Chapter 1

Introducing the Power Sector in Gujarat and the Reform and Unbundling Agenda

1 Introducing the Power Sector in Gujarat and the Reform and Unbundling Agenda

1.1 Brief introduction of the power sector in India and Gujarat

Like so many other critical infrastructures, electricity generation in India began during the British rule with a demonstration of electric lighting in Calcutta on July 24, 1879. In 1897, the Government of Bengal granted an exclusive 21 year license for electricity to illuminate and power the area of Calcutta (today, Kolkata) to the Calcutta Electric Supply Corporation (CESC) Limited, which was registered in London. CESC commissioned the first power station in 1899 and sold power at one rupee per kWh—the tariff set at parity with electricity in London at that time. Electricity was quickly adopted for lighting, fans and some commercial purposes. Bombay (now Mumbai) was the second city to electrify, and soon a number of private companies built urban power supply systems across India under franchises that allowed for reasonable rates of return and included Regulatory oversight. Thus, British colonial administration began the decentralized development of an electricity infrastructure in India during the early twentieth century. Most electricity generation plants were built to support British industrial concerns and to supply electricity to the commercial and ruling class families in the major cities (Hansen & Bower, 2003)[1].

[1] 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.1-2.

The Indian constitution places the electricity sector in the "Concurrent List", thereby granting responsibility for its management jointly to the Central and State Governments. The power sector in India is characterized by vertical integration between generation, transmission and distribution. It is dominated by the State Electricity Boards (SEBs), created under the Electricity Supply Act (ESA) of 1948 and owned by the State Governments and entrusted with generation, transmission and distribution of electricity throughout the state. The power sector in India has evolved through three historic Acts. These are the Indian Electricity Act of 1910, the ESA of 1948 and the Electricity Regulatory Commission Act of 1998. Of these three, the Indian Electricity Act, 1910 was the oldest Act. It provided for the basic framework for electric supply industry in India, growth of the sector through private licensees, license to be issued by the State Government, provision for license for supply of electricity in a specified area, legal framework for laying down of wires and other works and provisions for laying down the relationship between the licensee and the consumer. The Electricity (supply) Act, 1948 dealt with provisions of creation of SEBs and the Central Electricity Authority and the need for the State to step in (through SEBs) to extend electrification (so far limited to cities) all across the country. The 1948 Act allowed states to create generating companies and by the late 1950s, all State Governments had established their own SEBs.

It is interesting to mention here that private participation in the power sector in India is not a novel concept in the Indian context as the private sector represented through private companies like TEC, CESC, BSES, AESC and many other smaller licensees and urban local bodies have been successful participants in India's electricity sector for over a hundred years (Abraham,

2003)[2]. Electricity has been placed in the list of concurrent subjects under the Indian constitution, with both the central and the state governments having jurisdiction over it. Thus in this model of growth, the government, through the SEB, took upon the role of the developer, promoter and regulator of electricity. Physical infrastructure for the power sector in India (and Gujarat) showed healthy growth from independence onwards. Growth of energy infrastructure was made possible by four major policies -

- Centralized supply and grid expansion (through both the central and state government PSUs and utilities)
- Large support from government budgets in the form of long term loans with little or no interest
- Development of the sector based on indigenous resources
- Cross subsidization by charging industrial/commercial consumer a tariff above the cost of supply and charging agricultural /domestic consumers a tariff below the cost of supply

The Gujarat Electricity Board (GEB) was constituted under Section-5 of the Electricity Supply Act-1948 to perform the functions of Generation, Transmission & Distribution of Electricity. The GEB has, in the last few decades served as the power house of the state, thereby putting Gujarat in the top list of industrialised States in India. The GEB became a natural monopoly, supplying electricity to the remotest corners of the State.

[2] Abraham P., Power Sector Reforms: Focus on Distribution, New Delhi, Suryakumari Abraham Memorial Foundation, 2003, pp. 3-4.

1.2. Importance of Power Sector in economic growth

The power sector is possibly the single biggest catalyst for inclusive growth, whether it is in urban India or rural India. It is necessary not just for economic growth but also for social development. As can be seen from the Table-1, there is a strong linkage between the per capita income and the per capita power consumption and if a country's power industry is weak, its economy also limps along. (Inclusion, Jul-Sep.2009, pp.84-85)[3]

Table–1 Per Capita Power (Kwh) Consumption in Developed & Developing Countries, 2007

Country	Per Capita Power Consumption (Kwh per annum)	Country	Per Capita Power Consumption (Kwh per annum)
USA	13616	Thailand	2157
UK	6142	Philippines	592
Japan	8487	Vietnam	728
Korea	8502	India	543
China	2346	Gujarat	1354

Source : World Energy Statistics 2009, IEA (www.iea.org) and Social Economic Review Gujarat State, 2007-08 (http:/gujaratindia.com/pdf/ser/0708.pdf)

The Ministry of Power (MoP) in India is concerned with planning, policy formulation, processing investment needs of public sector projects, monitoring the implementation of electricity projects, and manpower development. The MoP also administers and enacts legislation pertaining to generation, transmission, and distribution of thermal and hydroelectricity. The Central Electricity Authority (CEA) advises the ministry on technical, financial, and

[3] Sameer, Kochhar, Capacity Building Key to Power Sector Reforms, Inclusion, Jul-Sep2009, pp.84-85.

economic matters. The CEA is concerned with the development of uniform electricity policy in relation to the control and utilization of national electricity resources. The Central Government currently operates 33.80 per cent of the generating capacity in India, approximately 48,360 MW (www.powermin.nic.in), which is managed by three public companies – the National Thermal Power Corporation (NTPC), National Hydel Power Corporation (NHPC) and Nuclear Power Corporation (NPC) - all three were established after the amendments to the 1948 Electricity Supply Act (Rao, 2002)[4]. These three Public Sector Units (PSUs) can only sell electricity to the states, and the proportion of electricity allocated to each state has therefore been a point of contention, especially considering the acute electricity shortages faced by most SEBs.

At the state level, the SEBs are responsible for ensuring generation, transmission, and distribution of electricity in India. The installed generation capacity of SEBs is 52.21 per cent of the total nation-wide. Private electricity companies produce only 13.99 per cent of total generation (CEA Annual Report, 2007-08)[5], which was allowed by legislative amendments in 1991 that permitted private investment, including foreign investment, in electricity generation plants. Given the chronic shortfall in electricity production and its inability to finance new investment in the sector, the Government of India began to allow private investment in new electricity generating capacity in 1991. In particular, industrial groups were allowed to build their own captive power plants to produce electricity for their own consumption.

