Chapter- 2

RESTRUCTURING OF POWER SECTOR – INDIAN EXPERIENCE

2.1 INTRODUCTION :

Power Sector reforms began in India in 1991. The Central Electricity Regulatory Commission (CERC) was set up in July, 1998 at the central level to look into all aspects of tariff fixation and such other related matters. The Ministry of Power, Government of India has been signing Memorandum of Understanding (MoU) with various State Governments for undertaking power sector reforms. Already nineteen States viz. Orissa, Haryana, Andhra Pradesh, Uttar Pradesh, Karnataka, West Bengal, Tamil Nadu, Punjab, Delhi, Gujarat, Madhya Pradesh, Maharashtra, Rajasthan, Assam, Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Kerala and Chhattisgarh have either constituted or notified the constitution of State Electricity Regulatory Commission (SERC) so far. Both the Central and State Governments in India have become partners for undertaking reforms and restructuring in a time bound manner.

The objectives of reforms and restructuring in different States include raising system efficiency, improving service standards, supplying quality services to consumers, making State Electricity Boards (SEBs) financially healthy and internal resource generating, reduction of cross-subsidies and for bringing them at zero level in a phased manner, speedy reduction in the levels of transmission and distribution (T&D) losses including pilferage of electricity etc. In spite of large investments made in the power sector over a couple of years, there is a persistent shortage of electricity...
in our country. Due to highly capital intensive nature of power sector and severe strain on resources of the State Electricity Boards (SEBs), the main objective of launching reforms and restructuring in the power sector is to mobilize resources from private sector for financing electricity generation, transmission and distribution schemes.

The Electricity Act, 2003 has been enacted to provide a legal and progressive framework for the development of power sector by introducing competition in various fields such as generation, distribution and trading of electricity. The Act has removed barriers to the entry of private parties in the electricity sector. The provisions of the Electricity Act, 2003 have been brought into force with effect from the 10th June, 2003. The Electricity Act, 2003 aims to consolidate the laws relating to generation, transmission and distribution, trading and use of electricity for taking measures conducive to the development of electricity sector in India. It integrates the Indian Electricity Act, 1910, the Electricity Supply Act, 1948 and the Electricity Regulatory Commission Act, 1998 into a single Act. It constitutes an umbrella legislation comprising a paradigm shift in power sector from a public monopoly where various private parties both foreign and domestic would be allowed to produce electricity in the Indian electricity market. However, it leaves several areas to be decided by the respective State Governments according to their special needs. It is a progressive Act, which seeks to liberalize the power sector by introducing and promoting competition and protecting consumers' interest and choice.

The per capita electricity consumption in India is one of the lowest as compared to the per capita electricity consumption in some developed countries. The per capita consumption of power in our country during 2005-06 as calculated by the Central Electricity Authority (CEA) is 631.41kwh only. Again, there are inter-state and inter-regional variations in the per capita electricity consumption in India. The per capita
electricity consumption in some selected countries in the world is shown below (Table-2.1):

TABLE – 2.1
PER CAPITA ELECTRICITY CONSUMPTION IN SOME SELECTED COUNTRIES IN THE WORLD DURING 2004:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Country</th>
<th>Per Capita Electricity Consumption (kwh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Canada</td>
<td>17,179</td>
</tr>
<tr>
<td>2</td>
<td>U.S.A</td>
<td>13,338</td>
</tr>
<tr>
<td>3</td>
<td>Australia</td>
<td>11,126</td>
</tr>
<tr>
<td>4</td>
<td>Japan</td>
<td>8,076</td>
</tr>
<tr>
<td>5</td>
<td>France</td>
<td>7,689</td>
</tr>
<tr>
<td>6</td>
<td>Germany</td>
<td>7,030</td>
</tr>
<tr>
<td>7</td>
<td>U.K</td>
<td>6,206</td>
</tr>
<tr>
<td>8</td>
<td>Italy</td>
<td>5,644</td>
</tr>
<tr>
<td>9</td>
<td>Russia</td>
<td>5,642</td>
</tr>
</tbody>
</table>


Although, almost two-decade of reforms have not yielded the desired results, yet they definitely provide important clues for our Policy Makers in the power sector. In this chapter, an attempt has been made to study the initial restructuring of power sector in a number of States in India. The chapter discusses the various aspects of early power reforms and offers insights into the achievements and shortfalls of reforms.
2.2 POWER SCENARIO IN INDIA:

Electricity has become very critical and indispensable infrastructure practically in every sphere of our lives. It is being used by all categories of consumers and industrial application of power in our country has no limit. Different types of machinery, which run on power are being used in small-scale, medium and large-scale industries. To operate computers, robots, internet power is very essential. Today, it is possible to contact and communicate with anybody from any part of the world through telephone, internet, e-mail, e-commerce, video conferencing etc. Distance among the places has little significance now due to the development of modern communication systems. Satellites supporting all these channels of communication are regulated from earth stations with the help of both conventional and non-conventional energy systems. The ever-increasing standard of living of our people leading to higher consumption of energy for meeting various comforts by means of energy intensive devices, electrical appliances, air conditioners and so on. But unfortunately, even after 60 years of independence, there still exists a huge demand-supply mismatch in our country.

In spite of many weaknesses and failures, power generation in our country during the last sixty (60) years has been very significant. The total installed power generating capacity in India was only 2300 MW in 1950. The generating capacity increased to over 1,53,694 MW on 31st October, 2009 (Table – 2.2 and Table -2.3):
### TABLE - 2.2

**TOTAL INSTALLED POWER CAPACITY IN INDIA: AS ON OCTOBER 31, 2009**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Capacity in MW</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Sector</td>
<td>49,562.63</td>
<td>34.0%</td>
</tr>
<tr>
<td>State Sector</td>
<td>78,105.71</td>
<td>52.5%</td>
</tr>
<tr>
<td>Private Sector</td>
<td>26,025.75</td>
<td>13.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,53,694.09</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Central Electricity Authority

### TABLE - 2.3

**BREAK-UP OF TOTAL INSTALLED CAPACITY IN INDIA: AS ON OCTOBER 31, 2009**

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Installed Capacity in MW</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>81,355.88</td>
<td>53.3%</td>
</tr>
<tr>
<td>Gas</td>
<td>16,822.85</td>
<td>10.5%</td>
</tr>
<tr>
<td>Oil</td>
<td>1,199.75</td>
<td>0.9%</td>
</tr>
<tr>
<td>Total thermal</td>
<td>99,378.48</td>
<td>64.7%</td>
</tr>
<tr>
<td>Hydro</td>
<td>36,885.40</td>
<td>24.7%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>4,120.00</td>
<td>2.9%</td>
</tr>
<tr>
<td>RES*</td>
<td>13,310.21</td>
<td>7.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,53,694.09</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Central Electrical Authority (CEA)

* Renewable Energy Sources (RES)
The National Electricity Policy (NEP) stipulates power for all and annual per capita consumption of electricity to rise to 1000 units by the year 2012. This necessitates provision of adequate and reliable power at an affordable cost for all the citizens in the country. As electricity is in the concurrent list in the Constitution, the primary responsibility of making the availability and distribution of electricity in the States lies with State Governments. However, both the Centre and the States have to play a decisive and positive role in this regard. While shortages are presently being experienced by each region in our country, but it is more acute in the case of some regions / States (Indian Journal of Power and River Valley Development, POWER - 2009, Annual Review).

