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Review of State Electricity Boards and Indian Energy Sector: A Case Study

Rudra Rameshwar *[1], Rajat Agrawal* and Mukesh Kumar Pathak*

Abstract *– Energy is one of the important inputs for economic progress of a country. Power generation is a key parameter in the development of recent economies and the augmentation of productivity. The main objective of the present paper is to review; compare the performance of SEB's and effect on energy sector in India. The paper discusses the more important of the problem areas holding up significant economic gains that could be realized through cost reductions, operation of market forces, needed levels of investments and targeting of resources to promote equitable growth. The slow rate of progress is a matter for concern.*

The state governments were unenthusiastic and conflicting to the unbundling of electricity boards, but according to the power research and recent studies, restructuring has improved the performance of these boards. The present research paper concludes with few case studies of unbundling of SEBs in India.

Keywords *– Energy, energy efficiency, peak demand, peak met, SEBs.*

1. OBJECTIVES AND SCOPE OF THE STUDY

Power and energy have turned into a primary issue with the state governments managing the electricity boards. The main objectives of this paper are to review and compare the growth of state electricity boards (SEBs) in India and what is being done by the state governments to bring back their economic fitness. The paper attempts to assess the status of restructuring and reforms in India by inspecting a case study of few state electricity boards and search of new methods of studies for monitoring the performance of these boards.

2. INTRODUCTION

Per capita energy consumption is one important indicator of standard of living in a country. energy crisis is due to the hike in world's population and human beings daily needs. To fulfill these needs electricity is required in sufficient amount. Thus, electricity is a matter of concern of central as well as state governments. The structure of SEBs was designed after independence, nearly sixty years ago, when the electricity sector was virtually non-existent in the country. The substantial expansion that these organizations could bring about and the plan-linked mode of funding supported from state and central sources seems to have served to allow organizational structures unsuited to commercial functioning and self-sustainable expansion. Managements of SEBs are answerable to government, the legislature, the auditing authority and in a small degree to the consumer. The problem is partly common to public enterprises and partly specific to the electricity sector, the retail distribution part of which is still not viewed as a commercial activity. For upgrading the technology, improved plant utilization is required. However, the entry of central undertakings into power generation also denoted adoption of larger unit sizes, improved maintenance practices and better plant utilization [1].

India's transmission and distribution (T and D) system comprises a 400 kV network as the main and bulk transmission system in each region; a 220 kV, 132 kV and 110 kV network as the main and support transmission systems in each State; a 66 kV, 33 kV and 22 kV network as sub-transmission system; an 11 kV network as primary distribution systems; and a 400 V (three phase) and 230 V network as local distribution systems. While the predominant technology for electricity distribution and transmission has been alternating current (AC) technology, high voltage direct current (HVDC) technology has been introduced for back-to-back interconnection between the northern and western regional systems and also for the bulk transfer of power in the northern region [1], [2]. Even though the T and D network expanded by about 6.3 % per annum during the 1980's, its growth has not kept pace with the capacity to supply power. There were instances when the generation levels of certain power stations, especially in the northern region, had to be reduced because not all the required 400 kV lines could be commissioned in time to deliver the power generated [1], [2]. Even then, the growth of power has been increased as tabulated in the following Table 1.

In addition to these quantitative parameters, there has been qualitative augmentation in terms of engineering proficiency and excellence of supply. However these achievements, the power sector has been overwhelmed by serious lack of supply in comparison with demand. Electricity regulatory commissions (ERCs) have been set up to improve the working of the SEBs in India. Despite the passive public sector and its impressive growth, India continues to face power shortages.

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In the 8th plan, India could achieve only a little above half the planned target for generation capacity addition. In the 9th plan period also the position was not improved. Thus, India is still a power starved nation, even after 55 years of planning and a vast experience of putting up a 112,058 MW generating capacity with the associated transmission and distribution systems. During 10th plan (2002-2007) and 11th plan (2007-2012) a total capacity addition of 113,000 MW is proposed and an investment of US $ 123.2 billion is required in power generation, transmission and distribution sector [3].

Here, Table 2 is indicating the overall generation capacity addition monitored from major sources. In recent years only some of the SEBs has taken up systematic studies for planning of their distribution systems using the available computer technology and other SEBs are expected to follow the same strategy for their distribution planning [3].

Table 1. Growth of the Indian power sector.