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[4] Rao S.L., Need to Ensure Independence of Electricity Regulators, Power Line, December,2002, pp.79-80.

[5] CEA Annual Report, 2007-08.

During the nineties, the Indian government did also aggressively pursue international Independent Power Producers (IPPs) in order to mobilize investor interest in investments in new generating capacity. In spite of various incentives offered by the government, private investment did not occur at the anticipated levels for a variety of reasons. The most critical inhibitor to IPPs throughout the 1990s was, and continues to be, a lack of security for investment recovery because most SEBs have a history of not paying for power in a timely manner. In addition, foreign firms have been discouraged by their past experiences of dealing with India's multi-level and ineffective bureaucracy, high taxes and unremunerative tariffs.

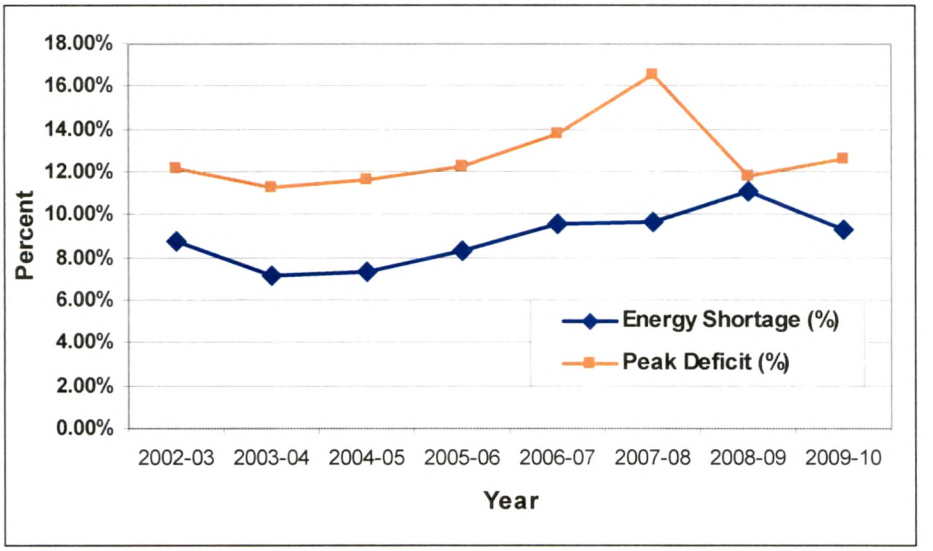
1.2.1 Status of electrification

With the stated goal of supporting development, the Indian electricity sector has grown rapidly in the past 20 years, expanding from 30,000 MW in 1981 to more than 100,000 MW installed capacity in 2001. However, this growth in capacity has not kept up with demand. Peak electricity shortages have remained above 18 per cent and total electricity produced is 10 per cent short of total demand. (Padmanaban and Sarkar, 2001)[6]. The Indian Government struggled to supply the industrial, residential, agricultural and commercial sectors with reliable electricity and conceded that it could no longer fund large infrastructure investments in electricity, nor subsidize residential or agriculture customers at current levels. The electricity sector was virtually bankrupt as a result of protracted mismanagement and political interference. Haphazard and inadequate expansion of the Transmission and Distribution (T&D) system has

[6] Padmanaban S, and Ashok Sarkar, Electricity Demand Side Management(DSM) in India: A Strategic and Policy Perspective.

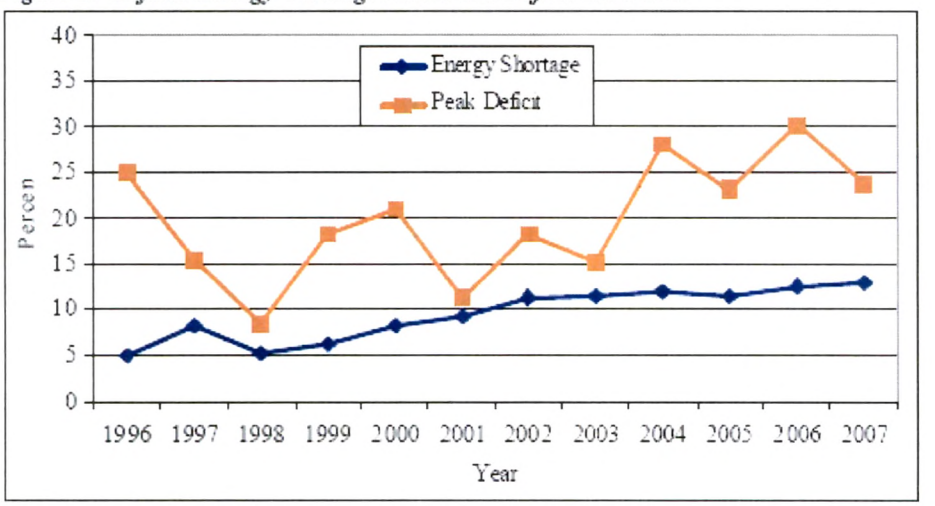
resulted in intermittent supply, low electricity quality and uneven distribution coverage, leaving many rural areas with poor electricity infrastructure.

Figure–1 India Energy Shortage and Peak Deficit 2002-2010



(Source: Ministry of Power, GOI)

Figure 2: Gujarat Energy Shortages and Peak Deficit 1996-2007



Source: (MoP 2005; CEA 2007)

More than 70 per cent of the Indian population lives in rural areas distributed over 580,000 villages (Neudoerffer, Malhotra, and Venkata Ramana, 2001)[7]. Many of these areas are under-served by energy services, and thus rely on locally available biomass for most of their energy supply. The Indian government has made a concerted effort in the last 30 years to electrify the rural areas, especially for the purpose of energizing irrigation pump sets. For example, SEBs have been aggressively electrifying rural areas of the country with the help of the REC, resulting in an official tally of 86 per cent of the villages electrified, but most of the low income households away from the centre of the village do not have access to the grid.

