POWER SECTOR REFORMS IN ANDHRA PRADESH

A Thesis Submitted to the University of Hyderabad for the Award of the Degree of

DOCTOR OF PHILOSOPHY

IN

ECONOMICS

By

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This is to certify that Mr. **GERRI SUNEEL** has carried out the research work embodied in the thesis entitled "**Power Sector Reforms in Andhra Pradesh",** under our supervision in fulfillment of the requirement for the degree of Doctor of Philosophy in Economics and that no part of the thesis has been submitted for any degree or diploma of any university or institution.

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DECLARATION

I here by declare that the work embodied in this dissertation entitled **"POWER SECTOR REFORMS IN ANDHRA PRADESH"** is carried out by me under the supervision of ***Dr. S. Sandhya, Reader,*** Co-supervisor ***Prof. Naresh Kumar Sharma***, Department of Economics, University of Hyderabad and is original. This dissertation as part there of has not been submitted for any other degree at this university or at any University.

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ACKNOWLEDGEMENTS

This acknowledgement is a humble attempt to express my gratitude in a few words to all those who have directly and indirectly helped me in making this work possible and my personal life.

Firstly I would like to praise and thank god for guiding and leading me and all the beautiful blessings during my years of study.

I'm at a loss to acknowledge my indebtedness to my supervisors, ***Dr. S. Sandhya,*** *Reader and Co-Supervisor* ***Prof. Naresh Kumar Sharma****, who have helped and encouraged me at all stages of my thesis work with great patience and immense care. I never forget their help throughout my life.*

I would like to express my sincere gratitude to my former supervisor late ***Prof. V. B. N. S. Madduri*** *for encouraging and supporting me at all guiding time of my thesis work despite his busy schedule.*

I would like to thank the feed back of ***Prof. B. Kamaiah****, and* ***Dr. K. Laxminarayana*** *who were Doctoral Committee members for my Ph.D thesis.*

I express my heartfelt gratitude to ***Prof. G. Nancharaiah****, Dean, School of Social Sciences and* ***Prof J. V. M. Sharma****, Head of the Economics Department, University of Hyderabad, to give an opportunity for the successful completion of my thesis work.*

I thank the staff of Indira Gandhi memorial library, University of Hyderabad, the Staff of Computer Center, HCU., Vidyut Soudha Staff, Kairathabad, Hyderabad., State Regulatory Electricity Commission Staff, Red Hills, Hyderabad, for their help they extended during the course of material and data collection.

I'm grateful to the faculty members of the Department of Economics, University of Hyderabad and non-teaching staff – ***Sri Natarajan, Sri. Venkateswara Rao, Sri. Basha*** *and* ***Smt. Shankar*** *is extending help with all official procedures.*

During my course of my work my friends have been a great source of moral support. I thank to each and every person in ***Dr. B. R. Ambedkar Student's Association*** *in H.C.U Campus friends and my well-wishers.*

My special thanks to ***Geetha Gowr (R.E.C)****,* ***Rajasekhar (D.S.W), Sar Raju (Chief Warden), Chaturvedhi (Warden), P. Madan Babu, G. Hari Krishna Reddy, S.V.V. Prasad, G. China Babu, K. Steephen, V. Dhanaraj, D. Siva Kumar, Raghupathi, A. Manikya Rao Manikya Rao (Tel), L. Vachya, Rama Krishna, Jagadeesh, Trinadh, Degala Ravi, Mastan, Godson, Jayaraju, Omprakash, Gummadi Prabhakar, Ramana, Ramesh, Satyanarayana, Venkata Rao, Israel,Nageswara Rao, Sheshagiri Rao, Sunder, Ganga Ratnam, Kranthi Kumar, B. Suresh Babu, Vijay Babu, Upendra, Sudharshan, Rajini(Raji,) Radhika Rani, Evelyn Jemima Jacob (Sophy), Anu Radha, Dr. J. Rani Ratna Prabha, Dr. B. Sai Sailaja, Dr. Suma Scaria****, Dr. P. Bhushan Dr. G. Giri Babu, and Seniors & Juniors*** *Who helped me while other activities.*

I don't know how to tell acknowledge greatly. But I am telling based on my knowledge. My special acknowledge to ***Dr. Neela Kishore Babu*** *for his spiritual cooperation when he was with me in my room. I had good fortune of sharing thoughts with him about good spiritual life structure. It's my minimum responsible to acknowledge to* ***Dr. Estarla Krishna Rao*** *for his moral support and good cooperation entire my HCU academic life and also I would like to acknowledge* ***Mr Sankuru Shyam Prasad*** *for his help in different activities and supporting various additional needs. As a friend having those three persons I am very lucky. So I never forget their help and friendship throughout my life at any circumstance.*

Words are not enough to express my gratitude towards my father late ***Sri Gerri Naraiah****, for being there with me in all ups and downs with out his encouragement I would not have been able to reach this stage.*

I owe deep gratitude to my mother ***Gerri Subbamma*** *for bearing so much inconvenience and extend their care and concern in every stage in my life.*

I would like to express my sincere thanks to my brothers ***Sukumar, Vasudevarao,*** *sisters* ***Suneetha, Kusuma Kumar, Sudha*** *who have taken care of my responsibilities and continuous support throughout my work for helping in all possible way.*

(GERRI SUNEEL)

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ACRONYMS

ABT	=	Availability Based Tariff
ADB	=	Asian Development Bank
AP	=	Andhra Pradesh
APBSS	=	Andhra Pradesh State Electricity Board Sub-stations
APDICOMS	=	Andhra Pradesh Distribution Companies
APDP	=	Accelerated Power Development Programme
APDRP	=	Accelerated Power Development and Reform Programme
APGENCO	=	Andhra Pradesh Generation Corporation
APGPCL	=	Andhra Pradesh Gas Corporation Limited
APTransco	=	Andhra Pradesh Transmission Company
ARR	=	Annual Revenue Requirement
AT&C	=	Aggregate Technical and Commercial
ATL	=	Anti Theft Law
B E	=	Budget Estimate
BEE	=	Bureau of Energy Efficiency
BHEL	=	Bharat Heavy Electrical Limited
CCGT	=	Combined Cycle Gas Turbine
CEA	=	Central Electricity Authority
CEA	=	Central Electricity Authority
CERC	=	Central Electricity Regulatory Commission
CII	=	Confederation of Indian Industries
CKM	=	Circuit Kilo Meters
CL	=	Connected/Contracted Load
CM	=	Chief Minister
CMD	=	Chief Managing Director
CN	=	Captive Norms
CoS	=	Cost-to-Serve
CPCB	=	Central Pollution Control Board
CPPs	=	Captive Power Plants

CRF	=	Consumer Redressal Forum
CTU	=	Central Transmission Utility
CWC	=	Central Water Commission
DC	=	Double Circuit
DFID	=	Department for International Development (UK)
DISCOMs	=	Distribution Companies
Dist	=	District
DOE	=	Department of Energy
DPC	=	Dabhol Power Company
DPE	=	Detection of Pilferage of Energy
DSM	=	Demand Side Management
DVB	=	Delhi Vidyut Board
EA	=	Electricity Act
EHT	=	Extra High Tension
EHV	=	Extra High Voltage
EIA	=	Environmental Impact Assessment
EPRI	=	Electric Power Research Institute (US)
ERC	=	Electricity Regulator Commission
EROs	=	Electricity Revenue Office
ESP	=	Electro-Static Precipitators
FO	=	Furnace Oil
GoAP	=	Government of Andhra Pradesh
GoI	=	Government of India
HES	=	Hydro Electric Scheme
HP	=	Horse Power
HRD	=	Human Resource Development
HSD	=	High Speed Diesel Oil
HT	=	High Tension
HV	=	High Voltage
HVDC	=	High Voltage Direct Current
HVDS	=	High Voltage Direct System

HVDS	=	High Voltage Distribution System
IAS	=	Indian Administrative Services
IIR	=	Indian Infrastructure Research
IPP	=	Independent Power Producer
ISO	=	Independent System Operators
ITP	=	Independent Transmission Providers
KTPS	=	Kottagudem Thermal Power Station
KTS	=	Krishnampatnam Thermal Station
KV	=	Kilo Volts
KVA	=	Kilo Volt Amperes
KWh	=	Kilowatt-hour
KWH	=	Kilo Watts Hours
KWH/Unit	=	Kilo Watt Hour/Unit
LF	=	Load Factor
LILO	=	Loop In Loop Out
LNG	=	Liquefied Natural Gas
LPG	=	Liquid Petroleum Gas
LSHS	=	Low Sulphur Heavy Stock
LSD	=	Low Speed Diesel Oil
LT	=	Low Tension
LV	=	Low Voltage
LVDS	=	Low Voltage Distribution System
MIS	=	Management of Information Systems
MKH	=	Million Kilowatt Hours
MoE&F	=	Ministry of Environment and Forest
MoU	=	Memorandum of Understanding
MT	=	Million Tonnes
MU	=	Million Units
MVAR	=	Million Volt Amperes (Reactive)
MW	=	Megawatt
MYT	=	Multi Year Tariff

NA	=	Not Available/Not Accounted for
NEEPC	=	North Eastern Eclectic Power Corporation
NEP	=	National Electricity Plan
NHPC	=	National Hydroelectric Power Corporation
NLDC	=	National Load Dispatch Center
NPCL	=	Nuclear Power Corporation of India
NTPC	=	National Thermal Power Corporation
NTS	=	Nellore Thermal Station
O & M	=	Operating and Management
PCB	=	Pollution Control Board
PCP	=	Prevention and Control of Pollution
PFC	=	Power Finance Corporation
PH	=	Power House
PLF	=	Plant Load Factor
PPA	=	Power Purchase Agreement
PPP	=	Purchasing Power Parity
PSUs	=	Public Sector Undertakings
R & M	=	Renovation and Modernization
RBDD	=	Reserve for Bad and Doubtful Debts
RE	=	Revised Estimate
REC	=	Rural Electrification Corporation
REDB	=	Rural Electricity Distribution Backbone
RHE	=	Rural Household Electrification
RLDC	=	Regional Load Dispatch Center
RoE	=	Return on Equity
RoR	=	Rate of Return
Rs	=	Rupees
RTPP	=	Rayalaseema Thermal Power Project
RTPS	=	Ramagundam Thermal Power Station
SC	=	Single Circuit
SCADA	=	Supervisory Control and Data Acquisition

SEBs	=	State Electricity Boards
SELDC	=	State Electricity Dispatch Center
SERC	=	State Electricity Regulatory Commission
SLDC	=	State Load Dispatch Center
SPV	=	Solar Photovoltaic
SREB	=	Southern Region Electricity Board
STU	=	State Transmission Utility
T&D	=	Transmission and Distribution
TMC	=	Thousand Million Cubic Feet
TPP	=	Thermal Power Project
TPS	=	Thermal Power Station
UHV	=	Ultra High Voltage
VEI	=	Village Electrification Infrastructure
VTPS	=	Vijayawada Thermal Power Station
WB	=	World Bank
WB-SAR	=	World Bank - Staff Appraisal Report
WREB	=	Western Region Electricity Board

WITH

DEDICATION

TO MY BELOVED FATHER

LATE SRI GERRI NARAIAH

CHAPTER – 1

INTRODUCTION

CHAPTER -1

INTRODUCTION

1. 1. BACKGROUND AND MOTIVATION:

It is perhaps stating the obvious to say that both the progress of civilization and material prosperity of society has gone hand in hand with developments in command over energy. More particularly for our present purpose, energy is critical to production of all sorts of goods and services that a society strives for. Energy has been harnessed in various forms, starting from the direct energy of human effort to its supplementation by taming of other animals, and obtaining energy from material resources, including chemically stored energy. In present day, the most important form of energy is electricity. We use the phrases like electricity, electric power or simply power inter-changeably in everyday usage.

There are various ways and levels of generation of electricity – from tiny cells to giant power plants. However, generation of electricity can be broadly divided into the following four types:

1. Conventional thermal that includes Coal, Oil, and Gas;
2. Nuclear energy (which is also thermal route to electricity generation – the thermal energy coming from nuclear sources);
3. Hydro electric – means electricity is generated using potential energy of water stored at a height; and
4. Non-conventional energy, in these electricity is generated from a variety of sources including Solar, Wind, Tides, Geo-thermal, Ocean thermal and so many others

Infrastructure plays a vital role in economic development and the energy sector is one of the most important sectors in infrastructure of any economy. Not only that the power sector can be seen as the most important component of the infrastructure sector, but also it is crucial for development of all other infrastructure

– which is so important for over all development of the economy. Increase in production of electric power and reduction in cost of power together with proper distribution of power is important to sustain a high rate of economic growth and development. However with increase in power generation requirements, it is found that the state governments are faced with problems of higher production costs and difficulties in proper distribution of power.

As economic reforms started giving impetus to growth, increasing power needs were seen as a concomitant requirement. Thus, it was seen that a massive increase in investment in all the sub sectors of the energy sector to augment the energy infrastructure required for sustaining higher levels of economic growth. The electricity sector by early 1990s was almost entirely in the hands of public sector – both at the state level and at the central level.

Most of the states had virtual monopoly in production (generation), transmission and distribution of electricity. It was seen to entail two serious and connected problems: (i) the state sector was in the form of electricity board, this combined with monopoly was seen as an important reason giving rise to various inefficiencies leading to escalating costs, sluggishness in generation and rather low plant load factors. Lack of any competition was seen as a major cause for such inefficiencies, apart from the non-corporate organizational structure. (ii) Secondly, it was also seen as incapable of generating huge resources needed for further expansion needed in the power sector.

This perception of the problem propelled governments at both the Union level and at the State Government level to undertake a number of initiatives since 1991 to attract private investment into energy industry. Thus, not only there has been a fairly fast pace of change in the overall economic structure consequent upon the initiation of economic reforms, the power sector scenario has also undergone significant and substantial changes. Reform of power sector might have been slow to begin with, yet there have been far reaching changes in the structure and organization of power sector in a number of states across the country. Andhra Pradesh was not the leader in initiating these power sector reforms but among the first states to start this process.

In this context this work undertakes to study the reform process in the electric power sector in Andhra Pradesh in some detail, and analyze the impact of reforms on certain factors and study other related issues in the power sector of Andhra Pradesh.

The plan of this chapter is as follows: we take a brief look at the world energy scenario in the next section, before a quick stock taking of power sector reforms in the states across India in section 1.3. A bird's eye view of power sector in Andhra Pradesh is provided in section 1.4 and there is a brief discussion, in section 1.5, on justification of this study in the above context. This is followed by objectives, hypothesis and methodology in section 1.6. This introductory chapter concludes by presenting the plan of this thesis in section 1.7.

1.2. WORLD ELECTRICITY SCENARIO:

"Globally about 15,430 Tera watt-hour (TWh) of Electricity was produced, translating into global average per capita electricity consumption of about 2,548 KWh per person. The per capita electricity consumption in North America was much higher, at 11,618 KWh per person followed by Japan at about 8,502 KWh per person and Western Europe at 6,295 KWh per person. The Asian average stood at 975 KWh per person. The total generation accounted for 36 percent of global primary fuel consumption. By 2020, the electrical power generation is expected to be about 25,500 TWh. In terms of installed capacity, the total global installed capacity as on January 2000 was 3,262 GW (32,62,000 MW), comprising 2,175 GW of thermal (67 percent), 694 GW of Hydro (21 percent), 358 GW nuclear (11 percent) and 36 GW of others like geothermal, solar, wind and wastes (1 percent). The top five countries in terms of overall installed capacity include US (795 GW), China (294 GW), Japan (229 GW), Russia (203 GW) and Canada (111 GW), India ranks 8th (108 GW). Top five countries in terms of nuclear capacity include US (98 GW), France (63 GW), Japan (45 GW), Germany (22 GW) and Russia (21 GW}, together accounting for 70 percent of the world nuclear capacity." (See Final

Report on The Indian Capital Goods Industry, p.80 at http://dhi.nic .in/heavy _electrical_equipment.pdf).

The report further tells us that the fuel mix to generate electricity has been structurally changing since 1970s. In particular, the share of oil in electricity generation declined after the oil shocks from 23 % prior to the oil shocks to a much lower fraction at around 10 percent or below presently. Coal continues to remain the dominant fuel for electricity generation. However, electricity generation from nuclear sources had increased rapidly from the 1970s till the mid 1980s, and then remained more or less stable. Natural gas fired generation grew rapidly in the 1980s and the 1990s. On the whole, the fossil fuels accounted for 64.5 percent of the annual electricity production in 2000. This included coal (36 %), natural gas (19.5 %) and oil (9 %). Among other sources, the hydroelectric power generation accounted for 19 %, and nuclear energy contributed a 16 % share. Only a paltry 0.5 % came from all other sources, including renewable energy sources.

With global development in the energy scenario are also concerns regarding the environmental issues? There have been serious concerns about use and role of nuclear power – recent debates and discussions on civil nuclear cooperation between India and USA being a reflection of that. There are also concerns about the changing structure of the electricity industry. Investments and developments in this sector have to be understood in this backdrop.

In tables below, some data are presented on the global electricity scenario. Table 1.1 shows installed capacity across different countries according to different types of sources of energy. Table 1.2 shows region wise electricity generation and Table 1.3 consumption of electric energy at the world level.

Table 1.1:
World Electricity (Installed Capacity as on January 1, 2000 in GW)

Country	Thermal	Hydro-electrical	Nuclear	Geo-thermal & Others	Total GW	% of Thermal	% of Hydro-electrical	% of Nuclear	% of Geo-thermal & Others	Total
United States	581	99	98	17	795	73%	12%	12%	2%	100%
China	222	70	2	--	294	75%	24%	1%	--	100%
Japan	162	22	45	1	229	71%	9%	20%	0%	100%
Russia	13S	43	21	0	203	68%	21%	10%	0%	100%
Canada	33	67	11	0	111	30%	60%	10%	0%	100%
France	*26*	21	63	0	110	24%	19%	57%	0%	100%
Germany	79	3	22	4	109	73%	3%	21%	4%	100%
India	80	25	2	1	108	74%	23%	2%	1%	100%
United Kingdom	58	1	13	0	72	80%	2%	18%	0%	100%
Brazil	6	59	1	3	69	9%	86%	1%	4%	100%
Italy	52	13	--	1	67	78%	20%	--	1%	100%
Ukraine	36	5	13	--	54	67%	9%	24%	--	100%
South Korea	35	2	14	--	50	69%	3%	27%	--	100%
Spain	26	12	7	1	46	55%	26%	16%	3%	100%
Australia	36	6	--	0	43	86%	14%	--	0%	100%
South Africa	37	1	2	--	40	94%	2%	5%	--	100%
Mexico	27	10	1	1	39	70%	25%	4%	2%	100%
Sweden	7	16	10	0	34	20%	49%	30%	1%	100%
Poland	29	2	--	0	31	93%	7%	--	0%	100%
Iran	29	2	--	--	31	93%	7%	--	--	100%
Norway	0	27	--	0	27	1%	99%	--	0%	100%
Turkey	16	11	--	0	26	60%	40%	--	0%	100%
Taiwan	16	4	5	--	26	63%	17%	20%	--	100%
Argentina	13	10	1	--	24	55%	41%	4%	--	100%
Saudi Arabia	23	0	--	--	23	100%	--	--	--	100%
Indonesia	17	3	--	0	21	84%	15%	--	2%	100%
Thailand	16	3	--	0	19	84%	16%	--	0%	100%
Kazakhstan	15	2	--	--	17	87%	13%	--	--	100%
Pakistan	12	5	0	--	17	71%	28%	1%	--	100%
Finland	11	3	3	0	16	66%	18%	16%	0%	100%
Switzerland	1	10	3	0	14	6%	72%	22%	0%	100%
Belgium	8	0	6	0	14	59%	1%	40%	0%	100%
Austria	6	8	--	0	14	44%	56%	--	0%	100%
Czech Republic	11	1	2	0	14	80%	7%	13%	0%	100%
Egypt	11	3	--	--	11	79%	21%	--	--	100%
Colombia	5	9	--	--	13	35%	65%	--	--	100%
Total	2175	696	358	36	3262	67%	21%	11%	1%	100%

Source: Reliance Review of Energy Markets Statistics (2003)

Table 1.2 :

REGION WISE ELECTRICITY GENERATION IN WORLD (Tera Watt Hrs.)

Year	North America	Central & South America	West Europe	East Europe & Former USSR	Middle East	Africa	Asia Pacific Other than Japan	Japan	World Total
1990	3,776	509	2,487	2,083	246	325	1,629	843	11,899
1991	3,856	534	2,543	2,025	243	333	1,757	880	12,170
1992	3,886	550	2,553	1,896	272	338	1,882	890	12,266
1993	4,021	582	2,565	1,804	299	346	2,016	900	12,533
1994	4,116	612	2,608	1,672	327	361	2,215	954	12,865
1995	4,234	644	2,684	1,656	341	373	2,397	978	13,307
1996	4,349	671	2,755	1,634	362	390	2,562	1,006	13,729
1997	4,412	715	2,785	1,597	386	408	2,666	1,036	14,004
1998	4,538	745	2,865	1,582	413	412	2,793	1,040	14,389
1999	4,656	771	2,933	1,595	442	420	2,911	1,050	14,776
2000	4,797	808	3,021	1,644	472	433	3,177	1,081	15,432
2000 Share of total	31%	5%	20%	11%	3%	21%	21%	7%	100%

Source: Reliance Review of Energy Markets Statistics (2003)

Table 1.3 :

PER CAPITA ELECTRICITY CONSUMPTION IN WORLD - REGION WISE

(KWH)

Year	North America	Central & South America	West Europe	East Europe & Former USSR	Middle East	Africa	Asia Pacific Other than Japan	Japan	World Total
1990	10,324	1,426	5,446	5,357	1,830	524	580	6,826	2,265
1991	10,411	1,468	5,535	5,189	1,754	524	615	7,097	2,280
1992	10,362	1,488	5,525	4,847	1,908	517	648	7,155	2,263
1993	10,587	1,547	5,520	4,607	2,045	517	684	7,215	2,278
1994	10,704	1,599	5,581	4,270	2,183	526	740	7,628	2,305
1995	10,875	1,656	5,713	4,229	2,223	530	789	7,795	2,351
1996	11,036	1,699	5,835	4,175	2,296	541	831	7,995	2,392
1997	11,060	1,782	5,871	4,085	2,388	552	852	8,207	2,406
1998	11,243	1,892	6,016	4,053	2,493	544	880	8,224	2,439
1999	11,401	1,864	6,135	4,093	2,600	541	905	8,276	2,472
2000	11,618	1,924	6,295	4,229	2,713	545	975	8,502	2,548

Source: Reliance Review of Energy Markets Statistics (2003)

1.3. POWER REFORMS ACROSS INDIAN STATES :

Reforms in electricity sector have been a debatable issue almost from the very beginning of the moves in this direction all over India. There was initially a great deal of apprehension and wide ranging opposition from the employees and the civil society fearing adverse consequences of privatization of this vital sector. Orissa was the first state to initiate and undertake power sector reforms in mid- 1990s. Lead of Orissa was initially followed by Haryana, Karnataka and then AP, Delhi and other states. Almost all states has sooner or later followed on the path of reforms, comprising broadly in structural reform of the state electricity boards, by corporatisation, un-bundling of generation, transmission and distribution functions and tariff reforms. These reforms have been assisted with help of both central legislation as well as state level legislations. Almost all states (and also union territories) have set up state electricity regulatory commissions (SERCs) to look after the functioning of the sector and most importantly to determine tariff related issues. The tariff determination by the SRRCs is expected to take into account efficiency related as well as welfare related issues in a balanced fashion.

1.4. POWER SCENARIO IN ANDHRA PRADESH:

Andhra Pradesh State Electricity Board was formed in April 1959 under the provisions of Electricity (Supply) Act 1948. The Board had been responsible for power generation, transmission, distribution and for the over all development of the Power sector in Andhra Pradesh until the reforms were introduced in power sector in late 1990s.

The APSEB was in a monopoly position in generation, transmission and distribution of power in AP. Till late 1980s, both the thermal and hydroelectric sources were equally important in contributing to electricity generation. The APSEB functioned reasonably well till late 1980s (in terms of installed capacity, as well as plant load factor etc, performance of APSEB was considered good).

The APSEB has always maintained high levels of performance on the generation side. The plant load factor of thermal generating stations was 65.8 percent

in 1990-91. Some of the generating stations like Vijayawada Thermal Power Station was awarded meritorious productivity award for the 17 time in succession during 1999-2000. While the Rayalaseema Thermal Project qualified for incentive award for the third time in succession for operating the plant economically. Kothagudem Thermal Power Station -V also won the meritorious productivity award twice and gold medal for the first time during 1999-2000.

However, there was a serious deterioration in operation and financial conditions of the APSEB in 1990s – the problems emerged in the form of deficiencies in per capita electricity consumption, transmission and distribution losses and high degree of power thefts. It may be noted here that power generation in the hydel sector was virtually stagnant and also showing much fluctuations. Further, the power needs at the state level had increased substantially and hence there was need for substantial investments. Second, the cost of transportation of coal began to increase. Third, there was significant increase in the consumption of power by subsidized categories, particularly agriculture and lower slab domestic categories. Fourth, there was shift in industrial consumption from grid to captive power. Finally in the 1990-2000 decade, the annual revision of power tariff did not take place.

Indeed, the APSEB losses appeared astounding, over the years. For instance, the losses of the APSEB rose from Rs.434 million in financial years 1980-81 to Rs.11343.9 millions in 1997-98. By 1997, besides incurring huge revenue deficits, APSEB due to persistent problem of cash flows was saddled with outstanding liabilities of over Rs.2500 crores by March 1999. The daunting problems emanating from outstanding liabilities had made it difficult for the APSEB to mobilize resources required to bring in capacity additions in generation, transmission and distribution commensurate with the rising demand for power producers. (See Sankar T. L., 2000).

Briefly, owing to the huge revenue deficits, outstanding liabilities, lack of internal resources as well as investments from national and international investors to meet fresh requirements the power sector was in critical physical and financial situation. The APSEB policy of covering inefficiency/losses

through hydel power and high industrial tariff had no sound basis. Also, being a vertically integrated organization, functional priorities were getting distorted under the conditions of resource scarcity. APSEB was unable to invest adequately in rationalization and modernization of its ever expanding and vast transmission and distribution network. It failed to take up modernization of the most profitable hydel units. A number of factors including power cut to HT industries, peak load restrictions, unmetered flat rate supply to agricultural consumers and unmetered agricultural tariff had merely compounded the difficulties managing of the APSEB,

With the objective to overcome these problems the power sector reforms were considered essential, and consequently, the Government of Andhra Pradesh, in February 1997, formulated its policy objectives about reforms in the power sector as follows:

- Providing operational, managerial and functional autonomy to APSEB/other successor utilities to enable it/them to operate along commercial lines.
- Separating the policy and regulatory functions from the management functions of the power sector.
- The establishment of a regulatory framework under Andhra Pradesh Electricity Regulatory Commission (APERC) to enable rational tariff formulation that would ensure cost optimization by securing operational efficiencies, in generation, transmission and distribution of energy.
- Limiting the government role to policy making and withdrawing regulatory functions from the purview of the government.
- Promoting increased participation of the private sector in power industry,
- Removing dependence of the power sector on government.

(See APSEB 1997)

After initiating the reform process, the AP Electricity Reform Act 1998 (Act. No 30 of 1998) was passed which came into force from 1st February 1999.

The Main Features of the Act:

- It created independent regulatory commission to be named AP Electricity Regulatory Commission.
- It inaugurated the process of reorganization of AP Electricity Supply Industry on functional lines involving separate corporations for transmission and generation. Thus, the A.P.S.E.B. has been restructured into two independent corporations and were registered 1956 on December 29, 1998 as APTRANSCO & APGENCO and have come into being on 1st February, 1999.
- It defined the spheres and the respective roles of different players in the power sector.
- Distributor companies were formed on 01-04-2000, to be licenses shortly.

Thus, with the 1998 Act and the establishment of APERC as well formal trifurcating of the Electricity industry the process of reform on restricting of the power sector was set on the rails. This entire process was done by consultative and participatory mechanisms that merit consideration.

1.5. JUSTIFICATION FOR THE STUDY:

The investments needed to meet the demand for power in Andhra Pradesh during the pre-reform period were huge. It is estimated that during 1999-2008 about Rs.6,50,862 crores would have been required to either augment or rehabilitate generation, transmission and distribution system. The state sector alone was seen to be in no position to mobilize resources at this scale – especially in the light of deteriorating condition of APSEB. Hence the case for reforms and restructuring of power sector in Andhra Pradesh had been strongly put forward.

With the reforms in power sector in Andhra Pradesh brought in 1999, there have been significant changes in the power sector in Andhra Pradesh. These changes can have far reaching consequences not only in the functioning of this

vital sector, but also for development of all sectors of the economy as well. As the state economy integrates more and more with the rest of the world, the need for quality power is felt even more acutely. Hence, it in important to undertake a study to examine the impact of reforms on the state economy and examine whether the major goals of reforms are being achieved.

1.6. OBJECTIVES , HYPOTHESES AND METHODOLOGY:

***The specific objectives of this study are*:**

1. To examine the changes in organizational structure before and after reform period and its impact on the functioning of the sector. Also to study the methods of Regulatory Commission is fixing the tariffs.
2. To examine the technical efficiency of power sector in Andhra Pradesh.
3. To examine the financial efficiency of power sector in Andhra Pradesh.

Hypothesis:

Keeping the objectives of the study in mind the following hypotheses are set for examination, which are examined on the basis of an analysis of compound growth rates, in total installed capacity, total power generation, transmission, distribution, number of agricultural connections, plant load factor, losses, high-tension consumers, number of low-tension consumers, expenditure and revenue.

The following hypotheses are examined

In chapter four

H_1 = Reforms in power sector, benefited the consumers.

H_2 = Decentralization helped better performance of the power sector.

H_3 = The decentralized organization structure improved the functioning of the sector.

H_4 = Changes in the organization structure helped in improving financial efficiency.

In fifth chapter

H_5 = Changes in the organizational structure have helped in improving technical efficiency.

H_6 = The rural electrification has improved in the post reform period.

In sixth chapter

H_7 = The financial efficiency has improved in the post reform period compared to pre reform period.

H_8 = Because of the reforms the financial condition of the Andhra Pradesh power sector has improved.

Methodology:

For achieving the above objectives, data was collected mainly from secondary sources. This data is collected from annual administration reports of A.P.S.E.B, Power Development Report in Andhra Pradesh, various publications of Government of Andhra Pradesh, and websites of A. P. Transco Ltd. Wherever necessary information was collected through interviews with officials of various departments. The data collected was analyzed by using appropriate statistical techniques including growth rates; trends wherever necessary, line, pie and bar diagrams are used to present the data.

To study the impact of reform, the period of study is divided into two parts namely pre-reform period (1991-92 to 1998-99) and reform period (1999-2000 to 2005-2006).

1.7. PLAN OF THE CHAPTERIZATION :

The present study has been divided into seven chapters. The present chapter contains a general introduction to the problem of the study and the issues concerned. The second chapter analyzes the characteristic features of the power sector reforms in

Andhra Pradesh. The third chapter deals with review of literature related to this topic to enable us to focus on the main issues The fourth chapter is devoted to a study of organizational structure in APGenco, APTransco and APDiscoms and to analyze their functioning. It also examines the methods adopted by regulatory commission for fixing tariffs. The fifth chapter examines issues relating to technical efficiency and its progress in Andhra Pradesh Power Sector. The sixth chapter studies the problem of financial efficiency and its characteristics for power sector in Andhra Pradesh. Finally, the seventh chapter provides summary and conclusions of the present study with some policy recommendations.

CHAPTER – 2

POWER SECTOR REFORMS IN ANDHRA PRADESH

CHAPTER - 02

POWER SECTOR REFORMS IN ANDHRA PRADESH

2.1. INTRODUCTION :

Andhra Pradesh is one of the largest states in India with a population of over 77 millions and a geographical area of over 275 thousand sq.kms. It is rich with minerals and other natural resources including natural gas. Three major rivers Krishna, Godavari and Pennar flow across the state. The development of infrastructure is an important factor to sustain overall economic growth. Production of power is an important constituent of infrastructure in a rapidly growing economy. The state's power sector is the third largest in the country. The state of Andhra Pradesh implemented reforms in power sector with the financial assistance and guidance from I.M.F and World Bank. At present, power is generated in Andhra Pradesh by 20 power stations. Out of them 5 are thermal stations located at Vijayawada, Rayalaseema, Kothagudem, (Kothagudem TV stage.), Ramagundam, and Nellore; 12 are hydel stations located in Muchkund, Tungabadhra, Nagarjuna Sagar, Pennur Ahobilam, Singur; 2 are mini hydel and one wind power station, APGENCO's contribution to A.P. power system energy demand is 51.7 %. The rest of the demand has to be met from the private sector, central sector and purchase of electricity from other states.

Economic liberalization from early 1990's has made it necessary for industry to be competitive by reducing cost. The quality and cost of power is an important factor for industries to be competitive and also for the welfare of the citizen, the ultimate consumers in the country. The single most significant event that the power sector witnessed was the passage of the Electricity Regulatory Act in July, 1998 by the Parliament for the establishment of Central Electricity Regulatory Commission (CERC) and for providing an option to the state governments to set up their State Electricity Regulatory Commissions (SERCs) to reform the electricity sector. Apart from this, it

was required to have a composite strategic approach to bring radical changes in the performance of the power sector. This can take the form of internal as well as external corrective measures including corporatization, privatization and others.

Substantial developments have taken place in power generation in India, stepping it up since independence from 1710 MW to 105000MW. However, on the flip side, the energy shortage of about 12 % and peak shortage of about 20 % continue to plague our economy. A study by Merrill Lynch further reveals that as against a national plant load factor (PLF) average of 63 %, State Electricity Boards (SEBs) have recorded Plant Load Factor of only 58 % along with high transmission and distribution (T&D) losses amounting to almost 23 %. Any amount of power generated in power stations is of little significance if a reliable and efficient system is not available to deliver the electricity to the consumer.

In late 1980's and early 1990's the most significant reason for economic slow down is that the growth of infrastructure has not kept pace with the economic growth. Instead of providing a fillip, it has become the greatest bottleneck.

2.2. NEED FOR REFORMS IN POWER SECTOR :

The government of India fealty that the solution to the problems mentioned above lies in economic reforms. The main objective of reform in power sector is to promote the development of an efficient, commercially viable and competitive power sector.

A study by Merrill Lynch, based primarily on responses from the industry representation suggests that the competitively priced and good quality power was essential for being globally competitive. It was suggested that the SEB monopoly needs to be broken and competition introduced to improve service levels. A majority of responses indicated that unbundling and subsequent privatization of SEB was essential and should be expedited. It was also suggested that tariff rationalization and transparent subsidy allocation was of utmost importance. Responses from other consumer

organizations, individuals and NGOs broadly indicated that there is a need for reforms and improvement of consumer service standards.

The different alternative options for reforms which were suggested are broadly summarized as follows :

- An SEB to retain its existing identity. The three functions of SEBs viz. generation, transmission and distribution to be run as profit centers.
- Corporatization of SEBs without unbundling.
- Unbundling and corporatization of unbundled entities of SEBs.
- Unbundling, corporatization of unbundled entities of SEBs followed by privatization of distributing entity(s).

For achieving the above objectives, several steps have been undertaken. The Central Electricity Regulatory Commission (CERC) is in place at the national level. It is expected to help growth in the power sector by rationalizing tariffs, formulating clear policies on subsidy and promoting environmentally benign policies. While this is a major development, state governments are also expected to get their act together. It has been suggested that they must replicate the central initiative by setting up State Electricity Regulatory Commissions (SERCs); corporatizing and unbundling SEBs and creating a conducive climate of assured return for private investors, apart from clearing off the massive Rs.17,800 crore dues to central power companies, as a first step to improve financial health, create confidence among the industry, agriculture and general pubic which will, in turn, create credibility among private participants and accelerate the process of privatization. This would it is suggested, lead to a rapid expansion of the power supply at affordable prices to the consumers.

Furthermore, power utilities have to stop being vertically integrated monopolies and need to separate generation from transmission and distribution so that they can rationalize their management. The state of Orissa was the first state to ahead with the unbundling process, others such as Haryana and Andhra Pradesh followed soon after.

States such as Punjab, Maharashtra, Rajasthan, Uttar Pradesh, West Bengal, and Gujarat have also started reforms in power sector.