Parameter	Year 2008 status	Growth Since Independence (times)
Installed capacity (MW)	147,715.51	90
No. of consumers (millions)	216	88
Agricultural connections (millions)	18	625
T and D network (‘000 circuit km.)	772	238
Electrified villages (‘000)	803	358
Per capita annual consumption (kWh)	631	36

[Source: Ministry of Power and Planning Commission (2008)]

Table 2. Generation capacity addition during April-September, 2008.

Sources	Additional Generation Capacity (MW)
Thermal	1319.80 MW
Hydro	439.00 MW
Nuclear	0.0 MW
Total	1758.80 MW

[Source: CEA-Vidyut Bharati, October, 2008]

3. DATA AND RESEARCH METHODOLOGY

The current study uses qualitative data to a better coverage; nevertheless quantitative data have also been gathered to have an in-depth observation. Primary records about the restructuring of SEBs have been collected from diverse sources and discussions. For the broader study, the secondary data are obtained from several research papers, annual reports, newspaper articles, and publications by CEA, MoP, CERCs, SEBs, etc. The study is not restricted to a particular number of years thus, the information and statistics concerning in SEBs performance since its inception have been analyzed for comprehensive point of view.

Compounded annual growth rate (CAGR) has been derived for data available for latest two years (2007-2008) on the basis of following energy parameters:

i. Requirement and availability [figures in million units, MU]

ii. Peak demand and peak met [figures in MW]

4. STATE ELECTRICITY BOARDS / UTILITIES

In India, the Electricity (Supply) Act, 1948, requires the SEBs to work like an independent corporation. However, the SEBs / utilities in HT-tariff for industrial consumers are a gainful opportunity, *i.e.* purchasing electricity from renewable energy technologies (RET) projects at lower prices and selling it to HT consumers. SEBs benefit from wheeling and banking charges for offering their transmission and distribution infrastructure. Government support to RETs through favorable policy framework enhances energy mix and financial health utilities.

In addition, the government earnings from electricity duty, tax on manufactured capital goods and inspection fees will increase [4].

5. FUTURE ENERGY DEMAND

India is not only experiencing an electricity shortage but is also all the time more dependent on oil imports to meet the demand [5]. In addition to pursuing domestic oil, a gas exploration and production project, India is also stepping up its natural gas imports, mostly all the way through imports of liquefied natural gas.

The country’s aptitude to secure a consistent supply of power and energy resources at reasonable prices will be one of the most significant factors in shaping its future energy demand. ‘According to the Indian government, 30 percent of India’s total energy needs are met through imports’ [5].

6. OPERATIONAL EFFICIENCY: MEETING ENERGY NEEDS

With dependability for the electricity supply shared constitutionally between the central government and the states, the Indian government now recognizes the need to increase its stress on improving the efficiency of supply, utilization, and pricing of electricity and this can only be achieved by reforming power sector management and financing at the state level.

The states' power sector problems are attributable to the poor operational efficiency of the SEBs, which are a key element of India's power system.

The weak financial position of the SEBs also remains the fundamental obstruction to private sector investment in the power sector. India's state governments have clearly accepted the problems of the SEBs in various national meetings. Finally, only few states namely Orissa, Haryana, Andhra Pradesh and Uttar Pradesh have initiated broad power sector reform programs. The main affects of operational efficiency are government's instability, disorganized commercial execution and political involvement.

Hence, restructuring the SEB is the only technical solution and the efficiency of the power sector can be improved. An energy conservation policy is another solution to increase its efficiency [6].

The SEBs were performing well till the mid 1980s both in technical and financial aspects but now government can not survive with the going up demand of investment required in the power sector.

To the innocent brains, India's progress has been extraordinary. According to recent updates *i.e.* April to September, 2008 the power supply position – a compounded annual growth rate (CAGR) of 11% [2].

During the same interval, the energy peak demand and peak met, a CAGR of 18.5%, it is seen that the development in the various sectors over the last 30-40 years has ranged from 10-20%. This is outstanding and is explained in Figures 1 and 2.