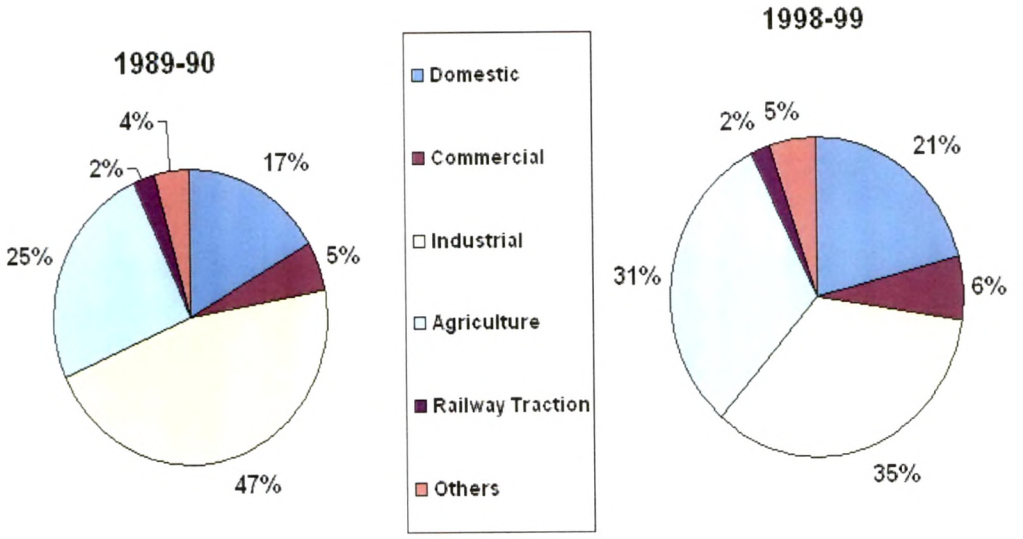
Electricity use in agriculture has increased rapidly in the past 30 years, both because an average of 30,000 pump sets were electrified every year in India from 1970 to 2000, and because the use per pump has increased quickly. In Gujarat for example, the electric consumption on agriculture pump set has increased from 5153 MUs in 1989-90 to 15695 MUs in 2001-02 (Socio Economic Gujarat State, 2007-08)[8]. Though industrial and commercial electricity demand had climbed rapidly over the same period, the exponential growth in agricultural use meant that the overall share of industry and commercial users had declined relative to agriculture users, as shown in Figure-3 on next page.

[7] Neudoerffer, Cynthia, Preeti Malhotra, and P. Venkata Ramana, Participatory Rural Energy Planning in India - A Policy Context, Energy Policy 29 (5), 2001, pp.371-381.

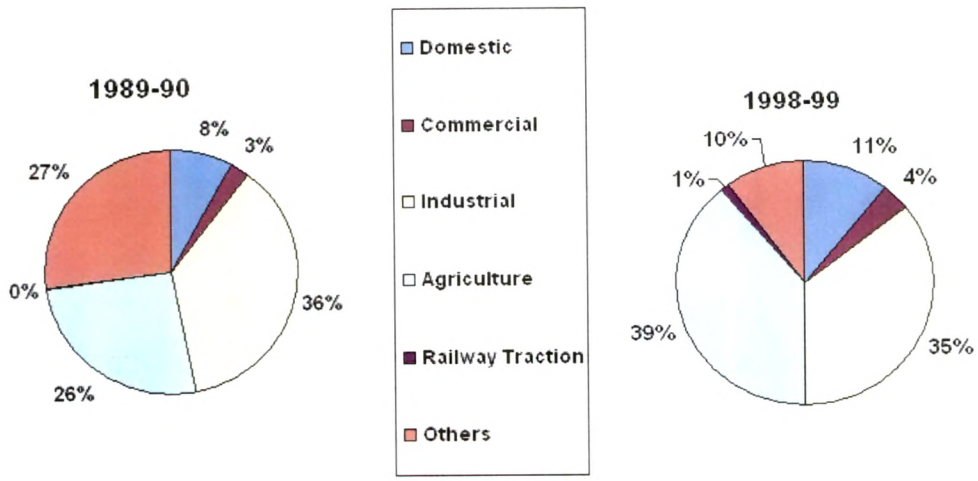
[8] Socio Economic Gujarat State, 2007-08, Directorate of Economics and Statistics, Government of Gujarat, Gandhinagar.

Figure–3 Sectoral consumption of Electricity of India and Gujarat

INDIA



GUJARAT



(Source: Socio Economic Review, 2007-08)

The domestic and agriculture sectors' electricity use has not only grown in gross units (kWh) supplied, but has also become more expensive for the state to supply.

Table–2 Cost of Supply and Average Tariff for Agriculture
(1990-1991 to 2004-2005)

Year	Average Cost to Serve (Rs per Kwh)	Average Tariff for Agriculture Excluding Subsidy (Rs per Kwh)
1990-91	2.4	0.18
1998-99	2.78	0.25
1999-00	3.05	0.25
2000-01	3.51	0.25
2001-02	3.36	0.25
2002-03	3.88	0.25
2003-04	4.15	0.46
2004-05	3.74	0.43

Source : Annual Statement of Accounts, GEB,2001-02 & 2004-05 & Calculated from Tariff Order of GERC.

Table-2 shows the disparity between the cost of supply and the average tariff in Gujarat for agriculture users, a gap that has been steadily growing, with the former increasing by 41 per cent from 1996–2001, while tariffs have increased by only 34 per cent. In total, the subsidy has risen by 74 per cent in the same period because of the combined effects of higher use and lower relative tariffs. The cost of generation and distribution of electricity for agricultural use is also high, compared to other users, because the load is transported through long transmission and distribution lines that are needed to deliver the electricity to remote rural users.

Table–3 Cost of Agriculture Subsidies in Gujarat

(Rs in Crore)

Year	Total Agriculture Subsidy
1990-91	356
1992-93	608
1994-95	703
1996-97	865
1999-00	1100
2000-01	1431
2002-03	1352
2004-05	1945
2006-07	1690
2008-09	2417

Source: Annual Statement of Accounts, GEB, 1990-2009.

1.2.2 Electricity sector in Gujarat

Against this backdrop, it would be pertinent to briefly discuss the state of Gujarat, its political economy, the important aspects of its electricity sector- a state, whose electricity sector is a microcosm of the issues facing the electricity sector reforms in the rest of India. Gujarat is one of the 28 States of India with a population of 50.07 million as per the population census of 2001 and with a growth rate of 22.66 per cent during the decade 1991-2001(Socio-economic review, 2004-05, p.3)[9]. The State is located on the southern section of the Pakistan border and has a long coastline with the Arabian Sea. Gujarat

[9] Socio-Economic Review Gujarat State 2004-2005, Directorate of Economics and Statistics, Government of Gujarat, Gandhinagar, February 2005, pp.1-85.

has both rich farmland in the central and southern portions and arid and dry regions in the west. Surface water is scarce, though the ambitious Narmada multi-purpose project has the potential to increase the irrigation potential to regions devoid of accessible and useable groundwater.