2.2.1 Power Generation in India:

The total electricity generation in the country increased from 480.70 billion unit (BU) during 1999-2000 to 723.80 BU during 2008-09. The overall electricity generation in the country as well as import from Bhutan since 1999-2000 to 2008-09 is shown in Table 2.4 and Fig. 2.1:
TABLE - 2.4

GENERATION OF ELECTRICITY IN INDIA:
(From 1999–2000 to 2008–09)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Year</th>
<th>Generation (In BUs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1999-2000</td>
<td>480.7</td>
</tr>
<tr>
<td>2</td>
<td>2000-01</td>
<td>499.5</td>
</tr>
<tr>
<td>3</td>
<td>2001-02</td>
<td>515.2</td>
</tr>
<tr>
<td>4</td>
<td>2002-03</td>
<td>531.6</td>
</tr>
<tr>
<td>5</td>
<td>2003-04</td>
<td>558.3</td>
</tr>
<tr>
<td>6</td>
<td>2004-05</td>
<td>587.4</td>
</tr>
<tr>
<td>7</td>
<td>2005-06</td>
<td>617.5</td>
</tr>
<tr>
<td>8</td>
<td>2006-07</td>
<td>662.4</td>
</tr>
<tr>
<td>9</td>
<td>2007-08</td>
<td>704.5</td>
</tr>
<tr>
<td>10</td>
<td>2008-09</td>
<td>723.8</td>
</tr>
</tbody>
</table>

Source: Central Electricity Authority

(41)
2.2.2 Power Supply Position in India:

The overall power supply position in India is not very satisfactory. The energy requirement in India has worked out to be 4,80,430 Million Unit (MU) during the year 1999-2000. However, the availability of energy during the same year was 4,50,594 MU only, thereby registering an energy shortage of 29,836 MU (6.2%). Similarly, energy availability in our country during 2008-09 was 6,91,038 MU against the requirement of 7,77,039 MU. The energy shortage during 2008-09 was as high as 11.1%. The table - 2.5 shows the shortage in energy requirement and energy availability in India from 1999-2000 to 2008-09 (Fig. 2.2):
## Table 2.5

**Requirement and Shortage of Electricity in India:**

(From 1999-2000 to 2008-09)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Requirement (MU)</td>
<td>4,80,430</td>
<td>5,07,216</td>
<td>5,22,537</td>
<td>5,45,983</td>
<td>5,59,264</td>
<td>5,91,373</td>
<td>6,31,554</td>
<td>6,90,587</td>
<td>7,37,052</td>
<td>7,77,039</td>
</tr>
<tr>
<td>Energy Availability (MU)</td>
<td>4,50,594</td>
<td>4,67,400</td>
<td>4,83,350</td>
<td>4,97,890</td>
<td>5,19,398</td>
<td>5,48,115</td>
<td>5,78,819</td>
<td>6,24,495</td>
<td>6,64,660</td>
<td>6,91,038</td>
</tr>
<tr>
<td>Energy Shortage (MU)</td>
<td>29,836</td>
<td>39,816</td>
<td>39,187</td>
<td>48,093</td>
<td>39,866</td>
<td>43,258</td>
<td>52,735</td>
<td>66,092</td>
<td>72,392</td>
<td>86,001</td>
</tr>
<tr>
<td>Energy Shortage (In Percentage)</td>
<td>6.2%</td>
<td>7.8%</td>
<td>7.5%</td>
<td>8.8%</td>
<td>7.1%</td>
<td>7.3%</td>
<td>8.4%</td>
<td>9.6%</td>
<td>9.8%</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

2.2.3 Demand and Supply of Electricity during Peak Hours in India:

Peak demand is the demand of electricity during peak hours i.e., between 5.30 pm to 10.30 pm everyday. In case of peak demand also the percentage of shortage of electricity has been fluctuating every year in our country. During 1999-2000, the percentage of shortage of power during peak hours was 12.4%. However, in 2007-08, the peak deficit was as high as 16.6%. Again in the year 2008-09, it came down to 11.9% (Table – 2. 6, Fig. 2.3):
# TABLE 2.6

DEMAND AND SUPPLY OF ELECTRICITY DURING PEAK HOURS IN INDIA:

(From 1999-2000 to 2008-09)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Demand</td>
<td>72,669</td>
<td>78,037</td>
<td>78,441</td>
<td>81,492</td>
<td>84,574</td>
<td>87,906</td>
<td>93,255</td>
<td>1,00,715</td>
<td>1,08,866</td>
<td>1,09,809</td>
</tr>
<tr>
<td>(MW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Supply</td>
<td>63,691</td>
<td>67,880</td>
<td>69,189</td>
<td>71,547</td>
<td>75,066</td>
<td>77,652</td>
<td>81,792</td>
<td>86,818</td>
<td>90,793</td>
<td>96,785</td>
</tr>
<tr>
<td>(MW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Deficit</td>
<td>8,978</td>
<td>10,157</td>
<td>9,252</td>
<td>9,945</td>
<td>9,508</td>
<td>10,254</td>
<td>11,463</td>
<td>13,897</td>
<td>18,073</td>
<td>13,024</td>
</tr>
<tr>
<td>(MW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shortage</td>
<td>12.4%</td>
<td>13.0%</td>
<td>11.8%</td>
<td>12.2%</td>
<td>11.2%</td>
<td>11.7%</td>
<td>12.3%</td>
<td>13.8%</td>
<td>16.6%</td>
<td>11.9%</td>
</tr>
<tr>
<td>(In Percentage)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Power-2009, Annual Review

![Graph](image)

**Fig. 2.3: Showing Demand and Supply of Electricity in India during Peak Hours**

(45)
A realistic and correct assessment of energy and peak power requirement is very important for planning and operation of electricity industry in India. According to the 17th Electric Power Survey, the all India peak demand would be about 1,87,960 MW and 2,12,725 MW by the end of XI and XII Five Year Plans respectively. The corresponding energy requirement would be about 9,75,220 MU (Million Units) and 13,18,640 MU respectively. It has been estimated that at the terminal year of the XI Plan, there would be about 13% shortage between electricity demand and electricity availability. This gap would be as high as 20% in the XII Plan (Sharma, 2009).

India is endowed with extensive hydropower resources. However, the development of these resources is uneven and also depend upon monsoon. So, a thermal power back up may be considered for urbanized and industrialized regions of our country. The coal based system and nuclear power are the two alternative options. India is endowed with large extractable coal resources and has also developed a nuclear power industry and nuclear research capabilities under Atomic Energy Commission. But the nuclear power system is highly capital extensive and the foreign exchange requirements are significantly higher than the coal based systems. The coal based system is superior due to its socio-economic objectives as emphasized in India’s five year plans with significant bearing to our domestic economy. So far as the cheapest source of energy is concerned, hydel power stands over thermal and nuclear powers. But instead of large hydro power projects, we may also go for small hydel projects, which will contribute a remarkable help in the energy sector of the country.

2.3 REFORM PROCESS IN INDIA:

Power sector reforms started in India since 1991. The Central Electricity Regulatory Commission (CERC) was established in our country in July 1998 to look
after the various aspects of tariff fixation and other related issues. Today, Central and State Governments have become partners for undertaking reforms and restructuring in a time bound manner in our country. In India, power sector reform and restructuring was first started in Orissa. The initial experience of reforms and restructuring of power sector in four states in our country, namely, Orissa, Andhra Pradesh, West Bengal and Rajasthan are discussed below.

2.4 POWER SECTOR REFORMS IN ORISSA:

Orissa holds the credit of being the pioneer in the process of power sector reforms in India. Encouraged by the Government of India’s New Power Policy of 1991, assisted by the World Bank and supported with grants from the Govt. of UK, Orissa took the initiative to go for reforms in its power industry (Shahi, 2006). The aim of the reform was to address the various issues underlying the poor performance of the Orissa State Electricity Board (OSEB) and restructuring its power sector. The objective was to make power supply in Orissa more efficient, meeting the needs of a growing economy, developing an economically feasible power industry etc. It was expected that power sector reform would enable Orissa to attract private investments while safeguarding the interests of the consumers in the State.

The reform programme was first announced by the Government of Orissa in November, 1993. It was formally approved by the Council of Ministers in April, 1994 and was endorsed by the new State Government, which took office in March, 1995. On 20th April, 1995 the Government of Orissa issued a formal statement of its power policy. The need for power sector reform and restructuring in Orissa was necessitated mainly due to the following reasons:

(i) Orissa started facing acute power shortage from 1980 onwards till 1995. The peak load hours deficit reached a staggering figure as high as 47% by 1993 – 94.
(ii) The Government of Orissa suffered from scarcity of funds to set up new power plants to bridge demand-supply mismatch.

(iii) There was a heavy revenue deficit every year in the running of Orissa State Electricity Board (OSEB) and it was creating a heavy burden on the State exchequer.

(iv) The transmission and distribution system in Orissa was also in a very deteriorated condition necessitating huge investment for its rehabilitation.

(v) There was heavy commercial losses resulting from operational inefficiency etc.