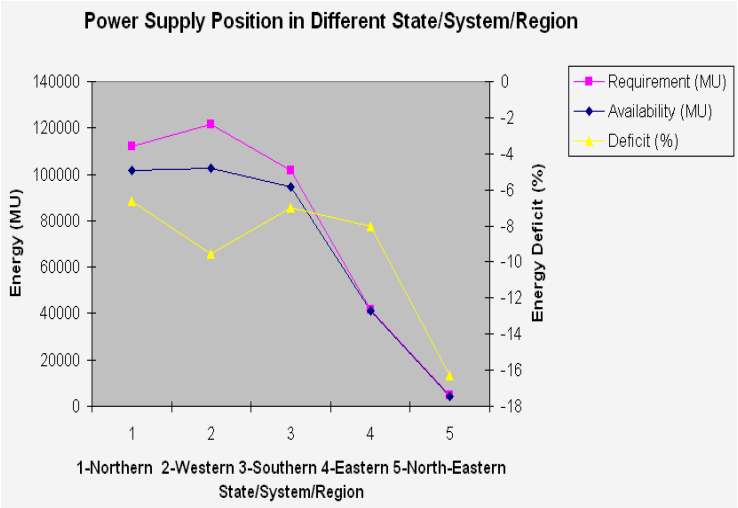

Fig. 1. Graphical projection of the power supply position in cifferent state/system/region (April to September, 2008).

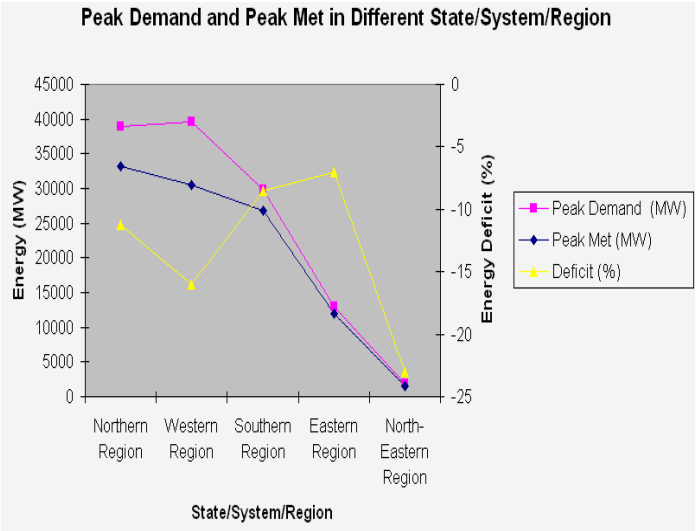

Fig. 2. Graphical projection of the energy peak demand and peak met in different state/system/region (April to September, 2008).

There are many profitable and hurting insights that we get from the statistics in these studies. Figures 3 and 4 are signifying the graphical projection of power supply position in different regions.

Apart from the failure of SEBs to raise investments, it is the uneconomic pricing of electricity. According to Figure 1, in the northern region / state, especially Uttar Pradesh requirement is more *i.e.* 31,946 MU with the deficit of 17.3 % which shows that power supply requirement is high.

However, in Punjab demand is 23,293 MU with the deficit 8.7 %, which is the 2nd largest demand in the

region. On the other hand, if we consider the eastern state, Orissa shows the 2nd highest demand *i.e.* 10172 MU with the deficit of 1.7% in the region. It is one of the states in the power sector, where the SEB is structured and well organized.

With reference to Figures 5 and 6, there was a shortfall monitored in 2008 between peak demand and peak met of 10,564 MW with deficit of 22.2 %, 8,737 MW with deficit of 16.3 % and 3,137 MW with deficit 3.8 % in Uttar Pradesh, Punjab and Orissa states respectively.

Moreover according to the energy data available from the general review 2007 of Central Electricity Authority (CEA), the State-wise energy available (in GWH) / Transmission and Distribution Loss (%) were monitored in the states of Orissa, Punjab and Uttar Pradesh are 16,036.37 GWH / 40.86 %, 35,956.22 GWH / 26.61 % and 51,937.13 / 33.49 %, respectively.

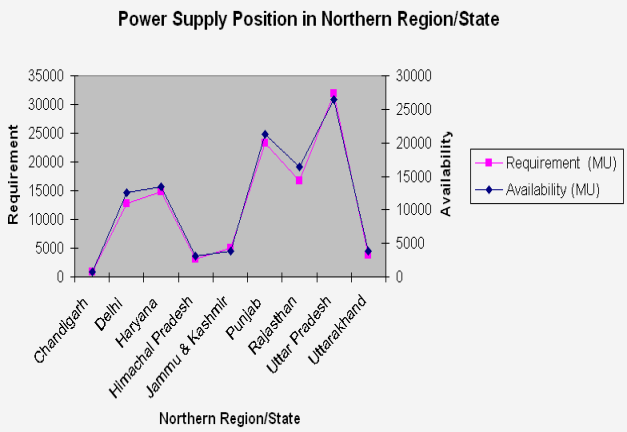

Fig. 3. Graphical projection of the power supply position in northern state/system/region (April to September, 2008).