Gujarat is one of the most industrialized and developed states in India. The GDP figures for Gujarat at current prices has been estimated at Rs.16,736 million in 2003-04 (6.64 percent of India's GDP) as against Rs.14,107 million in 2002-03 showing an increase of 18.6 per cent during the year. The per capita income at current prices has been estimated at Rs.26, 979 in 2003-04 as against Rs.22, 838 in 2002-03, registering an increase of 18.1 per cent during the year (Socio-economic review, 2004-05)[10]. Significantly, while the Indian economy witnessed a high growth rate during the 1990s (the period of economic liberalization in India), Gujarat's economy grew faster. Thus during 1993-2001, while India's GDP increased by 46.20 per cent (at constant 1993-94 prices), the GDP of Gujarat grew by 55.82 percent. At 6.74 per cent compounded annual growth, this figure was only slightly below the "tiger economies" of South-East Asia, whose average growth rate during 1991-96 was 7.49 percent (Quibria, 2002, p.17)[11] – a fact which underlines the tremendous energy requirement of Gujarat.

[10] Socio-Economic Review Gujarat State 2004-2005, Directorate of Economics and Statistics, Government of Gujarat, Gandhinagar, February 2005, pp.6-7.

[11] Quibria M.G., Growth and Poverty: Lessons from East Asian Miracle Revisited, ADB Institute Research Paper 33, February 2002, p.17.

The manufacturing and the service sectors have been the prime drivers of this economic growth in Gujarat. Compared to 62.7 percent growth in the manufacturing sector in India during this period, Gujarat's manufacturing sector grew by 88.9 percent at a compounded annual growth rate of 9.4 percent. Hence Gujarat is considered as the strong arm of the nation's industrial and trade performance and has consistently been ranking in the first few states in India for most of the industrial parameters. Like any modern economy, Gujarat is also showing increase in the relative share of the secondary and tertiary sector, compared to the primary sector in the GDP. In fact in the last decade, the share of the primary sector has come down from 25.4 per cent to 15.9 percent, while that of the secondary sector has increased from 35.8 per cent to 41.5 percent, and that of the tertiary sector from 38.8 percent to 42.6 percent. (Socio-economic review, 2004-05)[12]. Agriculture sector is thus continuously losing its economic primacy to the industry and service sector.

However some of the weaknesses of Gujarat's economy need a mention here as these affect the performance of the electricity sector. First, the later part of the 1990s showed a slowdown in GDP growth. Due to various natural calamities like earthquake, series of drought, and overall economic recession, the industrial output figures and GDP of Gujarat showed signs of decline as can be seen from Table-4.

[12] Socio-Economic Review Gujarat State 2004-2005, Directorate of Economics and Statistics, Government of Gujarat, Gandhinagar, February 2005, pp.6-7.

Table–4 GDP and Industrial Output figures of Gujarat (at current prices)

Year	1999-00	2000-01	2001-02	2002-03	2003-04
Total State GDP (in Mn. Rs.)	1088920	1084840	1210380	1410660	1673560
% change over previous year		-0.4%	11.6%	16.5%	18.6%
State industry's output (in Mn. Rs.)	428900	411230	444700	553450	608680
% change		-4.12%	8.14%	24.45%	9.98%
Industry output as % of total State GDP	39.4%	37.9%	36.7%	39.2%	36.4%

Source : Socio-Economic Review, Gujarat State 2004-05, Govt. of Gujarat 2005, pp.S-40

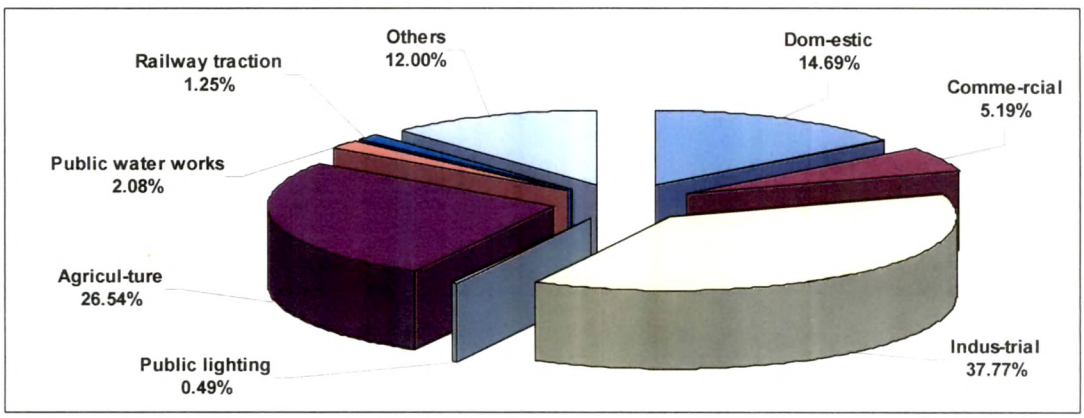
This economic slowdown also had a negative impact on GEB's finances, as will be discussed later. Secondly, while Gujarat ranks quite high in the industrial sector, it lags behind the all-India average in the agricultural sector. With irrigation coverage of only 31.2 per cent as against the Indian average of 37.63 per cent, the productivity in major food grains was also lower than the national average. Further the areas of north Gujarat, Kutch and Saurashtra are more dependent on agriculture and are rain deficient. As will be seen later, this increases their dependence on ground water irrigation, thereby increasing the burden on GEB to provide subsidized power for this purpose.

Another major socio-economic indicator is the rural-urban divide. Despite its high urban population (37.5 per cent of the total population, as compared to 27.28 per cent all-India average as per the 2001 census, and ranking fourth in India), Gujarat is still predominantly rural with 62.5 per cent population living

in the rural areas (Census, 2001)[13]. Thus over 31.7 million people live in rural Gujarat and are directly or indirectly dependent on the agriculture sector as their major economic activity. Out of 3.51 million operational landholdings in Gujarat, only 118,281 are large (above 10 hectares) and 669,084 are medium, while the rest are small and marginal holdings or are landless. In view of the costs of electric pumps, it is estimated that large and medium agriculturists are the ones owning the bulk of over 796,980 electricity pumps presently supplied power by the GEB. This preponderance of rural population gets translated into political strength as most of the elected representatives draw their strength from the rural populace. To sum up the socio-economic scenario, Gujarat represented an industrialized economy, but showed signs of slowing down in the last few years due to several reasons. Agriculture lost its primacy vis-à-vis industry and service sector, yet due to their numerical strength, it continued to dominate the affairs of the state and consequently the finances of the state electricity sector suffered, as will be seen later.