2.3. INTERNAL REFORM :

2.3.1. ELEMENTS OF REFORM :

The reform process should comprise internal reform, an independent regulatory frame work and structural changes. The key elements of internal reform are developing human resources, reducing transmission and distribution losses, instituting anti-theft measures, carrying out and setting up consumer grievance redressal system.

a) LOSS REDUCTION :

The target for loss reduction was set to 1 % per year for the technical losses and 3 % per year for commercial losses in urban areas and 0.5 % and 2 % repetitively in rural areas. The overall collection efficiency was excepted to be increased to 94 % in two years (Ref. mseb.org).

b) ANTI-THEFT MEASURES :

Over the years, theft of energy in the states has been highly threatening the very viability of the power sector. Theft of power should become a cognizable offence and necessary legislation for this should be enacted soon.

c) ENERGY AUDIT AND METERING :

Energy audits should be carried out to identify areas where there is maximum opportunity to reduce losses and thereby collect more revenue. The monthly energy accounting data detailing the energy input, billed sales and Transmission and Distribution losses to be publicly displayed. Wherever feasible, computerized systems are to replace non-computerized systems.

d) DEMAND SIDE MANAGEMENT :

The reforms process also focuses on demand side management with the objective of improving efficiency in end-use of electricity. Focus on demand side management will reduce the need for additional generation capacity.

e) CONSUMER GRIEVANCE REDRESSAL SYSTEM :

The critical objective of reform is to improve the quality of service. SEB's will have to further strengthen the existing systems to address consumer complaints. A consumer Charter of Rights has to be developed to focus on the needs of consumers.

f) INDEPENDENT REGULATORY FRAME WORK :

Some state governments have already set up the electricity regulatory commissions (ERC's) under the provisions of the Electricity Regulatory Commission Act, 1998. The state governments should be committed to take all steps necessary to facilitate and ensure that ERCs function smoothly in an independent manner.

g) TARIFF RATIONALIZATION :

ERC should broadly be guided by the following principles while determining tariffs Tariffs should progressively reflect the cost of supply. Consumer's interests should be safeguarded while reducing the cross-subsidies. Competition, efficiency and economical use of resources should be encouraged.

2.3.2. EXTERNAL REFORMS :

a). STRUCTURAL CHANGES :

In order to meet the objectives of power sector reforms, SEB's operations would need to undergo a structural change. It is evident that SEB's are currently very large

organizations, which prevent them from functioning efficiently. A vertically integrated SEB catering to the diverse needs of a customer base which is growing every year has some inherent limitations. Organization of the electricity industry into vertically integrated monopolies is no longer necessary in view of technological advances and a reduction in economies of scale.

For the power sector to be brought on the road to recovery it is necessary for various segments in the power business to be run by smaller, more manageable and commercially oriented smaller entities which would lead to closer supervision and greater efficiency. This would also lead to better customer service. In addition, unbundling is required to make the sector more amenable to competition.

b). POWER GENERATION :

The newly formed generating company(s) should initially be under State Government ownership. The splitting up of SEB plants into separate generating companies would enable competition to be introduced into the sector. Government may, at a later stage invite private sector participation in these companies after the successful privatization of distribution has been completed.

c). POWER TRANSMISSION :

The transmission business of SEB should be transferred to a separate transmission company and state governments will wholly own the transmission companies. The transmission company should be responsible for transmitting power from the generating company(s) and other sources of generation available to the State, for further supply to the distribution companies.

d). POWER DISTRIBUTION :

Since the distribution end of the business deals directly with the consumers and is responsible for collection, reform in distribution is vital if the power sector is to ultimately become self-sustaining. The distribution companies could initially be owned by the state governments and privatized in a phased manner. The distribution companies would enter into direct agreements with the generating company(s) for the purchase of power. Emphasis should also be given on electrifying rural areas.

2.4. GOALS OF THE REFORMS :

The Government of Andhra Pradesh arrived at the decision to restructure the power sector with the sole objective of creating conditions for the sustainable development of power sector through promotion of competition, efficiency, and transparency, attracting private finance and improving the efficiency and quality of the electricity services in the State.

The main objectives of reforms process are stated to be:

- To supply power to consumers under the most efficient conditions in terms of cost and quality, leading to the economic development of the state.

- To ensure that power sector generates profits.

Accordingly, the government of Andhra Pradesh appointed a High Level Committee on power in January 1995 headed by Sri. Hiten Bhaya a former member of Planning Commission, to study and recommend measures of reorganization of power sector in Andhra Pradesh so as to attract adequate resources to augment the generation, transmission and distribution networks and thus provide quality and reliable power supply to the consumer at a reasonable rate.

The Committee in its report stated that the existing vertically integrated APSEB (consisting of the three wings viz. Generation, transmission and distribution) is facing resources crunch, and suggested unbundling of the existing setup and creation of commercially viable and separate autonomous corporations for generation, transmission and distribution. The committee further suggested the creation of an autonomous Statutory Electricity Regulatory Commission to oversee and set standards of performance for the utilities and to rationalize the tariff structure.

2.5. OVERVIEW OF POWER SECTOR REFORMS IN ANDHRA PRADESH :

Andhra Pradesh State Electricity Board (APSEB) was formed in April 1959 under the provisions of the now repealed Electricity (Supply) Act 1948. The Board had been responsible for power generation, transmission, distribution and the overall development of power sector in the state. The state has the third highest installed generating capacity in the country. APSEB's generating stations had operated at high levels of efficiency and ranged among the best-run power stations in the country.

The APSEB had maintained high levels of performance on the generation side and some of the generating stations had won awards for excellence in their performance. For example Vijayawada Thermal Power Station were awarded meritorious productivity award for the 17^{th} time in succession during 1999-2000, while the Rayalaseema Thermal Project qualified for incentive award for three times in succession for operating the plant economically. Kothagudem Thermal Power Station-V also won the meritorious productivity award twice and gold medal for the first time during 1999-2000.

Though APSEB could fulfill the objective of its formation to a large extent, the demand for electric power out-stripped the capacity and shortages in energy at peak demand have occurred, resulting in imposing of restrictions on power supply to HT/LT consumers, load shedding (scheduled and unscheduled), roistering of agricultural feeders to ensure a minimum supply of 9 hrs/day etc. The shortages resulted in poor voltage profile and low frequencies. In spite of technological advancements as the system got

overloaded the technical and commercial losses increased due to various techno socio-economic factors. Thus, as the losses - technical as well as financial - went up, the credit-worthiness of the Board declined. Inadequate resources stood in the way of upgradation and strengthening the power system to supply power satisfactorily to the end consumers. Further, new capacity additions/infrastructure development got bogged down due to lack of investment.

Andhra Pradesh State Electricity Board was bifurcated and restructured as Andhra Pradesh Power Generation Corporation (APGENCO) to look after generation and Andhra Pradesh Power Transmission Corporation (APTRANSCO) to look after transmission and distribution and sale of electricity in the state of Andhra Pradesh from 01-02-1999.

As per the first phase of reforms APTRANSCO is to look after transmission and distribution and sale of electricity in the State of Andhra Pradesh. The second statutory transfer scheme was notified on March 31, 2000 by Government of Andhra Pradesh as a part of second phase of reforms separating the transmission and bulk supply business from the distribution and retail supply business by creation of separate undertakings for distribution and retail supply business.

APTRANSCO retained the business of transmission and bulk supply while four distribution companies (DISCOMS) were constituted to under take distribution and retail supply business. For this purpose, the state of Andhra Pradesh was carved into four geographically contiguous distribution zones (East, South, Central and North) and the distribution and retail business was segregated and vested respectively in four distribution companies.

- Eastern Power Distribution Company of Andhra Pradesh Limited with head quarters at Visakhapatnam (APEPDCL)
- Central Power Distribution Company of Andhra Pradesh Limited With Head quarters at Hyderabad (APCPDCL)

- Northern Power Distribution Company of Andhra Pradesh Limited with head quarters at Warangal (APNPDCL)
- Southern Power Distribution Company of Andhra Pradesh Limited with head quarters at Tirupati (APSPDCL)

2.6. THE REFORM PROCESS :

The reforms process broadly consists of the following phases.

a). INFORMATION DISSEMINATION:

Reforms of the power sector in any country presents particular challenges because a number of groups are affected. The first step by the Andhra Pradesh government was to appoint a high level committee in 1996 that included two former chairmen of the APSEB. This report was generally considered impartial and professional and was made public in 1996. The APSEB began circulating bulletins in English and the local language, Telugu, about the urgent problems in the power sector and the need to address them quickly. The bulletins highlighted the growing gap between supply and demand, the increasing price of generating power and the rising deficits. Later bulletins discussed the issues of metering and billing, explaining commercial losses and theft of energy. An inexpensive pocket-size publication explaining the key issues in the power sector and the case for reforms was circulated all over the State, reflecting the government's commitment to disseminate information on a massive state-wide scale.

Given the low literacy rates, particularly in rural areas, additional steps were necessary to inform key audiences and to obtain their active participation. Several films were produced and aired on the cable network throughout the state. In the film, a variety of participants from diverse social and professional backgrounds participated in the discussion and explored the merits of reforms.

The government issued "White Papers" on the State's finances and the financial conditions of the APSEB. These were debated in the State legislative assembly. A discussion of the power sector figured prominently in episodes of the "Dial your C.M.", a weekly televised program launched by the then Chief Minister's office.

b). BUILDING SUPPORT AMONG ELECTRICITY BOARD EMPLOYEES:

It was a clear priority to gain support for reform within the monolith of APSEB and its 53,000 employees. The Chief Minister appointed a three-member cabinet sub-committee, including the finance minister and energy secretary to identify concerns and build support. Top-level management of APSEB accepted that reforms offered the only hope of restoring financial viability. But the rank and file as well as mid-level engineers and professionals had strong concerns about the impact of reforms on job security and conditions of employment even though in this case, overstaffing at the aggregate level was not seen to be an issue. The government offered assurances to workers and entered into negotiations over revised terms and conditions. After sustained efforts, the government was able to rally some 90 percent of the employees to its side. In late 1997, all except one of the unions representing APSEB employees signed new agreements defining terms and conditions of service protection of jobs and retrenchment due to restructuring.

c). STATE GOVERNMENT'S POLICY STATEMENT :

After receiving the recommendation of the high-level commission, the government issued its policy statement in February 1997, which outlined the proposed reforms.

The government in its policy highlighted the need for unbundling the existing set up and accepted the suggestion of the High Level Committee for creation of a statutory Electricity Regulatory Commission. The general policy statement was elaborated and

updated by the government of Andhra Pradesh in a detailed policy statement issued in October 1998.

d). REFORMS SETUP IN ANDHRA PRADESH :

For the successful implementation of reforms programme, the government of Andhra Pradesh created a steering committee headed by the Chief Secretary. It included officials of the government and some experts in energy sector. A task force headed by the Principal Secretary (Energy) Government of Andhra Pradesh, was created to interact and ensure close monitoring of the reforms process. Further, a reforms project management group headed by Chief Engineer and consisting of a group of officers of different disciplines of the Board was created in June 1997 to effectively plan and implement the reform and restructuring programme in the power sector. Ten working groups were set up in the first phase of reforms to assist in related functions such as planning and investment, legal and regulatory frame work, distribution companies, tariffs, HRD, financial restructuring, commercialization and asset identification and valuation. Keeping in view the importance of the financial restructuring, working group on financial restructuring was headed by the then Member (Finance) of the Board. The reform process was envisaged as a two phase process.

e). PHASE – 1 OF REFORMS PROCESS :

The first phase concentrated mainly on

1. Unbundling of APSEB in to APGENCO and APTRANSCO and tentative transfer of personnel and assets to the companies.
2. Creation of autonomous APERC
3. Formulation of investment plan.
4. Preparing a financial restructuring plan for the power sector
5. Forming reconstruction plan for organizing the distribution system into a number of viable entities.

In the first phase ICICI, SNC-LAVLIN, PWC were enlisted as consultants with financial help from international funding agencies such as the World Bank, IDA, and DFID.

The government of Andhra Pradesh approached the World Bank for extending financial support to the proposed reforms and restructuring programme of Andhra Pradesh power sector The World Bank committed to extend assistance to the tune of 1000 million US dollars through adaptable programme of lending, through a series of 5 loans under Andhra Pradesh Power Sector Restructuring Project.

The state government invested assets and liabilities in APTRANSCO and APGENCO by a provisional transfer scheme valid for a period of one year from 1-2-1999. Transfer scheme of personnel consistent with tripariate agreement entered into between government of Andhra Pradesh, APSEB and employees Unions/Associations was also issued with effect from 1-2-1999.

f). PHASE – II OF REFORMS PROCESS:

In the second phase of reforms, the main focus was to be on activities connected with separation of the distribution function from transmission. The distribution system was to be divided into a number of viable, geographically separate distribution companies. It was also envisaged to induct private participation by forming joint venture distribution companies.

The government of Andhra Pradesh has committed in its letter of January 1999 to World Bank, to provide such support of about Rs.6,190/- crores to the new entities till they achieve a turn around and become net generators of resources. The second statutory transfer scheme was notified on March 31st 2000 by government of Andhra Pradesh as a part of second phase of reforms separating the transmission and bulk supply business from the distribution and retail supply business by creation of separate undertakings for distribution and retail supply business.

2.7. THE ELECTRICITY ACT 2003 AND SUBSEQUENT INIATIVES :

The Electricity Act 2003 replaced the then existing Electricity Acts, and it came into force on 10-06-2003. The Electricity Act 2003, has several liberalized provisions such as the following to stimulate investors interest in a joint venture with distribution companies :

- Open access in transmission immediately and in distribution in a tie frame to be decided by commission.
- Grant of license to two or more persons in the same area.
- Provision of local distribution in rural areas through panchayats, co-operatives, user associations, NGOs or franchises.
- Liberal definition and expansion of scope for captive generation.
- Consolidate the laws relating to generation, transmission, distribution, trade and use of electricity.
- Take measures conducive to development of electricity industry.
- Promote competition.
- Promote the interests of consumers.
- Supply electricity to all areas
- Rationalize electricity tariff.
- Erase transparent policies regarding subsidies.

In order to achieve the above objectives the Electricity Act has introduced several innovative concepts including a new concept called “Open Access”.

Table :2.1 Salient futures of the Electricity Act – 2003.

S.No.	Category	Key Factor
1	Objectives	Encouraging autonomous regulation with separation of policy regulation and operational aspects. Rationalizing tariff and lowering the cross subsidization levels, creating competition in the industry, ensuring supply of electricity to all areas and protecting consumer interests.
2	Policy	A national electricity plan shall be prepared in accordance with National Electricity Policy every 5 years, National policy on stand alone systems for rural areas and non-conventional energy systems and National policy on electrification and local distribution in rural areas.
3	Restructuring	State governments will have the freedom to decide the sequence and phases of restructuring and also retain the integrated structure of the SEB for a limited period. Introduction of the concept of power trading as a distinct activity and the introduction of the spot market for bulk electricity.
4	Generating	Generators can contract directly with Distribution Companies (DISCOMs). DISCOMs can have embedded generation. Captive generation allowed freely can supply to associates. Elimination of licensing requirement and techno-economic clearances for generation projects except hydel projects.

5	Transmission And Distribution	Provision for private participation in distribution surcharge for open access to meet current cross subsidy burden (except for Captive Power Producers (CPP's). Dedicated transmission lines allowed (not regulated). Central and State Transmission Utilities (CTU and STUs) not permitted to trade transmission licensees allowed, Multi Year Tariff (MYT) recommended bidding, allowed provision of non-discriminatory open access Mandatory open access in distribution is to be introduced in phases. SERCs to frame regulations within 1 year regarding phasing-in of open access, open access only when allowed by regulator, fixed charges for third party sales for service obligation of incumbent non-exclusive licensing. Parallel networks explicitly allowed. Mandatory metering within 2 years (extendable by GoI)
6	Regulation	Gradual (progressive) reduction, ultimate elimination of cross-subsidization. The formation of state Electricity Regulatory Commission (SERC) in every state to be mandatory.
7	Legislation	Provision for appropriate legislation to check power theft, provision of Appellate Tribunal.
8	Consumer Protection	Consumer protection against failure to meet the standards of performance mechanism for redressal of consumer grievances.

Source : S. Mallikarjuna Rao, Managent of Power Sector for Sistainable Development, Himalaya Publications, 2006.

2.8. OPPORTUNITIES :

The Electricity Act 2003 sees the open access provision as the most important instrument to transform the monolithic electricity utility structure existing now, into a competitive sector. One can immediately identify the following opportunities of Open Access provision :

- SEBs would be relieved of the need to meet industrial load growth requirements.
- There would be more capacity additions.
- Consumer migrations from the SEBs would free their capacity to meet their own captive load growth.
- Idle capacities of captive power units would be utilized well.
- There would be lot of competitive pressure on the SEBs to improve their service and to reduce their tariff rates.

2.9. TECHNICAL INITIATIVES :

Technical initiatives undertaken include :

- Aggressive thermo vision scanning lines and substations for condition pre-motioning.
- Regular preventative maintenance of lines and substations – hot line Maintenance.
- Ushering of 400 KV era.
- State of art technologies adopted by introducing SLICON rubber insulators for high populated areas
- Adoption of optical fiber communication and Vsat communication.
- Numerical relays for control.
- Established unified load dispatch centre for efficient system operation. Following merit order dispatch and ABT.

- Conducting regular load flow studies and fault analysis.
- Scientific approach for preparation of estimates and procurements for works and equipment.
- Optimization of construction costs.
- Avoidance of time and cost overruns by close monitoring and supervision.

2.10. PERFORMANCE MONITORING INITIATIVES :

Performance monitoring initiatives as part of reforms are as under :

- Key performance indicators concept introduced in APTRANSCO.
- Power purchase cost with respect to regulatory targets.
- Power procurement volume with respect to targets.
- Revenue from DISCOMs.
- Availability factor (zone wise/circle wise) of transmission line.
- Transmission loss on critical lines (zone wise/circle wise).
- Physical and financial progress of network expansion and R & M Zone wise/Circle wise.
- Introduction of grading system for individuals at various levels and introduction of reward system for units like substations, stores, gird operations etc.

2.11. KEY PERFORMANCE INDICATORS IN DISTRIBUTION COMPANIES :

Several key performance indicators have been fixed for evaluating the technical, commercial and financial performance of the distribution companies like :

- Energy draw as w.r.t ARR targets.
- Metered sales w.r.t ARR targets.
- Loss reduction.
- Revenue demand w.r.t input.

- Revenue collections w.r.t demand.
- Customer service presently limited to DTR failure rate.
- Targets drilled down to section level.
- Introduction of grading system for individuals at various levels and introduction of reward system for locations/ offices like substation, stores MRT etc.

2.12. COMPREHENSIVE SUPPORT PROVIDED BY GOVERNMENT OF ANDHRA PRADESH:

Some of the initiatives of Government of Andhra Pradesh for reforming and structuring the power sector in Andhra Pradesh are:

- Policy initiatives on unbundling the sector and issuance of Transfer Schemes for assets and employees.
- Employee buy-in of reforms through the Tripartite Agreements facilitated by the GoAP (Government of Andhra Pradesh is a signatory).
- Policy of competitive bidding for generation introduced in 1995.
- Enabling environment for capacity additions through back up guarantee to IPPs.
- Back up guarantee to various loans from multilateral/bilateral agencies & Transmission and Distribution infrastructure.

    - Approval of Financial Restructuring Plan and sector Business plan and support.
    - Enactment of stringent anti-theft law in Andhra Pradesh.
    - Prompt and timely payment of revenue subsidy.

- Interim cash support to the utilities to meet financial adversities arising from external and uncontrollable business conditions.

2.13. INITIATIVES BY THE REGULATORY COMMISSION FOR SECTOR IMPROVEMENT :

a). GENERATION :

- Approval of new PPAs through stringent operational and tariff norms.
- Directive on adherence to merit order dispatch.

b). TRANSMISSION :

- Stringent transmission loss reduction target.
- Directive on implementation of boundary metering scheme.

2.14. CONCLUSION:

The journey of the power sector in Andhra Pradesh in the past more than six years was tough and encountered four years of continued drought in the state and consequent hydro generation failure.

The Government of Andhra Pradesh was forced to bring about dynamic changes in its policy statement in 1997. A.P.S.E.B. was made into two corporations (a). A.P. Genco and (b). A. P. Transco in the first phase of reforms. In the second phase of reforms A.P. Transco retained the business of transmission and bulk supply and four distribution companies (APEPDCL, APCPDCL, APNPDCL, and APSPDCL) were constituted to undertake distribution and retail supply business.

After the state Government undertook the reforms national and international funding agencies came forward to help finance the power sector reforms in the state. With regard to installed capacity, the average annual growth rate during 1995 to 1999 was 4.7 percent and it climbed to 9.06 percent during 1999 to 2003. Similarly the average annual growth rate of high tension consumers went up from 1.9 percent to 6.5

percent. Also the average annual growth rate of low tension consumers went from 5.6 percent to 8.9 percent. However, the average annual growth rate of total power generation marginally declined from 6.9 percent to 5.6 percent whereas the average annual growth rate of revenue declined from 20.4 percent to 12.7 percent.

Due to introduction of reforms in power sector private power producers entered the power industry causing an increase in the average annual growth rate of installed capacity during the reform period. Reforms have created the hope in the customers that the power sector can supply power with quality resulting in increase in the average annual growth rate of high tension and low tension consumers during the reform period. On the other hand there is certain delay in the execution of private projects due to different factors including delay in getting different permissions from the government both at the center and state level, resulting in the decrease in the average annual growth rate of power generation during reform period in spite of the high average annual growth rate of installed capacity. Decrease in the average annual growth rate of revenue during the reform period indicated that the government is required to take some steps in the area of revenue collection in the power sector.

The salient features of Power Sector in Andhra Pradesh have been presented in this chapter. This forms the background for the analysis of reforms in the power sector of Andhra Pradesh in the subsequent chapters.

CHAPTER – 3

REVIEW OF LITERATURE

CHAPTER – 3

REVIEW OF LITERATURE

3.1. INTRODUCTION:

Andhra Pradesh is among the many states faced with the problem of rapid industrialization amidst power shortage. A number of studies have been made to examine the power scenario in various states of India and also in other counters. In order to identify the issues for the present study an attempt was made to review the existing literature on power sector economics.

3.2. REVIEW OF LITERATURE FROM DIFFERENENT AUTHOURS:

M. P. Parameswaran (1990) examined the performance of Kerala State Electricity Board (KSEB), and found that till 1983, when the state became energy deficient, Kerala exported electricity to other states. For two decades from 1962 the guiding philosophy of the Kerala State Electricity Board has been 'abundant hydro-power/export of energy/profit'. This deterred the board from thinking about thermal power. Even today the state depends on the hydro-system for its electricity needs. However, realistic hydro-energy estimates fall far short of the projected electricity demand.

Anthone D. Sa, K.V. Narasimha Murthy, Amulya K. N. Reddy (1995) emphasized that the Indian power sector was opened to private participation in 1991 to hasten the increase in generating capacity and to improve the system efficiency as well. However although several plants were under construction till early 1999, generation commenced at private plants totally to the tune of than 2,000 MW. In contrast some state undertaking completed their projects even earlier than scheduled.

They also explained the process of inviting private participation in power sector and the problems experienced which seem to have affected the restructuring of the power sector including the formation of central and state electricity regulation commission. However some important problems have not been addressed. In addition to the generation capacity without corresponding improvement of the transmission and distribution facilities is likely to further undermine system efficiency. They also explained that investment in infrastructure has been a responsibility of state governments because intrinsically long gestation periods coupled with the relatively low rates of return from serving all categories of consumers had rendered such projects commercially unviable. Whether or not private participation can take on such undertaking remained to be seen, according to them.

Partha Pratim (1996) wrote on power sector in India Issues and challenges. They examined the various facilities and placed them in perspective physical and financial achievements in the power sector highlights which are presently engaging attention of policy makers in this sector.

Pradip Baijal (1996) mentions that several countries, both in the west and in the east, developed and underdeveloped, have introduced reforms in the power sector. In all cases, restructuring revolved around the economic and institutional organization of the sector and the advantages of introducing competition to raise the overall efficiency in the power sector including India. The reforms already initiated, at the federal level, have been the enactment of laws which enable setting up of regulatory commissions and state at the levels providing for separation of generation and transmission and distribution activities. The suggest recognize central and state transmission, utilities as government companies allow setting up of private transmission lines within the overall supervision of operation of the government transmission utility and provide for regulation of transmission by the central and state regulators.

Amulya K. N. Reddy, and Sumithra (1997) analyzed Karnataka power sector's present situation and looked at the trend of electricity demand and supply, Karnataka

Electricity Board's financial problems, the important policy and technical milestones in the development of Karnataka power sector and the winners and losers from the pattern of development of power sector and also chart the way forward. They expressed the view that Karnataka power sector uses they the irrigation pump sets package to hide many of its technical and commercial shortcomings, in particular its transmission and distribution losses. They also justified the invitation to private power with all associated benefits including in the case of foreign private power. According to the authors, what are required are not only realistic and small measures on the institutional demand and supply sides for the immediate and near term but also a vision of a sustainable future.

Douglas Woode and Devendra Kodwani (1997) examined the lessons that can be learned from the British privatization programme for India's reforms since the reform of the energy sector is considered key economic objective in India. They felt that there is a necessity of strong political will to design the restructuring programme. They suggested that separating generation from bulk transmission and leaving the task of distribution to regional companies makes accountability for performance of these activities more transparent. They suggested the breaking up of those state electricity boards which were then serving large geographical areas. They also opined that a national grid company is essential to carry bulk power across the states. They also expressed the idea of restructuring and reviving of state electricity boards to make them attractive enough for the investors. They believed that private ownership, competition and constructive regulation create an incentive structure which will result in more consumer satisfaction in the long run. They also suggested the development of autonomous regulatory regimes on the lines of UK system.

Ninth Five Year Plan (1997-2002) suggests that 'the most important cause of the problems being faced in the power sector is the arbitrary and non-remunerative tariff structure. Though the tariff is fixed and realized by SEBs, the State Governments have constantly interfered in tariff setting subsidizing SEBs for the losses arising out of state government desire to provide power at concessional rates to certain sections especially agriculture. Therefore, power supply to agriculture and domestic consumers is heavily

subsided. SEBs through cross subsidization of tariff from commercial and industrial consumers are able to covers only a part of this subsidy. The SEBs in the process, have been incurring heavy losses. If the SEBs were to continue on the same lines, their internal resource generation during the next ten years will be negative, being of the order of Rs. (-) 77000 crores. This raises serious doubts about the ability of the states to contribute their share to capacity addition during the Ninth Plan and thereafter. This highlights the importance of initiating power sector reforms at the earliest and the need for tariff rationalization.

Madhav Godbole (1998) has explained that only the privatization of distribution coupled with the setting up of effective regulatory bodies would provide a long term and lasting solution to the power sector imbroglio. Otherwise this dance of one step forward one step sideways and one step backwards will continue to create an illusion of forward movement. The views that the many unresolved problems faced by private power projects can be traced to the liberalization process having started at the wrong end namely power generating. He opined that it should commence with the restructuring of the state electricity boards. He felt that as in other areas of reform, here too we failed to address the most difficult issues in the hope that some day the difficulties will disappear.

Anthone D'Sa, K. V. N. Murthy and Amulya K. N. Reddy (1999) said that state undertakings have completed their projects of generation earlier than scheduled periods whereas private sector performance on this count is not much impressive. They felt that additions to generation capacities without corresponding improvements in the transmission and distribution systems may decrease the system efficiency. They also find that there are no efforts on the part of the government to reduce the commercial losses. They suggest that there should be greater transparency in decision making, greater public participation and greater spread of information an the issues of power sector liberalization.

Arun Ghosh (1999) felt that the argument about competition enhancing efficiency does not apply to the electricity industry. Its advocacy has been motivated. He

also felt that the policy of separating generation, transmission and distribution of power is not justified and there are strong technical reasons for keeping generation, transmission and distribution under one authority. He opined that the need of the hour is not bifurcation of the board in Andhra Pradesh, but a minor adjustment of tariff rates for agriculture and domestic consumers. He felt that the private sector is interested in acquiring existing low valued assets of state electricity board with a view to make large capital gains. In any case, the private sector would look for profitability rates comparable to what it can earn elsewhere which would be entirely inappropriate for infrastructural facilities. He felt that the new approach is disastrous for the entire range of rural consumers. According to him properly targeting of input subsidy of electricity is good for economy.

Sebastian Morris (2000) expressed that true reform and restructuring of any state electricity board in India would have to address the issue of an enormous leakage of revenue from the system. This would call for privatization of distribution, and change in the institutional mechanism, for the administration of the subsidy. Rather than the detailed regulatory mechanisms, which are being pushed by the central government and the regulators, light and price-cap type regulation would suit India better. A model plan for change is put forward for the Gujarat State Electricity Board, which is quite general and could easily apply to other SEBs. A complete separation of distribution from generation is neither necessary nor desirable, existing IPP contracts would have to be extinguished and methods to carry out the same are suggested. The danger of mounting regulatory risk, either shutting out private power production, or resulting in massive tariff increases is real.

T. L. Sankar, Usha Ramachandra (2000) wrote on electricity tariffs regulators. They examined that the Orissa Electricity Regulatory Commission. Taking the word regulator strictly they consider development of the power sector beyond its scope. They explained the principles of retail tariff fixation and critically examined the performance of the Orissa Electricity Regulatory Commission.

S. L. Rao (2000) wrote on electricity reform and regulation. He explained that independent regulations are new in India. Public opinion has to recognize its value. It will do so when it sees results in terms of improved quality, availability and in due course, reduced tariffs. Ultimately the independence of regulators can only be guaranteed by strong public opinion. While legislation will help, it is important that financial and human resources for regulatory commissions are kept out of the scope of government approval.

India Infrastructure Report (2000) makes it clear that at the root of chronic inability of SEBs to raise required investment is the uneconomic pricing of electricity. Absence of cost based economic principles in consumer category wise tariff design, uneconomic level of cross subsidies, reliance on historical rather than marginal costs and inability to cover the costs incurred are the main weaknesses in the tariff policy.

Prayas Energy Group (2000) states that, for several reasons, development of power sector in Maharastra till then was are much different from many other reforming states, Unions, financial impacts as well as strong public opinion against the Enron Project forced MSEB/GOM to look for ways of avoiding this liability. Only legal and techno-economic innovations as well as strong political will would succeed in relieving people of Maharashtra (and of other states too) from the unwarranted and high cost Enron Power. The Enron experience has also resulted in rethinking about other IPPs in the states though a couple of attempts were made by the GOM in the previous two to three years. The privatization and unbundling have remained on paper. This was due to several factors such as the large and unbearable burden of Enron PPA, strong opposition by unions and some public groups and relatively better financial situation of MSEB. The regulatory process in the state is also much different when compared to other states due to strong public intervention. The MERC had to handle several important cases such as amendments to PPA, subsidy by Govt, tariff revision and merit order dispatch. The regulatory process in the state has resulted in the substantial improvement in the transparency and public participation, but at the same time, several further actions are needed to ensure that the process becomes sustainable and effective in protecting and promoting public interest in the long term. One of the major fallouts of the Enron

Controversy has been lack of concerted efforts to improve the performances of MSEB. The measures have started yielding some results in term of reduction in errors and better estimation of theft and identification of high theft areas. The success of these efforts depended on co-operation of MSEB workers and engineers and strong public pressure to ensure the top management of MSEB is given free hand to deal sternly with erring staff and consumers alike and is made accountable for performance of MSEB.

M. Thimma Reddy (2000) expressed opinion that at present for all ills of the power sector, the same set of reforms is imposed on several other states. In other words a uniform system in being imposed on all states. There is no attempt to examine specific experiences of different states and tailor the changes needed according to the requirements of the particular state. The problems faced by the electricity establishment in Andhra Pradesh are not the same as that of Orissa. And yet one can see that not only the electricity reforms act passed in AP is a carbon copy of the Orissa Act, even the regulations formulated by the APERC are only a copy of the OERC.

In AP no other alternatives are explored to solve the problem facing APSEB. Even the recommendations made by Hiten Bhaya Committee were brushed aside to impose the World Bank recommendations. While taking up these reforms stake holders were not consulted. Until the recent tariff hike, public was not aware of the changes taking place in the power sector. There is neither participation nor transparency let alone accountability in the whole exercise.

The ongoing changes in the power sector demand two things: one is to comprehend process and its implications and another is to enable citizens to interact with the Regulatory Commission and participate in its proceedings effectively as this exercise is new to the people in their state.

Sudha Mahalingam (2000) expressed the view that the choice of Orissa for a pioneering electricity reform experiment seemed logical as state with low literacy rate low income levels and more importantly negligible consumption by agricultural sector

(1ess than) and hence lacking in a constituency which would effectively resist a drastic overhaul. Nevertheless for the World Bank, which wrote the reform script, the choice of Orissa came about more by accident than design. Around the mid-90's the Bank-funded upper Indravati project in the state ran into rehabilitation problems. Unwilling to give up such a sizeable account the Bank hit upon the idea of converting the upper Indravati loan into a reform loan. It set aside 350 million US dollars to be disbursed to the Orissa electricity sector in phased manner linked to specific milestones in restructuring.

Dr. Surindar Kumar (2000) has explained that the process of power sector reform was initiated in India in the early 1990's. Haryana was the second state after Orissa to undertake power sector reforms under the overall supervision of the World Bank. The Haryana Electricity Reforms Act 1997 came into force with effect from 14 August 1998. Consequently a number of structural changes were undertaken. He examined the experience of electricity sector reform process in the context of Haryana State.

Abey George (2000) expressed the views that several factors namely high levels of transmission and distribution losses, increasing domestic consumption by a few, subsidized supply electricity to the industrial and the tourism sector, decreasing capacity of reservoirs, the unreliability of Monsoons etc., have led to a very vulnerable electricity generation system in Kerala. The KSEB's answers to this very complex issue were rather simple viz., in the form of fssil fuel based electricity generation system. Three of these are already operational and another five are in the pipeline including both public and private sector undertakings.

The state has therefore been looking for options to meet the demand for power from non-hydro sources such as coal, diesel etc. The statistics indicate the growing shift towards non-hydro options. However, the search for non-hydro options is not going to be very smooth, on the following grounds. The coal bearing regions being situated far from the state, it may be not economically viable to operate coal-based systems. It is not easy to find locations for coal based thousand MW power stations anywhere near the sensitive

coastline or with in the densely populated midlands. However the state has decided to go in for non-hydro option. By 2002 AD, as much as 50% of the states electricity needs would be met from non-hydro sources.

Rama Chandra (2000) has expressed the view that geographical, social, economic and cultural factors of region have a bearing on its power consumption pattern. The case of Kerala with regard to reform in the power sector reflects the positive as well as negative characteristic of a society with a rural production base a carbonized cultural. The lesson to be learned is that any reform would be welcomed only if it is preceded by open discussion and debate among the public. Any thing imposed from above will be opposed even if some of its implications might be beneficial to the public. KSEB appears to be resorting to this new process of reform slowly but steadily enlisting consumers' support for it. People will cooperate if they are convinced that they will be benefited not just by promise, the credibility of an institution, be it SEB or SERVC should be established beyond doubt, if people are to accept a reform package. What is true of Kerala is this respect can be true of other states as well.

Jenina Joy Chavez- Malauna (2000) expressed view that the power industry is the most scrutinized industry in the world today. Sweeping reforms are being pushed in many countries even as California one of the earliest states to adopt similar reforms comes under attack for its supposed failure to protect consumers and ensure stable power supply. Reforms of the power industry have increasingly been used as the basis for the release of funds by multilateral development banks and international financial institutions.

In the Philippines, power reform bill awaits finalization by the bicameral conference committee. The bill has been in deliberation for the five years, while a wide segment of civil society has been involved in drafting the bill. Their key concerns have been kept aside or inadequately addressed. Beyond doubt this was due to the successful and powerful lobby of business with vested interests in the passage of a version of the bill.

The strategy paper on infrastructure of the Government of Andhra Pradesh (2001) reflected the view that vision 2020 sets challenging targets for economic growth. To achieve these targets, Andhra Pradesh needs a new and comprehensive growth agenda. To attract private investment the state will start need to create the conditions that will allow private investor to successfully participate in its development. This involves building infrastructure and reforming regulation to create a conductive environment of business. Hence an infrastructure policy should be framed. The infrastructure policy should be addressed to different sectors. Among them the sectors of power generation, transmission and hydropower projects are also included.

The strategy paper on power of the Government of Andhra Pradesh (2001) presented various aspects of power sector in Andhra Pradesh. The paper consists of a detailed presentation of year wise revenues, expenses, operating surpluses and subsidies of electricity board and Andhra Pradesh Transco. The paper also focused on consumption, tariff of power and on energy balances. This paper discusses various issues like generation, private sector participation in generation projects, promotion of non conventional energy transmission and distribution in the state. The paper also discussed power sector reforms and emphasized that the ultimate goal of the reform process is to ensure that power will be supplied under the most efficient conditions in terms of cost and quality to support the economic development of the state and so that the power sector ceases to be a burden on the state's budget and eventually becomes a net generator of resources. The paper also focused attention on the results of reform programme and said that Vision 2020 document of the government envisages the supply of world class quality power at competitive prices, reduction of energy losses to 10 percent and total elimination of commercial losses by 2020. The objective is to reach a per capita consumption level of over 2000 KWH by 2020.