2.4.1 Principal Objectives of Power Reforms in Orissa:

The principal objectives of power reforms in Orissa include the following:

i) Restructuring of the power sector for rationalization of generation, transmission, distribution and supply of electricity.

ii) Developing the Power Industry in an efficient, economic and competitive manner.

iii) Encouraging private investment in the electricity sector to reduce the need for government funding.

iv) Providing quality electricity services to the People of Orissa.

v) Providing a transparent mechanism for development, regulation of Power Industry, tariff fixation and settlement of disputes through an independent statutory body, the Orissa Electricity Regulatory Commission (OERC).

vi) Increasing opportunities for rewarding employment of technical persons and provide a healthy environment for career development in the Electricity Industry.

vii) To ensure a speedy economic growth in the State by providing a superior uninterrupted electricity supply.

viii) To enhance the overall efficiency of OSEB and thereby speedy industrialization of the State of Orissa, etc.
2.4.2 Progress in the Reform Process in Orissa:

The reform process in Orissa was started with the establishment of two key Committees: Steering Committee and Task Force. Under Task Force, nine working groups were created to concentrate on: Planning, Metering, Commercial Financial Asset Valuation, Power Purchase Agreement, Technical Interface Requirement, Tariff, Legal and Regulation, Distribution, and HR Development. The reform process in Orissa received momentum when the Government of Orissa adopted an extensive reform programme for the power sector to unbundle generation, transmission and distribution functions and established an independent and transparent regulatory regime in order to promote efficiency and accountability in the power sector. Under the reform process, Grid Corporation of Orissa Ltd. (GRIDCO) was registered under the Indian Companies Act, 1956 in April, 1995 to own and operate the transmission and distribution system in Orissa. It is currently looking after:

i) Wire business which includes construction of new lines/sub-stations and maintenance of existing lines/sub-stations.

ii) Trading function: It procures power from the generators and sale in bulk to the distribution companies.

iii) Load despatch and functions of the State Transmission Utility (STU).

Under power sector reforms, the Orissa Hydro Power Corporation Ltd. (OHPC) was also registered under the Indian Companies Act, 1956 in April, 1995. The Orissa State Electricity Board (OSEB) was dissolved and unbundled with the takeover of hydro stations owned by the OSEB and the Government, by the Orissa Hydro Power Corporation (OHPC) Ltd. and its transmission and distribution business was taken over by GRIDCO with effect from 1st April, 1996. The restructured Orissa State Electricity Board (OSEB) is shown in the following figure (Fig. 2.4):

(49)
Under power sector reforms and restructuring, the assets and manpower were transferred from OSEB to the newly formed utilities, namely GRIDCO and OHPC. Assets taken over by Government of Orissa was revalued and revested on GRIDCO and OHPC in 1996. The restructuring of the electricity industry in Orissa came into force with effect from April, 1996. The Orissa Electricity Regulatory Commission (OERC) became operative since 1st August, 1996 for supervising and regulating the affairs of electricity industry including rationalization and tariff fixation. The Orissa Electricity Regulatory Commission (OERC) depends on State budget for funds. The Commission is now well staffed with in-house facilities for analysis of tariff applications.

2.4.3 **Privatization Process**:

In keeping with the objectives of power sector reforms and the commitments given to World Bank by the Government of Orissa, power distribution function was to be privatized. After considering various possible alternatives available for privatization, Grid Corporation of Orissa Ltd. (GRIDCO) decided to go for joint venture route. It was decided that, the four distribution zones namely, Central Electricity Supply
Company of Orissa (CESCO), Western Electricity Supply Company of Orissa (WESCO), Northern Electricity Supply Company of Orissa (NORTHCO) and Southern Electricity Supply Company of Orissa (SOUTHCO) which were functioning under the erstwhile Corporation would be converted into four distribution Companies as its wholly owned subsidiaries. Their functions include buying power from GRIDCO under Bulk Supply Tariff (BST) and finally sell it to the consumers under Retail Supply Tariff (RST). The process of privatization may be discussed as follows:

- Altogether 51 Companies initially participated in the process.
- GRIDCO Board pre-qualified only 11 Companies.
- Out of these 11 Companies, 4 Companies did not participate in the bidding process. The causes of non-participation are Asian Economic Crisis, Pokharan II blast, small business and regulatory risks.
- Another four Companies again stayed away from the bidding process.
- Out of the remaining bidders, only Bombay Sub-urban Electricity Services (BSES), Singapore Power Grasim and TEC Viridian were found to be technically qualified.
- BSES was finally selected for WESCO, NESCO and SOUTHCO and the management was handed over with effect from 1st April, 1999.
- American Electricity Company (AES), the pre-qualified bidder was selected for CESCO through negotiations and the management was handed over with effect from 1st September, 1999. Thus, through a process of international competitive bidding GRIDCO offered 51% stake to private sector investors, keeping 39% shareholding with it and 10% share for Employees' Welfare Trust. The new structure of the Power Sector in Orissa after privatization of the distribution function is shown in Fig. 2.5.
- There are independent generating sources like National Thermal Power Corporation (NTPC), Orissa Hydro Power Corporation (OHPC), Orissa Power
Generation Corporation (OPGC), Independent Power Plants (IPPs) and Captive Power Plants (CPPs) which supply electricity to Orissa.

- GRIDCO purchases power under Power Purchase Agreements (PPAs) from the above sources and provides electricity to the privatized distribution Companies at a bulk price. Thus, GRIDCO acts as a transmission Company between the generation and distribution Companies.

- CESCO, WESCO, NORTHCO and SOUTHCO cater to the power needs of the consumers in their respective areas in Orissa.

\[\text{Fig. 2.5 : New Structure of Power Sector in Orissa}\]

2.4.4. Funds for Reforms:

World Bank and Department for International Development of United Kingdom (DFID) funded the power reform programmes in Orissa. It is said that then it was World Bank's most ambitious project. World Bank has sanctioned a grant of $350 million loan for rehabilitation of transmission and distribution system in Orissa (Table (52))
2.7). World Bank prescribed, guided and supervised the reform programmes in Orissa.

Table – 2.7

WORLD BANK LOAN ALLOCATION : AS ON 07.02.2001

<table>
<thead>
<tr>
<th>Heads</th>
<th>Amount (In US Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission</td>
<td>$ 140.00</td>
</tr>
<tr>
<td>Distribution</td>
<td>$ 140.00</td>
</tr>
<tr>
<td>DSM</td>
<td>$ 10.00</td>
</tr>
<tr>
<td>Meters</td>
<td>$ 50.00</td>
</tr>
<tr>
<td>Technical Assistance</td>
<td>$ 10.00</td>
</tr>
<tr>
<td>Unallocated</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>$ 350.00</td>
</tr>
</tbody>
</table>

Source : Gridco Overview

On the other hand, DFID (Department for International Development) of UK Government also sanctioned 67 million Sterling Pounds (Table -2.8) for undertaking reforms. The fund was sanctioned for consultancy support and urgent needs for replacement of conductors and construction lines.

Table – 2.8

HEAD-WISE SANCTIONS BY DFID :

<table>
<thead>
<tr>
<th>Heads</th>
<th>Amount (In Million Sterling Pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R &amp; M</td>
<td>22.36</td>
</tr>
<tr>
<td>Staff Rationalization</td>
<td>2.56</td>
</tr>
<tr>
<td>Communication</td>
<td>0.20</td>
</tr>
<tr>
<td>Chandaka Up-gradation</td>
<td>0.20</td>
</tr>
<tr>
<td>Technical Assistance</td>
<td>41.68</td>
</tr>
<tr>
<td>Total</td>
<td>67.00</td>
</tr>
</tbody>
</table>

Source : Gridco Overview

1 DSM : Demand Side Management.
2.4.5 Initial Achievements of Power Reforms in Orissa:

Indeed, Orissa has set milestones in the field of power sector reforms in India. The major achievements of the reforms include taking over of TTPS (Talcher Thermal Power Station) by National Thermal Power Corporation (NTPC) is now operating at a high efficiency level of 75.10% PLF, whereas from its inception it never operated beyond 30% PLF. The profit and loss of Orissa Power Generation Corporation (OPGC), Orissa Hydro Power Corporation (OHPC) and Grid Corporation of Orissa Ltd. (GRIDCO) during 1996-97 to 1999-2000 had witnessed a positive trend. (Table 2.9):

| TABLE – 2.9 |
| PROFIT AND LOSS OF OPGC, OHPC AND GRIDCO: |
| (From 1996-97 to 1999-2000) (Rs. in Crores) |

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OPGC</td>
<td>.104.6</td>
<td>66.2</td>
<td>112.8</td>
<td>124.4</td>
</tr>
<tr>
<td>OHPC</td>
<td>69.9</td>
<td>77.8</td>
<td>63.9</td>
<td>47.7</td>
</tr>
<tr>
<td>GRIDCO</td>
<td>-295</td>
<td>-319.1</td>
<td>-305.8</td>
<td>-10.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>-120.5</td>
<td>-175.1</td>
<td>-129.1</td>
<td>161.8</td>
</tr>
</tbody>
</table>

Source: OSEB, Annual Reports

Thus, during 1996-97, power sector in Orissa was experiencing a loss of 120.5 Crores, whereas during 1999-2000, the power sector could see profits to the tune of Rs. 161.80 Crores after undergoing reforms and restructuring.