1.2.3 Structure of electricity consumption in Gujarat

Figure–4 Electricity Consumption by Sectors in Gujarat 2006-07



Source: Socio-Economic Review Gujarat State, 2007-08 p.32

[13] Census, 2001, Census of India 2001, Office of the Registrar General, Government of India.

Table–5 Sectoral Consumption of Electricity (in MU)

Sr. No	Year	Dom-estic (MU)	Comme-rcial (MU)	Indus-trial (MU)	Public lighting (MU)	Agricul-ture (MU)	Public water works (MU)	Railway traction (MU)	Others (MU)	Total consu-mption (MU)	Per capita consu-mption (kWh)
1	1960-61	72	32	806	N.A.	N.A.	N.A.	-	74	984	48
2	1970-71	244	108	2,401	56	405	95	-	13	3,322	N.A.
3	1980-81	675	284	4,840	74	1,334	189	-	170	7,566	235
4	1988-89	1,393	448	6,968	91	4,413	102	0	4,460	17,875	363
5	1989-90	1,595	505	7,278	95	5,153	114	0	5,206	19,946	382
6	1990-91	1,756	544	7,689	103	5, 678	116	0	5,734	21,620	429
7	1991-92	1,942	592	7,729	100	6,976	110	0	7,028	24,477	568
8	1992-93	2,086	638	7,880	107	7,803	108	0	7,854	26,476	581
9	1993-94	2,315	748	8,822	109	8,666	106	0	8,726	29,492	622
10	1994-95	2,521	798	9,590	112	8,476	369	301	1,736	23,903	633
11	1995-96	2,838	890	10,376	117	10,151	405	331	2,030	27,138	693
12	1996-97	2,968	931	11,048	120	10,105	431	345	2,134	28,082	724
13	1997-98	3,171	1,003	11,065	129	10,774	460	349	2,399	29,350	786
14	1998-99	3,486	1,097	10,940	134	12,061	510	358	2,482	31,068	848
15	1999-00	3,699	1,178	10,284	149	14,934	566	379	2,640	33,829	932
16	2000-01	3,981	1,279	9,813	166	15,489	611	383	2,603	34,325	953
17	2001-02	3,922	1,278	9,817	160	15,695	612	406	2,907	34,797	963
18	2002-03	4,136	1,353	10,708	165	12,965	685	409	3,439	33,860	944
19	2003-04	4,613	1,543	11,270	168	11,625	721	420	3,785	34,145	932
20	2004-05	5,026	1,713	12,340	177	9,958	762	477	3,965	34,418	1321
21	2005-06	5,490	1,905	13,244	189	10,617	816	501	5,596	38,358	1313
22	2006-07	6,097	2,154	15,680	202	11,016	863	518	4,983	41,513	1354

Source: Social Economic Review of Gujarat State, 2007-08

These data above indicate an increasing agricultural component and a shrinking industrial use up to 2002-03. While industry sector is becoming more energy efficient mainly due to high tariff rates and switchover to captive generation, agricultural use is exceedingly high. It is pertinent to mention here that the per capita consumption in Gujarat has increased steadily to 963 kWh/capita in Gujarat and is well above the all-India average of approximately 400 kWh/capita. Of course, as shown in the Table–1 on per capita electricity consumption, these figures are far below the international indicators pertaining

to the per capita energy consumption, which again is linked to the overall development of the economy.

An issue of increasing concern is about the high growth rate of electricity demand from agriculture, 54.6 percent of the total demand since 1995, which has severely strained the state budget and siphoned off physical electricity supply away from other sectors of the economy. This also had the dual effect of increasing (upward) the pressure on industrial tariffs, the ultimate payer of any cross-subsidization, while the quality and the reliability of electricity supply have not been satisfactory for all consumers.

In Gujarat state alone, the subsidy totalled Rs.14.56 billion in 1996, while the total for India amounted to Rs.270.83 billion in 2001. This represents 1.5 percent of GDP of Gujarat and a diversion of resources from other critical areas, such as education and health care (Hansen & Bower, 2003)[14]. The cause of this subsidy entrenchment is that short-term electoral concerns have repeatedly been placed ahead of dealing with the serious medium and long-term consequences of allowing the largest and fastest growing electricity end-use sector (farmers) to have free or subsidized electricity. By 2000-01, GEB figures showed that the agricultural sector constituted approximately 45 percent of the total electrical energy units consumed in Gujarat. At present, over 95 percent of the sales of energy units that are reported under this consumer category are unmetered. It is widely believed that by over-reporting sales to the subsidized agriculture users, individual managers of the GEB can sell the electricity to industrial users or rich domestic consumers and create a rent equal to the quantity sold multiplied by the price difference. The assessed

[14] 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, p.14.

sale of energy units reported under the agricultural segment has been questioned by the GERC (GERC, 2000)[15] as well as by others, who assert that much of the electricity that is claimed to be used by the agriculture sector is in fact diverted to illegitimate uses-clearly a very likely consequence of allowing unmetered supply to the agriculture sector. GERC had commissioned a study by TERI that showed that the total agricultural consumption was 13,345 kWh, which was 42 per cent of the total power consumption and the total T&D losses were estimated around 28.8 percent) (T&D Losses in GEB System, 2002)[16].

1.2.4 Status of electrification in Gujarat

Full electrification of all villages and urban units has been a major policy objective of the GOI and all state governments. This has so far been pushed through the respective SEBs with budgetary support and financing from several financial agencies including aid from the donor agencies. Gujarat has achieved full electrification of all inhabited villages barring 88 villages, which are not feasible for electrification, on account of either going under submergence, having no population or located in the reserved and the dense forest area (Annual Administrative Report, 2003-04, GEB)[17]. A total of 17,940 inhabited villages and 272 towns are covered under this full electrification programme, while the 88 non-feasible villages are being covered through off-grid, distributed generation projects, mostly through non-conventional energy like solar and wind power. The total number of rural households in Gujarat as

[15] GERC 2000, Tariff Order No.19 of 1999, Ahmedabad, Gujarat Electricity Regulatory Commission, p. 102.

[16] T&D Losses in GEB System Corresponding to 2000-01, TERI, Project Report No. 2000 ER 67, September, 2002.

[17] Annual Administrative Report 2003-2004, GEB, Baroda, Gujarat, p.49.

per the Census of 1991 is 4,792,660, out of which 56.4 per cent households have active electrical connection.

