Chapter 3

Performance of the undivided Gujarat Electricity Board

3 Performance of the undivided Gujarat Electricity Board

3.1 Analysis of the performance of the undivided Gujarat Electricity Board

Gujarat Electricity Board was set up under the Electricity Supply Act, 1948 of India as a vertically integrated monopoly in charge of generation, transmission, and supply and distribution of electricity in the state of Gujarat. Its general objectives listed under section 18 of the ESA were formulated at a time when SEBs were envisaged as the nodal agency for the purpose of power supply to all segments of the society and thus had an important social distributive function regardless of the profit motives. Constituted as a board (and not a company), the Board was headed by a Chairman and three Members dealing with technical, financial and administrative matters (Annexure-A). The Chairman was the executive head in the GEB and was appointed by the state government, often on political considerations. Below the Chairman and the Members were the Chief Engineers dealing with functional departments such as generation, transmission and distribution. Administrative, finance and technical personnel supported all these levels of functional heads. A Chief Engineer / Additional Chief Engineer with their own setup of required personnel headed the generation stations. On the transmission side, the GEB had the field units on the project and operation and maintenance side. On the distribution/supply side, there were circles headed by a Superintending Engineer/Additional Chief Engineer and divisions headed by an executive engineer. Thus it represented a vertically integrated huge monolith comprising over 46,000 employees belonging to the technical, administrative and finance

sectors. Since its inception, the GEB had made impressive strides on the generation, transmission and distribution side, thereby playing a major role in the state's economic ascendance.

This huge organizational structure was beset with many problems, which affected the operational performance of the GEB and had a bearing on the requirement for reforms. These will be discussed subsequently. But at this stage it would be pertinent to mention a few briefly. Firstly, the organizational structure at the field level was very complex, which violated the clear chain of command and suffered from the problems arising out of multiplicity of formal and informal authorities. Secondly, there was a confusion of priorities, as the system did not make the priorities clear. It also was difficult to pinpoint liability and accountability. Further the working system required multiple approvals and sanctions, thereby restricting the ability to take initiative. In this huge setup, it was not possible for the Board comprising the Chairman and the three Members to have effective control over manpower issues or micro level operational issues. There was excessive centralization and extreme formalization, wherein process and procedures rather than results became the prime goal, to the detriment of the organization. Poor level of computerization, inadequate strategies, absence of proper organizational culture, vision and mission were some of the other lacuna in the GEB system.

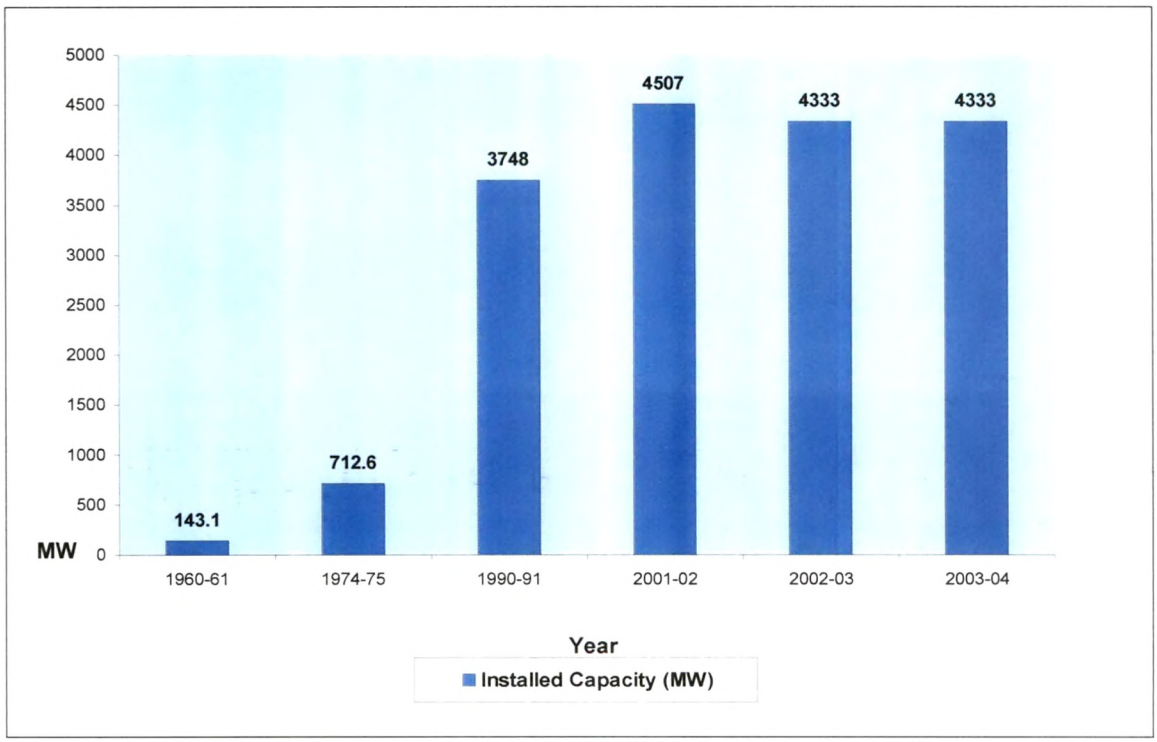
3.1.1 Generation

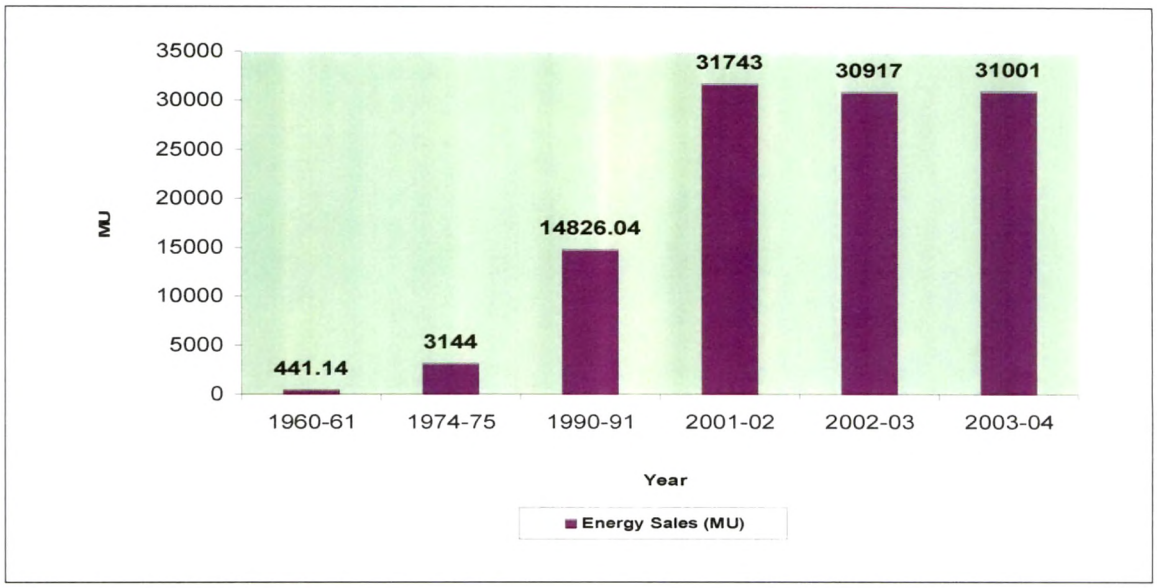
The growth of the power sector in Gujarat and the performance in generation, since its inception in 1960, has been quite impressive. Table-9 represents the strides made by GEB over the years.