K. P. Kannan., N. Viayamohan Pillai (2001) wrote on plight of power sector in India. They explained the significant aspects of inefficiency costs involved in SEBs functioning. They examine physical performances and financial performance. The physical performance focuses on such aspects as technical efficiency, transmission and

distribution losses. There is possible underestimation of institutional and organizational inefficiency. The financial performances focusing on performance of SEBs are examined.

K. Dubash and S.C. Rajan (2001) felt that three steps including de-metering of agricultural consumption and giving subsidies, signing independent power producers contract with major fiscal implications and implementing Orissa model on the national scale made the power sector policy in India to be locked into adverse arrangement. They criticized those international donor agencies that are largely unaccountable to the Indian. Public, playing crucial role in shaping the future of the power sector. They explained the process of power reforms in India by dividing the entire period into four overlapping but distinct periods. They are pre 1991, and 1991 independent power producer policy and its aftermath; the World Bank led restructuring policy that began to be implemented around 1993 in Orissa and the period shortly after 1998. In total they provide an analysis of the social and political context in which power sector reforms have taken place in India.

Anjula Gurtoo and Rahul Pandey (2001) examined the past problems of power sector and initial phase of reforms. They said the Uttar Pradesh State Electricity Board's poor financial condition and growing power shortages necessitated the radical reforms in the state power sector. They said that the reforms model being implemented is based on incomplete diagnosis of the Board's past problems. High cost of power purchase, arbitrary depreciation norms, misrepresentation of agricultural consumption and over reporting of impact of subsidy, were as important reasons as were poor maintenance, poor productivity, high transmission and distribution losses, poor billing efficiency and high subsidy to agriculture, in affecting the financial performance of the Board. They opined that besides lack of recognition of the former set of causes, the reforms process is ridden with other major pitfalls like shortage-prone gaps in the proposed model and adhoc handling of its implementation. It appeared to them that the proposed reforms model appears to have been conceived out of desperation to escape from financial burden imposed by past mistakes, rather than out of a conscious reorientation of past policies, structures and systems in keeping with international changes in technological and competitive environment.

B. Jones and Tenenbaum (2002) suggested that we should not rely on replicating the experiences of other countries by blindly imitating them. They also said that the model of reforms in the power sector recommended by the World Bank too needs to be examined critically in the Indian context. They expressed the view that a number of doubts were raised about the practicability, feasibility or even advisability of privatization of power distribution on all India basis stating the instance of privatization of distribution in Orissa. He also opined that guarantees by state governments; counter-guarantees by the Centre and escrow accounts will not create or sustain investor confidence which is key to power sector reforms. They stressed that state governments have to play critical role in these reforms and also felt that some financial steps including securitization of dues of state electricity boards to central PSUs or writing off loans given by the state government to state electricity boards or converting them into equity are not real solutions to the actual problems.

Madhav Godbole (2002) felt that rationalization of tariffs is the most important requirement for viability of power sector. He opined that an important step taken in this direction is enactment of legislation for the setting up of the electricity regulatory commissions (ERCs at the centre and in the states). But the experience of the functioning of the ERCs so far is far from satisfactory. He pointed out that it was time the ERCs made full use of the penal powers available under the concerned legislation since viability and future of the power sector depends on them.

Yasushi Suzuki (2002) attempted to throw light on indigenous structure as well as foreign aid policy towards India's electricity power development. He concluded that Japan's official development assistance should be carefully monitored taking into consideration the input output relationships in the unique rent seeking process in India which is characterized by the political power among the dominant proprietary classes that prevents politically weak tax payers, who ought to criticize and oppose this inefficient structure, from organizing the political powers against the classes.

Joel Ruet (2002) wrote that improvement in the Plant Load factor (PLF) and reduction in the non technical losses at least worth present tariffs can increase 17 percent energy level. These will enable us not to go in for unpopular measures such as tariff increase. He also expressed the view that these actions are not done because of the reasons that state electricity boards are operated based on self enforcing political executive instruction, absence of focus on costs and budgets in actual decision making, absence of properly designed information system.

Severin Borenstein (2002) felt that restructuring of electricity markets is a more difficult task than that of airlines, trucking natural gas and oil due to unusual combination of extremely inelastic supply and extremely inelastic demand. He says that real time retail pricing and long term contracting can help to control the soaring whole sale prices and to solve some problems to create a stable, well functioning electricity market. He suggested that the difficulties which are the outcomes from the experiments of California, New York, Pennsylvania, England and Norway should not be interpreted as a failure of restructuring but also a part of learning process towards an electric power industry that is still likely to serve customers better than the approaches of the past.

K. Parikh and S. Parikh (2002) discussed the state of the power sector and experiences of power sector reforms in India. They also suggested some means to enable state electricity boards to control expenditures.

Academic Foundations (2002) covers blue print for power sector development in India, Vision 2020, power for all, distribution policy committee report of Ministry of Power, Government of India and the reports of expert group on settlement of state electricity boards dues and report of the expert group on restructuring of state electricity boards both headed by Montek S. Ahluwalia and Electricity Bill 2001. The blueprint document brings out problems as well as strategies and initiatives to resolve them for accelerated development of power sector. Distribution policy committee report stressed the importance of distribution reforms for making the electricity sector self sustaining.

M. R. Srinivasan (2002) recommends that state electricity boards should be reformed into bankable, commercially and professionally run corporate enterprises, free from political and bureaucratic interference. He further opined that it is a better solution than to create conditions conducive for the private sector to take on the task of further expansion of capacity he stressed that the objective of power for all can be achieved with the help of funds provided from within and from out side India.

Tenth Five Year Plan (2002-2007) highlighted that the power sector has been suffering from serious problems, which were identified as early as ten-year ago. However, no corrective action was taken and the result is that the power sector faces an imminent crisis in almost all states. No state electricity board (SEB) was recovering the full cost of power supplied, with the result that they made continuous losses on their total operations.

S. L. Rao (2003) expressed the views that the Electricity Bill, 2001 was intended to enable a major restructuring of the electricity system in India. It would have been better if the government had amended the existing three Acts relating to electricity three years ago and introduced essential changes. The bill needs to be passed speedily. This is despite its many short-comings which can be addressed through later amendments after the bill is passed.

The cost of supply model may become an important tool for tariff fixation and identification of subsidy/cross subsidy. Section 61(d) of the Electricity Act 2003 says that the consumers should pay for the use of electricity in a reasonable manner based on average cost of supply. Section 61(g) of the Electricity Act 2003, shows that the tariff progressively reflects the cost of supply of electricity and also reduces and eliminates cross subsidies within the period to be specified by the appropriate commissions. Section 62(3) dictates that the commission shall not show any undue preference to any consumer of electricity but may differentiate according to the consumers load factor, power factor, voltage, total consumption of electricity during any specified period or the time at which

the supply is required or geographical position of an area, the nature of supply and the purpose for which the supply is required.

Madhav Godbole (2003) opined that when the bill which was in due course enacted as the Electricity Act 2003, was under consideration of the standing committee of parliament, a number of issues, which deserved closer examination had been highlighted. Several of their issues remain unattended. The Act, which is a half way house, also raises a number of new issues which are likely to become serious problems in the coming years.

V. Ranganathan (2004) has expressed that the Electricity Act 2003 opens the door to immense possibilities in unleashing competition and trading, but at the same time opens a new area of policy risk, which it is supposed to mitigate. The Act has an enabling framework to introduce competition in generation privatization in distribution, but the homework in terms of addressing transition issue has been left undone.

Madhav Godbole (2004) has expressed that several state governments, including Maharashtra have announced free power for farmers. In this rush towards competitive populism, the past experience of states that adopted the suicidal policy of giving free power for agriculture appears to have been lost sight completely. Moreover, considering that subsidies for agricultural consumption largely benefit big farmers and other well-to-do people, the subsidization of these sections by common taxpayers militates against all cannons of the welfare state.

Sudhir Kumar Kathivar (2005) has expressed that a study of a primarily agricultural electricity distribution subdivision in South Rajasthan reveals that distribution losses are not only very high, but that they are mostly commercial in nature, illegal hooking in both the domestic and agriculture categories is rampant and forms a large proportion of unaccounted energy. The reasons for this can be traced back to factors linked to the performance of the utility and the wider socio-political environment. It will not be possible to bring about improvements in the current set-up through primarily

technological measure. Instead reform packages must adopt a framework for intervention that encompassed technical commercial, social and institutional aspects of the problem.

R. Raji Kumar (2005) say that during the past 14 years the ministry of power has produced several policy documents and issued numerous amendments but it has failed to make any significant improvements in the power sector. The new policy is another example that the ministry is not yet ready to learn from its own mistakes.

Sumir Lal (2005) has presented that case study of the power sector in India. The weakness of the Indian power reforms programme has been that while it has focused on sorting out distortions in the relationship between the owner government and power utilities through the unbundling and regulation model, it has failed to carry credible assurances that this will improve the equation between the reformed utilities and their consumers.

Jaskiran Kaur Mathum, Dhiraj Mathur (2005) expressed that are commercially unviable and is responsible for the financial mess state electricity boards are in. They also examined rural electrification from a socio developmental perspective and argued that the direct and indirect benefits of rural electrification in reducing the burden on women, its positive impact on health, education and farm income, justifies the expenses of network expansion for universal access. They also advocated network uses of electricity as this would enhance these benefits, have a beneficial effect on the environment, increase the viability of rural electrification and result in savings on household (total) energy expenditure.

3.3. CONCLUSION:

After reviewing a number of books, journals and periodicals, it has been noticed that a systematic study based on secondary data is not available for Andhra Pradesh. Hence the present study is undertaken primarily to bridge the gap between data availability and academic writing. Thus, it is expected that this thesis will add to the

exciting literature on electric power sector in general and Andhra Pradesh electric power in particular.

CHAPTER – 4

ORGANIGATIONAL STRUCTURE AND METHODS OF REGULATORY COMMISSION

CHAPTER – 04

ORGANIZATIONAL STRUCTURE AND METHODS OF REGULATORY COMMISSION

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Objective : To examine the changes in organizational structure before and after reform period and its impact on the functioning of the sector. Also to study the methods of Regulatory Commission in fixing the tariffs.

Hypotheses :

The following hypotheses were set to examine in the chapter.

H_1 = Reforms in power sector, benefited the consumers.

H_2 = Decentralization helped better performance of the power sector.

H_3 = The decentralized organization structure improved the functioning of the sector.

H_4 = Changes in the organization structure has helped in improving financial efficiency.

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4.1. INTRODUCTION:

This chapter has two broad purposes. First, it deals with the changes in organization structure due to reforms and its impact on the performance of the power sector and second it deals with the methodologies adopted by regulatory commission for fixing the tariffs and its impact to consumers in terms of unit costs and to the corporation for getting profits.

4.2. ORGANISATIONAL ACTIVITIES :

The government of Andhra Pradesh declared its policy to restructure the Andhra Pradesh State Electricity Board for purpose of making it operationally and financially viable to meet the future demand for sufficient supply of energy and to pull out the Board from persisting revenue deficits.

Andhra Pradesh State Electricity Board was functioning under the Government of Andhra Pradesh since 1-4-1959. It was restructured with effect from 1st February 1999 as two corporations, viz.,

1) Transmission Corporation of Andhra Pradesh (APTRANSCO)
2) Andhra Pradesh Power Generation Company Limited (APGENCO)

To oversee and ensure efficient functioning of power sector, a Regulatory Commission known as Andhra Pradesh Electricity Regulatory Commission (APERC) was constituted by the state government. The APERC came into effect from 3-4-1999. APTransco was further unbundled into a transmission company and four distribution companies (DISCOMs) with effect from 1/4/2000. The APTransco was to be responsible for financial and operational administration, distribution of electricity. The four distribution companies in Andhra Pradesh.

1) Eastern Power Distribution Company of Andhra Pradesh Limited (APEPDCL)
2) Southern Power Distribution Company of Andhra Pradesh Limited (APSPDCL)
3) Central Power Distribution Company of Andhra Pradesh Limited (APCPDCL)
4) Northern Power Distribution Company of Andhra Pradesh Limited (APNPDCL)

The DISCOMs have been issued independent licenses from 1-4-2001 by APERC.

Jurisdiction of APEPDCL with head quarters at Visakhapatnam includes the districts of Srikakulam, Vijayanagaram, Visakhapatnam, East Godawari, and West Godawari.

Jurisdiction of APSPDCL with head quarters at Tirupati includes the districts of Krishna, Guntur, Prakasam, Nellore, Chittoor and Cuddapah.

Jurisdiction of APCPDCL with head quarters at Hyderabad includes the districts of Anantapur, Kurnool, Mahaboob Nagar, Nalgonda, Medak, Ranga Reddy and Hyderabad.

Jurisdiction of APNPDCL with head quarters at Warangal includes the districts of Khammam, Warangal, Karim Nagar, Adilabad and Nizamabad.

The AP Transco is managed by a Board of Directors headed by its Chairperson and Managing Director and seven other directors Viz

1) Joint Managing Director (HRD, Commercial, IPC, Reforms, RA & IT)
2) Joint Managing Director (Vigilance and Security)
3) Director (Finance and Revenue)
4) Director (Projects, Co-ordination & Gird Operation)
5) Director (Transmission) and
6) Director (Non-whole Time)

Each DISCOM is headed by Chairman & Managing Director. Further,

1) CPDCL, NPDCL have four whole time directors.
2) SPDCL has five whole time directors and
3) EPDCL has three whole time directors.

Further each DISCOM has two non-whole time directors.

4.3. FUNCTIONAL CHANGES :

After the reform few functional changes took place with regard to financial power of APTRANSCO. One them is transfer of trading business from APTRANSCO to distribution on companies. The second one is formation of APPower Coordination Committee.

4.3.1. SEPARATION OF TRADING BUSINESS FROM APTRANSCO :

As per the provisional transfer scheme notified by the state government, the rights, obligations, agreements and contracts relating to procurement and bulk supply of electricity or trading of electricity, were assigned to four distribution companies respectively in specified ratios w.e.f. 09-06-2005 as per Electricity Act–2003. Henceforth APTransco will concentrate only on transmission generation of power.

In order to allow smooth transition, institutional arrangements are put in place as per G.O.Ms.No.59, dated 7-6-2005 by forming the following committees.

1) Andhra Pradesh Power Co-ordination Committee (APPCC)
2) Andhra Pradesh Power Trading Committee (APPTC)
3) Andhra Pradesh Balancing & Settlement Committee (APBSC)
4) Accelerated Power Development and Reforms Programme (APDRP)

Andhra Pradesh Power Distribution Pool Account is opened on behalf of four DISCOMs for payments of bills proportionate to their allocation of capacities of respective DISCOMs.

The DISCOMs purchase power from APGenco, Central Generating Station (CGS) and Independent Power Producers (IPPs). They are in charge of distribution system and serving all the consumers i.e., High Tension (HT), and Low Tension (LT) and are also looking after the Rural Electrification in the state.

4.3.2. ANDHRA PRADESH POWER CO-ORDINATION COMMITTEE (APPCC):

As a part of the transfer of trading function to distribution companies there was a need to create a mechanism to support the distribution companies in the activities pertaining to power procurement, inter-state and intra-state trading function till such time as adequate capacity is built and requisite systems, processes and skill-sets are put in place in the distribution companies. An institutional arrangement was thought to be necessary during the transition period. Hence, Andhra Pradesh Power Co-ordination Committee has been constituted for this purpose vide G.O.Ms.No.59, Dt.7-6-2005,

The Andhra Pradesh Power Co-ordination Committee (APPCC) consists of following members:

1 CMD of APTransco - Chairperson
2 Director (Finance) of APTransco - Member
3 Director (Co-ordination) of APTransco – Member
4 JMD (HRD, Commercial. IPC, Reforms & IT of APTransco) Member
5 CMD of CPDCL - Member
6 CMD of EPDCL - Member
7 CMD of SPDCL - Member
8 CMD of NPDCL – Member

APPCC has two sub-committees.

1. AP power Trading Committee (APPTC) and
2. AP Balancing and Settlement Committee (APBSC)

4.3.3. AP POWER TRADING COMMITTEE (APPTC):

Till such time as the distribution companies build capacities and acquire necessary skills to manage their power purchase procurement obligations and inter-State

Trading arrangements, it was considered critical that these arrangements are undertaken jointly by distribution companies in a coordinated manner in order to optimally utilize the state resources. Hence, Andhra Pradesh Power Trading Committee (APPTC***)*** was constituted for the purpose. APPTC shall be responsible to co-ordinate the activities related to the intra-state and inter-state trading to ensure optimal utilization of resources.

The Andhra Pradesh Power Trading Committee (APPTC**)** sis it consists of the following members:

1. Superintending Engineer (Commercial) of CPDCL – Member
2. Superintending Engineer (Commercial) of EPDCL - Member
3. Superintending Engineer (Commercial) of SPDCL - Member
4. Superintending Engineer (Commercial) of NPDCL - Member
5. Chief Engineer (Grid Operations) of APT - Invitee

One of the members of the Committee representing a distribution company is to become Convener of the Committee on rotation basis.

4.3.4. ANDHRA PRADESH BALANCING AND SETTLEMENT COMMITTEE (APBSC):

To facilitate market operations amongst distribution licensees under power sector reforms regime, an institutional mechanism was put in place to address the commercial issues that may arise amongst the distribution of licensees. Hence, Andhra Pradesh Balancing and Settlement Committee (APBSC) have been constituted for this purpose. APBSC is a sub-committee of APPCC and reports to APPCC.

The Andhra Pradesh Balancing and Settlement Committee (APBSC*)* consist of following members:

1 CGM (Commercial) of CPDCL - Member
2 CGM (Commercial) of EPDCL - Member
3 CGM (Commercial) of SPDCL - Member
4 CGM (Commercial) of NPDCL – Member
5 Chief Engineer (Grid Operations) of APT - Invitee
6 SE (EBC) of APTRANSCO - Invitee

One of the members of the Committee representing a distribution company was to become Convener of the Committee on rotation basis.

Subsequently APTRANSCO sought amendment on, to the capacities allocated to the DISCOMs. The amendment to the G.O. Ms. No. 58, dated. 9.6.2005 as sought by APTRANSCO was issued by Government of A.P vide G.O. Ms. No. 101, dated. 31.10.2005.

4.3.5. ACCELERATED POWER DEVELOPMENT & REFORMS PROGRAMME (APDRP):

Government of India extended support to Government of AP through mechanism of APDP (Accelerated Power Development Programme) in the year 2000-01 to undertake renovation and modernization (R&M) activities of generating stations and up-gradation of sub-transmission and distribution system (33 KV & below) including energy accounting and metering in the three identified circles namely Eluru, Warangal and Tirupathi through short, medium and long term measures in order to reduce the transmission and distribution losses to 18% and make the circles as model circles. Subsequently in 2002, government of Inida renamed the APDP as Accelerated Power Development and Reforms programme (APDRP) and informed that priority will be given only for sub-transmission and distribution works instead of to the R&M works of generating stations.

4.3.5. (a). FUNDING MECHANISM:

Initially the funding mechanism under APDRP was that 50% of project cost was provided by GOI, of which 25% in the form of grant and 25% as loan. Remaining 50% of the cost of project was to be met by the utility either from its internal resources or through loans from financial institutions like rural electrification corporation/power finance corporation rural electrification corporation/power finance corporation (REC/PFC). Subsequently the Ministry of Power, Government of India vide letter F.No.12/4/2001-APDRP dated 07.11.2005 has revised the funding mechanism withdrawing the loan component of 25% of project cost which was extended earlier. Under the revised funding mechanism, only 25% of the project cost will be extended to the utilities as grant by Ministry of Power, Government of India and the balance 75% of the project cost is to be met by the utility either from its internal resources or through loans from financial institutions like rural electrification corporation/power finance corporation rural electrification corporation/power finance corporation (REC/PFC).

4.3.5. (b). SANCTIONS FOR THE YEARS 2001-02, 2002-03 AND 2003-04:

Ministry of Power, Government of India vide letters File No. 7-1-2002-APDRP dated 05.10.2005 and File No. 7/1/2002-APDRP dated 16.03.2006 informed that 5% consultancy charges were withdrawn which were allowed earlier and accordingly communicated the revised project cost as Rs.1436.488 Crores duly deducting the 5% consultancy charges from the earlier Project cost of Rs. 1489.406 Crores. The revised project cost for the years 2001-02, 2002-03 and 2003-04 was Rs. Rs.579.690 Crores for up-gradation of Sub-transmission and Distribution system in the circles of Eluru, Tirupathi, and Warangal for the year 2001-02. Rs.843.898 Crores for High Voltage Distribution System (HVDS) schemes in Central, South and North Circles of Hyderabad and for up-gradation of Sub-transmission and Distribution system in 95 towns in all the 23 district of AP for the year 2002-03. Rs.12.90 Crores for implementations of IT Pilot Project for one circle each in four DISCOMs for the year 2003-04

Table 4.1:
The Detailss of the Funding by Government of India and Financial Institutions REC/PFC

Utility	Year of Sanction	Scheme Name	Project Cost	GoI portion (25% of Project cost)	Counterpart funding portion (75% of Project cost)				
					REC	PFC	Banking Instit-utions	Fund to be obtained from REC/ PFC	Total
1	2	3	4	5= 0.25*4	6	7	8	9= 4-5-6-7-8	10= 6+7+8+9
EPDCL	2001-02	Eluru Circle	211.790	52.947	--	111.191	41.695	5.957	158.843
	2002-03	TBPLNS (21 Towns)	145.220	36.305	76.248	--	28.592	4.075	108.915
	2003-04	IT Plan	2.231	0.558	1.116	--	0.418	0.139	1.673
	Sub-total (i)		**359.241**	**89.810**	**77.364**	**111.191**	**70.705**	**10.171**	**269.431**
SPDCL	2001-02	Tirupathi Circle	251.420	62.855	131.993	--	49.496	7.076	188.565
	2002-03	TBPLNS (22 Towns)	122.088	30.522	64.108	--	24.039	3.419	91.566
	2003-04	IT Plan	3.164	0.791	1.582	--	0.593	0.198	2.373
	Sub-total (ii)		**376.672**	**94.168**	**197.683**	**--**	**74.128**	**10.693**	**282.504**
NPDCL	2001-02	Warangal Circle	116.480	29.120	61.149	--	22.930	3.281	87.360
	2002-03	TBPLNS (18 Towns)	58.150	14.537	29.071	--	10.901	3.641	43.613
	2003-04	IT Plan	2.518	0.630	1.259	--	0.472	0.157	1.888
	Sub-total (iii)		**177.148**	**44.287**	**91.479**	**--**	**34.303**	**7.079**	**132.861**
CPDCL	2001-02	Hyderabad Circle HVDS)	307.270	76.817	--	153.635	57.611	19.207	230.453
	2002-03	TBPLNS (34 Towns)	211.170	52.793	110.859	--	41.570	5.948	158.377
	2003-04	IT Plan	3.367	0.842	1.684	--	0.631	0.210	2.525
	Sub-total (iv)		**521.807**	**130.452**	**112.543**	**153.635**	**99.812**	**25.365**	**391.355**
AP Transco	2003-04	IT Plan **Sub-total (v)**	**1.620**	**0.405**	**0.810**	**--**	**0.304**	**0.101**	**1.215**
Grand Total (i+ii+iii+iv+v)			**1436.488**	**359.122**	**479.879**	**264.826**	**279.252**	**53.409**	**1077.366**

Source: Andhra Pradesh Power Development Statistics and Andhra Pradesh Administration Report 2

4.3.5.(c). RELEASES FROM MOP, REC, PFC, BANKS:

As per earlier funding mechanism, GOI has released Rs.558.505 Crores to APTRANSCO/ DISCOMs (Rs.279.253 Crores as grant and Rs.279.252 Crores as Loan). Subsequently, the APTRANSCO/ DISCOMs have repaid the loan component of Rs.279.52 Crores of GOI/ GOAP by availing the loans from Banks at lower interest rates than GOI.

Under the revised funding mechanism, the GOI is to fund Rs.359.122 Crores as grant i.e 25% of the Project Cost of Rs.1436.488 Crores and against which the GOI has released Rs.279.253 Crores as grant and need to release a balance amount of Rs. 79.869 Crores (Rs.359.122 Crores – Rs.279.253 Crores) as grant to DISCOMs/ APTANSCO. In respect of loan component of Rs.1077.366 Crores (i.e 75% of the project cost Rs.1436.488 Crores), the DISCOMs have drawn Rs.366.465 Crores from REC as against the sanctioned cost of Rs.479.879 Crores, Rs.78.680 Crores from PFC as against the sanctioned cost of Rs.264.826 Crores and Rs.279.252 Crores from banking institutions. See table 4.1 for details of these funding arrangements.

4.4.COMMERCIAL ACTITIVITY OF APTRANSCO :

The Transmission Corporation of Andhra Pradesh Limited (APTRANSCO) earlier the holder of Transmission and Bulk Supply License to carry out the Transmission and Bulk Supply business in Andhra Pradesh under the Third Transfer Scheme notified by the Government of Andhra Pradesh was divested of its bulk supply business with effect from 09.06.2005. The APTRANSCO, being designated by the GoAP under Section 31(2) of the Central Act, to increase the electricity.

1. The Andhra Pradesh Electricity Regulatory Commission has issued Regulations on terms and conditions of Open Access (OA) to Intra State Transmission and Distribution Networks (the Regulation no. 2 of 2005) effective from 01.07.2005

As per the Regulation, phasing of OA in the state is as follows (see Table 4.2):

Table 4. 2:

The Regulation Phasing of OA in the State.

Phase	Eligibility Criteria	Commencement Date
1	Consumers availing of power from NCE developers irrespective of the quantum of contracted capacity.	September, 2005
2	Contracted capacity being greater than 5 MW	September, 2005
3	Contracted capacity being greater than 2 MW	September, 2006
4	Contracted capacity being greater than 1 MW	April, 2008

2. APTRANSCO is nodal agency for processing within the state of open access applications, according to approvals and arranging agreements as per the regulations issued by APERC (see Table 4.3).

3. Based on the filings made by APTransco for its aggregate revenue requirement for the year 2005-06, APERC finalized the Transmission Tariff and SLDC charges as follows.

Table 4. 3:

As per Tariff order, the charges for the year 2005-06 are

Transmission charges	Rs 69.25/kw/month plus energy losses in kind at 5%
SLDC charges	Rs 4.10/kw/month

Total transmission capacity of the Discoms is 10816 MW and intra- state open access consumers is 455.89 MW

4. The revenue realization for transmission for the year 2005-06 was Rs. 729.03 Crs. from DISCOMs and Rs. 19.04 Crs. from OA consumers of inter-state transactions. Similarly, the revenue realization for SLDC for the year 2005-06 was Rs. 43.16 Crs. from DISCOMs and Rs. 0.22 Crs. from OA consumers of inter-state transactions.

4.5.ORGANIZATIONAL ACTIVITIES :

The employees of the APSEB expressed apprehension that their services will be privatized and that there would be retrenchment in the services resulting in loss of employment and also that their service conditions may be adversely affected. In order to allay the apprehensions of the employee's tripartite agreements between the government of Andhra Pradesh, Andhra Pradesh State Electricity Board and Unions/Associations were entered into protecting the service conditions of the employees.

Andhra Pradesh Transco & Discoms are conducting training programs for employers in their staff.

4.5.1. TRAINING PROGRAMES:

Different training programmes are:

1) Technical Training Programmes
2) HRD Training Programmes
3) Computer Training Programmes
4) Commercial and Accounts Training Programmes.
5) Regulatory Affairs Training Programmes.
6) Consumer Related Programmes.

These training programmes would enhance the skills or between functioning of employees.

4.5.2. CUSTOMERS SERVICE INITIATIVES:

Citizens charter was introduced and implementation was monitored through call centers for providing better customers services. For this purpose, 336 customer services centers covering all subdivisions including 221 centers in rural areas were established in 3 years and achieved 97 % compliance in standards of performance (SOP).

1157 express industrial feeders have been separated for providing reliable, interruption free supply to industrial consumers. 1241 mandal and town feeders have been separated for providing reliable supply. 5651 rural feeders have been separated for lighting supply to provide. The following initiatives were undertaken providing for improving consumer services.

- Proper regulation of agriculture hours of supply
- Improved voltages for lighting supply in rural areas.
- Spot billing using hand held computers introduced to cover all the areas i.e., towns, municipalities, mandals and villages.
- On-line billing collection facility is available in Hyderabad city and all the towns through ‘e-seva’ centers.
- On-line billing collection facility in rural areas through 1249 Rural Service Delivery Points (RSDPs) ‘e-kiosks’ are set up.
- There are 1120 ‘e-kiosks’ in rural areas and 250 ‘e-seva’ centers in urban areas. Rajiv internet, was initiated which proposed to cover 6618 major villages through a franchise system. The Principal Rajiv Partners (PRPs) provide the required securities. This is to cover all villages.
- Meetings with consumers to be held every month at circle and division level. Major issues raised in the meetings were billing complaints and delay in represent of DTRs in rural areas. To solve these problems action was taken as below :
    1) Vidyuth Adalats were held every week to resolves billing complaints at mandal quarters.
    2) DTR replacement centers increased from 85 to 239 for timely repayment.

- Various IT initiatives have been taken up in distribution companies to improve the performance and bring in transparency/accountability.

    1) Consumer Analysis Tool (CAT)
    2) Monitoring and Trading System (MTS)
    3) Transformer Information Management System (TIMS)
    4) Performance Monitoring and Reporting System (PMRS)
    5) Book Consolidation Module (BCM)
    6) Remote Meter Reading (RMR)

- Enterprise Resource Planning (ERP) is being implemented in AP Transco & Discoms.
- E-Vaaradhi, an electronic way to reach electricity consumers is introduced in EPDCL for passing the messages relating to billing information, power shut down, etc., through SMS.

4.6. VIGILANCE:

The Vigilance wing consists of the Anti Power Theft Squad Police Stations, the Detection of Pilferage of Energy Wing and the Assessment Wing. The vigilance wing is headed by an IPS Officer of the rank of Inspector General of Police on deputation from the Govt. of Andhra Pradesh.

4.6.1. VIGILANCE SET UP IN THE DISCOMS:

Vigilance wing in the Discoms consists of chief vigilance officers in the rank of S.P/ Addl. S.P. for all the four distribution companies with head-quarters at Hyderabad for CPDCL, Warangal for NPDCL, Visakhapatnam for EPDCL, Tirupati for SPDCL and Addl. SP (Head-quarters) functioning directly under the supervision of JMD (Vig. & Sec). An Information Cell headed by C.I. of Police at Hyderabad is functioning under the control of JMD (Vig. & Sec). In the Information Cell, the offices of the Addl.SP(Head-

quarters) and the JMD (Vigilance) rank have jurisdiction over the entire state while the offices of the four Addl. SP/SP rank heading the vigilance wing in the DISCOMS have powers of the police station for investigation over their respective jurisdictions.

Each operation circle of district has one APTS Police Station and one DPE wing. Each Anti Power Theft Squad police station has a sanctioned strength of 1 Inspector, 2 Sub-Inspectors, 2/3 Head-Constables and 4/6 Constables. The pilferage of energy cases reported by DPE and Operation Engineers are registered with concerned Circle APTS. APTS wing compound the cases in which the accused come forward to pay the compounding charges for dropping of criminal prosecution. They assist the inspection teams during inspections, for collection of arrears and for disconnections by providing necessary protection. They co-ordinate with the local police wherever necessary. They conduct enquiries into the irregularities committed by the staff as well as outsiders causing loss of revenue, property or image to the organization. Details are provided in Table 4. 8.

Apart from booking theft cases, identification of highly theft prone areas in towns and conducting inspections in those areas were put into practice in DISCOMs.

During 2005-06 1,65,510 cases of pilferage of energy were registered by DPE and Operation wings together. Out of these 1,30,670 cases were compounded collecting an amount of Rs.10.23 crores as compounding fees while realizing 12.93 crores as first installment of assessment amount. (Table 4. 9).

The inspections lead to not only registration of cases of theft but also detection of a large number of cases of other irregularities such as wrong categorization, unauthorized reconnections, cases of mal-practice, cases of additional connected load and defective meters which lead to huge amount of back billing and revenue to the organization.

4.7. ENERGY AUDIT:

Comprehensive Energy Audit was taken up in 114 selected towns as they draw considerable amount of power and they also register the highest revenue in absolute

terms as well as specific revenue in the Low Tension sector. Losses in 105 towns were brought down below 10%. Loss wan Hyderabad is to the tune of 28.65% in 2005-06. Losses are less than 7 1/2% in 50 towns. Table 4. 10 indicate the reduction in loss in 114 towns in the year 2005-2006.

The loss reduction in 105 towns to below 10% and a substantial number below 7.5 % is a direct result of the action taken by the vigilance department in conjunction with the operation staff in year 2005-2006.

Objectives of energy audit are specified as:

- To identify the technical losses and to take remedial action by arranging system improvements, etc.,

- To identify commercial losses so that the leakages of revenue can be arrested.

4.7.1. ACCURACY OF ENERGY AUDIT:

The limitation of energy audit in calculating system losses is indicative due to the several reasons such as : (a) different metering cycles for LT Billing like monthly, bi-monthly, un-metered agricultural consumption and defective metering (burnt, stuck-up , wrong reading, wrong categorization of billing etc); and

(b) Difficulty in simultaneous reading of all meters, errors in CTs and PTs, variations in system parameters like voltages, frequency, and load flows due to both active and reactive powers in the power system etc.

4.7.2. TYPES OF ENERGY AUDIT:

1. Energy Audit for 132 kV to 400 kV level: The Transmission Wing is incharge of the Energy Audit for the EHT level System. The line losses of all 400 kV, 220 kV and 132 kV EHT Feeders is being reviewed in KPI Meetings held monthly.

2. Energy Audit for 33 kV and below level (by DISCOMs) : Consequent to the formation of distribution companies with effect from 1.4.2000, the subject of energy audit hitherto dealt at the AP Transco headquarters has been transferred to the respective DISCOMs to have a close monitoring. The General Managers /Energy Audit of EPDCL, SPDCL and NPDCL and Superintending Engineers (O&M), CPDCL are the nodal officers for the Energy Audit at DISCOM level.

As per the APERC directive No. 1 of Tariff Order 2005-06, Monthly T&D Losses statement containing the parameters like energy handled during the month, CGS Share, third party wheeled Energy, third party generation at 33 kV Level, Genco-DISCOM Drawals at 33 kV Level, retail sales of DISCOMs, transmission losses, as well as cumulative up to distribution losses and T & D losses incurred (with/with out wheeling) for each month were submitted to APERC. As per the instructions of CMD, AP Transco, the transmission losses excluding wheeled energy are calculated on MRI downloaded data as per the methodology evolved by the Technical Committee. The quarterly energy audit reports collected from all DISCOMs (Distribution Losses Statements) are reviewed and submitted to APERC.

As per the APERC directive No. 5 of Tariff Order 2005-06 , monthly abstract statement as well as of daily interruptions at all voltages (220 kV, 132 kV, 33 kV, 11kV) collected by Load Monitoring Cell were submitted monthly to APERC to maintain and monitor the quality of power supply to consumers.

The following information is furnished to Chief Minister Review on " White Paper on Power" : (a) The Units Handled, HT&LT Metered Sales and Agricultural consumption, percentage System Losses and HT&LT Demand, and (b) The assessment

cases finalized and cases pending at the end of month by the Superintending Engineers, Divisional Engineers of Assessment Wings of all DISCOMs. The Amount realized against Theft of Energy, Pilferage, Malpractice and Back-billing cases detected by DPE Wings;

The compilation and analysis of 33 KV & below System losses, town losses, demand Vs revenue collections of all DISCOMs as per the APERC guidelines is being done by the state government.. The energy audit is being extended to nine more towns in SPDCL (Vinukonda, Piduguralla, Nagari, Puttur, Palamaner, Pulivendala, Rajampeta, Jammalamadugu and Rayachoti towns). The energy audit of towns provides the aggregate technical and commercial losses in each town. A constant watch is kept on the energy consumption especially where the losses are more than 10% and efforts are made to reduce the losses by way of conducting special drives, replacement of defective meters etc.

4.7.3. FEEDER WISE ENERGY AUDIT IN 114 MUNICIPAL TOWNS:

It's observed that going for the energy audit at 11KV level would give a more realistic view of the energy loss in various DISCOMS. To implement this,11 KV feeder output and the loss would be computed by observing the deviation in the Sold-Out units. The unit for calculation of the MU inputs would be a TOWN. So as to initiate this action plan, the Divisional Engineers / DPE of the designated 114 municipal towns in the Andhra Pradesh were requested to submit the energy meter readings of the 11 KV feeders in their jurisdiction taken on 1st of every month. These readings are taken as the basis and the total energy input in MU in each town is communicated to the Chief Engineer/Commercial to arrive at percentage losses by taking the sold-out units [MU] in the respective towns.

