Power Sector Reforms and Issues
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Abstract—This paper describes the growth of Indian power sector under different Electricity Acts, emergence of States Electricity Boards (SEBs) and central utilities. The various factors as huge losses, poor performance of SEBs, theft and corruption in the power sector has led to the introduction of reforms, are discussed. The paper also discusses the steps taken and to be taken by the center and the states governments, introduction of new Electricity Bill, rationalization of tariffs and protection of the laws of the land provided to the private sector. In the last, it is concluded that the success of the reforms lies in the co-operative actions of the center and the state governments.

Index Terms—Government role, huge financial losses, poor SEBs, tariff rationalization.

I. INTRODUCTION

Electric power is recognized as a major input for the country’s economic development and accorded highest priority. The total installed capacity of power utilities has increased manifolds since independence but even then the demand-supply gap is increasing every year. The governing bodies which are looking after the generation, transmission and distribution of electric power are States Electricity Boards (SEBs) and central agencies as National Thermal Power Corporation (NTPC), National Hydro Power Corporation (NHPC). In nineties, to cope up with the rising demand-supply gap and due to poor financial positions of the SEBs the government decided to open up the power sector for private sector investment thus initiating the process of power sector reforms. Now, many states have started power sector reforms process and are passing through the different stages of the reforms. But, unfortunately the reforms which were started with so zeal and enthusiasm have not so far met with fate they were supposed to meet with. This paper describes the growth of Indian power sector under different Electricity Acts, emergence of SEBs and central utilities. The different factors which resulted in starting of reforms and then opening up of generation sector to private investment and its problems and solutions are discussed. After generation, distribution reforms were introduced and number of issues as tariff rationalization, agricultural tariff, preventing of thefts and corruption in the social and economic context have been discussed.

II. GROWTH OF INDIAN POWER SECTOR

After the independence major thrust was given for the development of power sector which was considered to be backbone of economic growth and development. And large amount of funds were provided in the Five –Year plans. SEBs were set up in 1960s which had monopoly over generation, transmission and distribution of power within the state. In 1970s, to cope up with the need for quicker and greater capacity addition and to avoid uneven distribution of resources and large inter-state imbalances, the government of India set up NTPC and NHPC in the central sector to supplement the efforts of the states. Consequently, total installed capacity of the power utilities has increased from 1,362 MW in 1947 to 104,918 MW in March, 2002[1]. The most of installed capacity is under government control. The state governments control nearly 60% of power generating capacity and 30% is controlled by central government, rest 10% is with the private sector. Table I [2] and Table II [1] shows the present status of power generation and the growth of Indian Power Sector since independence respectively.

Power sector is governed by three principle Acts namely: i) The Indian Electricity Act, 1910, ii) The Electricity (Supply) Act, 1948 iii) The Electricity Regulatory Commissions Act, 1998. The Indian Electricity Act deals with functioning and regulation of the private licensees whereas the Indian Electricity (Supply) Act mainly deals with establishment and functioning of state government owned monopoly utilities (within the state) called State Electricity Boards (SEBs). Electricity Regulatory Commissions Act provides for establishment of state level and central level Electricity Regulatory Commissions (ERCs) for regulating the functioning of private licensees as well as SEBs. The central government also regulates investment in power sector through its agencies such as the Central Electricity Authority (CEA), which was created as per the Indian Electricity (Supply) Act, 1948. All generation or distribution scheme above a particular size requires approval of CEA.

‘The Electricity Bill 2001’ which was tabled in the Parliament in August 2001, once approved by the parliament it will be converted into an Act. The Electricity Bill 2001 which seeks to replace earlier three Electricity Acts, contains a number of forward-looking features. It provides for increased competition in the sector by facilitating open access to transmission and distribution, grid power trading, and also allowing setting up of captive (only for self use) power plants without any restriction. This Bill would allow a variety of
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TABLE I
PRESENT STATUS OF POWER GENERATION (IN MW)