Table–9 GEB's development through the years

Particulars	1960-61	1974-75	1990-91	2001-02	2002-03	2003-04
Installed Capacity (MW)	143.1	712.6	3748	4507	4333	4333
Energy Sales in Million Units (MU)	441.14	3144	14826.04	31743	30917	31001
Revenue (Rs. in Mn.)	54.9	5340.07	18534.78	100515.4	101042.1	102117.9
Consumers Served	140281	1254447	4771285	7332979	7474402	7860353

Source : Annual Statement of Accounts, 2003-04, GEB, pp.A-E

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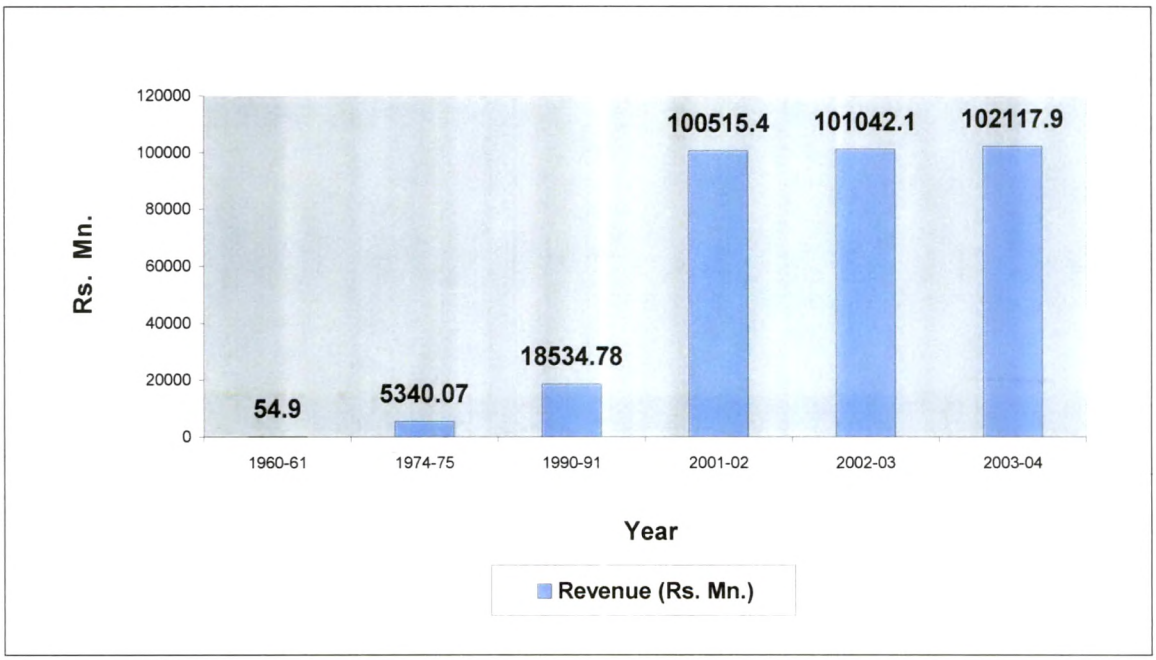
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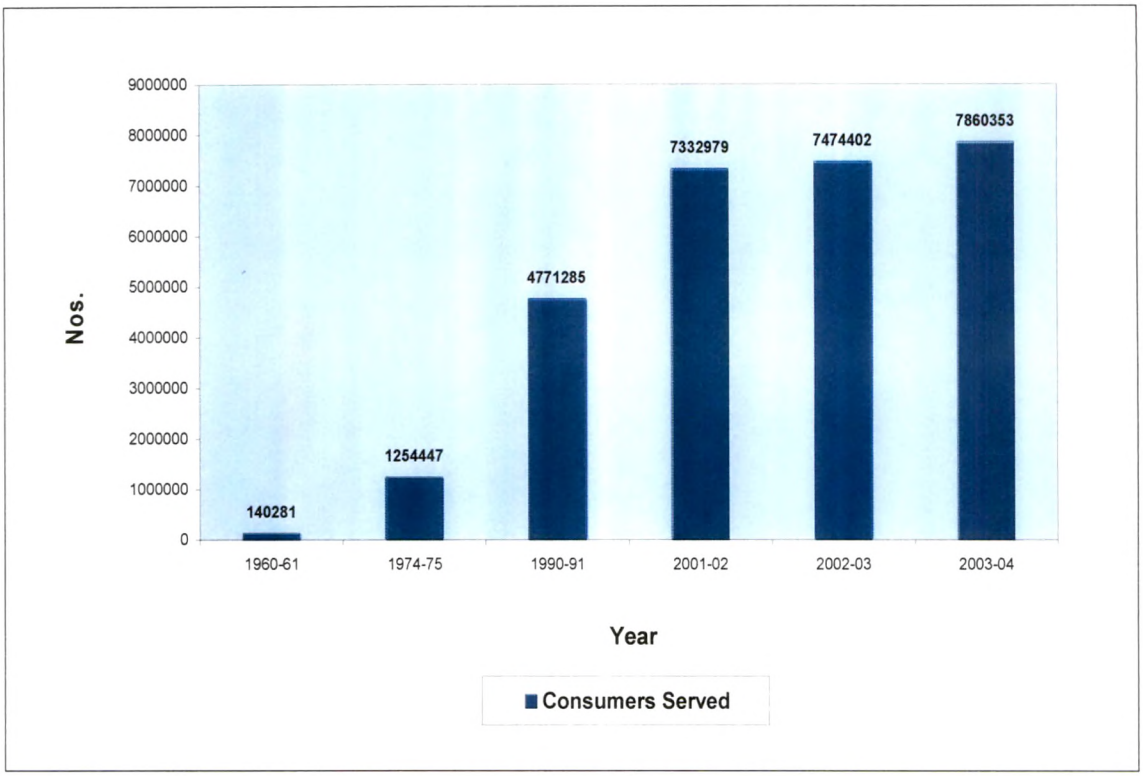


The present installed capacity of GEB is 4,995 MW, while the installed capacity of the private producers in Gujarat is 2,156 MW. Further GEB gets nearly 1,532 MW from the power stations owned by CPSUs located within Gujarat as its share. In terms of fuel- mix, only 547 MW (14.6 percent) is based on hydroelectric and 219 MW is based on wind energy. The major source of power in Gujarat is based on coal (76.09 percent on coal). The trend these days is to go for more CCGT gas-based plants, (both CNG and LNG). (Annual Report of GUVNL, 2007-08)[34]

[34] Annual Report of GUVNL, 2007-08.