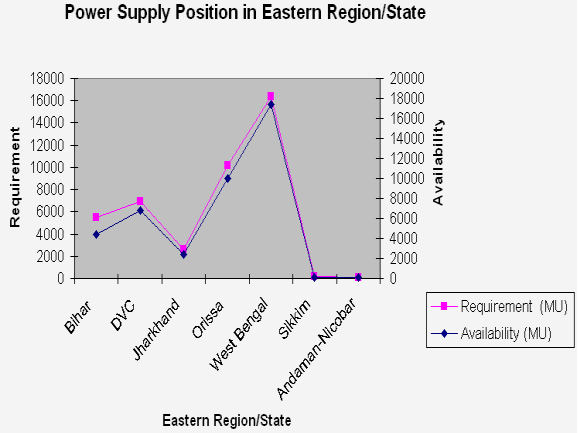

Fig. 4. Graphical projection of the power supply position in eastern state/system/region (April to September, 2008).

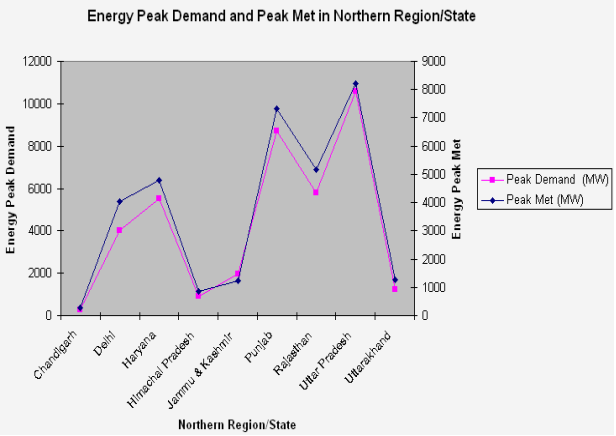

Fig. 5. Graphical projection of the energy peak demand and peak met in northern state/system/region (April to September, 2008).

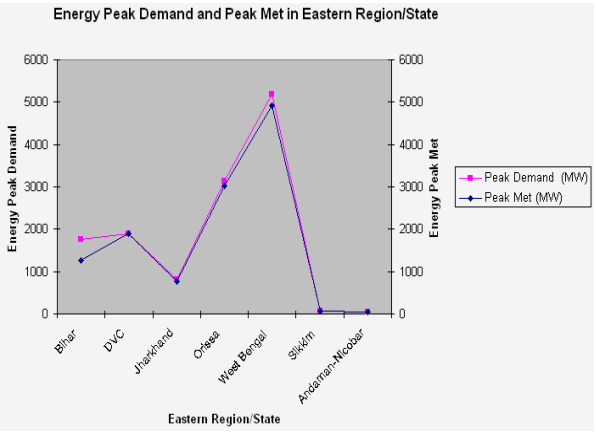

Fig. 6. Graphical projection of the energy peak demand and peak met in eastern state/system/region (April to September, 2008).

7. ELECTRICITY LEGISLATION IN INDIA

The electricity legislation that has evolved in India over the years, in many ways, reflects the worldwide trends. By 1948, there were considerable advances in power generation technology, giving rise to economies of scale in power generation. This together with the advances in transmission technology, made it possible to transmit power at high voltages over long distances.

The result was the concern of typical state owned, centralized power generation, transmission and distribution utilities in the form of State Electricity Boards (SEBs) in the country. In fact, the Electricity (supply) Act, 1948 was exclusively meant to comprise and regulate the activities of these utilities [6]. The straight structure of power utilities came into question worldwide on grounds of efficiency during the 1990s. India too was affected by this international concern for efficiency, which gave rise to electricity reforms.

Indian power sector has also experienced a speedy change where India's installed capacity was 1.362 MW in 1947 but rose to 127.673 MW as on October, 2006 [1]. Reforms and privatization is important to look upon the required amount of power, where government is unable to provide the same.