2 PLF : Plan Load Factor: It is an efficiency measuring parameter for the power plants.
Similarly, the Orissa Power Generation Corporation Ltd. (OPGC) being exclusively in charge of thermal power generation in Orissa has been consistently managing high PLF of 70% to 80%, which is comparable to NTPC. Disinvestment of 49% Government share has unlocked a huge amount of funds, which can be further utilized for power development in the State. In the pre-reform period, Government of Orissa used to give a huge subsidy of about Rs.340 Crores almost every year to the power sector. Significantly, this practice has been stopped since 01.04.1996.

2.5 POWER SECTOR REFORMS IN ANDHRA PRADESH :

Before independence (1947), the present Andhra Pradesh State was partly under composite Madras State and partly under the Nizam's rule as Hyderabad State. The power needs of respective areas were served by the Madras State Electricity Department (Established in 1926-27) and the Hyderabad Electricity Department (Established in 1912). Again, on 1st October, 1953 the ‘Andhra State’ was formed after getting separated from composite Madras State with Kurnool as the Capital. On the same day (i.e. 01.10.1953) the Andhra Electricity Department was created to cater the power needs of Andhra and Rayalseema regions. Again on 1st November, 1956 the "Andhra Pradesh" State was constituted by joining the Andhra State and the Telangana Region under Nizam's rule with Hyderabad as its Capital and the Andhra Pradesh Electricity Department was catering the power requirements of the State (Rao and Krishna, 2008).

The Andhra Pradesh State Electricity Board (APSEB) was established on 1st April, 1959. While constituting the Electricity Board, the Andhra Pradesh Government did not transfer all the activities of the Electricity Department to the Board. They retained with them investigation of new projects, construction of projects, generation of power and operation and maintenance of main transmission lines. The Government transferred to the APSEB only the functions of distribution and supply of power.
However, in the year 1962-63, all the generating stations and transmission lines were transferred to APSEB.

2.5.1. **Power Scenario in Andhra Pradesh before Power Sector Reforms**

The Andhra Pradesh State Electricity Board (APSEB) was in a very bad shape till 1997. The losses of the Board were escalating at a rapid rate and its outstanding liabilities were experiencing a multiplying effect. These adverse developments prevented APSEB from mobilizing internal resources or private sector financing, which in turn badly affected the process of its generation, transmission and distribution capacity. Demand for power in the State continued to increase steadily and inevitably the gap between demand and supply widened. Thus, the State power sector in Andhra Pradesh was creating a severe drain on Government resources. Therefore, reform in the Power Sector was an urgent need on the part of Government of Andhra Pradesh.

2.5.2 **Reform Process**

In the year 1996, the Government of Andhra Pradesh started circulating bulletins in English and local Telugu informing people about the serious problem of State Power Sector and the necessity to address the issue immediately (Chandra Sekhar, 2004). The important issues that were highlighted in the bulletins are:

- **i)** The continuously increasing gap between supply and demand.
- **ii)** The increasing cost of power generation and the rising deficit.
- **iii)** Poor metering and inefficient billing system.
- **iv)** Heavy commercial losses.
- **v)** Large scale theft of energy, etc.

Media played an active role in spreading the message across the masses in Andhra Pradesh. Finally, in August, 1997 the Government of Andhra Pradesh unveiled
its proposal to restructure the Andhra Pradesh State Electricity Board (APSEB) as a first step towards power reforms in the State. It may be mentioned here that since the very beginning of the reform process, the Andhra Pradesh Government faced stiff opposition from the main Opposition Party, the Congress and also from other smaller parties.

In order to overcome the opposition, the Government of Andhra Pradesh appointed a high-level Commission to examine the modalities for carrying out the reform measures. The recommendations of the Commission were received in 1997 and the Government came out with its Policy Statement in February, 1997 itself on power reforms. The then Chief Minister initiated a dialogue with diverse groups of stakeholders including industrialists, agriculturists, non-government organizations (NGOs) and journalists. The public debate on the new policy statement continued for a long period of 14 months. In April, 1998 after much public debate, the Government of Andhra Pradesh first announced its policy on power sector reforms. Finally, the Andhra Pradesh Electricity Reforms Bill was passed in Andhra Pradesh Legislative Assembly on 28th April, 1998. On 21st October, 1998 the President of India gave his assent to the legislation and the State Government in the Andhra Pradesh Gazette notified the Andhra Pradesh Electricity Reform Act 30/98 dated 29th October, 1998. Consequently, the Certificate of Commencement of Business was obtained on 5th January, 1999. The Andhra Pradesh Electricity Reforms Act came into force from 1st February, 1999. Thus, under the reform process, the 39 year and 10 months old Andhra Pradesh State Electricity Board (APSEB) was bifurcated into two independent Corporations, namely,

1. Andhra Pradesh Power Generation Corporation Ltd. (APGENCO) and
2. Transmission Corporation of Andhra Pradesh Ltd. (APTRANSCO).

Both the Corporations were registered under the Indian Companies Act, 1956.
on 29th December, 1998. Personnel working in various wings of the Board were transferred to these two new Corporations as per the transfer scheme, thereby ending the era of Andhra Pradesh State Electricity Board (A.P.S.E.B) on as-is where-is basis. The Andhra Pradesh Power Generation Corporation Ltd. (APGENCO) is vested with the responsibility of power generation in the State. The APGENCO took over all the existing power stations of A.P.S.E.B to generate and sell power to the Transmission Corporation of Andhra Pradesh Ltd. (APTRANSCO). It is a fully owned Government Company having total control over all the existing power plants both thermal as well as hydel of A.P.S.E.B. On the other hand, APTRANSCO is vested with the responsibility of looking after the transmission and distribution of electricity in the State. The APTRANSCO would procure power from APGENCO as well as from other independent power generating sources under various controls. In order to revamp the distribution system in the State, APTRANSCO decentralized itself to have four (4) Distribution Companies, namely:

a) Southern Power Distribution Company Ltd. (SPDCL),

b) Eastern Power Distribution Company Ltd. (EPDCL),

c) Central Power Distribution Company Ltd. (CPDCL) and

d) Northern Power Distribution Company Ltd. (NPDCL).

These four (4) distribution companies supervise the retail supply of power across the State of Andhra Pradesh. The restructured Andhra Pradesh State Electricity Board (A.P.S.E.B) is shown in the following figures (Fig. 2.6 and Fig.2.7):
Fig. 2.6: Showing Restructured A.P.S.E.B.

Fig. 2.7: Showing New Structure of Power Sector in Andhra Pradesh
The Andhra Pradesh Electricity Regulatory Commission (A.P.E.R.C) was established on 31st March, 1999 under the Andhra Pradesh Electricity Reform Act, 1998. Sri G.P. Rao, I.A.S. (Retd.) was appointed as its Chairman immediately for a period of 5 years. The A.P.E.R.C. came out with its first recommendations in June, 2000.