Despite having an impressive increase in installed capacity from 143.2 MW in 1960-61 to 4,995 MW in 2003-04, the generation activity in the GEB revealed major weaknesses. First, on the PLF front, its performance was not satisfactory. Due to poor PLF, the GEB was forced to purchase costlier external power, thereby affecting its financial position. As Table-10 shows, GEB's PLF performance was better than the Western India and all-India averages in the beginning of the 1990s, but by 2001-02, while the rest of India improved significantly, the GEB's improvement was only marginal. The contrast becomes even more glaring when compared to the performance of the NTPC.

Table–10 PLF of thermal generating plants

(Figure in %)

Year	Gujarat	Western Region	India average	NTPC
1992-93	61.60	59.70	57.10	68.80
1994-95	60.50	63.80	60.00	76.20
1996-97	64.80	70.20	64.40	76.40
1998-99	63.60	70.50	64.60	75.60
2000-01	66.90	73.40	69.00	79.50
2001-02	66.30	74.20	69.90	80.10
2005-06	68.0	71.6	73.6	87.5
2007-08	76.2	75.6	78.6	92.2

Source : Planning Commission, Annual Reports of SEBs, p.73, PFC Report on the performance of the State Power Utilities, p.107.

Secondly, auxiliary consumption in GEB thermal plants was approximately 10 per cent in 2000-01 (GERC, 2000)[35], which was well above the OECD benchmark of 3-5 per cent. The reasons for the lower PLF of GEB plants were the relatively poor operation and maintenance of the plants, lack of adherence to professional standards, ageing plants, poor quality coal and poor fuel management and lack of timely renovation and modernization activities etc. The combined effects of these factors can be seen in the very high forced outage time in terms of percentage as can be seen from Table-11. In fact the impact of R&M and turn-around exercises have been demonstrated in the Indian context by NTPC when it improved the PLF of the Badarpur plant (an old plant operated earlier by Delhi power utility) from a low 31.94 percent in 1997-98 to 85.38 percent in 2002-03 and Unchahar plant (earlier owned and operated by Uttar Pradesh utility) from a low 18.02 percent in 1992 when it took over to 89.02 percent in 2002-03.

Table–11 Forced outages of thermal generating plants

(Figure in %)

Year	Gujarat	Western Region	All-India average	NTPC
1992-93	7.20	11.64	16.19	9.42
1994-95	6.60	8.29	12.42	6.40
1996-97	7.40	7.80	12.80	8.30
1998-99	10.40	8.20	14.50	6.60
2000-01	12.90	8.40	13.10	5.20
2001-02	12.40	8.80	12.60	6.90
2005-06	7.08	8.40	8.74	6.50
2007-08	5.00	7.20	7.71	6.30

Source : Planning Commission, Annual Reports of SEBs GSECL

[35] GERC 2000, Tariff Order No. 19 of 1999, Ahmedabad: Gujarat Electricity Regulatory Commission, p.23.

The financial implications of lower PLF are quite important. Even if the GEB could achieve the PLF performance of its western region counterpart of Maharashtra (with a PLF of 74.5 percent) only, its additional generation would be 2799 MU. At NTPC's performance level of 80.10 percent PLF, the additional generation for GEB would be 4710 MU. If the GEB were to substitute part of its purchased power (costing an average Rs.2.42 per unit) by this incremental cheap power at Maharashtra's level of generation, the saving would be Rs.2603.07 million. If the GEB were to reach NTPC's level of generation, the resultant saving would be Rs.4380.3 million.

3.1.2 Transmission and Distribution

The GEB has made considerable progress in transmission activities during the last four decades since its inception. The GEB has 646 substations in 66 KV, 49 substations in 132 KV, 64 substations in 220 KV and 9 substations in 400 KV covering in total 32642 Ckms crisscrossing the whole state. Gujarat is connected with the states of Maharashtra and Madhya Pradesh by 220 KV and 400 KV network and also is connected with the national grid. (Annual Administrative Report, 2003-04, GEB)[36]. Despite such considerable progress on the transmission side, there are glaring weaknesses.

3.1.2.1 T&D Losses

A major weakness in the present system relates to very high T&D losses. To improve sector profitability, the issue of T&D losses, which are estimated at over 50 percent in many Indian states and amount to more than $ 6 billion annually (about 2 percent of India's GDP) needs to be tackled on a war

[36] Annual Administrative Report 2003-2004, GEB, Baroda, Gujarat, pp.40-41.

footing. The T&D losses, which have doubled every three years for the past decade, represent twice what India spends on health and half its expenditure on education (CORE, 2002)[37]. The T & D losses involved four parts, viz. technical losses, distribution losses, corruption and theft.

Intense rural electrification activities to supply electricity to all villages led to an overloading of low-tension lines and the over extension of the length of the feeder lines. Further there has been inadequate investment in T&D new capacity, maintenance and tardy up gradation of the T&D network. The longer length of the lines, higher currents travelling through them and the high ratio of low-tension (LT) to high-tension (HT) lines have resulted in high technical losses.

Further Gujarat had a very high failure rate of distribution transformers, with an annualized failure rate of 24 percent, which is a major avoidable expense on top of theft and technical line losses. The main causes of transformer failure are the large number of unauthorized loads and the over-capacity of agricultural motors connected to each. Even the GERC has instructed GEB to reduce outages and improve voltage and frequency levels (GERC, 2000)[38].

Earlier a reference has been made to the TERI study on T&D losses. The above study estimated the losses at 28.8 percent of the total system power. Of these, 7.7 percent was technical losses and 21.1 percent was non-technical or commercial losses, largely due to theft and corruption. Internationally, a T&D loss up to 10 percent of the total power supplied is considered reasonable. As

[37] CORE, 2002, Indian Electricity Distribution Reform Review and Assessment, Volume 1: Main Report, New Delhi, USAID, September 18, 2002,pp.1-6.

[38] GERC, 2000, Tariff Order No.19 of 1999, Ahmedabad: Gujarat Electricity Regulatory Commission.

can be seen from the Table-12, losses in the developed countries are in the range of 7-8 percent, while even in the developing countries losses do not exceed the range of 10-15 percent (Kannan and Pillai, 2000)[39]. For India the official figure for losses in 1999-2000 was 30.8 percent (Annual Report of Planning Commission)[40]. The losses of the GEB at 28.8 percent are extremely high compared to international standards or even of BSES, an Indian distribution and supply company in Mumbai with 11.3 percent loss (Annual Report of BSES, 2000-01)[41].