As today, Indian energy strategy is coal based with major 65% power comes from coal-fired plants and rest from other energy sources. Power sector reforms are commonly acceptable on the basis that a state authority leads to poor productivity, services and financial returns. As a part of restructuring exercise, Power Grid Corporation of India Limited (PGCIL) was set up to look after T and D.

It was strong willed that distribution would be privatized in phase manner. Even most of the states in India adopted and initiated this scheme of privatization for better results to reduce theft, corruption and improve the revenue collection strategy, efficiency and reliability of the distribution system.

8. REFORMS IN POWER SECTOR

Through the sign of liberalization in the 1992, governments across the world began to reassess the structure of the electricity industry. Various governments also viewed privatization and competitive markets opportunity for reducing participation in their own power sector.

Exceptionally steeped in the amount outstanding as they were, many were no longer in a position to finance future expansion of their power projects. They, as a result, used this as a means to shift at least part of their responsibilities to private participants.

The main purpose behind this was to get private parties to invest in generation, while leaving the complex matter of network operations and long-term planning with the central organization. Indian government has to a pro-active role in unleashing and accelerating the process of reform in the power sector in the country.

According to the Tables 3 and 4, Central and States power reforms are expressed to be acquainted with the different scenarios of reforms at a glance. With the beginning of economies liberalization in 1990s, solutions were sought to the crisis in power sector. Major role was played by international financial institution to reform plans in the growing power industry. Reform plans intended to introduce private players into the sector beginning with generation.

SEBs was unbundled and plans were made to privatize distribution. Additionally, independent regulatory commissions were also set up during the period and achieved major milestones are indicated below.

9. GRID MANAGEMENT AND TRADING

In order to expand the scope of power trade in the coming years, it would be necessary to plan a suitable tariff structure for the inter-system energy exchanges which would be attractive to all and that would enable best possible operation of the regional systems. The obligatory managerial structure at the regional and national level has already been created to encourage efficient integrated operation in the form of Regional Electricity Boards and the Power Grid Corporation Limited.

For optimum utilization of generating resources the company has planned to create a strong national grid in a phased manner to bringing out the security and the reliability in power system operation [4].

9.1 Identifying the Main Problem in SEBs

Independent power producers (IPPs) are demanding that they have been allowed to sell power to third parties straight as a substitute of selling to SEBs. The most critical issue is finance under the PPA between IPPs and SEBs. One basic requisite for identifying effective solution is the correct identification of the problem itself. The weak finances of the SEBs are generally and incorrectly diagnosed as the basic problem of the sector. The central problem of the sector is its politicization, which prevents the restoration of SEB finances and blocks many other desirable developments. The policy making process would benefit greatly in effectiveness if the central problem of the sector is recognized. Following identification principles are important as:

- Avoiding of any measures that contribute to further entrenching of the politicizing process
- Priority to measures that would insulate the sector from the adverse effects of politicization

These principles continue to be overlooked, which is cause for concern. Much damage has resulted from the adoption of the MOU approach to project selection, without either stipulation of a screening and pre-qualification mechanism or transparent regulatory and approval procedures in position.

Table 5 is indicating the grid performance analysis using power supply position through different factors like energy requirement, availability and shortage comparing with peak demand and peak met in different regions of India, which shows the situation of its trading and security of national grid.

THE CASE OF ORISSA STATE

State Overview

The Orissa State Electricity Board (OSEB) is a statutory body working with different corporations in the state named as Grid Corporation of Orissa Limited (GRIDCO), Orissa Hydro Power Corporation Limited (OHPC), Orissa Power Generation Corporation Limited (OPGC), Central Electricity Supply Corporation Limited (CESCO), Northern Electricity Supply Corporation Limited (NESCO), Southern Electricity Supply Corporation Limited (SOUTHCO), Western Electricity Supply Corporation Limited (WESCO) with an independent regulatory administration *i.e.* Orissa Electricity Regulatory Commission (OERC) established in April 1996 to promote responsibility in the power sector and invite the private sector investment in the state.

Table 3. Indian power reforms- major milestones.

Year	Milestone
1991	IPP (Independent Power Producer) process
1996	Orissa Reform Act
1998	Central Electricity Regulatory Commission Act
1999	RCs in many states, distribution privatization in Orissa
2003	Electricity Act
2004	Electricity (Amendment) Act
2007	Electricity (Amendment) Act

[Source: Indian Power Sector Reforms Update, Issue VIII-May 2004 Prayas, Pune and MoP, 2009]

Table 4. Power sector reforms in states.