But an important issue that arises from the Gujarat household surveys by the National Council of Applied Economic Research (2002) indicates that the actual electrical connection rates are much higher, especially for the rich, thereby implying that at least 20 percent of all connections are illegal. Also the current level of demand by the rural poor is too small and the coordination failures and the investment risks too high for the private sector to be motivated to adequately respond. Transmission lines are expensive to build and without a large paying consumer base in the rural areas, these high capital costs cannot be recovered. Long distances covered by the distribution lines result in high electricity losses, estimated at 2.4 times higher than the rate in the urban areas (Rabindranath and Hall, 1995)[18]. The quality of service in terms of the quantity of electricity that is actually delivered and the regularity of the supply were present shortcomings of the system - a task the reforms exercise had to address squarely to find out innovative, non-centralized solutions as alternatives to the centralized grid electricity in non-urban areas.

1.3. International experience of Reforms and the Reform trends

For most of its history, the electricity sector in Europe, North America and rest of the world has been dominated by large, vertically integrated, and heavily regulated utilities. The natural monopoly characteristics of the industry, its enormous economic importance, plus concerns about corporate abuses and mergers led to state and federal regulation of investor-owned utilities and to

[18] Rabindranath N.H, and Hall D.O. Biomass, Energy, and Environment: A Developing Country Perspective from India, Oxford, Oxford University Press, 1995.

public ownership throughout much of the 20th century. However, in contrast to India and other transition economies, electricity sector reforms began early in the developed countries and Latin America, mainly in the 1980s. Beginning in 1978, however, reforms made inroads into this traditional structure and operation of the private sector of this industry. By the late 1990s, a transformed industry had started to take shape, characterized by substantial de-integration, significantly looser regulation, and more market-oriented operations (Kwoka John, 2006)[19].

The view of the state's role in the economy in the developed countries was changing around the 1970s, most notably in the UK, where free and competitive markets were seen as more efficient than public sector intervention. It was believed that the divestiture of publicly owned assets would lead to improved resource allocation and innovation. The experience with deregulation in the United States in the late 1970s showed that markets were better at reducing prices and increasing efficiency, thus reinforcing this view. In Latin America, restructuring and regulatory reform was an outgrowth of the Washington Consensus that called for privatization, liberalization and a great reliance on market forces (Choyonowski, 2004)[20].

Many countries started their reforms in the power sector much before India embarked on reforms. Notable among them were the UK, the USA, and several member countries of the EU, including Scandinavian countries, and Latin American countries like Chile, Brazil and Argentina. Each country's unique governmental structures and institutions, demography, socio-economic

[19] Kwoka, John, Restructuring the U.S. Electric Power Sector: A Review of Recent Studies, Report Prepared for the American Public Power Association ,November 2006,pp.1-3.

[20] Choynowski Peter, Restructuring and Regulatory Reform in the Power Sector: Review of Experience and Issues, ERD Working Paper Series No.52, Economics and Research Department, Manila, Asian Development Bank, May 2004, p.19.

and political environment and resource availability guided their reform agenda. Most of the developed countries had undertaken restructuring of the electricity utilities for improving the efficiency, reducing tariffs, and to provide better quality of service to the consumers, through competition and the consumers would benefit from the efficiency gains in generation, transmission, distribution and supply.

The strategy adopted in most of these countries was to segment the hitherto vertically integrated structure of the power utilities into small functional organizations to induce greater competition and to establish a regulatory regime to oversee their working. The structural options involve a movement along a range of options from a vertically integrated, publicly or privately owned utility to a full vertical and horizontal separation with full competition in generation (through a pool) and in retail supply. Reform models that involve different degrees of vertical and horizontal separation of the industry require new market structure and pricing systems. In the post-reforms scenario, new contracts with generators will be required together with costs for the use of the transmission and distribution system, bulk supply tariffs and retail tariff. Depending on the typical context of reforms of a country, progress among various developed nations has been quite varied as we take up a brief analysis of reforms in different nations below.

1.3.1. The UK experience

The UK was a pioneer in unbundling government owned vertically integrated electricity utility and privatizing it. It also introduced competition in generation through power pool and a spot market. The restructuring of the power sector in the UK was part of a more general trend in the 1980s to move

away from government intervention in the economy toward an economy more dependent on free markets. The ideological beliefs underlying restructuring of the Electricity Supply Industry (ESI) in the UK were that private ownership and the profit motive were better incentives than the most benevolent kind of state control and that competitive private industries performed better than monopolies (Domah & Politt, 2000, P.3)[21]. The real significance of the UK reforms is that they have been extremely influential in shaping the reform processes elsewhere, including the European Union. Beyond Western Europe, places as diverse as Colombia, Ukraine, and Orissa and several other states in India have been deeply influenced by the "UK" model (MacKerron, 2003)[22].

The main features of the changes undertaken during the early 1980s comprised.

- The transmission side of the Central Electricity Generation Board (CEGB) was formed into a separate company (National Grid Company), which has to set common, transparent tariffs for all users of the high-voltage network, and was responsible for plant dispatch.

- The generating side of the CEGB was split into three companies, two private fossil-generators (National Power and Power Gen) plus a public sector nuclear company (Nuclear Electric).

[21] Domah P., Politt M., The Restructuring and Privatization of Electricity Distribution and Supply Businesses in England and Wales: A Social Cost-Benefit analysis, Fiscal Studies, Vol.22 (1), March 2001, p.3.

[22] MacKerron Gordon, Electricity in England and Wales: Efficiency and Equity, in Glachant Jean-Michel and Finon Dominique.ed., Competition in European Electricity Markets, A Cross-country Comparison, Cheltenham, UK, Edward Elgar Publishing Limited,2003, p.41.

- The area boards were made into Regional Electricity Companies (RECs). They were to have ongoing monopoly control over the wires, but would be subject to increasing competition in retail supply to final consumers. This was to happen in three stages, culminating in the intended opening of choice to all consumers in early 1998. RECs were also permitted to own some of their own generation.

- A new trading mechanism known, as the Pool was compulsory for generators and suppliers, though the spot price it set could be hedged by more stable long-term contracts for wholesaling of electricity.

- A new regulator, the Director General of Electricity Supply (operating through the Office of Electricity Regulation [OFFER]), was given a range of powers and responsibilities in relation to the new structures.

- All generators had open access to the transmission network to ensure retail competition.

- Two generation companies and RECs were privatized and the transmission company, which had been owned by the distributors, was floated on the stock exchange.