Table–12 Transmission and Distribution Losses, 2004

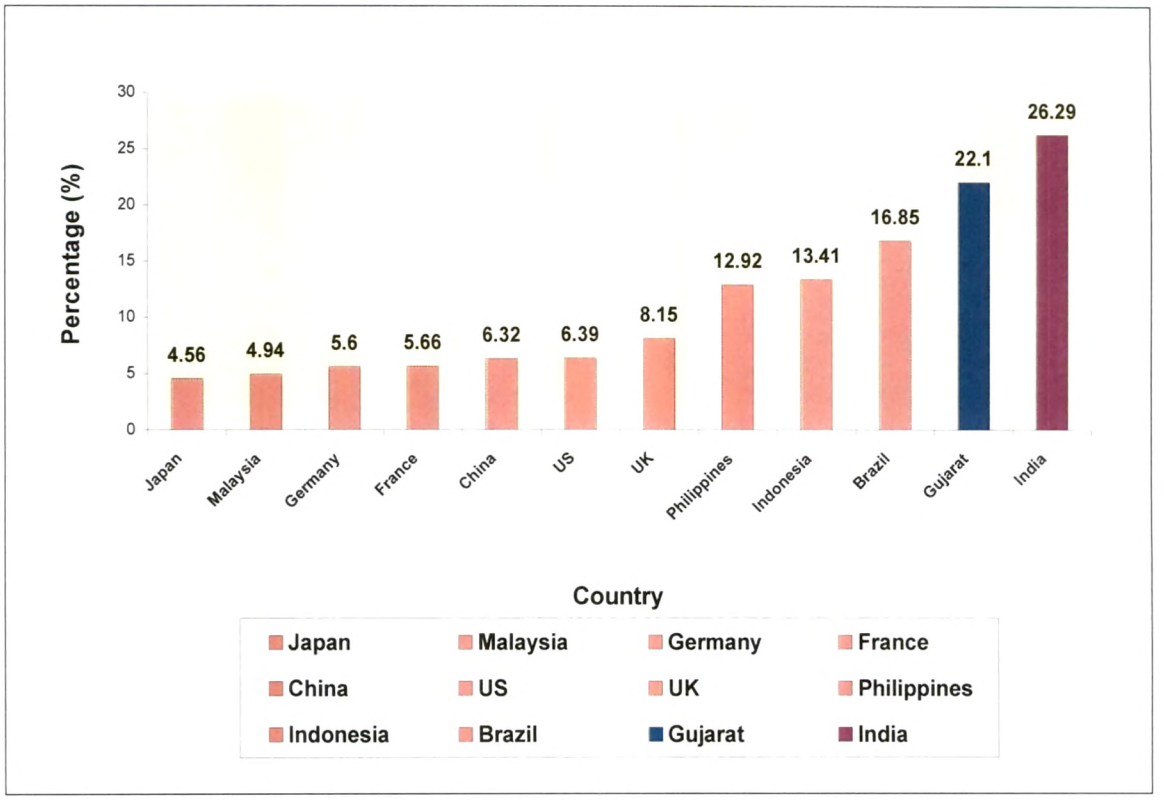
Country / State	T&D Losses in %	Country / State	T&D Losses in %
Japan	4.56	Malaysia	4.94
Germany	5.60	Brazil	16.85
France	5.66	Indonesia	13.41
US	6.39	Philippines	12.92
UK	8.15	China	6.32
India	26.29	Gujarat	22.1

Source : T&D Losses (http://www.nationmaster.com)

[39] Kannan K.P, and Pillai N.V., Plight of the Power Sector in India: SEBs and their Saga of Inefficiency, Centre for Development Studies, Thiruvananthapuram, 2000.

[40] Annual Report of Planning Commission,2000 p.73.

[41] Annual Report of BSES, Mumbai,2000-01.



The financial implications of such high T&D losses were quite serious. For every percent reduction in these losses, GEB will have to hypothetically buy that much less power from external sources. If the losses were brought down by a figure of 10 percent (still keeping 8 percent as technical and 10 percent as commercial losses), it would result in an annual savings of Rs.7598.8 million. If GEB were to achieve BSES loss figures, the savings would be in the range of Rs.13297.9 million per year at the average purchase price.

3.1.2.2. Demand-supply Imbalance

Another major weakness with the distribution system was the demand-supply imbalance. Despite the significant growth in power supply in Gujarat, the demand-supply imbalance is acute both in India and in Gujarat. Demand growth in Gujarat, a highly industrialized state (with very high agricultural demand for power), has outpaced capacity installation and demand side management efforts. The gap is particularly acute with respect to peak demand periods, when the shortfall grows to more than 15 percent. On an all-India level, the total deficit in March 2002 was 7.5 percent of demand supplied, which during the evening peak demand hours increased to 12.6 percent. The situation in Gujarat was even worse. While the total deficit was 11.5 percent, the peak demand deficit was around 15 percent for the last decade, thus leading to blackouts during the peak evening hours. Table-13 represents the demand-supply imbalance in Gujarat in the last decade

Table–13 Demand-Supply Imbalance in Gujarat

Year	Peak demand (MW)	Demand supplied at the peak period (MW)	Deficit of peak demand (%)
1990-91	4330	3720	14.1
1992-93	4863	4294	11.7
1994-95	5693	4981	12.5
1996-97	6511	5424	16.7
1998-99	7346	6482	11.8
2000-01	8171	7289	10.8
2001-02	8476	7064	16.7
2003-04	9692	7605	21.53
2004-05	9995	8078	19.18

Source : Annual Administrative Reports, GEB.

As a result GEB routinely resorted to widespread load shedding to balance the system. The most common scenario was for the rural areas to be subject to rostering, allowing 4-8 hours of electricity for agriculture per day and even for domestic use in rural areas, the supply was for around 10-12 hours. During peak demand, even the urban areas are subjected to load shedding. This shortfall also impacted industrial growth, retarding new investment or forcing industries to go for their own captive generation capacity and above all generate discontent among the consumers.

From the preceding discussion, it can be summed up that while there has been growth and development of infrastructure, the same did not keep pace with the demand of electricity in the State. The supply demand gap increased due to non availability of resources to invest in Generation, Transmission and Distribution networks.

3.2 Financial Performance

The most critical area of concern in the electricity sector has been the poor financial position of the state electricity boards and Gujarat was no exception. The high levels of theft and non-payment of bills have undermined the GEB's finances. In addition, the large agriculture subsidy and the misreporting of industrial or commercial users as agricultural demand that in effect represents illegal electricity sales are further reducing revenues. The detailed analysis of the profit and loss accounts of GEB for the years 1990-91 and 1996-97 to 2004-05 in Table-14 illustrates its acute financial problem.