State	Status of Reforms	State	Status of Reforms
Andhra Pradesh	• SERC constituted and is functional • Tariff orders issued • Reform Law enacted • SEB unbundled • MoU signed with GoI	Kerala	• MoU signed with the GoI • SERC constituted
Arunachal Pradesh	• SERC notified (yet to be constituted)	Madhya Pradesh	• SERC constituted • Tariff orders issued • Reform Law passed by the Assembly and notified • MoU signed with the GoI
Assam	• Single-member SERC constituted • Tariff order issued • MoU signed with GoI	Maharashtra	• SERC constituted and is functional • Tariff orders issued • MoU signed with the GoI
Bihar	• MoU signed with GoI • Tariff revised by the SEB • SERC notified (yet to be constituted)	Orissa	• SERC constituted and is functional • Tariff orders issued • Reform Law enacted • SEB unbundled • Distribution privatized • MoU signed with GoI
Chhattisgarh	• SERC constituted • MoU signed with Madhya Pradesh adopted	Punjab	• SERC constituted and is functional • Tariff orders issued
Delhi	• SERC constituted and is functional • Tariff orders issued • Reform Law enacted • Distribution privatized	Rajasthan	• SERC constituted and is functional • Tariff orders issued • Reform Law enacted • SEB unbundled • MoU signed with GoI
Goa	• MoU signed with the GoI • Single member commission constituted	Tamil Nadu	• SERC constituted • MoU signed with the GoI • Tariff orders issued
Gujarat	• SERC constituted and is functional • Tariff orders issued • The Gujarat Electricity Industry (Reorganization and Regulation)Act 2003, notified • MoU signed with the GoI	Uttar Pradesh	• SERC constituted and is functional • Tariff orders issued • Reform Law enacted • SEB unbundled • MoU signed with the GoI
Haryana	• SERC constituted and is functional	Uttaranchal	• MoU signed with the GoI • SERC constituted and is

	• Tariff orders issued • Reform Law enacted • SEB unbundled • MoU signed with the GoI		functional • SEB unbundled
Himachal Pradesh	• Single-member commission constituted • Tariff orders issued • MoU signed with the GoI	West Bengal	• SERC constituted • Tariff orders issued • MoU signed with the GoI • SEB unbundling initiated
Jammu and Kashmir	• The state government has appointed the Administrative Staff College of India as consultant for conducting reform studies	Nagaland, Meghalaya, Mizoram, Tripura, Manipur and Sikkim	• Have shown willingness to constitute Joint Electricity Regulatory Commission
Jharkhand	• SERC constituted • MoU signed with the GoI		
Karnataka	• SERC constituted and is functional • Tariff orders issued • Reform Law enacted • SEB unbundled • MoU signed with he GoI		

Table 5. Grid performance analysis (provisional) power supply position during the year 2008 and 2007.

Energy										
	April –September, 2008				April-September, 2007				Annual Growth	
	Energy Requirement	Energy Availability	Energy Shortage		Energy Requirement	Energy Availability	Energy Shortage		Energy Requirement	Energy Availability
	(MU)	(MU)	(MU)	%	(MU)	(MU)	(MU)	%	%	%
Northern	112256	101877	-10379	-9.2	112841	104925	-7916	-7.0	0.5	-2.9
Western	121322	102405	-18917	-15.6	111480	97924	-13556	-12.2	8.8	4.6
Southern	101753	94580	-7173	-7.0	91228	89236	-1992	-2.2	11.5	6.0
Eastern	41664	39489	-2175	-5.2	37868	36645	-1223	-3.2	10.0	7.8
North Eastern	4940	4198	-742	-15.0	4421	3911	-510	-11.5	11.7	7.3
All India	381935	342549	-39386	-10.3	357838	332641	-25197	-7.0	6.7	3.0
Peak										
	April –September, 2008				April-September, 2007				Annual Growth	
	Peak Demand	Peak Met	Peak Shortage		Peak Demand	Peak Met	Peak Shortage		Peak Demand	Peak Met
	(MW)	(MW)	(MW)	%	(MW)	(MW)	(MW)	%	%	%
Northern	34036	29504	-4532	-13.3	32462	29495	-2967	-9.1	4.8	0.0
Western	37171	27634	-9537	-25.7	36371	26732	-9639	-26.5	2.2	3.4
Southern	27576	25035	-2541	-9.2	25682	24194	-1488	-5.8	7.4	3.5
Eastern	12210	11435	-775	-6.3	11284	10562	-722	-6.4	8.2	8.3
North Eastern	1744	1343	-401	-23.0	1589	1347	-242	-15.2	9.8	0.3
All India	109962	93046	-16916	-15.4	102428	90022	-12406	-12.1	7.4	3.4