2.5.3 **Post-reform Scenario in Andhra Pradesh**:

After unbundling of Andhra Pradesh State Electricity Board (APSEB) on functional basis, the problems in various areas were identified and corrective measures were initiated. An efficient and adequate transmission network is very important for proper evacuation as well as reliable and quality supply of electricity to the consumers. In Andhra Pradesh, right from the very beginning, the transmission sector was given due attention on par with generation and distribution sectors under the reform process. The transmission sector which was neglected earlier received proper attention after undertaking reforms and efforts were made to bring down the transmission losses. Significantly, transmission losses which were at 8.94% in the year 2001 came down to only 4% in the year 2007 (Table - 2.10) (Fig. 2.8). Similarly, a huge investment of about Rs. 2800 Crores have been made to upgrade transmission network till 2007, in Andhra Pradesh (Table - 2.11) (Fig.2.9):
### TABLE – 2.10

**REDUCTION OF TRANSMISSION LOSSES IN ANDHRA PRADESH:**

(From 2001 to 2007)

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Years</th>
<th>Transmission Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2001</td>
<td>8.94 %</td>
</tr>
<tr>
<td>2</td>
<td>2002</td>
<td>8.13 %</td>
</tr>
<tr>
<td>3</td>
<td>2003</td>
<td>7.55 %</td>
</tr>
<tr>
<td>4</td>
<td>2004</td>
<td>6.27 %</td>
</tr>
<tr>
<td>5</td>
<td>2005</td>
<td>4.53 %</td>
</tr>
<tr>
<td>6</td>
<td>2006</td>
<td>4.48 %</td>
</tr>
<tr>
<td>7</td>
<td>2007</td>
<td>4.00 %</td>
</tr>
</tbody>
</table>

Source: A.P.S.E.B, Annual Reports

---

![Graph showing reduction in transmission losses](image)

**Fig. 2.8:** Showing Reduction in Transmission Losses in Andhra Pradesh

(61)
**TABLE – 2.11**

Investment made in Transmission Sector in Andhra Pradesh:
(From 2001 to 2007)

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Years</th>
<th>Investment (Rs. In Crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2001</td>
<td>420</td>
</tr>
<tr>
<td>2</td>
<td>2002</td>
<td>459</td>
</tr>
<tr>
<td>3</td>
<td>2003</td>
<td>363</td>
</tr>
<tr>
<td>4</td>
<td>2004</td>
<td>248</td>
</tr>
<tr>
<td>5</td>
<td>2005</td>
<td>415</td>
</tr>
<tr>
<td>6</td>
<td>2006</td>
<td>358</td>
</tr>
<tr>
<td>7</td>
<td>2007</td>
<td>499</td>
</tr>
</tbody>
</table>

Source: A.P.S.E.B, Annual Reports

**Fig 2.9:** Showing Investment made in Transmission Sector in Andhra Pradesh.
Today, Andhra Pradesh Power Sector is a forerunner in adopting best practices in the areas of operation, maintenance and protection of transmission system. By utilizing latest equipments like thermo-vision cameras, continuous inspection of lines is being carried out and necessary corrective action, if any, needed is being immediately taken in order to avoid future power interruption. The latest numeric relays are used for protection of switchgear, which ensure quick isolation of faults and help in the prevention of damage. Andhra Pradesh has the best hotline crew, which ensure rectification of faults without interrupting the power supply in the line. Thus, today in Andhra Pradesh the repairing works are being carrier out on live conductors.

2.5.4 The Achievements:

As a result of timely execution of expansion projects and best maintenance practices adopted by the Andhra Pradesh Transmission Corporation Ltd. (APTRANSCO), made the transmission system very effective in Andhra Pradesh. This achievement has also been recognized by the Indian rating agencies and the Ministry of Power, Government of India. M/S CRISIL has also rated the Andhra Pradesh power utilities to be the best in the Country thrice. It may be noted here that, Ministry of Power, Government of India has constituted an award for best performance in the transmission system. In the year 2004-05, APTRANSCO with a success rate of 99.85% bagged the Silver Shield for its improved performance. Again in the year 2005-06, APTRANSCO was awarded the prestigious Golden Shield for the remarkable success rate of 99.87%. In the present competitive environment, a public utility concern can only sustain if it is operating at the highest efficiency level accompanied by the lowest possible operating costs. Power Sector in Andhra Pradesh is no exception in this respect. It should be committed to the mission of providing the consumers reliable power supply in an efficient manner at an affordable price. All its future endeavours should aim at achieving this goal in the post-reform period.
2.6 POWER SECTOR REFORMS IN WEST BENGAL:

West Bengal, historically, is the pioneer State in power sector development in our country. The first hydel power plant in India was set up in 1897 in Sidrapong, a village in the Darjeeling district of West Bengal. It may be mentioned here that, the first thermal power plant was also set up in Kolkata, West Bengal as early as 1899 (Dhar, 2005). However, the economy of West Bengal is mainly dependent on thermal power.

Today, the power scenario in West Bengal, despite its rich legacy is not very encouraging. The State had gone through cycles of acute shortage and occasional surplus in electricity availability. The electricity demand has practically stagnated due to lack of industrial growth in the State. Today, there is a significant improvement in load-shedding index in capital city Kolkata as well as the other parts of the State including the district headquarters. At present, West Bengal is a power surplus State for all periods of the day except for a brief spell in peak-hours (Das, 2008). Excess available power of the State is being sold to other States in India including Assam for quite sometimes now.

2.6.1 Major Players in Power Sector in West Bengal:

The West Bengal State Electricity Board (WBSEB) was established on 1st May, 1955. The power sector of West Bengal is structured with multiple agencies since its inception. The major players in the power sector in West Bengal include the following:

- West Bengal State Electricity Board (WBSEB): The organization is the guardian of electricity sector as per Electric Supply Act, 1948 in West Bengal. It is engaged mainly in power distribution and transmission along with 165 MW hydro generating station and 100 MW of gas turbine.

- Durgapur Project Limited (DPL): This Organisation is a multi-disciplinary
coal-based industry. Generation of power and catering of electricity demand in industrial areas of Durgapur are its important functions. Excess power is sent to WBSEB.

- West Bengal Power Development Corporation Limited (WBPDCL): It is the second largest generating company in eastern India having an initial installed capacity of about 2900 MW. This organization was formed in 1985 primarily for mobilization of fund for Kolaghat thermal power project.

- Calcutta Electricity Supply Corporation Limited (CESC): It is the oldest power utility concern in our country. It caters the electricity demand of Calcutta and its adjoining areas through its own generation. It has a generation capacity of 1065 MW. The organization also get power from WBSEB and Damodor Valley Corporation (DVC). CESC was set up in 1899.

- Disergarh Power Supply Corporation Limited (DPSC): The organization is responsible for supplying power to mines and it tries to meet the demand of electricity of its command areas through its own generation. The organization also get power from DVC. Its own installed capacity is about 40 MW.

- Damodor Valley Corporation (DVC): This organization is established under the DVC Act, 1948 for multi-purpose development along with the major objective of flood control in Damodor Valley spreading over West Bengal and Jharkhand. The organization is responsible for supplying power at voltage of 30 KV and above in its command areas. It has a large number of bulk consumers with considerable amount of industrial load.

- Singur-Haripal Co-operative: This organization is formed in the agriculturally rich Singur areas in 1978. Its power requirement is exclusively met by WBSEB. Another co-operative was formed in Lavpur areas of Birbhum district in West Bengal. But this organization could not function successfully due to lack of local initiative and participation.
- West Bengal Renewable Energy Development Authority (WBREDA): This organization is primarily responsible for development of renewable and non-conventional energy sources for both grid and off-grid areas. Here, distribution of power is done through local beneficiary committees/societies in off-grid areas as in Sagar Island.

Besides the above utilities, other Central Sector Organisations active in West Bengal include Power Grid Corporation of India Ltd. (PGCIL), National Hydroelectric Power Corporation Ltd. (NHPC), National Thermal Power Corporation Ltd. (NPTC), Power Trading Corporation (PTC) etc. (Guha, 2002). Power is also made available to West Bengal from North Eastern Electric Power Corporation Ltd. (NEEPCO) and Power Stations of Bhutan through Power Trading Corporation (PTC). The inter-utility business relationship of power utilities in West Bengal is shown in the following figure (Fig.2.10):

Fig. 2.10: Showing Business Relationship among Electricity Utilities in West Bengal

---

CHUKA HYDRO 134 MW

WBPDCIL 2900 MW (THERMAL)

NHPC RANGETT-14 MW KIRUCHU-22MW (Hydro)

NTPC- FSITPS- 540MW KSTPS- 42 MW (Thermal)

NEEPCO- PEAK- 50 MW NORMALLY- 20 MW (Hydro)

PTC For Other States

WBSEB HYDRO- 165.725 MW GAS TURBINE- 100 MW

DVC THERMAL- 245 MW HYDRO- 15 MW

DPL THERMAL- 390MW

Free supply To Bhutan

CESC- Thermal- 105SMW

Singur-Haripal Cooperative

Sikkim - Small hydro supply

PTC

DPSC Thermal- 40 MW

End consumer

Direct Industrial Consumer

End consumer

End consumer

End consumer

End consumer

(66)
2.6.2 Reform Process in West Bengal:

After 1995, Indian power sector has undergone rapid structural changes through vertical disintegration of State Electricity Boards (SEBs). The first experience was done in Orissa, which has already been explained in this chapter. With this experience, the Government of West Bengal also undertook the re-organization of its power sector. An independent West Bengal Electricity Regulatory Commission (WBERC) was constituted in March, 1999, which is fully operational now. The Memorandum of Understanding (MoU) was signed between Ministry of Power, Government of India and Government of West Bengal in May, 2001. In exercise of the power conferred under Sub-Section 4 of Section 131 of the Electricity Act, 2003 the Government of West Bengal unbundled the West Bengal State Electricity Board (WBSEB) into two companies, namely, West Bengal State Electricity Transmission Company Ltd. (WBSETCL) and West Bengal State Electricity Distribution Company Ltd. (WBSEDCL) in April, 2007. Under the West Bengal Power Sector Reforms Transfer Scheme, 2007 activities relating to transmission and load despatch business of West Bengal State Electricity Board (WBSEB) were transferred to WBSETCL and the activities relating to power distribution were transferred to WBSEDCL (Fig. 2.11 and Fig. 2.12):

![Diagram of restructured WBSEB]

Fig. 2.11: Showing Restructured W.B.S.E.B
Fig. 2.12: Showing the New Structure of Power Sector in West Bengal

- N.E.E.P.C.O
- D.V.C
- D.P.S.C
- C.E.S.C
- D.P.L
- NHPC
- NTPC
- W.B.S.E.T.C.L (Transmission)
- W.B.S.E.D.C.L
- Siliguri Zone
- Beharapur Zone
- Midnapur Zone
- Burdwan Zone
- Kolkata Zone
- Consumers
By the Notification No. 12-PO/O/III/3R-29/2006 dated 25th January, 2007 the scheme for providing and giving effect to the transfer and vesting of all properties and all interests of the WBSEB in the State Government and revesting thereof by the State Government in the WBSETCL and WBSEDCL along with other property, interests, rights and liabilities of the State Government and for determining the terms and conditions on which such transfer or vesting or revesting shall be made was issued by the Government of West Bengal. By a further Notification No: 313/PO/O/III/3R-29/2006 dated 19th September, 2008 the terms and conditions of the above transfer scheme regarding the transfer of properties, interests, rights and liabilities etc. were modified. In effect of the said Transfer Scheme, WBSETCL was incorporated under the provisions of the Companies Act, 1956 on 16th February, 2007 and the Company obtained the Certificate of Commencement of business with effect from 21st March, 2007.

2.6.3 **Major Milestones in West Bengal Reforms:**

- In West Bengal, under the reform process various measures have been adopted for improving the transmission and distribution network. Japan Bank for International Co-operation (JBIC) has been assisting the Transmission System Projects in West Bengal. The Security and Loss Prevention (S&LP) Wings have been strengthened in the State by establishing Security and Loss Prevention Offices at 17 circles in addition to the Central Security and Loss Prevention (S&LP) Wing in Kolkata. West Bengal Renewable Energy Development Authority (WBREDA) has implemented a massive programme in the field of renewable energy sources like solar energy, wind energy, biomass, mini micro hydel, tidal power etc.

- West Bengal Rural Energy Development Corporation Ltd. (WBREDCL) which was established in 1998 under the reform process adopted a number of steps to strengthen rural electrification scenario and supply of electricity at 400 volts or below.
to the consumers in rural areas with the active involvement of Panchayat institutions. As on 30th September, 2007 out of a total 37,910 villages 34,555 villages have been electrified (91.15%). A unique feature of the functioning of West Bengal Rural Energy Development Corporation Ltd. (WBREDCL) is that it is highly decentralized to the district and sub-divisional levels in its planning, execution and monitoring operations. At the district level, the apex body is the District Rural Energy Committee, whose members include the Chairman of the Zilla Panchayat and the District Magistrate. At the block level, there is a Block Rural Energy Committee headed by the Block Development Officer (BDO). At the basic level of this structure is the Beneficiary Committee, comprising of a member of gram panchayat, a local teacher and a local youth representative. After the closing of electrification and intensification work, the Beneficiary Committee takes up the role of protecting and monitoring the transformers in their localities. Hence, the Beneficiary Committee is also known as Transformer Protection Committee.

- West Bengal has become highly successful in maintaining grid discipline complied with grid code and ABT (Availability Based Tariff) and carried out the directions of Regional Load Despatch Centre (RLDC). State Load Despatch Centre (SLDC) established by the Government of West Bengal under Sub-Section (I) of Section 31 of the Electricity Act, 2003 on 24th April, 2006. All necessary measures in order to maintain grid discipline are being adopted in the State. There is no known occurrence of major grid indiscipline in recent times in West Bengal. Availability Based Tariff (ABT) regulations have been made and have become operational in the State since 1st January, 2008.

- Department of Power, Government of West Bengal has also taken a number of steps to stop power theft in the State. The most stringent Anti Theft Law in the State came into force on 15th July, 2003 and has been further amended by Electricity (Amendment) Act, 2007. Adequate training and increase in the awareness level has
helped in maintaining healthy relationship between the service provider and the consumers. Board personnel very often conduct ‘de-hooking’ drive and in this respect they are also getting co-operation and help from the common men as well as other State departments.

- In order to promote open access and invite more competition in the power sector in the State, West Bengal Electricity Regulatory Commission (WBERC) has made regulations which lay down terms and conditions, schedule of charges, fees and format for long term, short term and temporary types of open access. The guidelines for phasing for open access in the distribution of electricity or sale of electricity have also been laid down. However, open access has not become functional in the real sense in the State due to feasibility factors.

- It may be mentioned here that the Ministry of Power, Government of India has adjudged WBSETCL (West Bengal State Electricity Transmission Company Ltd.) for best Transmission System Availability Award with Gold Shield for the year 2007-08. WBSETCL has earned a net profit of Rs.81 crores with a turnover of Rs.428 crores during the financial year ended in March, 2008. The company operates through 89 EHV sub-stations, some of which have already obtained ISO-9001 Certificate. WBSETCL has been maintaining its transmission system with a network of 10,773 circuit kms. of EHV lines with transmission capacity of 14,823 MVA and handles about 20,000 MU of electricity in a year. WBSETCL has also earned the distinction of accident free operation in the areas of operation, maintenance and construction.

- Under power sector reform process, West Bengal has achieved almost 100% feeder metering. Almost 99% domestic connections in the State are now metered, Under power sector restructuring, customer service and grievance redressal system continue to receive due attention. West Bengal State Electricity Distribution Company Ltd. (WBSEDCL) has introduced many customer friendly facilities regarding payment of bills, knowing of bill amounts, lodging of complaints etc. Night services for attending
faults have also been extended to newer areas.

2.6.4 Different Constraints for Power Development in West Bengal:

From early seventies to mid-nineties West Bengal has faced severe energy crisis. The then planners could not foresee the power problems properly. The major constraints for power development in the State of West Bengal may include the following:

**Resource Constraints:**

The State is not much rich in natural resources. Oil and gas are not available in West Bengal. But the State has huge coal reserves. Thermal power plants in West Bengal are mainly coal based plants. The estimated potential of different renewable and non-conventional energy in West Bengal include wind power (70MW), biomass power (200MW), small hydel power (20MW). The total potential of all these types of energy sources in West Bengal is estimated to be about 900MW including energy from urban and industrial wastes but excluding solar energy.

**Technological Constraints:**

In West Bengal, power plants are mostly coal based. Coal based thermal plants produce a huge pollution in the environment through emission of flue gases from their Chimneys. Now-a-days, this type of plants carries out huge expenditure for adopting preventive measures against environmental pollution and degradation.

Again in West Bengal, most of the hydel power is obtained by constructing dams across the running rivers. These rivers are completely in destruction in the downstream of dams thereby creating ecological imbalance along with destruction of bio-diversity in the State. Moreover, siltation is a severe problem of most of the
rivers in South Bengal. Huge money will be required for dredging out silts from these rivers. Therefore, attempts should be made for quest of such technology, which is pollution free and for which required raw-materials are available in abundance in the State.

**Economic Constraints:**

The State of West Bengal is economically backward or hardly mediocre. The State is unable to manage huge amount of fund on itself for her power sector. After economic reform in the country, West Bengal has been able to get some foreign investments for its power sector. However, unlike Karnataka and Maharashtra, the State of West Bengal was unable to attract sufficient amount of foreign investments.