Table–14 Profit and Loss Account *

Sr. No.	Particulars	1990-91	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
1.	Income (Rs. in Mn.)										
2.	Rev. of sale of Power	12752	43197	50631	56979	57780	62805	72743	78742	85451	90501
3.	Subsidy	5449	11796	14831	16732	13299	20213	25787	18051	11011	11005
4.	Other Income	334	1625	2016	2545	2618	2155	2762	5325	4580	4410
5.	Total Income	18535	56618	67478	76256	73697	85173	101292	102118	101042	105916
6.	Total Income (at 2004-05 prices)	47079	82804	94127	100388	94949	102405	117556	114470	107533	105916
7.	Expenditure (Rs in Mn.)	2515	14920	19257	30389	44468	50467	49976	53061	55781	53581
8.	Purchase of Power										
9.	Generation of Power	8723	23132	27201	27051	27007	28692	30820	31346	29046	32879
10.	Repairs & Maintenance	747	1516	1932	1720	1758	1566	1463	1925	2049	2401
11.	Employee cost	2117	4426	4858	7045	6905	7230	7355	7460	7774	8267
12.	Admn. & General Exp.	334	687	782	845	1000	1012	1083	1101	1340	1559
13.	Depreciation	906	4443	5149	5581	6041	7145	6944	7257	7789	7687
14.	Interest & Finance charges	2454	6256	7138	7286	8627	12275	10173	7723	13446	12028
15.	Other debits	206	430	801	453	749	387	549	559	350	660
16.	Extra ordinary items	1	42	32	119	-480	116	89	29	53	-186
17.	Less: Capitalization	356	1516	1401	1406	1530	1255	1376	1479	1936	2424
18.	Add: Prior period Expenses	0	1183	534	1008	1238	2968	436	0	4668	0
19.	Less: Prior period Income	115	0	0	0	0	0	0	2106	0	182
20.	Total Expenses	17532	55519	66283	80091	95783	110603	107512	106876	120360	116270
21.	Total Expenses (at 2004-05 prices)	44532	81197	92460	105436	123404	132979	124775	119804	128092	116270
22.	Subsidy(+) / Deficit(-) with Subsidy	1003	1099	1195	-3835	-22086	-25430	-6220	-4758	-19318	-10354
23.	Capital base at the begin. of year	18745	36620	39760	42083	40730	42335	39757	38015	35580	32037
24.	Surplus/ (Deficit) as a % of Cap. base	0	0	0	0	0	0	0	0	-1	0
25.	Surplus / Deficit without subsidy	-4446	-10697	-13636	-20567	-35385	-45643	-32007	-22809	-30329	-21359
26.	Surplus / Deficit without subsidy @	-11293	-15644	-19021	-27076	-45589	-54877	-37146	-25568	-32277	-21359
27.	WPI (All commodities) (93-94 price)	73.7	128.0	134.2	142.2	145.3	155.7	161.3	167	175.9	187.2
28.	WPI (base : 2004-05=100)	39.4	68.4	71.7	76.0	77.6	83.2	86.2	89.2	94.0	100.0

* Note : Original values converted to 2004-05 prices using wholesale price index with base 1993-94 = 100

Source : Annual Administrative Reports, GEB.

Three indicators of financial health used by ICRA (formerly, Investment Information and Credit Rating Agency of India Limited) for the SEBs are - the subsidy rate required from the state government to achieve a 3 percent return on capital, board debt levels and the ratio of revenues to operating costs. In each case, the GEB's position has deteriorated (Hansen & Bower, 2003)[42]. To cover the revenue shortfall, the Government of Gujarat (GoG) pays to the GEB an operating subsidy each year. Table -15 shows the level of subsidy required (i.e. payable) to help the GEB to breakeven and the total subsidy actually paid. This shows the difference between the subsidies receivable versus actual subsidy paid by the government. It shows that the actual subsidy paid has always been less than the requirement.

Table–15 Subsidy level for GEB (in Million Rs.) (at 2004-05 prices), 1998-99 to 2004-05

Sr. No.	Particulars	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
1.	Subsidy paid	16732	13299	20213	25787	18051	11011	11005
2.	Subsidy required for breakeven	20567	35385	45643	32007	22809	30329	21359
3.	Ratio of Subsidy required v/s. paid	0.81	0.38	0.44	0.81	0.79	0.36	0.52

Source : Derived from Table-14 above.

[42] Hansen Christopher Joshi and Bower John, Political Economy of Electricity Reform, A Case Study of Gujarat, Oxford, Oxford Institute of Energy Studies, EL 03, September 2003, pp.26-27.

The above Table-14 shows the magnitude of the losses over the years. The GEB started incurring losses, as can be seen from the above, from 1997 onwards. In 2000-01, the losses were 2.27 percent of the entire GDP of Gujarat state and 16.5 percent of the total developmental expenditure of the state government. It was more than three times the entire plan outlay on the power sector for Gujarat for the year. The losses look all the more glaring against the fact that GEB had always been a profit making concern from its inception to 1997-1998 (barring an exceptional year of 1985-86). It would be worthwhile to briefly analyze the factors contributing to this dismal state of finance in the GEB. These factors relate to policy issues like pricing policy for electricity and selective liberalization in the sector and to the operational efficiency of the GEB, apart from the changes in the macro-economic conditions in Gujarat. In fact these are some of the important factors, which any successful reform exercise has to address.

The pricing of electricity sends appropriate signals for investment, production and consumption. Charging prices below the cost of production to meet social/political obligations can lead to over-consumption and waste of scarce resources, while charging higher prices to any sector can dent the competitiveness of that sector. In Gujarat, prior to the emergence of the independent regulatory authority (GERC) in 1998, the GEB, along with the state government was deciding the pricing of electricity. Rather than deciding a price that would enable it to generate revenue adequate to cover prudent expenses and investment and provide a reasonable return on that investment, the policy was to allow cross-subsidization, making the rates of commercial and industrial sectors very costly and fixing the rate of subsidized power below the marginal cost, thereby distorting the entire power supply economics.

The pricing policy of the agricultural sector was another major contributory factor. Till 1986-87, the agricultural power tariff broadly reflected the average cost of power supply to agriculture. In 1960-61, the average tariff (average of all sectors) was Rs.0.121, while for agriculture it was Rs, 0.13 (107.4 percent of average tariff). But in 1986-87, while the average tariff was 261.81 paise, for agriculture it was still 175.14 paise. Following a strong farmer's agitation in early 1986, the government succumbed to the farm lobby and accepted the demands for replacement of metered tariff by a fixed horse power based tariff and reduction in agricultural tariff. (Shah, 1993)[43]. This resulted in the reduction of average tariff in agriculture. This extremely low tariff and the fixed rate without metered supply continued till October 2000 (till GERC changed the policy). The influence and clout of special agricultural interest groups in deciding the tariff of electricity has always been very strong on account of several factors. (Rao, Kalirajan & Shand, 1998)[44]. Gujarat's predominantly rural base, the domination of legislators representing the rural farm populace, competitive electoral politics, and the dependence of farmers on electric power for irrigation purpose on account of scanty rainfall and inadequate surface irrigation facilities ensured that agricultural tariff was always treated separately and heavily subsidized and pampered. The consequences of such populist concessions were however very adverse to the financial interests of GEB and GOG. Due to the continuous pressure of the farm lobby, the agricultural tariff had very marginal increase, while the cost of supply and the tariff for other sectors kept on increasing. Table-16 shows the tariff rates for the agriculture and the other sectors.

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[43] Shah Tushar, Groundwater Markets and Irrigation Development: Political Economy and Practical Policy, Oxford University Press, Delhi, 1993,pp.67-68.