Source: CEA-Vidyut Bharati, October, 2008

Orissa is the first state to have undertaken reform and restructuring in power sector to build efficient power supply structure and to meet the investment needs of the sector. The Orissa Electricity Regulatory (OER) Commission established by the Government of Orissa under OER Act, 1995 is deemed to be a state Commission u/s 82(1) of the Electricity Act, 2003.

The demand for power has been growing increasingly and to meet the higher demand, necessary planning for capacity addition is required.

The installed capacity as of 30.06.2007 in the state is 3,822 MW out of which hydro constitutes 52.80 %, thermal 44.50% and captive generating plants (CGPs) 2.7%.

The 17th Electric Power Survey (EPS) has projected peak demand of 4,459 MW at the end of XI Plan (2012) and installed capacity requirement of about 6,778 MW. Energy requirement is projected to grow from 18,076 MU in 2007-08 to 27,149 MU in 2011-12 [7].

Regulatory Involvement and its Impact

OERC gave its order on intra-state open access in June 2005. Long term (>25 years contract) and short term (others) customers are specified and the phasing plan is

given. Compared to Andhra Pradesh, Orissa has chosen to introduce open access rather slowly, with customers having > 5 MW connected load getting the facility by April 2008 and those with > 1 MW by January 2009' [8].

Government is also trying to establish Regulatory Information Management System (RIMS) for entering, monitoring, analyzing and exchange of utility data applicable to finance, operation, technical and planning. Utilities can also seek data on such matters and communicate with regulator easily and effectively. Additionally, establishing unique Integrated Tariff Module (ITM) and interfacing the same with RIMS.

Private Sector Generation

It is mentioned that Calcutta Electric Supply Corporation (CESC), Kolkata discussed with the Government of Orissa for setting up 2,000-MW power plant (coal-based) around Talcher at a cost of $171.5 billion.

However private player viz. Jindal Steel and Power (JSPL) has revised its contract with the State Government to increase the capacity of the proposed plant and also took the new steps to set up a 900 MW captive power plant [8].

Private Sector Distribution

Reliance Energy took over the management of the three district distribution companies; BSES in 2001 had issued bonds worth $85.8 million at a 12.5 % interest in favour of GRIDCO to cover its arrear dues.

GRIDCO, while securitizing its past dues of $236.4 million to NTPC, had pledged the BSES bonds to NTPC. The other companies such as Tata Power, AEC-Ahmadabad, NTPC, and CESC have also shown interest in private distribution network [8].

THE CASE OF PUNJAB STATE

State Overview

The Punjab State Electricity Board (PSEB) is a constitutional body formed on 1st Feb.1959 under the Electricity Supply Act. 1948. The board's net generation during the year 2006-07 was 36,412.055 MU. This board is serving T and D network to more than 19,172 km^2 consumers comprising of 15,843 km^2 general, 336 km^2 industrial and 2,791 km^2 agricultural connections approximately [8], [9]. Punjab has given approval for 20.78 % of its budget to be spent on the energy sector in 2007-08.

The state put emphasis on reducing the T and D losses and take full advantage of the utilization of existing capacities, adopting non-conventional sources for power generation and the increase of captive power plants. Total installed capacity in Punjab in 1990-91 was 3,049 MW, which increased to 4,626 MW in 2006-07. Per capita consumption of electricity in the state is 940kWh, nearly 2.5 times the all India number of 390.3kWh.

Regulatory Involvement and its Impact

According to the recent decision made by the government, PSEB is heading towards bankruptcy to adjust the cash subsidy due to board against earlier loans. PSEB was facing a deficit of $ 171.5 million in the financial year of 2008 but the decision of the state government not to give cash subsidy of $300 million to adjust the earlier loans.