1.3.2. The US experience

In USA, a large federal and diverse country, the power sector structure varied across the states. The electricity industry in the US consisted of around 200 vertically integrated privately owned utilities, over 4000 non-utility generators, about 3000 distribution utilities, including municipalities and rural electric cooperatives. The existing legislative framework for regulating electric industries has Federal Energy Regulatory Commission (FERC) at the federal level and separate regulatory authorities at the state level. In this section, the focus is on Californian reforms, as it has many lessons on how successful reforms are to be pursued and what pitfalls to be avoided. California has earned a deserved reputation for both catastrophe and innovation, and the worldwide attention given to its recent electricity crisis has components of both. In 1998, California was the first major state to implement sweeping deregulation in a record time. The Californian crisis unfortunately occurred at a time when there was considerable criticism about the reforms, prompting even a rollback of reforms from some quarters.

1.3.3. The South American experience

In South America, restructuring and regulatory reform was an outgrowth of the Washington Consensus that called for privatization, liberalization, and a greater reliance on market forces. The aim of the reforms was to create a more commercially oriented power sector that was more efficient and less politicized. It was also expected that private sector investment in the power sector would ease the financial burden on government budgets. Following the successful introduction of power sector reforms in the UK, many other

developing countries adopted a model that promotes competition in their power market to achieve economic efficiency and higher quality services, as well as lower consumer prices for electricity. Here we can start with the reforms initiatives in Chile, as this was the first South American country to introduce reforms in 1980and other countries in South America like Argentina more or less followed the Chile reforms model.

Chile is the pioneer of reforms in South America and started the reform process way back in 1980. The electricity industry in Chile consisted of two state-owned major vertically integrated utilities, and 14 small public owned distribution and supply entities. The power sector in Chile is relatively small and comprises two power grids with a relatively even mix of hydro and thermal generation. The government began the reform process in 1981 with the unbundling of the generation and distribution functions from the two major vertically integrated monopolies in the country. This created seven generating, one transmission and 26 distribution companies. All of these companies were privatized by 1990. Although more generating companies entered the electricity market since restructuring, one generator in the main grid still represents about 65 percent of the electricity produced. The transmission function was separated from generation and privatized only later in 1993.

1.3.4. The EU experience

The issues of reform in the ESI in Europe has been a priority agenda item among supra government institutions like the EU and various national governments, generating political debates and controversies among policy-makers and economists. Some pioneering countries, such as the UK (as discussed before) and the Scandinavian counties, deregulated and reformed

their own ESI by themselves. But others define and develop their own ESI in terms of the requirements of the EU Directive 96/92 on electricity markets. In this section the reforms in the EU region will be discussed, along with certain specific cases like France and Italy.

Till the mid-1980s, electric utilities in Europe were government controlled and vertically integrated companies. Restructuring of the monolithic utilities, often accompanied by private sector participation, started in the 1980s. The broad strategy adopted in Europe was to segment the vertically integrated structure into small functional organisations to induce greater competition and to establish a regulatory regime to oversee their working. The UK was the first European nation to fully liberalize the power sector in 1999, in line with its liberalization efforts, which started with the privatisation of the British Telecom in 1984. The Directive 96/92/EC of the European Parliament and of the Council of 19 December laid down common rules for the internal market in the electricity sector. However this was repealed by the Directive 2003/54/EC of 26 June, which became effective from July 1999. This important directive of the EU laid down the basic features of the liberalization process as initiated in the EU member nations (Hrovatin, 2001)[23]. The EU has been very active in changing the institutional setting of all utilities, including electricity. The basic EU objective is to stimulate competition in all activities in an integrated European internal market. It is expected that the creation of a competitive EU internal market in electricity sector will lead to a reduction in prices, and consequently enhance the global competitiveness of Europe vis-à-vis its most important competitors, the US and Asian countries.

[23] Hrovatin, N. (2001), Regulatory Framework for EU Utilities Pricing: Legislation, Enforcement and Institutional Structure, Working Paper No. 29, Glasgow Caledonian University, May 2001, p.3.

1.3.5 The South East Asian experience

In South East Asia, the reform process in the power sector started in the early 1990s. South East Asia comprises of the island nations of Thailand, Indonesia, Philippines, Singapore, Malaysia, Vietnam, and Cambodia etc. The first five countries here constitute a major trade block, the ASEAN, and are considered an economic powerhouse. Called the "tiger economies", most of these Asian nations have initiated electricity reforms much earlier than others in the rest of Asia. We can briefly discuss the trends in reforms in a few important countries of the region, viz. Thailand and the Philippines.

The ESI in Thailand was characterised by public sector ownership and vertical integration in generation and transmission. The electricity generating authority of Thailand (EGAT) was the sole agency responsible for the above functions. The distribution and retail service functions were under the responsibility of the Metropolitan Electricity Authority (MEA) and Provincial Electric Authority (PEA).

Financing needs for power supply expansion and adherence to market economy were the key concerns that prompted restructuring and privatization. Although power utilities around this time were considered profitable, the inefficiencies of the utilities were becoming a major concern. The economic prosperity in the late 1980s and early 1990s that brought increase in capital requirements led to the stepping up of the implementation of the reform and privatization policy.

The government of Thailand began promoting a greater role for the private sector in sharing in the financing of future generation projects in 1992 when it

approved the establishment of the Electricity Generating Company (EGCO) and the relevant regulations for the purchase of power from small power generators. EGCO was established through a partial privatization of EGAT and sells electricity to EGAT directly through long-term contracts. In 1998, the government endorsed a Master Plan for State Enterprise Reform that would serve as a framework for determining the scope and direction of restructuring and privatization in major economic sectors, including the energy sector. The goal was to improve the efficiency of the sector. Various short-term, intermediate, and long-term goals were prepared and implemented accordingly.

The Master Plan of 1998 envisaged that the future structure of the electricity industry would follow a competitive model in which generation companies compete in a power pool. EGAT retained its dominant role as primary bulk purchaser and provide of electricity. An independent regulatory body and a regulatory framework were established through legislation. Transmission and distribution activities are sought to be regulated, while efforts would be undertaken to promote real competition. A wholesale power pool was created which consisted of system operator, market operator and settlement administrator. In the long run, a competitive power pool is to be set up. Competition will be introduced at both the wholesale and retail levels.