In this process following major points were brought to notice.

- ❖ The energy meters of some 11 KV feeders are non-functional (Defective / Stuck-Up).

- ❖ There were no meters on some 11 kV feeders.
- ❖ There were some meters which need replacement /calibration due to visible abnormalities.

An action plan was prepared to solve these problems so as to make the energy audit more functional and realistic. Accordingly the Superintending Engineers /Operation were requested to get the meters replaced / calibrated wherever necessary and to install new meters where the meters are absent.

This resulted in replacement /calibration of good number of feeder meters, giving the audit more authenticity in terms of the percentage losses. The theft prone areas were identified and the SEs/Operation is requested to look into these areas for probable power pilferage and intensify the inspection activities. This way the energy audit has triggered a healthy auditing practice and the results are reviewed and analyzed on a monthly basis.

This resulted in reduction of municipal town losses below 10% and increase of metered sales by 2.51% and improvement of revenue collections in 2005-06.

4.7.4. ENERGY AUDIT ON EHT INDUSTRIAL FEEDERS:

Energy audit on all Industrial dedicated feeders was being carried out with an intention to find and plug any leakage of power due to defective metering or due to theft of energy. 147 feeders are identified as dedicated feeders under 220 & 132kV voltage levels. It is mostly single consumers existing on the feeders and in some cases two to three consumers. Energy audit is being carried out on all dedicated feeders except on those whose billing meters are at sub station, rectifying defects in metering if any at the sub-station end. Readings are taken simultaneously at both ends for conducting energy audit.

Table 4. 4:

Abstract of Energy Audit on 220 Kv & 132 Kv Feeders as On 31-03-2006

DISCOM	Existing Industrial Feeders (Other than those feeders whose billing meters are at SS)	No. of Feeders with Negative % Losses	No. of Feeders with Positive % Losses <2	No. of Feeders With Positive % Losses > 2 - <5	No. of Feeders with % Losses >5	Other Others
APCPDCL	20	11	6	1	-	2
APEPDCL	13	11	-	1	-	1
APNPDCL	10	8	2	-	-	-
APSPDCL	6	3	3	-	-	-
TOTAL	49	33	11	2	-	3

Source : Andhra Pradesh Power Development Report 2005-06

The power interruptions on all industrial dedicated feeders were monitored to ensure uninterrupted quality power to the EHT consumers. Steps were taken to avoid repeated momentary interruptions and to improve the supply conditions to EHT consumers.

4.7.5. DETECTION OF PILFERAGE OF ENERGY UNIT (DPE):

The Detection of Pilferage of Energy (DPE) Wing manned by Electrical Engineers was brought under the direct supervision of the Joint Managing Director (Vigilance) in July 2000. Consequently synergy could be brought about between the DPE & APTS for enhanced results. The DPE units in the discoms are headed by four Superintending Engineers/DPE located at Discom headquarters at Hyderabad, Tirupathi, Visakhapatnam and Warangal. They supervise the functioning of the 25 operation circles of district units. Each operation circle of district is provided with 1 DPE team consisting of 1 DE, 2 ADEs and 5 AEs. The DPE teams which were originally meant for inspecting industrial services and other high value services became the coordinating agencies for

taking up inspections on a large scale involving operation staff also. The function of DPE wing is to reduce the power loss by detecting theft of energy thereby to improve the efficiency and revenues of the organization. They detect not only cases of direct tapping from LT lines but also cases of meter tampering, meter bypass and such other means of pilferage of energy, cases of mal-practice and defective metering which lead to back billing. Instructions were issued to DPE wing to inspect LT high value (above Rs.10,000) services by shifting their focus from domestic sector. This has improved quality of inspection resulting in high per case assessment value.

Pole to pole inspections and intensive inspections were carried out in identified areas of all distribution companies where the losses were high and to reduce the losses to minimum values, percentage energy sold improved from 76 to 82.96 and overall T&D losses were limited to 20.21%

Table 4. 5:

Percentage Improvement in Energy sold & Metered sales

S.No.	Year	% Energy sold	%Metered sales
1	2002-03	68	48
2	2003-04	73	51
3	2004-05	76	52
4	2005-06	83	55

Source : Andhra Pradesh Power Development Report 2005-06

A major case of power theft to the tune of Rs.51 lakhs by M/s. Vasanthi Marine Foods, Bapatla, and Guntur district was detected by DPE LT wing in January'2006. M/s.Dhanalakshmi Enterprises of Guntur district was booked for theft of power to the tune of Rs. 25 lakhs in the month of January'2006.

During the year 2005-06, 5,20,714 services were inspected and 72,128 cases of theft of energy, back billing, malpractice and development charges with provisional

assessment of Rs.4, 718.22 lakhs were detected by the DPE wing. The details are furnished as follows:

Table 4. 6: Theft of Energy, Back Billing, Malpractices in the year 2005-06.

Category	No.of services Checked	Total irregularities detected	Amounts assessed (Rs.in lakhs)	Total units lost (in lakhs)	Realization (Rs.in lakhs)
H.T. Services	6865	176	1443.74	120.58	319.13
L.T.Services	--	--	--	--	--
a) Cat.I	409513	61814	1520.60	167.281	497.83
b) Cat.II	72920	5878	826.91	35.57	172.70
c) Cat.III	26736	3211	803.90	55.08	191.16
d) Cat.V	2949	748	69.34	10.775	8.72
e) Others	1731	301	53.71	6.24	11.03
Total	520714	72128	4718.22	395.52	1200.57

Source : Andhra Pradesh Power Development Report 2005-06

4.7.6. HT WING:

There is an exclusive DPE/HT unit under SE/DPE/ Hyderabad /CPDCL consisting of DE/DPE/HT and 3ADEs/DPE/HT and one AE to assist each ADE in APCPDCL. In the other three Distribution Companies DPE/HT unit consists of one ADE/HT and AE/HT under the control of SE/DPE of respective company.

The HT wing inspects all H.T. services, LT Industrial IIIA and IIIB services with HT metering. They also inspect the metering arrangements in EHT sub stations for facilitating energy audit on dedicated and express industrial feeders. Energy audit of all EHT and HT services is also carried out every month by HT wing.

During the year 2005-06, 6865 services were inspected and 1 case of theft, 127 cases of back billing with an assessment of Rs.1443.74 lakhs were detected by DPE HT Wing. Thus, the DPE LT & HT wings function to reduce the power loss and to improve the revenues of the APTRANSCO & DISCOMS.

4.7.7. ASSESSMENT WING:

Each distribution company has one SE/Assessment assisted by 2 DEs/Assessment. They make the final assessment in all the cases where the assessment is not paid on the initial assessment notice.

Table : 4. 7

State of Assessment wing for the year 2005-06. (Amount in Rs. In Lakhs)

SNO	Company	Cases pending at the beginning of the year		Cases received during the year		Cases disposed during the year		Balance cases at the end of the year	
		No	Amt.	No	Amt.	No	Amt.	No	Amt.
1	EPDCL	2376	271.32	5614	661.63	6255	618.18	1735	290.16
2	SPDCL	1992	327.76	8953	867.25	8757	508.34	2188	252.10
3	CPDCL	5379	812.60	38776	1471.72	42913	1362.52	1242	445.55
4	NPDCL	2110	127.16	25314	356.00	26173	367.01	1251	91.12
Total		11857	1538.84	78658	3356.6	84098	2856.05	6416	1078.93

Source : Andhra Pradesh Power Development Report 2005-06.

During the year 2005-06, 78658 cases were received and 84098 cases were disposed with an assessment amount of Rs. 28.56 crores.

4.7.8. CAT ANALYSIS:

Consumer Analysis Tool (CAT) was developed in 2001. Services which appear irregular either from the point of view of consumption, billing or collection are being identified using the CAT and reports are being generated section wise. The philosophy is not to “Inspect and Detect” but to “Detect and then Inspect”. Special drives have been organized based on various parameters and guidelines such as seasonality, type of meters, type of industry and many types of consumption related drives.

DPE and APTS wings are directed to focus their inspections on theft prone areas based on CAT reports generated by Discoms for better results. Operation engineers are also instructed to inspect at least 100 services each per month to reduce exceptional services in their section and to bring down commercial losses. Billing, meter and collection irregularities were identified and rectified.

4.8. REDUCTION OF TECHNICAL LOSSES & COMMERCIAL LOSSES IN SYSTEM:

The technical losses depend on the quantity of power handled in the system, seasonal changes and also on the generation levels at load center power stations like Srisailam (Hydel), Nagarjunasagar (Hydel), RTPP (Thermal), KTPS (Thermal) and VTPS (Thermal). The line losses also increase with increase of load flows and also on quantum of wheeled power from other regions based on bilateral power purchases. The following steps were taken to reduce technical as well as commercial losses and to improve the metered sales.

4.8.(a) REDUCTION OF TECHNICAL LOSSES:

Input Interface Boundary points are provided with electronic meters between AP Genco, PGCIL and AP Transco for arriving at the EHT Input. Output Interface Points are provided with electronic meters of 0.2 classes between AP Transco and DISCOMs for arriving at output, there by accurate transmission losses are calculated through MRI download data.

The energy audit is made accurate by replacing the existing defective meters with the high-class accuracy meters and also replacing the associated equipments (CT, PT, etc.,) whose accuracy is higher, as follows:

- 0.2 class of accuracy meters for 132 kV and above.
- 0.5 class of accuracy meters for 33 kV and below.

The further steps undertaken in this regard include the following. The continuous monitoring of HT /LT industrial feeders as well as associated industrial consumer meters to keep energy losses within the permissible limits. 100 % replacement of Electro Mechanical Meters with Static Meters for all HT/LT industrial services.

Installation of Capacitor Banks and monitoring of all Capacitor Banks at all 33 kV Sub Stations for Reactive Power Compensation, thus improving power factor and increase in voltage level as they are also one of the contributing factor in reduction of losses.

It is being insisted that all industrial consumers have to install the shunt capacitors and maintain the power factor above 0.9. In case of non-compliance, penalty is imposed in the shape of surcharge for any violation. This has also helped to reduce the system losses.

Implementations of HVDS (High Voltage Distribution System) have also reduced the scope of pilferage and reduce the system losses for both domestic and agricultural and it is under implementation.

Replacement of Electro Mechanical Meters with Static Meters for all Domestic Services. Procurement of Static Meters is under progress and targeted to be completed for all domestic services by 2008.

Twin circuit parallel Stringing of Transmission lines, Ring Main Concepts with alternate feeders have impact on reduction of losses. Augmentation of Power Transformers reduces the overloading of the System, which in turn reduces hysteresis loss and eddy current losses in Transformation losses. These are also being implemented.

4.8.(b) REDUCTION OF COMMERCIAL LOSSES:

Inspecting all the feeder meters and also services existing on the feeders simultaneously at the same point of time is being undertaken. Subsequently, inspections are being organized and technical investigation on the feeders recording high losses is being done. This has lead to the detection of certain pilferage cases and defects in the meters, which were rectified subsequently.

MRI (Meter Reading Instrument) downloaded data analysis of all electronic meters of HT Industrial and LT High value services (up to 75hp) are undertaken for billing with accuracy.

Deterrent actions are being taken on theft of energy and pilferage cases detected including fine and imprisonment with the help of Special Courts set up in each district.
APERC methodology is being adopted in all the Circles for estimation of agricultural consumption every month. The new agricultural services (2.00 lakh nos. approximately) released in two years were provided with meters. Steps have been initiated to provide the metering to other existing agricultural services in a phased manner.

4.9. TELECOMMUNICATION WING:

4.9.a. SCOPE OF WORK:

The Telecom organization in APTRANSCO is responsible for planning, design, procurement, testing, erection, commissioning and O&M of the following Communication Systems.

PLCC Communication among all Generating Stations, 400 kV, 220 kV & 132 kV Grid Substations on Express, Black Channel and Generation Channel networks for voice & data communication and carrier inter tripping.

VHF wireless communication network among all Grid Substations and 33 kV substations through out the State.

Satellite based (VSAT) communication system provided at most of the Grid substations throughout the State for voice and data communication.

Broadband communication system consisting of optic fiber based and digital microwave based systems installed at major EHT substations for voice, data and protection signaling.

4.9.b. OPERATING AND MAINTAINCE WORKS CARRIED OUT DURING THE YEAR 2005-06:

O&M of existing PLCC channels, Optical fiber links, digital microwave, VSAT, UHF, VHF & FAX links and data channels has been carried out satisfactorily production for the period from 1.4.2005 to 31.3.2006.

Voice communication system on the PLCC & broadband network from State Load Despatch Centre at Vidyut Soudha to all Generating stations and Grid substations has been working.

Data communication system on the PLCC & broadband network from Generating stations and important 220 kV substations to back-up State Load Despatch Centre at Vidyut Soudha has been working.

AT network for voice communication & back-up communication to the SLDC and data communication requirement of remote meter reading has been working. VHF Wireless communication network connecting all Grid Sub stations (400 kV, 220 kV, 132 kV) and 33 kV Sub stations throughout the State has been maintained.

Biometric Finger Print Based Auto Attendance Recording System installed for recording the time of arrival and departure of employees of APTransco in Vidyut Soudha has been maintained.

All interruptions in Broadband communication due to breakdown of Optical Fibre Cable were got restored within very short period by deploying the APTRANSCO Telecom Engineers who are specially trained in splicing of Optic Fibre Cable, without entrusting the restoration work on contract basis to any private agency. All communications to the SLDC and ALDCs, Viz, PLCC, VHF, VSAT & Broadband, were maintained with an availability factor of more than 0.99 throughout the year.

4.9.c. VIDEO CONFERENCING

Multipoint Video Conferencing equipment has been installed at Vidyut Soudha to enable simultaneous Video Conferencing among all the Power Utilities, Ministry of Power & Power Finance Corporation. Three numbers ISDN lines (BRI lines having speed of 128 KBPS each) from BSNL have been provided at Vidyut Soudha to establish the Video Conferencing facility.

4.9.d. TELECONFERENCING:

In order to conduct conference with all field Chief Engineers/ Superintending. Engineers at a time, Teleconference facility has been established at Vidyut Soudha with three numbers special telephone (32 conferences) lines provided from BSNL.

4.9.e. CELLULAR TELEPHONES:

Approval has been accorded for providing cell phones in the Closed User Group (CUG) of Govt. of A.P. with services from M/s BSNL Cellone to the officers of APTransco, both in corporate office and in field, to improve the communication network.

4. 10. REGULATORY COMMISSION :

4.10.1. NEW REGULATORY FRAMEWORK :

In 1998, the Government of India passed the Electricity Regulatory Commission (ERC) Act under which the Central Electricity Regulatory Commission (CERC) was set

up. The Act also enabled states to set up State Electricity Regulatory Commissions (SERCs) without passing state level legislation.

The Electricity Regulatory Commission (ERC) was set up as quasi-judicial bodies and effected a transition from old style regulation to new style regulation. Regulation of the power sector, under previous regulation, was by the government through various government agencies such as the Central and State Governments, the Central Electricity Authority and the SEBs themselves. Regulatory decisions were taken and then were often conveyed to the other stakeholders and the public after the fact. Under the new style of regulation however, the regulatory is expected to make decisions in a transparent fashion and after public consultation the government is divested of its role of regulatory decision-making and is a policy maker and facilitator,. The government is however entitled to provide "policy directions" to the regulator provided such policy directions are in consonance with the legislation. If however, these policy directions have a financial implication for the utility, the government has to bear this burden through budgetary support.

Orissa was the first state in India to initiate power sector reforms by restructuring the OSEB and establishing independent regulation in 1995. the legislative foundation for this initiative was the power sector Reform Act (1995) which enabled the GoO to abolish the OSEB, partly privatized both generation and distribution and take way regulatory decision-making from the hands of the state government. The OSEB was functionally unbundled and corporatized. The Orissa Electricity Regulatory Commission (OREC) was established as an independent regulatory authority that would taken over the regulatory powers entrusted to the GoO as well as the erstwhile OSEB such as tariff setting, investment decision and performance monitoring.

All states that wanted to restructure the power sector had to pass enabling legislation – Haryana, Andhra Pradesh, Karnataka, Uttar Pradesh, Assam, Delhi followed suit. These states were being supported wither by the World Bank or the Asian Development Bank. The state Acts enabled state government to restructure the power sector and set up regulatory commission. The government of India toyed with the idea of

enacting a comprehensive legislation that would enable all states to reform but gave up the idea on account of inter-state differences and the reluctance of state governments to be directed on what they perceived as their jurisdiction. It was therefore decided to enact legislation that would allow for states to set up Regulatory Commissions but would not mandate any kind of restricting. For states that wanted to simply demonstrate an inclination for reforms to satisfy either financial institutions or the centre, the Electricity Regulatory Commission Act 1998 was the answer. If states wanted to restructure and privatize, they required state-level legislation to do so.

4.10.2. ELECTRICITY REGULATORY COMMISSIONS ACT 1998 :

The Act specified a two stage system for entrusting regulatory responsibilities to the SERCs. There were four mandatory functions that all SERCs were entrusted with namely :

- Determining power tariff – wholesale, built, grid or retail – in the manner provided under Section 29.
- Determining the tariff payable for the use of transmission facilities in the manner provided under Section 29.
- Regulating power purchase and procurement procedures of transmission and distribution utilities including the price at which power shall be procured from generating companies, generating stations or from other sources for transmission, sale, distribution and supply in the state.
- Promoting competition, efficiency and economy in the activities of the electricity industry to achieve the objectives and proposes of this legislation.

The Act also listed a series of additional 22 functions that could be notified by the state government to the regulatory commission from time to time.

A significant difference in the function of the CERC and SERCs was that at the state level, ERCs did not regulate generation tariffs, while the CERC set tariffs for CPUs. This disparity caused criticism even at the state level; a significant component of the cost

of the KWH paid by consumers was on account of electricity generation – often more than 80%. Thus there was question of the rationale for omitting such a significant component of cost? The reason was that it was expected that generation would soon be competitive and hence would not require regulation – a believed that was believed and the matter was corrected in subsequent legislation.

The Electricity Laws (Amendment) Act, 1998 also provided for the creation of Central and state Transmission utilities. The Central Transmission Utility shall be to undertake transmission system with State Transmission Utilities, Central Government, State Government, generating companies etc. Power Grid Corporation of India Limited will be Central Transmission Utility. The State Transmission Utility (STU) shall be to under take transmission if energy through intra-state transmission system and discharge all functions of planning and co-ordination relating to intra-state transmission system with Central Transmission Utility, State Governments, generating companies etc.

The most comprehensive legislation in the history of the power sector is the Electricity Act 2003, which supercedes all previous legislation.

4.10.3. THE ELECTRICITY ACT 2003:

The Electricity Act 2003 is expected to bring about sea changes in the way the power sector in the country is structured and the way power is bought and sold. The Act emphasized competition, anti-theft laws, open access on network, electricity trade concept introduced for the first time in Indian electricity legislation, and time bound restructuring of the SEBs. The stated objectives of the Act are : .

To consolidate the laws relating to generation, distribution, trading and use of electricity.

- Generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers.

- Supply of electricity to all areas, rationalization of electricity tariff.
- Ensuring transparent policies regarding subsidies, promotion of environmentally being policies.

The Act emerged as a result of a long drawn process of consultation amongst diverse stakeholders as well as the recommendations of the standing committee of Parliament. The Act consolidates the provisions of all the previous Acts pertaining to electricity, right from the Electricity Act 1910, to the amendments proposed to the Electricity Regulatory Commissions Act 1998. The Act also makes it mandatory for all States to establish a regulatory commission six months from the date of enactment. The important features of the Electricity Act 2003 are :

a. GENERATION :

Generation has been delicensed which means that any company, association or body of individuals can generate electricity without a techno-economic clearance from the CEA, or approval of the state government or regulator except in the case of hydel power where the written consent of the CEA is required. Furthermore, a generating company can supply electricity directly to more than one consumer thus effectively demolishing the single-buyer model and monopoly prevailing earlier. A generating company can also establish, operate and maintain sub-stations, tie lines etc.

b. CAPACITY :

Capacity generation has been liberalized. Any entry can set up a captive generating facility primarily i.e., at least 51 % for its own use. Open access without cross subsidy is ensured for all captive power generation.

c. TRANSMISSION :

Transmission will mandatory have to be a wired function without treading electricity i.e., buying and selling in order to enable open access. Central and State transmission utilities will be deemed licensees.

4.11. OPEN ACCESS :

Open Access will have to be introduced compulsorily in all states within one year of the enactment of the Act. Therefore, all transmission networks will have to provide non-discriminatory access to its networks.

4.12. TRADING :

Trading of electricity is officially recognized and is a licensed activity, where regulators would be responsible for issuing the license. However, distribution companies would not require a separate trading license. The ERC, on the recommendation of the Government, or in the public interest or in accordance with the National Policy can exempt any local body such a Panchayat Institution, Users Association, Co-operatives, NGOs or a Franchisee from requiring a license. The ERC will also need to specify the entry conditions for trader's i.e. technical requirements, capital adequacy and credit worthiness as well as fix the trading margins if required. It would be the responsibility of the ERCs to develop a trading market taking into consideration the parameters laid down in the National tariff Policy.

4.13. TRANSMISSION TARIFF :

The Transmission Tariff Schedule consist of a) Transmission Charge in Rs/MW/Month and b) Transmission Loss percent.

a) To recover the estimated net ARR, APTRANSCO proposed to levy the monthly Transmission Charge/Rate on Generation Capacities estimated (excluding auxiliaries) for each year of the Control Period. APTRANSCO computed the Transmission Charge by dividing the net ARR with the estimated generation capacity (excluding auxiliaries) for each year of the control period.

b) Since the energy drawn by the users from the transmission system is always less than energy injected into system to the extent of transmission losses, APTRANSCO is accountable for energy to the users to the extent of input energy net of transmission losses. APTRANSCO estimated the transmission loss percentage and filed the same for each year of the Control Period.

4.14. RURAL ELECTRIFICATION:

Rural electrification through generation and distribution no longer needs any licensing.

a. DISTRIBUTION:

Distribution licensee is mandated to provide electricity to consumers who agree to pay the applicable tariff and its license can be suspended or revoked for failure to maintain uninterrupted supply. Further, the ERC can award a second distribution license in the same area of supply against payment of wheeling charge and surcharge in lieu of cross subsidy. The provision for a second distribution licensee was not in the original Bill but found its way into the Act in Section 14. The ERC will need to stipulate the conditions of entry but no applicant will be refused a license on the ground that a license already exists in the same area.

b. TARIFF:

Tariff setting will be completely under the purview of CERC and SERCs. The ERCs are expected to be guided by the National Electricity Policy, Tariff Policy of the Government and the CERCs principles and methodologies. The ERC is also permitted to set ceiling rates when two or more distribution companies operate in the same area. Power purchase agreements or Bulk Supply Agreements entered into before June 10, 2003 have not been explicitly saved or granted a protection from regulatory intervention.

c. CONSUMER INTERESTS:

Consumer Interests are highlighted by the creation of a Consumer Redressal Forum (CRF) by the distribution licensees. Those consumers whose grievances have not been adequately addressed can approach the ombudsman, an authority appointed by the SERC.

4.15. APPELLATE TRIBUNAL:

An Appellate Tribunal would be as an expert body which shall dispose appeals against all orders of the ERC. The appeal from the Appellate Tribunal lies to the Supreme Court and the appeal to the Supreme Court is limited to substantial question of law.

The Electricity Act 2003 clearly attempts to delineate policy making which is the responsibility of the Government and regulatory decisions-making of the ERCs which need to be designed within the parameters of the policy pronouncements. The central government, in consultation and co-ordination with State Governments and the CEA is expected to formulate the following:

- National Electricity Policy
- Tariff Policy
- National Policy on Stand Alone Systems for Rural Areas.

- National Policy on Rural Electrification.

The CEA is entrusted with formulating the National Plan in line with the National Policy.

Under the Electricity Act 2003, it is mandatory for all states to set up Electricity Regulatory Commissions. The functions of the central commission as prescribed in the legislation include:

- To regulate the tariff of generating companies owned or controlled by the central government;
- To regulate the tariffs of generating companies, other then those owned or controlled by the Central Government specified in clause (a), if such generating companies enter into or otherwise have a composite scheme for the generation and sale of electricity in more than one state;
- To regulate the inter-state transmission of energy including tariff of the transmission utilities;
- To promote competition, efficiency and economy in the activities of the electricity industry;
- To aid and advise the Central Government in the formulation of tariff policy which shall be fair to the consumers;
- Facilitate ,mobilization of adequate resources for the power sector;
- Fair to the consumers;
- Facilitate mobilization of adequate resources for the power sector;
- To associate with the environmental regulatory agencies to develop appropriate policies and procedures for the environmental regulation of the power sector;
- To frame guidelines in matters relating to electricity tariff;
- To arbitrate or adjudicate upon disputes involving generating companies or transmission utilities in regard to matters connected with clauses (a) to (c) above;

- To aid and advises the Central government on any other matter referred to the control commission by the government;

4.16. The functions of State Commission are :

- Determine the tariff for generation supply, transmission and wheeling of electricity, supply, transmission and wheeling of electricity wholesale, bulk or retail, as the case may be, within the state;

- Provided that where open access has been permitted to a category of consumers under Section 42, the state commission shall determine only the wheeling charges and surcharge thereon, if any, for the said category of consumers;

- Regulate electricity purchase and procurement process of distribution licensees including the price at which electricity shall be procured from the generating companies or licenses or from other sources through agreements for purchase of power for distribution and supply within the state;

- Facilitate intra-state transmission and wheeling of electricity.

- Issue licenses to persons seeking to act as transmission licenses, distribution, licensees and electricity traders which respect to their operations within the state;
- Promote co-generation and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person and also specify, for purchase of electricity from such sources a percentage of the total consumption of electricity in the area of a distribution licensee;

- Adjudicate upon the disputes between the licensees and generating companies and to refer any dispute or arbitration;'

- Levy fee for the purposes of this act;

- Specify state grid code consistent with the grid code specified under clause(h) of sub-section (1) of section 79;

- Specify or enforce standards with respect to contribution and reliability of service by licensees; fix the trading margin in the intra-state trading of electricity, if considered, necessary and;

- Discharge such other functions as may be assigned to it under this Act.

Although, there was some initial resistance, the efficacy of the new regulatory system has been well established in India. Several states have active ERCs, even while consumer groups are gearing themselves to participate in the regulatory process. The obvious outcome of this process has been a well-established basis for ensuring that the public consultation process continues and brings about transparency in decision-making, the effective inter-face between the government, the regulator, the regulated utility and the stakeholders are still being forged.

A great deal is expected of the Electricity Act 2003, to further the reforms process in the power sector. The act is expected to facilitate:

(a) Entry of more players, both private and public, in power generation and distribution.

(b) Increase in captive generation, particularly by group captives such as industrial estates, export processing zones etc. once open access on distribution is allowed or even open access to bulk consumers on transmission networks; many bulk consumers who pay almost double the average cost of supply are expected to desert the state electricity boards and conventional utilities.

(c) Many contracts between bulk consumers and generators such as those between railways and generating companies such as NTPC, BSES (Reliance energy) may be finalized without public scrutiny.

(d) The tariffs would gradually change to reflect cost to serve and cross subsidies will slowly decline – they may never disappear.

(e) Most SEBs would be forced to restructure and vertically integrated utilities would be a structure of the past. Distribution utilities my desire to invest in generation and vice versa in order to minimize risk but the activities would have to be functionally separated. The structure of the power sector would become increasingly complex with multiple and diverse players involved in generation, trading, distribution and supply. Contractual dealings between these players would be the order of the day.

(f) The central governments role in policy making will increasingly become dominant and will perhaps undermine the role of the state governments.

(g) The Act's provision for a second distribution licensee is expected to create numerous implementation and regulatory problems that delay with an inherent inconsistency in the notion of competition amongst network utilities.

4.17. EMERGING ISSUES – REGULATORY:

The interface between the regulator and the government would need to be carefully forged – the policy making, the financial responsibility for policies and the regulatory decision – making need to be clearly delineated.

Secondly it is important to forge regulatory tools appropriate to the Indian context – while the traditional tools are directed at private utilities, we need tools and processes that would be effective for government owned utilities.

Thirdly, the power sector has several links to allied areas such as the fuel sector-gas, coal, transportation (rail freight) and the environment which are heavily controlled by the government. If and when regulatory bodies are set up to regulate these sectors, it would be required to have adequate interaction between the regulatory authorities for the smooth functioning of the sector.

Fourthly, the regulatory process needs informed and adequate stakeholders participation to be effective – a great deal of capacity building needs to be done in this area particularly amongst consumer groups who need to be trained to participate effectively.

4.18. EMERGING ISSUES – LEGAL:

There is a great deal of pressure on the government to review some of the provisions of the Electricity Act 2003. In fact, all the governments have asked for extension of the time limit by which open access would be mandatory which necessitates the separation of the transmission and treading functions of the transmission functions. Moreover, the appellate tribunal is yet to be set up. And as the implementation of the act progresses case law would need to be documented which would provide a strong framework for future regulatory decision – making. The emerging structure relies heavily

on the framing of contracts between the different players and the adherence to these contracts adequate capacity needs to be built on contracting issues as it pertains to the electricity sector.

4.19. CONCLUSION:

To study the impact of reform, the period of study is divided into two parts namely pre-reform period (1991-92 to 1998-99) and reform period (1999-2000 to 2005-2006). The study of organization structure highlights the changes in the structure and its impact on the performance. As a result of changes that took place in the organization structure the following activities were undertaken after reforms, Separation of trading business from A.P.Transco, commercial, activity, conducting training programs, vigilance services, energy auditing, conducting operation & maintaining work conferences after reforms the APSEB has divided into four power distribution companies i.e., APEPDCL, APSPDCL, APCPDCL and APNPDCL. Each DISCOM is headed by Chairman & Managing Director. The DISCOMs purchase power from APGenco, Central Generating Station (CGS) and Independent Power Producers (IPPs). Andhra Pradesh Transco & Discoms are conducting training programs for employees on their rolls. The pilferage of energy is cases reported by DPE (Detection of Pilferage of Energy) and Operation Engineers are registered with concerned Circle.

1. On-line billing collection facility is available in Hyderabad city and all the towns through ‘e-seva’ centers
2. Sport billing using hand held computers introduced covered all the areas i.e., Towns, Municipalities, Mandals and Villages
3. Generation capacity improved due to increased confidence of IPPs
   Because of these there was improvement in decentralized organization structure.
4. Implementation of circle-wise profit and loss concept to bring accountability and responsibility.

5. Establishing systems and processes to handle power procurement and other issues relating to electricity act.

Thus hypotheses set earlier are proved. Reforms in power sector, benefited the consumers, decentralization helped better performance of the power sector, the decentralized organization structure improved the functioning of the sector and Changes in the organization structure has helped in improving financial efficiency

It is found that the changes in organizational structure improve the performance of power sector in terms of transparency, accountability and also in reducing the pilferages. The regulatory commission was put in place to fix the tariffs. Flexibility in the structure of tariffs should benefit the consumers as well as the corporations.

Table : 4.8 ABSTRACT OF APTRANSCO EMPLOYEES KEPT UNDER SUSPENSION FROM APRIL-2005 TO MARCH-2006 GRAND TOTAL: 141

	Designation	REASONS										
		Meter Seals Tampering	Involvement in Criminal cases.	Pilferage/ Direct Tapping	Corruption	Misappropriation	Negligence/ Dereliction of Duty	Releasing Unauthorized Services	Producing Bogus Educational Certificates	Theft of Dictatorial	Other reasons	Total
1	D.Es	0	0	0	0	0	0	0	0	0	0	0
2	ADEs	0	1	0	2	2	2	0	0	0	0	7
3	A.Es/AAEs	0	1	0	8	6	7	0	0	0	7	29
4	FM. Gr-L1	0	0	0	0	0	1	0	0	0	0	1
5	SLI/ LIs	0	1	1	2	1	6	1	0	0	2	14
6	Linemen	0	3	6	9	5	14	1	2	2	3	45
7	JLM/ALM	0	4	3	3	1	6	0	1	1	0	19
8	UDCs/LDCs	0	0	0	0	9	2	0	0	0	1	12
9	JAO	0	0	0	0	1	1	0	0	0	2	4
10	Typist/RA	0	0	0	0	1	0	0	0	0	0	1
11	ERO Staff	0	0	0	0	1	1	0	0	0	2	4
12	Others	0	0	0	0	0	1	0	0	0	2	3
13	Sub-Engineers	0	0	0	2	0	0	0	0	0	0	2
TOTAL		0	10	10	26	27	41	2	3	3	19	141

Source : Andhra Pradesh Power Development Report 2005-06

Table 4. 9 :
STATEMENT OF CASES REPORTED AND COMPOUNDED FROM APRIL 2005 TO MARCH 2006

Rs.in lakhs

S.No.	District/ APTS	Cases Registered	Cases Compounded	Amount assessed	Assessed amt.Collected	Compound amt.collected	Persons arrested
APEPDCL							
1	Srikakulam	708	544	53.37	13.77	7.42	1
2	Vizianagaram	697	715	39.55	23.12	7.76	1
3	Visakhapatanm	393	403	46.29	25.22	6.68	0
4	East Godavari	801	642	128.63	33.46	14.29	0
5	West Godavari	1021	897	97.09	41.27	16.11	3
Total		3620	3201	364.92	136.85	52.25	5
APSPDCL							
1	Krishna	4091	2965	120.68	48.12	30.70	9
2	Guntur	6044	3496	276.05	69.45	48.90	0
3	Prakasam	7569	4011	119.49	43.09	29.82	1
4	Nellore	8041	5241	126.84	56.32	53.05	9
5	Chittoor	13653	7014	101.40	37.27	48.15	8
6	Cuddapah	12439	7592	145.09	54.52	48.56	0
Total		51837	30319	889.56	301.60	259.18	27
APCPDCL							
1	Ananatapur	9564	6641	245.13	46.30	46.47	69
2	Kurnool	7538	6392	233.33	43.53	49.76	109
3	Mahabubnagar	11603	5898	160.33	44.85	42.56	106
4	Nalgonda	10539	5399	144.22	60.39	38.67	147
5	Medak	7632	6383	133.99	69.74	46.56	118
6	Rangareddy N	10905	6796	195.60	81.52	60.77	254
7	Rangareddy S	5020	5385	94.95	55.38	49.57	193
8	Hyd.team.I (S)	5492	5880	136.53	60.21	52.41	244
9	Hyd.team.II (C)	1762	1959	72.11	35.85	23.97	116
10	Hyd.Team.III (N)	1967	2522	136.41	45.53	28.78	112
Total		72022	53255	1552.60	549.03	439.49	1468
APNPDCL							
1	Warangal	8910	10361	82.92	88.35	63.93	194
2	Karimnagar	7706	9901	120.02	97.56	64.15	416
3	Khammam	9193	8269	47.42	40.31	45.80	304
4	Nizamabad	6968	9110	61.85	38.70	58.97	111
5	Adilabad	5254	6254	70.49	40.62	39.78	185
Total		38031	43895	382.70	305.55	272.63	1210
Grand Total		165510	130670	3189.78	1293.02	1023.54	2710

Source : Andhra Pradesh Power Development Report 2005-06

Table 4. 10 :

Analysis of Losses of 114 Towns

DISCOM	No. of towns	Mar-05					Mar-06				
		< 5%	> 5% < 7.5%	> 7.5% < 10%	> 10% < 12.5%	> 12.5%	< 5%	> 5% < 7.5%	> 7.5% < 10%	> 10% < 12.5%	> 12.5%
EPDCL	29	5	23	1	0	0	7	17	1	4	0
SPDCL	30	1	16	13	0	0	0	8	18	4	0
CPDCL	35	1	14	19	0	1	3	12	19	0	1
NPDCL	20	1	5	12	2	0	0	3	17	0	0
Total	114	8	58	45	2	1	10	40	55	8	1

Source : Andhra Pradesh Power Development Report 2005-06

CHAPTER – 5

TECHNICAL EFFICIENCY

CHAPTER – 05

TECHNICAL EFFICIENCY

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5.1. INTRODUCTION :

In this chapter an attempt is made to understand the technical efficiency of power sector in Andhra Pradesh, during the pre-reform period and after the reforms. Technical efficiency is concerned with the performance of power sector with respect to use of real resources in generation, transmission and distribution of power. Improvement of efficiency has been n important motionation for reforms in the power sector. Its one component, namely technical efficiency is addressed in this chapter.

HYPOTHESES :

The following hypotheses were formulated for examination :

H_5 = Changes in the organizational structure have helped in improving technical efficiency.

H_6 = The rural electrification has improved in the post reform period.

During the pre-reforms period, the power sector was highly centralized. Transmission, generation and distribution were managed by single authority, i.e. Andhra Pradesh State Electricity Board. There was heavy increase in the cost of production and distribution without a commensurate increase in the revenue. Power pilferage, malpractices and power theft were also prevalent. Hence, it was not able to achieve the desired efficiency. There was also considerable government subsidization of the sector.