<table>
<thead>
<tr>
<th>Source</th>
<th>Central</th>
<th>State</th>
<th>Private</th>
<th>Total</th>
<th>%age Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>21417.51</td>
<td>36302</td>
<td>4414.39</td>
<td>62130.38</td>
<td>59.22</td>
</tr>
<tr>
<td>Gas</td>
<td>4419.00</td>
<td>2661.70</td>
<td>4082.40</td>
<td>11163.1</td>
<td>10.64</td>
</tr>
<tr>
<td>Diesel</td>
<td>0</td>
<td>582.89</td>
<td>551.94</td>
<td>1134.80</td>
<td>1.08</td>
</tr>
<tr>
<td>Total (Thermal)</td>
<td>25836.51</td>
<td>39546.59</td>
<td>9045.72</td>
<td>74428.82</td>
<td>70.94</td>
</tr>
<tr>
<td>Hydro</td>
<td>3049.00</td>
<td>2263.60</td>
<td>576.20</td>
<td>26261.2</td>
<td>25.03</td>
</tr>
<tr>
<td>Nuclear</td>
<td>2720.00</td>
<td>0</td>
<td>0</td>
<td>2720.00</td>
<td>2.59</td>
</tr>
<tr>
<td>Wind</td>
<td>0</td>
<td>62.86</td>
<td>1444.60</td>
<td>1507.46</td>
<td>1.44</td>
</tr>
<tr>
<td>Total</td>
<td>31605.5</td>
<td>62245.4</td>
<td>11066.5</td>
<td>104917.</td>
<td>100.0</td>
</tr>
</tbody>
</table>

power suppliers and large users of electricity to trade with each other directly. This would spur owners of existing power generating plants – not only the few existing Independent Power Producers (IPPs), but also central stations and user-owned captive power units – to produce more power from their installed capacity. And the increased competition would put pressure on states to accelerate governance and retail tariff reforms. The provisions of the bill are fairly comprehensive and should help plug many of the gaps that exist today. Once implemented, it is hoped the Bill will restore investor confidence and bring in the badly needed private funds into the sector. Thus, the impact of this Bill will be far-reaching and more fundamental.

III. NEED OF REFORMS

In 1992-93, the total financial losses of the power sector came to Rs.4,600 crore. In just three years, these losses doubled. Three years later, they’d doubled again. Till March 2001, combined state utility financial losses are estimated at Rs.26,000 crore[3]. If current trends continue, in another three years, state utility financial losses will reach Rs.45,000 crore a year. This huge amount of financial losses borne by every Indian every year would perhaps be more tolerable if it led to a high quality of power supply. On the contrary, deteriorating financial viability has led to inadequate investment and maintenance. As a result, India is among the worst in developing countries in reliability of power supply. Industry suffers twice over from India’s power sector policies. It receives low-quality power, but is forced to pay tariffs above cost to cross-subsidize residential and agricultural consumers. Industrial tariffs in India at Rs. 4 to 5 per kWh or US 7-10 cents are among the highest in the world. The main reasons for such an unacceptable situation in the power sector are inadequate tariffs for non-industrial consumers and excessive losses including theft. The gap between unit cost of supply and revenue was 92 paise in 2000-01. The country faces an energy shortage of about 8.3% and peaking shortage of around 11.3%. The situation is likely to worsen due to the anticipated slippage in the planned capacity addition. The energy and peaking demand shortages facing the economy are perceived to be primarily a result of lower than required investment in installed capacity. The poor financial position of SEBs and large requirement of funds for the sector, which are not possible for the government alone to invest in, had led to the strategy of opening the power sector to private management and capital and thus the process of power sector reforms was set in.

IV. REFORM STRUCTURE

The states had started the process of fundamental restructuring of the state power sector in mid 1990s. The World Bank has been one of the main agencies funding reforms in the power sector. Till, over $2 billion of the bank assistance has been committed largely to five states: Orissa, Haryana, Andhra Pradesh, Uttar Pradesh and Rajasthan, while another $150 million is in the pipeline for Karnataka. Table III shows the World Bank Assistance [4] to different states.

Under the World Bank (WB) loan, the states decided to adopt - what is known as World Bank model of reform. This consisted of a three pronged strategy of: i) Un-bundling the integrated utility in three separate sectors of generation, transmission and distribution, ii) Privatization of generation and distribution companies and, iii) Establishment of independent regulatory commissions to regulate these utilities.

Several states such as Maharashtra, Tamil Nadu and Punjab have not adopted the WB model of unbundling and privatization These states have established regulatory commissions under the Electricity Regulatory Commissions Act, 1998 of the central govt. Gujarat and Rajasthan had favored privatization through the joint sector route, while Kerala and West Bengal, on the other hand, seemed to be opting for reform patterns that retain the public ownership of the SEBs. The fervor of reforms in the power sector was so intense, that the UP (Uttar Pradesh) government, despite facing stiff resistance from the employees of the UPSEB, had approved plans to split the ailing SEB into three independent corporations. Delhi has also formed an independent Delhi Electricity Regulatory Commission (DERC) under the Central Act and separated the generation and distribution investments...
companies.