[44] Rao MG, Kalirajan KP, and Shand Ric., The Economics of Electric Power Supply in India, Macmillan, Delhi, India, 1998,p.50.

Table–16 Average power tariff of agriculture compared to industry and average cost of supply*

(At 2001-02 prices)

Year	Average power tariff of Agri. (in paise**/kWh)	Average power tariff in Industry (in paise/kWh)	Ratio of Agri. to Ind. Tariff (in paise/kWh)	Average cost to supply per unit (in paise/kWh)
1986-87	175.14	273.55	0.64	261.81
1987-88	62.12	304.21	0.20	253.51
1988-89	50.91	299.26	0.17	233.39
1989-90	37.85	298.73	0.13	253.16
1990-91	33.70	283.21	0.12	240.75
1991-92	21.99	316.83	0.07	253.77
1992-93	19.26	328.61	0.06	235.92
1993-94	31.13	355.18	0.09	245.18
1994-95	31.32	314.61	0.10	232.47
1995-96	25.16	310.11	0.08	239.84
1996-97	25.46	362.42	0.07	273.45
1997-98	21.39	407.10	0.05	296.88
1998-99	18.83	416.75	0.05	315.34
1999-00	16.32	436.50	0.04	340.81
2000-01	15.54	440.29	0.04	363.62
2001-02	59.00	428.00	0.14	337.00

*Note: Original values converted to 2001-02 prices using wholesale price index with base 1993-94 = 100
** One Rupee = 100 Paise

Source: Annual Statement of Accounts, GEB, 2003-04

In view of the artificially low prices, there was a tremendous increase in agriculture demand for power. Since there was no incentive to optimally utilize water as the power rate was fixed on the horsepower of the motor, the marginal cost of power was practically zero. Further there was no incentive to invest in energy efficient pumps, leading to increased power consumption.

Thus from a low consumption of 40 MU in 1960-61, equal to 9.07 percent of the total consumption in Gujarat, it grew steadily to 2187 MU in 1986-87 (21.30 percent) and reached an astronomical figure of 15457 MU in 2001-02 (48.67 percent). Table-17 shows the increasing agricultural power consumption in Gujarat vis-a -vis other sectors and the percentage of agricultural power consumption of the total power consumption.

Table–17 Increasing agricultural power consumption in Gujarat

Year	Power consumption by Agriculture sector (in MU)	Total consumption by all sectors of GEB (in MU)	Agricultural power consumption as percentage of total consumption
1960-61	40	441	9.07
1970-71	391	2346	16.67
1980-81	1298	6516	19.92
1986-87	2187	10267	21.30
1987-88	3840	12555	30.58
1988-89	4402	13769	31.97
1989-90	5145	14826	34.70
1990-91	5670	15993	35.45
1991-92	6959	17319	40.18
1992-93	7783	18501	42.06
1993-94	8652	50488	42.22
1994-95	8462	21529	39.30
1995-96	10132	24695	41.02
1996-97	10070	25595	3.34
1997-98	10757	26783	40.16
1998-99	12221	28828	42.39
1999-00	14914	31178	47.83
2000-01	15467	31544	49.03
2001-02	15457	31743	48.69

Source : Annual Statement of Accounts of GEB, 2002-03

As can be seen from Table-18 below, from a mere Rs.1902.71 million in 1986-87, the low tariff and the losses on that count combined to increase the losses in agriculture power supply to Rs 42971.45 million by 2001-02. This was one important factor contributing to the accumulated losses and resource constraint of GEB.

Table–18 Major indicators of electricity use in Agriculture in Gujarat*

Year	Average cost to supply per unit (Rs.)	MU sold to Agri.	Revenue from Agriculture (in Mn.Rs.)	Agri. tariff per unit (Rs.)	Loss per unit in Agri. supply (Rs.)	Total loss in Agri. supply (in Mn.Rs.)
1960-61	2.65	40	106.2	2.65	0.00	1.02
1970-71	1.83	391	715.1	1.80	-0.11	-35.98
1980-81	1.20	1298	1554.4	1.18	0.70	492.82
1986-87	1.75	2187	3831.8	1.75	0.87	1902.71
1987-88	0.62	3840	2383.8	0.61	1.89	7299.95
1988-89	0.51	4405	2241.6	0.52	1.82	7985.65
1989-90	0.38	5145	1948.1	1.45	2.17	11131.75
1990-91	0.34	5670	1907.4	0.33	2.06	11696.15
1991-92	0.22	6959	1531.1	0.21	2.33	16174.99
1992-93	0.19	7783	1499.1	0.19	2.17	16827.42
1993-94	0.31	8652	2696.9	0.31	2.15	18579.41
1994-95	0.31	8462	2650.8	0.31	2.01	16989.57
1995-96	0.25	10132	2549.0	0.25	2.13	21697.72
1996-97	0.25	10070	2562.8	0.25	2.48	24962.85
1997-98	0.21	10757	2296.2	0.22	2.76	29701.51
1998-99	0.19	12221	2303.7	0.19	2.96	36209.47
1999-00	0.16	14914	2428.8	0.17	3.25	48434.03
2000-01	0.16	15467	2432.0	0.16	3.47	53750.33
2001-02	0.59	15457	9116.3	0.59	2.78	42971.45

*Note : Original values converted to 2001-02 prices using wholesale price index with base 1993-94 = 100

Source : Annual Statement of Accounts of GEB, 2002-03

GEB also bore substantial losses on account of charging less than the cost to serve from the residential consumers. In 1999-2000, 5.34 million domestic consumers were supplied power at the average rate of Rs.2.12 while the cost to supply power per unit was Rs 3.07. This meant a loss of Rs 2672.35 million, which increased to Rs.2930.37 million in 2000-01. Of course factors like substandard meters, line losses, and theft and illegal connections also contributed significantly to this.

With the liberalization introduced by the GOI in the 1990s, private generators were allowed to set up generation facilities. By 1990s, Gujarat had the largest base of IPPs among all states in India-955 MW of fully private IPPs and 975 MW of partly government sponsored IPPs (by state PSUs). Both as a cause and effect of the entry of IPPs in generation, the government substantially reduced its budgetary allocation to the power sector. (from 24 percent in 1985-90 to 10.81 in 2001-02) As demand for power continuously increased, GEB had to depend more and more on such IPPs for buying power to cater to its consumers. The power purchase from the IPPs was very costly compared to its cost to supply and the rates charged by the central PSUs in generation. Table-19 shows how the mix of power tilted increasingly towards purchased power from the IPPs.