In order to change this scenario, the government divided APSEB into three independent organizations based on transmission, generation and distribution. This was

aimed to reduce the cost of production, reduce the power theft and pilferage, and eliminate other malpractices and also to increase the revenue.

As a part of reforms strategy, private entrepreneurs were invited to invest in the power sector. Assistance of international organization like the World Bank was sought to facilitate the restructuring. Consequently, the management of power sector has become more decentralized which is expected to help achieve higher technical efficiency through efficient transmission, generation and distribution.

The indicators considered for technical performance are :

- ✓ Auxiliary consumption
- ✓ Availability factor
- ✓ Thermal and hydel efficiency
- ✓ Special oil and coal consumption
- ✓ Plant load factor
- ✓ Transmission and distribution losses

5.2. PATTERN OF INSTALLED CAPACITY FOR POWER GENERATIONS IN ANDHRA PRADESH :

Table 5.1 shows the installed capacity under private and public sectors in Andhra Pradesh. Of the total installed capacity, Andhra Pradesh State Electricity Board contributed about 84 % share in 1990-91 the rest coming from the central sector. But the share significantly declined to about 60 % in 2005-06. The installed capacity of hydel, thermal and gas also declined during the study period. Hydel share in the total installed capacity declined from 50.21 % in 1990-91 to 32.16 % in 2005-06. Even though the share of hydel power declined in total installed capacity during the study period, the capacity under the sub sector recorded positive growth of 6.02 % in post reform period. Similarly during the reform period, the installed capacity under the state thermal sector also had a marginal growth (0.15%) through its share declined from 32.90 % to 26.57 %. Gas and

wind power has recorded meagre share in the total installed capacity, which has not increased since 1997-98.

As can be seen from the table 5.1, the private sector also participated in the power generation processes since 1995-96. Among the private power generating sources gas is the most important. The share of gas based installed capacity significantly increased from 3.44 % in 1996-97 to 8.94 % in 2005-06. While the pre-reform period witnessed a growth of 34 % in the gas based installed capacity of power (all in the private sector), the growth has decelerated to11.88 % during the post-reform period. Moreover the share of private sector in total installed capacity has increased from about 4 % in 1996-97 to about 14 % in 2005-06. It indicates the increased role of private sector in the power generation process.

The central sector contributes substantial share to the installed capacity in the state. The share of central sector in total installed capacity had increased from 15.55 % in 1990-91 to 23.47 % in 2005-06. During the post reform period remarkably the installed capacity of central sector registered 21.01 % annual growth up from 1.6 % annual growth in pre reform period. The overall data from the table reveals that the installed capacity of that state level has increased significantly during the reform period and registered 7.46 % annual growth compared to 5.9 % in pre reform period.

Table 5.2 shows the pattern of power generation in Andhra Pradesh through different ways since 1991 to 2006. It could be seen from the table that among all the generating systems, Hydel and Thermal are more important. The share of hydel in total generated power has been declining (with some fluctuations) from 48 % in 1991-92 to 14.97 % in 2005-06. It is attributed due to the low rain fall and less availability of water in power generating plants. Thermal power occupied major share in the total plants generated power. During the study period, share of thermal power in total power generated in state sector increased from 38.90 % in 1991-92 to 51.43 % in 1998-99, and afterwards it has declined to 35.06 % in 2005-06. The power generated through gas and wind occupied very small percentages in the total generated power. The power generated

through private sector has significantly increased from 1.52 % in 1996-97 to 14.70 % in 2005-06. The state is also getting power from central sector and its share in total generated power has increased from 13.10 % to 30.38% during 1991-92 to 2005-06. It is interesting to note that after the reform (reform period 1999) in Andhra Pradesh the power generated through different segments of state sector has declined significantly. However the power generated through hydel registered negative growth rates both during pre and post- reform periods, whereas power generated through thermal sources registered 13.46 % annual growth in pre-reform period and then sharply declined to a negative (-2.03 %) growth annually in the post-reform period. A comparison is also made for the power generated through gas, which observed positive growth rates in pre and post-reform periods. But the growth rate in post-reform period is sluggish compared to the pre-reform period. The power got from the central sector registered 11.37 % annual growth in post-reform period compared to 9.25 % growth in the earlier period. Where all sectors are taken together, the power generation has declined during the post-reform period (2.78%) compared to the pre-reform period (7.94%). It seems that the reforms in power sector at state level could not bring up the capacity of power generation at state level. The power generation declined in post-reform period in Andhra Pradesh. It is largely because of the abandoning of Nellore Thermal Station which was one of the important power generation stations. It is also suggested that the failing of power generation plant frequently in the post-reform periods also caused sluggish power generation.

5.3. CONTRIBUTION OF PRIVATE SECTOR :

Table 5.3 gives data on the power generated by private sector, if shows that the private sector contributes significant percentage of power to the total generated power at Andhra Pradesh State Level. The private sector generates power through gas, hydel, wind and other methods. The data presented in table 5.3 shows that among different sources of power generation by private sector gas occupied major share in the total generated power. It is interesting to note that the power generated by private sector has increased from 2.93 MU in 1994-95 to 1681.85 MU in 2004-05. The volume of power

generated by gas remarkably increased from 232.70 MU to 998.88 MU. The other sources also contribute significantly. Among the other sources hydel, wind, biogases, bio-mass and mini power plants also contribute notable percentage to the total power generated by private sector. It can be clearly seen from the table that the private sector had a significant prominent share in the total power generated and its to share had to increased significantly during the study period.

The power generation at Andhra Pradesh State has declined in the post-reform period, which is mainly due to the increase of inputs prices, like coal and oil. It is observed from tables 5.4 and 5.5 that due to the strict regulation of coal prices by the Electricity Regulation Commission has resulted in declining trend of coal prices in 2006 compared to previous year i.e., 2005, The rayalaseema thermal power project (RTPP) is paying highest cost (Rs.832.84 /mt) among the major thermal power stations, followed by RTS (B), VTPS and KTPS,. Even the declining tendency of coal prices per metric tonne could not surpass the increasing tendency of the oil prices. A significant increase is observed in the prices of oil. The details of oil prices during 2005 and 2006 can be seen in the table 5.5. In the table total oil used is classified into three sub groups such as furnace oil, high speed diesel and low speed diesel. It is interesting to note that the LSD oil prices doubled in 2006 compared to 2005. More or less same increasing tendency has been observed in case of remaining oil types. The increase of oil prices is the main reason for the declining tendency of power generation.

Table 5.6 explains the gross and net generation of power and auxiliary consumption at state level since 1990-91 to 2005-06. It is seen from the table that the gross power generation increased from 21103 MU in 1990-91 to 40574 MU in 1998-99. But after wards it steeply declined and reached to 28573.92 in 2005-06. Moreover during the pre- reform period the power generation remarkably increased and recorded 8.2 % annual growth, where as in post-reform period it steeply declined and recorded -0.88 % annual growth. It is not so much a case of declining trend in gross generation as of a one time sharp fall in gross generation from 40574 MU in 1998-99 to 29632 Mu in 1999-2000. Due to increase of auxiliary consumption, the net power generation also declined

during the study period. Moreover during the post-reform period even auxiliary consumption declined after 1999-2000, though only marginally. Thus net generation declined more sharply than gross generation. It is interesting to note that in the pre-reform period the state used to export power to other neighbour states like Karnataka, Orissa, Madhya Pradesh and Pondicherry. Among these states major percentage of power was exported to Pondicherry and Orissa. The exported power during the pre-reform period registered 7.95 % of growth. The state had some "excess" amount of power after the domestic consumption. But after the reforms only in the initial period it has exported very meagre percentage of power from the state sector. This may be attributed to low generation of power and increasing tendency of power demand during the post-reform period (Table 5.9).

Table 5.7 shows the plant load factor since 1992-93 to 2004-05. The generation of the power increased from 9114.18 MU to 19833.62 MU during 1992-93 to 1998-99. In this period plant load factor has generally increased and quite significantly from 65% in 1992-93 TO 82 % is 1997-98 before declining to 78 % in 1998-1999. After reforms the power generation increased 21499.10 to 23359.71 during 1999-2000 to 2004-05 respectively. In its generating capacity the plant load factor, increased further from 83.18 % to 89.79 % during the same period. It can be seen that the pre- reform period itself saw significant improvement in PLF and it is creditable that it increased further from that high base in the post-reform period.

Table 5.8 explains that the installed capacity and relative demand of power since 1991 to 2006. It is observed from the table that the installed capacity has recorded 8.25 % of growth during pre-reform period but during the post-reform period its slows down and records 7.47 % annual growth. On the other hand, the peak demand for power registered 7.62% of growth in the pre-reform period and only 2.94 % of growth in the post-reform period. Even though the installed capacity and demand of power has registered positive growth rates during post-reform period but it was comparatively lower than the pre-reform period. Due to the progress electrification in remote areas by state government resulted in relatively lower demand for power in relation to installed capacity

during post-reform period. It may be noted that electrification of remote (rural) areas may not generate commensurate demand and peak demands in such areas and urban areas may be staggered thus lowering rate of growth of overall peak demand. This table suggests that the electrification performance is impressive in the post-reform period.

5.4. RURAL ELECTRIFICATION :

Progress of rural electrification under Five Year Plans can be seen from the Table 5.10. The study period here is from 1990-1999 and 1999-2006. Hence, to examine the impact of power reforms, the data has been taken only from The Seventh Five Year Plan to Tenth Five Year Plan. Increase in transmission, distribution is one of the indicators for progress of electrification. From Seventh Five Year Plan to Eighth Five Year Plan the transformers distribution recorded 35.67 % of growth. But during the post-reform period it recorded 23.50 % of growth. The number of towns and villages electrified are constant during all study five year plans, indicating majority of villages in Andhra Pradesh have electricity. However the growth of electrified hamlets is recorded at 15.01 % during the pre-reform period and 2.83 % during and post-reform period. The electrified dalit wadas have increased form 29899 to 51254 indicates the progressive development. It is interesting to note that the agriculture connections have remarkably increased from 11.12 lakh to 24.40 lakh during the study period. One can understand from the data presented in the table that under the five year plans the progress of electrification is significant. However it is slower in post-reform period compared to the pre-reform period.

The electrification of villages and towns in Andhra Pradesh State can be seen in Table 5.11. The services of electricity to towns and villages has significantly increased during the post-reform period (7.48 % of growth) compared to pre-reform period (4.84 % of growth). However, the growth in connected load to the towns and villages has slightly declined in the post-reform period. (7.21 % of growth) compared to the pre-reform period (10.92 % of growth). Thus it is seen from this data that, on the one side the expansion of electrification is significant and on the other hand the load capacity has grown at a slower

pace. It does indicate the government's interest towards the electrification of development in the rural Andhra Pradesh.

Table 5.12 presents the data on electrification of hamlets, towns and villages and dalits wadas. During the period of 1991 the total number of electrified hamlets was 16578. This increased at 4.9 % annually to reach 27209 hamlets in 1999. In the post-reform period number of electrified hamlets was 27391. In year 2000, it increased at a slower growth rate (2.7) annually to reach 31533 electrified hamlets in 2006. Thus, during the pre-reform period the average annual growth rate was 4.86 and it has slowed down to 2.72 % during the post-reform period

There is no change in number of towns and villages because the entire villages and towns were already electrified by 1991. The electrification of dalit wadas, before reforms grew at an annual compound growth rate of 2.8 %. It has increased after reform with an annual compound growth rate of 4.38% almost twice as fast compared to the pre-reform period. Thus, we see that government has become more serious in the post-reform period regarding electrification of dalit wadas.

The data in Table 5.13 presents the agricultural services connected to farmers. In pre-reform period it was 1193363 connections in 1991 and grew in 1999 to 1884686 connections. After reform period from 1932913 connections in 2000 it increased to 2440823 connections in 2006. Looking at annual compound growth rates before and after reforms compound growth rate was 5.99 before reform and slowed down to 4.2 % in post-reform period. Supply of electricity to the farmers has remained an important issue at this period.

5.5 OTHER INDICATORS :

The data given is Table 5.14 shows that the length of transmission lines and distribution lines was 1571484 KM in 1991 and it increased to 209156 KMs in 1999 in the pre-reform period. On the other hand in the post-reform period the length of lines

was 216527 KMs in 2000. It increased further to 278015 KM in 2006. The annual compound growth rate was 3.4 % in pre-reform period and it improved to 4.2 % in the post-reform period. Clearly, the transmission and distribution network has seen further and faster expansion in the post-reform period

Similarly, when we examine the state of consumers served by Andhra Pradesh Transco we find significant improvement in growth of consumers. In pre-reform period there were 6659 (thousand) consumers in 1991, which increased to 10583 (thousand) consumers. In the post-reform period, the number of consumer was 11104 (thousand in 2000 and it increased to 17235 (thousand) consumers in 2006. Annual compound growth rate has substantially increased from 5.9 % during the pre-reform period to over 6.8 % in the post-reform period. So year by year the consumer utilization has increased faster and it should contribute to increase in revenue.

The development of 11KV and low tension lines can be seen in Table 5.16 since 1991 to 2006. The length of 11 KV lines has increased during pre and post-reform periods. But compared to the pre-reform period the growth rate at about 4 %, is much higher in post-reform period in case of 11kv lines. It was only 3.16 % in during the pre-reform period. When we came to the length of low tension (LT) lines it has remarkably declined to 2.9 % of growth during post reform period. The declining tendency of LT lines in post-reform period resulted in the decline in growth rate of total length of lines and registered only 3.2 % growth. It is noted that after the reforms the electricity board of Andhra Pradesh mostly concentrated on the development of high tension (HT) lines due to its high ceiling rates (tariff rates).

Table 5.17 provides a synoptic view of power sector in Andhra Pradesh in terms of indicators of electricity development. Overall we get a mixed picture from this view. There is no doubt that installed capacity per 1000 persons has continued to increase in more or less similar way in both the pre-reform and post-reform periods. Likewise, actual energy consumed per 1000 person has continued to increase but at a slower growth rate. As already seen, transmission and distribution line network has continued to expand in

the post-reform period. The picture is the same when considered in terms of these lines per Sq. Km of area. Proportion of electricity sold to agriculture has remained more or less close to 40% in both the periods, except for more recent years, when it has declined to nearly 36 %.

Some factors which can be seen to be indicative of improvement or otherwise in technical efficiency, it can be seen that electricity generation (in KWH) per unit of installed capacity (in KW) has improved in the post-reform period though only marginally. Length of transmission lines per 1000 units generated is relatively smaller in the pre-reform period. Finally, there is significant and substantial increase in customers served per employee in the post-reform period. This certainly is a positive and welcome development.

5.6. CONCLUSION:

Technical efficiency concerns evaluating the performance of power sector with respect to use of real resources in generation, transmission and distribution of power. The analysis has indicated that the installed capacity at the state level has increased significantly during the reform period and registered 7.46 % annual growth compared to 5.9 % in pre reform period. It seems that the reforms in power sector at state level could not boost the power generation capacity at state level. A factor contributing to this problem is the abandoning of Nellore Thermal Station which was one of the important power generation stations.

Power generated by gas remarkably increased from 232.70 MU to 998.88 MU. With in the private sector, other sources also contribute significantly after gas. Among the other sources hydel, wind, biogases, bio-mass and mini power plants also contribute notable percentage to the total power generated by private sector.

The exported power during the pre-reform period registered 7.95 % of growth. The state had excess amount of power after the domestic consumption. But after the

reforms only in the initial period it has exported very meagre percentage of power from the state sector. This may be attributed to low generation of power and increasing tendency of power demand during the post-reform period. Due to the progress of electrification in remote areas by state government resulted in relatively lower demand for power in relation to installed capacity during post-reform period. It may be noted that electrification of remote (rural) areas may not generate commensurate demand and peak demands in such areas and urban areas may be staggered thus lowering rate of growth of overall peak demand.

The electrification performance is impressive in the post-reform period. The services of electricity to towns and villages has significantly increased during the post-reform period (7.48 % of growth) compared to pre-reform period (4.84 % of growth). The annual compound growth rate was 3.4 % in pre-reform period and it improved to 4.2 % in the post-reform period. Clearly, the transmission and distribution network has seen further and faster expansion in the post-reform period. The declining tendency of LT lines in post-reform period resulted in the decline in growth rate of total length of lines and registered only 3.2 % growth. It is noted that after the reforms the electricity board of Andhra Pradesh mostly concentrated on the development of high tension (HT) lines due to its high ceiling rates (tariff rates). Finally, there is significant and substantial increase in customers served per employee in the post-reform period. This certainly is a positive and welcome development. Thus the main hypotheses that Changes in the organizational structure have helped in improving and technical efficiency and the rural electrification has improved are in the post reform period.

CHAPTER – 6

FINANCIAL EFFICIENCY

CHAPTER – 06

FINANCIAL EFFICIENCY

6.1. INTRODUCTION:

In this chapter an attempt is made to understand the issue financial efficiency in the power sector in Andhra Pradesh. The study period as before, as divided in to two parts i.e., pre-reform period (1990-91 to 1998-99) and post-reform period (1999-2000 to 2005-06). In pre-reform period the entire power sector was under the control of Andhra Pradesh State Electricity Board.

As we saw in earlier a chapter that is the post-reform period there was change in the organizational strudure in the state sector through corporatization and dividing up of the APSEB. Further, power sector was opened up to the private sector. The Board's financial health can be improved through cost reduction and additional revenue earnings. Cost can be reduced in many ways. There are possibilities of cost reduction though technical efficiency improvement and reduction in labor cost, pilferage and interest burden, and the last of these can be reduced through proper capital restructuring. Although the technical performance has improved but there is scope of reducing auxiliary and coal consumption. Reductions in auxiliary losses will earn additional revenue through selling of the additional electricity that will be available.

HYPOTHESES :

The following hypotheses were set for examination in this chapter:

H_7 = The financial efficiency has improved in the post reform period compared to pre reform period.

H_8 = Because of the reforms the financial condition of the Andhra Pradesh

power sector has improved.

6.2. CAPITAL INVESTMENT & SALES OF ENERGY :

Table 6. 1 capital investment indicates the capital investment incurred in generation, transmission and distribution since 1991- 2006. The capital investment for generation of the power increased from 191.14 to 561.41 during 1991-1999 and registered 14.59 % of growth during the same period for the transmission and distribution of power the capital investment also increased and registered 1.75 % and 15.57 %. During the same period respectively. It also can be seen from the table 6.1, that the capital investment in the power generation has slow down and registered only 12.52 % of growth during the post reform period. Same declining tendency also observed in the case of transmission process. However the capital investment has increased and registered 16.42 % of growth during the post reform period more over in the post reform period (11.47 % of growth) comparative the pre-reform period (9.52 % of growth).

Table 6.2, sales of energy category wise. The data presented in the table 6.2 tells the sales of energy from 1991-1992 to 2005-06. The table mainly shows sales of energy from L.T category, H.T. categhory and ytotal L.T and H.T categories. In L.T. category the Exp. Growth rate was 5.67 % it is in pr-reform period. In post-reform period the exp. Growth rate increased considerably to 6.21 %. In all sectors in L.T. category from 1 to 8 categories in sales of energy is increasing constantly. Speciallyt in category 5th catefgory I.e.., in agriculture that sales are in 1993-4, 1994-95, 1995-96, 1996-97 and 1997-98 the sales in MU are 9022.00, 10922.00, 13399.00, 7833.00 and 9336.00 respectively. It is light or slow fluctuation in its sales. But after post-reform period its growth rate was lowly increased.

n H.T. sector during the years 1991-92 to 1998-99 the sales shows an exp. growth rate of 0.99 % after reforms in 1999-2000 to 2005-06 the exp.growth rate is 11.81. it is rapid change and improvement in its sales. It could be observed from the data that major proportion of sales of energy had been recorded in the case of sales of energy in pre-

reform period the exp.growth rate was 4.12 % and in post-reform period the exp.growth rate was 7.73%. It is a remarkable increase it its sales. So the table shows after reforms the sales of energy is increased.

6.3. DEVELOPMENT IN FIVE YEAR PLANS :

Table 6.3 progress under five year plans shows the progress under the five year plan for, fixed assests and revenue. During the first five year plan and 2nd plan period the gross capital is 27.95 and the gross revenue is 6.78. During the third five year plan the gross capital is 89.52.and accumulated depreciation is 15.78, gross revenue is 18.00. During the fourth plan period the gross capital is 281.23, accumulated depreciation is 66.59, and total revenue is 56.70. Again during the period of seventh plan period is gross capital is accumulation depreciation capital is and total revenue is 1015.98. During the tenth plan period is the gross capital is 13049.24 and accumulated depreciation is 5410.97 and the total revenue is 12361.53rupees in Crores

6. 4. DETECTION OF THEFT OF ENERGY :

Table 6. 4 detection of theft of energy It could be also observed that detection of theft of energy during the period of 1990-91 the number of theft cases booked 1387. It increased to 5863 during the period of 1995-96. During the period of 2000-01 the number has increased to 6100. Further it has been increased to 57828 during the period of 2005-06.

It could be also observed the number of malpractices noticed. During the period of 1990-91 the number of malpractice are 3281; it reduced to 2305 during the period 2000-01. It then increased to 6463 in the year 2005-06. The efficiency of electricity of administration and performance can be seen from the table 6.4, the administrative efficiency can be assessed through the protection of electricity thefts and the malpractices cases.

The theft cases booked by the electricity department has increase during the study period and registered 35.65 % of growth in pre reform period and 44.84 % of growth in post reform period comparative to the pre reform period that the notified malpractices cases has declined in the post reform period. However the revenue also increased during the entire period due to the power control of misusing electricity facility and appropriate monitoring efficiency.

6.5. REVENUE FROM SALES OF POWER :

Table 6. 5 shows Percentage of income and expenditure in Andhra Pradesh electricity board have been presented in the table 6. 5. Major proportion of revenue comes from sale of power. But its share has not remained constant but fluctuates. During the pre reform period its share in total revenue declined from 92.97 % in 1990-91 to 58.51 % in 1998-99. Moreover the subsidy shares significantly increased from 2.987 % to the 35.03 % during the same period. In the case of expenditure major proportion has been incurred on fuel cost and power purchase cost. The fuel cost share in the total expenditure has slightly increased from 23.69 % to 26.39 % and power purchased cost also increased from 19.50 % to 28.98 % during the pre reform period. The share of establishment, general and office expenses sharing total revenue declined from 17.22 %, 12.27 % and other expenses have major percentage of total share which can be negligible.

The data presented in the table 6. 5 explains that during the post reform period the share of revenue by sectors of power in the total revenue receipts has recorded an increase from 58.45 % to 71.80 %. However share of subsidy steeply declined from 35.71 to 12.94 % in the post reform period. Even during the post reform period, the cost of power purchases has occupied major proportion in the total expenses. After the power purchasing cost establishment, general and operation and management expenses are the major constitutes. The depreciation and interest charges have declined in the post reform period comparative to the pre reform period.

Table 6. 6 provide the revenue receipts and expenditure details of transmission and distribution during pre and post reform period. In the pre-reform period the revenue receipts registered 20.48 % growth rate. It is mainly because of the increasing tendency of sale of power which has increased from Rs.1210.2 crores or in 1990-91 to Rs.3479.64 crores in 1998-99. The revenue expenditure and other expenses also registered positive growth rates in pre-reform period. Growth rate is revenue receipts, revenue expenditure and other expenses has declined during the post-reform period compared to the pre reform period. Like pre-reform period major revenue accrued from the selling of power. During the post-reform period revenue receipts growth have slightly declined comparative to the pre-reform period and registered 20.16 % growth rate. The revenue expenditure also declined in the post-reform period due to the decline in the power purchase expenditure. It is important to note that gross generating result as recmtasly increased in post-reform period indicates that the profitability and progress of the electricity in the Andhra Pradesh.

The data presented in the table 6.7 reveals the revenue from selling of power during 1990-91 to 2005-06. The table mainly shows revenue from low tension category and high tension category from sales of power. In L.T category, the compound growth rate was 23.25 %. In pre-reform period. After reform period compound growth rate reduced considerably to was 10.84 %. In all sectors in LT category from 1 to 8 in revenue is increasing constantly in the pre-reform period. But after post reform period the revenue having some fluctuation in its growth. Specially it is observed in category number 5 to 7 (the 5^{th} category is agricultural sector and 7^{th} category is general purpose), that revenue from 5^{th} category in 2001-02, 2002-03, 2003-04 and 2004-05 was 208.22, 818.37 416.94 and 402.29 respectively. In 7^{th} category during the years 1999-2000, 2000-01 and 2001-2002 revenue was 29.49, 34.52 and 33.17 respectively. In agricultural sector the thefts are high and general purpose misuses are high. Because of these two reasons the revenue was less and also the compound growth rate also less.

In HT sector during the years 1990-91 to 1998-99 the income is shows a compound growth rate of 12.64 %. After reforms from 1999-2000 to 2005-06 the

compound growth rate is higher at 13.01 %. Rebate to new industries during the pre reforms period is 8.09 % and it is 43.00 % after reform period. On the aggregate level the revenue compound growth rate is 16.53 % in pre-reform period and, 12.00 % in post-reform period.

It could be observed from the data that major proportion of revenue had been recorded in the case of selling low tension power. In details the revenue from low tension category increased from 357.54 cr in 1990-91 to 1953.14 cr in 1998-99 and registered 23.259 % of growth. It is ascribed to the rapid revenue increase from category I, II, and III. The revenue from high tension category registered 12.64 % of growth. Moreover during the pre reform period the revenue from the selling of power recorded 16.52 % of growth. It is important to note that the revenue growth rate from low tension category has significantly declined where as the revenue growth rate from high tension category has increased in the post reform period compared to the pre reform period. However the total revenue from the selling of all category power has a recorded 12.1 % of growth in post-reform period which is also lower compare to the pre reform period. The annual data on power sector revenue reveals that during the total study period income from the selling of power has continuously increased even in the post reform but at a lower rate compare to pre reform period.

Table 6.8 shows gross revenue indicates the gross revenue incurred from APSEB during 1990-2006. The gross revenue increased from Rs.1301.70 crs to Rs. 4260.47 crs during 1990-91 to 2005-06 and registered 16.77 % growth rate during the same period. From the table we can be seen that the gross revenue increased and registered 17.93 % of growth rate in post-reform period. So the table's shows positive performs year by year during the study period and the gross revenue increased

6. 6. CONCLUSION :

As we saw in earlier chapters that are the post-reform period there was change in the organizational structure in the state sector through corporatization and dividing up of

the APSEB. Further, power sector was opened up to the private sector. Financial health can be improved through cost reduction and additional revenue earnings. Cost can be reduced in many ways. There are possibilities of cost reduction though technical efficiency improvement and reduction in labor cost, pilferage and interest burden, and the last of these can be reduced through proper capital restructuring. The capital investment has increased and registered 16.42 % of growth during the post reform period more over in the post reform period (11.47 % of growth) comparative the pre-reform period (9.52 % of growth). From the analysis it was found that after reforms the sales of energy is increased. the revenue also increased during the entire period due to the power control of misusing electricity facility and appropriate monitoring efficiency. The annual data on power sector revenue reveals that during the total study period income from the selling of power has continuously increased even in the post reform period but at a lower rate compared to pre reform period. Further it was found that the gross revenue increased during the study period .so the above analysis indicate that the reforms have improved the financial efficiency during post-reform period.

CHAPTER – 7

CONCLUSTION AND POLICY SUGGESTIONS

CHAPTER – 07

CONCLUSION AND POLICY SUGGESTIONS

Power development is one of the key infrastructural elements for the economic development of the country. In recent years, it has assumed paramount importance in view of its role in rapid development of industry, agriculture and service sector in the country

The viability of project is a major consideration in selecting the power generating technologies in Andhra Pradesh, in India and also in other developing countries. Cost of power has become the most sensitive commercial and political issues in India; Government wants to produce power at the lowest price. Further grants, subsidies, tax incentives, low or no interest rate for farmers are important in the electricity sector.

The journey of the power sector in Andhra Pradesh in the recent past more than six years was tough and encountered four years of continued drought in the state and consequent hydro generation failures. In spite of the unkindness of rain in part of this period, the sector is able to pull through and achieved a turn around. The over all supply conditions have improved a lot with the system attaining a high availability factor. The power sector in Andhra Pradesh today is seen by many as an example for efficient and commercially viable operations and customers-oriented initiatives.

If we observe during the year 2005-06 the working expenses worked out to Rs.12070.13 crores, which constitutes 97.64% of gross revenue of Rs.12361.52 including subsidy of Rs.1599.48 crores receivable from Government of Andhra Pradesh. The deficit (without subsidy) before depreciation and interest was Rs.132.36 crores in 2005-06. Sales of energy with in state were 39651.71 MU during the period 2005-06. Revenue by sales of power during this year amounted to Rs.8875.26 crores. The total assets of the

APTransco as on 31-03-2006 stood at Rs.16810.15 crores and amount of Rs.358.16 crores was spend on capital works (including outside plan).

Power crisis many times not only disturbs the normal living but also the political parts and Government mechanism. The reforms taken up by the central and state government to overcome the crisis have not always yielded the targeted results. The mindset of the producers, distributors and users are equally important. Keeping concern for environment, coordinated efforts among various agencies public and government officials an required to overcome the misuse of regulatory mechanism to bridge the gap between demand and supply. Cautious policy in generation, transmission and distribution with the support of all is required for smooth working of power sector, which is core input for the economic development.

Given the back ground for the need of reforms in power sector, the current study was taken with the following specific objectives;

***The specific objectives of this study are*:**

1. To examine the changes in organizational structure before and after reform period and its impact on the functioning of the sector. Also to study the methods of Regulatory Commission is fixing the tariffs.

2. To examine the technical efficiency of power sector in Andhra Pradesh.

3. To examine the financial efficiency of power sector in Andhra Pradesh.

For achieving athe above material or data was collected from secondary sources, mostly from the published annual administrative reports of the A.P.S.E.B and web sites of government of Andhra Pradesh.

The following hypotheses were set for testing in different chapters

In chapter four

H_1 = Reforms in power sector, benefited the consumers.

H_2 = Decentralization helped better performance of the power sector.

H_3 = The decentralized organization structure improved the functioning of the sector.

H_4 = Changes in the organization structure helped in improving financial efficiency.

In fifth chapter

H_5 = Changes in the organizational structure have helped in improving technical efficiency.

H_6 = The rural electrification has improved in the post reform period.

In sixth chapter

H_7 = The financial efficiency has improved in the post reform period compared to pre reform period.

H_8 = Because of the reforms the financial condition of the Andhra Pradesh power sector has improved.

7. 1. SUMMARY OF THE FINDINGS :

Prior to the reforms in the power sector the erstwhile APSEB has become unviable resulting in inadequate production and distribution coupled with revenue losses. Therefore the government of Andhra Pradesh was forced to bring about dynamic change in its policy statement in 1997. APSEB was made into two corporations APGenco and APTransco in the first phase of reforms. In the second phase of reforms APTransco retained the business of transmission and bulk supply and four distribution companies

(APEPDCL, APCPDCL. APNPDCL and APSPDCL) were carried out of APTransco for the rest. After the state government under took the reforms, national and international funding agencies came forward to help finance the power sector in the state. With regard to installed capacity, the number of high tension consumers and low tension consumers the growth rates were encouraging. With regard to installed capacity, the average annual growth rate increased.

Due to introduction of reforms in power sector private power producers entered the power industry, thus augmenting annual growth rate of installed capacity during the reform period. Reforms have created the hope in the consumers that the power sector can supply power with quality resulting in increase in the average annual growth rate of high tension and low tension consumes during the reforms period, on the other hand there is certain delay in the execution of private projects due to different factors including delay in getting different permissions from the government both at the center and state level, resulting in the decrease in the average annual growth rate of power generation during reform period in spite of the high average annual growth rate of installed capacity. Decrease in the average annual growth rate of revenue during the reform period indicated that the government is required to take some more steps in the area of revenue collection in the power sector.

To study the impact of reform, the period of study is divided into two parts namely pre-reform period (1991-92 to 1998-99) and reform period (1999-2000 to 2005-2006). The study of organization structure (chapter-4) highlights the changes in the structure and its impact on the performance. As a result of changes that took place in the organization structure the following activities were undertaken after reforms, Separation of trading business from A.P.Transco, commercial, activity, conducting training programs, vigilance services, energy auditing, conducting operation & maintaing work conferences after reforms. The APSEB has divided into four power distribution companies. 1) Eastern Power Distribution Company of Andhra Pradesh Limited (APEPDCL), 2) Southern Power Distribution Company of Andhra Pradesh Limited (APSPDCL), 3) Central Power Distribution Company of Andhra Pradesh Limited

(APCPDCL), 4) Northern Power Distribution Company of Andhra Pradesh Limited (APNPDCL). Each DISCOM is headed by Chairman & Managing Director. The DISCOMs purchase power from APGenco, Central Generating Station (CGS) and Independent Power Producers (IPPs). They are in charge of distribution system and serving all the consumers i.e., High Tension (HT), and Low Tension (LT) and are also looking after the Rural Electrification in the state. Andhra Pradesh Transco & Discoms are conducting training programs for employees on their rolls. There is a vigilance wing in the Discoms which consists of chief vigilance officers in the rank of S.P/ Addl. S.P. for all the four distribution companies with head-quarters at Hyderabad for CPDCL, Warangal for NPDCL and Visakhapatnam for EPDCL and Tirupati for SPDCL functioning directly under the supervision of JMD (Vig. & Sec). Each Anti Power Theft Squad police station has a sanctioned strength of 1 Inspector, 2 Sub-Inspectors, 2/3 Head-Constables and 4/6 Constables. The pilferage of energy are cases reported by DPE (Detection of Pilferage of Energy) and Operation Engineers are registered with concerned Circle.

It is found that the changes in organizational structure helped to improve the performance of power sector in terms of transparency, accountability and also in reducing the pilferages. It was done through the following actions:

- Spot billing using hand held computers introduced covering all the areas i.e., Towns, Municipalities, Mandals and Villages. Monthly spot billing is introduced in all Municipalities.

- On-line billing collection facility is available in Hyderabad city and all the towns through e-seva centers.

- On-line billing collection facility in rural areas through 1248 Rural Service Delivery Points (RSDPS) e-kiosks are already setup.

- Collection centers increased from 1390 in 2002-03 to 2712 at present.

- There are 1120 e-kiosks in rural areas and 250 e-seva centers in urban areas.

- Various IT initiatives have been taken up in Distribution Companies to improve the performance and bring in transparency/accountability.

    - Consumer Analysis Tool (CAT)
    - Monitoring and Tracking System (MATS)
    - Transformer Information Management System (TIMES)
    - Performance Monitoring and Reporting System (PMRS)
    - Book Consolidation Module (BCM)
    - Remote Meter Reading (RMR)

The regulatory commission was put in place to fix the tariffs. Flexibility in the structure of tariffs should benefit the consumers as well as the corporations.

Chapter 5 examines the technical efficiency of the power sector reforms, technical efficiency concerns evaluating the performance of power sector with respect to use of real resources in generation, transmission and distribution of power. The analysis has indicated that the installed capacity at the state level has increased significantly during the reform period and registered 7.46 % annual growth compared to 5.9 % in pre reform period. It seems that the reforms in power sector at state level could not boost the power generation capacity at state level. A factor contributing to this problem is the abandoning of Nellore Thermal Station which was one of the important power generation stations. The share of power generated by gas remarkably increased from 232.70 MU to 998.88 MU in the private sector. The other sources also contribute significantly after gas. Among the other sources hydel, wind, biogases, bio-mass and mini power plants also contribute notable percentage to the total power generated by private sector.

The exported power during the pre-reform period registered 7.95 % of growth. The state had excess amount of power after the domestic consumption. But after the reforms only in the initial period it has exported very meagre percentage of power from

the state sector. This may be attributed to low generation of power and increasing tendency of power demand during the post-reform period. Due to the progress electrification in remote areas by state government resulted in relatively lower demand for power in relation to installed capacity during post-reform period. It may be noted that electrification of remote (rural) areas may not generate commensurate demand and peak demands in such areas and urban areas may be staggered thus lowering rate of growth of overall peak demand.

The electrification performance is impressive in the post-reform period. The services of electricity to towns and villages has significantly increased during the post-reform period (7.48 % of growth) compared to pre-reform period (4.84 % of growth). Clearly, the transmission and distribution network has seen further and faster expansion in the post-reform period. The declining tendency of LT lines in post-reform period resulted in the decline in growth rate of total length of lines and registered only 3.2 % growth. It is noted that after the reforms the electricity board of Andhra Pradesh mostly concentrated on the development of high tension (HT) lines due to its high ceiling rates (tariff rates). Finally, there is significant and substantial increase in customers served per employee in the post-reform period. This certainly is a positive and welcome development.

