO) with regard to the planning and implementation are not clearly outlined in the Act and would need to emerge through the regulatory process.

### C. Distribution

The Indian State Electricity Boards (SEBs) are mired in poor financial health due to continued subsidies that are currently 1.5 % of national GDP, resulting in gap between the national average cost of generation of Rs 3.50 per unit and the average realization of only Rs 2.50 per unit.

By 1999-2000, the Tariffs for the industrial sector became 15 times that in the agriculture sector and 2.1 times that in the domestic segment. Despite continuing reforms cross subsidies have continued to thrive due to political compulsions and serve as a rational for helping the underprivileged. Such subsidies continue despite the recognition that cross-subsidy regimes prove counter-productive in the long run and are essentially sub-optimal.

The Act in its present form does leave certain issues in T & D like undefined mechanism for cross subsidy surcharge, lacking in scheduling & settlements in STU for transmission. For distribution, Act defines cross subsidy must be eliminated, but does not define time for elimination of cross subsidy. Strengthening of open access & free captive generation, so as to reduce paying customer base of DISCO

### VI. CONCLUSION

This paper considers all the recent changes in Indian electricity market and implications of act-2003. The success of legislation depends on the implementation of regulations. The uncertainties in the market could be checked by proper functioning of government & private bodies. Reformation of regulation on time & transparent coordination among commissions is needed. Act -2003 is expected to deliver Indian consumer benefits of deregulated regime. It also expected to create environment that fosters huge investment in Indian power sector for capacity addition & increased efficiency of the system.

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