In 2000-01, there was a shortfall in power of 12.05% at peak demand and 10.3% in terms of gap between demand and supply. But in the last decade the average rate of growth on demand of electricity had been 6%. Around $0.06 was the average cost of power supply per unit in Punjab recorded in the year 2001-02, which was among the lowest rate in India [3], [9]. PSEB was not rewarded for this reduction in cost of supply by the government. Thus, the fiscal position of the board is unstable with sickness.

Private Sector Generation

PSEB recently launched an important initiative for Rajpura power plant with the contracted generating capacity of 1,200 MW ± 10% (1,080-1,320 MW) coal based thermal power plant at Nalash village, near Rajpura, District Patiala, Punjab.

As per the Ministry of Power (MoP), Government of India's guidelines, the project will be given to a developer on the basis of tariff based competitive bidding. Accordingly, Nabha Power Limited (NPL) invites the proposals for the same.

New thermal power plant at Gidderbaha (2400 MW ± 10%) has been proposed in the state near Village Ghagga, Tehsil Gidderbaha, District Muktsar on Bathinda-Abohar National Highway and the information for bidders have been provided. The selection of the project developer will on the basis of tariff based competitive process as per the government guidelines.

Private Sector Distribution

With recent updates, private participation in distribution under the PPP approach is the best decision because private managements may lead in professional efficiency and bring the required investments.

The Punjab Government has ambitious plans to build a wide distribution network for power in association with private players. It is assumed that PSEB is in the process of developing a comprehensive plan for T and D.

THE CASE OF UTTAR PRADESH STATE

State Overview

On January 14th, 2000, UP Power Corporation, UP State Power Generation and UP Hydel Power Corporation had been formed by re-organising UP State Electricity Board (UPSEB). At the time of inception the total installed capacity of UPSEB, including thermal and hydro, was 2,635 MW which has now been raised to 4,621 MW. However, MoP has further pointed out that the amount of $137.3 million that has already been released to UP under 'Accelerated Electrification of 308 km^2 area villages and 30,769 km^2 of houses, now merged with

Rajiv Gandhi Grameen Vidyutikaran Yojana, needs to be utilized in the first instance before any further allocations could be made [8].

Since 2005, a total of $1,072 million has been sanctioned for rural electrification during the 10th plan and $2,358 million could be availed in the 11th plan based on the performance of UPSEB.

Regulatory Involvement and its Impact

The UP Power Corporation is of the view that the average cost of supply of power is $0.09 per unit while the average selling cost is only $0.06 per unit. After the five years of the reforms in the power sector, the financial position of the UPPCL remains precarious. According to the financial year 2004-05, cash losses of the UPPCL were $592 million, which too after it received a subsidy of $215 million from the state government [8].

The UPERC has declared the Electricity Supply Code for the improvement of the situation which contains all aspects related to consumer services, billing and connections.

Private Generation and Distribution

According to the New Tata Projects, there are reports of Tata Power Company's (TPC) strategy to setup thermal and hydro power projects in the state.

Also, TPC has decided to set up a 600 MW hydro power plant near by Shrinagar. This project worth of all processes including rehabilitation, land and building a dam is expected to be around $322 million. A new 1,000 MW capacity thermal power plant at Bawana near Singrauli is also proposed by TPC to the state government [8], [9].

10. CONCLUSION

All the Indian SEBs without exception are on the edge of economic failure due to restricted tariff policies, low capacity utilization of existing plants and high incidence of thefts. Re-establishment of financial health of SEBs and the development in their operational performance is one of the most critical issues in the power sector.

This is only possible through organizational restructuring of SEBs. Accordingly, the only solution is the unbundling of each SEB into separate generation, transmission and distribution utilities, rationalization of tariffs, setting up independent regulators at the central and state levels and for clearing their growing dues with central utilities. State like Orissa, Punjab, Uttar Pradesh and few have already unbundled and corporatized their SEBs. Other states are expected to carry out reforms soon.

The CERC should use its provisions under section 36 for fixing fair and reasonable rates for the use of intervening facilities in case of open access users by formulating new regulations.

Also, CERC should exercise its powers under Section 61 to guide the state commissions by prescribing principles and methodologies for determining tariffs applicable to generating companies and transmission lines. Government should ensure the effectiveness of the SERC and should also not involve itself in the day-to-day operations of the SERC.

These regulatory institutions should have sufficient funds, manpower, technology and authority to regulate the public-private mix experiment in the power sector.

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