Table–19 Purchase mix of Power for GEB

Year	Total power available for sale (in MU)	GEB's own generation (in MU)	% of total power	Purch-ased power (inMU)	% of total power	Central sector share of purch-ased Power (in MU)	% of total power	IPP's other share of purch-ased power (in MU)	% of total power
1995-96	30658	20860	68.04	9798	31.96	8965	29.24	833	2.72
1996-97	31919	20663	64.74	11256	35.26	9471	29.67	1785	5.59
1997-98	34200	21545	63.00	12655	37.00	9738	28.47	2917	8.53
1998-99	36100	20934	57.99	15166	42.01	8790	24.35	6376	17.66
1999-00	40006	21018	52.54	18988	47.46	10060	25.15	8928	22.32
2000-01	40576	21106	52.02	19470	47.98	11492	28.32	7978	19.66
2001-02	41388	20775	50.20	20613	49.80	13042	31.51	7571	18.29

Source : Annual Statement of Accounts, 2003-04, pp.A-E

From 68 percent of power generated by its own plants in 1995-96, GEB's plants' share came down progressively to 50.2 percent, while that of the IPPs went up from 2.72 percent in 1995-96 to around 20 percent, while the percentage contribution from the central share remained fixed around 29 percent. The difference in cost between GEB's own generated power and the cost of the power purchased from the IPPs is represented in Table-20.

Table–20 Cost of Purchased Power v/s. GEB's Own Power*

Year	Total cost of GEB's generation (in Mn.Rs.)	GEB's own generation (in MU)	Unit cost of GEB Power (Rs.)	Total cost of purchased power (in Mn.Rs.)	Purchased power (in MU)	Per unit cost of purchas -ed power (Rs.)	Total cost of central sector power (in Mn.Rs.)	Unit cost of central sector power (Rs.)	Total cost of IPP power (in Mn.Rs.)	Unit cost of IPP power (Rs.)
1996-97	29150.6	26039	1.12	18802.0	11256	1.68	14214.3	1.50	138.0	3.05
1997-98	32694.0	25896	1.26	23145.3	12655	1.83	13983.8	1.43	6717.4	3.04
1998-99	30684.1	23746	1.29	34470.2	15166	2.27	13155.8	1.49	19462.5	3.14
1999-00	29980.8	23332	1.28	49364.3	18988	2.60	15982.0	1.59	29921.4	3.63
2000-01	29723.7	21865	1.36	52281.8	19470	2.68	18725.8	1.63	30278.2	3.98
2001-02	30860.7	20775	1.49	49949.6	20613	2.42	19966.1	1.53	21487.0	3.17

* Note : Original values converted to 2001-02 prices using wholesale price index with base 1993-94 = 100

Source : Annual Statement of Accounts, 2003-04, pp.A-E

The financial burden arising out of the purchase of costly power from the IPPs and the policy of captive generation were also detrimental to the GEB. Since the industrial rates were very high because of cross-subsidization, most big industries switched off from the GEB by setting up their own captive facility.

The macro economic conditions also played a role in affecting the GEB's finances adversely. The impact of the slow-down in the growth rate of Gujarat towards the later part of the 1990s was significant. As GDP growth rate decelerated, power consumption growth rate also decelerated, particularly in the more paying sections of consumers, viz. industry and commercial sectors. This affected GEB's finances adversely. As industry's demand declined, the GEB was forced to pay the fixed cost part of the power purchase from the IPPs. Also the significant shift in the consumer mix of the GEB through reduction in industrial demand was a negative factor on GEB's finances.

The worsening financial condition of the GEB was reflected clearly in several indicators. In view of the liquidity problem, there has been a significant increase in current liabilities. Current liabilities increased from Rs.21562 million in 1996-97 to Rs.58884 million in 2003-04. And the payment liability to suppliers of coal, other fuels and IPPs etc have all increased substantially. (Annual Statement of Accounts, 2003-04)[45]. In order to manage the acute cash-flow problem of the GEB, it has been increasing the working capital requirements. During 1998-99 to 2001-02, while income increased by only 31.8 percent, the working capital increased by 341.7 percent. Further, against all canons of financial prudence, the GEB started taking long-term loans from 1999-2000 to run its day-to day operations and raised money from the capital markets through bonds guaranteed by the government. While no major capital expenditure was being incurred, the long –term liabilities increased by Rs.26142.3 million in just three years, but this money was used for running its regular operations rather than spending it on capital projects.

As a result of the poor financial position of the GEB and low budget allocation, it was unable to finance new generation projects and struggles to keep up with maintenance on current generation plants and training and development facilities. Sources of new finance for electricity projects are difficult to obtain. The fast deteriorating financial conditions of the state electricity boards were seen as a major bottleneck by the industry. The weak financial condition of the state electricity boards not only discouraged new investment by the private sector but also caused trouble for the existing investment. With weak financial positions of state electricity boards, banks also started reducing their exposure to the power projects .The mounting losses and the severity of their financial position, despite many incremental efforts

[45] Annual Statement of Accounts, 2003-04, GEB,Baroda,pp.35-36.

for improvement by the GEB, was a key factor that prepared the path for drastic power sector reforms.

3.3 The Problem Areas

We have seen in the preceding section how the dismal state of finance of the GEB (like other SEBs) made it imperative for the SEB to undertake drastic reforms. There were other important factors as well, which seriously undermined the viability and sustainability of the existing model and underlined the urgent importance of undertaking reforms.

- While the SEB have performed reasonably well in generation and transmission, the distribution always was the weakest link and suffered from many problems. So far investment in generation had taken precedence over distribution primarily due to the capital-intensive nature of generation plants. The outlay on the generation component in the total power sector outlay used to be as high as 69 percent of the plan till the 8th plan, totally neglecting investments in transmission and distribution. It has since been recognized that the distribution sector is equally important, as the revenue streams for the SEBs start at the distribution level.

- The sheer size and monolithic structure of the SEBs, covering the entire state made it unwieldy, unmanageable, inefficient and unresponsive to changes. Such monolithic structure led to mixing up of priorities, lack of accountability and concealing areas of weakness. In the case of the GEB, its state-wide presence with more than 46,000 employees, 7.7 million consumers, and six power stations generating 4,995 MW of electricity,

768 transmission substations and all the complications arising out of managing such a huge monolith was a case in point. (Annual Administrative Report, 2003-04, GEB)[46].

- The tariff structure of SEBs was skewed, with high degree of cross-subsidization among different categories of consumers. Agricultural tariff, being either free, or very nominal, coupled with increasing share of agricultural demand, had ruined the finances of SEBs and also provided for a cover for energy thefts and other commercial losses. Average tariff rates were 30 percent higher than in neighbouring China (Koop, 2003)[47]. Poor quality, unreliable supply and unviable high tariff had forced the industry sector to switch over to captive sources thereby further weakening the financial health of the SEBs. The low domestic and agricultural tariffs and the inability of the state governments to provide funds towards subsidy and for capital expenditure had made the SEBs unsustainable.

- On the billing and collection side, it was estimated that about 70 percent of the energy supplied by the SEBs is metered and billed. Of the energy billed, large amount is not collected. Of course the billing and collection efficiency of the GEB is better than most other SEBs .The major defaulters of the SEBs are various central and state enterprises and departments, municipal and village local bodies, rural and agricultural consumers and industrial consumers. Misclassification of consumers, inadequate collections and increasing account receivables and mounting

[46] Annual Administrative Report, GEB,Baroda, 2003-04.