Realizing the importance of having an alternative power generating system, the Department of Power, Government of West Bengal has been giving priority for the development of hydel power in the State. Efforts are on to obtain a perfect thermal-hydro mix for facilitating right peak load management. West Bengal has immense potential and prospect of hydel power including mini, micro and small hydel power. At present only about 3% of total power generation in the State is from hydel power. The State has earmarked to achieve electricity for all of its households by 2012. It seems that power authorities in West Bengal are determined to improve the revenue earnings by using suitable cost reducing techniques and forging a system of participatory management to discuss on all important issues and work together to reach the common goals for the benefit of all concerned.
2.7 POWER SECTOR REFORMS IN RAJASTHAN:

The State of Rajasthan was established in 1949 out of the merger of 19 princely States. The State has the largest geographical area in our country (3,42,239 sq. km.). However, about 60% of its area is arid or semi-arid, drought-prone and very thinly populated. The density of population in Rajasthan being less than 200 persons per sq. km. At the time of its formation, the state had a total installed power generating capacity of only 13.27 MW (Mathur, 2005). At that time, electricity supply was considered as a luxury and was confined to the palaces of Rajas and Maharajas and to a few towns only. The power distribution system was only available in the limited areas of 42 towns and there was hardly any energized pump set for agricultural purposes.

The power sector in Rajasthan received a boost only after the formation of the Rajasthan State Electricity Board (RSEB) in July, 1957. With the beginning of planning era in India, ambitious schemes were drawn for Rajasthan also. The schemes emphasized the development of individual small thermal power stations as well as participating in the partnership projects with the neighbouring States. As a result, Bhakra-Beas project was started with Punjab and Chambal Complex Projects (Rana Pratap Sagar, Jawahar Sagar and Gandhi Sagar Projects) and Satpura thermal project were started with Madhya Pradesh. The Department of Atomic Energy, Government of India actively contributed to the development of power sector by setting up 2x220 MW Rajasthan Atomic Power Project (RAPP) in the State and by allocating its entire generation to Rajasthan. The total installed power generation capacity in the state rose to 134.57 MW at the end of the Second Five Year Plan.

However, there was not much progress initially in the field of rural electrification due to the lack of infrastructural facilities and non-availability of power. Severe drought conditions that prevailed in Rajasthan during 1965 and 1966, brought some changes
in our National Power Policy by way of re-orientation of the rural electrification programmes and laying importance on energization of pump sets. As a result, Rural Electrification Corporation (REC) was formed in the year 1969 in order to accelerate rural electrification programmes in our country. The progress in the field of rural electrification in Rajasthan started thereafter. As a result, by 2003-04 the number of electrified localities in the State of Rajasthan was increased to 38,740 (222 towns and 38,518 villages) and the number of energized pump sets increased to 6,87,242. However, simultaneous development of adequate transmission system did not take place in Rajasthan due to lack of adequate investments. This resulted in a very sub-optimal transmission and distribution system accompanied by high transmission and distribution (T & D) losses apart from theft/pilferages.

In the eighties and nineties, the State of Rajasthan added its coal based power station at Kota with an installed capacity of 850 MW. Two hydropower stations were also started on Mahi river in Banswara district with a generation capacity of 140 MW. Moreover, 23.85 MW capacity mini-micro hydel projects were also commissioned during this period. In Central sector the National Thermal Power Corporation Ltd. (NTPC) set-up its gas-based power plant at Anta, from which the State received its due share as per Central power allocation formula. During the last decade of the 20th Century, high priority was given in the State for increasing the power generation bases. Five units with a capacity of 250 MW each were commissioned at Suratgarh. Similarly, 113.5 MW capacity of gas turbines were also installed at Ramgarh in Jaisalmer district of Rajasthan. During this period, the State also introduced an attractive policy of setting-up power projects based on non-conventional energy sources (e.g. wind, biomass and solar based projects). It may be mentioned here that 224.79 MW capacity power projects based on non-conventional energy sources have been commissioned in Rajasthan upto 01.12.2004.
2.7.1 Reform Process:

Despite of investing large amount in the power sector in Rajasthan, there was a persistent shortage of electricity in the State. The main objective of launching power sector reforms in Rajasthan was to mobilize resources from private sector for speedy development of the power sector. In spite of overwhelming response received from the private sector for electricity generation, the Government of Rajasthan failed to attract large private investments in the State for hydel as well as thermal power generation. In order to accelerate private investments in the electricity sector, the Government of Rajasthan initiated power sector reforms in the State. As a result, Rajasthan State Electricity Board (RSEG) was unbundled into five (5) Government owned companies, with effect from 19th July, 2000 (Ghose, 2005). These five newly constituted units are:

i) Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (RRVUNL)
ii) Rajasthan Rajya Vidyut Prasaran Nigam Ltd. (RRVPNL)
iii) Ajmer Vidyut Vitran Nigam Ltd. (AVVNL)
iv) Jaipur Vidyut Vitran Nigam Ltd. (JVVNL) and
v) Jodhpur Vidyut Vitran Nigam Ltd. (JVVNL).

These companies have been incorporated under the provisions of the Indian Companies Act, 1956. Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (RRVUNL) is for generation of power, Rajasthan Rajya Vidyut Prasaran Nigam Ltd. (RRVPNL) is for transmission of power and Ajmer Vidyut Vitran Nigam Ltd. (AVVNL), Jaipur Vidyut Vitran Nigam Ltd. (JVVNL) and Jodhpur Vidyut Vitran Nigam Ltd. (JVVNL) are for distribution of power in the respective regions in the State (Fig. 2.13 and Fig. 2.14):
The Rajasthan Power Sector Reforms Bill, 1999 was approved by the State Legislature on 2nd September, 1999 and was brought into force with effect from 1st June, 2000. Rajasthan Electricity Regulatory Commission (RERC) was also set up.

(77)
on 10\textsuperscript{th} December, 1999 under the provisions of the Electricity Regulatory Commission Act, 1998. The Rajasthan Electricity Regulatory Commission has already started functioning in the State since 2\textsuperscript{nd} January, 2000.

\textbf{2.7.2 Major Objectives of Power Sector Reforms in Rajasthan:}

The major objectives of power sector reforms outlined by the Government Rajasthan in its policy statement, 1999 included the following:

a) To supply electricity to the consumers in the State most efficiently in terms of quality and cost to support the State's economic development.

b) To initiate effective steps to enable the power sector in the State to mobilize from within the sector adequate financial resources for financing grid expansion requirements.

c) To create and maintain an operative and regulatory environment, which is conducive for making investment and competition so as to foster the entry of private parties into the electricity generation, transmission and distribution business in the State. To attract the capital and expertise required to support power system upgradation, expansion and service quality improvement.

In order to achieve the above mentioned objectives, the Department of Power, Government of Rajasthan has embarked on the following agenda of reforms:

a) Setting up of an independent State Regulatory Commission to regulate the workings of state power sector on sound commercial principles. The Regulatory Commission would safeguard the interests of the consumers in the State in respect of quality, reliability and fair price for electricity. Further, the commission would fix cost and efficiency based tariffs in order to ensure the creditworthiness and viability of the state power sector and progressively eliminate tariff distortions and subsidies.
b) Strengthening of the generation, transmission and distribution activities into separate services, which are to be provided by separate autonomous companies.

c) Reconfiguration of the distribution system into separate distinct, economically viable geographical zones, each zone to be served by an autonomous distribution company.

d) Corporatization and commercialization of the emerging power sector entities in the State in order to make the power sector more attractive for the prospective investors both domestic as well as foreign.

e) Retention of the work of basic policy formulation with the Department of Power, Government of Rajasthan.

f) Encouraging competition among the various power sector entities in the State.

g) Effective management of demand and supply of power in the State to conserve and promote efficient use of energy and ensure environmental protection (Gupta and Gupta, 2005).

2.7.3 Initial Achievements of Power Sector Reforms in Rajasthan:

After unbundling of Rajasthan State Electricity Board (RSEB) in 2000 on functional basis, the initial performance of the power sector in the State seemed to be a mixed one.

- Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (RRVUNL) has made commendable work performance in conceiving, constructing and commissioning various power plants in the State. It has created a benchmark in the country when it constructed a 195 MW power unit at Kota Thermal Power Station (KTPS) in a period of 24 months. Similarly, units II, III, IV, and V of Suratgarh Thermal Power Station (STPS) with a generation capacity of 250 MW each and unit II of Ramgarh Thermal Power Project with a generating capacity of 75 MW were constructed and commissioned even in lesser time than the targets fixed by the Central Electricity
Authority (CEA). Such early constructions and commissioning of projects by RRVUNL not only reduced the construction period but also resulted in saving of a sum of Rs.520 crores approximately.