From the analysis of financial efficiency of power sector in Andhra Pradesh, (chapter 6) it was observed that financial health can be improved through cost reduction and additional revenue earnings. Cost can be reduced in many ways. There are possibilities of cost reduction though technical efficiency improvement and reduction in labor cost, pilferage and interest burden, and the last of these can be reduced through proper capital restructuring. The capital investment has increased and registered 16.42 % of growth during the post reform period. It is more over in the post reform period (11.47 % of growth) compared to the pre-reform period (9.52 % of growth). From the analysis it was found that after reforms the sales of energy is increased. The revenue also increased during the entire period due to the power control of misusing electricity facility and appropriate monitoring efficiency. The annual data on power sector revenue reveals that

during the total study period income from the selling of power has continuously increased even in the post reform period but at a lower rate compared to pre reform period. Further it was found that the gross revenue increased during the study period. So the above analysis indicates that the reforms have improved the financial efficiency during post-reform period.

The theft cases booked by the electricity department increased during the study period. These registered 35.65 % of growth in pre reform period and 44.84 % of growth in post reform period comparative to the pre reform period gap. The revenue increased during the entire period due to the control of misusing electricity facilities and putting in place appropriate monitoring. Effective working of staff and booking of theft and malpractices cases is also one of the reasons for profits of state electricity board.

To sum up, the analysis of data from the main chapters of the thesis indicate that due to change in organizational structure from board to corporation the technical performance and financial performance of the power sector have improved during post reform period.

7. 2. POLICY SUGGESTIONS:

There is need for further reducing Transmission and Distribution losses technical as well as commercial; and consumers should help to electricity board for better services, in a state Andhra Pradesh our where there is great demand for improvement of rural and urban energy supply. Improvement of the overall health of the power sector is possible, if these and other measures, such as improved metering, billing and better management practice are put into practice.

APPENDIX TABLE

LIST OF TABLES (INCLUDING GRAPHS & CHARTS)

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Name of the Category	1-11-90	1-01-92	1-12-92	2-08-95
H.T. Category - I a)Industrial	**A)Rs.55/KVA/Month B)Rs.115Ps/Unit	A)Rs.65/KVA/Month B)150Ps/Unit	A)Rs.75/KVA/Month B)185Ps/Unit	A) Rs.110 per KVA per month 235 Paise per unit
b)Seasonal	A) R.M.D.or 30% CMD which ever is higher at Rs.55/KVA/Month B) 125 Ps/Unit	A)R.M.D. or 30% of CMD which-ever is higher at Rs.65/KVA /Month B)160 Ps/Unit	*A)R.M.D.or30% of CMD whichever is higher at Rs.75/KVA/Month B)200 Ps/Unit	A) R.M.D. or 30% of CMD whichever is higher at Rs.110 per KVA/month B) 255 paise per unit
Category-II (Other than all other HT Cat.)	A)Rs.55/KVA/Month B)125 Ps/Unit	A)Rs.65/KVA/Month B)160 Ps/Unit	A)Rs.75/KVA/Month B) 200 Ps/Unit	A) Rs.110 KVA per month B) 255 Ps/Unit
Category-III Power Intensive Indl.	A)Rs.55/KVA/Month B)Rs.115 Ps/Unit	A)Rs.65/KVA/Month B)150 Ps/Unit	A)Rs.75/KVA/Month B) 185 Ps/Unit	A) Rs.110 / KVA per month B) 235 Ps/unit
Category-IV Irrigation & Agl.	A)F.C. Rs.6/HP/Month B)50 Ps/Unit	A)F.C.Rs.6/HP/Unit B)80 Ps/Unit	A)F.C.Rs.6/HP/Unit B)95 Ps/Unit	A) F.C.Rs.6/HP/Unit B) 130 Ps/Unit
Category-V Railway Traction	A)Rs.55/KVA/Month B)115 Ps/Unit	A) - Nil B) - 170 Ps/Unit	A) - Nil B) - 200 Ps/Unit	A) Nil B) 265 Ps/Unit
Category-VI Township & Residential Colonies	A)Rs.55/KVA/Month B)115 Ps/Unit	A) - Nil B) - 100 Ps/Unit	A) - Nil B) - 120 Ps/Unit	A) Nil B) 160 Ps/unit
** A - Demand Charges	B - Energy Charges	F.C- Fixed Charges	C.M.D.-Contracted maximum demand	R.M.D.-Recorded maximum demand
L.T. Category Category - I (Domestic)	First 40 Units - 60 Ps/Unit 41-100 Units/Month - 70 Ps/Unit 101-200 Units/Month - 85 Ps/Unit More than 200 Units/Month -100 Ps/Unit Monthly Minimum - 1Φ Rs.9/- 3Φ Rs.60/-	First 40 Units/Month - 70 Ps/unit 101-200 Units/month - 100Ps/Unit 200-300 Units/Month - 120Ps/Unit More than 300 Units/ - 150Ps/Unit Monthly Minimum 1Φ - Rs.11/- 3Φ Rs.68/-	First 50 unit/month - 70 Ps/Unit 50-100 Units/Month - 80 Ps/unit 100-200 Unit/Month - 100 Ps/Unit 200-300 Units/Month - 110 Ps/Unit 300-400 Units/Month - 125 Ps/Unit 400-500 Units/Month - 135 Ps/Unit More than 500 Units/Month - 145 Ps/Unit Monthly Minimum - 1ph Rs.15/- 3ph Rs.75/-	First 50 unit/month 70 Ps/Unit 50-100 units/month 95 Ps/unit 100 - 200 Units/Month 130 Ps/Unit 200-300 Units/Month 150 Ps/Unit 300-400 Units/Month 175 Ps/Unit 400-500 Units/Month 195 Ps/Unit More than 500 Units/Month - 215 Ps/Unit Monthly Minimum - Rs.15/- per month
Category- II (Non-Domestic)	All consumption 150 Ps/Unit Monthly Minimum - 1Φ Rs. 25/- 3Φ Rs. 75/-	Up to 100 Units/Month - 160 Ps/Unit Above 100 Units/Month - 175 Ps/Unit Monthly Minimum - 1Φ Rs.25/- 3Φ Rs.75/-	Up to 100 Units/Month - 175 Ps/Unit Above 100 Units/Month - 200 Ps/Unit Monthly Minimum - 1Φ - Rs.35/- 3Φ Rs.90/-	Up to 100 Units/ Month - 225 Ps/Unit Above 100 UNits/Month - 250 Ps/Unit Monthly Minimum Rs.45/- per month
Category-III(Industrial)	All consumption - 110 Ps/Unit Monthly Minimum - Rs.10/HP/Month	Up to 50 Units/Month - 125 Ps/Unit Above 500 Units/Month - 150 Ps/unit Rs.10/HP/month (Subject to a Minimum of 3 H.P)	Up to 500 Units/month - 165 Above 500 units/month - 190 Ps/Unit Rs.10/HP/Month(Subject to a Minimum of 5 H.P)	Up to 500 Units/month 215 Ps/Unit Above 500 units/month - 245 Ps/Unit Monthly Minimum Rs.15/HP Month

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	1-11-90	1-1-92	1-12-92	2-08-95
4.	Category-IV (Cottage	Consumption - 50 Ps/Unit	Consumption - 60 Ps/Unit	Consumption - 75 Ps/Unit	a) Consumption - 90 Ps/Unit Rs.6/HP/M for a minimum of 3 HP Up to 75 HP - Rs.50/HP/Annum
		Month Minimum Rs./6HP/ Month	Rs.6/HP/Month(Subject to a	Rs.6/HP/Month(Subject to a	
			Minimum of 3 HP)	MInimum of 3 HP)	
5.	Category-V (Agricultural)	UP to 5Hp - No Charges at all	Up to 5 HP - Rs.100/HP/Annum	Up to 5 HP - Rs.75/HP/Annum	
		5HP to 10HP - Rs.100/H P/Annum	Above 5 to 10 HP - Rs.250/HP/	Above 5 to 10 HP -Rs.250/HP/Annum	
		Above 10 HP - 50 Ps/U (Metered)	Annum.	Above 10 HP - Rs.400/HP/Annum	
		Subject to a minimum of	Above 10 HP - Rs.400/HP/Annum		
* For all units rate		Rs.150/HP/Annum			
6.	Category - VI (Public Lighting) Monthly Minimum	Panchayats - 52 p/u	Panchayats - 55 Ps/Unit	Panchayats - 60 Ps/Unit	Panchayats - 70 Ps/Unit
		Municipalities- 65 Ps/Unit	Municipalities 70 Ps/Unit	Municipalities - 75 Ps/Unit	Municipalies - 90 Ps/Unit
		Corporation - 70 Ps/Unit	Corporation - 85 Ps/Unit	Corporation - 95 Ps/Unit	Corporation - 115 Ps/Unit
		Panchayats - Rs.2/Pt/Month	Panchayats - Rs.2/Pt/Mont	Panchayats - Rs.2/Pt/Month	Pacnhayats - 2/HP/Month
		Municipalities}-Rs.6/Pt/Month	Municipalities}- Rs.6/Pt/Month	Municipalities}- Rs.6/Pt/Month	Municpalities- - Rs.6/P/Month
			& Corporation }	& Corporation }	& Corporation)
7.	Category - VII (General Purpose) Monthly Minimum	Consumption - 110 Ps/Unit	Consumption - 120 Ps/Unit	Consumption - 140 Ps/Unit	Consumption - 155 Ps/Unit
		S0/ - Rs. 25/-	S0/ - Rs.30/-	S0/ - Rs.30 /-	S Dhobighats - Rs.35
		30/ - Rs. 75/-	30/ - Rs.90/-	30/ - Rs.90 /-	3 Dhobighats /- Rs.100 /-
8.	Category - VIII Temporary	Consumption - 170 Ps/unit	Consumption - 200 Ps/Unit	Consumption - 250 Ps/Unit	Consumption - 300 Ps/Unit
	a) Other than Agl. Monthly Minimum	Rs.60/KW or part there of	Rs.70/KW or part there of up	No change.	Rs.70/KW or part there of up
		up to 30 days and Rs.40/KW or	to 30 days and Rs.40/KW or part		to 30 days and Rs.40/KW or part
		part thereof for every	thereof for every subsequent		thereof for every subsequent
		subsequent period of 15 days	period of 15 days or part		period of 15 days or part
		or part thereof.	there of.		there of.
	b) Agricultural Monthly Minimum	For all units - 80 Ps/Unit	For a ll units - 85 Ps/Unit	For all units - 95 Ps/Unit	For all units - 100 Ps/Unit
		Rs.40/HP/up to 30 days or	Rs.50 /HP/up to 30 days or	No change.	Rs.50 /HP/up to 30 days or
		part thereof & Rs.15/HP/	part thereof & Rs.20/HP/		part thereof & Rs.20/HP/
		for every subsequent period.	for every subsequent period		for every subsequent period
		of 15 days or part thereof.	of 15days or part thereof.		of 15days or part thereof.

* H.T.Consumers were levied fuel cost adjustment charges as follows :

	Effective date	FCA Charge (Paise/Unit)	6)	From 16.09.1992	14.76
1)	From 15.10.1990	17.89	7)	From 17.02.1993	5.17
2)	From 25.07.1991	17.89	8)	From 01.04.1993	7.48
3)	From 16.08.1991	25.17	9)	From 01.07.1993	9.35
4)	From 01.01.1992	10.89	10)	From 01.04.1994	12.69
5)	From 01.04.1992	12.56	11)	From 01.07.1994	14.78

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	1.8.96	Name of the Category	1.8.96
1	H.T Category - I	(Industrial; other than II & III)	L.T Category-I (Domestic)	0-50 units/month-80 Ps.per unit
	a) Demand Charges	Rs.140/- per KVA per month		0-100 units/montb-120 Ps.per unit
	b) Energy Charges	1 lakh units per month 255 Ps./unit		0-200 units/month-165 Ps.per unit
		Next 1 lakh units per month-285 Ps./unit		0-300 units/month-210 Ps.per unit
		Balance units - 305 Ps/unit		0-400 units/month-240 Ps.per unit
	H.T Category - II	(Those that are not covered by other Categories)		0->400 units/month-265 Ps.per unit
	a) Demand Charges	Rs.140/- per KVA per month		
2	b) Energy Charges	300 Ps.per unit for all units.		Minimum Charges ;
3	H.T Category - III	(Power intensive; CMD-1_>1000KVA)		
	a) Demand Charges	Rs.140/- per KVA per month		
	b) Energy Charges	1 lakh units per month 255 Ps./unit		Upto 250 W connected Load : Rs. 25 / month
		Next 1 lakh units per month 285 Ps./unit		Above 250 W connected Load : Rs. 50 / month
		Balance units - 305 Ps/unit		Three Phase : Rs.150/- per month
4	H.T Category - IV	(Irrigation)		
	a) Fixed Charges	Nil	L.T Category - II (Non - Domestic)	0-100 units/month-275 Ps.per unit
	b) Energy Charges	Rs. 400 /- per H.P per year		Above 100 units/month-375 Ps per unit
5	H.T Category - V	(Railway Traction)		Minimum Chages :
	a) Demand Charges	Nil		Single Phase : Rs.65/- per month
	b) Energy Charges	340 Ps.per unit for all units		Three Phase : Rs.200/- per month
6	H.T Category - VI	(Town ships & Residential Colonies)	L.T Category - III (Industrial)	Energy Charges :
	a) Demand Charges	Nil		Upto 500 units/month : 250 Ps.per unit
	b) Energy Charges	200 Ps per unit for all units		Next 1500 Units/month : 275 Ps.per unit
H.T. Consumers are levied fuel cost adjustment charges as follows				Balance units/month : 300 Ps.per unit
S.No.	Effective date	FCA Charges(paise per unit)		Fixed Charges :
1)	From 01.08.1996	9.83		Rs.15/- per month per HP of Contracted
2)	From 12.11.1996	15.99		Load or Connected Load whichever is
				higher subject to a minimum for 5 HP
CL:-Connected Load			L.T Category - IV	Energy Chages :
			A (Cottage Industries)	120 Ps/unit for all units consumed
				Fixed Charges :
				Rs.10/- per month per HP of contracted
				Load or connected load whichever is
				higher subject to a minimum for 3 HP
			B) Dhobi Ghats	Upto 3 HP : Rs. 150/HP/Year
				Above 3 HP and upto 5 HP : Rs.250/HP/Year
				Above 5 HP and below 10 HP : Rs.350/HP/Year
				10 HP and above : Rs.400/ HP/Year

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Name of the Category 1.8.96	Name of the Category	1.8.96
@: a)Per HP of contracted load for the first 30days or part of - rs 100/-	L.T Category - V (Agricultural)	Upto 3 HP : Rs. 150/HP/Year
		Above 3 HP and upto 5 HP : Rs.250/HP/Year
b) Per HP of contracted load for subsequent period of 15 days or part there of Rs 50/-		Above 5 HP and below 10 HP : Rs.350/HP/Year
		10 HP and above : Rs.400/ HP/Year
		Note:The above tariff will be reduced by
		Rs.50/- per HP per year in DPAP areas
		excluding registered irrigation command areas
		for all capacities of pump sets below 10 HP.
	L.T Category - VI (Local Bodies)	A. Street LIghting
		a) Panchayats :
		Minor:- Upto 250 units/Month - Free
		Above 250 units/month- 100 Ps./Unit
@@ : a)Per KW of contracted load for the first 30 days or part there of Rs 100/-		Major:- For all units-100 Ps/unit
		b) Municipalities : For all units-120Ps/Unit
		c) Corporations:For all units-140 Ps/unit
b) Per KW of contracted load for subsequent period of 15 days or part there of Rs 60/-		B)PWS Schemes
		a) Panchayats : Minor - Free
		Major-Corresponding Agricultural Tariff
		b) Municipalities:Corresponding Industrial
		LT/HT Tariff
		c) Corporations: Corresponding Industrial
		LT/HT Tariff
		MINIMUM CHARGES-Rs.2/-per point
		per month for Panchayats. Rs.6/-per
		point per month for Municipalities and Corporations
	L.T.Category-VII (General Purpose)	Energy Charges - 200 Paise/unit for all units consumed
PWS = Public Water Supply		MINIMUM CHARGES :
		Single Phase-Rs.50/- per month
		Three Phase-Rs.150/- per month
	L.T.Category-VIII (L.T. Temporary supply)	a) For Agriculture : 100 Ps per unit
		b) For other Categories 400 Ps.per unit

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	1.1.99	Name of the Category	1.1.99
1	H.T Category - I	(Industrial; other than II & III)	L.T Category-I (Domestic)	0-50 units/month-80 Ps.per unit
	a) Demand Charges	Rs.165/- per KVA per month		0-100 units/montb-120 Ps.per unit
	b) Energy Charges	1 lakh units per month 330 Ps./unit		0-200 units/month-165 Ps.per unit
		Next 1 lakh units per month-350 Ps./unit		0-300 units/month-210 Ps.per unit
		Balance units - 365 Ps/unit		0-400 units/month-290 Ps.per unit
2	H.T Category - II	(Those that are not covered by other Categories)		0->400 units/month-340 Ps.per unit
	a) Demand Charges	Rs.165/- per KVA per month		Minimum Charges ;
	b) Energy Charges	410 Ps.per unit for all units.		Upto 250 W connected Load : Rs. 25 / month
3	H.T Category - III			Above 250 W connected Load : Rs. 50 / month
	Power Intensive industries deleted			Three Phase : Rs.150/- per month
	and merged with HT Cat-1		L.T Category - II (Non - Domestic)	0-200 units/month-425 Ps.per unit
4	H.T Category - IV	(Irrigation)		0->200 units/month-495 Ps.per unit
	a) Fixed charges	Nil		Minimum Chages :
	b) Energy Charges	Rs. 400 /- per H.P per year		Single Phase : Rs.65/- per month
5	H.T Category - V	(Railway Traction)		Three Phase : Rs.200/- per month
	a) Demand Charges	Nil	L.T Category - III (Industrial)	Energy Charges :
	b) Energy Charges	420 Ps.per unit for all units		Upto 1000 units/month : 320 Ps.per unit
6	H.T Category - VI	(Town ships & Residential Colonies)		Balance units/month : 360 Ps.per unit
	a) Demand Charges	Nil		Fixed Charges :
	b) Energy Charges	250 Ps per unit for all units		Rs.15/- per month per HP of Contracted
H.T. Consumers are levied fuel cos adjustment charges as follows				Load or Connected Load whichever is
	Effective date	FCA Charges(paise per unit)		higher subject to a minimum for 5 HP
1)	From 01.08.1996	9.83	L.T Category - IV	Energy Chages :
2)	From 12.11.1996	15.99	A (Cottage Industries)	120 Ps/unit for all units consumed
CL:-Connected Load				Fixed Charges :
				Rs.10/- per month per HP of contracted
				Load or connected load whichever is
				higher subject to a minimum for 3 HP
			B) Dhobi Ghats	Upto 3 HP : Rs. 150/HP/Year
				Above 3 HP and upto 5 HP :Rs.250/HP/Year
				Above 5 HP and below 10 HP : Rs.350/HP/Year
				10 HP and above : Rs.400/ HP/Year

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Name of the Category	Name of the Category	1.1.99
@ : a)Per HP of contracted load for the first 30 days or part there of - Rs.100/-	L.T Category - V (Agricultural)	Upto 3 HP : Rs. 150/HP/Year
		Above 3 HP and upto 5 HP : Rs.250/HP/Year
b) Per HP of contracted load for subsequent period of 15 days or part there of - Rs.50/-		Above 5 HP and below 10 HP : Rs.350/HP/Year
		10 HP and above : Rs.400/ HP/Year
@@ : a)Per KW of contracted load for the first 30 days or part there of – Rs.125/-		Note:The above tariff will be reduced by Rs.50/- per HP per year in DPAP areas excluding registered irrigation command areas for all capacities of pump sets below 10 HP.
b) Per KW of contracted load for subsequent period of 15 days or part there of - Rs.75/-	L.T Category - VI (Local Bodies)	A. Street LIghting
		a) Panchayats :
		Minor:- Upto 250 units/Month - Free
		Above 250 units/month- 100 Ps./Unit
		Major:- For all units-100 Ps/unit
		b) Municipalities : For all units-120Ps/Unit
PWS = Public Water Supply		c) Corporations:For all units-140 Ps/unit
		B)PWS Schemes
		a) Panchayats : Minor - Free
		Major-Corresponding Agricultural Tariff
		b) Municipalities:Corresponding Industrial
		LT/HT Tariff
		c) Corporations: Corresponding Industrial
		LT/HT Tariff
		MINIMUM CHARGES-Rs.2/-per point
		per month for Panchayats. Rs.6/-per
		point per month for Municipalities and
		Corporations
	L.T.Category-VII (General Purpose)	Energy Charges - 250 Paise/unit for all
		units consumed
		MINIMUM CHARGES :
		Single Phase-Rs.50/- per month
		Three Phase-Rs.150/- per month
	L.T.Category-VIII (L.T Temporary supply)	a) For Agriculture : 230 Ps per unit @
		b) For other Categories 500 Ps.per unit @@

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	4.6.2000	Name of the Category	4.6.2000
1	H.T Category - I	(Industrial; other than II & III)	L.T Category-I (Domestic)	0-50 units/month-135 Ps.per unit
	a) Demand Charges	Rs.170/- per KVA per month		51-100 units/montb-295 Ps.per unit
	b) Energy Charges	1 lakh units per month 376 Ps./unit Next 1 lakh units per month-390 Ps./unit Balance units - 395 Ps/unit		201-400 units/month-450 Ps.per unit Above 400 units/month-575 Ps.per unit Minimum Charges ;
2	H.T Category - II	(Those that are not covered by other Categories)		Upto 250 W connected Load : Rs. 25 / month
	a) Demand Charges	Rs.170/- per KVA per month		Above 250 W connected Load : Rs. 50 / month
	b) Energy Charges	450 Ps.per unit for all units.		Three Phase : Rs.150/- per month
3	H.T Category - III	deleted	L.T Category - II (Non - Domestic)	0-100 units/month-340 Ps.per unit
	Power Intensive industries and merged with HT Cat -I			101-200 units/month-665 Ps.per unit Balance units 745 ps per unit
4	H.T Category - IV	(Irrigation)		Minimum Chages :
	a) Fixed Charges	Rs. 400 /- per H.P per year		Single Phase : Rs.65/- per month
	b) Energy Charges	Metered tariff 35 ps\kwh(Optional)		Three Phase : Rs.200/- per month
		Subject to Minimum of Rs 300/HP/year pf Contracted load.	L.T Category - III(A) (Industrial Normal)	Energy Charges : Upto 1000 units/month : 385 Ps.per unit
5	H.T Category - V	(Railway Traction)		Balance units/month : 430 Ps.per unit
	a) Demand Charges	Nil		Fixed Charges :Rs 15/- per HP per month of Contracted load
	b) Energy Charges	460 Ps.per unit for all units		
6	H.T Category - VI	(Town ships & Residential Colonies)	L.T Category - III(B) (Industrial Optional)	For all units consumed/Month :430 Ps per unit
	a) Demand Charges	Nil		Fixed charges :Rs.15/- per month per HP of Contracted Load.
	b) Energy Charges	320 Ps per unit for all units		
CL:-Connected Load			L.T Category - IV A (Cottage Industries)	Energy Chages : 174 Ps/unit for all units consumed Fixed Charges : Rs.10/- per month per HP of contracted Load subject to Minimum of Rs 30/- per month.
			B) Dhobi Ghats	Upto 3 HP : Rs. 250/HP/Year Above 3 HP and upto 5 HP : Rs.400/HP/Year Above 5 HP and below 10 HP : Rs.500/HP/Year 10 HP and above : Rs.600/ HP/Year

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No. **Name of the Category** **4.6.2000**	**Name of the Category**	**4.6.2000**
@ : a)Per HP of contracted load for the first 30 days or part there of - Rs.100/-	L.T Category - V (Agric**u**ltural)	Upto 3 HP : Rs. 250/HP/Year Above 3 HP and upto 5 HP : Rs.400/HP/Year
b) Per HP of contracted load for subsequent period of 15 days or part there of - Rs.50/-		Above 5 HP and below 10 HP : Rs.500/HP/Year 10 HP and above : Rs.600/ HP/Year Metered Tariff(Optional) :35Ps/unit
@@ : a)Per KW of contracted load for the first 30 days or part there of - Rs.125/-		Note:The above tariff will be reduced by Rs.50/- per HP per year in DPAP areas excluding registered irrigation command areas for all capacities of pump sets below 10 HP.
b) Per KW of contracted load for subsequent period of 15 days or part there of - Rs.75/		
	L.T Category - VI (Local Bodies)	**A. Street LIghting** a) Panchayats : Minor:- For all units 148ps\unit Major:- For all units-198 Ps/unit b) Municipalities Gr.3 : For all units-260Ps/Unit c) MunicipalitiesGr 1&2 : For all units-310Ps/Unit d) Municipalities Spl.Gr: For all units-335Ps/Unit e) Corporations:For all units-360 Ps/unit MINIMUM CHARGES-Rs.2/-per point per month for Panchayats. Rs.6/-per point per month for Municipalities and Corporations **B)PWS Schemes** a) Panchayats : Minor - Agl.Tariff Major-Corresponding Agricultural Tariff b) Municipalities Gr.3 : Up to 1000 units-355Ps/Unit For balance units-385Ps/Unit c) MunicipalitiesGr 1&2 : up to 1000 units-355Ps/Unit For balance units-385Ps/Unit d) Municipalities sp.Gr : up to 1000 units-355Ps/Unit For balance units-385Ps/Unit e) corporations : up to 1000 units-385Ps/Unit
PWS = Public Water Supply	L.T.Category-VII (General Purpose)	For balance units-438Ps/Unit FIXED CHARGES-Rs.20/-/HP/Month of cont.load subject to minimum of 5 HP for all types Muncipalities Energy Charges - 430 Paise/unit for all units consumed MINIMUM CHARGES : Single Phase-Rs.50/- per month Three Phase-Rs.150/- per month
	L.T.Category-VIII (L.T.Temporary Supply)	a) For Agriculture : 230 Ps per unit @ b) For other Categories 620 Ps.per unit @@

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	1.4.2001	Name of the Category	1.4.2001
1	H.T Category - I	(Industrial; other than II & III)	L.T Category-I (Domestic)	0-50 units/month-135 Ps.per unit
	a) Demand Charges	Rs.170/- per KVA per month		51-100 units/montb-260 Ps.per unit
	b) Energy Charges	1 lakh units per month 376 Ps./unit		101-200 units/montb-285 Ps.per unit
		Next 1 lakh units per month-390 Ps./unit		201-300 units/month-450 Ps.per unit
		Balance units - 395 Ps/unit		301-400 units/month-500 Ps.per unit
2	H.T Category - II	(Those that are not covered by other Categories)		Above 400 units/month-575 Ps.per unit
	a) Demand Charges	Rs.170/- per KVA per month		Minimum Charges ;
	b) Energy Charges	450 Ps.per unit for all units.		Upto 250 W connected Load : Rs. 25 / month
3	H.T Category - III	deleted		Above 250 W connected Load : Rs. 50 / month
	Power Intensive industries and merged with HT Cat-1			Three Phase : Rs.150/- per month
			L.T Category - II (Non - Domestic)	0-100 units/month-340 Ps.per unit
4	H.T Category - IV	(Irrigation)		101-200 units/month-665 Ps.per unit
	a)Fixed charges	Rs. 400 /- per H.P per year		Balance units 745 ps per unit
	b) Energy Charges	Metered tariff 35 ps\kwh(Optional)		Minimum Chages :
		Subject to Minimum of Rs 300/HP/year pf		Single Phase : Rs.65/- per month
		contracted load.		Three Phase : Rs.200/- per month
5	H.T Category - V	(Railway Traction)	L.T Category - III(A) (Industrial Normal)	Energy Charges :
	a) Demand Charges	Nil		Upto 1000 units/month : 385 Ps.per unit
	b) Energy Charges	460 Ps.per unit for all units		Balance units/month : 430 Ps.per unit
6	H.T Category - VI	(Town ships & Residential Colonies)		Fixed Charges :Rs 15/- per HP per month of Contracted load \
	a) Demand Charges	Nil		
	b) Energy Charges	320 Ps per unit for all units	L.T Category - III(B) (Industrial Optional)	For all units consumed/Month :430 Ps per unit
FSA will be extra as applicable for all HT & LT categories except to Dhobighats, Agriculture categories.				Fixed charges :Rs.15/- per month per HP of Contracted Load.
			L.T Category - IV	
			A (Cottage Industries)	Energy Chages : 174 Ps/unit for all units consumed
				Fixed Charges : Rs.10/- per month per HP of contracted
CL:-Connected Load				Load subject to Minimum of Rs 30/- per month.
			B) Dhobi Ghats	Upto 3 HP : Rs. 250/HP/Year
				Above 3 HP and upto 5 HP : Rs.400/HP/Year
				Above 5 HP and below 10 HP : Rs.500/HP/Year
				10 HP and above: Rs.600/ HP/Year

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Name of the Category	Name of the Category	1.4.2001
@ : a)Per HP of contracted load for the first 30 days or part there of - Rs.100/-	L.T Category - V (Agricultural)	Upto 3 HP : Rs. 250/HP/Year
		Above 3 HP and upto 5 HP : Rs.400/HP/Year
		Above 5 HP and below 10 HP : Rs.500/HP/Year
b) Per HP of contracted load for subsequent period of 15 days or part there of - s.50/-		10 HP and above : Rs.600/ HP/Year Metered Tariff(Optional) 0-2500 units/year:20Ps/unit
		above 2500 units 50 Ps/uniT
@@ : a)Per KW of contracted load for the first 30 days or part there of - Rs.125/-		Note:The above tariff will be reduced by Rs.50/- per HP per year in DPAP areas excluding registered irrigation command areas for all capacities of pump sets below 10 HP.
b) Per KW of contracted load for subsequent period of 15 days or part there of - Rs.75/-		
PWS = Public Water Supply	L.T Category - VI (Local Bodies)	**A. Street LIghting**
		a) Panchayats :
		Minor:- For all units 148ps\unit
		Major:- For all units-198 Ps/unit
		b) Municipalities Gr.3 : For all units-260Ps/Unit
		c) MunicipalitiesGr 1&2 : For all units-310Ps/Unit
		d) Municipalities Spl.Gr: For all units-335Ps/Unit
		e) Corporations:For all units-360 Ps/unit
		MINIMUM CHARGES-Rs.2/-per point per month for Panchayats. Rs.6/-per point per month for Municipalities and Corporations
		B)PWS Schemes
		a) Panchayats : Minor - Agl.Tariff Major-Corresponding Agricultural Tariff
		b) Municipalities Gr.3 : Up to 1000 units-355Ps/Unit For balance units-385Ps/Unit
		c) Municipalities MGr 1&2 : up to 1000 units-355Ps/Unit For balance units-385Ps/Unit
		d) Municipalities sp.Gr : up to 1000 units-355Ps/Unit For balance units-385Ps/Unit
		e) corporations : up to 1000 units-385Ps/Unit For balance units-438Ps/Unit FIXED CHARGES-Rs.20/-/HP/Month of cont.load subject to minimum of 5 HP for all types Municipalities
	L.T.Category-VII (General Purpose)	Energy Charges - 430 Paise/unit for all units consumed
		MINIMUM CHARGES : Single Phase-Rs.50/- per month
		Three Phase-Rs.150/- per month
	L.T.Category-VIII (L.T. Temporary supply)	a) For Agriculture : 230 Ps per unit @
		b) For other Categories 620 Ps.per unit @@

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	1.4.2002	Name of the Category	1.4.2002
1	H.T Category - I	(Industrial; other than II & III)	L.T Category-I (Domestic)	0-50 units/month-145 Ps.per unit
	a) Demand Charges	Rs.195/- per KVA per month		51-100 units/montb-280 Ps.per unit
	b) Energy Charges	For all units 371 Ps./unit		101-200 units/montb-305 Ps.per unit
2	H.T Category - II	(Those that are not covered by other Categories)		201-300 units/month-475 Ps.per unit
	a) Demand Charges	Rs.195/- per KVA per month		Above 300 units/month-550 Ps.per unit
	b) Energy Charges	450 Ps.per unit for all units.		Minimum Charges ;
3	H.T Category - III	deleted		Upto 250 W connected Load : Rs. 25 / month
	Power Intensive industries and merged with HT Cat-1			Above 250 W connected Load : Rs. 50 / month
				Three Phase : Rs.150/- per month
4	H.T Category - IV	(Irrigation)	L.T Category - II (Non - Domestic)	0-100 units/month-395 Ps.per unit
	IV(A)Govt.Lift Irrigation Scheme Energy Charges	178 Ps.per unit		Above 100 units 700 Ps.per unit
	IV(B)Other than Govt.L.I Scheme			Minimum Chages :
	a)Fixed Charges	Rs. 430 /- per H.P per year		Single Phase : Rs.65/- per month
	b) Energy Charges	Metered tariff 35 ps\kwh(Optional)		Three Phase : Rs.200/- per month
		Subject to Minimum of Rs 300/HP/year pf	L.T Category - III(A) (Industrial Normal)	Energy Charges :
		contracted load.		For all units : 385 Ps.per unit
5	H.T Category - V	(Railway Traction)		Demand charges(Optional) Rs 100/KVA/Month
	a) Demand Charges	Nil		Fixed Charges :Rs 37/- per HP per month
	b) Energy Charges	460 Ps.per unit for all units		of Contracted load
6	H.T Category - VI	(Town ships & Residential Colonies)	L.T Category - III(B) (Industrial Optional)	For all units consumed/Month :385 Ps per unit
	a) Demand Charges	Nil		Demand charges(Optional) Rs 100/KVA/Month
	b) Energy Charges	320 Ps per unit for all units		Contracted Load.
FSA will be extra as applicable for all HT & LT categories except to Dhobighats, Agriculture categories.			L.T Category - IV A (Cottage Industries)	Energy Chages : 180 Ps/unit for all units consumed
				Fixed Charges : Rs.10/- per month per HP of contracted
CL:-Connected Load			B) Dhobi Ghats	Load subject to Minimum of Rs 30/- per month.
				Upto 3 HP : Rs. 250/HP/Year
				Above 3 HP and upto 5 HP : Rs.400/HP/Year
				Above 5 HP and below 10 HP : Rs.500/HP/Year
				10 HP and above: Rs.600/ HP/Yr

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Name of the Category	Name of the Category	1.4.2002
@ : a)Per HP of contracted load for the first 30 days or part there of - Rs.100/-	L.T Category - V (Agricultural)	Upto 3 HP : Rs. 275/HP/Year
		Above 3 HP and upto 5 HP : Rs.425/HP/Year
		Above 5 HP and below 10 HP : Rs.525/HP/Year
b) Per HP of contracted load for subsequent period of 15 days or part there of - Rs.50/-		10 HP and above : Rs.625/ HP/Year
		Metered Tariff(Optional) 0-2500 units/year:20Ps/unit
@@ : a) Per KW of contracted load for the first 30 days or part there of - Rs.125/-		above 2500 units 50 Ps/unit
		Note:The above tariff will be reduced by Rs.50/- per HP per year in DPAP areas excluding registered irrigation command areas for all capacities of pump sets below 10 HP. Out of turn allotment Metered tariff Ps 125/Unit
b) Per KW of contracted load for subsequent period of 15 days or part there of - Rs.75/-		
PWS = Public Water Supply		**A. Street LIghting**
		a) Panchayats :
		Minor:- For all units 156ps\unit
		Major:- For all units-208 Ps/unit
	L.T Category - VI (Local Bodies))	b) Municipalities Gr.3 : For all units-274Ps/Unit
		c) MunicipalitiesGr 1&2 : For all units-326Ps/Unit
		d) Municipalities Spl.Gr: For all units-353Ps/Unit
		e) Corporations:For all units-379 Ps/unit
		MINIMUM CHARGES-Rs.2/-per point per month for Panchayats. Rs.6/-per point per month for Municipalities and Corporations
		B)PWS Schemes
		a) Panchayats : Minor - Agl.Tariff
		Major-Corresponding Agricultural Tariff
		b)All Types of Muncipalities
		Up to 1000 units-375Ps/Unit
		For balance units-405Ps/Unit
		c)Corporations
		up to 1000 units-405Ps/Unit
		For balance units-460Ps/Unit
		FIXED CHARGES-Rs.20/-/HP/Month of cont.load
		subject to minimum of 5 HP for all types Muncipalities
	.T.Category-VII (General Purpose)	Energy Charges - 400 Paise/unit for all units consumed
		MINIMUM CHARGES :
		Single Phase-Rs.50/- per month
		Three Phase-Rs.150/- per month
	L.T.Category-VIII (L.T. Temporary supply)	a) For Agriculture : 230 Ps per unit @
		b) For other Categories 620 Ps.per unit @@

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	1.4.2003	Name of the Category	1.4.2003
1	(A) H.T Category - I	(Industrial; other than II & III)	L.T Category-I (Domestic)	0-50 units/month-145 Ps.per unit
	a) Demand Charges	Rs.195/- per KVA per month		51-100 units/montb-280 Ps.per unit
	b) Energy Charges	For all units 360 Ps./unit		101-200 units/montb-305 Ps.per unit
	(B) Ferro Alloy Units			201-300 units/month-475 Ps.per unit
	a) Demand charges	NIL		Above 300 units/month-550 Ps.per unit
	b) Energy Charges	For all units 212 Ps/Unit		Minimum Charges ;
2	H.T Category - II	(Those that are not covered by other Categories)		Upto 250 W connected Load : Rs. 25 / month
	a) Demand Charges	Rs.195/- per KVA per month		Above 250 W connected Load : Rs. 50 / month
	b) Energy Charges	450 Ps.per unit for all units.		Three Phase : Rs.150/- per month
3	H.T Category - III	Deleted	L.T Category - II (Non-Domestic)	0-50 units/month-395 Ps.per unit
	Power Intensive industries and merged with HT Cat-1			Above 50 units 660 Ps.per unit
				Minimum Chages :
4	H.T Category - IV	(Irrigation)		Single Phase : Rs.65/- per month
	IV(A)Govt.Lift Irrigation Scheme Energy Charges	208 Ps. Per unitSubject to Minimum of Rs 300/HP/year of contracted load		Three Phase : Rs.200/- per month
			L.T Category - III(A)	Energy Charges :
	IV(B)Other than Govt.L.I Scheme		(Industrial Normal)	For all units : 385 Ps.per unit
	a) Fixed Charges	Rs. 430 /- per H.P per year		Fixed Charges :Rs 37/- per HP per month of contracted load
	b) Energy Charges	Metered tariff 35 ps\kwh(Optional) Subject to Minimum of Rs 300/HP/year pf contracted load.	Pisciculture and Prawn culture units with Contracted Load below 10HP	90 paise per unit
5	H.T Category - V	(Railway Traction)	Sugar cane crushing	50 paise per unit
	a) Demand Charges	Nil	L.T Category - III(B) (Industrial Optional)	For all units consumed/Month Rs:385 Ps per unit Demand charges(Optional) Rs 100/KVA/Month
	b) Energy Charges	450 Ps.per unit for all units		
6	H.T Category - VI	(Town ships & Residential Colonies)	L.T Category - IV(Cottage Industries and Dhobighats)	Energy Chages :
	a) Demand Charges	Nil		180 Ps/unit for all units consumed
	b) Energy Charges	320 Ps per unit for all units		Fixed Charges : Rs.10/- per month per HP of contracted Load subject to Minimum of Rs 30/- per month.
FSA will be extra as applicable for all HT & LT categories except to Dhobighats, Agriculture categories.				