[47] Koop, Jennifer, Overview of the Indian Power Sector, India Trip Paper, Special Seminar in International Management, 2003, p. 1.

revenue arrears combine to adversely affect the SEBs finances (Baijal, 1999)[48].

- Most of the SEBs had a negative rate of return and cumulatively, the RoR of the SEB without subsidy was minus 44 percent in 2001-02 as against minus 19.6 percent in 1996-97 and with subsidy minus 33 percent in 2001-02 as against minus 8 percent in 1996-97. Table-21 and Table-22 represent the above (Abraham, 2003)[49]

Table–21 RoR on Capital (with subsidy) (in %)

Sr. No.	SEBs	1992-93	1996-97	2001-02
1.	Andhra Pradesh	-0.20	-2.06	-43.31
2.	Assam	-43.30	-27.51	-36.66
3.	Bihar	-20.00	-27.57	-59.44
4.	Delhi (DVB)	-26.20	-27.75	-44.42
5.	Gujarat	3.20	2.67	-38.81
6.	Haryana	-23.80	0.41	-62.05
7.	Himachal Pradesh	0.50	-3.77	-4.44
8.	Jammu & Kashmir	-39.10	-56.69	-75.48
9.	Karnataka	3.30	3.00	3.00
10.	Kerala	-11.40	-16.22	-16.18
11.	Madhya Pradesh	-3.40	-3.87	-66.09
12.	Maharashtra	3.10	2.16	-31.72
13.	Meghalaya	-1.80	-3.27	-17.20
14.	Orissa	2.60	-18.57	-17.38
15.	Punjab	-19.90	-18.18	-18.16
16.	Rajasthan (Transco.)	1.00	2.44	-73.80
17.	Tamil Nadu	3.20	6.93	-29.62
18.	UP (Power Corpn.)	-16.70	-14.09	-15.77
19.	West Bengal	-35.30	-36.40	-48.07
	Average :	**-7.60**	**-8.09**	**-33.03**

Source : Abraham, 2003, pp.35-37

[48] Baijal P., Restructuring Power Sector in India: A Base Paper, Economic and Political Weekly, Delhi,25 September,1999, p.2796.

[49] Abraham P., Power Sector Reforms: Focus on Distribution, New Delhi, Suryakumari Abraham Memorial Foundation, 2003, pp. 35-36.

Table–22 RoR on Capital (without subsidy) (in %)

Sr. No.	SEBs	1992-93	1996-97	2001-02
1.	Andhra Pradesh	-0.20	-21.80	-102.29
2.	Assam	-43.30	-27.51	-36.66
3.	Bihar	-20.00	-27.57	-59.44
4.	Delhi (DVB)	-26.20	-27.75	-44.42
5.	Gujarat	-16.50	-22.89	-63.46
6.	Haryana	-26.10	-38.97	-78.88
7.	Himachal Pradesh	0.50	-3.77	-4.44
8.	Jammu & Kashmir	-39.10	-56.69	-75.48
9.	Karnataka	-2.00	-36.16	-81.25
10.	Kerala	-11.40	-19.11	-49.26
11.	Madhya Pradesh	-14.60	-10.99	-76.45
12.	Maharashtra	3.10	-1.20	-31.72
13.	Meghalaya	-7.90	-7.30	-22.16
14.	Orissa	-8.70	-19.15	-17.38
15.	Punjab	-19.90	-18.18	-18.16
16.	Rajasthan (Transco.)	-11.40	-19.20	-73.80
17.	Tamil Nadu	-8.80	-5.40	-32.90
18.	UP (Power Corpn.)	-16.70	-26.14	-22.46
19.	West Bengal	-35.30	-42.24	-50.39
	Average :	**-12.70**	**-19.57**	**-44.13**

Source : Abraham, 2003, pp.35-37

- The quality of supply of power was very poor in both urban and rural areas. Problems such as unscheduled load shedding, low voltages, and frequency fluctuations etc. affected the industry (and the economy) in particular and all sections of the consumers in general. This was largely due to funds constraints, which did not allow the SEBs to invest timely in capital expenditure and operation and maintenance.

- Most SEBs were over-staffed, with large redundancy, poor productivity, low skill levels, uncooperative labour unions, lack of training for skill up gradation, low motivation and lack of accountability. The combined effect of these was reflected in the low productivity and employee

morale. This was a significant factor to contend with in the reforms agenda.

- Political interference is also recognized as a barrier to effective corporate governance in the SEBs. The SEBs are creations of the state governments and all the members, including the chairmen are appointed by the state governments. Due to frequent changes of the top management, one notices lack of continuity in the top management. In the pre-regulator era, though the SEBs were competent to decide the tariff, this function was virtually taken over by the political government in the name of giving directives to the SEBs under Section 78 A of the ESA and also through indirect means. Energy prices in India have always traditionally been considered as social policy instruments and deciding on a cost-related price has not been a major concern (Pillai,1997)[50] Political concessions to the domestic and agricultural lobbies have affected the financial health of the SEBs very strongly.

All the above factors and the scenario contributed to the substantial losses incurred by the SEBs, rendering these utilities incapable of undertaking major improvements without launching a major reform/restructuring drive. It was in these compelling circumstances that several initiatives were undertaken by the central government and the state governments to undertake major reform initiatives.

[50] Pillai, S.M.C. and Krishnamurthy. R., Problems and Prospects of Privatization and Regulation in India's Power Sector, Energy for Sustainable Development, Vol.III, No.6, March 1997, p.60.

3.4 The setting/environment preceding the comprehensive reforms in Gujarat

Gujarat Electricity Board (hereafter GEB) was the monolithic power utility owned by the Government of Gujarat. It combined in itself the monopolistic control of all the three sectors of electricity- generation, distribution, and distribution. Due to the structural weaknesses, the utility was into financial mess, unable to enhance capacities to match the burgeoning power demand. We have discussed the various reasons for urgent reforms mainly in the structure of organization, in overall working style and in the efficiency of GEB. To sum up, these reasons were,

- Lack of efficiency in Generation of electricity
- Higher Transmission losses
- Ineffective performance in Distribution of energy
- Political interference in internal functioning of the Board
- Financial problems and lack of resources to undertake systems improvement
- Power sector reforms drive in India

The environment was changing with the enactment of some landmark legislations, both at the central and state Government level. Unless the public utility undertook comprehensive changes, almost resulting in a total metamorphosis, it could have sunk further. Earlier in the late eighties and early nineties, comprehensive power sector reforms were initiated in countries like the UK, USA, and in other countries in Europe, South America, and South East Asia. In India, Orissa was the first state, which went for very bold, path-breaking reforms in its state utility. Soon, spurred by these initial reforms,

more and more states followed. Gujarat also undertook comprehensive power sector reforms after 2001, though some initial steps towards reforms were initiated in the 1990s. It needs to be understood that the setting was just a 'now or never' situation. The organization had to take a leap and follow the leads for reforms that had started in some other utilities, both in India and abroad. This was the setting which led to the change management agenda in the power sector in Gujarat.