V. GENERATION SECTOR REFORMS

In the initial period of opening up of power sector reforms state governments and SEBs were allowed to enter into negotiated contracts with IPPs without competitive bidding. Initial response to this was enormous. During the three year period when such non-competitive contracts were allowed, SEBs signed 243 contracts (MoUs) for the capacity addition of over 90,000 MW (more than the national installed capacity at that time), amounting to contracts of nearly 90 MW per working day [2]. In their zeal to sign as many IPP contracts as possible states and SEBs virtually gave a go by to even elementary norms of power planning including proper demand forecasts and evolution of least cost plans based on comparative costing of different options for sites and fuels. Only a handful of these contracts are likely to result in actual capacity addition.

As per the IPP Report 2001, since the opening up in 1991, till 2001 only 3,200 MW of IPPs have come on line and another 2,700 MW have achieved financial closure[2]. Major reasons for this failure to add capacity was weak financial situation of SEBs and lack of demand. IPPs found it difficult to achieve financial closure due to lack of creditworthiness of the sole buyer i.e. SEBs. SEBs were making huge financial losses mainly due to huge transmission and distribution losses (including theft) and highly subsidized tariff to agricultural and domestic consumers. Some IPPs could progress beyond the initial stage due to credit enhancement through guarantees from state and central governments as well as allocation of escrow facility ¹.

Even the states having overstated their escrow capacity signed Power Purchase Agreements (PPAs) and impetuously promised escrow all around. However on closer scrutiny it was found that most of the states did not have much to offer as escrow. Without escrow and in the absence of an alternative payment security mechanism, the lenders have been wary of providing funds. Moreover what has really dampened the morale of IPP investors is the fate of high profile Dabhol project. Touted as a showcase project, Dabhol ended up one messy controversy after another. Since Jan 2000, it struggled to get its dues from MSEB. The situation deteriorated so greatly that the company invoked the government of Maharashtra guarantee and central counter guarantee month after month. The Dabhol episode reduced the confidence of investors in the state, which was viewed as a preferred investment destination. A large number of foreign companies have decided to leave their projects due to the bleak prospects in the sector. These include Mission Energy of the US, Cogentrix, Electricite de France, the UK-based Powergen, Enron and several others. The only reason is that the with the bankrupt SEBs as sole buyers of their power, no sensible private sector investors will have any courage to invest in power generation or major transmission.

VI. BUILDING UP IPPS CONFIDENCE

The biggest stumbling block in the setting up of power plants by the IPPs is security mechanisms. The financial position of the SEBs, in general, is rather dismal and therefore, the financial institutions are not very comfortable with the SEBs assurance of timely payment of the IPPs. The financial institutions want a foolproof escrow and security mechanisms. The government can take number of steps which would lead to confidence building of IPPs [4] as:

1) Permission to Regulate Power Freely

NTPC has ability that it can reduce or regulate the power to a particular SEB if it defaults and divert the power elsewhere. This ability to divert power elsewhere is a source of much greater comfort than the strongest escrow cover. But the IPPs unfortunately do not enjoy this comfort as they have to sign the Power Purchase Agreement(PPA) with a particular SEB and if that SEB defaults, the IPPs are totally helpless as they cannot sell power to anyone else. In this case, Power Trading Corporation (PTC) can come to the rescue of the IPPs and play a significant role in wheeling power from one state to another. Thus, with the help of PTC, the IPPs’ handicap on account of their inability to divert power elsewhere in the event of payment default could be substantially removed.

2) Direct Deductions

In case of default by a particular SEB, the Government of India can makes direct deductions, perhaps in a phased manner and reimburse funds to the concerned IPP. NTPC, Power Grid of India, etc. have been frequently resorting to this recovery mechanism. This kind of commitment by the center government would go a long way in building the

¹ Escrow facility is a special agreement through which IPPs get priority access to SEB revenue. Revenue from SEB customers is deposited in a separate bank account, which can be directly withdrawn by the IPP in case SEB fails to honor IPP payments.
confidence of the financial institutions.

3) **Wider jurisdiction for PTC**

The jurisdiction of PTC is presently confined to only inter-state projects or mega projects concerned with more than one state. There shall be no restriction. PTC should be able to transact business with any IPP and should be able to wheel power from one part of the country to another rather than confining to only interstate projects.

4) **Central Government Guarantee**

The center government could also give a commitment for deduction from the central plan allocation of the defaulting state. This would not be an extra burden on the government. The government does not have to “pay” but only to commit the “deduction” from the central devolution to the states.

5) **Regulatory Commissions**

Regulatory Commissions, which have already set up in many states are taking steps in rationalizing the tariff and also introducing changes as kVAH-based billing system for industrial consumers as against the kWh system currently being followed. Such steps will significantly help to improve the financial position of SEBs and build IPPs confidence.