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Name of the Category (1.4.2003)	Name of the Category	1.4.2003	
@ : a)Per HP of contracted load for the first 30 days or part there of - Rs.100/-	L.T Category - V(A)	IN DPAP AREAS	IN OTHER AREAS
		Upto 3 HP : Rs. 225/ HP/Year	: Rs. 275/HP/Year
b) Per HP of contracted load for subsequent period of 15 days or part there of - Rs.50/- (Agricultural)		Above 3 HP and upto 5 HP : Rs.375/HP/Year	: Rs. 425/HP/Year
		Above 5 HP and below 10 HP : Rs.475/HP/Year	: Rs. 525/HP/Year
@@ : a)Per KW of contracted load for the first 30 days or part there of - Rs.125/-		10 HP and above : Rs.575/ HP/Year	: Rs. 625/HP/Year
		Metered Tariff(Optional) 0-2500 units/year:20Ps/unit	
b) Per KW of contracted load for subsequent period of 15 days or part there of - Rs.75/-	L.T Category - V(B) (Agricultural)	above 2500 units 50 Ps/unit Out of turn allotment Metered tariff energy charges at Ps. 100 / unit	
		A. Street LIghting	
		a) Panchayats :	
		Minor:- For all units 156ps\unit	
		Major:- For all units-208 Ps/unit	
		b) Nagarpalikas & Municipalities Gr.3 : For all units- 274 Ps/Unit	
		c) Municipalities Gr 1&2 : For all units-326Ps/Unit	
		d) Municipalities Spl.Gr: For all units-353Ps/Unit	
		e) Corporations: For all units-379 Ps/unit	
		MINIMUM CHARGES- Panchayats : Rs.2/-per point per month/municipalities and corporations : Rs.6/-per point per month	
		B)PWS Schemes	
		a) Minor - Metered Agricultural. Tariff	
		Major-Metered Agricultural Tariff	
		b)All Types of Municipalities(Grade1,2& 3)	
		Up to 1000 units-375Ps/Unit	
		For balance units-405Ps/Unit	
		c)Corporations	
		up to 1000 units-405Ps/Unit	
		For balance units-460Ps/Unit	
	L.T Category - VI (Local Bodies)	FIXED CHARGES-Rs.20/-/HP/Month of cont.load	
		subject to minimum of Rs.100/-	
	L.T. Category-VII (General Purpose)	Energy Charges - 400 Paise/unit for all units consumed	
		MINIMUM CHARGES : Single Phase-Rs.50/- per Month Three Phase-Rs.150/- per month	
	L.T. Category-VIII (L.T. Temporary supply)	a) For Agriculture : 230 Ps per unit @	
		b) For other Categories 620 Ps.per unit @@	

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	1.4.2004	Name of the Category	1.4.2004
1	(A) H.T Category - I	(Industrial; other than II & III)	L.T Category-I (Domestic)	0-50 units/month-145 Ps.per unit
	a) Demand Charges	Rs.195/- per KVA per month		51-100 units/montb-280 Ps.per unit
	b) Energy Charges	For all units 350 Ps./unit		101-200 units/montb-305 Ps.per unit
	(B) Ferro Alloy Units			201-300 units/month-475 Ps.per unit
	a) Demand charges	NIL		Above 300 units/month-550 Ps.per unit
	b) Energy Charges	For all units 212 Ps/Unit		Minimum Charges ;
2	H.T Category - II	(Those that are not covered by other Categories)		Upto 250 W connected Load : Rs. 25 / month
	a) Demand Charges	Rs.195/- per KVA per month		Above 250 W connected Load : Rs. 50 / month
	b) Energy Charges	440 Ps.per unit for all units.		Three Phase : Rs.150/- per month
3	H.T Category - III	Deleted	L.T Category - II (Non-Domestic)	0-50 units/month-395 Ps.per unit
	Power Intensive industries			Above 50 units 625 Ps.per unit
	and merged with HT Cat-1			Minimum Chages :
4	H.T. Catgegory-!V	(Irrigation)		Single Phase : Rs.65/- per month
	IV(A)Govt.Lift Irrigation Scheme Energy Charges	241 Ps. Per unitSubject to Minimum of Rs 300/HP/year of contracted load		Three Phase : Rs.200/- per month
			L.T Category - III(A)	Energy Charges :
	IV(B)Other than Govt.L.I Scheme		(Industrial Normal)	For all units : 375 Ps.per unit
	a) Flat Rate Tariff	Rs. 430 /- per H.P per year		Fixed Charges :Rs 37/- per HP per month of contracted load
	b) Energy Charges	Metered tariff 35 ps\kwh(Optional)	Pisciculture and Prawn culture units with Contracted Load below 10HP	90 paise per unit
		Subject to Minimum of Rs 300/HP/year pf		
		contracted load.		
5	H.T Category - V	(Railway Traction)	Sugar cane crushing	50 paise per unit
	a) Demand Charges	Nil	L.T Category - III(B) (Industrial Optional)	For all units consumed/Month :375 Ps per unit Demand charges(Optional) Rs 100/KVA/Month
	b) Energy Charges	440 Ps.per unit for all units		
6	H.T Category - VI	(Town ships & Residential Colonies)	L.T Category - IV(Cottage Industries and Dhobighats)	Energy Chages : 180 Ps/unit for all units consumed
	a) Demand Charges	Nil		
	b) Energy Charges	350 Ps per unit for all units		Fixed Charges: Rs.10/- per month per HP of contracted Load subject to Minimum of Rs 30/- per month.
FSA will be extra as applicable for all HT & LT categories except to Dhobighats, Agriculture categories.				

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Name of the Category 1.4.2004	Name of the Category	1.4.2004
@ : a)Per HP of contracted load for the first 30 days or part there of - Rs.100/-		IN DPAP AREAS IN OTHER AREAS
	L.T Category - V(A)	Upto 3 HP : Rs. 225/ HP/Year : Rs. 275/HP/Year
b) Per HP of contracted load for subsequent period of 15 days or part there of - Rs.50/-	(Agricultural)	Above 3 HP and upto 5 HP : Rs.375/HP/Year : Rs. 425/HP/Year
		Above 5 HP and below 10 HP : Rs.475/HP/Year : Rs. 525/HP/Year
@@ : a)Per KW of contracted load for the first 30 days or part there of - Rs.125/-		10 HP and above : Rs.575/ HP/Year : Rs. 625/HP/Year
		Metered Tariff(Optional) 0-2500 units/year:20Ps/unit
b) Per KW of contracted load for subsequent period of 15 days or part there of - Rs.75/-	L.T Category - V(B) (Agricultural)	above 2500 units 50 Ps/unit Out of turn allotment Metered tariff energy charges at
		Ps. 100 / unit
	L.T Category - VI (Local Bodies)	**A. Street LIghting**
		a) Panchayats :
		Minor:- For all units 156ps\unit
		Major:- For all units-208 Ps/unit
		b) Nagarpalikas & Municipalities Gr.3 : For all units-274 Ps/Unit
		c) Municipalities Gr 1&2 : For all units-326Ps/Unit
		d) Municipalities Spl.Gr: For all units-353Ps/Unit
		e) Corporations:For all units-379 Ps/unit
		MINIMUM CHARGES- Panchayats : Rs.2/-per point per month
		/muncipalities and corporations : Rs.6/-per point per month
		B. PWS Schemes
		a) Minor - Metered Agricultural. Tariff
		b)All Types of Muncipalities(Grade1,2& 3)
		Up to 1000 units-375Ps/Unit
		For balance units-405Ps/Unit
		c)Corporations up to 1000 units-405Ps/Unit
		For balance units-460Ps/Unit
		FIXED CHARGES-Rs.20/-/HP/Month of cont.load subject to minimum of Rs.100/-
	L.T.Category-VII (General Purspose)	Energy Charges - 400 Paise/unit for all units consumed
		MINIMUM CHARGES :
		Single Phase-Rs.50/- per month
		Three Phase-Rs.150/- per month
	L.T.Category-VIII (L.T.Temporary supply)	a) For Agriculture : 230 Ps per unit @
		b) For other Categories 620 Ps.per unit @@
	Free power supply w.e.f. 14-5-2004 not exceeding the quantities approved (MU) for the year 2004-05.	

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Sl.No.	Name of the Category	1.4.2005	Name of the Category	1.4.2005
1	**(A) H.T Category - I**	(Industrial; other than II & III)	**L.T Category-I (Domestic)**	0-50 units/month-145 Ps.per unit
	a) Demand Charges	Rs.195/- per KVA per month		51-100 units/montb-280 Ps.per unit
	b) Energy Charges	11kV &below - 340 paise per unit		101-200 units/month-305 Ps.per unit
		33kV - 335 paise per unit for all units		201-300 units/month-475 Ps.per unit
		132kV & above - 325 paise per unit		Above 300 units/month-550 Ps.per unit
	(B) Ferro Alloy Units			Minimum Charges ;
	a) Demand charges	NIL		Upto 250 W connected Load : Rs. 25 / month
	b) Energy Charges	For all units 287 Ps/Unit		Above 250 W connected Load : Rs. 50 / month
2	**H.T Category - II**	(Those that are not covered by other Categories) Rs.195/- per KVA per month		Three Phase : Rs.150/- per month
	a) Demand Charges		**L.T Category - II (Non-Domestic)**	0-50 units/month-395 Ps.per unit
	b) Energy Charges	440 Ps.per unit for all units.		Above 50 units 625 Ps.per unit
3	**H.T Category - III**	Deleted		Minimum Chages :
	Power Intensive industries			Single Phase : Rs.65/- per month
	and merged with HT Cat-1			Three Phase : Rs.200/- per month
4	**H.T. Category IV**	(Irrigation) 236 Paise Per unit	**L.T Category - III(A)**	Energy Charges :
	IV(A)Govt.Lift Irrigation Scheme Energy Charges		**(Industrial Normal)**	For all units : 375 Ps.per unit
				Fixed Charges :Rs 37/- per HP per month of contracted load
	IV(B) Agriculture	ZERO	Pisciculture and Prawn culture units with Contracted Load below 10HP	90 paise per unit
	a) Fixed Charges			
	b) Energy Charges		Sugar cane crushing	50 paise per unit
			L.T Category - III(B) (Industrial Optional)	For all units consumed/Month :375 Ps per unit
5	**H.T Category - V**	(Railway Traction)		Demand charges(Optional) Rs 100/KVA/Month
	a) Demand Charges	Nil	**L.T Category - IV(Cottage Industries and Dhobighats)**	Energy Chages :
	b) Energy Charges	440 Ps.per unit for all units		180 Ps/unit for all units consumed
6	**H.T Category - VI**	(Town ships & Residential Colonies)		Fixed Charges :
	a) Demand Charges	Nil		Rs.10/- per month per HP of contracted
	b) Energy Charges	350 Ps per unit for all units		Load subject to Minimum of Rs 30/- per month.
FSA will be extra as applicable for all HT & LT categories except to Dhobighats, Agriculture categories.				

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

<table>
<tr><td colspan="3">Name of the Category</td><td>Name of the Category</td><td colspan="3">1.4.2005</td></tr>
<tr><td colspan="3">@ : a)Per HP of contracted load for the first</td><td></td><td colspan="3">With DSM measures Without DSM measures</td></tr>
<tr><td colspan="3">30 days or part there of - Rs.100/-</td><td rowspan="4">L.T Category - V(A) (Agricultural)</td><td>Dry land Farmers (connections < = 3 Nos) 0/ unit</td><td>0</td></tr>
<tr><td colspan="3" rowspan="2">b) Per HP of contracted load for subsequent period of 15 days or part there of - Rs.50/-</td><td>Wet Land Farmers (Holdings <=2.5 Acres) 0/ Unit</td><td>0</td></tr>
<tr><td>Dry land Farmers (connections >3 Nos)
Rs 210/HP/Year Ps20./ unit</td><td>Rs 525/HP/ Year & Ps 50/ Unit</td></tr>
<tr><td colspan="3" rowspan="2">@@ : a)Per KW of contracted load for the first 30 days or part there of - Rs.125/-</td><td>Wet land Farmers (Holdings >2.5Acres)
Rs 210/HP/Year Ps20./ unit</td><td>Rs 525/HP/ Year & Ps 50/ Unit</td></tr>
<tr><td>Corporate Farmers & IT Assesses Ps 100/Unit</td><td>Ps 200/ Unit</td></tr>
<tr><td colspan="3">b) Per KW of contracted load for subsequent period of 15 days or part the of Rs 75/- L.T Category - V(B) (Agricultural)</td><td colspan="3">Out of turn allotment Tatkal Scheme with DSM measures Metered tariff (energy charges at Ps. 20/ Unit)</td></tr>
<tr><td colspan="2"></td><td rowspan="15">L.T Category - VI (Local Bodies) L.T.Category-VII (General Purpose)</td><td colspan="3">A. Street Lighting</td></tr>
<tr><td colspan="2">Incentive for H.T -I (A) category (Discount applicable on Energy Rates)</td><td colspan="3">a) Panchayats :</td></tr>
<tr><td>Load Factor</td><td>Incentive (2005-06)</td><td colspan="3">Minor:- For all units 156ps\unit</td></tr>
<tr><td>More than 30% & upto 50%</td><td>5%</td><td colspan="3">Major:- For all units-208 Ps/unit</td></tr>
<tr><td>More than 50% & upto 60%</td><td>10%</td><td colspan="3">b) Nagarpalikas & Municipalities Gr.3 : For all units-274 Ps/Unit</td></tr>
<tr><td>More than 60% & upto 70%</td><td>15%</td><td colspan="3">c) Municipalities Gr 1&2 : For all units-326Ps/Unit</td></tr>
<tr><td>More than 70%</td><td>20%</td><td colspan="3">d) Municipalities Spl.Gr: For all units-353Ps/Unit</td></tr>
<tr><td colspan="2" rowspan="14"></td><td colspan="3">e) Corporations:For all units-379 Ps/unit</td></tr>
<tr><td colspan="3">MINIMUM CHARGES- Panchayats : Rs.2/-per point per month</td></tr>
<tr><td colspan="3">muncipalities and corporations : Rs.6/-per point per month</td></tr>
<tr><td colspan="3">B. PWS Schemes</td></tr>
<tr><td colspan="3">a) Minor / Major Panchayats up to 2500 units/year - 20 paise per unit</td></tr>
<tr><td colspan="3">Above 2500 units 50 Ps/unit All Nagarapalikas & Municipalities</td></tr>
<tr><td colspan="3">FIXED CHARGES-Rs.20/-/HP/Month of cont.load</td></tr>
<tr><td colspan="3">subject to minimum of Rs.100/-</td></tr>
<tr><td colspan="3">Energy Charges - 400 Paise/unit for all units consumed</td></tr>
<tr><td colspan="3">MINIMUM CHARGES :</td></tr>
<tr><td colspan="3">Single Phase-Rs.50/- per month</td></tr>
<tr><td colspan="3">Three Phase-Rs.150/- per month</td></tr>
<tr><td>L.T.Category-VIII (L.T.Temporary supply)</td><td colspan="3">a) For Agriculture : 230 Ps per unit @</td></tr>
<tr><td colspan="3">b) For other Categories 620 Ps.per unit @@</td></tr>
</table>

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006					
Sl.No.	**Name of the Category**	**1.4.2006**	**Name of the Category**		**1.4.2006**
1	**(A) H.T Category - I**	(Industrial; other than II & III)		**L.T Category-I (Domestic)**	0-50 units/month-145 Ps.per unit
	a) Demand Charges Rs. per KVA/ month	132kV & above - 250 , 33kV - 230 , 11kV &below - 195			51-100 units/montb-280 Ps.per unit
	b) Energy Charges(Paise/KWh)	132 kV &above -280, 33kV - 310 , 11 kV & below -330			101-200 units/month-305 Ps.per unit
					201-300 units/month-475 Ps.per unit
					Above 300 units/month-550 Ps.per unit
	(B) Ferro Alloy Units				Minimum Charges ; Upto 250 W connected Load : Rs. 25 / month
	a) Demand charges	NIL			
	b) Energy Charges	For all units 255 Ps/Unit			Above 250 W connected Load : Rs. 50 / month
2	**H.T Category - II**	(Those that are not covered by other Categories)			Three Phase : Rs.150/- per month
	a) Demand Charges (Rs.per KVA)	132 kV & Above - 250, 33kV - 230 11kV &below - 195		**L.T Category - II (Non-Domestic)**	0-50 units/month-395 Ps.per unit
	b) Energy Charges (Paise/KWh)	132 kV & Above - 365, 33kV - 390 11kV &below - 440			Above 50 units 625 Ps.per unit
3	**H.T Category - III**	Deleted			Minimum Chages :
	Power Intensive industries				Single Phase : Rs.65/- per month
	and merged with HT Cat-1				Three Phase : Rs.200/- per month
4	**H.T. Category IV** (Irrigation)			**L.T Category - III(A)**	Energy Charges :
	IV(A)Govt.Lift Irrigation Scheme Energy Charges 36 Paise Per unit			**(Industrial Normal)**	For all units : 375 Ps.per unit
	IV(B) Agriculture(Flat Rate Rs./HP/Year)	0	Pisciculture and Prawn culture units with Contracted Load below 10HP		Fixed Charges :Rs 37/- per HP per month of contracted load 90 paise per unit
	a) Fixed Charges				
	b) Energy Charges	ZERO	Sugar cane crushing		50 paise per unit
			L.T Category - III(B) (Industrial Optional)		For all units consumed/Month :375 Ps per unit
5	**H.T Category - V**	(Railway Traction)			Demand charges(Optional) Rs 100/KVA/Month
	a) Demand Charges	Nil			Energy Chages :
	b) Energy Charges	420 Ps.per unit for all units			180 Ps/unit for all units consumed
6	**H.T Category - VI**	(Town ships & Residential Colonies)			Fixed Charges :
	a) Demand Charges	Nil			Rs.10/- per month per HP of contracted Load subject to Minimum of Rs 30/- per month.
	b) Energy Charges	350 Ps per unit for all units			

Table : 4.11. DETAILS OF TARIFF REVISION 1990 ONWARDS UP TO 2006

Name of the Category	1.4.2006	Name of the Category	1.4.2006	
			With DSM measures	**Without DSM measures**
@ : a)Per HP of contracted load for the first 30 days or part there of - Rs.100/-		**L.T Category - V(A) (Agricultural)**	Dry land Farmers (connections < = 3 Nos) 0/ unit	Rs 210/HP/ Year & Ps 20/ Unit
b) Per HP of contracted load for subsequent period of 15 days or part there of - Rs.50/-			Wet Land Farmers (Holdings <=2.5 Acres) 0/ Unit	Rs 210/HP/ Year & Ps 20/ Unit
@@ : a)Per KW of contracted load for the first 30 days or part there of - Rs.125/-			Dry land Farmers (connections >3 Nos) Rs 210/HP/Year Ps20./ unit	Rs 525/HP/ Year & Ps 50/ Unit
			Wet land Farmers (Holdings >2.5Acres) Rs 210/HP/Year Ps20./ unit	Rs 525/HP/ Year & Ps 50/ Unit
			Corporate Farmers & IT Assesses Ps 100/Unit	Ps 200/ Unit
b) Per KW of contracted load for subsequent period of 15 days or part there of Rs 75/-		**L.T Category - V(B) Agricultural)**	Out of turn allotment Tatkal Scheme with DSM measures Metered tariff (energy charges at Ps. 20/ Unit)	

	L.T Category - VI (Local Bodies)	**A. Street Lighting**
		a) Panchayats :Minor:- For all units 156ps\unit
		Major:- For all units-208 Ps/unit
		b) Nagarpalikas & Municipalities Gr.3 : For all units-274 Ps/Unit
		c) Municipalities Gr 1&2 : For all units-326Ps/Unit
Incentive for H.T -I (A) category (Discount applicable on Energy Rates)		d) Municipalities Spl.Gr: For all units-353Ps/Unit

Load Factor	**Incentive (2006-07)**		
	> 50% & upto 70%	25% (for inremental consumption over 50% LF)	muncipalities and corporations : Rs.6/-per point per month
	25% (for inremental consumption over 40% LF)		**B. PWS Schemes**
			a) Minor / Major Panchayats
			up to 2500 units/year - 20 paise per unit Above 2500 units 50 Ps/unit
			All Nagarapalikas & Municipalities Up to 1000 units-375Ps/Unit

Table : 5. 1

PATTERN OF INSTALLED CAPACITY IN ANDHRA PRADESH (1990-91 TO 2005-06) STATE, PRIVATE AND CENTRAL SECTORS (%) (MU)

Year	Installed Capacity APSEB/APGENCO				Private			Central	Total
	Hydel	Thermal	Gas	Wind	Mini Hydel	Gas	Non-conven-tional	NTPC, Neyveli, MAPP, Simhadri, Talcher	
1990 - 1991	2461.21 (50.21)	1612.50 (32.90)	66.00 (1.35)	Wind power started 1994	Mini Hydel power started 1995	Gas power started 1996	Non-conventional power started 1994	762.00 (15.55)	4901.71 (100.00)
1991 - 1992	2462.21 (49.42)	1612.50 (32.37)	100.00 (2.01)					807.00 (16.20)	4981.71 (100.00)
1992 - 19893	2524.21 (49.60)	1612.50 (31.69)	100.00 (1.97)					852.00 (16.74)	5088.71 (100.00)
1993 - 1994	2605.21 (46.24)	2032.50 (36.07)	100.00 (1.77)					897.00 (15.92)	5634.71 (100.00)
1994 - 1995	2665.21 (43.55)	2452.50 (40.08)	100.00 (1.63)	2.00 (0.03)			2.93 (0.05)	897.00 (14.66)	6119.64 (100.00)
1995 - 1996	2666.21 (43.26)	2452.50 (39.79)	100.00 (1.62)	2.00 (0.03)	3.75 (0.06)		41.85 (0.68)	897.00 (14.55)	6163.31 (100.00)
1996 – 1997	2666.21 (39.38)	2702.50 (39.92)	212.00 (3.13)	2.00 (0.03)	3.75 (0.06)	232.70 (3.44)	53.99 (0.80)	897.00 (13.25)	6770.15 (100.00)
1997 - 1998	2666.21 (36.66)	2952.50 (40.60)	272.00 (3.74)	2.00 (0.03)	15.75 (0.22)	423.90 (5.83)	55.49 (0.76)	885.00 (12.17)	7272.85 (100.00)
1998 - 1999	2666.21 (36.32)	2952.50 (0.22)	272.00 (3.71)	2.00 (0.03)	27.25 (0.37)	423.90 (5.77)	112.49 (1.53)	885.00 (12.06)	7341.35 (100.00)
1999- 2000	2681.21 (35.73)	2952.50 (39.34)	272.00 (3.62)	2.00 (0.03)	43.45 (0.58)	423.90 (5.65)	186.75 (2.49)	942.50 (12.56)	7504.31 (100.00)
2000 - 2001	2682.21 (33.61)	2952.50 (37.00)	272.00 (3.41)	2.00 (0.03)	62.35 (0.78)	778.90 (9.76)	230.00 (2.88)	1000.00 (12.53)	7979.96 (100.00)
2001- 2002	2982.21 (32.93)	2952.50 (32.60)	272.00 (3.00)	2.00 (0.02)	76.95 (0.85)	918.90 (10.15)	351.34 (3.88)	1500.00 (16.56)	9055.90 (100.00)
2002 - 2003	3432.21 (33.23)	2962.50 (28.68)	272.00 (2.63)	2.00 (0.02)	80.26 (0.78)	998.90 (9.67)	474.73 (4.60)	2106.25 (20.39)	10328.85 (100.00)
2003 - 2004	3586.36 (33.53)	2972.50 (27.79)	272.00 (2.54)	2 (0.02)	84.25 (0.79)	998.9 (9.34)	567.07 (5.30)	2212.5 (20.69)	10695.56 (100.00)
2004 - 2005	3586.36 (32.29)	2992.50 (26.95)	272.00 (2.45)	2 (0.02)	91.4 (0.82)	998.9 (8.99)	591.57 (5.33)	2571 (23.15)	11105.71 (100.00)
2005 - 2006	3586.36 (32.16)	2962.50 (26.57)	272.00 (2.44)	2 (0.02)	101.4 (0.91)	996.6 (8.94)	613.37 (5.50)	2616.94 (23.47)	11151.19 (100.00)
Compound Growth Rate (before)	1.15	7.51	18.46	0.00	109.27	34.96	113.35	1.64	5.85
Compound Growth Rate (After)	6.02	0.15	0.00	0.00	139.27	11.88	23.61	21.01	7.46

Source : Power Development Statistics In Andhra Pradesh 2005-06

Table : 5. 2

PATTERN OF POWER GENERATION IN ANDHRA PRADESH (1990-91 TO 2005-06) STATE, PRIVATE AND CENTRAL SECTORS

MU (%)

Years	Energy State Sector		Gas	Wind	Private sector	Central Sector & MAPP	Other States/ Regions	TOTAL
	Hydel	Thermal						
1990 - 1991	10017.00 (48.00)	8102.00 (38.90)	--	--	--	2725.00 (13.10)	--	20844.00 (100)
1991 - 1992	9516.00 (41.70)	8726.00 (38.20)	--	--	--	4595.00 (20.10)	--	22837.00 (100)
1992 - 1993	8758.00 (35.57)	9114.00 (37.02)	--	--	--	6748.00 (27.41)	--	24620.0 (100)
1993 - 1994	9632.00 (35.14)	9639.00 (35.17)	525.00 (1.92)	--	--	7612.00 (27.77)	--	27408.0 (100)
1994 - 1995	9687.00 (32.94)	10842.00 (36.87)	431.00 (1.47)	--	--	8449.00 (28.73)	--	29409.00 (100)
1995 - 1996	6662.00 (22.11)	15103.00 (50.13)	540.00 (1.79)	8.00 (0.03)	--	7814.00 (25.94)	--	30127.00 (100)
1996 - 1997	7969.29 (24.06)	16719.76 (50.47)	626.67 (1.89)	0.71 (0.00)	504.65 (1.52)	7308.33 (22.06)	--	33129.41 (100)
1997 - 1998	7244.49 (19.64)	19019.69 (51.57)	1249.00 (3.39)	0.44 (0.00)	2049.67 (5.56)	7321.00 (19.85)	--	36884.29 (100)
1998 - 1999	7189.24 (18.64)	19833.62 (51.43)	1798.82 (4.66)	0.64 (0.00)	2820.21 (7.31)	6921.05 (17.95)	--	38563.5 (100)
1999 – 2000	8132.00 (18.48)	21499.00 (48.85)	2006.34 (4.56)	1.18 (0.00)	4149.40 (9.43)	8221.00 (18.68)	--	44008.92 (100)
2000 - 2001	7230.35 (15.83)	21934.25 (48.02)	1978.13 (4.33)	1.45 (0.00)	4945.67 (10.83)	9588.88 (20.99)	--	45678.73 (100)
2001 - 2002	5757.00 (12.26)	22245.00 (47.38)	1951.35 (4.16)	--	6513.5 (13.87)	9645.92 (2054)	838.17 (1.79)	46951.0 (100)
2002 - 2003	3336.85 (6.96)	23032.54 (48.05)	2030.04 (4.23)	--	8169.00 (17.04)	11574.98 (24.15)	-206.52 (-0.43)	47936.89 (100)
2003 - 2004	2940.87 (6.20)	20401.25 (43.00)	2109.29 (4.45)	0.57 (0.00)	8636.46 (18.20)	13011.48 (27.42)	344.29 (0.73)	47444.21 (100)
2004 - 2005	5264.95 (10.30)	21145.07 (41.36)	1908.20 (3.73)	2.25 (0.0044)	8848.73 (17.31)	13774.03 (26.94)	179.58 (0.35)	51122.81 (100)
2005 - 2006	7872.53 (14.97)	18718.33 (35.60)	1752.98 (3.33)	--	7730.29 (14.70)	15971.13 (30.38)	529.60 (1.01)	52574.86 (100)
Compound Growth Rate (Before)	-4.4041	13.4683	31.1772	-55.3166	136.989	9.2561	0.0000	7.9457
Compound Growth Rate (After)	-4.8887	-2.0337	12.5573	NA	12.5573	11.3727	10.0393	2.7852

Source : Power Development Statistics In Andhra Pradesh 2005-06.

Table : 5. 3

Capacities of Various other units in Private Sector. (MU)

Years	Private Sector								Total
				Co-Generation					
	Gas	Hydel (Mini)	Wind	Bagasse	Bio-Mass	Bio-Mass Projects	Mini power plants	others	
1994-95	--	--	2.93	--	--	--	--	--	2.93
1995-96	--	3.75	41.85	--	--	--	--	--	45.60
1996-97	232.70	3.75	51.24	--	1.50	--	--	--	289.19
1997-98	423.90	15.75	52.74	--	1.50	--	--	--	493.89
1998-99	423.90	27.25	58.74	9.00	1.50	1.00	--	41.00	562.39
1999-2K	423.90	43.45	84.99	14.00	1.50	1.00	40.31	43.70	652.85
2000-01	778.90	62.35	88.74	15.50	6.70	29.00	40.31	43.70	1065.2
2001-02	918.90	76.95	90.43	37.50	9.70	73.50	78.11	62.10	1347.19
2002-03	998.88	80.26	90.43	89.50	16.70	119.50	93.50	65.10	1553.87
2003-04	998.88	84.26	90.43	114.50	20.43	165.50	93.50	82.70	1650.2
2004-05	998.88	91.40	95.49	114.50	20.43	178.50	93.51	89.14	1681.85

Source : Power Development Statistics In Andhra Pradesh 2005-06.

Table : 5. 4

COST OF COAL AS ON 2005 and 2006

Sl. No.	Thermal Station	Source of supply	(Rs. / Metric Ton)	
			2005	2006
1	K.T.P.S. (A,B,C)	SCCL (Manugur)	1041	972.64
		SCCL (Rudrampur)	1041	943.44
2	K.T.P.S. (V)	SCCL (Manugur)	1080	972.64
		SCCL (Rudrampur)	1080	943.44
3	V.T.P.S.	Talcher	1366	1360.00
		SCCL (Manugur)	1366	1098.14
4	R.T.P.P.	SCCL (Manugur)	1806	1517.74
		Talcher	1806	1832.84
5	R.T.S. (B)	SCCL (Godavarikhani)	1515	1395.75

Source : Power Development Statistics In Andhra Pradesh 2005-06.
Note : SCCL : Singareni Collieries Co. Ltd.

Table : 5. 5

COST OF OILS AS ON 2005 and 2006

Sl. No.	Thermal Station	F. O. (Rs./KL)		H S D Oil (Rs./KL)		L S D Oil (Rs./KL)	
		2005	2006	2005	2006	2005	2006
1	K.T.P.S. (A,B,C)	15101	21193.57	24023	33381.54	--	--
2	K.T.P.S. (V)	15351	21193.57	--	--	16883	31564.71
3	V.T.P.S	14531	20974.24	22218	33183.08	--	--
4	R.T.P.P	14860	21671.51	--	--	17844	32452.63
5	R.T.S. (B)	14926	21864.17	23986	33598.77	--	--

Source : Power Development Statistics In Andhra Pradesh 2005-06
Note : FO : Furnace Oil
HSD : High Speed Diesel Oil
LSD : Low Speed Diesel Oil
LSHS : Low Sulphur heavy Stock

Table : 5. 6

GROSS GENERATION, NET GENERAGTION AND AUXILIARY CONSUMPTION IN ANDHRA PRADESH (MU)

Year	Gross Total	Auxiliary Consumption	Net Generation
1990-91	21103	869.86	20233.14
1991-92	23508	958.75	22549.25
1992-93	25374	958.01	24415.99
1993-94	27865	1002.26	26862.74
1994-95	29985	1137.89	28847.11
1995-96	30924	1466.55	29457.45
1996-97	33682.79	1590.57	32092.22
1997-98	38146.09	1788.58	36357.51
1998-99	40574.00	1853.43	38720.57
1999-2K	29632.1	2022.05	27610.05
2000-01	29164.93	2025.41	27139.52
2001-02	28002.1	2029.25	25972.85
2002-03	26369.4	2112.50	24256.89
2003-04	25414.94	2072.25	23342.69
2004-05	28562.16	2149.88	26412.28
2005-06	28573.92	1983.06	26590.86
Before Reforms Compound Growth Rate	8.216431	11.05462	8.091098
After Reforms Compound Growth Rate	-0.8811	-0.2927	-0.97355

Source : Power Development Statistics, Andhra Pradesh 2005-06.

Table : 5. 7

Generation and its Plant Load Factor.

Year	Generation (MU)	PLF (%)
1992-93	9114.18	64.93
1993-94	9639.42	68.67
1994-95	10820.20	70.11
1995-96	13775.35	78.16
1996-97	16719.98	78.14
1997-98	19019.49	82.32
1998-99	19833.62	77.64
1999-2K	21499.10	83.18
2000-01	21934.26	85.09
2001-02	22245.00	86.30
2002-03	23032.54	88.90
2003-04	22455.39	86.00
2004-05	23359.71	89.71

Source : Power Development Statistics, Andhra Pradesh 2005-06.
Note : Plant Load Factor

Table : 5. 8

GROWTH OF DEMAND AND INSTALLED CAPACITY (1990-91 TO 2005-06) (MW)

Year Ending March	Installed Capacity MW	Compound Growth Rate (%)	Peak Demand MW	Compound Growth Rate (%)
1991	4902		3465	
1992	4982		3703	
1993	5089		3915	
1994	5634		4170	
1995	6120	8.2555	4434	7.6286
1996	6163		4576	
1997	6770		5022	
1998	7273		5742	
1999	7341		6480	
2000	7504		6684	
2001	7980		7143	
2002	9056		7029	
2003	10329	7.4706	6895	2.9421
2004	10696		7441	
2005	11106		7613	
2006	11151		8239	

Source : : Power Development Statistics In Andhra Pradesh 2005-06.

Table : 5. 9

GENERATION, PURCHASE, IMPORT AND EXPORT OF ENERGY (MU **)**

Source : Power Development Statistics In Andhra Pradesh 2005-06

Years		Gross Total	Compound Growth Rate	Auxiliary Consumption	Compound Growth Rate	Net Generation	Compound Growth Rate	Exports							Net Total	Compound Growth Rate
								Karnataka	Tamil Nadu	Orissa	M.P.	Maharashtra	Pondicherry	Total		
Before reforms	1991-92	23508	7.9922	958.75	11.8073	22549.25	7.8270	5	--	159	--	--	18	182	22367.25	7.9540
	1992-93	25374		958.01		24415.99		6	--	142	30	--	17	195	24220.99	
	1993-94	27865		1002.26		26862.74		28	--	94	--	--	18	140	26722.74	
	1994-95	29985		1137.89		28847.11		--	--	--	15	--	19	34	28813.11	
	1995-96	30924		1466.55		29457.45		1	--	--	--	--	22	23	29434.45	
	1996-97	33682.79		1590.57		32092.22		--	--	0.45	40.48	--	21.68	62.61	32029.61	
	1997-98	38146.09		1788.58		36357.51		-	-	-	-		27.61	27.61	36329.90	
	1998-99	40574.00		1853.43		38720.57		--	--	--	--	--	24	24	38696.57	
APGENCO																
After Reforms	1999-2K	29632.1	-0.8811	2022.05	-0.2927	27610.05	-0.9736	--	--	--	--	--	24	24	27586.05	-0.9643
	2000-01	29164.93		2025.41		27139.52		--	--	--	--	--	--	--	27139.52	
	2001-02	28002.1		2029.25		25972.85		--	--	--	--	--	--	--	25972.85	
	2002-03	26369.4		2112.50		24256.89		--	--	--	--	--	--	--	24256.89	
	2003-04	25414.94		2072.25		23342.69		--	--	--	--	--	--	--	23342.69	
	2004-05	28562.16		2149.88		26412.28		--	--	--	--	--	--	--	26412.28	
	2005-06	28573.92		1983.06		26590.86		--	--	--	--	--	--	--	26590.86	

Table : 5. 10

PROGRESS UNDER FIVE YEAR PLANS - RURAL ELECTRIFICATION

(Figures in Nos.)

Plan Period	Period (at the end of)	Distribution Transformers	Towns and Villages Electrified	Hamlets electrified	Dalit Wads electrified	Agricultural (pump sets energized)
7th Plan	31.3.1990	80419	27610	15904	29899	1111569
2 Annual plans	31.3.1992	101376	27610	18035	33505	1273973
8th Plan	31.3.1997	148024	26829	21036	39074	1821239
9th Plan *	31.3.2002	213803	26829	27849	41466	2088759
10th Plan (2002-03)	31.3.2003	242668	26829	30302	42739	2257969
10th Plan (2003-04)	31.3.2004	323033	26829	30557	46315	2309605
10th Plan (2004-05)	31.3.2005	405937	26829	31253	49298	2374365
10th Plan (2005-06)	31.3.2006	474959	26829	31533	51254	2440823

Source : Power Development Statistics In Andhra Pradesh 2005-06 .

Note : * As per 2001Census, From 10th Plan onwards AGL pump sets includes RESCO services

Table : 5. 11

Number of Villager and Towns Electrified

At the end of the year	Services per Town & Village Electrified (KW)	Connected Load (KW) per Town & Village
31-03-1991	239	394
31-03-1992	259	418
31-03-1993	279	423
31-03-1994	292	435
31-03-1995	313	462
31-03-1996	332	543
31-03-1997	353	583
31-03-1998	375	612
31-01-1999	317	1130
31-03-1999	394	637
31-03-2000	414	651
31-03-2001	500	714
31-03-2002	525	755
31-03-2003	547	830
31-03-2004	588	923
31-03-2005	627	927
31-03-2006	646	1009
Compound Growth Rate (Before)	4.8453	10.9261
Compound Growth Rate (After)	7.4859	7.2148

Source : Power Development Statistics
In Andhra Pradesh 2005-06

Table : 5. 12

ELECTRIFICATION OF HAMLETS, TOWNS & VILLLAGES AND DALITWADAS

Year	Hamlets	Compound Growth Rate	Towns & Villages	Compound Growth Rate	Dalit Wadas	Compound Growth Rate
1991	16578		26829		32095	
1992	17400		26829		33505	
1993	18910		26829		34862	
1994	19702		26829		36257	
1995	20902	4.8616	26829	0.0000	38007	2.8043
1996	20956		26829		38772	
1997	21036		26829		39074	
1998	21193		26829		39337	
1999	27209		26829		40021	
2000	27391		26829		40537	
2001	27762		26829		40797	
2002	27849		26829		41466	
2003	28134	2.7230	26829	0.0000	43052	4.3765
2004	30560		26829		46616	
2005	31253		26829		49298	
2006	31533		26829		51254	

Source : Power Development Statistics In Andhra Pradesh 2005-06

Table : 5 . 13

AGRICULTURAL SERVICES CONNECTED
(1990-91 TO 2005-06)

(No.)

Year	Agricultural Services	Compound Growth Rate
1991	1193363	
1992	1273973	
1993	1398049	
1994	1504975	
1995	1605807	
1996	1642993	5.9876
1997	1791203	
1998	1824689	
1999	1884686	
2000	1932913	
2001	1939573	
2002	2207052	
2003	2257969	
2004	2309605	4.1921
2005	2374365	
2006	2440823	

Source : Power Development Statistics
In Andhra Pradesh 2005-06

Table : 5. 14

TRANSMISSION AND DISTRIBUTION LINES
(11 KV and above) (From 1990-91 To 2005-06)

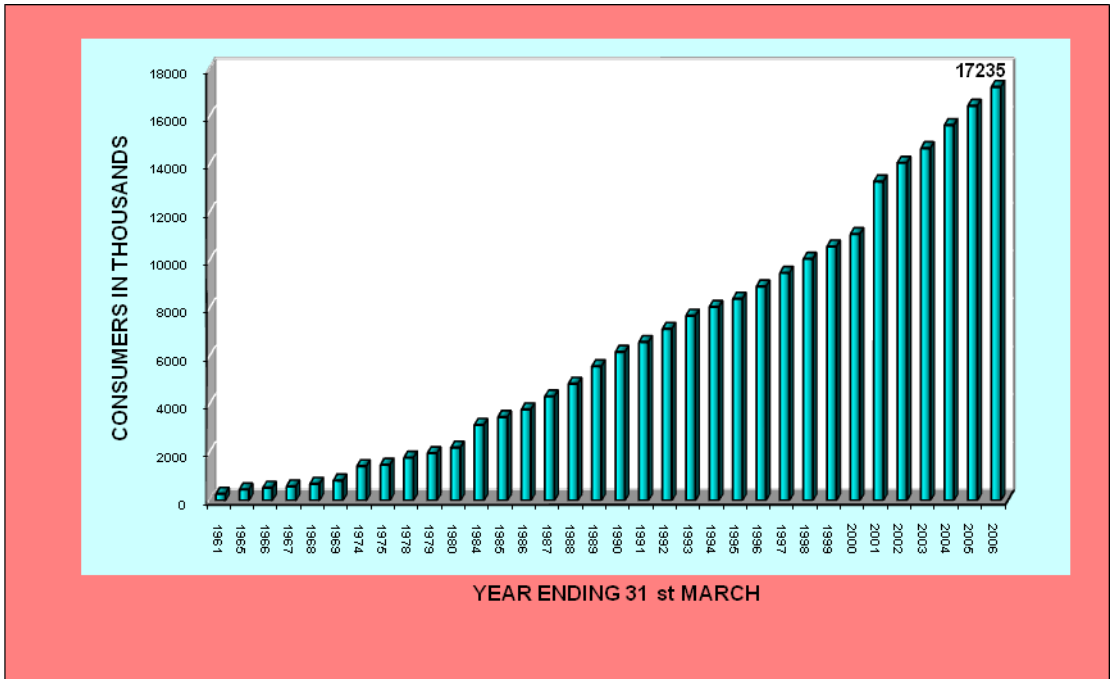
Year	Length of Lines (in KM)	Compound Growth Rate
1991	157484	3.4094
1992	166700	
1993	174282	
1994	182493	
1995	189665	
1996	193172	
1997	196793	
1998	202033	
1999	209156	
2000	216527	4.1883
2001	224199	
2002	227022	
2003	236391	
2004	245910	
2005	262973	
2006	278015	

Source : Power Development Statistics
In Andhra Pradesh 2005-06.

Table : 5. 15

Electricity Consumers Served By The A.P.Transco.
(From 1990 - 91 To 2005 – 06)

Years	Consumers (in thousands)	Compound Growth Rate
1991	6599	5.8912
1992	7147	
1993	7697	
1994	8066	
1995	8406	
1996	8915	
1997	9483	
1998	10071	
1999	10583	
2000	11104	6.8328
2001	13294	
2002	14073	
2003	14683	
2004	15644	
2005	16449	
2006	17235	



Source : Power Development Statistics In Andhra Pradesh 2005-06.

Table : 5. 16

LENGTH OF 11 KV AND LT LINES SINCE THE FORMATION OF A.P GRID

At the end of the Year	Length of 11kV (KM)	Compound Growth Rate	Length of L.T (KM)	Compound Growth Rate	Total Length 11kV and L.T (KM)	Compound Growth Rate
31-03-1991	123467		287197		410663	
31-03-1992	131110		311177		442287	
31-03-1993	137225		335984		473209	
31-03-1994	142901		361474		504375	
31-03-1995	148101	3.1663	382270	4.5122	530371	4.1222
31-03-1996	150540		392787		543327	
31-03-1997	153408		397627		551035	
31-03-1998	156875		404622		561497	
31-01-1999	160813		411673		572486	
31-03-1999	162087		414542		576629	
31-03-2000	166488		424277		590765	
31-03-2001	169893		431711		601604	
31-03-2002	172882		438160		611042	
31-03-2003	178321	3.9778	467313	2.9040	645633	3.2137
31-03-2004	186988		473928		660916	
31-03-2005	202547		486191		688738	
31-03-2006	215008		504820		719829	

Source : Power Development Statistics, Andhra Pradesh 2005-06

Table : 5. 16

LENGTH OF 11 KV AND LT LINES SINCE THE FORMATION OF A.P GRID

At the end of the Year	Length of 11kV (KM)	Compound Growth Rate	Length of L.T (KM)	Compound Growth Rate	Total Length 11kV and L.T (KM)	Compound Growth Rate
31-03-1991	123467		287197		410663	
31-03-1992	131110		311177		442287	
31-03-1993	137225		335984		473209	
31-03-1994	142901		361474		504375	
31-03-1995	148101	3.1663	382270	4.5122	530371	4.1222
31-03-1996	150540		392787		543327	
31-03-1997	153408		397627		551035	
31-03-1998	156875		404622		561497	
31-01-1999	160813		411673		572486	
31-03-1999	162087		414542		576629	
31-03-2000	166488		424277		590765	
31-03-2001	169893		431711		601604	
31-03-2002	172882		438160		611042	
31-03-2003	178321	3.9778	467313	2.9040	645633	3.2137
31-03-2004	186988		473928		660916	
31-03-2005	202547		486191		688738	
31-03-2006	215008		504820		719829	

Source : Power Development Statistics, Andhra Pradesh 2005-06

Table : 5.17 : Indicators Of Electricity Development

Particulars	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000
Installed Capacity per 1000 Population (KW)	62	60.76	60.08	66.62	73.60	85.00	92.44	98.28	96.43	98.69
K.W.H Generated per KW of Installed Capacity(Kwh)	4458	4474	4330	4163	4017	4258	4605	4680	4761.57	4897.39
Energy consumed per 1000 population (KWH)	245443	264538	279966	305817	331415	326300	345603	411410	480000	483000
Length of Transmission Lines (33 KV & above)per 1000 Units Generated (Mtrs)	1.9	1.95	2.07	2.05	2.16	1.96	1.76	1.72	1.76	1.69
Length of Line per Sq.KM of area										
Transmission Lines (33 KV and above) (Mtrs)	124	129	130	144	151	155	158	164	170.97	181.96
b) Distrubution Lines (11 KV and below)	1493	1608	1720	1834	1929	1975	2004	2041	2096.83	2148.24
Average annual consumption per consumer (KWH)										
a) Agricultural	5612	5791	5960	6292	6292	6937	4609	5398	5699.27	2961.76
b) Total (LT + HT)(KWH)	2442	2483	2498	2646	2779	2625	2660	2874	2882.87	2323.71
Number of customers per employee (Nos)	100	102	107	111	116	123	130	136	142	108
Distribution of Sales										
a) Agricultural (%)	39.41	39.48	41.28	42.27	47.77	48.51	37.45	39.43	40.07	39.62
b) Others	60.59	60.52	58.72	57.73	52.23	51.49	62.55	60.57	59.93	60.38
Percentage of Towns and villages Electrified (%)	100	100	100	100	100	100	100	100	100	100

Table : 17
Indicators Of Electricity Development

(Continuation)

Particulars	2000-2001	2001-2002	2002-2003	2002 – 2003	2003-2004	2004-2005	2005-2006
Installed Capacity per 1000 Population (KW)	104.87	119.09	135.71		140.53	139.96	139.29
K.W.H Generated per KW of Installed Capacity (KWH)	4752.31	4931.8	4433.0	4433.0	4435.5	4603.2	4714.7
Energy consumed per 1000 population (KWH)	489000	510000	520000	520000	560000	575000	604000
Length of Transmission Lines (33 KV & above) per 1000 Units Generated (Mtrs).	2.03	2.28	2.42	2.42	2.52	1.99	2.04
Length of Line per Sq.KM of area							
a) Transmission Lines (33 KV and above) (Mtrs).	197.478	198.59	211.17	211.17	214.26	219.73	229.12
b) Distribution Lines (11 KV and below) (Mtrs).	2187.65	2210.08	2347.76	2347.76	2403.33	2504.50	2617.56
Average annual consumption per consumer							
a) Agricultural (KWH)	5962.84	5507.47	5596.37	5322.02	5471.25	5641.23	5435.45
b) Total (LT + HT) (KWH)	2029.14	2071.77	2320.07	2320.07	2160.30	2273.24	2251.90
Number of customers per employee Nos.	172	184	238	233	254	267	281
Distribution of Sales							
a) Agricultural (%)	40.26	41.34	37.07	39.42	37.07	36.17	33.46
b) Others	59.74	58.66	62.93	60.58	62.93	63.83	66.54
Percentage of Towns and villages Electrified (%)	100	100	100	100	100	100	100

Source : Power Development Statistics In Andhra Pradesh 2005-06

Table : 6. 1

Capital Investment

(Rs. In Crs)

Years	Generation	Transmission	Distribution	Total
1990 - 1991	191.14	77.60	190.68	459.42
1991 - 1992	329.26	127.64	224.23	681.13
1992 - 1993	492.18	17416	250.28	916.62
1993 - 1994	502.98	155.28	357.32	1015.58
1994 - 1995	686.81	141.54	388.50	1216.85
1995 - 1996	1030.28	99.57	239.06	1368.91
1996 - 1997	750.55	60.96	206.55	1018.06
1997 - 1998	709.05	115.47	193.91	1018.43
1998 - 1999	561.41	205.00	404.70	1171.11
1999 - 2000	358.16	424.19	494.06	1276.41
2000 - 2001	666.70	420.14	518.02	1604.86
2001 - 2002	452.71	459.11	526.43	1438.25
2002 - 2003	219.77	362.62	983.54	1565.93
2003 - 2004	426.44	248.01	1247.62	1922.07
2004 - 2005	355.00	352.00	1083.72	1790.72
2005 - 2006	1673.00	358.00	937.00	2968.300
Compound Growth Rate (Before)	14.59	1.75	15.58	9.52
Compound Growth Rate (After)	12.52	-5.14	16.43	11.47

Source : Power Development Statistics of Andhra Pradesh 2005-06.

Table : 6. 2

SALE OF ENERGY CATEGORY-WISE (ANNUAL GROWTH RATES(1990-91 TO 2005-06)) (Provl) MU

Financial Year	L.T.CATEGORY									Total HT	Total LT+ HT
	I	II	III	IV	V	VI	VII	VIII	Total		
1991-92	2438.00	553.00	944.00	19.00	6972.00	140.00	43.00	1.00	11110.00	6640.00	17750.00
19 92-93	2825.00	611.00	1010.00	20.00	7895.00	146.00	57.00	1.00	12565.00	6662.00	19227.00
19 93-94	3187.00	673.00	1072.00	23.00	9022.00	151.00	59.00	1.00	14188.00	6998.00	21186.00
1994-95	3213.00	672.00	1128.00	21.00	10922.00	152.00	61.00	3.00	16172.00	6763.00	22935.00
1995-96	3276.00	704.00	1172.00	22.00	11399.00	159.00	62.00	2.00	16796.00	6604.00	23400.00
1996-97	3801.00	795.00	1270.00	23.00	7835.00	212.00	70.00	3.00	14009.00	6914.00	20923.00
1997-98	4535.00	927.00	1358.00	25.00	9336.00	286.00	86.00	2.00	16555.00	7187.00	23742.00
1998-99	5090.00	1060.00	1492.00	27.08	9554.00	367.00	100.38	5.00	17695.46	7136.00	24831.46
1999-2k	5486.00	1142.00	1576.00	27.00	10222.00	403.00	115.00	7.00	18978.00	6824.00	25802.00
2000-01	5907.50	1235.22	1681.37	27.97	11055.11	457.26	92.82	6.71	20463.96	6743.20	27207.16
2001-02	6729.48	1406.79	1774.58	28.01	12155.27	527.19	80.60	6.96	22708.88	6693.34	29402.22
2002-03	6980.07	1537.24	1914.70	31.80	12468.82	765.79	86.28	6.22	23790.92	7839.85	31630.77
2003-04	7200.00	1661.00	1962.00	36.00	12636.00	1010.00	94.00	8.00	24607.00	9478.00	34085.00
2004-05	7789.00	1832.00	2120.00	41.00	13394.00	1151.00	104.00	9.00	26440.00	11178.00	37618.00
2005-06	8462.00	2047.00	2226.00	43.00	13267.00	1176.00	115.00	9.00	27345.00	12307.00	39652.00
Exp. Growth Rate Before Reforms									5.67	0.99	4.12
Exp. Growth Rate After Reforms									6.21	11.81	7.73

Source : Power Development Statistics of Andhra Pradesh 2005-06.

Note : Sales with in the State considered

Table : 6. 3

Progress Under Five Year Plans : Fixed Assets And Revenue

(Rs. in Crores)

Plan	As on	Gross Block Capital	Accumulated Depreciation	Gross Revenue
Up to 1961	31.03.1961	27.95	-	6.78
3rd Plan	31.3.1966	89.52	15.78	18.00
3 Annual Plans	31.3.1969	163.46	29.37	29.85
4th Plan	31.3.1974	281.23	66.59	56.70
5th Plan	31.3.1978	610.62	470.59	124.72
2 Annual Plans	31.3.1980	819.94	185.76	174.94
6th Plan	31.3.1985	1463.05	323.59	520.37
7th Plan	31.3.1990	2547.39	708.53	1015.98
2 Annual Plans	31.3.1992	6642.72	1570.48	2935.08
8th Plan	31.3.1997	6847.89	2143.57	4408.94
9th Plan	31.3.2002	7622.83	2899.84	8839.92
10th Plan (2002-03)	31.3.2003	8757.32	3398.44	10088.67
10th Plan (2003-04)	31.3.2004	9907.31	3968.30	10981.24
10th Plan (2004-05)	31.3.2005	11298.05	4622.70	11589.49
10th Plan (2005-06)	31.3.2006	13049.24	5410.97	12361.53
Compound Growth Rate (Before)	1961 - 1999	81.80657 63.95	82.02428 73.94	105.1712 108.32
Compound Growth Rate (After)	1999 - 2006	14.22391	16.82662	8.429591

Source : Power Development Statistics of Andhra Pradesh 2005-06
Note : From 1999-2000 ,A.P.TRANSCO + DISCOMS

Table : 6. 4

DETECTION OF THEFT OF ENERGY (1991-2006)

Year	No. of Theft Cases booked	No. of Malpractices noticed	Revenue assessed (Rs. in lakhs)
1990 - 1991	1387	3281	283
1991 - 1992	1323	3502	369
1992 - 1993	1650	4600	627
1993 - 1994	3164	2753	907
1994 - 1995	1725	2894	730
1995 - 1996	5863	6124	2076
1996 - 1997	10971	14710	2835
1997 - 1998	10140	17639	4863
1998 - 1999	9706	21462	4335
1999 - 2000	7716	13870	3265
2000 - 2001	6100	2305	3284
2001 - 2002	11739	3244	4396
2002 - 2003	49137	5996	4228
2003 - 2004	28852	6202	4033
2004 - 2005	33932	5904	4818
2005 - 2006	57828	6463	4718
Compound Growth Rate (Before Reforms)	35.6579	29.4497	45.4936
Compound Growth Rate (After Reforms)	44.8455	0.8546	6.5818

Source : Power Development Statistics of Andhra Pradesh 2005-06

Table : 6. 5

Percentage of Income and Expenditure for the Period (1990-91 To 2005-06) Provisional

Sl.No.	I t e m s	1990-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	98-99
		%	%	%	%	%	%	%	%	(Up to 1/99)	(2/99& 3/1999)
A)	**REVENUE RECEIPTS**										
1	By Sale of Power	92.97	93.73	97.48	94.34	66.62	61.81	75.09	91.45	58.51	58.45
1(a)	By interstate sale of power	--	--	--	--	--	--	--	--	--	--
2	Miscellaneous	4.05	2.01	2.51	5.65	4.06	4.18	6.32	8.55	6.46	5.84
3	Subsidy	2.98	4.26	0.01	0.01	29.32	34.01	18.59	-	35.03	35.71
	TOTAL (A)	100	100	100	100	100	100	100	100	100	100
B)	**REVENUE EXPENDITURE**										
1	Fuel	23.69	24.23	26.07	27.47	23.09	30.00	30.79	29.60	26.39	--
2	Power Purchase	19.50	26.70	31.87	33.52	30.19	27.51	24.50	32.15	28.98	76.63
3	O& M Expenses	5.07	5.07	5.55	5.52	4.25	3.83	4.03	3.71	3.31	2.15
4	Establishment, General & office Exp.	17.22	16.05	15.15	14.18	13.27	11.63	12.27	11.62	12.37	11.47
5	Central Excise/ State Excise Duty	2.99	2.58	2.27	2.32	2.09	1.67	1.6	1.34	1.09	0.91
6	Net prior period charges	--	--	--	--	--	--	--	--	1.99	-0.21
7	Expenses capitalized	--	--	--	--	--	--	--	--	-1.06	-1.41
8	Others	6.45	1.69	(-) 5.7	(-)4.41	0.69	(-)3.83	0.88	-0.04	1.7	0.06
C)	**OTHER EXPENSES**										
1.	Depreciation	7.74	7.44	7.91	7.77	9.21	9.75	9.84	7.91	7.13	3.78
2.	Interest Charges	17.34	16.24	16.88	13.63	17.21	19.44	16.09	13.71	18.1	6.62
	TOTAL (B + C)	100	100	100	100	100	100	100	100	100	100

Contd. 2 ……

Table : 6. 5. Percentage Of Income And Expenditure For The Period (1990-91 To 2005-06) (provisional)

Sl.No.	I t e m s	1999-2K	2K-01	01-02	02-03	03-04	04-05	2005-2006
		%	%	%	%	%	%	%
A)	**REVENUE RECEIPTS**							
1	By Sale of Power	56.18	62.08	69.85	74.28	69.71	73.95	71.80
1(a)	By interstate sale of power	--	--	--	--	0.83	0.95	5.84
2	Miscellaneous	5.48	5.33	2.35	4.87	15.68	13.85	9.42
3	Subsidy	38.34	32.59	27.80	20.85	13.78	11.25	12.94
	TOTAL (A)	100	100	100.00	100.00	100.00	100.00	100.00
)	**REVENUE EXPENDITURE**							
1	Fuel	--	--	--	--	--	--	--
2	Power Purchase	77.11	80.58	81.44	76.95	76.15	76.82	75.58
3	O&M Expenses	1.65	1.75	2.15	1.99	1.51	1.59	2.00
4	Establishment, General & office Expenses	9.55	7.88	8.11	8.82	7.56	8.65	7.68
5	Central Excise/ State Excise Duty	0.94	0.89	0.91	0.94	0.94	1.06	1.11
6	Net prior period charges	-0.14	0.17	-2.22	-0.21	1.58	-0.04	0.41
7	Expenses capitalized	-0.98	0	0.00	0.00	0.00	--	--
8	Others	0.03	0.27	0.15	0.09	0.44	0.44	1.05
C)	**OTHER EXPENSES**							
1.	Depreciation	3.75	3.7	4.60	5.05	5.17	5.80	6.26
2.	Interest Charges	8.09	4.76	4.86	6.36	6.65	5.66	5.67
3	Taxes	--	--	--	--	--	0.04	0.24
	TOTAL (B + C)	100	100	100	100	100	100	100

Source : Power Development Statistics of Andhra Pradesh 2005-06.

Table : 6. 6

Revenue Receipts & Expenditure (T & D) (Rs.in crores)

Sl.No.	Details	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999 (Up to 1/99)	1998-99 (2/99 & 3/99)
A)	REVENUE RECEIPTS										
	1.By sale of Power	1210.20	1530.98	1886.84	2172.78	2145.33	2288.33	3286.43	3990.20	3479.64	704.06
	By sale of power-Inter state	--	--	--	--	--	--	--	--	2.16	1.17
	2.Miscellaneous	52.74	32.86	48.58	130.24	131.00	154.93	272.14	373.21	382.51	67.33
	3.Subsidy	38.76	69.54	0.08	0.13	944.11	1259.10	850.37	--	2074.66	474.60
	TOTAL (A)	1301.70	1633.38	1935.50	2303.15	3220.44	3702.36	4408.94	4363.41	5938.97	1247.16
	Compound Growth Rate	**20.4030**									
B)	REVENUE EXPENDITURE										
	1.Fuel/Generation of Power	289.23	375.34	483.90	608.75	719.09	1071.25	1319.69	1627.41	1571.00	--
	2.Power Purchase	238.00	413.54	591.46	742.75	940.29	982.69	1049.40	1767.48	1683.89	911.17
	3.O&M Expenses	61.92	78.53	102.96	122.28	132.28	136.81	187.44	204.21	154.01	25.50
	4.Establishment, General & office expens	210.21	248.57	281.14	314.33	413.13	415.47	546.40	638.92	656.77	119.33
	5.State Electricity Duty.	36.44	40.01	42.13	51.50	65.23	59.66	68.13	73.68	63.58	10.85
	6.Others (RBDD)	42.44	21.04	1.01	2.16	21.60	1.80	20.16	2.72	98.97	0.71
	7. Prior period Charges(Credits)	36.52	5.16	106.66	99.93	18.95	138.81	14.75	4.97	115.83	60.89
	TOTAL (B)	914.76	1182.19	1395.94	1741.84	2310.57	2528.87	3205.97	4309.45	4344.05	1128.45
	Compound Growth Rate	**22.44122**									
	GROSS OPERATING RESULTS (A-B)	386.94	451.19	539.56	561.31	909.87	1173.49	1202.97	53.96	1594.92	118.71
	Compound Growth Rate	**2.763074**									
C)	OTHER EXPENSES										
	1.Depreciation	94.44	115.25	146.75	172.30	286.82	348.27	418.99	434.72	414.01	44.90
	2.Balance Surplus	292.70	335.94	392.81	389.01	623.05	825.22	783.98	(380.76)	1180.91	73.81
	3.Interest Charges :										
	a)On Loans from Institutional Creditors	159.91	167.74	220.91	277.12	451.23	691.11	834.98	961.36	1082.05	66.78
	b)On Loans from State Government	110.06	134.82	176.18	134.56	209.08	130.23	37.53	33.52	187.34	22.70
	c)Less: IDC	58.26	51.06	83.73	109.66	124.51	126.71	217.72	241.25	217.80	29.08
	CHARGES	211.71	251.50	313.36	302.02	535.80	694.63	654.79	753.63	1051.59	60.40
	NET SURPLUS/LOSSES	80.99	84.44	79.45	86.99	87.25	130.59	129.19	1134.39	129.32	13.41
	NET SURPLUS/(DEFICIT)	80.99	84.44	79.45	86.99	87.25	130.59	129.19	1134.39	129.32	13.41
	Compound Growth Rate	**20.20933**									

Contd. Table.6.6…..

Table : 6. 6. Revenue Receipts & Expenditure (T & D) (Rs.in crores)

Sl.No.	Details	1999-2K	2K-01	2001-02	2002-03	2003-04	2004-05	2005-2006
A)	REVENUE RECEIPTS							
	1.By sale of Power	4535.45	5591.77	5870.13	7396.96	7654.17	9169.99	8875.17
	By sale of power-Inter state	6.82	3.59	2.76	130.15	91.57	110.52	721.60
	2.Miscellaneous	414.20	476.57	510.03	1052.18	1722.01	1005.71	1165.28
	3.Subsidy	3064.42	2935.68	2457.00	1509.38	1513.49	1303.27	1599.48
	TOTAL (A)	8020.89	9007.61	8839.92	10088.67	10981.24	11589.49	12361.53
	Compound Growth Rate	**7.475467**						
B)	REVENUE EXPENDITURE							
	1.Fuel/Generation of Power	--	--	--	--	--	--	--
	2.Power Purchase	6201.87	7258.47	7497.26	7579.51	8415.87	8858.54	9122.82
	3.O&M Expenses	133.33	156.31	197.64	195.56	166.97	183.66	241.45
	4.Establishment, General & office expens	728.37	709.91	746.54	868.84	834.99	997.25	926.42
	5. State Electricity Duty.	75.35	80.45	83.98	92.98	104.01	122.18	133.38
	6.Others (RBDD)	3.72	24.61	13.73	9.07	48.13	50.15	124.94
	7. Prior period Charges(Credits)	(38.82)	15.42	(204.41)	(20.98)	174.58	(4.89)	49.12
	8 Expenses capitalized		0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL (B)	7103.82	8245.17	8334.74	8724.98	9744.55	10206.90	10598.13
	Compound Growth Rate	**6.576057**						
	GROSS OPERATING RESULTS (A-B)	917.07	762.44	505.18	1363.69	1236.69	1382.59	1763.40
	Compound Growth Rate	**15.55073**						
C)	OTHER EXPENSES							
	1.Depreciation	301.47	333.23	423.80	497.87	571.88	668.69	757.72
	2.Balance Surplus (Less Depreciation)	615.60	429.21	81.38	865.87	664.81	713.90	1005.68
	3.Interest Charges :							
	a)On Loans from Institutional creditors	645.67	482.26	473.47	611.01	677.47	716.71	793.48
	b)On Loans from State Government	122.12	36.56	76.49	117.24	168.68	125.10	5.85
	c)Less: IDC	152.19	89.61	102.12	101.53	111.26	652.16	114.52
	CHARGES	651.60	429.21	447.84	626.72	734.89	189.65	684.81
	TOTAL SURPLUS/LOSSES	0.00	0.00	366.46	240.03	70.08	61.75	320.87
	Provision for Tax	--	--	--	18.50	5.64	4.50	29.49
	NET SURPLUS/ (DEFICIT)	0.00	0.00	366.46	221.53	75.72	57.25	291.38
	Compound Growth Rate	**-16.5703**						

Source : Power Development Statistics of Andhra Pradesh 2005-06.

Table : 6. 7

REVENUE FROM SALE OF POWER

(Rs. in Crores)

Financial Year	L.T.CATEGORY								Total L.T	Exp.Gro. Rate	Total H.T.	Exp.Gro. Rate	Rebate To New Industrial	Exp.Gro. Rate	TOTAL REVENUE	Exp.Gro. Rate
	I	II	III	IV	V	VI	VII	VIII								
1990-91	151.38	68.97	104.86	0.95	18.05	8.52	4.40	0.41	357.54		864.30		11.64		1210.20	
1991-92	190.51	85.55	131.88	1.22	22.84	9.66	5.30	0.68	447.64		1054.66		8.76		1493.54	
1992-93	242.24	110.28	181.80	1.52	63.98	10.85	6.38	1.62	618.67		1218.86		9.75		1827.78	
1993-94	284.51	128.16	220.68	1.75	57.78	11.38	8.56	1.20	714.02		1409.47		18.33		2105.16	
1994-95	294.63	131.72	241.03	1.83	57.57	11.61	8.93	1.22	748.54		1412.30		15.51		2145.33	
1995-96	352.12	163.12	253.10	2.05	32.02	13.85	10.22	1.27	827.75		1474.92		14.34		2288.33	
1996-97	544.83	260.59	365.66	2.97	105.89	24.00	14.74	1.90	1320.58		1995.14		20.32		3295.40	
1997-98	749.02	342.07	449.69	3.48	151.08	34.75	18.41	2.05	1750.55		2293.79		13.91		4030.43	
1998-99	826.46	403.79	496.59	3.90	153.81	43.50	22.53	2.56	1953.14	**23.25925**	2225.43	**13.01349**	19.49	**8.09829**	4159.08	**16.52956**
1999-2K	908.82	505.87	568.26	3.70	154.98	47.84	29.49	3.77	2222.73		2292.32		20.37		4494.68	
2000-01	1278.43	690.71	689.74	4.97	235.60	86.28	34.52	4.40	3024.65		2567.13		22.72		5569.06	
2001-02	1393.61	821.08	724.17	5.47	208.22	102.80	33.17	4.45	3292.97		2577.16		26.28		5843.85	
2002-03	1617.28	901.87	758.73	5.99	818.37	153.70	35.29	4.08	4295.31		3101.65		3.74		7393.22	
2003-04	1664.75	987.68	787.27	7.02	416.94	195.70	39.25	5.18	4103.79	**10.84886**	3553.40	**13.01349**	3.02	**-43.0033**	7654.17	**12.00054**
2004-05	1827.21	1061.94	851.64	7.58	402.29	202.17	42.84	6.24	4401.91		4169.27		--		8571.18	
2005-06	1909.83	1157.39	862.43	7.93	13.52	202.99	45.72	6.18	4205.99		4669.27		--		8875.26	

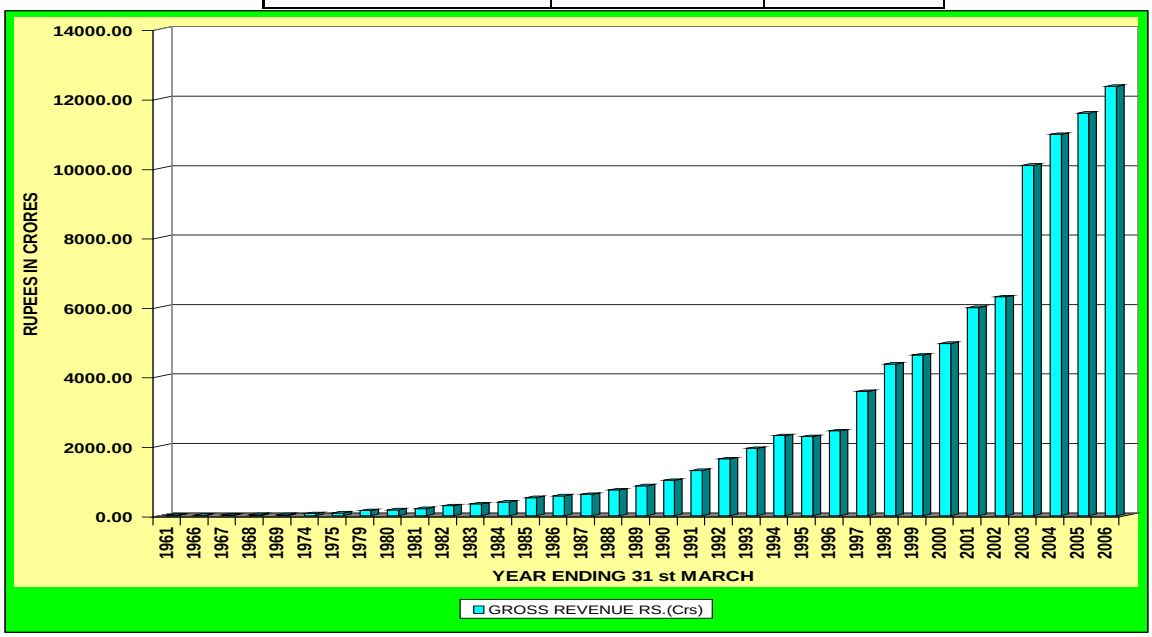
Source : : Power Development Statistics of Andhra Pradesh 2005-06

Table : 6. 8

Gross Revenue (1990 - 91 To 2005 - 06)

(Rs. in Crs)

Years	Gross Revenue	Compound Growth Rate
1991	1301.70	
1992	1633.38	
1993	1935.50	
1994	2303.15	16.7728
1995	2276.34	
1996	2443.26	
1997	3578.96	
1998	4363.41	
1999	4620.47	
2000	4956.45	
2001	5991.50	
2002	6298.84	
2003	10088.66	17.9268
2004	10981.24	
2005	11589.49	
2006	12361.53	



Source : Power Development Statistics of Andhra Pradesh 2005-06.

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