The course of reforms in Thailand has more resemblance with the reform model of the UK. The reforms have made positive effects. Thailand has been successful in attracting substantial private sector investment in generation. A little more than one third of the country's installed generating capacity is now owned by the private sector. The costs have been reduced through standardisation of system designs and provision of financially sustainable tariff

for meeting the requirement. The system losses of PEA were only 5.5 percent in 1997. Village electrification in the rural area was nearly completed. More important, household electrification was as high as 90 percent. However, the restructuring and privatization process was slow mainly because of opposition from power sector labour unions and some sections of the public.

The archipelago of Philippines comprises more than 7,100 islands, grouped into three major administrative regions-Luzon (which includes Manila), Visayas and Mindanao. Approximately 82 million people live in the Philippines, with 10 percent living in Manila alone. Nearly 45 percent people live in rural areas. The power system in Philippines is divided into five major island grids. Geothermal power accounts for the country's largest share of indigenous energy production, followed by hydropower, coal, oil and gas. The state-owned National Power Corporation (NPC) owns most of the installed capacity. There are also a few privately owned and operated generation stations, who sell power to NPC, which is also the owner of the high voltage transmission facilities in the country. The Electric Power Industry Act of 1996 outlined the organizational setup of the ESI in the country.

The most significant event in the country's energy industry has been, after seven years of congressional debate and several court cases, the Power Industry Reform Act of 2001. The Act has three main objectives, viz. to develop indigenous resources, to reduce the high cost of power, and to encourage foreign investment in the power sector. This Act set into motion the deregulation of the power industry and the break-up and eventual privatization of state-owned enterprises with a market orientation.

The state-owned utility National Power Corporation (NAPOCOR) is to break-up it's vertically integrated assets into generation, transmission and distribution in order to lead to eventual privatization. NAPOCOR will transfer its existing power purchase obligations to private distributors and also to negotiate high-priced contracts. This would necessitate financial restructuring of the sector before privatization. The transmission system will be transferred to an independent company, Transco. It is sought to be privatized, unlike the case in many other reforming countries like India. The Energy Regulatory Commission (ERC) on the basis of RoR regulation regulates the Transco and the distribution companies or some performance- based regulation. This independent and quasi-judicial body will determine tariffs and lay the standards for efficiency improvements. Although firm plans and the legislative initiatives regarding restructuring and reforms have been made, progress in their implementation has been slow.

1.3.6. Major trends

From the preceding analysis on the state of power sector reforms in a few countries across the globe, one can draw some common features arising out of the reform agenda.

- Restructuring and unbundling - It can be seen from the international experience that most countries such as Argentina, Chile, etc. have adopted the UK model of restructuring the power sector. The unbundling of the monolithic electricity utilities into separate generation, transmission, and distribution entities has been a general trend as it introduces competition in various segments of the power sector.

- Post-privatization and unbundling, the sector was not left totally to market forces, but an independent regulator was created, typically entrusted with the task of regulating capacity planning, tariffs, and the quality of supply and customer service. After the California debacle arising out of the extreme form of deregulation, it does not seem likely that any country/state will leave the power sector totally to market forces, at least in the near future. Modelled mostly after the regulatory regime of the UK, an independent regulatory agency was created to regulate the generation, transmission and distribution companies, to instil confidence in the private players by creating a level playing field and to protect consumer interests. Regulatory reforms have accompanied with the private sector participation in most countries. The scope of the functions and the effectiveness of the regulator vary from country to country. The challenge in all transition economies will be to strengthen regulatory independence and mechanism design (Kennedy, 2003)[24]. In stable, consistent, credible and independent and autonomous regulatory framework, privatization has been very successful in countries like the UK, Chile and Argentina.

- While separation of functions of a monolithic utility is seen to be a general trend, the extent of competition varies from country to country. The UK was again the trendsetter, where competition was introduced both in wholesale and retail supply. But most other countries have mostly limited competition only for bulk supply or wholesale supply fully and to large consumers only and not for complete retail, as it requires considerable strengthening of the operational systems. For most

[24] Kennedy David, Power Sector Regulatory Reform in Transition Economies: Progress and Lessons Learned, Working Paper No.78, European Bank for Reconstruction and Development, London, February.2003,p.1.

reforming states, the primary need was to improve the operational efficiency of the distribution utilities and make them viable and competitive. The retail market was not a priority and could wait for a later period. However, most reforming nations allowed free access to all distribution companies and bulk consumers.

- Successful reforms require extensive preparatory work. Considerable preparatory work was undertaken prior to introduction of reforms.

- A participatory approach of involving all stakeholders is likely to be more successful than a closed approach. In developing countries in Asia and South East Asia, one notices several criticisms to the entry of IPPs because the process was perceived to be non-transparent. The need for social and political consensus is even more evident in a country like India, where tariff increase is bound to follow any reform process, as the government has the financial compulsion of reducing the subsidy burden.

- The social impact of the reforms has not been uniform on all sectors of society. In the well-documented cases of Argentina, while the efficiency gains have been significant, the poor were the ones most affected by the privatization process. The rich were the greatest beneficiaries. There has been evidence of discrimination against the "life-line" consumers. This issue is of great significance in India and in Gujarat, where the vulnerable sectors (including the agriculture sector) apprehend such discrimination.

- The countries, which have taken better care of the employee concerns, have had a greater level of success with distribution privatization as in Argentina. In almost all reforming states, the employees of the erstwhile monopoly had lot of apprehensions about their future prospects in the new scenario. Intensive training programmes have been undertaken to make the employees pro-reforms and result –oriented and introduce the culture of the New Public Management (Polidano, 2003)[25] and (Horton, 2002)[26]. Participation in ownership in share holding (stock options), higher incentive for better performance, and attractive voluntary retirement benefits etc have been undertaken in many reforming nations like the UK.

- Reforms in power sector were more successful where they formed a part of the overall financial reforms in the country, as was the case with Chile, Argentina and the UK. Any stand-alone reform only in the power sector leads to doubts about the merits for the privatization programme per se and about the motives and commitment of the government. Hence, power sector reforms, if part of an overall reforms agenda, has better, sustainable results.

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[25] Polidano Charles, Administrative Reform in Core Civil Services : Application and Applicability of the New Public Management, in McCourt Willy and Minogue Martin, ed., The Internationalization of Public Management: Reinventing The Third World State, Edward Elgar, Cheltenham, UK, 2001, p.44.

[26] Horton, Sylvia, The Competency Movement, in Horton Sylvia, Hondeghem Annie, and Farnham, David, ed., Competency Management in the Public Sector: European Variations on a Theme, IOS Press, Amsterdam, 2002, p.3.