### VII. DISTRIBUTION SECTOR REFORMS

It can be stated at the outset that the reforms in the power sector, which began in 1991, were started at the wrong end of generation instead of distribution of power. Perhaps this was due to the fact that opening generation for private sector was considered to be simpler and easier to handle, though this did not stop Enron, Cogentrix and other projects becoming objects of major controversy. On the distribution front, the losses are rising at such a fast rate that these will reach Rs.45,000 crore a year in another three years [3]. There are two major causes of this unacceptable situation in the power sector. The first problem is inadequate tariffs for non-industrial consumers. Both agricultural and residential customers are heavily subsidized. The average domestic customer pays less than 60% of the cost of supply, while the average farmer pays about 10% of the cost of supply. The second problem is of excessive losses. Losses cannot be measured accurately in India because so much consumption is un-metered. Technical or physical losses are likely to be up to 20% of power supplied, double the international best practice of about 10%, on account of under-investment in an under-funded system. Another 20-30% of supply is lost due to non-technical factors, or, more bluntly, theft and non-payment. For the country as a whole, about Rs.19,000 crores of electricity is stolen annually. In recent years, the value of unpaid bills has grown by about Rs.2,000 crore a year. As a result, there must be some Rs.20,000 – 25,000 crore flowing every year into the pockets of individuals and institutions through theft, graft and corruption in the power distribution sector.

1) **Governing the Reforms**

The most important, and most challenging element, of power sector reforms is to combat widespread theft, graft and corruption. But when a huge amounts of nearly Rs.20,000 crore is involved, there is no surprise that vested interests against reforms are so strong and resistance at many levels is very violent. To contain this requires nothing less than a new governance system in the power sector.

The solution is thought to privatize the distribution. But privatization by itself is not enough as seen in Orissa, where it has raised a number of doubts about practicability or feasibility of privatization of power distribution. For private distributors to operate properly, they must have the protection of the laws of the land, and cut off supply to non-paying customers, even if they are ministers or government agencies. Governments must be prepared to prosecute those suspected of power theft. Containing graft and corruption, maintaining law and order – these are all government responsibilities, not those of private firms. Without governments fulfilling these responsibilities, power reform will not succeed.

2) **Tariff Rationalization**

Among all the reforms in the power sector, perhaps the most crucial is of rationalization of the tariff structure. The power tariffs are unfortunately embroiled in a complicated web of social economic and political issues. The best thing in untangling this web is to de-politize tariff setting through the establishment of regulatory commissions for retailing power in every state. Many states had already set up Electricity Regulatory Commissions (ERCs) but unfortunately, their experience so far is a mixed one. Sometimes, state governments are tempted to interfere with the functioning of these commissions, for example, by delaying tariff filings, thus undermining the basic purpose for which these commissions were established. The state governments must learn to respect the orders of the ERC and not override them by agreeing to give subsidies to certain categories of consumers from the state budget.

3) **Agricultural Tariff**

No tariff issue causes greater consternation or controversy than agricultural power pricing. If power sector reforms are said to be anti-poor in general, they are indicted as being anti-farmer in particular. But it is ironically revealed by one survey, conducted by World Bank that current subsidies hardly help poor farmers. The fixed rate per horsepower method used to charge farmers, favors the richer farmers. Small land-owners use less electricity, but pay the same amount as large land-owners. Power sector reforms would help, not hurt farmers. Farmers benefit from power being cheap, but they are hurt by power being unreliable and of low quality. Though farmers do stand to gain rather than lose from power reforms, there is a problem of phasing: tariffs can be increased immediately, but improvements in supply will take some time. For this reason, it is simply not feasible to
talk of raising farmers tariffs from the current level of about 10% of the cost of supply to the full cost of supply in the near future.

4) Role of the Center

The fate of the reforms lies in the hands of the state governments as SEBs belongs to them. But, the state reforms will only succeed if the centre plays a leadership role and creates a conductive environment for reforms. All areas of reforms, including the maintenance of law and order, and the combating of theft and corruption, require the strong political support of the centre. The centre also has a role to play in consensus building, which needs to extend beyond the Chief Ministers to cover all major political leaders in Delhi and in the states.

VIII. CONCLUSION

The success of power sector reforms lies in the co-operative actions by the center and the state governments as it require to de-politicize tariff and to take other strong steps to financial and social discipline. The reforms could free up huge amounts of funds by containing widespread thefts, graft and corruption in power sector. These amounts could be used by government to invest in health, education and other poverty reduction programs. They could help create a sustainable fiscal system, especially at the state level. They could offer poor farmers and urban dwellers reliable power supply which would greatly improve the quality of their lives.

IX. REFERENCES

[1] National Thermal Power Corporation, New Delhi