- The generating stations of Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (RRVUNL) have earned a distinctive reputation in our country for their efficient and economic power production.

- During the period 2003-04, the average PLF (Plant Load Factor) of RRVUNL was 83.22%, which is the second best amongst all the SEBs/Corporations in our country (Indian Journal of Power and River Valley Development, May, 2005).

- It may be mentioned here that both Kota Thermal Power Station (KTPS) and Suratgarh Thermal Power Station (STPS) have received Golden Shield awards from the Ministry of Power, Government of India for their outstanding performance. The Golden Shields were presented by Dr. A.P.J. Abdul Kalam on 24th August, 2004. Mr. R. K. Makharia, Chief Engineer, Kota Thermal Power Station (KTPS) and Mr. R. M. Singhvi, Chief Engineer, Suratgarh Thermal Power Station (STPS) received the awards on behalf of their respective organizations.

- Transmission and Distribution (T&D) losses which was as high as 42% in 2000 has come down to 23.5% in 2007.

- Under the reform process, concrete plan for 100% metering of 11 KV feeders and energy auditing have been formulated in Rajasthan. It may be mentioned here that out of 9,389 of 11 KV feeders, 8,289 have already been metered (88.28%). In Rajasthan, over 96% of the consumers are metered today.

- Under the Accelerated Power Development and Reform programme (APDRP), which is initiated by the Ministry of Power, Government of India, emphasis has been given in Rajasthan to strengthen the existing sub-transmission and distribution network. Under the APDRP scheme, Rs.1,255 crores have been sanctioned to the State of Rajasthan. 11 KV feeder renovation programme has
already been implemented under this scheme in the State in order to provide reliable and quality power, to reduce technical and commercial losses and rate of burning of distribution transformers etc.

- In order to improve the power scenario in the State, the Government of Rajasthan has set-up a Corporation, named, Rajasthan Renewable Energy Corporation (RREC) for promotion of renewable energy programmes in the State in August, 2002. Rajasthan Renewable Energy Corporation (RREC) has been extending electricity in remote rural areas in the State through Solar Photo Voltaic (SPV) lighting system. Various projects, namely, wind energy power projects, biomass power projects, mini-hydel power projects etc. have been developed in Rajasthan under the supervision of RREC in recent years.

2.7.4 World Bank's Assessment on Initial Power Reforms in Rajasthan:

The World Bank supervision team visited the State to review the progress of implementation of the Rajasthan power sector restructuring projects between 30th September, 2002 to 5th October, 2002. The following are the key observations:

- Rajasthan has made satisfactory progress in improving power sector efficiency in terms of revenue realization. The ratio of revenue realization to revenue assessment during the first quarter of each financial year of 2001, 2002 and 2003 in Rajasthan is 91.2%, 94% and 95.1% respectively. There are, however, variations in collection efficiency of the distribution Companies.

- The financial restructuring plan for the power sector is a matter of serious concern. The Country Director of World Bank vide his letter dated 1st November, 2002 addressed to the Chief Secretary, Government of Rajasthan expressed serious concern at the absence of an agreed financial restructuring plan for the power sector. He mentioned that the issue is not one of mere technical compliances but of the
sustainable financial viability of the sector. Without the agreement and implementation of such a financial restructuring plan, the utilities will descend further into a spiral of debt and be unable to provide the energy, which is essential to the development process of Rajasthan.

- The power sector reform programme requires assistance and long-term commitments to ensure that the sector ceases to be a huge drain on the resources of the government and ultimately it is able to finance itself, is in a position to seek private participation and investment in the future and in the long-term eventually becomes a contributor to state finance. Neither the government nor the utilities can continue to absorb the subsidy bill for the sector. There is a need to ensure that the future borrowing requirements come down below to the level of sector’s borrowing limits and debt service capacity.

- The Country Director, World Bank has rated the project unsatisfactory due to current financial problems of the power sector, despite the positive progress in other areas such as investment, procurement, financial management and efficiency improvements. If the financial restructuring plan is not brought within the sector’s borrowing limits and implemented timely, this project will not meet its development objectives and the Bank will have no option but to initiate remedial measures including the possible suspension of future fund disbursements.

- After a slow start, progress in procurement is, however, satisfactory. Materials for the planned improvements in the power transmission and distribution systems are started to be received and related construction work on sub-stations and networks has begun. The World Bank loan of US $ 180 million is mainly being used by the Government of Rajasthan to fund the procurement of plant and materials for the construction of a new 220 KV and eleven new 132/33 KV sub-stations, 220 KV and 132 KV transmission lines, capacitors to improve system power factor and voltages, the expansion and extension of the 33 KV and lower voltage distribution systems,
especially in rural areas of the State. The project also included the replacement of excessively long low voltage distribution lines with 11 KV sub-stations and lines, transco boundary metering and 11KV feeder metering etc. It will facilitate in analyzing and locating technical and non-technical losses in the power sector in Rajasthan.

The World Bank team in the next visit in the State during the first week of February, 2003 pointed out that severe drought conditions in Rajasthan during 2002 have an adverse impact on the power sector operations in the State and added to a further financial weakening of different distribution companies in the State. However, the achievement of the companies in managing the power sector in spite of drought situation is indeed commendable. The inadequacy of government financial support, the failure to file for a tariff increase, the lack of agreement on the financial restructuring plan etc. are the factors responsible for the companies to incur losses in their financial accounts.

The team was of the view that the performance of the companies would become satisfactory after the commitment of the Government of Rajasthan to make budget provisions of an enhanced level of subsidy to the tune of Rs.400 crores in the budget for the Financial Year 2004 and an agreement to finalize the financial restructuring plan. The financial condition of the sector, however, continues to deteriorate and the level of transmission and distribution losses have also increased, largely due to the increase in the sale of power to agriculture sector due to drought.

The Country Director, World Bank in his letter dated the 19th February, 2003 addressed to the Chief Secretary, Government of Rajasthan pointed out that the financial health of the power sector is deteriorating and it is a matter of great concern. He mentioned that the electricity utilities in the State are continuously borrowing to finance their operating and debt servicing requirements in the absence of government support. It is not a sustainable strategy for power sector development in future in the
State. In the opinion of Country Director, project rating of the power sector would become satisfactory only when the Government of Rajasthan implements the financial restructuring plan for the sector timely (Gupta and Gupta, 2005).

2.8 CONCLUSION:

Thus, we see that the power sector reforms in India started in 1991 with the objective of reorienting the system. In order to improve the financial stability and efficiency of Indian power sector, many State Governments have adopted structural reforms in respect of State Electricity Boards (SEBs). In this respect, several states like Orissa, Andhra Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Assam, West Bengal etc. have also enacted similar legislations and went for power sector reforms and restructuring. The Ministry of Power, Government of India had initiated the reforms in the power sector in order to address the challenges facing it.

Unfortunately, despite adopting and implementing the reform measures initiated by the Government of India, there was no such significant improvement in the performance of the power sector in our country. Most of the States found it difficult to restructure their electricity boards due to a number of reasons like lack of public support, opposition from NGOs, political parties, trade unions etc. Again, the States that had already undertaken the reforms are not in much better position today. They are still characterized by the same old difficulties like huge demand-supply gap, unreliable and poor quality supply of power besides the existence of inefficient SEBs/power utilities. All the old problems like poor operating efficiency, inadequate tariff structure, disproportionately high transmission and distribution losses, huge revenue arrears, delays in the construction and commissioning of new power projects etc. are still continuing even today. Moreover, the policies which were formulated to attract huge private investments in the power sector, also failed to produce significant results in most of the States, even after a decade of undertaking reforms.
But there is no alternative other than the effective adoption and implementation of further reforms and restructuring in our country. This is because, the power utilities in our country are still financially unviable and there is practically little prospect of getting money from the State budget. Therefore, it is high time to give a further push to our power sector reforms and restructuring in the right direction. For power reforms to be successful, the Central and State Governments should frame long and medium term goals to encompass sustainable developmental objectives with meaningful stakeholders involvements and broaden participation by different parties. The reform measures must be implemented through public-private participatory process and ensure mechanisms for meaningful public feedback. There must be consultation and adjustment during the reform and post-reform period. Donor agencies, private sector and civil society should play their own role in funding, investing and supporting such a reform process. An all out endeavours need to be initiated by the Governments both Central and State, unbundled Companies, regulatory authorities, media, political parties in power and in the opposition and the public at large to improve the health of our power sector and here lies the success of reforms and restructuring in our country.
REFERENCES:


