

**REPORT OF
THE HIGH LEVEL COMMITTEE**

**GUIDELINES ON
RESTRUCTURING AND
PRIVATISATION OF POWER SECTOR
AND
POWER TARIFF**

HYDERABAD

APRIL 1995

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CHAPTER - 1

TERMS OF REFERENCE

- 1.1.01. Consequent on the liberalised policy announced by the Government of India for attracting private investment in power sector, the State Government have been taking steps towards promoting private generating stations with State Government guarantees. The State Government considers that the existing policy on private participation in power sector needs a thorough review with the emphasis shifting towards greater private involvement in transmission and distribution of electricity also. The need for a careful evaluation of privatisation based on a long-term strategy for private participation in the power sector was felt.
- 1.1.02. The Government have constituted a High Level Committee with a Chairman and five members in G.O.Ms.No.2, Energy & Forests (Power-I) Department, dated 7.1.1995 (Annexure 1.1) to provide guidelines and appropriate recommendations to Government on the issues of private investment in power sector, restructuring of power sector and a tariff policy.

- | | |
|--|------------------------|
| 1. Sri Hiten Bhaya | Chairman |
| 2. Dr. N. Tata Rao | Member |
| 3. Sri D. Sankara Guruswamy | Member |
| 4. Sri T.L. Sankar | Member |
| 5.** Dr. E.A.S. Sarma,
Prl. Secretary to Govt.,
Energy & Forest Dept. | Member |
| 6. Sri K. Balarama Reddi ,
Chairman, APSEB | Member/Convenor |

**** Note :** Dr. E.A.S. Sarma proceeded on leave on February 18th, 1995. The Committee was assisted by Sri M.V. Natarajan who was placed in additional charge of the Energy and Forests Department, Govt. of AP. In the final stages, Sri M.C. Mahapatra, Secretary, Department of Energy, Government of A.P. was nominated as Member of the Committee.

1.1.03. The terms of reference to the Committee are as follows:

- i. To review the existing approach to private participation in the power sector and evolve comprehensive guidelines on the strategy to be adopted by the State Government in the context of the statutory provisions on electricity as they stand today, including the notifications issued from time to time by the appropriate authority.
- ii. To review and provide guidelines for the Government to proceed further in regard to the various existing proposals of private investment in the power sector, in the context of the overall strategy.
- iii. To review the existing organisation of the power sector and evolve guidelines for restructuring the power sector in the State in the above context and also in relation to the scope for private sector assuming total responsibility for generation, transmission and distribution of electricity.
- iv. To evolve guidelines on a transparent tariff policy to be adopted for the power sector in the State, including a suitable organisation to ensure that the tariffs promote optimum use of scarce resources of the State.
- v. To suggest ways and means other than through tariff rationalisation, for mobilising additional resources for power development and energy conservation in the State.
- vi. To consider the privatisation strategy in relation to non-conventional and decentralised energy systems; and
- vii. To consider such other related issues and make appropriate recommendations.

1.1.04 The Committee held as many as 14 sittings from January, 1995 to April, 1995.

1.1.05 The Committee called on the Hon' ble Chief Minister, Govt. of AP on January 24th, 1995.

1.1.06 The Committee held extensive discussions with various experts, Indian and Foreign. It met representatives of the following organisations

- i. The World Bank

- ii. **Overseas Development Agency, UK**
- iii. **Industrial Credit & Investment Corporation of India Limited, Bombay**
- iv. **Bombay Sub-urban Electric Supply Company (BSES)**
- v. **Tata Power Company Limited, Bombay**
- vi. **Calcutta Electric Supply Company (CESC)**
- vii. **Workers' Unions and Engineers' Association of APSEB**
- viii. **Electricite De France.**

GOVERNMENT OF ANDHRA PRADESH**ABSTRACT**

POWER SECTOR - Privatisation of Power Sector - Constitution of a High Level Committee for presentation of a policy paper to Government on the issues of private investment in power sector, restructuring of power sector, guidelines on tariff policy etc., - Orders - Issued.

ENERGY & FORESTS (POWER - I) DEPARTMENT

G.O.Ms.No.2

Dated : 7-1-1995

Read the Following:

G.O.Ms.No.280, Energy & Forests, (Pr.I) Department, dated : 19.12.1994.

ORDER :

Consequent on the liberalised policy announced by the Government of India for attracting private investment in power sector, the State Government have been taking steps towards promoting private generating stations with State Government guarantees. The State Government considered that the existing policy on private participation in power sector needs a through review with the emphasis shifting towards greater private involvement in transmission and distribution of electricity also. It is also considered necessary that the approach toward privatisation needs to be carefully evaluated and a long-term strategy evolved for private participation in the power sector.

2. The Core Group constituted in the Government Order read above, to study and make recommendations to the Government on the issues relevant to privatisation of the power sector such as the electricity tariff structure, private participation in transmission and distribution etc., was of the opinion that the existing organisational structure of the electricity industry, the electricity tariff structure etc., should be reviewed in order to evolve a comprehensive policy by constituting a Committee with a group of persons who are experts in the power sector.

3. The Government, after careful consideration of the matter, hereby constitute a High Level Committee headed by **Sri Hiten Bhaya**, as Chairman with the following members to provide guidelines on privatisation and to make appropriate

recommendations to the State Government on the specific terms of reference indicated below :

- | | |
|--|-----------------|
| 1. Dr. N.Tata Rao | Member |
| 2. Sri D.Sankara Guruswamy | Member |
| 3. Sri T.L.Sankar | Member |
| 4. Sri E.A.S.Sarma,
Prl. Secretary to Government,
Energy & Forest Department | Member |
| 5. Sri K.Balarama Reddi,
Chairman,
A.P.State Electricity Board | Member/Convenor |

TERMS OF REFERENCE :

- i. To review the existing approach to private participation in the power sector and evolve comprehensive guidelines on the strategy to be adopted by the State Government in the context of the statutory provisions on electricity as they stand today, including the notifications issued from time to time by the appropriate authority.
- ii. To review and provide guidelines for the Government to proceed further in regard to the various existing proposals of private investment in the power sector, in the context of the over all strategy.
- iii. To review the existing organisation of the power sector and evolve guidelines for restructuring the power sector in the State in the above context and also in relation to the scope for private sector assuming total responsibility for generation, transmission and distribution of electricity.
- iv. To evolve guidelines on a transparent tariff policy to be adopted for the power sector in the State, including a suitable organisation to ensure that the tariffs promote optimum use of scarce resources of the State.
- v. To suggest ways and means other than through tariff rationalisation, for mobilising additional resource for power development and energy conservation in the State.

- vi. To consider the privatisation strategy in relation to non- conventional and decentralised energy systems; and
 - vii. To consider such other related issues and make appropriate recommendations.
4. The Committee may frame its own procedure. It may also invite other experts in the field to assist it as it may deem necessary.
 5. The Committee is requested to furnish its report on the above mentioned terms of reference to Government within 45 days.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

**E.A.S.SARMA
PRINCIPAL SECRETARY TO GOVERNMENT**

CHAPTER 2

CONTOURS OF THE ECONOMY IN ANDHRA PRADESH AND THE PRESENT POWER SCENARIO

- 2.1.01 The State of Andhra Pradesh has a population of 71 million spread over 2.76 lakh square kilometers of land which is divided into 23 districts comprising 252 towns and 27300 villages.
- 2.1.02 The State is predominantly agricultural, the total irrigated area is 63 lakh hectares. Lift irrigation is almost entirely powered by electricity. The number of pumpsets energised is over 16 lakhs of which two thirds are in eight districts of Telangana and Rayalaseema. In the past few years, more than one lakh pumpsets have been added every year.
- 2.1.03 A large number of industries - Steel, Fertiliser, Cement, Paper, Electronics, Pharmaceutical & Chemicals, granite polishing and others have been set up. However, the industries have come up mostly in and around Hyderabad, Medak, Rangareddy, Vijayawada, Visakhapatnam, Tirupati, Nalgonda, Adilabad and Khammam.

Resources for Power Generation :

- 2.2.01 The hydel potential in the State is estimated as 6000 MW (at 60% PLF). Coal reserves are estimated to be 3000 million tonnes of the power category. The oil and natural gas potential of the Krishna Godavari basin is said to be 890 million tonnes oil equivalent. The supply of gas however is limited and uncertain. Therefore, Coal based thermal and Hydel appear to be the natural choices. Diesel and Fuel Oil are least favoured nationally as power fuels, because we are net importers of petroleum products.

Imperatives of Power Systems :

- 2.3.01 There are **certain imperatives of Power Systems in general** which set the practical parameters of any power policy for the State.
- 2.3.02 **Power cannot be stored.** Therefore, optimal use of power is achieved only when power flows freely within the system. The larger the system with a mix of generation - thermal & hydel the better the chances of optimising. Some important corollaries follow from this basic characteristic:

- a. The power system should be considered for the country as a whole - as a national grid. Self-sufficiency in power for a state or region must be planned in this larger context.
- b. There has to be a judicious mix of own and imported power from other systems. Therefore transmission lines to and from all sources outside the State must be in position.

2.3.03

The demand for power fluctuates hourly, daily, seasonally and regionally. Hence the need of a central Load Despatch System to even out these variations as well as other variations such as in frequency and voltage. The corollaries to this characteristic are :

- a. When the demand is less than the supply, some generating units may have to be backed down. Ideally, the stations whose incremental generating cost per unit are higher should back down first, i.e., backing down should be according to 'merit order'. 'Merit order' operation is economical for the stations with lower fuel cost. Though 'merit order' operation is economical for the whole system, it may adversely affect the profitability of the newer stations.
- b. When maximum demands arise simultaneously within the system, the system will be at its peak; To meet this peak demand, adequate reserve should be available. However investment in generating capacity could never keep pace with the fast growth in peak demand. Therefore, the country as a whole has peaking shortage and the States in varying degrees, have to resort to rationing in power and planned load-sheddings. Until sufficient reserves are built up this may be unavoidable to a certain extent. While, a system may not be able to meet fully the peak demand, it may be able to satisfactorily meet the demand during most of the year. The extent to which the peak demand is not met would obviously depend on how frequently and how long the peak demand lasts. Demand management (through energy conservation measures and tariff policies) will have to be a part of power strategy
- c. In order to respond quickly to a fluctuating demand situation it is necessary to have generating units which can be switched on and off relatively faster. Hydel and Gas units can do this. It is uneconomical and inadvisable technically to frequently start and stop the thermal units designed for base load operations.

Growth of the A.P. Power System:

- 2.4.01 Rapid development of the power sector started only with the formation of the State Electricity Board in April 1959, as a statutory body under the provisions of the Electricity Supply Act, 1948. A glance at the following data shows clearly the tremendous development of the power sector in the past three decades and more.

	1960-61	1993-94
(a) Installed capacity (MWs)	213	4,729
(b) Generation (in million units)	784	19,272
(c) Length of H.T lines (circuit KM) (11 KV and above)	14,800	1,82,493
(d) Length of L.T lines (circuit KM)	13,738	3,61,474
(e) Substations		
(i) No.of 220 KV Substations	--	41
(ii) No.of 132 KV Substations	--	151
iii) No.of 33 KV Substations	65	1,266
(iv) No.of LT distribution transformers	4,667	1,19,691
(f) Number of Towns and Villages electrified	2,680	27,610
(g) Number of pumpsets energised	17,968	15,04,975
(h) Per capita consumption	19	347
(i) Total Revenue (Rs.in Crores)	5.50 (1959-60)	2,303

- 2.4.02 The State Government has been investing from a low 19.63% in 7th Plan and a high 42.5% in 4th Plan of the total plan outlay in the power sector

- 2.4.03 At the time the Board was formed the entire power system in existence was an urban based system. The real thrust of electrification has been the extension to the rural areas and the use of electricity primarily to boost agricultural production. The number of electrified pumpsets has gone up from 17968 in 1960-61 to about 16 lakhs in 1994-95. This simple fact has been responsible for a revolution in agricultural production in the State. The

Missing

entire State has been covered by electrification by the end of 7th Plan (1985-1990). The per capita consumption of electricity has gone up from 19 units in 1960-61 to 347 units 1993-94.

- 2.4.03 Total energy sold has gone up from 601 MU in 1960-61 to 21746 MU in 1993-94. Starting from 1978-79 purchases from the Central Public Sector Entities (NTPC, NLC and the Nuclear Power Corporation) has gone up steadily and now constitutes 25 percent of the total power available for sale. The rapid expansion in sales of power has, however, not enabled the SEB to generate sufficient resources for future expansion owing to skewed tariff policies culminating in practically free supply to the agricultural sector and substantially subsidised supply to the domestic sector. Notwithstanding this, APSEB was able to generate surplus to the extent of 3 % of the net fixed assets at the beginning of the year, in the four years 1989-1994.
- 2.4.04 The total capital liabilities of the Board including funds from the State Government stood at Rs. 3998.04 crores as at the end of 1993-94. The Board finances its capital expenditure mainly through loans.
- 2.4.05 In 1993-94, the State Government converted a part of its loans under Section 64 to the extent of Rs.908.13 crores in to equity. In the absence of equity capital, the debt servicing obligations of the Board have been very large.
- 2.4.06 In Annexure 2.1 a detailed note along with time series statements has been placed which gives a detailed picture of the growth of the power system in Andhra Pradesh. In the next paragraph the existing system has been described.
- 2.5.01 **Generation:**
- i. The present installed capacity is 5213 MW comprising 2656 Hydel (13 stations), 2453 MW Coal thermal (9 stations), 100 MW Gas and 4 MW from Wind Farms. The Gas station is a joint venture between APSEB and a group of HT consumers. In addition, the State has a share of 897 MW from Central sector stations of Southern Region.
 - ii. One thermal project with a total capacity of 500 MW and five Hydel projects to a total of 1135 MW are under construction by APSEB.
 - iii. Four thermal projects with a total capacity of 2500 MW and two gas based projects with a total capacity of 424 MW have been entrusted to

the private sector, . The proposal of NTPC for implementation of 1000 MW Simhadri Coal Based Thermal Power Station at Visakhapatnam and 650 MW Naphtha Based Thermal Power Station at Hyderabad has been accepted by the Government of Andhra Pradesh. **Thus there are prospects of addition of about 6000 MW within the next 5 to 7 years.**

- iv. **Hydel Power plays a crucial role in the management of the power system.** A very favourable mix of hydel and thermal has been the strong feature of the Andhra Pradesh system both for meeting the demand and for keeping the average cost down. However this feature may not continue as more and more thermal units are added. During monsoon months, the hydel units are able to supply to full capacity and any rise in frequency during this period requires some backing down specially during off-peak hours. Between November and April frequencies are low for most part of the day. Operation of the Hydel reservoirs is primarily dictated by the needs of their irrigation system, insufficient inflows, larger and faster withdrawals resulting in power cuts invariably.
- v. APSEB's operating efficiency by way of Plant availability and Plant Load factor has been consistently one of the best in the country. There is some scope for improvement in O&M expenditure and auxilliary consumption.
- vi. APSEB's own generation during 1994-95 was 20525 Million units (excluding auxilliary consumption) comprising Hydel 9684 Million units and Thermal 10841 Million units. In addition 9441 Million units were bought from sources outside the state.
- vii. **The energy consumption went up by 11.56%. While grid registered a Peak demand of 4434 MW or a rise of 6.33% over the corresponding 1993-94 values.**

5.02 **Transmission and Distribution System**

- i. The APSEB's Transmission and distribution system has grown into a very large network comprising as on 31.3.1994;

Voltage	Length of lines in Ckt KM	Sub stations
220 KV	6422	41
132 KV	9649	151
66 KV	420	7
33 KV	23102	1266
11 KV	142900	
LT	361474	

ii. **Distribution Transformers** **119691**

iii. **Number of services connected**

Category	No. of services	Connected load MW
HT	3481	2960
LT	8062801	9070

iv. **Sale of Power in 1993-94**

Category	Sale of Power MKWH
HT	7158
LT	14187

- v. **The LT system is unusually large in line length and number of consumers consuming two thirds of the Sales. Major part of the unaccounted losses occur in this system (14%) which supplies mainly to the domestic and agriculture sectors. The HT system has few subscribers and consumes one-third of the power.**

2.5.03 **Inter-Connections :**

APSEB is connected with the Power Grid Corporation's 400 KV overlay system which integrates the operation of the four southern states under the control of the Southern Regional Electricity Board. The Southern and the Western regions are connected by the 400 KV Chandrapur-Ramagundam line (being converted to HVDC system back to back). Andhra Pradesh is connected at 220 KV with Madhya Pradesh, Orissa, Tamil Nadu and

Karnataka. Andhra Pradesh is also connected by a 100 KV HVDC system with Madya Pradesh.

2.5.04 **The Demand Pattern :**

- i. The share of the major consumers in the total sales in 1993-94 was as follows :-

Category	Energy (%)	Revenue (%)
Agricultural	42	3
Industry	32	70
Domestic	15	13
Railway Traction	3	5
Elect. Co-ops	3	0.1
Others	5	8.9

The revenue from industrial consumption (32%) is balancing the revenue deficit from the Domestic and Agricultural consumption (57%). As the trend is for the demand from these two latter categories to rise faster, this balance cannot be maintained unless industrial load increases faster and / or the tariffs are revised upward for these two categories particularly agricultural sector. Otherwise the losses will be incurred.

2.5.05 **Revenue, Costs and Profits :**

- i. During 93-94 the total power sold was 21746 Million units and the revenues amounted to Rs.2303 crores. The average revenue per unit sold worked out to Rs.1.06 paise. The average cost of one unit of energy delivered at HT terminals (11 KV) was 80.98 paise and the average cost per unit at LT terminals was 126.74 paise.
- ii. On this basis, the contribution by the major consumer categories was as follows :-

Category	Consumption KV	Cost of supply Paise/Unit	Revenue realised per unit	Total Surplus/ Deficit
Agricultural	9022	126.74	6.4	(1085.70)
Domestic	3187	126.74	89.27	(120.34)
Industry	7158	80.98	196.91	829.93

- 2.5.06 **Power costs in all future projects will be high, basically because of higher capital costs in equipment and construction. This is likely to be higher still in case of private projects** because most of the new IPP's are inexperienced and dependent on foreign collaborators. The more there is of foreign exchange (technical fees, imported equipment), the higher the capital cost, also in such cases finances raised in the foreign capital market are of the non-recourse type and require full risk guarantees. It is estimated that it adds 20 to 30% to the cost. The precedent set by a guaranteed return of 16% post tax in some projects is likely to set a floor for power projects. For both public and private sector there are time overruns and unabated inflation. Once high capital costs get built in Regulatory Commission can not limit tariffs effectively.
- 2.5.07 The operations of the SEB 1993-94 resulted in a commercial loss of Rs. 12.93 Crores. Adjustments of prior period credits - charges and a conversion of a part of its loan by the State Government into equity has enabled the SEB to achieve a return of 3% as stipulated in the Electricity (Supply) Act, 1948.
- 2.5.08 **Regional Disparities :**
- i. The total consumption of power varies from 1750 MUs to 250 MUs among the 23 Districts. Karimnagar, Rangareddy consumption of power varies from 1750 MUs to 250 MUs 23 districts. Karimnagar, Rangareddy, Nalgonda, Medak and Chittoor are high consumption areas. Prakasam, Vijayanagaram, are low in consumption.
 - ii. The number of consumers ranges from 488000 in Rangareddy to 161000 in Vijayanagaram. The number of HT consumers likewise ranges from 508 in Rangareddy to 30 in Srikakulam.
 - iii. Net revenue surplus areas (Rs. 90 to 70 crores are : Visakhapatnam, Rangareddy and Hyderabad. (Rs. 40 to 20 Crores) are: Khammam, Krishna, East and West Godavari Vijayanagaram.
 - iv. Net Deficit areas are: Warangal, Nizamabad, Chittoor, Mahaboobnagar, Anantapur and Nalgonda.
 - v. Marginal areas are: Prakasam and Karimnagar.

vi. High Agricultural consumption areas are: Warangal, (954 MU), Chittoor(880 MU), Nalgonda (853 MU), Karimnagar (820 MU), Nizamabad (626 MU), Medak (605 MU), Mahaboobnagar (598 MU) and Anantapur (554 MU)

vii. High Industrial consumption areas are: Visakhapatnam (783 MU), Karimnagar (762 MU), Rangareddy (747 MU), Medak (689 MU), Adilabad (467 MU) and Nalgonda (490 MU)

viii. **Districts above 3 million population are:**

East Godavari, Krishna, Guntur

above 2 million population are :

West Godavari, Visakhapatnam, Anantapur,
Mahabubnagar, Karimnagar, Kurnool, Prakasam,
Warangal, Nalgonda, Chittoor

above 1 million population are :

Srikakulam, Cuddapah, Medak, Vizianagaram,
Khammam, Nizamabad, Adilabad, Rangareddy

2.6.01 The sizes of the districts vary considerably. Apart from this the load mix capacity of various districts also varies substantially

A REVIEW OF POWER DEVELOPMENT IN THE STATE

1.0 At the time of formation of the State in 1956, the installed capacity was 99 MWs. The peak demand was 55 MW and the energy generation was of the order of 239 MU. The gross sales were 186 MU. The percapita consumption was 7 KWH per annum. The consumers served were 1.49 lakhs. The villages electrified were 197. The Agricultural pumpsets electrified were 4300 Nos.

1.2 **Progress in Generation Capacity:**

The APSEB has made great strides in power development in the past three and a half decades. The statements 2.1, 2.2 and 2.3 indicate the plan-wise progress made by the APSEB in installed capacity, peak demand and generation since its inception. The power plants of APSEB have made a name for themselves all over the country for a high level of availability, capacity utilisation and low specific fuel consumption besides good house-keeping. Statement 2.4 indicates the performance figures of the Boards power plants.

1.3 **Growth in Services:**

Growth of Electricity breeds new demand exponentially. The number of consumers of various categories has been increasing by leaps and bounds over the past few decades. Statements 2.5 and 2.6 indicate the category-wise growth in services and consumption. It may be seen that the share of Agricultural consumption in the total consumption has gone up from about 19% in 70-71 to about 43% at present. During this period the share of the industrial consumption has declined from about 65% to 32%. Keeping the demand for services in view the Board had to keep on releasing about 4 lakh domestic services, 1 lakh agricultural services and about 8000 new LT industrial and commercial services every year from the past many years. This high growth in number of consumers and the resulting increase in consumption could not be met by the rate of additions to the capacity in the past decade. The shortages have led to restrictions and controls on industrial and other consumers.

1.4 **Network Expansion:**

The total length of Transmission system (33 KV and above) was 2833 Ckt Km in 1959-60. This met the needs of about 2 lakh consumers. The transmission and distribution system has grown enormously over the years. Statement 2.7 indicates this enormous growth of the T&D network over the past three decades Statement 2.8 indicates the tremendous strides made by APSEB in Rural Electrification over the years.

1.5 **Financial Position:**

The revenue earned by the Board in 1959-60 was of the order of Rs.5.5 crores. This has grown to Rs.2308 crores by 1993-94. Though there has been a steady increase in sales and revenues, the position in respect of surplus has remained static for the past few years due to a steep increases in operating expenditure and practically free supply to agriculture and substantially subsidised tariff to the domestic consumers.

STATEMENT 2.1
OUTLAY ON POWER DEVELOPMENT IN ANDHRA PRADESH

Period (at the end of)	Outlay in Power	State Plan Outlay	% of Power outlay to the State outlay
1st Plan 1951-56	37.84	96.78	39.10
2nd Plan 1956-61	38.53	188.60	20.40
3rd Plan 1961-66	93.61	352.42	26.60
Three Annual Plans 1966-69	91.96	234.06	41.80
4th Plan 1969-74	190.58	448.87	42.50
5th Plan 1974-78	385.61	1004.28	38.40
Two Annual Plans (1978-80)	309.27	942.10	32.80
6th Plan 1980-85	737.98	3243.59	22.80
7th Plan 1985-90	1173.51	5976.60	19.63
Annual Plan 1990-91	360.85	1508.28	24.15
Annual Plan 1991-92	428.40	1602.00	29.40
8th Plan (1992-97) 1992-93	677.39	1995.80	33.90
8th Plan (1992-97) 1993-94	660.19	2075.60	28.90

STATEMENT-2.2
PROGRESS UNDER VARIOUS PLANS - GENERATION

	Period (At the end of)	Installed Capacity (MW)	Peak Demand (MW)	Generation (MU)
Pre-plan	31.3.1951	43.1	22.6	104
1st Plan	1951-56	98.9	54.6	239
2nd Plan	1956-61	213	190	784
3rd Plan	1961-66	292	258	1399
Annual Plan as on	31.3.1969	615	440	2277
4th Plan	1969-74	668	652	3106
5th Plan	1974-78	1563	970	5148
2nd Annual Plan	1978-80	1888	1055	6493
6th Plan	1980-85	3156	2158	12551
7th Plan	1985-90	3825	3070	15024
Annual Plan	1990-91	4131	3465	18119
	1991-92	4166	3703	18242
8th Plan (1992-97)	1992-93	4228	3916	17872
8th Plan (1992-97)	1993-94	4729	4170	19272

STATEMENT-2.3
GENERATION, PURCHASES, GROSS ENERGY, AUXILIARY
CONSUMPTION SALES AND LINE LOSSES

Figures in MU

At the end of	Generation	Central Sector Imports	Others	Gross Energy	Auxiliary Consumption	Sales	Line Losses	% Losses
4th Plan (1969-74)	3106	-	505	3611	176	2586	850	24.73
5th Plan (1974-78)	5148	-	262	5409	370	3901	1138	22.59
2 Plans (1978-80)	6493	-	104	6597	401	4870	1326	21.40
6th Plan (1980-85)	12551	834	17	13402	685	10112	2605	19.86
7th Plan (1985-90)	15024	3550	497	19071	729	14628	3705	20.20
2 Plans (1990-92)	18242	4595	671	23508	959	18198	4351	19.33
8th Plan 1992-94	19272	7612	981	27865	1002	21746	5117	19.05

STATEMENT-2.4
PERFORMANCE OF THERMAL POWER PLANTS OF APSEB

Year	Plant Load Factor		Specific Coal Consumption(Kg/KWH)		Specific Oil Consumption(Kg/KWH)	
	A.P	All India	A.P	All India	A.P	All India
1983-84	56.30	47.90	0.74	0.72	8.35	17.90
1984-85	55.80	50.10	0.76	0.71	3.49	13.80
1985-86	64.80	52.40	0.72	0.70	3.39	13.96
1986-87	69.70	53.20	0.76	0.71	3.24	12.00
1987-88	76.20	56.50	0.78	0.71	1.91	10.50
1988-89	69.50	55.00	0.78	0.71	2.12	9.97
1989-90	66.40	56.40	0.80	0.71	3.42	9.23
1990-91	65.30	53.80	0.78	0.71	3.02	7.59
1991-92	62.00	55.30	0.82	0.72	3.06	6.77
1992-93	64.90	57.10	0.84	0.72	3.13	4.09
1993-94	68.67	61.00	0.86	0.73	2.88	5.12

STATEMENT-2.5
NUMBER OF CONSUMERS

YEAR	L.T					H.T
	Domestic	Commercial	Industrial	Agriculture	Total LT	
1974-75	900030	262326	30257	275072	1481574	1314
1980-81	1541436	315328	52200	422418	1957734	1905
1984-85	2374900	362282	70024	594330	2877536	2627
1985-86	2621835	382427	16188	639586	3707660	2837
1986-87	3022950	410323	82363	733169	4329252	2974
1987-88	3410100	437519	88353	834435	4856480	3113
1988-89	3975147	467803	95131	951466	5585749	3280
1989-90	4428828	483829	107407	1056407	6183935	3610
1990-91	4730697	504044	114057	1134519	6594715	3809
1991-92	5162662	531543	121352	1211003	7142600	3915
1992-93	5556713	557224	127315	1331555	7693500	3415
1993-94	5787801	586558	131188	1433732	8062801	3484

STATEMENT - 2.6
GROWTH OF CATEGORYWISE CONSUMPTION (EXPRESSED
AS A PERCENTAGE OF TOTAL CONSUMPTION)

Year	Domestic	Commercial	Industrial	Agricultural	Railway traction and Others	Total L.T
1970-71	8.7	5.83	65.44	18.44	1.9	100
1980-81	10.7	4.23	63.05	24.46	3.58	100
1985-86	11.59	3.3	54.78	28.79	5.05	100
1991-92	14.05	3.18	38.95	40.37	3.45	100
1993-94	15.03	3.18	32.45	42.76	6.58	100

STATEMENT - 2.7
PROGRESS IN TRANSMISSION AND DISTRIBUTION

PERIOD (AT THE END OF)	Number of Sub- stations	Transmission and Distribution Lines (Circuit KM)
2nd Plan (1956-61)	65	28538
3rd Plan (1966-69)	172	51076
Three Annual Plans (1966-69)	197	68288
4th Plan (1969-74)	279	121526
5th Plan (1974-78)	387	159079
Two Annual Plans (1978-80)	435	188271
6th Plan (1980-85)	665	272465
7th Plan (1985-90)	1067	416123
Annual Plan (1990-91)	1136	441803
Annual Plan (1991-92)	1228	477878
8th Plan (1992-93)	1313	510266
8th Plan (1993-94)	1465	543967

STATEMENT - 2.8
PROGRESS IN RURAL ELECTRIFICATION

Sl.No	Plan	Towns and Villages Electrified	Agricultural (Pumpsets energised)
1	Pre-Plan	197	620
2	1st Plan	630	4300
3	2nd Plan	2680	17968
4	3rd Plan	4353	57225
5	3rd Annual Plan	5788	122321
6	4th Plan	10485	261989
7	5th Plan	14851	318357
8	2nd Annual Plan	16659	388292
9	6th Plan	23078	636003
10	7th Plan	27610	1111569
11	Annual Plan	27610	1193363
12	Annual Plan	27610	1273973
13	8th Plan (1992-93)	27610	1398049
14	8th Plan (1993-94)	27610	1504975

CHAPTER 3

DEMAND PROJECTIONS AND POWER AVAILABILITY

- 3.1.01 The first task before the committee was the identification of the emerging gap between the demand and supply. The Central Electricity Authority, Government of India has the responsibility for the formulation of short term and perspective plans for power development for the country as a whole.
- 3.1.02 The Ministry of power, Government of India, constitutes every year a Power Survey Committee under the Chairmanship of Chairman, Central Electricity Authority to review in detail the electricity demand projections submitted by each state and finalise the forecast in consultation with respective states and publish them for guidance as per section 3(iv) of the Electricity (Supply) Act, 1948.

Fifteenth Electric Power Survey:

- 3.2.01 The 15th Electric Power Survey Committee has been constituted and its assignment is to review the Electricity Demand Projections in detail during the 9th plan period i.e., upto 2001 - 2002 and to project the perspective demand upto 2011 - 2012. The Central Electricity Authority has communicated the preliminary forecast of power demands of Andhra Pradesh based on the information supplied by the A.P.S.E.Board and that obtained from various industries. The summary of the forecast as projected by the CEA for Andhra Pradesh is given in Table 3.1.

Table 3.1

	1992-93	1994-95	1999-2000	2001-02
Energy Requirement in MKwh	24382	29182	40393	44903
Peak Load in MW	3692	4863	6732	7483

The above projections are yet to be discussed by CEA with APSEB and the detailed forecast finalised.

- 3.2.02 In Andhra Pradesh there was a long spell of availability of unrestricted power from 1976-77 to 1985-86. This period was followed by a period of acute power shortage from 1986- 87 to 1994-95. During this period, severe restrictions on demand and energy were in force. The cuts in power were of

the order of 40 to 60 per cent. APSEB is of the view that in projecting the power demand in future there is need to adequately appreciate this crucial fact. In several industries capacity utilisation has been substantially below capacities built up during periods of unrestricted supply. A study of the rates of growth of power consumption by different categories during the period of unrestricted supply and again during the years of acute restrictions brings out vividly the large difference between the two. The table 3.2 placed below shows the over all growth rate and the growth rates of individual categories during the two periods.

Table 3.2

Category	No-Power cut period 1976-77 to 1985-86 (%)	Power cut period 1986-87 to 1993-94 (%)
Domestic	16	12
Commercial	8	6
Public Lighting	12	6
Industrial LT	10	7
Industrial HT	12	2.5
Agricultural	15	15
Total	13	9

The following conclusions can be drawn from the data presented above.

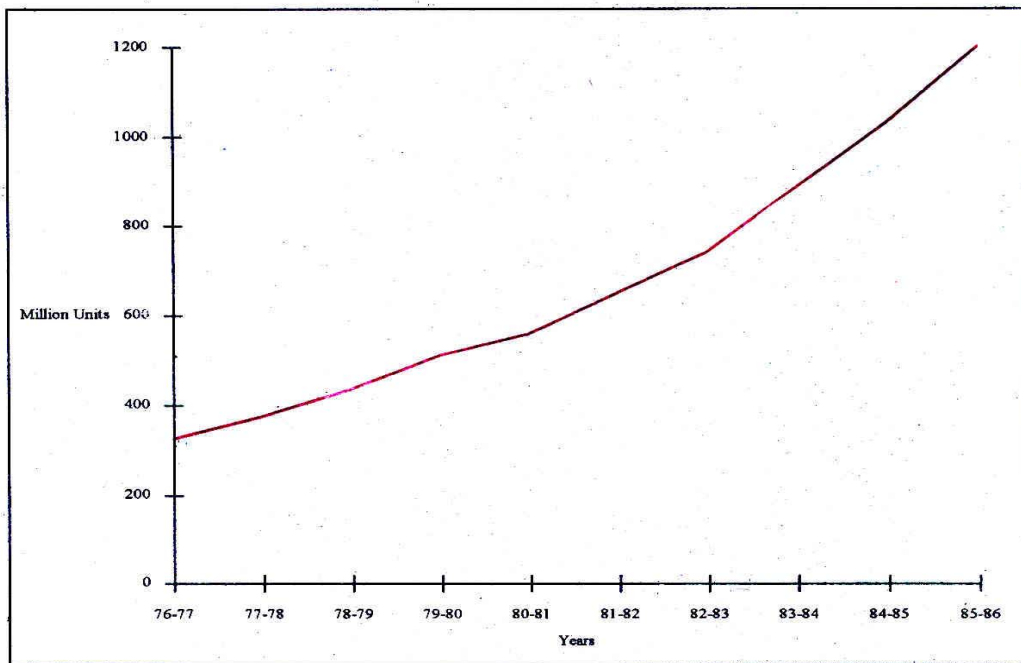
- a. The industrial sector has suffered the most during periods of restrictions.
- b. In the Industrial sector again industries availing H.T. supply have been affected to the maximum extent. These industries with a growth rate of 12 per cent per year during the unrestricted supply period registered a very low or marginal growth of 2.5 per cent per annum only in the years of acute shortage.
- c. It is significant that agricultural consumption has been growing at a constant rate of 15 per cent while all other categories have shown much lower growth rates.

During the period of unrestricted supply the industrial sector grew at as high a rate as 27 per cent in some years and the compound rate of growth for the entire period of no cuts was 12 per cent. The overall compound growth rate was as high as 13 per cent. APSEB is of the view that the growth rates

achieved during the period of full availability of power represent the real potential for growth in Andhra Pradesh.

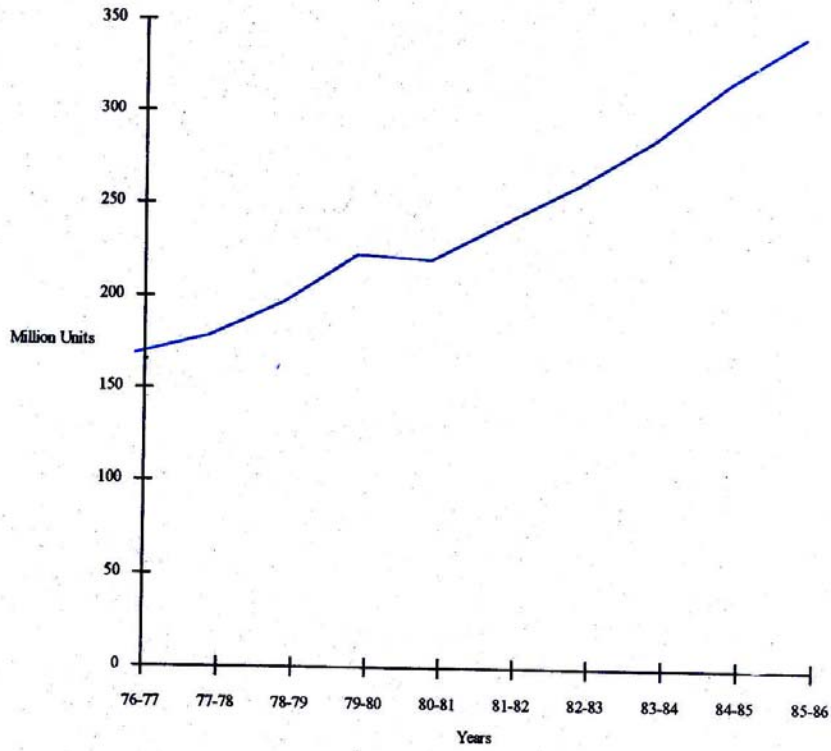
A detailed statement showing consumption of power by the different categories during the period 1976-77 to 1985-86 is furnished in Table 3.3. The data has also been presented in the form of graphs in Fig. 3.1 to Fig. 3.5.

Fig. 3.1
DOMESTIC CONSUMPTION
(1976-77 TO 1985-86)



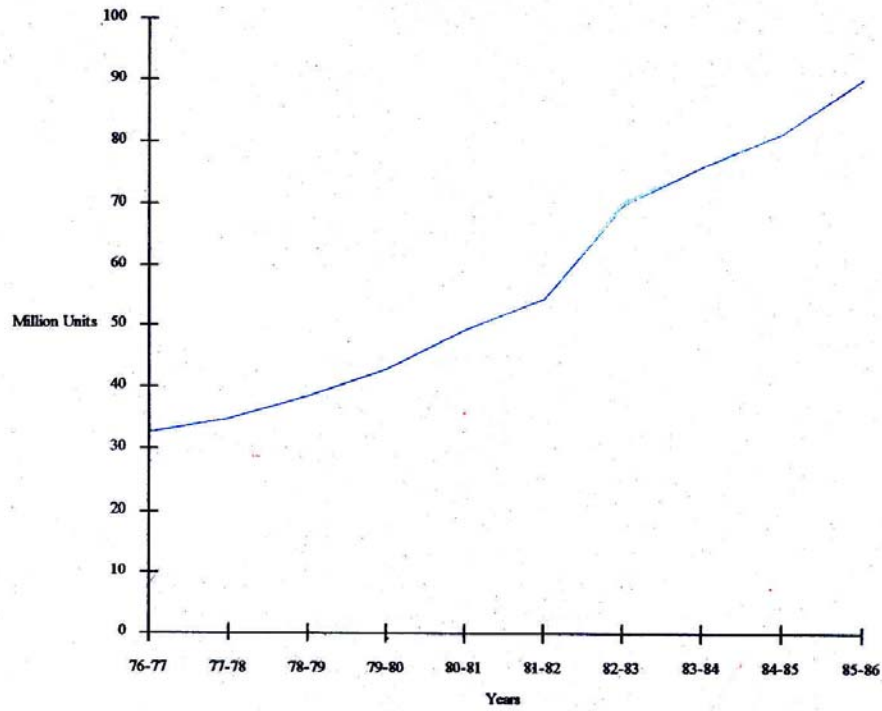
Yrs	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
MU	309.40	360.70	421.90	498.20	545.90	638.30	730.30	879.10	1026.21	1194.90

Fig. 3.2
NON- DOMESTIC CONSUMPTION
(1976-77 TO 1985-86)



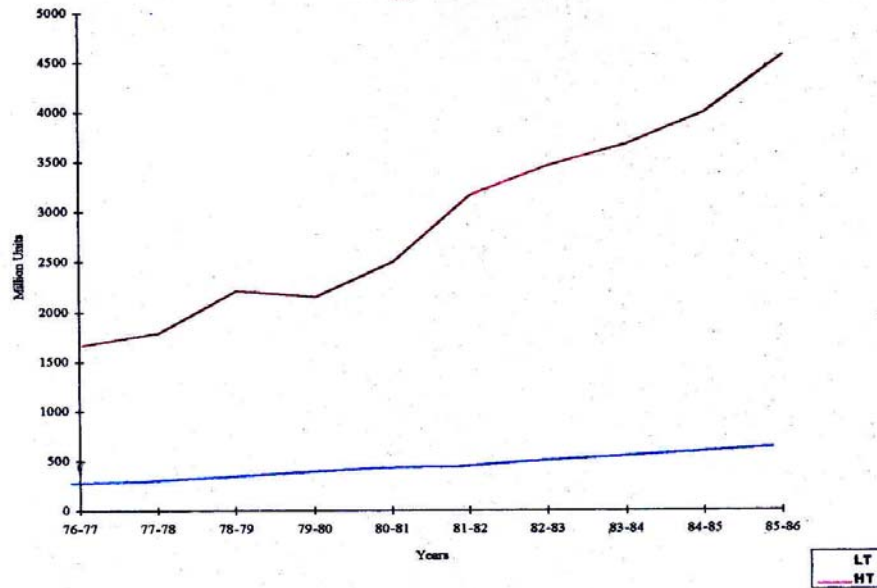
Yrs	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
MU	163.60	174.20	192.70	218.50	216.00	237.00	257.50	282.10	313.96	339.90

Fig. 3.3
PUBLIC LIGHTING CONSUMPTION
(1976-77 TO 1985-86)



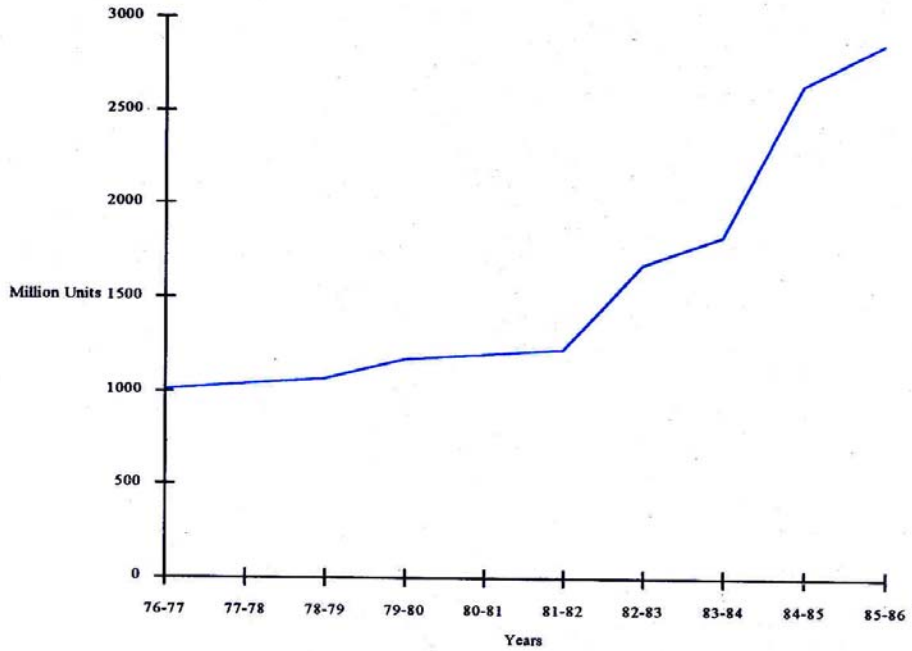
Yrs	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
MU	32.80	35.00	38.70	43.10	49.50	54.70	70.10	76.20	81.63	90.40

Fig. 3.4
INDUSTRIAL (LT & HT) CONSUMPTION
(1976-77 TO 1985-86)



Yrs	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
LT (MU)	262.90	287.10	333.10	384.70	422.60	442.40	504.00	550.10	596.82	642.80
HT (MU)	1689.60	1818.70	2249.90	2191.00	2543.50	3220.00	3515.40	3732.60	4053.96	4628.30

Fig. 3.5
AGRICULTURAL CONSUMPTION
(1976-77 TO 1985-86)



MU	726.90	756.90	785.40	889.60	914.90	942.20	1393.00	1540.30	2345.44	2569.20
Yrs	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86

TABLE - 3.3
CATEGORY WISE SALES OF ENERGY

Sl. No.	Category	1976-77		1977-78		1978-79		1979-80		1980-81		1981-82		1982-83		1983-84		1984-85		1985-86		Average Growth % (rate for 9yrs)	Compound Growth rate (rate for 1976-77 to 1985-86)	
		Million Units	Growth %	Million Units	Growth %	Million Units	Growth %	Million Units	Growth %	Million Units	Growth %	Million Units	Growth %	Million Units	Growth %	Million Units	Growth %	Million Units	Growth %	Million Units	Growth %			
1.	Domestic	309.4	360.7	17%	421.9	17%	498.2	18%	545.9	10%	638.3	17%	730.3	14%	879.1	20%	1028.2	17%	1194.9	18%	286%	32%	16%	
2.	Non-Domestic	183.6	174.2	5%	192.7	11%	218.5	13%	216.0	-1%	237.0	10%	287.5	9%	282.1	10%	313.96	11%	339.9	8%	108%	12%	8%	
3.	Public Lighting	32.8	35.0	7%	38.7	11%	43.1	11%	49.5	15%	54.7	11%	70.1	28%	76.9	10%	81.63	6%	80.4	11%	176%	20%	12%	
4.	Industrial	262.9	267.1	9%	333.1	18%	384.7	15%	422.6	10%	442.4	5%	504.0	14%	550.1	9%	596.92	8%	642.8	8%	145%	16%	10%	
	L.T.																							
	H.T.	1899.6	1816.7	8%	2249.9	24%	2191.0	-3%	2543.5	16%	3220.0	27%	3515.4	9%	3732.6	8%	4054	9%	4628.3	14%	174%	19%	12%	
5.	Agricultural	726.9	756.9	4%	785.4	4%	869.6	13%	914.9	3%	942.2	3%	1393.0	48%	1540.3	11%	2345.4	52%	2569.2	10%	253%	28%	15%	
6.	TOTAL CONSUMP.	3185.2	3432.6		4021.7		4225.1		4892.4		5534.6		6470.3		7081.0		8418.02		9465.5					13%

Similar details regarding sales of energy, for the period 1986-87 to 1993-94 are furnished in Table 3.4.

Table 3.4

S. No	CATEGORY	Energy Consumption in MU								Compound Growth Rate (87-94)
		86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	
1	Domestic	1402	1532	1752	1929	2079	2473	2870	3187	12%
2	Commercial & Miscellaneous	753	722	779	809	1064	1015	1054	1138	6%
3	Public lighting	100	106	120	126	134	140	146	151	6%
4	Agricultural	3386	4018	4497	5316	6342	7007	7937	9022	15%
5	Industries									
	i. L.T.	674	711	764	856	933	923	983	1095	7%
	ii. H.T.	4895	3774	4312	4447	4506	5052	4956	5787	2.5%
6	Total consumption	11210	10863	12224	13483	15058	16610	17946	20380	9%

3.2.04 The total Contracted Maximum Demand of existing industry is 2600 MWs. The Industries Department of the Government of Andhra Pradesh has made a detailed exercise and indicated additional investment by industries of the order of Rs. 35,000 crores in the next 5 to 7 years. Keeping in view the trend in the past during periods of unrestricted supply and the anticipated investment in industries the maximum demand in 2001-2002 would be of the order of 10000 MWs.

3.3.01 APSEB is of the view that the projections submitted by them to the 15th Power Survey Committee give a more realistic picture in regard to likely growth in power consumption taking into account the growth rates observed during periods of unrestricted supply. These projections indicate a compound growth rate of 10% per year in regard to total consumption as compared to the preliminary projections prepared by the CEA which indicate a compound growth rate of 8% per year. The assumptions made by the Board for making projections for the years 1994-95 to 2001-2002 are shown in Table 3.5.

Table 3.5

(Figures in M.U)

Sl. No.	Category	1988-89	1999-2000	2001-2002	Compound growth rate %
1.	Domestic	1752	8314	11033	15
2.	Commercial & Misc.	779	1950	2304	9
3.	Public Lighting	120	326	391	9
4.	Agriculture	4497	10051	11636	7.6 Based on release of One lakh pumpsets every year
5.	Industrial i. L.T. ii. H.T	764 4312	2396 11547	2947 13826	11 9
6.	TOTAL CONSUMPTION	12224	34584	42137	10

Comparative category wise actual consumptions (1990-94)

3.3.02 A survey of growth of energy consumption by the three major consumer categories viz., industry, agriculture and domestic shows that, while agricultural consumption has gone up steeply, the industrial consumption has declined. Domestic consumption has gone up steadily. Details are shown Table 3.6.

TABLE 3.6

Category	1990-91	1991-92	1992-93	1993-94
Domestic	12.79	14.05	14.69	15.03
Agricultural	38.62	40.37	41.28	42.76
Industry	39.03	38.95	34.83	32.45

(These figures are expressed as a Percentage of total consumption)

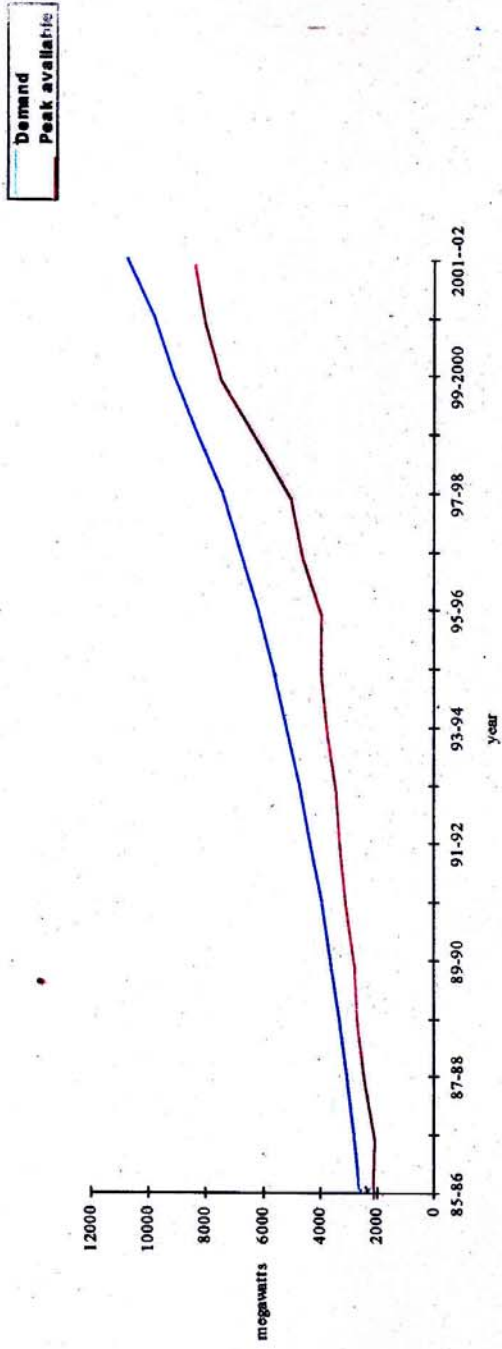
Additional Generation Capacity Required During the Ninth Plan:

- 3.4.01 The Committee has considered carefully the various projections made. Though, the actual maximum demand of the system has been lower than that projected by the Fourteenth Power Survey, the fact remains that acute power shortage has resulted in substantial part of industrial capacity not being utilised or utilised at best partially. This is reflected in lower consumption of energy and lower levels of maximum demand touched. Further, delicensing of industries has added yet another dimension to the uncertainties attendant on any projection of future demand. The Committee is, therefore, of the view that it would be more realistic to consider a range in regard to projections for future demand. Having regard to their various factors, the Committee is of the view that on a conservative basis the maximum demand in the year 2001 - 2002 would be of the order of 8000 MWs and on a more realistic basis it would be roughly 10,500 MWs. The corresponding installed capacities required being 11,000 MWs and 15,000 MWs respectively. Some additional generation is expected in 1996-97; The graphic presentation of demand projections from 1985-86 with a compound growth rate of 10% is shown in Fig. 3.6. But substantial additions to capacity would come only much later as noted in para 2.5.01 supra. In these circumstances the Committee is of the view that the best course would be to update the demand projections every year as one goes along keeping in view the growth achieved during the year. Such a course of action would have the needed flexibility to arrive at most realistic projections in regard to demand for consumption of power in future. If resource is not a constraint, planning for an optimistic growth will be prudent at this stage of our economic development.

Availability of Power

- 3.5.01 The year wise additions to installed capacity in 8th and 9th plans are detailed in Table 3.7. The total additional capacity planned before the end of 9th plan works out to 6740 MWs including the two projects entrusted to NTPC

FIG. 3.6
DEMAND AND PEAK AVAILABILITY FORECAST UPTO 2001-2002



	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-01	2001-02
Demand in MW	2293	2522	2775	3052	3357	3693	4062	4468	4913	5407	5947	6542	7196	7916	8708	9578	10536
Peak available in MW	2293	2251	2641	2889	2962	3299	3497	3692	4000	4200	4210	4878	5280	6474	7748	8325	8707

Table 3.7

YEAR	PROJECT	UNDER EXECUTION	SANC-TIONED	COMMIT-TED	AGENCY EXECUTING THE PROJECT
1995-96	SINGURU	15			APSEB
	SUB TOTAL	15			
1996-97	KTPS -V Stage	250			APSEB
	JEGURUPADU			216	GVK INDUSTRIES
	KAKINADA			208	SPECTRUM
	CO-GENERATION			41	PRIVATE
	CENTRAL SECTOR (NPC)	90			N.P.C & Neyveli
	SRISAILAM	150			APSEB
	SUB TOTAL	490		465	
1997-98	KTPS -V Stage	250			APSEB
	TAILPOND DAM		25		APSEB
	SRISAILAM	300			APSEB
	SUB TOTAL	550	25		
1998-99	TAILPOND DAM		25		APSEB
	RTPP-II		210		AGENCY TO BE FIXED
	VISAKHAPATNAM			500	HINDUJA NATIONALPOWER
	PAMAGUNDAM			250	B.P.L
	SRISAILAM	300			APSEB
	SUB TOTAL	300	235	750	

Table 3.7 (Contd..)

YEAR	PROJECT	UNDER EXECUTION	SANCTIONED	COMMITTED	AGENCY EXECUTING THE PROJECT
1999-2000	VISHAKAPATNAM			500	HINDUJA NATIONALPOWER
	RAMAGUNDAM			250	B.P.L
	KRISHNAPATNAM			500	G.V.K & B.B.I
	RTPP-II		210		AGENCY TO BE FIXED
	SRISAILAM	150			APSEB
	SUB TOTAL	150	210	1250	
2000-2001	KRISHNAPATNAM			500	G.V.K & B.B.I
	JURALA		110		APSEB
	SUB TOTAL		110	500	
2001-2002	BALIMELA		60		APSEB
	SUB TOTAL		60	-	
	GRAND TOTAL	1505	640	2965	5110

3.5.02 In addition to the projects as planned above, Government of Andhra Pradesh have also accepted the proposal of National Thermal Power Corporation (NTPC) for implementation of 1000 MWs Simhadri Coal Based Thermal Power Station at Visakhapatnam and 630 MWs Naptha based Thermal Power Station at Hyderabad. 420 MWs of the Naptha based station is expected to commissioned in 1998-99 and balance 210 MWs in 1999-2000. The two coal based units of 500 MW each are expected to be commissioned in the years 2000-2001 and 2001-2002. With these capacity additions as planned, the Committee feels that there will be still gap in meeting the power needs of the Andhra Pradesh even by the end of 9th plan i.e., 2002, even if the projects contemplated materialise as per programme envisaged. **Due to increase in demand on irrigation, the Committee also noted that the generation from the Hydro projects will get reduced by about 1000 MU a year.**

- 3.5.03 The Committee, however, noted that there will be gap between the demand and availability even upto the end of 9th Plan. This gap is expected to be order of 2000 MWs or even more. This deficit can be made up partly by expediting the projects under construction by APSEB, those entrusted to private generators and NTPC. Large consumers may also be permitted to take up captive generation plants. Plant availability and Plant Load Factor of existing generating stations should be improved. Earnest attempts should also be made to reduce system losses. However, the efforts to bridge the immediate/short term gap through the above measures may not be adequate and since there may be delays in completion of projects on hand by the private generators, APSEB may purchase power from private generators to fill the gap. Proposals for such generating stations should be evaluated on the basis of unit cost of electricity supplied and the period in which the projects will be commissioned. Suitable penalties should be built into the agreements to ensure completion within agreed time frame. Some non-conventional energy projects like wind farms and mini hydels have been taken up in Andhra Pradesh under private sector; but the availability of energy from these projects is highly undependable. They can at best save some coal/oil at the thermal stations.
- 3.5.04 The Committee also feels that State Government should actively encourage, co-generation plants and non-conventional sources of energy to fill up the gap in the next three to four years as they are expected to yield quicker benefits.
- 3.6.01 Demand for power during the Tenth Plan period and beyond cannot be projected with any degree of certainty. Nonetheless it is essential to try and project a rough estimate of the likely power scenario during this period. Much would depend on the build up of industrial demand by the end of the Ninth Plan. Since the power situation is expected to be favourable during the Ninth Plan, it can be expected that the growth of demand, particularly, in the industrial sector, would be high. Measures to improve the quality of supply through adequate investment in transmission and distribution and to improve response to consumers through privatisation of the distribution system will make Andhra Pradesh an attractive area for investment. Taking into account all these factors, the Committee is of the view that during the Tenth Plan Period, generation capacity would need to be augmented atleast by about 1000 MW every year.

3.6.02 The analysis in the foregoing paragraphs clearly brings out the following:

- i. In the immediate/short term, the State would be facing a shortage of around 2000 MWs.
- ii. If the new power stations are commissioned as programmed and measures outlined in para 3.5.03 are effectively implemented, the shortage would be by and large be made up by the year 2001-2002.
- iii. During the Tenth Plan period the gap between demand supply would keep increasing steeply. Additional capacity of at least 5000 MWs would have to be inducted into the system in a phased manner during this period.

CHAPTER 4

OUR BASIC APPROACH

4.1.01 In attempting to develop a comprehensive policy and strategy for power development in Andhra Pradesh, the Committee had a few basic goals in view -

- The Government has and will always have the responsibility for enhancement of the quality of life and the material prosperity of the State as a whole and all its peoples. Power is an essential and critical input in the process - Lighting and heating in the Domestic consumption sector and productive uses in the Agriculture and Industry Sectors. Availability of power, therefore, has to be planned and ensured well in advance as it takes nearly five years for a normal project to become commercially operational.
- The State has also the responsibility to see that Electricity is available to all sections of the people to meet their basic needs. Power costs and power tariff becomes crucial for this purpose.
- All policy must be directed towards meeting these ends as far as practicable.

4.1.02 The Committee took note of the perceptions of the State Government conveyed to the Committee before they started their deliberations. These were broadly -

- i. that the State should not bear the financial burden of further capital investment in power generation. Hence, the necessity to induce private investors.
- ii. that there should be no guarantee of any kind henceforth to the independent power producers even if power is purchased by the State agency, i.e., APSEB.
- iii. since no guarantee of the State Government would be forthcoming, the new investors should also take up the responsibility for transmission and distribution of the power they would be generating. Perhaps the thought behind this was that investment in distribution may be less attractive to the private sector, linking generation and distribution would make a more saleable package, apart from relieving the Government of the obligations of giving guarantees.

4.1.03 The Committee is of the view that the policies and strategies should subserve the twin objectives of bringing in additional resources for the development of the power sector and improving efficiency in the generation, transmission and supply of electricity to the satisfaction of the customers. A.P.S.E.B. is a vertically integrated utility with total responsibility for generation transmission and supply of power. It has grown into a very large utility with assets of over Rs.4402 crores (1993-94) at book value (the present market value would be several times the book value) and revenues of around Rs.2303 crores (1993-94). Substitution of a private monopoly for a public monopoly would only make the situation much worse and defeat the basic objectives of the State Government to use the power sector as an effective instrument for the development of the economy of the State and improving the quality of life of peoples of the State. Ensuring effective competition is key to the efficient functioning of the private sector in the development of this crucial infrastructure area. APSEB, as already noted, has a creditable record in the areas of generation and transmission. The sheer size and complexities of the distribution system have been serious constraints in the management of the distribution system. There are serious shortcomings in the management of the distribution system and the response to the needs of the consumers inadequate. Most importantly, APSEB has not been able to generate adequate resources for the development of the sector to meet the demand for power.

4.1.04 **Privatisation :**

As this term is used frequently and loosely, the Committee thought fit to put down its concepts clearly on this score. Privatisation in its true sense only takes place when productive assets are transferred from public, i.e., state ownership to a private entity. Or a private entity is allowed to create and own assets in the same field of activity as one reserved for public investment only. Therefore, partial disinvestment, unless taken to the point of selling the majority controlling interest will not be privatisation proper.

All other steps are in the nature of liberalisation that is, allowing private entities to enter. These can be through management contract, where assets remain with the State, or through leasing of assets to the private operator.

4.1.05 **The basic aim of privatisation is to bring in additional investment, introduce competition which in its turn should increase efficiency and**

bring down the price, or at least not allow it to go up so that the consumer is the ultimate beneficiary. If this ultimate end is not fulfilled privatisation has little to commend. Hence, it is necessary to have a competitive structure and a regulatory instrument to protect the consumer interest, specially in the case of power which is a commodity of universal need and one where more often than not the consumer does not have a choice as to source of supply.

4.1.06

Regulation :

Regulation implies adjusting the flow of activities as necessary, as distinct from control which implies the possibility of stopping an activity altogether. For reasons mentioned above, a regulatory body should be set up even before or at least along with the restructuring of SEB. This has been the experience elsewhere in the world also. Our concept of a Regulatory Commission is that it should be able to look after the interests of both the producer and the consumer so that the gains of competition and efficiency can be shared fairly and that the producer fulfills his obligations in regard to the quantity and quality norms laid down. The power industry like others also needs to conform to safety and environmental standards. There are government bodies in existence for the latter functions, therefore, we felt that the proposed Regulatory Commission should mainly concern itself with Tariff and operating performance of the generating and distribution agencies. Since both the public and private agencies will be operating in the field, it is necessary that the Regulatory Commission be totally independent of the Government like a judicial body.

The outline of a Bill in this regard is also drafted as a part of our recommendation.

4.1.07

Competition:

The essence of liberalisation is to improve efficiency through competition. The more the number of producers, buyers and sellers, for a given product, the greater is the competition resulting in reduction of costs. In the infrastructure sector like power, the State has been so far the monopoly producer and seller. This situation needs to be changed by introduction of more players in the field and intermediaries between the producer and the ultimate consumer. However, the presence of a State agency as a major player, say in generation, can serve as a countervailing force against run

away costs. The introduction of competition in power has to be a planned process so that the utilities' strength is not undermined.

- 4.2.01 The basic approach of the Committee is, therefore, to enable desperately needed additional resources to be brought in through induction of the private sector and at the same time, foster competition in the sector, make it more efficient, manageable and protect the interests of both the developers and the consumers through the establishment of an autonomous, judicial regulatory system.
- 4.2.02 The Committee has also taken note of the very encouraging response received by the State Government from the private sector to put up more generating stations.
- 4.2.03 Unbundling of services on a functional basis follows naturally as a corollary to the approach outlined in the preceding paragraphs. Various aspects that arise for consideration are enumerated below.
1. Restructuring of A.P.State Electricity Board on a functional basis.
 2. Reshaping of the distribution system into smaller, manageable and viable distribution entities.
 3. Induction of the private sector.
 4. Establishment of a suitable, transparent regulatory framework incorporating an autonomous judicial regulatory commission.
 5. Tariff policy for the future and attainment of social objectives through subsidies.
 6. Strategy to be followed to meet the needs of the sector both in the short term and in the medium/long term.
 7. Encouragement of demand side management and energy conservation to supplement efforts to augment supply of power.
- 4.2.04 In Chapter 3, we have reviewed the demand projections and the likely availability of additional capacity to meet the demand. It has been noted therein that after taking into account the additional capacity of 6000 MWs., the problem is essentially one of meeting the gap of about 2000 MWs. during the immediate/short term and later in the 10th Plan period and beyond, of inducting additional capacity in the system. The strategy to be followed has been outlined in the Chapter 5. (i.e., Strategy to be adopted for

meeting the power needs of Andhra Pradesh upto 2002). It would suffice to indicate here our approach to this problem. During the later period, i.e., after the end of the Ninth Plan a competitive environment/situation should be established in which the prospective power generators will be competing to supply power to the distributing agencies and conversely the various distributing agencies will be competing for purchase of power from the prospective generators. The transmission agency should fulfill the crucial role of providing the required access to the generators and distributors. A.P.S.E.B. (as it will be after restructuring) will act as a facilitator or promoter getting the interested parties together to a successful conclusion.

- 4.2.05 As regards the immediate/short run problem of bridging the gap of about 2000 MWs., the committee took note of the fact that the State Government has already invited N.T.P.C. to set up a 650 MW multi-fuel station near Hyderabad. The Committee's approach is to encourage setting up of captive generation by the consumers or groups of consumers which can be commissioned in a short time.

CHAPTER 5
STRATEGY FOR MEETING THE POWER NEEDS
OF ANDHRA PRADESH

- 5.1.01 The strategy for matching demand and supply has to be considered for the power system as a whole, that is generation, transmission and distribution and set it in a time perspective. The latter would be
- a. Short run, i.e., the next two to three years
 - b. till the end of the 9th Plan i.e., 2002
 - c. 10th Plan and beyond i.e., 2007 and beyond

Generation

- 5.1.02 The APSEB has, currently an installed capacity of 5213 MW comprising 2656 MW hydel, 2453 MW thermal and 100 MW gas (joint venture) and 4 MW wind farm. It has also a share in Central Sector generation upto 897 MW.
- 5.1.03 One thermal project with a capacity of 500 MW and five hydel projects to a total of 1135 MW are under progress by the APSEB. APSEB and the State Government have already entered into power purchase agreements for two gas based units totaling 424 MW and four thermal projects totaling another 2500 MW.
- 5.1.04 These projects are expected to produce power on different dates from 1998 to 2002. Even if these capacities materialise according to plans, there will be difficulty to meet the demands till 2002.
- 5.1.05 The requirement may go up between 11000 MW and 15000 MW by the beginning of the 10th Plan depending on the rate of growth. Whilst growth in domestic demand and pumpsets can be relatively easily projected, it is difficult to reliably project industrial growth which partly depends on availability of power itself.

Requirements in the immediate/short term

- 5.2.01 In the immediate future, that is, upto the end of 9th plan, shortages of the order of 2000 MW may occur. A fourfold strategy for meeting this gap would be

- a. Projects under construction by Andhra Pradesh State Electricity Board and projects entrusted to private power generators and NTPC should be expedited.
 - b. Large consumers may be permitted to take up captive generation plants.
 - c. Improvements in plant availability and Plant Load Factor (PLF) of the existing generating units.
 - d. Reduction of system losses.
- 5.2.02 Co-generation by use of industrial wastages is to be encouraged. Use of non-conventional and renewable resource based projects are to be freely encouraged, taking advantage of the concessional incentives in the Central Government programmes.
- Demand management measures outlined in the short note on the subject (Chapter 5)should be projected.
- 5.2.03 During this period, as suggested in the report, a separate Power Generation Corporation as subsidiary of the APSEB will come into being. It will pool the power also from the 6 private agencies with which PPAs have been entered already, and supply to the distribution companies.
- 5.3.01 As the efforts to bridge the projected immediate/short term gap through captive generation may not be adequate and since, there may be delays in completion of projects on hand by the private generators, APSEB may have to purchase power from private generators to fill the gap. Proposals for such generating stations should be evaluated on the basis of unit cost of electricity supplied equal to or less than those agreed to in the recent PPAs and the period in which the project will be commissioned. Suitable penalties should be built into the agreements to ensure completion within agreed time frame.
- Requirements beyond the 9th Plan**
- 5.4.01 The strategy for a new initiative for covering the requirements beyond 2002, will mainly be from the private sector. **For these requirements, the Government and the APSEB will be no longer required to call for bids and enter into power purchase agreements with private producers.**
- 5.4.02 It has been recommended in this report (Chapter 7) that the distribution functions of the APSEB be decentralised into a number of independent zonal

subsidiaries. Therefore, the market today which consists of a single buyer will be expanded into five or more, with different requirements. Producers of power at this stage will have to negotiate the sale of their power with these zonal companies. APSEB will act as a facilitator to enable the generators and the distributors to conclude their requirements quickly and prove the way for smooth functioning of the system. At a much later date it might be possible for large consumers - 5 MW - and above to have direct contracts with the power companies, thus widening the market still further.

- 5.4.03 Given this scenario, it should be left to the future entrepreneur in power, to make his own assessment of the market demand, likely price the market can bear and decide on his own investment, like any other industry.
- 5.4.04 It will be necessary for the APSEB to publish their forecast of demand and other data periodically as well as project profiles already developed for preferred sites, as a guideline for future investors.
- 5.4.05 In this context the Committee also considered the possibility of each generating company being linked to a distribution area. During the period immediately following the setting up of the zonal distribution companies, the IPPs which are already in production or are at the stage of construction could be given an opportunity to get involved in distribution. The modalities for private participation in Distribution have been discussed in Chapter 7. However, the Committee feels that this arrangement may not turn out to be a very desirable or workable proposition.

Transmission

- 5.5.01 Considering the importance and the nature of the function, the Committee has recommended that the transmission function should be in the public domain and vest in an AP State Transmission Corporation as a subsidiary of the APSEB.
- 5.5.02 The State has a fairly well laid out 220 KV network of 6422 Ckm for transmission of power from the generating station to major load centres with 41 Nos. 220/132 KV substations and 9649 km of 132 KV network for further transmission of power to other load centres throughout the State via 151 Nos. 132/33 KV substations. The downstream 33 KV sub-transmission system consists of 23,102 Ckm feeding the entire State via 1266 Nos 33/11 KV substations.

- 5.5.03 The 220 KV and 132 KV system has a strung overlay of 400 KV network of Power Grid Corporation for transmitting power from Central generating Stations to beneficiary States in the Southern Region. The 400 KV system is connected at 8 points at 220 and 132 KV levels.
- 5.5.04 Apart from the 400 KV network which connects the Southern States, Andhra Pradesh is connected with Madhya Pradesh at 220 KV AC and at 100 KV HVDC. The Southern region is also interconnected with the Western region through Chandrapura-Ramagundam 400 KV line. The Eastern region is connected with the State at 220 KV.
- 5.5.05 The Transmission system as it exists is adequate to evacuate power in the State. The value of the gross block of fixed assets to be transferred to the proposed Transmission Corporation is about Rs. 824 crores, its net value being around Rs.678 crores. The replacement value at current prices would be several times as much.

Augmentation :

- 5.6.01 The APSEB has planned the requirements for evacuation of power from all the generating stations likely to come up by 2001-2. This is to be done by addition of 1200 Ckm of 400 KV lines and 4000 Ckm of 220 KV lines, four 400 KV substations and 32 nos. 220 KV substations. This programme has already been sanctioned and action initiated except for the evacuation of power from the Krishnapatnam station. It is understood that a 400 KV system is already formulated and is up for sanction.
- 5.6.02 The AP State Transmission Corporation has to work closely with the Power Grid Corporation so that transmission facilities put up by the two organisations are planned and used optimally. An inter-institutional linkage by way of common Board members or even equity participation may be desirable.

LIFT IRRIGATION - ITS IMPACT ON POWER SECTOR

1.01 The phenomenal growth in lift irrigation is entirely attributable to the spread of electricity to the remotest corners of the country with the emphasis given by the State Government and the SEBs to rural electrification and lift irrigation. While this policy has made a significant contribution to the achievement of food self-sufficiency, this has been achieved through very heavy subsidization of capital and recurring cost of power supply. The heavily subsidized tariff for the energy to the agricultural sector have affected the finances of the SEBs enormously.

1.02 **Progress to Date and Financial Implications:**

In the case of APSEB for instance the number of lift irrigation pumpsets electrified is 1.6 million. The cost of electricity to these pumpsets is about Rs. 1.26 per unit, while the tariff is only 6 paise per unit. The agricultural sector is receiving about Rs.1000 crores per annum as subsidy. The quantum of subsidy will go up further with the introduction of Rs.50/- HP per year. The Board has so far survived as the burden was shifted to the other categories of consumers especially to the industrial sector. This cannot possibly go on, without forcing the industry to think of alternative locations instead of coming to Andhra Pradesh. There is evidence that already the trend has started. Besides tariff, the heavy power cuts to the industries in summer on account of the very steep and unpredictable increase in agriculture load and the preference it gets during this period is a big discouragement to industrial development. The Committee, while fully appreciating the importance of power supply to agricultural sector, feels that the resolution of the issues relating to agricultural tariff and supply management particularly during the periods of power cut is very urgent. These issues have become too large to be brushed aside.

1.03 **Tariff : who should bear the subsidy :**

Everyone agrees that some sections of agriculturists in India, as in other countries need a certain element of subsidy in input costs. Who should get the subsidy, how much should be the subsidy and who should bear the burden of the subsidy have been debated too long without finding solutions. There is some consensus that the subsidy should be confined to small

marginal and subsistence farmers. However, difficult to implement this may be, it is a good proposal. The committee endorses the proposal.

1.04 As the Power Ministers of many states have agreed to levy Rs. 0.50 per unit as Agricultural Tariff, the Committee suggests that efforts should be initiated to move towards the goal and achieve it by the end of the VIII Plan Period. This subsidy rate should be available only upto a specified level of say 1500 units per pump. Consumption above this could be charged at a graded scale, so that the big farmers pay near commercial rates. The Committee recognises that the scale may be different for different regions depending on water-table and other factors. The Regulatory Commission could examine and fix these grades for agriculturists. Considerable improvement in the metering system might be needed for this.

1.05 It is often urged that just as the subsidy on fertilisers, seeds, pesticides is borne by Government of India, it should bear the power tariff subsidy to some extent. If the Government of India thinks that the reasonable tariff for this sector should be 0.50 paise per unit, then it should subsidize the difference between the cost of supply (or average cost of power) and the rate of 0.50 paise per unit. If the State Government wants to keep the tariff even lower than the rate of 0.50 paise per unit it could do so and bear the subsidy involved. The other view is that the subsidy should be borne to the extent possible by other power consumers and the rest by the Government. The "extent possible" could be decided by the Regulatory Commission with reference to the maximum tariff that could be fixed on industrial consumers and the composition of load.

1.06 **How Many More Pumpsets in the Coming Years:**

The composition of the categories of consumers and the share of agricultural load becomes an important issue for the long term growth of power sector in Andhra Pradesh. With about 1.6 million pumpsets, presently the rate at which the number of pumpsets is growing in the State is about 1 Lakh per annum. Whether the growth rate can be sustained without adversely affecting the ground water depletion is still to be ascertained. But the fact that the State Government has decided to set up a mechanism to discourage indiscriminate digging of wells, is an indication of some likely fall in the growth rate in the electrification of pumpsets in future. This may still be far off. According to an estimate of the Ground Water Department of Andhra

Pradesh there is scope for another 2.7 million pumpsets based on the estimated ground water potential.

- 1.07 The long term but lasting solutions are the optimal utilisation of ground water through drip irrigation and the introduction of High Voltage Distribution System (HVDS) in rural areas.

Drip Irrigation - Energy and Water Conservation Through:

- 1.08 In the case of lift irrigation, conservation of water and electricity both could be achieved simultaneously if we encourage or enforce, if feasible, drip irrigation. There appears to be adequate realisation of the benefits of drip irrigation by the farmers but many of them are reluctant to bear the initial costs even with the subsidies now available. These may have to be enhanced. With drip irrigation even solar pumps might be in a position to meet the energy requirements.

High Voltage Power Distribution System:

- 1.09 There are other measures too which must be taken and implemented by the SEB to save on the enormous losses in energy transmission and distribution to the agriculture sector. At present in rural systems according to one estimate there is a loss of about 1/2 unit of energy for every unit of energy consumed by the pumpset. This is on account of the low tension or LT distribution instead of high tension or HT distribution for the rural sector in particular and for the urban sector too. The savings involved in reducing the losses are well known. The lift irrigation pumpsets now in use are very inefficient and any improvement in their efficiency will add to the savings. HT distribution envisages the use of single phase pumpsets which are inherently more efficient; and also contribute to an improvement in the power factor of the power system. This brings additional benefit to the SEB by way of the limitation of the capital investment which it is now making for the improvement of the power factor of the power system. HT distribution eliminates to a great extent the non-technical losses which are also on the increase with the increase in the cost of supply. A more detailed note on the advantageous of HT distribution along with particulars of a case study are appended to this annexure.

HIGH VOLTAGE DISTRIBUTION SYSTEM

The Distribution System practices in vogue can be classified as High Voltage Distribution System (HVDS) and Low Voltage Distribution System (LVDS). The HVDS is based on North American Practice, where three-phase or single - phase HV line is taken to as near the load as possible and a distribution transformer of appropriate capacity is installed to feed one or a small group of loads, such that the length of LV lines is minimum or restricted to service lines only. This is best suited to meet the scattered loads of low load density which is normally the case in developing countries. The LVDS is based on European practices where a three-phase transformer of considerable capacity is installed and LV lines are extended to cater to a group of loads. It is best suited to meet the concentrated loads of high load density. The LVDS which was in vogue in India in metropolitan and large cities at the time of independence, was adopted to extend the supply to remote villages and also to energize agricultural pumpsets, without reckoning the characteristics of the loads and the cost of losses. The number of pumpsets energised in the country has risen from 6,500 in 1947 to 10.27 million in 1994 an increase by 1580 times. This has resulted in the average energy losses of the country, increasing from 15% in 1960 to the present level of 22 - 25%. The increased losses in entire country in the year 1992-93 come to 16144 million units. At an average rate of Rs.1/- per unit, the financial loss is Rs. 1614.4 Crores. The low voltage network or secondary distribution system is responsible for the steep rise in percentage of losses. It is estimated that about 40% of total losses occur in low voltage network. The losses can be reduced substantially, as losses in HV system are less than 1% of LV system for the distribution of the same amount of power. Two Asian Countries namely South Korea and Japan which were having 23 to 30% losses in 1960 have brought them down to 6% in 1980 by adopting HVDS.

Problems faced by utilities with LVDS and how HVDS overcomes these problems are indicated in Table 1.

Table 1
Comparison of HVDS and LVDS

Features	HVDS	LVDS
Line Losses & Voltage Drop	Less than 1% of LV	Long LV lines, small conductor sizes cause high losses and voltage drop
Power Factor	PF is almost unity due to usage of single phase motors	PF is 0.7 causing high losses, poor voltage profile and overloading of power system
Distribution Transformer Failure	Very rare due to short and insulated LV lines	Frequent on account of large no. of LV faults due to long uninsulated LT lines and overloading
Theft of Energy	Very difficult to tap lines	Direct tapping of long and very wide spread LV lines. Loss of revenue, over loading of system, low voltage and burning of transformers.
End Use Efficiency	Is high as failures of motors is eliminated	Very low as motors are frequently rewound after they get burnt due to low voltage and single-phasing
Reliability of supply	High	Very poor. Frequent faults on uninsulated LV lines and transformer failures due to theft of energy and over loading.
Voltage Fluctuation	Nil due to stable voltage profile	Very large due to high voltage drop

The single phase transformers and single phase motor pumpsets both open well type and borewell type are manufactured in the country.

The pilot study conducted for extension of supply to 117 pumpsets in a village indicate that the capital investment and losses for HVDS are about 20% lower than that of LVDS. The details are indicated in Table 2.

Table 2
Comparative Cost of HVDS and LVDS for new extensions

Particulars	Unit	LVDS	HVDS	% of HVDS over LVDS
Capital Investment	Rs. Lakhs	18.26	15.23	83.40
Energy Losses	KWH	35757	29339	82.05
Peak Power Loss	KW	21.30	14.30	67.13

RESTRUCTURING OF DISTRIBUTION SYSTEM :

The existing distribution system based on LVDS is wide spread over the entire state, catering to 1.6 million pumpsets. This distribution system has to be restructured as HVDS to reduce the overall cost of serving a pumpset.

The restructuring of existing system as HVDS will result in following benefits:

- Reduction of power losses
- Avoidance of failure of transformers
- Avoidance of pilferage
- Improvement of PF
- Improvement of end use efficiency

The studies made on the restructuring of HVDS indicate that it is highly viable and the payback period is less than 2 years. Based on the studies, a pilot project in Warangal District in Chelapur, Parkal and Chityal, covering 7414 pumpsets has been taken up.

Restructuring of existing distribution system as HVDS comprises the following works :

- **Replacement of existing three phase distribution transformer of HIGH capacity with small capacity single phase transformers:**
The connected load of dispersed loads i.e. Agricultural and small domestic & commercial on A.P.system is about 70%. Hence, to make the distribution system energy efficient, the HVDS should cover all dispersed loads i.e., 70 to 75% of connected load. In other words, the ratio of single-phase, to three-phase distribution transformer capacity in the distribution system should be 3:1. This is proposed to be achieved by adopting the procedure indicated below:
 - To procure only single - phase transformers in future
 - Replace the existing three-phase transformers feeding dispersed loads with single-phase transformers in a phased manner.
 - To shift the existing three-phase transformers for feeding medium size industrial loads and concentrated loads in multistoried buildings, where the length of LV line is minimum.

To cannibalize the failed three phase transformers to make healthy units instead of repairing the units. The prevailing high failure rate of distribution transformers facilitates this measure.

Studies indicate that the desired single phase transformer ratio with three phase unit can be achieved in about 6 years for the state of A.P.

- **Conversion of existing low voltage lines to single phase, 2 wire HV line:** The three phase 4 wire can be converted to single phase, 2 wire lines by upgrading the insulator of line conductor and removing additional two conductors. The net cost is negligible and brings large capital credits to the utility.
- **Utilisation of Motors :** The end use equipment has to be single phase type. Since all the existing motors of pumpsets are for three phase supply, they are proposed to be rewound for single phase supply. The three-phase motors in service are of two types : Motors with Class 'A' insulation and Class 'B' insulation. Class 'A' motors have bigger frame size and can be rewound with Class 'B' insulation. In this case, the capacity of rewound single phase motor is equal to that of three-phase motor. In the case of motors with Class 'B' insulation, the capacity of single phase motor is about 80% of three-phase motors. The marginal reduction in capacity is an added advantage at most of the installations, since the capacity of motor selected is always higher than what is required. However, in such cases, the impeller has to be modified to avoid over loading of motors. Sample motors were rewound and the result indicated that efficiency of rewound motor can be improved and the power factor is raised nearer to unity. The cost of rewinding of motors up to 5 HP and retrofitting of pump set is estimated to cost about Rs. 1500/- to Rs. 2000/- per pumpset.

The results of investigation for restructuring LV Distribution Network in respect of one village having 117 pumpsets and 2 Industrial loads are shown in table 3.

Table 3
Financial Analysis of Restructuring Low Voltage Network as HVDS

Capital cost of Restructuring	
Gross	Rs. 14.66 Lakhs
Net	Rs. 10.00 Lakhs
Value of Benefits	
Power Losses	Rs. 4.56 Lakhs
Others	Rs. 2.04 Lakhs
Total	Rs. 6.60 Lakhs
Pay back period	About 2 Years

DEMAND SIDE MANAGEMENT (DSM) :

The farmers are used to switch on the pumpsets in the early morning hours and evening hours causing sharp demand peaks on the system. This in turn requires large investment in Generation, Transmission and Distribution Systems to meet the peak demand. The investment to supply agricultural loads can be substantially reduced by staggering the loads. The present practice of staggering the feeders at substation is highly unsatisfactory. This control strategy raises the diversity of load on the feeder concerned to unity and inturn calls for higher investment in primary and secondary distribution system. It is estimated that the benefits of capacity released at substation and higher level is neutralized by the higher investment required at distribution level.

The DSM reduces the load to 50% on predominantly agricultural feeders and also reduces the power loss to 25% of what it would have been without DSM. The DSM also increases the feed area of distribution substation by 50%, reducing the number of substations required to meet the given demand by 40%.

The DSM of agricultural loads is implemented in HV Distribution by providing a separate spur line for a group of single phase transformers supplying exclusively agricultural pumpsets. A Vacuum/SF6 switch is provided for each spur line and is switched on/switched off from the Control Centre through SCADA. For this purpose a pole top RTU cum transceiver is provided at each switch. The switches are divided into two groups and each group is switched on at a time from the Control Centre.

A scheme for DSM of 60,000 pumpsets in Nalgonda District was formulated. The costs of the scheme is Rs 200 million. The agricultural DSM reduces the agricultural peak demand from 170 MW to 85 MW and also reduces the peak power loss by 10.2 MW. The capital investment that could be deferred is Rs. 400 million and the recurring charges saved are Rs. 72 million at 18% of capital investment (12% interest + 3% depreciation +3% O & M charges). The scheme is highly viable and pay back period is less than three years.

CONCLUSIONS

- HVDS provides solution to the present problems of existing distribution system
- The capital investment required for building new HVDS and power losses are lower than that of LVDS
- ♦ Restructuring of existing distribution system is technically feasible & highly viable and the pay back period is less than 2 years.
- The agricultural Demand Side Management is technically feasible and economically viable.

ENERGY CONSERVATION

- 1.01 Energy conservation is essentially a form of demand management, because every unit of power saved is a unit of power gained, Central agencies like the PCRA and the Energy Management Centres are mostly concentrating on awareness campaigns and demonstrations.
- 1.02 Energy Conservation Strategy should be oriented towards different categories of consumers.
- 1.03 **Rural Agriculture :** The enormous loss in the LT system can be drastically reduced if the HT supply is extended. This would need conversion of the existing pump motors. The pilot project initiated by APSEB whereby the manufacturers are voluntarily doing such conversion is very promising and this should be extended. Programmes are also available for improving the foot valves of existing pumps. Wind and SPV pumps should be encouraged. It is believed that ground water sources will not remain wholly renewable therefore extensive propagation of drip-irrigation practice should be undertaken. Funds may be available for such purpose from the plastic industry and financial institutions Metering, as far as possible may be planned. Some of these measures as mentioned earlier may be taken up by the Distribution companies. A more detailed note is appended herewith.
- 1.04 **Rural Domestic :** It is unlikely that villagers will be using electricity for domestic lighting in a large measure as long as kerosene is available at subsidised prices, even though kerosene is least energy efficient either for cooking or lighting. Use of biogas, smokeless chulahs and more efficient wood- burning stoves, pressure cookers, solar cookers, SPV lanterns should be encouraged.
- 1.05 **Urban Domestic :** Use of LPG for cooking is now largely replacing other forms and this trend may be encouraged. The use of fluorescent tubes in place of tungsten bulbs should be pushed. Distributing companies may introduce slab system tariffs to encourage use of electricity within a modest budget. This will also encourage urban consumers to look for more energy efficient devices in the commonly used household goods like toasters, ovens, washing machines, air conditioners, refrigerators etc.

1.06

Industry : By and large new industries will adopt more energy efficient processes and equipment as the cost of power is rising. But the older industries still have energy inefficient boilers and other equipment which need changing and some capital investments. There are incentives available now for such expenditure. Energy Audit is an important instrument in bringing down power consumption in Industry. The Distribution Companies may offer incentives for consumption below industry norm and disincentives for consumption above norm.

ENERGY CONSERVATION IN LIFT IRRIGATION

APSEB supplies more than 42% of the total energy generated to the lift irrigation sector and that too at rates which bear no comparison to the cost of production. A subsidy of more than 120 paise per KWH of consumption is involved. All this burden is hitherto transferred to the industrial consumers. This may not be possible in the very near future and the possibility of the entire burden being borne by the State Govt. is also remote. It is therefore essential to observe the utmost economy in the use of electricity for lift irrigation in particular and for other categories of consumers in general.

In the case of lift irrigation there is considerable scope for conservation of energy.

With the proposed introduction of HT distribution system hereafter for all lift irrigation demands and gradual conversion of the existing LT system to HT system it should be possible to save about 2500 million units of energy out of the present consumption of 9000 million units of energy by the lift irrigation, domestic and commercial loads.

HT distribution contributes to system power factor improvement, reduction in the failure of transformers, total elimination of burning of motors due to single-phasing of power supply, elimination of non-technical losses, facilitates rostering of loads etc.

Use of pumpsets of proven efficiency will have to be insisted upon, otherwise the presently used pumpsets are notoriously inefficient and are contributing greatly to the wasteful use of energy.

Together with HT distribution, if drip irrigation is popularised by giving preference in extending connections to these applicants, savings that could be effected in electrical energy and water usage would be very substantial. The burden of subsidy might then become manageable. The cost of drip irrigation system is about Rs.15,000 per acre. Even if it is assumed that the 50% of the crops presently under lift irrigation go in for drip irrigation, the quantum of electricity saved would be about 1600 million units.

Low capacity single phase transformers with very low losses are now available and use of these will further reduce the losses.

In A.P. agriculture occupies preeminent position as far as the economy of the State is concerned. But it can also make or unmake the APSEB considering enormous subsidy of Rs.1000 crores per year. This is presently breaking the back of the industry which is bearing it through cross subsidy. This is also the reason why the APSEB is not able to raise enough resources for reinvestment in the power sector for the benefit of all the present and future consumers. The need for conservation of energy by this sector is therefore imperative and should get the highest priority.

Submersible pumpsets are more efficient than the pumpsets mounted on the ground out side, because of the zero suction head in the case of the former. Therefore even for the open wells submersible pumpsets will have to be encouraged.

It is estimated that almost 50% of the energy presently consumed by the agricultural sector can be saved by these measures. To the extent the subsidy could be reduced by this means the resources of the Board will improve.

CHAPTER 6

RESTRUCTURING OF ANDHRA PRADESH STATE ELECTRICITY BOARD

6.1.01 The Andhra Pradesh State Electricity Board, over the years has grown into a very large organisation having total responsibility for Generation, Transmission and Distribution. It has 23 generating stations, over 70 thousand employees, more than 80 lakhs consumers mostly in rural sector spread over an area of 2.76 lakhs sq. km and the sales revenue of nearly Rs.2303 crores. Its restructuring was perhaps overdue irrespective of the current liberalisation policy.

6.1.02 Why Restructure ?

- i. From the management point of view this is too large an organisation to effectively oversee all activities. Even in large corporations all over the world the trend is to create autonomous, cost and profit centres with full management responsibilities.
- ii. Being a vertically integrated organisation, functional priorities can get distorted particularly in a situation of resource scarcity. While the APSEB is one of the best in terms of efficient performance in generation, it has been unable to invest adequately in the rationalisation and modernisation of the vast transmission and distribution network. As a result it has not been able to pay adequate attention to the satisfaction of consumer needs. The monopoly position of the APSEB and the employee motivation has also made it less responsive to consumer problems.
- iii. The APSEB has barely been able during the recent years to obtain the required return of 3% on net fixed assets as laid down in the Electricity Act . It is creditable that the Board has been able to discharge the social objective of the Government by cross subsidising between the HT consumers and the LT consumers in the domestic and agricultural sectors. But the consequence is that investment in generation or transmission and distribution has not kept pace with the growing demand and no further growth is possible as the present Balance Sheet will not make it credit-worthy in the market. It is in this context that private sector participation is being sought.

6.1.03 It is in the interest of survival and growth of power sector that the restructuring of APSEB has become necessary. The Committee's approach to restructuring was to build on its strength namely generation and transmission and explore decentralisation and privatisation of the weaker and more difficult area of distribution.

6.2.01 **Objectives of Restructuring :**

Restructuring is not recommended for the sake of restructuring but for certain objectives viz.,

- i. to improve management and financial viability as well as the competitive strength of restructured units and free them as far as possible from budgetary support and governmental control;
- ii. to reconstitute units on a functional basis, that is generation, transmission, distribution;
- iii. to protect the employee interests by way of security of jobs and prospects of growth;
- iv. to harmonise the new situation wherein private sector will emerge with the major share in generation, half by the end of the 9th plan and may be two-thirds in subsequent years.

6.2.02 **Profile of Restructure:**

The committee examined several options;

- i. to corporatise the Board, as it is, with greater autonomy and some management improvements. This in effect means little or no change from the present situation. The problems outlined above will remain unsolved and therefore the committee rejected this option.
- ii. to have one corporation both for generation and transmission leaving aside distribution. This option did not appeal to the committee because generation and transmission are two entirely different functions, the latter being concerned with efficient evacuation of power across the state and to and from outside the state etc. providing access to both generating and distribution companies, thus fostering competition as well as maintenance of grid discipline. Therefore the committee came to the following conclusion:

- a) a separate **Generation** company such as for example AP Power Corporation under the Companies Act to whom all the current assets and employees in generation should be transferred. The management should have autonomy to function commercially as a subsidiary of the APSEB.
- b) likewise a separate **Transmission** company is also to be set up with relevant assets and employees transferred to it and with a clear charter of duties. It will have to work in close co-ordination with the Power Grid Corporation in the matter of improvement of transmission system and opening up of new lines to meet the expanding generation capacity in the State. Mutually acceptable institutional relationship has to be evolved, it may even be through participation in the equity as a joint venture. It should also function as a commercial entity.
- c) **Distribution** is a complex problem commanding a vast area, extremely large LT network with large number of consumers in the rural areas with 16 lakhs of pumpsets, one lakh more to be added per year. On the revenue side also it is a problem area because 40 to 45 percent of the supply is virtually free. While cross subsidising in the State as a whole has been done so far, it is not possible to sustain it any longer. Also the regional disparities as pointed out earlier are wide. A separate chapter has been allocated to consider restructuring and privatisation of distribution. Briefly for the purpose of this chapter the committee visualises at the first stage five distinct distribution companies in five zones, all as subsidiaries of the APSEB to whom the assets like subtransmission and distribution network including substations, transformers, as well as the employees will stand transferred. This decentralisation along with the formation of Transmission and Generation companies should be done simultaneously and at the earliest possible.

At a later stage the committee visualises that these distribution companies will induct private parties through such instruments as management contract, lease or sale etc. These have been discussed in detail in chapter 7.

- 6.2.03 ✓ A.P.Power Corporation should be responsible for the following functions;
- i. Generation of power from all existing generating stations and those under construction by APSEB

- ii. Purchases of power from Central Sector Generators and the joint venture generating company (APGPCL)
 - iii. Purchases of power from those private generators with which APSEB has already entered into Power Purchase Agreements.
 - iv. Purchase of power from other States.
 - v. All major hydro stations that may come up in future.
- 6.2.04 ✓ A.P. Transmission Corporation should be responsible for the following functions:
- i. Management of the entire Transmission System - 132 KV and above including inter-state lines.
 - ii. Expansion and upgradation of the existing transmission system.
 - iii. Load Despatch.
- 6.2.05 ✓ Regional Distribution Companies should be responsible for the following functions:
- i. Sale of power to the Consumers.
 - ii. Management of the existing distribution system below 132 KV including 132 KV substations.
 - iii. Expansion and upgradation of the existing distribution system.
 - iv. Extension of supply to new consumers.
- 6.2.06 The APSEB being a statutory body has certain responsibilities under the Electricity (Supply) Act. It is also not easily possible to transfer some of the assets and liabilities. An interface with the government is also necessary. Considering all these aspects the Committee recommends that the APSEB as a statutory body will continue but will have no operational functions. Its main functions, as a holding company, will be:
- i. to plan and oversee the total power development in the State, publish forecast of demand and the likely price the market will bear;
 - ii. to advise the government as required;
 - iii. to oversee the working of the subsidiaries;
 - iv. to oversee the implementation of restructuring and privatisation process in Distribution till it is complete.

Implementation of Restructuring:

- 6.3.01 The Restructuring and privatisation of such a large state organisation is a gradual process and can not be undertaken hastily or piecemeal. Thorough planning and preparation are needed. Preparation includes preparing the mindset of all concerned particularly the employees as to the need for restructuring and the fact that not only their interests will not be jeopardized but opportunities will improve. Without this preparation, restructuring might pose some problems. Training of Managers and key personnel in this process is also necessary.
- 6.3.02 As the APSEB came into being as a result of the Electricity (Supply) Act, 1948 and power is a concurrent subject, legislation has to be enacted with the President's assent to enable the State Government to do the restructuring. Detailed work is necessary in regard to the transfer of assets and liabilities, drawing up the requirements of the Articles and Memorandum of association for the new companies, the composition of the Board etc.

Timing :

- 6.3.03 A distinct time table is necessary as suggested earlier. The first part of the restructuring viz., formation of two transmission and generation companies and 5 distribution companies should take place at the earliest and simultaneously. This must not be done piece-meal. It may not also give the right signal to the public if it is not done all together, about the intentions of the Government as to the direction in which it wants the power sector to be restructured.
- 6.3.04 Since no new functions are being added, care must be taken to keep the staff strength as it is on date. Overheads should not be allowed to increase as a result of new companies being formed. On the Boards of the various companies the directors could be common.
- 6.3.05 Care has to be taken to structure the assets and liabilities in the Balance Sheet of the new companies with a view to their viability and creditworthiness. Special care is necessary to restructure the capital and its debt and equity components.

Implementation Committee:

- 6.3.06 An Implementation Committee(s) with experts drawn from the Government, APSEB and such other experts must be constituted to work out the detailing mentioned above.

CHAPTER - 7

RESTRUCTURING AND PRIVATISATION OF DISTRIBUTION

7.1.01 Features of the Distribution system:

The distribution system in Andhra Pradesh is very large covering the entire State. Its network consists of 182493 ckt km of high tension lines (11 KV and above) and 361474 ckt/km of low tension lines. It serves 3500 H.T. and 8062080 L.T. consumers and 16 lakh irrigation pumpsets. Majority of the consumers reside in the rural areas. It's revenues in 1993-94 were Rs.2303 crores. Gross Block of fixed assets exceeded Rs.1800 crores. There are 50000 employees engaged in the distribution function.

7.1.02 L.T. consumers account for nearly two-thirds of the total consumption but contribute only a third of the total revenue. For the agriculture irrigation pumpsets which consume over 9 billion units, the supply is practically free. Domestic consumers who number nearly 58 lakhs pay on an average only 89.27 paise per unit against cost of supply of 126.74 paise per unit, thus subsidising to the extent of 37.5 paise per unit on an average.

7.1.03 According to demand forecasts the total consumption is expected to double itself by the end of the Ninth Plan and treble by the end of the Tenth Plan. The distribution system handles over 20 billion units of energy at present and it will have to cater to the additional demand. The major part of the losses occur in the L.T. distribution system (roughly 14%) which includes technical and other unaccounted for losses.

7.1.04 From the consumer's point of view, metering and billing, and attendance to fault repairs leave much to be desired.

7.1.05 The above situation has arisen partly due to certain structural deficiencies in the A.P.S.E.B. viewed as a commercial body. It suffers from the usual disabilities of a large monopoly in the public sector, its principal weakness has been its inability to adjust its tariff to cover its financial requirements. In trying to continually subsidise more than two-third of its supply from the revenues of one-third of the supply, it has been unable to generate any surplus for investment. It has become heavily dependent on borrowings to meet its capital needs. Further, its capacity to borrow is dwindling.

- 7.1.06 During the past eight years, most of the additional generation has gone to meet the needs of the subsidised categories of consumers and the growth of the paying category viz., H.T. consumers has been low, if not marginal.

In this situation, being a vertically integrated organisation, priority of investment has gone to generation and a backlog of replacement and upgrading of the distribution network has accumulated. As the sole public sector agency in charge of supplying electricity, it has to undertake the national programme of energisation of lakhs of pumpsets by taking loans from the Rural Electrification Corporation regardless of the financial, technical and managerial consequences of this huge programme on A.P.S.E.B.

Objectives of restructuring

- 7.2.01 Before considering any measures for restructuring, it is necessary to have a clear understanding of the objectives sought to be achieved. Most importantly, restructuring should enable more resources to be brought in to the sector to urgently expand and upgrade the system. Restructuring should lead to improved efficiency, lowest possible tariffs and better response to the needs of the consumer.

Strategy of Restructuring Distribution

- 7.3.01 In order that distribution may get the needed undivided attention, it should be separated from generation and transmission. Management should be decentralised by dividing it into a number of smaller units.
- 7.3.02 Since many of the problems in the distribution system can be directly traced to its very size, the second important element of the strategy is to decentralise the system - breaking up the existing distribution system into smaller manageable units from the point of view of area, the volume of sale of energy, the load-mix and number of connections. Value of assets and anticipated, revenues from the area would be other important considerations, as also the size of the employee strength.
- 7.3.03 The distribution system would be divided into Zones (Zonal Distribution Companies - ZDC) keeping in view the need to make the average revenue yield in each zone as nearly equal as possible. Merely dividing up the distribution into smaller areas is not an end in itself but only sets the stage effectively for inducting the private sector, which is the only possible means

of bringing in additional capital to meet the growing needs of the distribution system.

7.3.04 Vesting the new entities with autonomy to carry out their commercial tasks is extremely important. The re-allocation of the distribution system into smaller units is in a sense a preparatory stage for the private sector to come in later. To the extent these new units are able to improve metering and billing and collection of revenues, remove classification anomalies on the one hand and improve customer service on the other hand, they would be making them attractive for the private sector to come in on favourable terms. The experience gained would be valuable in determining the strategy in each of the zones for induction of private parties.

7.3.05 Many employee groups may be interested in joining others and taking up management of distribution systems. An important component of the strategy would be to encourage the employees and motivate them to take up management of the distribution system. The two stage operation restructuring and induction of private sector - is expected to bring about the desired changes at the field level.

7.3.06 The strategy indicated above would, in the long run, (i.e., by the beginning of the Tenth Plan, when private generating stations would be coming up without any contract with A.P.S.E.B. to purchase power or any guarantees by the State Government) create a situation in which the generating companies will be competing among themselves and negotiating agreements with the distribution companies in regard to quantity of energy to be supplied and the tariff for sale and other matters incidental thereto. At this stage, electricity would be sold and purchased as a commodity in a competitive market.

7.3.07 It is only then that the objective with which the State Electricity Boards were set up under the Electricity Supply Act, 1948, namely, that every consumer should get adequate power to meet his needs at the least cost will become a reality.

Regulation

7.4.01 Freeing all the entities engaged in production, transmission, distribution and selling of electricity from Governmental control to pursue their commercial goals, must not mean unrestricted exploitation of the market. Power is a universal input needed for subsistence, improved quality of life as well as for

productive purposes. Therefore, it is essential to have a regulatory body to balance the legitimate interests of all the players in the system. We have discussed in detail the duties and responsibilities of the Regulating Commission in Chapter 9. We have recommended therein that it should be an autonomous judicial body with necessary independence.

Under the existing arrangements, the State Government has been performing this role, as Government itself is a major player in the economic and social development of its people. The State Government may in the discharge of its responsibilities towards economic and social development of its people consider it necessary in the future, for very good reasons, that certain categories of consumers, at certain points of time, should have electricity supply at rates lower than the cost of supply. It can then make its case before the Regulatory Commission which can then decide objectively how this burden has to be shared by different categories of consumers. This has been discussed in detail in Chapter 9.

An Overriding Caution :

- 7.5.01 Restructuring of distribution can achieve some improvements in efficiency in the immediate future and privatisation some more. But it will not be sustainable until the central problem of the power sector is squarely faced. Distribution entities can survive and fulfil their role efficiently in organising further investment in distribution only, if they earn surplus of income over expenditure and have a proper cash flow. Cash can come from only one source, namely, the consumers. In this State, 40 - 45% of the consumers who do not contribute any cash, cannot be served indefinitely on cross-subsidisation. If the Distribution companies cannot collect enough cash, they cannot pay the generating companies, who in their turn will not be able to pay their supplies and eventually their employees. Some State Electricity Boards are already reduced to that predicament. A.P.S.E.B., which is one of the best SEBs in the country, may also have to face the same situation, unless a wayout is found. This issue has been dealt with in Chapter 8.

Modalities of Restructuring Options :

- 7.6.01 The options are:
- i. Corporatisation of APSEB with management improvements - This is not worth considering because in the event the APSEB will continue

to be sole purchaser and give guarantee of off-take to the future private generators of electricity ;

- ii. Corporatise and partially disinvest - The same objection as in (i). In neither of these options, is the problem of size and monolithic vertically integrated structure is solved ;
- iii. Decentralise into a few zones of manageable size area, turnover and employee strength wise. This option commends itself to the Committee, as it provides for the smoothest transition and has several advantages. For the employees, it will mean no change other than in the ambience of work and the challenge presented. He may well get motivated to perform better, in healthy competition with other sister companies. There could even be incentives for better performance. Much closer supervision and customer contact will be possible. Most importantly it will provide closer analysis of the experience region wise which will help in choosing the right strategy in inducting private participation (including employees) at the appropriate stage. These will naturally be different for different zones.

7.6.02 After considering the pros and cons of a few large or many small zones, the Committee preferred a division into five Zonal Distribution Companies (ZDCs). The different Zones are as shown below:

Zone I	Srikakulam, Vizianagaram, Visakhapatnam, East Godavari and West Godavari
Zone II	Krishna, Guntur, Prakasam and Khammam
Zone III	Nellore, Chittoor, Cuddapah, Anantapur, Kurnool and Nalgonda
Zone IV	Hyderabad, Rangareddy, Warangal and Mahaboobnagar
Zone V	Medak, Nizamabad, Karimnagar and Adilabad

The different zones are exhibited in Annexure 7.1. Details of the assets, demand, revenue and expenditure of the zones are given in Annexure 7.2.

But this need not be hard and fast. Other combinations are possible. It is important to note that because of regional disparities in development, the mix of categories is different and to that extent, the income and viability of the Zonal Company are affected. This mix will go on changing. It may be

necessary to even out the differences for a short period of time. There are two ways in which this could be managed. A.P. Power Corporation would be supplying power to the distribution companies. The cost of supply would be fixed after taking into account its own operation and maintenance costs etc. and the need for it to make at least 3 percent return on its fixed assets at the beginning of the year. In fact, it would be necessary for it to so fix the cost of supply as to earn a reasonable return on equity and leave a small surplus for future investment. A.P. Power Corporation while keeping the average cost of supply, intact, charge a little more for electricity supplied to those distribution companies where the load-mix has turned more favourable and a little less to the distribution companies where it has become a little less favourable. It will be a zero sum game with A.P. Power Corporation playing the role of a manager of the system without affecting its own finances.

- 7.6.03 In the alternative, a **Power Price Equalisation Fund** can be created by charging the consumers in all the distribution areas a little more and out of this fund, even out the differences arising out of differential growth of different categories in the various zones. In effect, both arrangements lead to the same result. In the case of the equalisation fund, all the H.T. consumers in the State would be required to pay the same additional amount and the operation would be transparent. A.P.S.E.B. (the residual body) can manage this fund thus insulating the A.P. Power Corporation from these operations. This is an attractive proposition till a rational tariff structure emerges. The State Government may consider this option.

Modalities of Privatisation

- 7.7.01 The rationale for inducting private participation in the restructured, but still state-owned, zonal companies is the need for injection of some capital investment for replacing and upgrading the existing infrastructure of distribution and its expansion to meet the rapidly growing load. Before examining the modalities of privatisation, the Committee examined the earning potential, if any, from these zones within the present skewed tariff structure and the present facilities. Because that alone will be the attraction at the first stage.
- 7.7.02 The scope for increasing revenue lies specifically in the following areas
- Reduction in distribution losses, mostly non-technical and extra earning from the sale of extra units gained thereby

- Correction of misclassification (i.e. commercial loads going now under domestic) Extra earnings therefrom.
- savings in O & M expenses.

These mostly pertain to better managerial supervision and efficiency and may not entail significant capital expenditure. There has to be a programme of graduated improvement annually. These have been detailed out in Annexure 7.3. It shows that the extra surplus revenue is not inconsiderable. Thus, even within the present tariff structure distribution could be an attractive proposition to private investors with strong management competence.

7.7.03 Once the zones have been carved and the ZDCs formed as part of the restructuring of the A.P.S.E.B., several options are available for induction of the private sector. These options are considered below. It may be noted that they are not necessarily mutually exclusive. Initially, the possibility of inducting the private sector may be explored. However, since this is a new field, it is very likely that private developers may not come forward straight away for taking over one of the ZDCs. It is more likely that they may adopt a more cautious approach and the ultimate take over may be preceded by a first phase of management contract followed by leasing or hiring.

i. **Management contracts :-**

As explained before, this being a new field, there will be a cautious approach by the private investor. Likewise on the part of the state-owned companies, there will also be hesitation to trust a newcomer to handle such large assets. Both will be testing the water. Therefore, the period of control should not be too long, but long enough to start realising extra earnings, say one to three years. Bids should be called for on a simple gross sum basis. For example if the current earning from a particular area, net of expenses (O&M, repair and maintenance, employee costs) is Rs. 7 crores, bids of Rs. 8 crores and above may be acceptable. This simple form of bidding is suggested instead of any formula-based profit-sharing as this is likely to lead to endless arguments as to the amount of surplus realised. Bids may be called for the entire zone. Along with the bid, the bidders' credentials must be established by way of his financial and managerial capability and standing. Some means of security such as deposits or bank guarantee may become necessary.

In this arrangement, the ZDC continues to remain the owner of the company and the assets and liabilities remain with the Company. A detailed note in regard to the arrangements necessary is placed in Annexure 7.4 and 7.5.

ii. **Leasing and Hiring**

This could be the next stage when management contract comes to an end. Here, the assets are given on lease or hire to the private investor. The Z.D.C. retains the liabilities and will have to service the debt. The lease or hire charges may be calculated in different ways. At the least, it would be based on present book values and be enough to service the liabilities. However, this may be, far too low a charge. The assets could be revalued to arrive at the present day values which may be several times the present book value. Calculation of hire charges on this basis may make it necessary to increase the tariff sharply which would not be desirable. Yet another way of calculating the hire charges could be to relate it to the expected return from the operation and use of the assets. This would be equitable to both A.P.S.E.B. and the private investor.

iii. **Disinvestment-**

This is the final stage when the ownership is transferred to private entities with equity participation partially, or wholly. However, it is only when the controlling interest is with the private entity that it will be willing to invest, which is the ultimate objective for decentralisation and privatisation of Distribution. When we say private entities, we also have in mind employee groups who may opt out and make a bid for participation at any stage. In fact, this should be encouraged. It is hoped that at this stage, the viability of the Distribution Companies will have been well demonstrated and their share value would have appreciated.

Tenth Plan Scenario

7.8.01 Any of these modalities could be employed at any point of time by the different distribution companies depending on the stage of their development and their interests. The scenario visualised at the beginning of the 10th plan is that the Distribution companies will be the buyers of power and the new

IPPs will have to enter into long or short term contracts with them. The State Government or APSEB does not have to come into the picture or give any guarantees of any kind. The IPPs will be free to have contracts likewise, directly with large consumers or sell power outside the State, if there are no buyers in the State after paying wheeling charges to the Transmission company. Thus, production, buying and selling will be driven by market forces, without State intervention and the logical conclusion of the liberalisation policy would be reached. This stage should be completed within the next eight to ten years.

7.8.02 If the distribution companies find it necessary to buy power at a cost which affects their viability within the retail price ceiling fixed by the Regulatory Commission, they would approach the Commission for a revision.

7.8.03 One of the possibilities is to explore the likelihood of the private generators taking up the responsibility for distribution also. On the face of it, it may appear attractive as in such a case the State Government does not have to give any guarantee. In future where power purchase agreements have not been signed by A.P.S.E.B., such a course of action would be possible. It would be necessary to work out the modalities of inducting the private generator in to distribution based on certain objective criteria. Some of the private generators with whom power purchase agreements have been signed already can be asked to take up some of the zones, if it is felt that there may be an adequate or no response if the State Government were to go in for a bid. Even here an element of competition would have to be built in to safeguard the interest of the State Government. In no case can the private generator be allowed to choose a distribution zone, or part thereof. If he is allowed to do so then the risks in the distribution zones being unknown, there will be "cherry picking" that is choosing areas of apparent profit, namely, urban and industrial areas of which there are very few. Most of the predominantly agricultural areas will be left behind with the A.P.S.E.B. and privatisation will stop there. However, any arrangement in which the generator essentially looks after the distribution also will suffer from the same structural defect as the SEB in as much as essentially the same management will look after two different functions in which distribution will receive less attention where in fact it needs more.

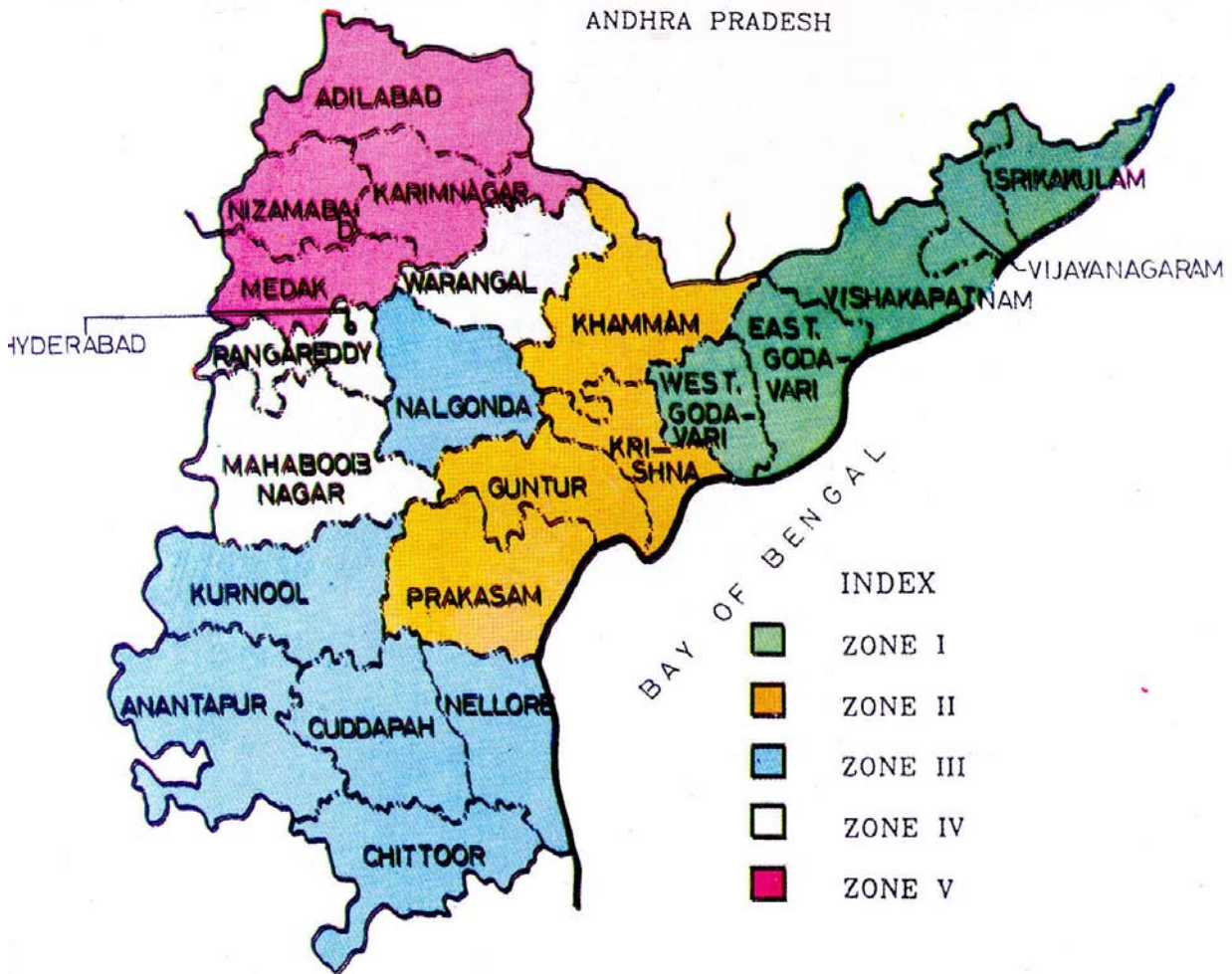
Standards of Service

7.9.01

Electricity being a basic necessity, its marketisation must be accompanied by adequate protection of the customer. In regard to tariff this responsibility will vest with an independent Regulatory body. Similarly in regard to the quality of service the distribution agencies must maintain records to be published periodically by the Regulatory body. In UK, this is done by the regulatory body which is also empowered to impose fines for failure to maintain standards.

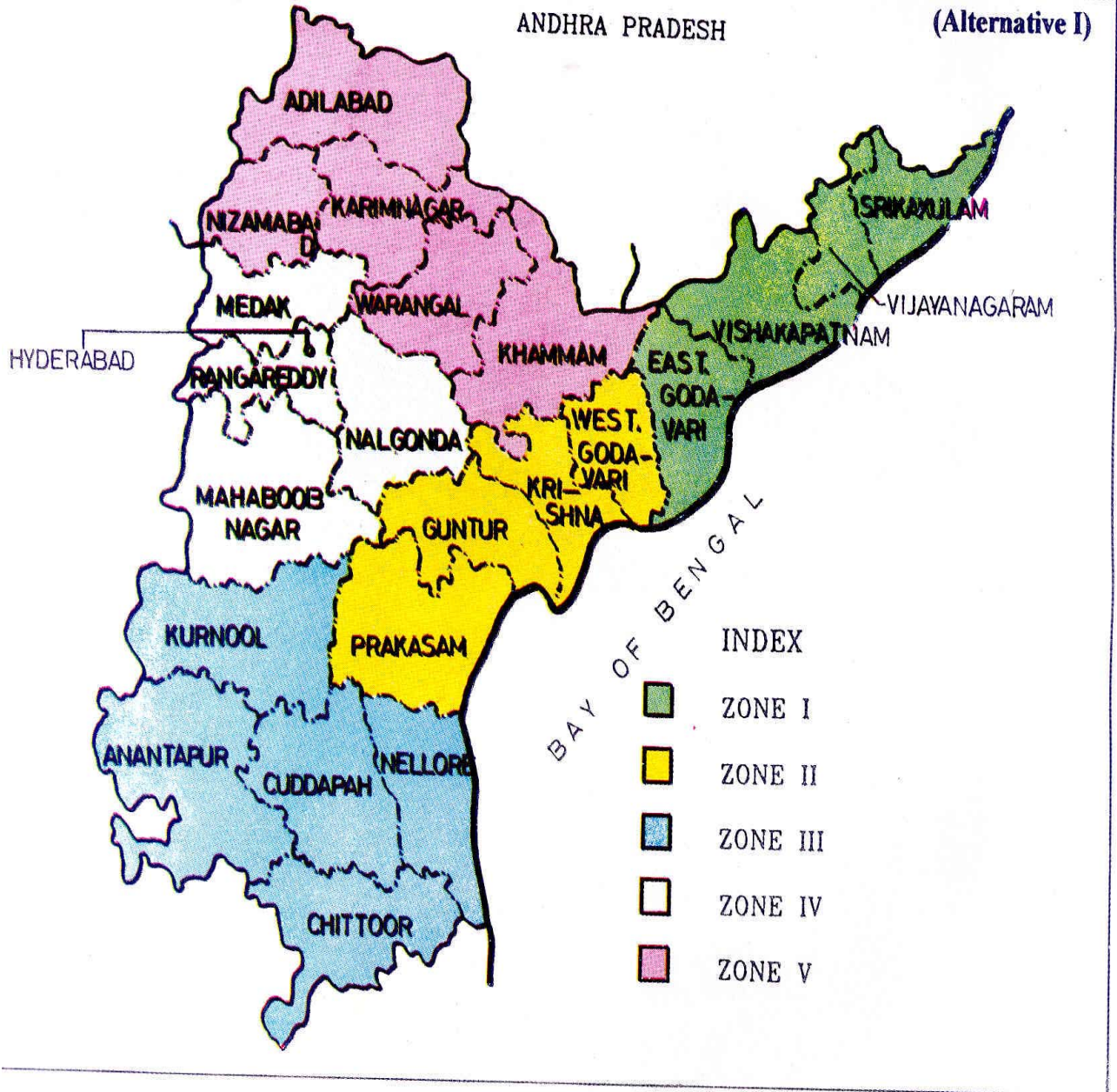
The following is the tentative list of standards and service -

- i. Number of supply interruptions per month
- ii. Number of interruptions as a percentage of connections
- iii. Number restored as % of interruption
 - in 1 hour
 - in 3 hours
 - in 6 hours
 - beyond 6 hours
- iv. Restoration of fuse failures as % of fuse calls
 - with in 4 hours
 - with in 8 hours
- v. Failure to provide new meters within 10 days of complaint
- vi. Number of voltage complaints - no. of visits to enquire into the complaint within 10 days
- vii. Number of metering problems attended within 10 days of metering reports.
- viii. Number of complaints reading bills and No. attended within 10 days as % of complaints



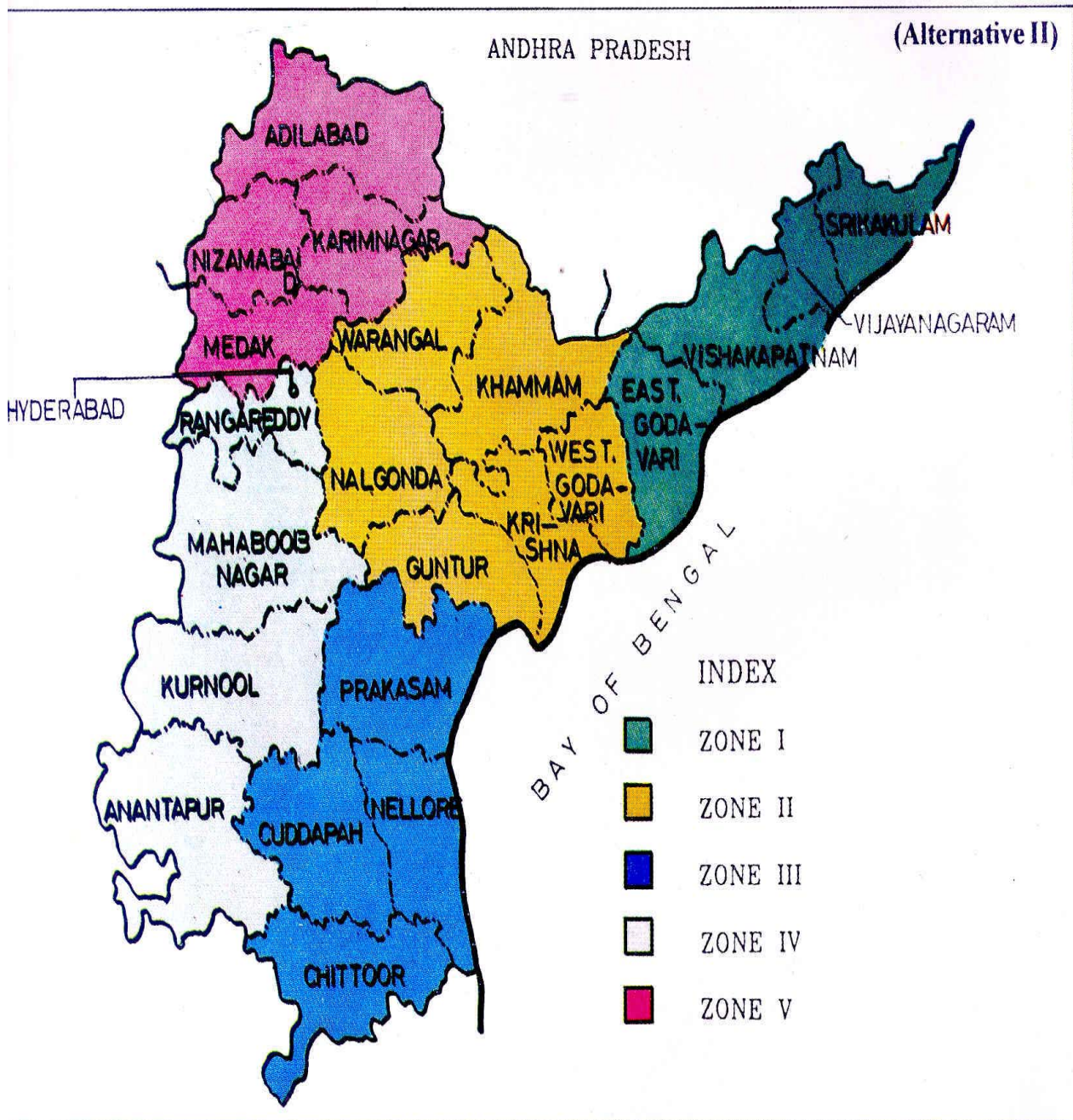
DIVISION OF ZONES

(Alternative I)



DIVISION OF ZONES

Note: The detailed calculations for this alternative can be worked out on similar lines as per Annexure 7.1



DIVISION OF ZONES

Note: The detailed calculations for this alternative can be worked out on similar lines as per Annexure 7.1

THE PROCEDURE FOR INVITING BIDS FOR DISTRIBUTION COMPANIES MANAGEMENT TAKEOVER

One of the critical issues in the distribution restructuring in a manner in which the private entities will be inducted into five Zonal distribution companies which will have the responsibility for managing the distribution functions in five areas of the state. They are called the zones and the five distribution companies are called ZDC - I,II,III,IV and V. The current situation is that of the five zones, zone I,II, and IV are more industrialised and their average realisation per unit sold is over one rupee. Whereas in zone III, dealing with Chittoor, Cuddapah etc. and zone V dealing with Medak, Nizamabad etc. the average realisation is far below one rupee. It is also found that in zone II and IV there is more industrial growth and therefore, the energy consumed per connected load is fairly high and consequently the employee cost, administration cost and repair charges are also lower per unit and energy sold as compared to zone III and V. The 5 companies are formed and their T&D losses, expenditure on various items and total consumption will continue as on the date of transfer. Zone I, II and IV would make substantial surplus. The energy produced by electricity board from various power stations would be averaged and at the 220 KV sub-station level, the cost of energy per unit could be computed. If energy sold at this rate to all the 5 (five) ZDCs, then ZDC I,II and IV would make a substantial cash surplus. While ZDC III and V will have a deficit. Taking note of this, the appropriate manner of calling for bids would be as follows.

We compute the expenditure of various items, total cost at which power will be sold and if the revenue continues to be the same would lead to a margin of Rs.147.2 crores in zone I which is the highest average realisation. Against this one must set-off the depreciation and the interest charges on any loans and return on the assets as provided under the Electricity Act. But at this stage it would not be possible to compute all that. Therefore, we may invite bids for zone I clearly specifying Rs. 147.2 crores as the minimum expected bid and persons who are offering more than this as a lumpsum payment to the electricity boards towards whatever to be set-off towards depreciation and interest charges should be evaluated. Please see Table. The handling of ZONE II and ZONE IV-will be on the same computation basis.

ZONE III which make a deficit of Rs. 128.18 crores and zone V a deficit of Rs. 9.2 crores call for a change in procedure. See annex I. It would not be appropriate nor feasible to ask for a negative bid. The correct approach appears to be that we first make the correction in the cost per unit of power sold to zone III by SEB so as to bring the net result to a break-even situation. This is computed as 0.48 ps per kwh. In other words, zone III will be charged at 0.48 ps per kwh for power supplied by SEB so that the company can break-even. The bids can be from zero upwards. Similarly for zone V, for the deficit being Rs. 9.2 crores, the correction is only 0.02 ps. i.e., for zone V, SEB can charge 0.63 ps. per unit as the price of energy sold to the zonal company and bids can be called with zero as the base. It is interesting to see that if this is done, the electricity board will still get a total of Rs. 125.67 crores as the income from the sale of power from all the 5 zonal companies, even if the bids are not higher than the off-set levels.

If we set the off-set price at a level where the ZDCs can make a 5% turnover of the profit at that level, then the bids will be called for on this basis.

Zone	Price of energy sold to ZDC	Minimum bid/ Payment to SEBs
I	0.59	124.74
II	0.60	66.46
III	0.45	-150.63
IV	0.61	9.27
V	0.60	-30.22

As the rate at which power should be sold over and above the number of units taken as the base, i.e., in zone I if the total input of power is over 3771.5 million units because of increase in load, what should be the rate at which power should be sold ? In our view, every year one can assume that the rate should be re-fixed with reference to the composition of the increment load at the end of the year, i.e., they would be charged at the same rate through out the year but at the end of the year if it is found that there is a increment of 300 million units, of which 200 million units are for agriculture and 100 million units for industries, the rate would be fixed appropriately. Whereas if the incremental power is sold mostly to industries and marginally to agriculture, then the rate should be fixed in a different way.

ANNEXURE 7.4 TABLE

**PROFITABILITY STATEMENT OF SELECTED (FIVE) ZONES
BASED ON REVENUE AND LINE LOSSES**

Rupees in Crores

S No	DETAILS	Zone					Re-remarks
		I	II	III	IV	V	
1.	Total Revenue Collection (Crores)	449.16	359.05	449.06	442.88	420.67	
2.	Total Expenses on Employees (Crores)	43.33	38.21	64.92	47.56	31.48	
3.	Administrative Expenses (Crores)	6.82	6.34	12.31	8.49	5.31	
4.	Repairs and Maintenance Costs (Crores)	6.71	7.89	19.41	12.72	11.57	
5.	Total Energy Sold (in MU)	3205.76	2905.05	5914.91	4481.16	4695.76	
6.	Total Energy fed into Zone at 220KV (MU)	3771.5	3417.7	7393.6	5272	5869.7	
7.	Cost of Power averaged from all sources to SEB at 220KV SS.(Ps./Unit)	0.65	0.65	0.65	0.65	0.65	
8.	Total Cost of Power fed into Zone at SEB rate. (Crores)	245.1	222.2	480.6	342.7	381.5	
9.	Gross Surplus in each Zone (Crores)	147.20	84.41	-128.18	31.41	-9.19	125.67*
10.	The Cost per KWH to be charged by SEB to ZDC to make ZDC break-even for Zone III & V (Ps / kwh)	--	--	0.48	--	0.63	
11.	The Cost per KWH to be charged by SEB to ZDC to make ZDC get 10% margin on turnover. (Ps / kwh)	0.53	0.54	0.42	0.57	0.56	
12.	The Cost per KWH to be charged by SEB to ZDC to make ZDC get 5% margin on turnover. (Ps / kwh)	0.59	0.60	0.45	0.61	0.60	
13.	The Amount to be earned by APSEB after providing for 10% margin on the turnover to ZDC. (Crores)	102.29	48.51	-173.08	-12.87	-51.25	
14.	The Amount to be earned by APSEB after providing for 5% margin on the turnover to ZDC. (Crores)	124.74	66.46	-150.63	9.27	-30.22	

* Net amount gained by the SEB

Assumptions:

1. The total energy fed into 220 KV (Item 6) is arrive with assumption that for the Zone with average Revenue realisation above Re. 1/- has the line losses of only 15% and for the others at 20%
2. The Gross surplus in each zone (Item 9) is arrived as follows:

(Total Revenue)less (Total Cost of energy fed into 220 KV SS +Cost of Adm expenses+employee Cost + Repairs and Maintenance expenses)

ANNEXURE 7.4 TABLE
(Refer Annexure 7.1(a))

**PROFITABILITY STATEMENT OF SELECTED (FIVE) ZONES
BASED ON REVENUE AND LINE LOSSES**

Rupees in Crores

S No	DETAILS	Zone					Re-marks
		I	II	III	IV	V	
1.	Total Revenue Collection (Crores)	355.04	338.64	331.99	658.66	436.50	
2.	Total Expenses on Employees (Crores)	32.64	41.79	55.46	54.09	41.52	
3.	Administrative Expenses (Crores)	5.25	6.65	10.13	10.02	7.22	
4.	Repairs and Maintenance Costs (Crores)	4.33	8.07	15.73	16.92	13.25	
5.	Total Energy Sold (in MU)	2441.62	2839.44	4458.55	6089.04	5373.99	
6.	Total Energy fed into Zone at 220KV (MU)	2872.50	3340.50	5573.20	7163.60	6717.50	
7.	Cost of Power averaged from all sources to SEB at 220KV SS.(Ps./Unit)	0.65	0.65	0.65	0.65	0.65	
8.	Total Cost of Power fed into Zone at SEB rate. (Crores)	186.70	217.10	362.30	465.60	436.60	
9.	Gross Surplus in each Zone (Crores)	126.12	65.03	-111.63	112.03	-62.09	129.47*
10.	The Cost per KWH to be charged by SEB to ZDC to make ZDC break-even for Zone III & V (Ps / kwh)	-	-	0.45	-	0.56	
11.	The Cost per KWH to be charged by SEB to ZDC to make ZDC get 10% margin on turnover. (Ps / kwh)	0.53	0.55	0.39	0.56	0.49	
12.	The Cost per KWH to be charged by SEB to ZDC to make ZDC get 5% margin on turnover. (Ps / kwh)	0.59	0.60	0.42	0.60	0.53	
13.	The Amount to be earned by APSEB after providing for 10% margin on the turnover to ZDC. (Crores)	90.61	31.17	-144.83	46.17	-105.74	
14.	The Amount to be earned by APSEB after providing for 5% margin on the turnover to ZDC. (Crores)	108.37	48.10	-128.23	79.10	-83.91	

* Net amount gained by the SEB

Assumptions:

1. The total energy fed into 220 KV (Item 6) is arrived with assumption that for the Zone with average Revenue realisation above Re. 1/- has the line losses of only 15% and for the others at 20%
2. The Gross surplus in each zone (Item 9) is arrived as follows:

(Total Revenue)less (Total Cost of energy fed into 220 KV SS +Cost of Adm. expenses+employee Cost + Repairs and Maintenance expenses)

ANNEXURE 7.4 TABLE
(Refer Annexure 7.1(b))

PROFITABILITY STATEMENT OF SELECTED (FIVE) ZONES
BASED ON REVENUE AND LINE LOSSES

Rupees in Crores

S No	DETAILS	Zone					Re-marks
		I	II	III	IV	V	
1.	Total Revenue Collection (Crores)	355.04	575.90	251.89	517.33	420.67	
2.	Total Expenses on Employees (Crores)	32.64	62.53	42.12	56.73	31.48	
3.	Administrative Expenses (Crores)	5.25	10.56	7.94	10.21	5.31	
4.	Repairs and Maintenance Costs (Crores)	4.33	14.01	12.67	15.72	11.57	
5.	Total Energy Sold (in MU)	2441.62	5891.80	3372.00	4801.46	4695.76	
6.	Total Energy fed into Zone at 220KV (MU)	2872.50	6931.50	4215.00	5648.80	5869.70	
7.	Cost of Power averaged from all sources to SEB at 220KV SS.(Ps./Unit)	0.65	0.65	0.65	0.65	0.65	
8.	Total Cost of Power fed into Zone at SEB rate. (Crores)	186.70	450.50	274.00	367.20	381.50	
9.	Gross Surplus in each Zone (Crores)	126.12	38.30	-84.84	67.47	-9.19	137.87*
10.	The Cost per KWH to be charged by SEB to ZDC to make ZDC break-even for Zone III & V (Ps / kwh)	--	--	0.45	--	0.63	
11.	The Cost per KWH to be charged by SEB to ZDC to make ZDC get 10% margin on turnover. (Ps / kwh)	0.53	0.57	0.39	0.56	0.56	
12.	The Cost per KWH to be charged by SEB to ZDC to make ZDC get 5% margin on turnover. (Ps / kwh)	0.59	0.61	0.42	0.60	0.60	
13.	The Amount to be earned by APSEB after providing for 10% margin on the turnover to ZDC. (Crores)	90.61	-19.29	-110.03	15.74	-51.25	
14.	The Amount to be earned by APSEB after providing for 5% margin on the turnover to ZDC. (Crores)	108.37	9.50	-97.43	41.61	-30.22	

* Net amount gained by the SEB

Assumptions:

- The total energy fed into 220 KV (Item 6) is arrived with assumption that for the Zone with average Revenue realisation above Re. 1/- has the line losses of only 15% and for the others at 20%
- The Gross surplus in each zone (Item 9) is arrived as follows:

(Total Revenue)less (Total Cost of energy fed into 220 KV SS +Cost of Adm.
expenses+employee Cost + Repairs and Maintenance expenses)

MODALITIES FOR INDUCTING PRIVATE AGENCIES INTO ZONAL DISTRIBUTION COMPANIES

As explained earlier, if the state is divided into five zones and if to each of Zonal Distribution Company power supplied from the AP Power Corporation at rates which will bring the companies to break-even level of operation, all zonal companies will be at the same level and APSEB could be capture part of the distribution gains.

For example, in the illustration given in Annex VII (2), the five zones will break-even at the following if energy is sold at the following rates.

Zone I	ps. 110.0
Zone II	ps. 94.1
Zone III	ps. 48.0
Zone IV	ps. 72.0
Zone V	ps. 63.0

A zonal company which purchases power at the rates specified above and the quantity that is being supplied to the zone currently, and sells the power at an average cost which is being realised now, will neither make a profit nor loss provided it also incurs the three items of expenditure which it has to bear, namely, the cost of employees, administration cost and cost of repair and maintenance as at present.

It can generate very large surplus if operational efficiency is increased by a) reduction of loss, b) reducing the classification anomalies, and c) reducing the O&M expenditure. (see Annexure 7.3).

APSEB which would own all the equity shares of zonal distribution company can invite bids for management contract. While inviting the bids we should clearly specify that the successful bidder would have to pay an amount as bid and at the end of the contract period, say, two or three years he has to take over a minimum of 26% of the equity of the company at rates to be decided by a mutually agreed Merchant Banker. The APSEB which is the owner of all the equity shares may at that stage also retain the right to dis-invest another 25% to the public in small lots. If the private agency wants it should have the right to purchase the other shares also held by the SEB.

The draft notification may have the following details while inviting bids.

Details	Zone I	Zone II	Zone III	Zone IV	Zone V
1. Total Electricity given to the zone by APSEB(MU)	3771.50	3417.50	7393.60	5272.00	5869.70
2. Price at which power is sold (Ps/KWH)	110.90	94.05	48.00	72.00	63.00
3. Total Electricity sold by zonal distribution companies (MU)	3205.76	2905.05	5914.91	4481.16	4695.76
4. Average Revenue per unit realised (Ps/KWH)	140.10	123.60	75.90	98.20	89.60
5. Employment cost (Rs. Crores)	43.30	38.80	63.00	44.20	36.10
6. Administration Cost (Rs. Crores)	6.80	6.30	10.10	7.10	7.70
7. Cost of Repair and Maintenance (Rs. Crores)	6.70	9.30	18.50	12.80	11.10

Given these details they should be asked to bid in terms of the amount that they would pay in addition to the power price to the zonal distribution company in the first, second and third year. This should be a fixed sum.

CHAPTER 8

TARIFF POLICY

- 8.1.01 The Andhra Pradesh State Electricity Board on its formation inherited the tariffs in force. Subsequently, tariffs have been adjusted upwards from time to time by the SEB to take care of not only increased costs of generation, transmission and distribution, but also to generate a surplus in conformity with the provisions of the Electricity (Supply) Act, 1948, for further investment. Though it has been fairly successful in covering increased costs of supply, it has been only marginally successful in generating additional resources for investment. Out of the ten years from 1985-86 to 1994-95, the SEB has earned a surplus of 3 percent stipulated in Section (59) of the Electricity (Supply) Act in four years. It is necessary to note here that the SEB had no equity base at all till 1993-94. According to the priorities laid down in the Electricity (Supply) Act, 1948 (Sections 67 and 67 A), available surplus is to be apportioned first to meet the non-governmental debt repayment obligations for sums borrowed by the Board and only after then for repayment of any part of the loans from the State Government.
- 8.1.02 A study of the increases in tariffs during the past 15 years shows that increased tariffs have barely kept pace with increasing costs. Average realisation has risen from 32.97 paise per unit in 1977-78 to 106 paise per unit in 1993-94. The cost of supply has also gone up during the same period from 33.16 paise per unit to 102 paise per unit. The graph in Fig. 8.1 shows the increases in average realisation and costs during the period 1977-78 to 1993-94. It will be readily seen that increases in average realisation have hardly kept pace with the increases in average cost of supply.
- 8.1.03 In the table below the earnings of the SEB are compared with costs of operations. The performance of the SEB is judged by comparing the return achieved with the yield stipulated in the Electricity (Supply) Act, 1948. In the last column, the net surplus available has been computed as a percentage of the capital expenditure in that year.

Fig. 8.1
AVERAGE REALISATION VS. COST OF SUPPLY (OVER ALL)

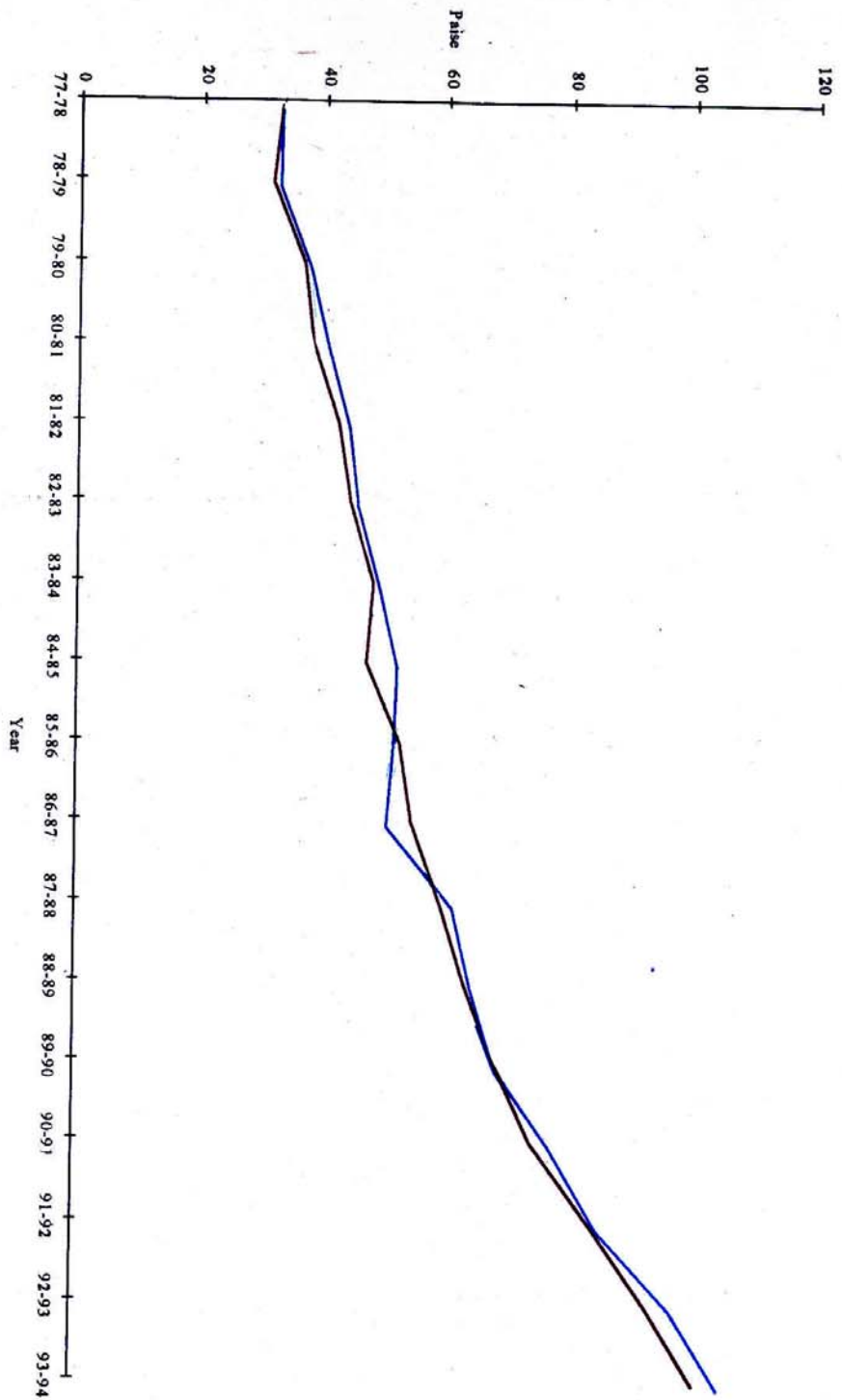


Table 8.1

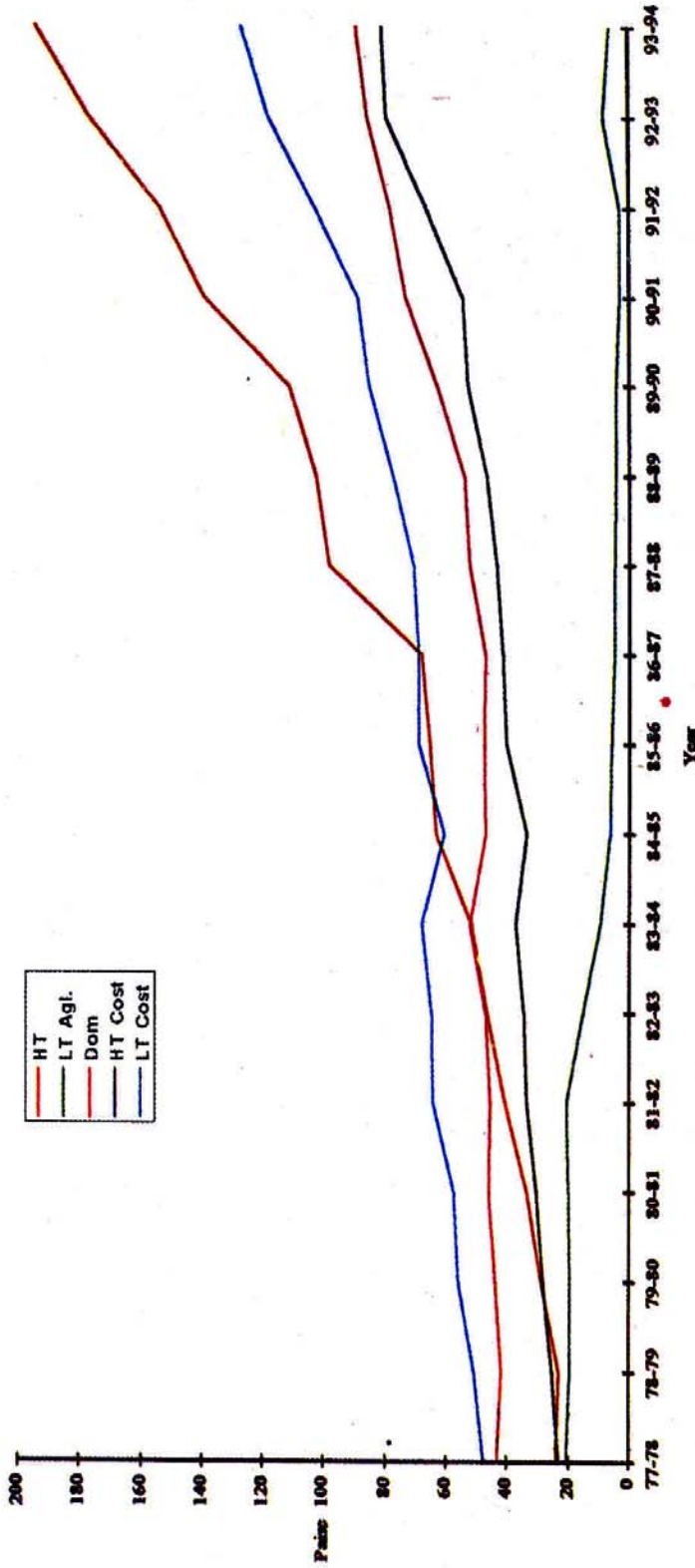
Year	Total Revenue (Rs. Crs)	Total Expenditure (Rs. Crs)	Surplus available (Rs. Crs)	Rate of Return (%)	Surplus as on percentage of capital expenditure (Rs. Crs)
1985-86	592.87	578.51	14.36	1.38	6.74
1986-87	677.88	668.92	8.96	0.83	3.32
1987-88	736.87	707.57	29.30	2.51	9.66
1988-89	832.03	815.27	16.76	1.31	5.02
1989-90	1015.98	1013.46	2.52	0.18	0.79
1990-91	1301.70	1220.71	80.99	4.71	17.60
1991-92	1633.38	1548.94	84.44	3.74	14.75
1992-93	1935.50	1856.05	79.45	3.26	9.44
1993-94	2303.15	2216.16	86.99	3.19	10.12

8. 1.04 Tariff has been adjusted over the years as already noted to cover the costs of supply and to leave some surplus for investment. Tariff increases for different categories have become highly distorted owing to the need to provide a large amount of cross subsidisation. The graph in Fig 8.2 show the increases in tariff as against the average of realisation in the case of H.T., domestic and agricultural consumers.

8. 1.05 This graph (Fig. 8.2) clearly brings out the cross subsidisation in the tariffs. Increases in tariff for the three main categories against the increase in cost of supply to that category has been depicted in the graphs in Fig. 8.3 to 8.5.

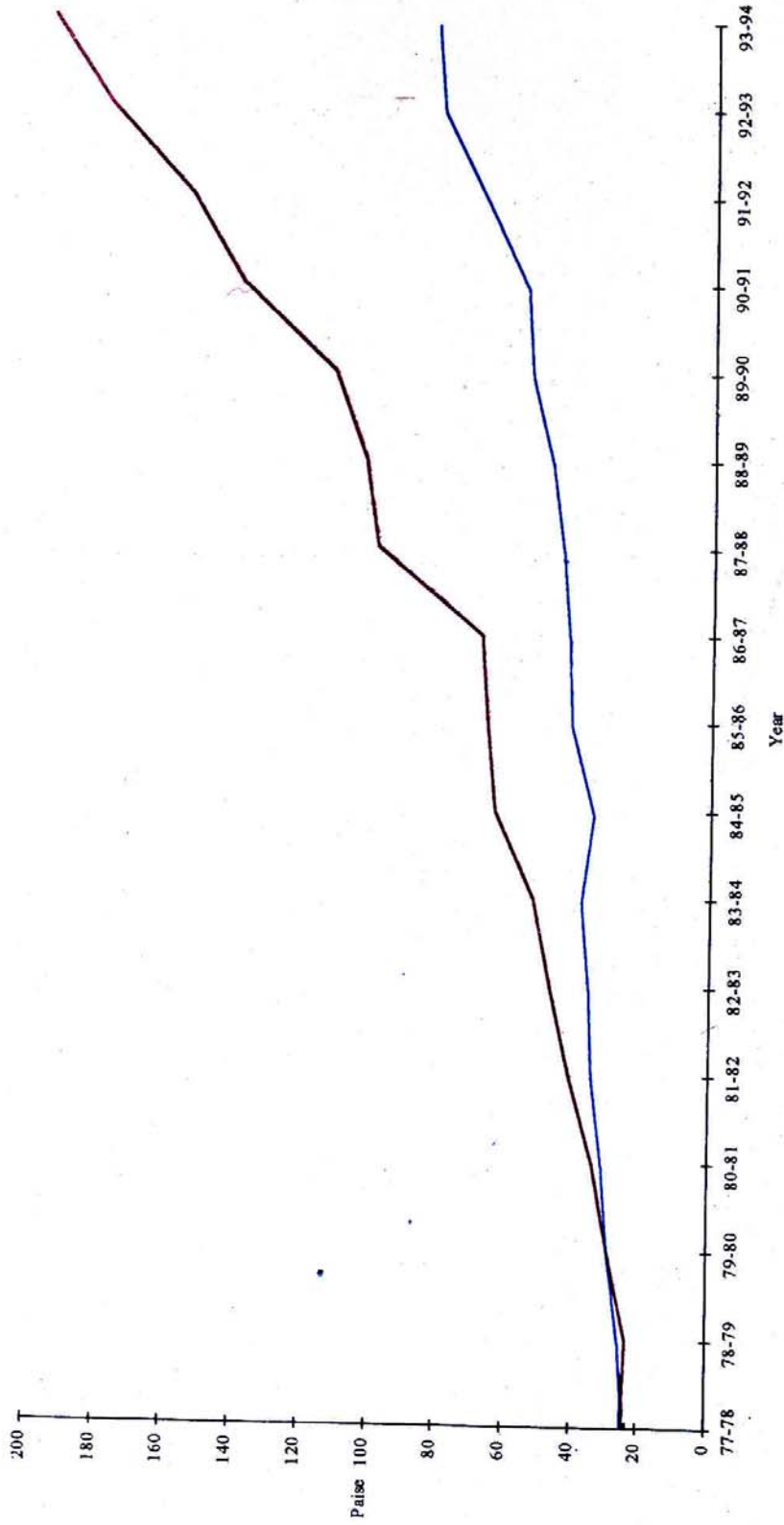
It will be seen from the above graphs that only in the case of H.T. industry, the tariffs have increased faster than the cost of supply. In the case of domestic supply, the tariff has been always below the cost of supply. In 1981 the tariff covered two-thirds of the cost of supply and the gap between cost of supply and tariff was reduced gradually and in 1989 the tariff was 78 percent of the cost of supply. However, subsequently, the tariff has fallen again to 63 per cent of the cost of supply. In the case of agriculture, the tariff in 1981 was equal to 31 percent of the cost of supply and ever since it has declined going down to only 3.2 percent of cost of supply in 1990. It registered a small increase in 1991 and 1992, but declined thereafter.

Fig. 8.2
CATEGORYWISE TARIFF /KWH Vs. COST OF SUPPLY/KWH



	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94
HT (Ps./KWH)	24.06	23.19	28.69	33.52	40.77	46.52	51.77	63.14	65.48	67.72	98.16	102.32	111.13	138.75	153.31	177.24	194.35
LT Agl. (Ps./KWH)	20.59	19.42	19.22	19.81	20.18	14.91	9.21	6.12	5.74	4.87	4.72	4.28	4.22	2.88	3.28	8.1	6.4
Domestic (Ps./KWH)	43.47	41.96	43.78	45.75	45.48	47.04	52.32	46.96	47.37	47.09	52.19	54	62.6	73	78.14	85.75	89.27
Cost of supply at 11 KV (HT)	22.89	24.96	28.24	30.12	33.47	34.39	36.83	33.52	40.41	41.26	43.09	46.61	52.62	54.26	66.30	79.24	80.98
Cost of supply (LT)	47.72	50.56	56.04	57.45	64.25	64.94	68.08	60.63	68.93	68.90	70.68	77.03	84.88	88.90	102.93	117.83	126.74

FIG. 8.3
CATEGORYWISE TARIFF (HT)/KWH Vs. COST OF SUPPLY/KWH



	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94
HT (Paise/KWH)	24.06	23.19	28.69	33.32	40.77	46.52	51.77	63.14	65.48	67.72	98.16	102.32	111.13	138.75	153.31	177.24	194.35
Cost of supply at 11 KV (Paise/KWH)	22.89	24.96		30.12	33.47	34.39	36.83	33.52	40.41	41.26	43.09	46.61	52.62	54.26	66.30	79.24	80.98

Fig. 8.4
CATEGORYWISE TARIFF(Domestic) /KWH Vs. COST OF SUPPLY/KWH

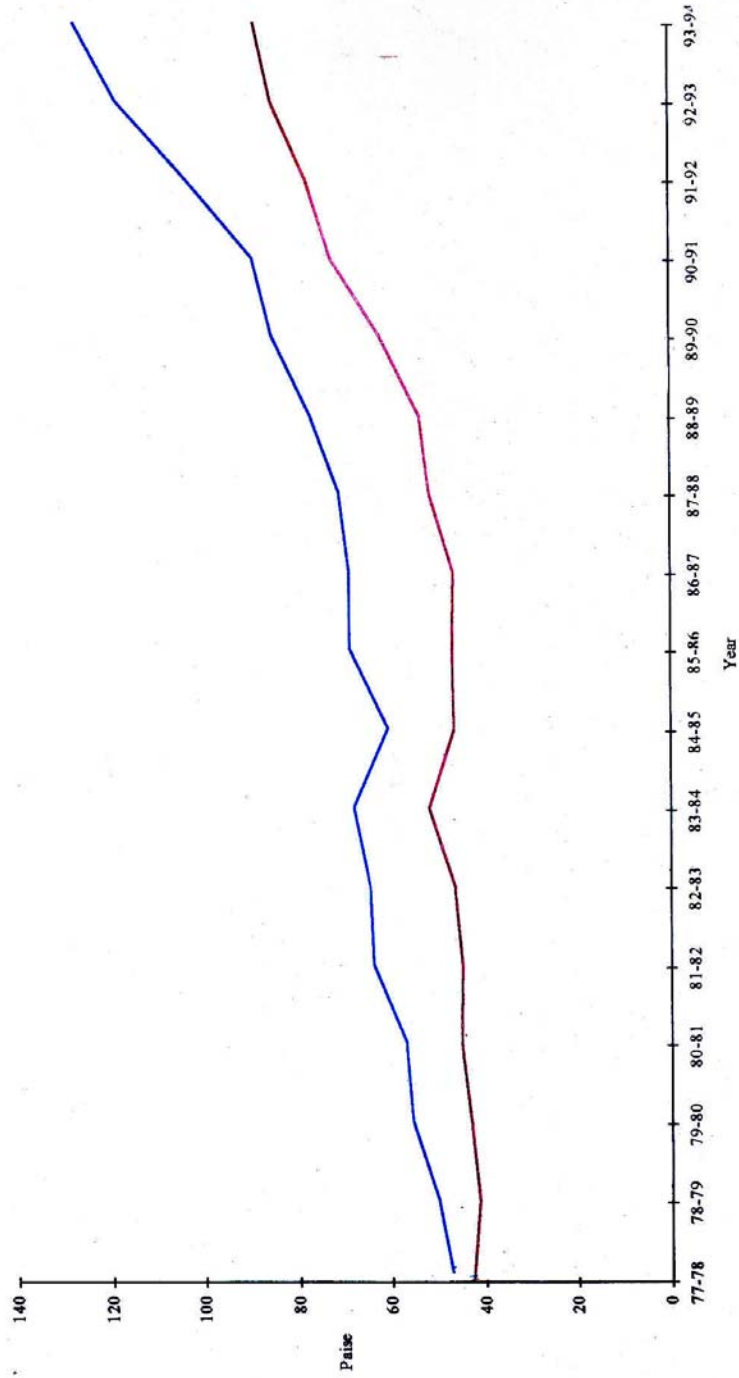
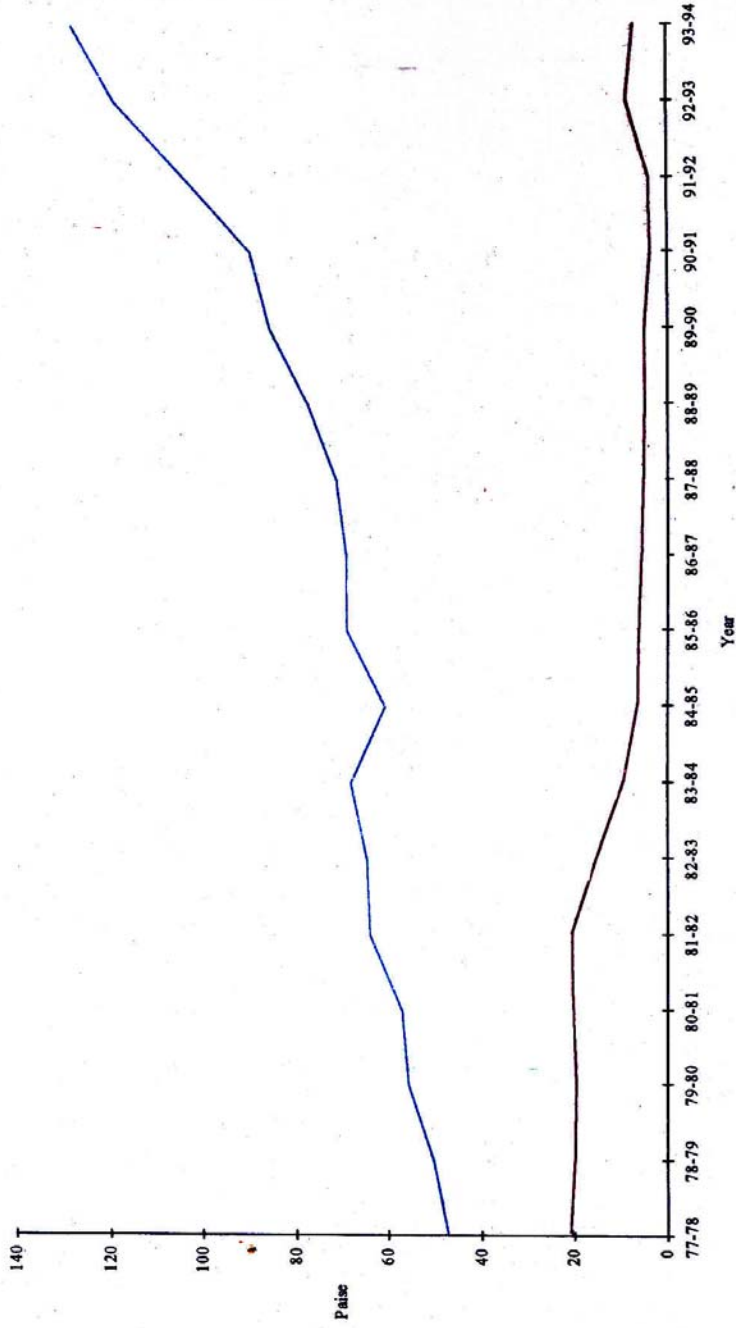


Fig. 8.5
CATEGORYWISE TARIFF(LT AGL)/KWH Vs. COST OF SUPPLY/KWH



- 8.1.06 Tariff for Agricultural consumption has undergone drastic change at different points of time. To begin with, it was metered supply and it was adjusted upwards from time to time even though at much lower rates of increase as compared to other categories.
- 8.1.07 Demand projections have been discussed in Chapter 3 in detail. Here, the rates of growth in the past have been touched upon to bring out the real impact of the 1993-94 tariffs on the revenues of the Board. The customer profile can be broadly divided into three categories as shown in Table 8.2.

Table 8.2

Category	Percentage of energy consumed
H.T. Consumers	33.53
Domestic Consumers	14.93
Agricultural Consumers	42.27

Others like commercial and street lighting consume less than 10 percent of the total energy. A study of the growth of three main categories has thrown up very interesting facts.

In the Chapter on Demand Projections it is noted that the period 1976-77 to 1993-94 falls into two distinct periods. There were no restrictions on demand and energy from 1978-79 to 1985-86. However thereafter every year there have been restrictions on consumption of power. The compound growth rate declined in the case of all categories except agriculture. In the case of Agriculture, however, there has been a steady growth. It is very significant that consumption of power by HT industry grew only by 2.5 per cent during the period 1985-86 to 1990-94 owing to imposition of restrictions as compared to a compound growth rate of 12% during the earlier period of no restrictions.

- 8.1.08 The adverse impact of subsidised tariffs on the finances of the Board and the magnitudes involved are brought out in the table placed in Table 8.3 and Table 8.4.

Table 8.3
1977-78

S. No.	Category	Consumption in MU	Cost of supply in Paise	Average realisation in paise	Surplus/Deficit Rs. Crs	Total Revenue Rs.Crs	Surplus/Deficit as a percentage of total revenue
1	H.T.	2160	22.89 (at 11 KV)	24.06	2.53	124.72	2.03
2	Domestic	361	47.72 (Avg. LT)	43.47	(1.53)	124.72	1.23
3	Agricultural	755	47.72 (Avg. LT)	20.59	(20.48)	124.72	16.42

Table 8.4
1993-94

S. No.	Category	Consumption in MU	Cost of supply in Paise	Average realisation in paise	Surplus/Deficit Rs. Crs	Total Revenue Rs.Crs	Surplus/Deficit as a percentage of total revenue
1	H.T.	7158	80.98	196.91	2303.83	2303.15	36.03
2	Domestic	3187	126.74 (Avg L.T.)	89.27	(120.34)	2303.15	5.23
3	Agricultural	9022	126.74 (Avg L.T.)	6.40	(1085.71)	2303.15	47.14

It will be seen from the above that there has been a tremendous change in the whole picture and today the very magnitude of the subsidies involved is so large that it can no more be managed without a more rational tariff structure.

- 8.1.09 The likely impact on industry on account of increase in rates for HT category to maintain the cross subsidy has been estimated by the Andhra Pradesh State Electricity Board. This is very important as it has a direct bearing on the growth of industries in the State. The average H.T. industrial rate in the State in 1993-94 is 205.42 paise/unit (the last revision was in December, 1992 only). This rate will have to go up by 35 per cent per unit if the agriculture rate of Rs.50/HP/year continues in order to achieve a ROR of 3 percent by the Board.

The graph in Fig. 8.6 shows the comparative position of H.T. industrial tariff for 14 States. It will be seen that there is not much scope for significant increase in H.T. rates in Andhra Pradesh. The graph in Fig. 8.7 shown comparative position of agriculture tariff in 14 States.

Fig. 8.6

Comparative Tariffs High Tension Industry

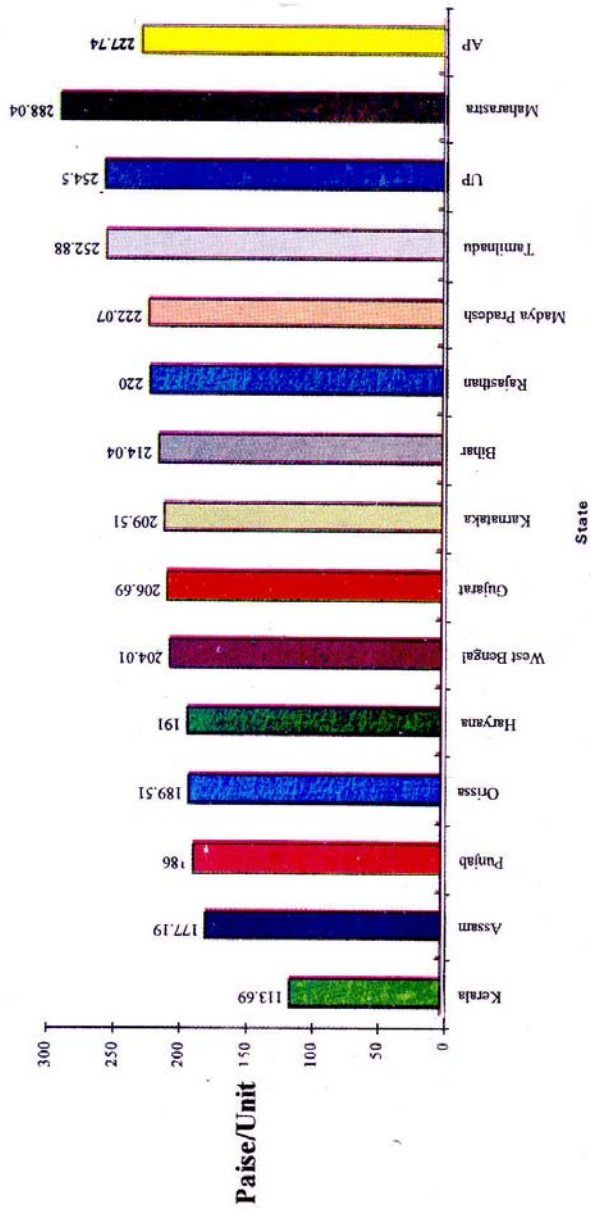
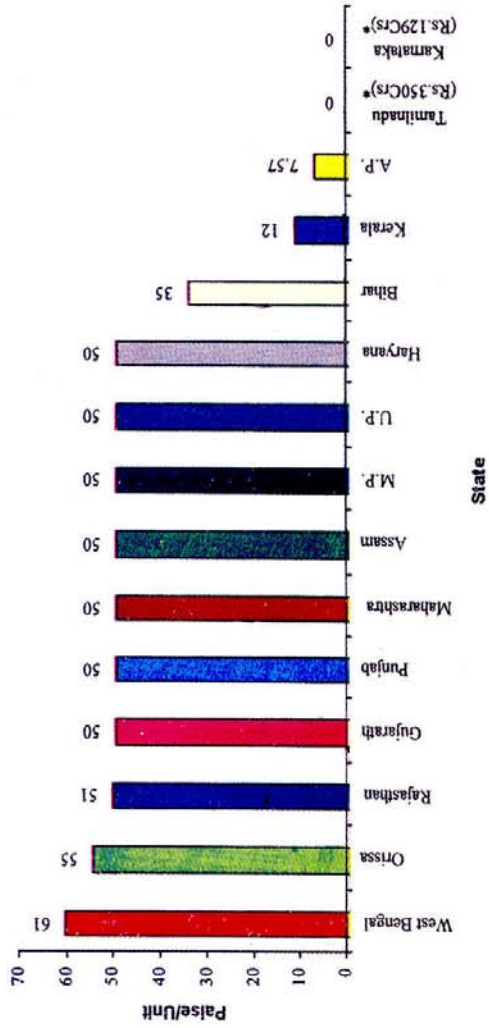


Fig. 8.7

COMPARATIVE AGRICULTURE TARIFF IN DIFFERENT STATES



West Bengal	Orissa	Rajasthan	Gujarath	Punjab	Maha-rashtra	Assam	M.P.	U.P.	Haryana	Bihar	Kerala	A.P.	Tamilnadu	Karnataka
61	55	51	50	50	50	50	50	50	50	35	12	7.57	0	0

Note: (*) indicates the subsidy from the State Governments. (Source: Planning Commission's "Annual Report on the Working of SEBs and Electricity Departments", Feb. 1994)

8.1.10 The discussion in the preceding paragraphs clearly brings out the inexorable logic of the situation. So long as H.T. industrial tariff is kept at reasonable levels to promote industrial growth in the State, the cross subsidisation by this category will not cover the losses to the SEB on account of the existing agricultural tariff and a direct subsidy from the State Government becomes inescapable. As mentioned earlier the rate of growth of industrial consumption (both H.T. and L.T) on an average has been only 2.5 percent from 1985-86 to 1993-94. Therefore, if the entire burden of subsidy is to be borne by the H.T. consumers as at present then not only will there be no growth but flight away from the State of existing H.T. consumers is a distinct possibility, even if unrestricted supply is available at a future date.

8.1.11 The analysis in the preceding paragraphs brings out the following:

- i. the period of cheap power is over with costs of new plants being considerably more than the existing ones
- ii. the limit for cross subsidisation by other categories particularly the H.T. consumers to compensate for the near free supply of power for agriculture has been reached. Any further burden on the H.T. consumers would be counter-productive as there would be a flight of potential H.T. consumers and some of the existing H.T. consumers
- iii. Periodic revision of tariff without fail every year is a must
- iv. Intervention by the State Government in fixing the tariffs has continually drained the resources position of the Board
- v. In the existing system, all increases in costs are a pass-through and there is no incentive for improving efficiency in the existing tariff mechanism.
- vi. It would not be possible to attract Private Sector and fresh capital may not be forthcoming unless tariffs are set by fully autonomous semi-judicial body.

8.1.12 The principal objective of the tariff policy shall be to promote the development of the sector to meet the growing needs of the economy. Availability of power in adequate quantity is a critical factor in the development of the State. The tariffs should also ensure increased efficiency based on norms of performance. Greater efficiency in the use of energy, has

also for the same reason, become a matter of great concern and one of considerable urgency. The tariff policy should support inflow of resources in to this sector for its development. At the same time, the tariff policy cannot be blind to the national and social objectives. eg. it cannot work at cross purposes with the national policy on protection of the environment or with the national policy to encourage foreign investment. Similarly, it should also subserve social objectives like supply of electricity in the rural areas for improving the quality of life in these remote areas. Nevertheless, too low a tariff will also lead to wasteful consumption.

- 8.1.13 Having traced the contours of the tariff policy to be followed by the State Government and the Regulatory Commission, the next issues for consideration are the guiding principles to be followed in the fixation of retail tariff. In fixing the retail tariff, the following elements should be taken into account.
- a. the cost of power and wheeling charges based on established norms.
 - b. the cost of supply by the licensee which will include staff costs, operation and maintenance charges, depreciation, interest charges and return on investment based on norms to be established.
 - c. Tariffs should be so fixed as to yield a reasonable return on investment
 - d. the tariff may also contain an element (es. a surcharge) to provide for technically desirable investments in long term development of the distribution system, as approved by the Regulatory Commission.
 - e. the tariff should send the right signals both to the licensee and to the consumer so as to promote efficiency in the provision of the services by the licensee and greater efficiency in the use of energy by the consumers.
- 8.1.14 Guidelines for the regulatory commission are listed below:
- a. Tariffs should be viewed as an instrument to foster the rapid and balanced development of the power sector and promote efficiency in the supply and consumption of power.
 - b. Interests of the consumers should be protected and costs of supply should be evaluated as far as possible in the light of norms and standards fixed by the regulatory commission.

- c. Tariffs should be so fixed as to yield a reasonable return on investment.
- d. Tariffs should enable reasonable amount of resources to be generated for future investment.
- e. the tariff should yield a reasonable surplus for investment in future in the development of the system. These amounts should not be allowed to be diverted for any other purpose.
- f. The tariff should be reviewed periodically or on request from the distribution companies.
- g. In the even of State Government desiring that certain categories of consumers should be supplied power at rates lower than the cost of supply fixed by the Commission, then it will be for the Commission to decide the manner in which the burden should be shared between the Government, the producers and distributors.

RESOURCE MOBILISATION

Mobilisation of additional resources for the power sector without touching the tariff structure is not an easy proposition.

After the proposed restructuring of the SEB and privatisation of generation as well as distribution, the sector that will be under the control of the SEB or the State Government and which would still require additional investment for the proper functioning of the power sector is the proposed Transmission Corporation. The investment requirements of this sector may not be much and would not be difficult to mobilise since its revenues would easily attract the additional investments as and when required.

With the magnitude of assets that will be with the proposed Generation and Transmission Corporation one of the options available for raising the capital is through the sale and lease back of these assets to the many profit making institutions wanting to take advantage of the depreciation allowed by the prevailing tax laws. Many of the SEBs are already using this route.

Partial disinvestment of equity shares after restructuring could also bring in some cash resources.

Distribution companies with the problem of balancing their budgets, have to find innovative methods of making the beneficiaries of power supply pay for the service without loud protests. This might be difficult but the following measures could be considered; which could enhance the realisation without disturbing the basic tariff structure:

1. Most of the industrial units have equipment which is not as efficient as it should be and the consumption of electrical energy per unit of production of the particular industry is very high compared to the standards obtaining elsewhere in the world. With the energy costs going up many times it is essential to see whether measures could be introduced by which the industry would opt for more energy efficient equipment over a period of time. To this end it is proposed that consumption norms for each unit of production of say, tonne of cement, steel, fertilizer, caustic soda, ferro-alloys etc. should be determined and any consumption over these set norms should be billed atleast 50% higher rate to force the industry to invest on energy efficient equipment and help the country and help itself. Penalties are more effective than incentives.

2. Domestic tariffs are heavily subsidised. Against the average cost of supply of 127 paise per unit the average realisation is hardly 89 paise involving a subsidy of about 38 paise per unit.

In the case of domestic consumers in the urban areas of the municipalities and the corporations, a tariff that is atleast 25% to 30% higher than the tariff applicable to domestic consumers in other areas is justifiable and this should be considered for introduction.

The developmental charges that were introduced for LT supply along with HT supply could be increased for connected loads of 3 KW and above in urban areas to begin with. These are presently Rs.450 per KW and could be increased to Rs.750 per KW.

With the proposed introduction of HT distribution instead of LT distribution the consumers per transformer who may not be more than three per transformer in urban areas, could be asked to share the cost of transformer. The urban area consumers in particular would be happy for the quality of service they can hope to get with HT distribution.

In rural areas too the farmers would be willing to bear the cost of a transformer as the cost of it is not significant compared to the service they can hope to get.

3. It is the agricultural sector which is getting the maximum subsidy. There is no discrimination between a small farmer or a big farmer or one pump or more pumps per farmer. Some discrimination appears necessary. It is the marginal farmer who needs the subsidy and not the others who could afford a much higher rate of say Rs.200 per HP instead of Rs.50 per HP per year. Just as the tax structure discriminates between various levels of income, there is need to bring about a discriminatory tariff between those who could afford and those who could not afford.
4. Even in the case of farmers who may be now paying only Rs. 50 per HP per year compared to Rs.75 or Rs.100 per HP per year they were paying earlier, the habit of saving to take care of the future could be encouraged by asking them to deposit atleast Rs.500 every year in a 5 year post office savings account. This will double in five years time and will come in handy for the farmer to take care of the needs of the family. Savings of this nature enable the State Government to draw up to 75% for its developmental activities. About Rs. 80 crs.of savings per year are involved.

5. Though the APSEB with its large hydel capacity could manage the demand to a considerable extent there is need to restrict the peaks to conserve on the energy losses that go up if the load curve is not flattened to the extent possible. Time of the day metering with penalties for use of the energy during the peak period need to be introduced to save on the losses and to bring additional revenue to the extent possible. Both HT and LT industrial consumers should be provided with this type of metering.
6. Irrespective of the power position and the seasons involved it is worthwhile to roster lift irrigation loads. Detailed schedules for each of the sub-stations should be worked out and published each month to keep the farming community informed of the hours of supply availability. Segregation of the feeders for the domestic supply and for lift irrigation in rural areas is a must. The savings in energy losses alone would be considerable. Energy saved is a contribution to the resources.
7. In some of the urban areas it is worthwhile introducing prepaid meters for the benefit of the consumers and of the SEB. Savings in meter reading, revenue collection before it is due, avoidance of wrong readings and wrong billing etc. would be the gain.
8. Urban area consumers may also have to be persuaded to give low interest bearing loans to the SEB on a long term basis.
9. Some of the other suggestions made are that the SEBs should through its Project wing take up consultancy work on behalf of the HT consumers in particular and any industrial establishments wanting guidance from the SEB.
10. The TV Cable operators can be allowed to run their coaxial cables with a bearer wire on the existing LT lines of the SEB on payment of about Rs.100 per pole.
11. Some of the equipment manufacturers could be permitted to supply, erect and maintain their equipment such as transformers, capacitor banks, switchgear and even some of the sub-transmission and distribution lines on an agreed basis for the charges involved, provided these do not exceed those that the SEB might incur if it were to undertake this work. By this means the consumers might be getting better service than otherwise possible.

CHAPTER - 9

REGULATORY COMMISSION

- 9.1.01 In Chapter 4, we have discussed the need for a regulatory commission in the new set up. In this chapter, we have considered the organisational set up of the regulatory commission, its powers, duties and responsibilities.
- 9.1.02 It would be pertinent to take note of the existing regulatory mechanism before taking up detailed consideration of the new regulatory system needed. The generation, transmission and distribution of power is regulated by the Indian Electricity Act, 1910 and The Electricity Supply Act, 1948 and the rules made thereunder. The Indian Electricity Act, 1910 broadly provides for the following.
- I a. The grant, revocation and amendment licences;
 - b. Purchase of an undertaking, vesting of the same and purchase price;
 - c. Restrictions on a licensee; and
 - d. General powers of the Govt. to vary the terms of the licence.
 - II a. Powers of the licensee to take up various works, compensation to be paid by the licensee in case of damage to a third party, and dispute resolution;
 - b. Point of supply energy, access to its equipment
 - III a. Obligation of the licensee to supply energy,
 - b. Powers of the State Government to give directions in regard to supply of power to any class of consumers;
 - c. Powers of the State Govt. to control the distribution and consumption of energy for maintaining the supply and securing equitable distribution of energy.
 - IV a. Licensee not to show any undue preference to a customer and not to interfere with the consumption of energy supplied;
 - b. Licensee to disconnect supply for non-payment of charge.
- 9.1.03 The Act of 1910 also provides for protection of the licensee and its employees for acts done in good faith, penalties for various criminal offences like theft of energy and for arbitration as a means of securing speedy resolution of disputes.

- 9.104 The Electricity Supply Act, 1948 brought into being the Central Electricity Authority and the State Electricity Boards. It established the S.E.Bs. as the principal agency for development of the power sector. Mostly, the provisions of the Electricity Supply Act, 1948 deal with the creation of CEA by the Central Government its powers and responsibilities at the Central level and at the State level with the constitution of the SEB by the State Government, its powers and responsibilities and the control to be exercised by the State Government. The State Governments have been empowered to give policy directions to the State Electricity Boards.
- 9.1.05 The Electricity Supply Act confers on the Central Electrical Authority (CEA) wide-ranging powers and duties. It has been made responsible for developing a sound adequate and uniform national power policy, collection of information data from Boards and licensees, make public such information, advise the State Government, Board, Generating Company or any other agency to operate and maintain the system owned by it, arbitrate in case of disputes, promote research and advise the Central Government, etc. More specifically Central Electrical Authority is responsible for approving schemes involving capital expenditure. Presently, all schemes with a capital expenditure of more than Rs.100 crores have to be referred to the CEA for approval.
- 9.1.06 The State Electricity Boards are competent to fix the tariff to be charged to each class of consumers (Section 59). This power of the State Electricity Boards has been consistently upheld by the Courts. SEBs have been used by the State Governments as a vehicle for implementing the State's welfare policies e.g. levying a highly subsidised tariff to the agriculture sector and certain class of domestic consumers. In the result, the State Governments and the SEBs have built in to the tariffs over a period of time a large element of cross subsidisation of the consumption of power by the agricultural sector and weaker sections by the HT consumers. The State Electricity Boards being public enterprises are accountable to the State Government and to the State Legislature through the State Government. Section 57 of the Electricity Supply Act, 1948 read with Schedule - VI provides in detail for regulating the tariff to be charged by a licensee.
- 9.1.07 The existing legislative framework essentially provides for regulation of a public sector monopoly. There are very few licensees in the country and in

Andhra Pradesh only one joint venture generation company and no private distribution. The critical question for consideration is whether the existing regulatory framework would be adequate in the new set up. This aspect is discussed in the ensuing paragraphs.

9.2.01 Section 57 provides that the provisions of Schedule - VI shall be deemed to be incorporated in the licence of every licensee (not being a local authority). Schedule - VI provides for the licensee to so adjust the charges for the sale of power so that in any accounting year, the clear profits do not exceed the amount of reasonable return. The licensee has to give due notice to the State Government and the SEB before enhancing the tariff. What constitutes a reasonable return has also been laid down. The State Government is competent to appoint a Rating Committee if the licensee fails to comply with any of the provisions of schedule -VI or requests for the same (Section 57 A). The implication in the above system is that the State Government and the SEB look after the consumer interest. There is no transparency in the transaction. The consumer has no forum to represent. Since the licensee earn no more than a reasonable rate of return as laid down, there is no incentive to increase operational efficiency. The charges to be levied can easily become a matter of negotiation with the State Government/SEB and be subject to political and other non-objective considerations. Since the ability to fix tariffs on sound economic and financial considerations (subject of course to regulatory overseeing and control) is fundamental to attracting much needed capital, clearly, the existing regulatory mechanisms are inadequate for dealing with the problems of the future set up in the power sector.

9.2.02 The Committee is of the view that a new regulatory framework should be established which shall -

- i. ensure that the consumers pay only a fair and reasonable price
- ii. enable the enterprises to earn an adequate profit not only to provide reasonable returns to the equity holders but also to enable it to attract the needed capital.
- iii. ensure that licensees comply with and function in accordance with the terms and conditions of their licence ; and
- iv. promote efficiency in supply and consumption of energy as also its conservation. Further the framework should provide for the

establishment of a regulatory commission which will function in a judicial and transparent manner which alone will inspire confidence in the consumer, the licensee and the potential investors.

9.2.03 The regulatory framework needed has been considered under the following five broad heads :

- the scope of the functions, duties, responsibilities of the regulatory commission;
- the constitution of the regulatory commission ;
- the powers of the regulatory commission to secure compliance with its orders and levy of penalties and powers to lay down of standards;
- the grievance redressal mechanism and resolution of disputes;
- the powers of the State Government to lay down policies.

9.2.04 The regulatory commission should be competent to fix the tariffs to be charged from each class or category of consumers. The purpose is to protect the consumers. This is essential as the distributor has a monopoly for supply of power in his area. Even if at a much later date, the bulk consumers get a choice of supply for the majority of consumers the distributor will be the sole agency for supply of power. Thus, there is an element of monopoly which unless regulated will lead to exploitation of the consumers. This provides the rationale for empowering an autonomous judicial body - the regulatory commission - to fix the tariffs to be charged from the consumers. Even if the rate to be charged for transmission and supply is agreed to between the generator on one hand and the transmitting agency and the distributor on the other hand, the regulatory commission shall in fixing the charges to be paid by the consumer allow or take into account only that part of the charges agreed to between the distributor and the generator or transmitter as are considered by it as reasonable and justified as per standards laid down by it.

9.2.05 The regulatory commission shall ensure that the terms and conditions of supply envisaged in the licence are strictly adhered to by the licensee. This is particularly relevant from the point of obligation of the licensee to supply power within a reasonable time as may be stipulated in the licence and the quality of supply shall conform to the standards laid down in the relevant legislations, the licence and other rules and regulations.

9.2.06 **Functions of the Commission :**

Subject to the provisions of this Act, the Commission shall exercise such functions and perform such duties and in such manner as the State Government may prescribe under this Act and in particular to, -

- i. promote efficiency and economy in the generation, transmission and distribution of electricity;
- ii. promote competition in the generation and supply of electricity;
- iii. enable the licensees to carry on their activities in accordance with the terms and conditions of their licence ;
- iv. collect and record information concerning generation, transmission and distribution and utilisation of electricity, and like matters ;
- v. carry out studies relating to cost of generation, transmission and distribution of electricity, efficiency and losses in the power system and utilisation of electricity and like matters ;
- vi. make public from time to time information secured under this Act and to provide for publication of the relevant information thus secured reports of studies and investigations ;
- vii. advise the State Government on any matter on which its advice is sought or make recommendation to the State Govt. on any matter, if in its opinion, the recommendation would help in the better generation, transmission and distribution of electricity,
- viii. discharge such other functions as may be entrusted to it by or under any other law.

9.2.07 In fixing retail tariffs, the Regulatory Commission shall have due regard to the following:

- a. the nature of the supply and the purposes for which it required.
- b. the need to promote the coordinated development of the supply and distribution of electricity within the State in the most efficient and economical manner;
- c. the simplification and standardisation of methods and rates of charges for such supplies,

- d. the need to protect the interests of the consumers while enabling the licenses to earn a reasonable profit;
- e. In approving the tariff proposals the Commission shall not show undue preference to any consumer;
- f. Tariffs should be viewed as an instrument to foster the rapid and balanced development of the power sector and promote efficiency in the supply and consumption of power;
- g. Tariffs should be so fixed as to yield a reasonable return on investment;
- h. Tariffs may also contain (eg. surcharge) to provide for technically desirable investments in the long term development of the distribution system as approved by the Regulatory Commission.
- i. Interests of the consumers should be protected and costs of supply should be evaluated as far as possible in the light of norms and standards fixed by the Regulatory Commission.
- j. Tariffs should be reviewed periodically or on request from distribution companies;
- k. In the event of the State Government desiring that certain categories of consumers should be supplied power at rates lower than the cost of supply fixed by the Commission, then it will be for the Commission to decide the manner in which the burden should be shared between the Government, the producers and the distributors.

9.2.08

Obviously, the licensee will have to adjust his charges from time to time be able to earn a reasonable return on his investments. The Commission will have to fix the tariffs in such a manner as to enable the licensee to earn a reasonable return on the investments made and be able to attract additional resources. Further, in order to encourage the licensee to take steps to improve the efficiency of the distributing system, he will have to be allowed to retain part of the additional revenues accruing from efficiency improvements and at the same time, the consumers will also have to be allowed to share the benefits as the entire rationale for restructuring is founded on the thesis that competition and regulation would lead to greater efficiency and in turn to cost reductions. In considering and allowing enhancement in charges, the Commission will have to not only give relief to the licensee but also ensure that claims in regard to additional costs are not

unreasonable and unwarranted. In dealing with charges to be paid by the consumers and the return to be allowed, the regulatory commission will have to ensure that the licensee is exercising due diligence, and running the system efficiently. Over a period of time, the regulatory commission acting in a consistent judicial and transparent manner, will be able to ensure a degree of predictability as to the charges to be paid by the consumers and the returns which the distributors and investors can hope to earn.

9.2.09 The next set of issues which arise for consideration relate to the powers and functions of the regulator vis-a-vis generators and transmission agency. Having regard to the fact that one of the basic responsibilities of the regulatory commission is to promote efficiency and cost effectiveness, clearly, the regulatory commission would have to play an active role in determining the charges to be paid for power generated and for wheeling the power to the distributor. One view is that the regulating agency should be responsible for grant of licences, their amendment and revocation. Another view is that the State Government should continue to exercise this power. The Committee has carefully considered the two alternatives and is of the view that the State Government should continue to exercise the power to grant licences as it is essentially an administrative function. However, to ensure that licences once granted are not arbitrarily amended or revoked the Committee is of the view that while the State Government will continue to exercise the power grant licences, their amendment or revocation shall be exclusively based on the recommendations of the regulatory commission in this regard. This will ensure that the power to revoke or amend is not exercised in an arbitrary manner.

9.2.10 The Committee has stressed repeatedly that privatisation will yield substantial benefits only if competition is encouraged. One of the important functions of the Regulatory Commission is to ensure that distributors and generators (including potential generators) are able to have access to the transmission system. The agency incharge of transmission will have two important functions - Firstly, provide access to the system to all generators and distributors, and secondly, enforce grid discipline on the generators and distributors. In a sense, he is a neutral player but an active one.

9.3.01 The regulatory Commission will not be able to discharge the responsibilities cast upon it or perform the duties enumerated above unless it is clothed with adequate powers and enabled to function in an independent and autonomous

manner. It is necessary, therefore, to create the environment necessary which would be conducive for it to so function and remove impediments which may constrain its independent functioning.

- 9.3.02 The Committee has considered in detail the composition of the regulatory commission. A regulatory commission cannot be too small as it would not have the necessary expertise and experience and at the same time, it cannot be too large to make decision making difficult. Since the jurisdiction is restricted to a Andhra Pradesh, a four member commission with members chosen from judicial, technical, finance and disciplines and another member who is an economist with knowledge of industry should be adequate. To ensure that persons with adequate experience alone are selected certain criteria should be laid down, e.g. a judicial member should be a judge of the rank of a Judge of High Court, a technical member should be one who is of the rank of a member of CEA/SEB, a finance member should be one with experience of having worked as a Finance Director of a large Central Public Enterprise, Member Commercial of CEA/Director in Large Public Sector Financial Institutions. The member with economics back ground should be one who has wide experience in regard to matters economic preferably dealing with infrastructural matters and industry and should be of the rank of a professor in a reputed university or equivalent. The Chairman of the Commission shall be the judicial member.
- 9.3.03 To ensure a measure of independence, it is axiomatic to prescribe a specific term of office. The Committee is of the view that a term should be of 3 years with a maximum of two tenures. Suitable restrictive provisions will have to be incorporated in regard to removal of a member to protect them from undue pressures.
- 9.3.04 The regulatory commission will have to be clothed with adequate powers to call witnesses, obtain documents and if need be, inspect any premises. As the regulatory commission starts functioning, it will be able to build up a reputation for fairness, diligence and firmness only if it conducts its business openly ensuring total transparency. It shall be able to summon all witnesses needed, get the documents required, obtain expert assessment, if need be and follow through its decisions to ensure they are implemented urgently.
- 9.3.05 Another important matter which is critical for the impartial functioning of the regulatory Commission is its financial independence. It cannot be dependent

either on the Government or on the licensees indulgence to get the funds needed. It will be necessary to enable the regulatory Commission to levy a small charge on the licensees. In order to make sure that the licensees comply with the levy, this levy will be deemed to be a part of terms and conditions of the licence.

9.3.06 The Andhra Pradesh State Electricity Board has over 80 lakh consumers. The H.T. consumers are only around 3300. Thus, establishment of adequate mechanism for redressal of grievances and speedy resolution of disputes is of utmost importance. These lakhs of consumers are located through out the length and breadth of the State and it is, therefore, necessary that redressal mechanisms which can give them relief are established as close to their place of residence as possible. Of the L.T. consumers relate to faulty meter readings, non-receipt of bills, payments already made not properly accounted and the like. These grievances can be speedily redressed, if an adequate mechanism is established which will bring the consumer and the licensee together and effect reconciliation. The committee is of the view that consumer grievance redressal cells should be formed consisting of a representative of the licensee and one representative of the consumer. Such a cell shall be constituted by the regulatory commission at the rate of one cell per ten thousand consumers. The consumer grievance redressal cell will not take up for adjudication any matter where the amount in dispute exceeds Rs.5,000/-.

9.3.07 It may happen that in a few cases either the consumer or the licensee is not happy with the decision of the cell and want to take the matter up for resolution by a higher level body. Disputes which involve larger sums of money may also come up for resolution. The committee recommends that a consumer grievance redressal forum be established at the district level. This body will be the first level arbitration mechanism and will take up matters brought up by a licensee or consumer in appeal from the cells. It will also act as an arbitrator in case of disputes involving an amount not exceeding Rs.50,000/-. This forum shall be constituted by the regulatory commission and function under its guidance. This adjudication forum shall have two members - one an electrical engineer with wide experience in the functioning of utilities and the other a person with experience in financial matters preferably with knowledge of legal matters. The regulatory commission itself shall take up matters in appeal from the redressal forum and disputes

involving amounts more than Rs.50,000/-. It shall also act as an arbitrator in case of disputes between licensees.

- 9.4.01 The regulatory commission should be able to secure compliance with its directions. This is extremely important, if the regulatory commission is to function effectively. The committee recommends that the regulatory commission shall be empowered to levy a fine which may extend up to Rupees five lakhs and for continuing default, a fine of Rupees ten thousand per day. Further, in extreme cases of continued default, the commission shall be competent to recommend revocation of the licence.
- 9.5.01 One of the important duties of the regulatory commission is to ensure that the licensee functions in accordance with the existing legislations, the terms and conditions of the licence and other rules laid down in this regard. To protect the interests of the consumers, the committee recommends that the Regulatory Commission shall be empowered to lay down over all standards of performance as also standards of performance in regard to supply to individual consumers.
- 9.6.01 Financial autonomy is essential for the regulatory commission to withstand pressures. The Committee recommends that for the first year of its operation, the State Government provide a suitable subvention. For meeting its expenditure subsequently, the regulatory commission shall be empowered to levy a charge on the licensees (generators, transmission agency and the distributors) to raise the funds needed and in order to secure compliance the levy shall be deemed to a condition of the licence.
- 9.7.01 The State Government will always be responsible for the development of power sector, while the Regulatory Commission is charged expressly with the responsibility of fixing retail tariffs. It is necessary that the State Government has the powers to lay down broad policies and principles for the guidance of the Commission.
- 9.8.01 A draft legislation for establishing the regulatory framework has been got ready by the committee and is placed at Annexure 9.1 to enable the State Government to take immediate action in this regard.

THE ANDHRA PRADESH ELECTRICITY REGULATION BILL, 1995

BILL NO. 1995

A Bill to provide for the better regulation and balanced development of generation, transmission and distribution of electricity, for promoting efficiency in electrical development and for protecting the interests of the licensees and consumers and for that purpose to make provision for the constitution of Electricity Regulation Commission and for all matters incidental thereto.

CHAPTER - I

1. Short title extent and commencement :

- (1) This Bill may be called **The Andhra Pradesh Electricity Regulation Bill, 1995.**
- (2) It extends to the whole of Andhra Pradesh.
- (3) It shall come into force on such date, as the State Government may notify in the official Gazette.

2. **Definitions :**

In this Bill unless there is anything repugnant in the subject or context, -

- (1) "**Commission**" means the Andhra Pradesh State Electricity Regulation Commission constituted under Clause 3;
- (2) The expressions used but not defined in this Bill shall have same meaning as assigned to in the Indian Electricity Act, 1910, The Electricity (Supply) Act, 1948 and the rules made thereunder.

CHAPTER - II

3. **Constitution of the Andhra Pradesh State Electricity Regulation Commission**
The State Government shall constitute a body called the Andhra Pradesh State Electricity Regulation Commission.

4. Functions of the Commission :

Subject to the provisions of this Act, the Commission shall exercise such functions and perform such duties and in such manner as the State Government may prescribe under this Act and in particular to, -

- i. promote efficiency and economy in the generation, transmission and distribution of electricity;
- ii. promote competition in the generation and supply of electricity;
- iii. enable the licensees to carry on their activities in accordance with the terms and conditions of their licence ;
- iv. collect and record information concerning generation, transmission and distribution and utilisation of electricity, and like matters ;
- v. carry out studies relating to cost of generation, transmission and distribution of electricity, efficiency and losses in the power system and utilisation of electricity and like matters ;
- vi. make public from time to time information secured under this Act and to provide for publication of the relevant information thus secured reports of studies and investigations ;
- vii. advise the State Government on any matter on which its advice is sought or make recommendation to the State Govt. on any matter, if in its opinion, the recommendation would help in the better generation, transmission and distribution of electricity;
- viii. discharge such other functions as may be entrusted to it by or under any other law.

5. Approval of tariffs for sale of power to the consumers:

- (1) The Licensee shall submit to the Commission for review of every proposal to amend the existing tariffs or to set a new tariff for the sale of electricity to any consumer in his jurisdiction. Every such proposal shall be supported by such information, documents and statements as may be prescribed by the Commission in this regard.
- (2) The Commission shall review and approve the tariff proposals of the licensee with such modifications as may be deemed necessary after

affording reasonable opportunity to all parties likely to be affected by the proposed tariffs.

- (3) The Tariffs notified by the Andhra Pradesh State Electricity Board and in force before to the constitution of the Commission shall continue to be in force until they are amended by the Commission, under sub clause (1) of this clause.
- (4) In reviewing the proposals submitted by the licensee under this clause, the Commission shall have due regard to any or all of the following factors, namely :-
 - (a) the nature of the supply and the purposes for which it required;
 - (b) the need to promote the coordinated development of the supply and distribution of electricity within the State in the most efficient and economical manner ;
 - (c) the simplification and standardisation of methods and rates of charges for such supplies ;
 - (d) the need to protect the interests of the consumers while enabling the licenses to earn a reasonable profit;
 - (e) In approving the tariff proposals the Commission shall not show undue preference to any consumer ;
 - (f) In approving the tariff, the Commission shall have due regard to the following guidelines
 1. Tariffs should be viewed as an instrument to foster the rapid and balanced development of the power sector and promote efficiency in the supply and consumption of power.
 2. Tariffs should be so fixed as to yield a reasonable return on investment.
 3. Tariffs may also contain an element (eg, surcharge) to provide for technically desirable investments in the long term development of the distribution system as approved by the Regulatory Commission.
 4. Interests of the consumers should be protected and costs of supply should be evaluated as far as possible in the light of norms and standards fixed by the regulatory commission.

5. The tariff should be reviewed periodically or on request from the distribution companies or from any category of consumers.
6. In the event of State Government desiring that certain categories of consumers should be supplied power at rates lower than the cost of supply fixed by the Commission, then it will be for the Commission to decide the manner in which the burden should be shared between the Government, the producers and distributors.
- (5) Notwithstanding anything contained in the agreements in regard to charges for sale of electricity generated or in regard to charges for wheeling of electricity to the distributor, the Commission may fix norms and standard costs to be taken into account for the purposes of review of the charges proposed to be levied, for sale of electricity, on any consumer.
- (6) The Commission shall complete its review and announce the approved tariffs within 60 days of the receipt of the proposals from the licensee along with the prescribed information with documents and statements.
- (7) The tariffs for sale of electricity to the consumer as finally approved by the Commission shall be published by it for general information.

6. **Enforcement of the terms and conditions of the licence :**

The Commission shall ensure that every licensee complies with all and every term and condition incorporated in the licence and shall function in a transparent manner.

7. **Quality of supply, continuity and reliability :** The Commission shall ensure that the electricity supplied by the licensee conforms to the standards prescribed under the laws governing the supply of electricity and other appropriate authorities in regard to quality of supply, continuity and reliability.

CHAPTER - III

8. **Composition of the Commission :**

The Commission shall consist of -

- (a) One member who is or has been a Judge of a High Court who shall be its Chairman;

- (b) One member who is an economist of repute with knowledge of the industry and should be of the rank of Professor of a reputed University or equivalent.
- (c) One member shall be an electrical Engineer with wide experience and of the rank of a Member CEA/Chairman, SEB;
- (d) One member shall be a person with wide experience in financial matters in the rank of Principal Secretary to the State Govt./Member (Commercial) CEA/Director (Finance) in a large Public Sector Financial Institution.

9. **Terms and conditions of appointment :**

- (i) The Chairman and members of the Commission shall be full time members of the Commission and shall be appointed for a period of three years. No member shall be appointed for more than two terms.
- (ii) Subject to the provisions of this Act, their salaries, allowances and other terms and conditions of appointment shall be such as may be prescribed by the State Government.

10. **Disqualification for being a member :**

A person shall be disqualified from being appointed or being a member of the Commission, if he is a Member of Parliament or the State Legislature or any local authority. Having been appointed, if a member becomes a Member of Parliament or the State Legislature or any local authority, he shall cease to be a member of the Commission forthwith.

11. **Saving of actions of the Commission :** No act done by the Commission shall be called in question on the ground only of the existence of any vacancy in or any procedural defect in the Constitution of the Commission.

12. **Members not to hold interest in certain concerns :** A member of the Commission shall, prior to his appointment give to the State Government intimation of, and shall, before taking charge of his office, sell or divest himself of, any interest which he may have for his own benefit whether in his own name or otherwise, in any firm or company carrying on the business of supplying electricity.

13. **Removal of Members -**

- (1) The State Govt. may remove from office any member of the Commission who, -
 - (a) is found to be a lunatic or becomes of unsound mind ; or
 - (b) is adjudged insolvent ; or
 - (c) fails to comply with the provisions of Clause 12 ; or
 - (d) is convicted of an offence involving moral turpitude.
- (2) No order of removal shall be made under this Clause unless the member concerned has been given an opportunity to submit his explanation to the State Government, and when such order is passed, the seat of the member removed shall become vacant.
- (3) ~~A member who has been removed shall not be eligible for re-appointment as member or in any other capacity to the Commission.~~
- (4) The State Government shall appoint another member to fill the vacancy caused by the resignation or removal of a member in the manner prescribed in Clause 8 ante.

14. Temporary absence of members If the Chairman or any other member of the Commission is by infirmity or otherwise rendered temporarily incapable of carrying out his duties or is absent on leave or otherwise in circumstances not involving the vacation of his appointment, the State Government may appoint another person to officiate for him and carry out his functions under this Act or any rule or regulation made thereunder.

15. **Authentication of orders and other instruments of the Commission -**

All orders and decisions of the Commission shall be authenticated by the signature of the Chairman or the Secretary appointed by the Commission.

16. **Appointment of Secretary to the Commission and other Staff :-**

- (i) The Commission may appoint a Secretary and such other staff as may be required to enable the Commission to carry out its functions under this Bill efficiently.
- (ii) The Secretary to the Commission shall be a person with wide administrative experience in the rank of Secretary to the State

Government and shall be appointed with the concurrence of the State Government.

17. **Proceedings of the Commission**

- (1) The Commission shall carry out its business in a transparent and open manner and frame its own regulations and procedures for the conduct of its business to discharge its duties under this Bill efficiently.
- (2) The Commission shall meet at least once in a month. Any member of the Commission may call upon the Chairman to convene a meeting of the Commission to consider urgent business. On receipt of such request, the Chairman shall convene such meeting forthwith.
- (3) The Commission shall take decisions by majority vote. Each member will have one vote and the Chairman shall have no casting vote.
- (4) The number of members necessary to constitute a quorum at a meeting of the Commission shall be three for the transaction of its business.
- (5) The Commission may constitute special cells to carry out specific investigations and studies. The Commission may hire the services of reputed experts or institutions to assist the Commission or the special cells constituted by it for carrying out investigations and studies. The Commission may lay down suitable procedures for the efficient functioning of the special cells and also to ensure that such special cells function in a transparent manner and all interested parties affected or likely to be affected by the decisions of the Commission have sufficient, opportunity to interact with the special cells in regard to the specific matters under investigation or study by the Special Cells.

18. **Powers of the Commission to gather evidence -**

The Commission shall have the powers of a Civil Court for the purposes of enforcing the attendance of witnesses, compelling the production of documents, administering oaths and reviewing evidence.

19. **Powers of the Commission to obtain information :**

The Commission shall have the powers to obtain all necessary material by way of technical, financial reports, accounts and other data from all licensees within the State and all others generating power within the State for own consumption and for sale to other consumers or licensees.

20. **Location of the Commission :**

The headquarters of the Commission shall be at Hyderabad, but the Commission may conduct its proceedings at any other place within Andhra Pradesh. The Commission shall be entitled to visit, inspect any electrical installation, for generation, transmission and distribution of electricity for the efficient discharge of its duties under this Bill

21. **Public Servants :**

All members, and the staff of the Commission shall be deemed, when acting or purporting to act in pursuance of any of the provisions of this Bill to be public servants within the meaning of Section 21 of the Indian Penal Code, 1860 (XIV of 1860)

22. **Protection to persons acting under this Bill :**

No suit, prosecution or other legal proceedings shall lie against any member or staff of the Commission for anything which in good faith done or intended to be done under this Bill.

23. **Appeals :**

Notwithstanding anything contained in any other law, the jurisdiction of all the subordinate courts is excluded with respect to any matter which is by or under this Bill required to be decided or dealt with by the Commission and an appeal from the orders of the Commission shall lie only to the Andhra Pradesh High Court.

24. **Finances of the Commission -**

- (1) The Commission may require a licensee to pay an annual fee to the Commission which shall be calculated so as (together with fees levied on all other licensees) to cover the estimated expenses of the Commission. The requirement to pay an annual fee as directed by the Commission shall be deemed to be incorporated in the licence of every licensee.
- (2) The State Government shall make a subvention to the Commission in respect of its expenses in the first year to enable it to discharge efficiently its duties under this Bill.

25. **Compliance**

- (1) Having regard to the gravity of the offence committed by the licensee, the Commission shall have the powers to impose suitable fine on the licensee which may extend upto Rs. five lakhs and for continuing default the fine shall be Rs.10,000 per day for non- compliance with the orders of the Commission.
- (2) The Commission may recommend in cases where the licensee does not comply with the orders of the Commission notwithstanding the imposition of fine under sub clause (1) to the State Government the revocation of the licence of the licensee.

26. **General Powers and duties of the State Government :**

The State Government shall have the power to issue directions in regard to matters of policy for the better regulation and balanced development of generation, transmission and distribution and for promoting efficiency in electrical development separately. Provided that no such direction shall adversely affect or interfere with or in any manner constrain the Commission from effectively discharging its duties or carrying out its functions or in exercising all or any of the powers conferred on it under this Bill.

27. **Electricity Supply - Performance standards :**

- (i) The Commission may determine such standards of overall performance in connection with the provision of electricity supply services and in connection with the promotion of the efficient use of electricity by consumers as, in its opinion, is economic and ought to be achieved by such licensees.
- (ii) The Commission may prescribe such standards of performance in connection with the provision of electricity supply services to consumers by the licensees as, in its opinion, ought to be achieved in individual cases.

28. **Consumer Grievance Redressal Cells:**

- (1) The Commission shall constitute consumer grievance redressal cells as may be found necessary for the quick and effective redressal of the grievances of the consumers.

- (2) Every consumer grievance redressal cell shall consist of one representative of the licensee and one representative of the consumers.
- (3) The Commission shall lay down the rules and procedures for the guidance of these cells and supervise their functioning to ensure that these cells provide quick and effective redressal of the grievances of the consumers.
- (4) In the event of a difference of opinion between the two members of the consumer grievance redressal cell, it shall be referred to the consumer grievance redressal forum for adjudication.
- (5) The licensee or the consumer may appeal to the consumer grievance redressal forum from the findings of the consumer grievance redressal cell.
- (6) The consumer grievance redressal cell will not take up for adjudication any matter where the amount in dispute exceeds Rs.5,000/-.

29.

Consumer Grievance Redressal Forum :

- (1) The Commission shall constitute one Consumer Grievance Redressal Forum for each licensee's area to provide a speedy and effective mechanism for adjudication of disputes.
- (2) The consumer grievance adjudication forum shall have two members. One member shall be an electrical engineer with experience in the functioning of utilities. The other member shall be a person who has experience in financial matters preferably with knowledge of legal matters. The Commission shall with the approval of the State Government, prescribe the qualifications, experience, salaries, allowances and the terms and conditions governing their appointment.
- (3) The Commission shall prescribe the regulations and procedures for the functioning of the consumer grievance redressal forum and supervise its functioning.
- (4) An appeal shall lie to the Commission from the proceedings of the consumer grievance redressal forum.
- (5) The consumer grievance redressal forum will not take up any dispute where the value of the amount in dispute exceeds Rs.50,000/-.

30.

Arbitration :

- (1) The Commission shall act as an arbitrator in cases of dispute between a consumer and the licensee where the amount in dispute exceeds Rs.50,000/- and in all cases of disputes between licensees.

31.

Access to the transmission system :

- (1) For purposes of promoting competition among generators and distributors, the Commission shall ensure access to each of them through the transmission system. In case of dispute on account of refusal of access by the agency in charge of transmission or the quantum of wheeling charges proposed to be levied by the transmission agency or other terms and conditions set by the transmission agency for wheeling of electricity through the transmission system, the generator and/or distributor concerned may submit the subject matter of dispute to the Commission for arbitration.
- (2) The Commission shall have the powers to arbitrate in case of any dispute referred to in sub clause (1) between the agency in charge of the transmission system and the generator and the distributor.

32.

Application of the Indian Arbitration Act :

The provisions of the Indian Arbitration Act, 1940 shall apply to the adjudication proceedings of the consumer grievance redressal forum under clause 29 and the proceedings of the Commission under clauses 30 and 31.

33.

Power of the State Government to lay down policies:

In the discharge of its functions, the Regulatory Commission shall be guided by the policies and principles laid down by the State Government in this regard.

CHAPTER - 10

CONCLUSIONS

Demand and Supply:

- 10.1.01 Projections of likely demand and available supply show that during the period 1995-2002, there would be a shortfall which may go up to 2000 MW or even more. This deficit can be made up partly by expediting the projects under construction by APSEB, those entrusted to private generators and NTPC. Large consumers may also be permitted to take up captive generation plants. Plant availability and Plant Load Factor of existing generating stations should be improved. Earnest attempts should also be made to reduce system losses.
- 10.1.02 If the private sector generation projects, for which APSEB has already entered into Power Purchase Agreements (PPAs), and the projects entrusted to NTPC are commissioned as planned, and measures as outlined in para 10.1.01 are implemented effectively, the demand for power should be more or less satisfactorily met during the later part of 9th Plan i.e., during the period 1999- 2002.
- 10.1.03 However, the efforts to bridge the immediate /short term gap to the above measures may not be adequate and since, there may be delays in completion of projects on hand by the private generators, APSEB may purchase power from private generators to fill the gap. Proposals for such generating stations should be evaluated on the basis of unit cost of electricity supply and the period in which the project will be commissioned. Suitable penalties should be built into the agreements to ensure completion within the agreed time frame.
- 10.1.04 In the 10th Plan period i.e., 2002-2007, additional capacity of at least 5000 MW would be required. By this time, a competitive environment would have been established and the private generators would enter into agreements for sale of power directly with each of the Zonal Distribution Companies (ZDCs). The private generating companies will be treated like any other industry. There would be no power purchase by any Public Sector utility like APSEB (residuary body) or AP Power Corporation. There would be no guarantees by the State Government. APSEB (residuary body) would act as a facilitator to enable the parties to quickly conclude Power Purchase Agreement so that the whole system functions smoothly. The arrangements

between the generator and the distributing companies should be subject to overseeing by the Regulatory Commission in terms of the regulatory framework to protect the interests of the consumers.

- 10.1.05 AP Power Corporation may also put up new generating plants using its own resources and by borrowing from the capital market. No budgetary resources need be made available. Such a step would be useful as AP Power Corporation would develop as an alternative to private generation and provide needed competition. It would also enter into direct agreements with the distribution companies, like other generators, for sale of this power.

Restructuring of APSEB:

- 10.2.01 APSEB should be restructured on a functional basis to promote efficiency and functional specialisation by constituting the following companies which would be wholly owned subsidiaries of APSEB
- a) AP Power Corporation (APPC)
 - b) AP Transmission Corporation (APTC) and
 - c) Zonal Distribution Companies (ZDCs).
- 10.2.02 The functions of the new entities shall be as shown below :

Entity	Functions
a) AP Power Corporation	<ul style="list-style-type: none">i. Generation of power from all existing generating stations and those under construction by APSEBii. Purchases of power from Central Sector generators and the joint venture generating companies (APGPCL)iii. Purchases of power from those private generators with which APSEB has already entered into Power Purchase Agreements.iv. Purchase of power from other States.v. All major hydro stations that may come up in future.

- b) AP Transmission Corp.
 - i. Management of the entire Transmission System - 132 KV and above including interstate lines.
 - ii. Expansion and upgradation of the existing transmission system.
 - iii. Load Despatch.
- c) Zonal Distribution Companies
 - i. Sale of power to the consumer.
 - ii. Management of the existing distribution system below 132 KV including 132 KV substations.
 - iii. Expansion and upgradation of the existing distribution system.
 - iv. Extension of supply to new consumers.

10.2.03 AP Power Corporation should function as a commercial enterprises. The sale price of energy should be so fixed as to enable it to meet its costs of operation, yield a reasonable return on the investment and service the debt.

10.2.04 AP Transmission Corporation should remain a public sector corporation to ensure that it provides adequate access to generators and distributors functioning in an objective and transparent manner. Further, it is responsible for load dispatch also. It should function as a commercial enterprise.

AP Transmission Corporation should work in close co-ordination with the Power Grid Corporation Limited and formal institutional arrangements should be made to achieve the same. The possibility of joint venture arrangement with the Power Grid Corporation Limited should also be explored.

10.2.05 APSEB, the residual statutory body, would be a holding company and perform a number of important functions. It would assist the State Government in the implementation of the restructuring and privatisation. It would coordinate the functioning of all the new entities in the power sector to ensure a smooth functioning of the power system. It would also approve schemes proposed by distribution companies costing above Rs. 5 crores and below Rs. 100 crores.

10.2.06 Restructuring of APSEB should be done immediately through suitable legislation. The new entities should be established simultaneously.

10.2.07 A regulatory framework would be necessary to ensure smooth working of the new system. A Regulatory Commission should be set-up to fix retail tariffs and to protect the interests of the distributing licensees as well as the consumers.

10.2.08 The new regulatory framework should be established through legislation urgently and in any case, before induction of private sector into distribution.

Restructuring and Privatisation of Distribution:

10.3.01 The distribution system should be restructured into five zones and each zone placed incharge of a Zonal Distributing Company (ZDC) initially as a subsidiary of APSEB and to be privatised gradually.

10.3.02 In view of the complexities involved and the imperative need to ensure better availability and quality of power supply, it would be advantageous to induct private parties into the Zonal Distribution Companies in a phased manner. Induction of the private parties into any ZDC should be done only on the basis of competition through a bidding process described in Chapter 7. Private parties with necessary experience and financial standing should be asked initially to take over the distribution system on a contract management basis with necessary safeguards. The period of contract management should be limited to a maximum of two years.

10.3.03 In the alternative, private parties with necessary experience and financial standing may be permitted to take over the operation of the new distribution companies on a lease or hire basis with adequate safeguards for a short period of not more than 2 to 3 years.

10.3.04 In case the State Government feel that there would be inadequate or no response, if they were to go in for a bid, the private generators with whom power purchase agreements have been already signed by APSEB may be asked to take up distribution for a zone. Even here an element of competition should be built into the process of selection and allocation to safeguard the interests of the State Government. The private generator shall in no case be allowed to choose a distribution zone or a part thereof.

Tariff Policy :

- 10.4.01 Tariffs should be so set as to yield a reasonable return to investors. At the same time, the interests of the consumers should be protected.
- 10.4.02 The existing policy of practically free supply to the agricultural sector and partially subsidized supply to the domestic sector and covering the losses through higher tariffs on the HT consumers has prevented the APSEB from generating any surplus for investment. It has made the APSEB heavily dependent on the capital market for meeting its capital needs and reduced its creditworthiness.

Regulatory Commission:

- 10.5.01 The Regulatory Commission should be a statutory body autonomous and judicial - with powers to call for documents, examine witnesses and secure compliance of its directions and orders. It will have powers to raise funds to defray its expenditure. It will also have power to organise research studies in regard to specific issues.

Implementation :

- 10.6.01 It is important that the restructuring and induction of the private sector takes place in a smooth manner without disruption of the existing system. An Implementation Committee should be set-up and task forces organised under its supervision to draw up details of the capital structures, Articles and Memoranda of Association, etc., of the proposed wholly owned subsidiaries of the APSEB viz.,
- i) A P Power Corporation,
 - ii) A P Transmission Corporation,
 - iii) Five Zonal Distribution Companies

Action by the State Government:

- 10.7.01 The State Government should
- i. enter into dialogue with the APSEB employees and their unions and convince them about the necessity of the restructuring to bring about functional specialisation which would not only protect the interests of the employees but also offers new opportunities which do not exist in

the present situation where expansion is no longer possible with public funds.

- ii. bring the new entities into existence through proper legislation at the earliest.
- iii. decide the extent of budgetary support available for completion of the generation and transmission projects already in hand with the APSEB
- iv. decide on the extent of subsidy to be given for lift-irrigation and the transparent manner in which it would be given.

Terms of Reference :

Review the existing approach to private participation and guidelines on strategy to be adopted by the State Government:

- 10.8.01 The existing approach is spelt out in the Government of India guidelines for competitive bidding. The intention of the Andhra Pradesh Government as indicated to the Committee before it started its deliberations was that it would like privatisation of the sector and without any guarantees. The Committee accordingly developed a strategy to achieve this objective, which is outlined in Chapter 5.
- 10.8.02 It is seen that the proposals already approved or under way by the APSEB, including those of NTPC and some private producers will be of the order of 6000 MW to coincide with the demand in the 9th Plan. However during the next seven years i.e., upto 2002 there will be shortages of the order of 2000 MW or more. These have to be met by expediting existing projects, allowing captive generation, encouraging cogeneration and actively promoting non-conventional and renewable resources based on decentralised generation particularly to meet rural demands.
- 10.8.03 For the 10th Plan period and beyond the Committee's strategic approach is to create an environment in which the power industry can function like any other Industry making its own assessment of market demand and invest accordingly. This will be done through restructuring, the essence of which is to unbundle the activities of the APSEB and decentralise distribution into a number of companies with which the Generation companies will enter into contracts. Guarantees and calling for bids by the State Government/APSEB will then be eliminated altogether. However the APSEB should make public its forecast of demands and project profiles already developed for preferred

sites, for the guidance of future investors. These have been dealt with in detail in Chapter 6.

Review existing proposals of Private Investment :

- 10.9.01 No specific proposal has been referred to the Committee for review. Also, the Committee did not consider it fruitful, at this stage, to re-open the few projects for which agreements have been already entered into, as this would only delay the availability of additional power badly required in the 9th plan. The Committee recommends expediting these projects.

Evolve guidelines for the restructuring of the power sector and examine scope for private sector assuming total responsibility for generation, transmission and distribution.

- 10.10.01 These have been discussed in Chapter 6.
- 10.10.02 Restructuring and privatisation, by themselves will not however resolve the vexed problem of virtually free supply to agriculture and the huge subsidy involved. These have been discussed in detail in the relevant Chapters.
- 10.10.03 The residual APSEB will continue as a statutory body for planning and overseeing development of the power sector in the State, overseeing the performance of the subsidiary companies and advise and service the Government as required. It will not have any operational responsibilities. Since the present organisation was formed on the authority of the Electricity (Supply) Act, 1948, the restructuring proposed has to be brought about by proper legislation.

Evolve guidelines for a Tariff Policy and an Organisation to administer it.

- 10.11.01 The nature of the organisation - a statutory independent Regulatory Commission - has already been outlined. This and the Tariff policy have been discussed in Chapters 8 and 9.

Mobilising additional resources for power development and energy conservation in the State.

- 10.12.01 Special note has been annexed to Chapter 8 on Resource Mobilisation and on Energy Conservation as an annexure to Chapter 5.

Privatisation Strategy for non-conventional and decentralised Energy Systems.

- 10.13.01 The Committee is of the view that the development in this area should be entirely left to the private sector. Most of the technologies based on renewable resources were started after the first oil shock with many incentives and concessions in the West. However as soon as the oil prices stabilised these concessions were withdrawn. As a result many of these technologies have not yet attained full commercial viability, and market is being sought in the developing countries. Therefore state funds need not be tied with such projects at this stage. The strategy should be to direct these sources as much as possible in the rural areas and in particular to relieve the load on the grid for agricultural pumpsets. Other than wind farms most of these are suited for stand-alone generation and meet small local needs. The Capital cost per unit is high but the running costs are negligible. These are however not maintenance free. Here again the Centre is giving substantial incentive in the form of subsidies and concessions to make it attractive to private entrepreneurs. All help other than financial may be given to investors in these devices. The marketing of the power has to be done by the entrepreneur.
- 10.13.02 Advantage should be taken of the central programmes on Bio-gas units and solar-photovoltaic pumps.
- 10.13.03 In urban areas, projects for power generation based on urban waste and sewer sludge should be encouraged and in Industry cogeneration particularly from waste products should be encouraged.
- 10.13.04 APSEB has already identified over 100 mini, micro hydel projects and canal drops totaling about 93 MW. Wind farms for about 250 MW capacity in the Ramagiri area are also earmarked for the private sector. These efforts should continue.

Strategy Proposed :

- 10.14.01 It will be seen that the strategy proposed by the Committee proceeds in three distinct phases so that there is no disruption of the system and the transition is as smooth as possible.

- 10.14.02 **Phase One**, which is immediate; some privatisation of additional generation, to the extent about 3000 MW has already taken place. Restructuring of the APSEB is to be done as soon as possible, into a separate generating company, a separate transmission company and five zonal distribution companies. These will be all subsidiaries of the APSEB which will remain a non-operating statutory body with some special function of planning and overseeing power development in the State as a whole. There is no privatisation of APSEB in this phase but it sets the stage for privatisation. A Regulatory body also comes into being.
- 10.14.03 **Phase Two** is a period of experience and consolidation. Privatisation initiative in distribution will be taken through management contracts initially and progress towards leasing etc. Private generators on the basis of the information on demand forecast and project profiles publicised by the APSEB will formulate their projects in consultation with the zonal companies in regard to the likely offtake and prices. There will be no guarantees by the government or the APSEB. Most of the 9th Plan period will see this transition towards market driven investment in power like in any other industry.
- 10.14.04 **Phase Three** which coincides with the 10th Plan period, will see the full impact of this transition. Power producers will enter into contracts with the zonal companies as well as with large consumers within or outside the State. The Regulatory body will also have developed its own system and criteria for revision of tariffs and for overseeing the standards of service and performance.
- 10.15.01 The Committee is grateful to the Hon'ble Chief Minister and the Government of Andhra Pradesh for the opportunity given and the confidence bestowed on it for a study of this crucial and complex sector in the context of the new economic reforms.

10.16.01 Finally the Committee expresses its thanks to the Andhra Pradesh State Electricity Board, its Chairman Shri K.Balarama Reddi and other officers, in particular to Shri V.Rama Krishna Rao, Special Officer/IPC for the excellent support and facilities provided for the completion of this task. The Committee would also like to place on record its appreciation of the diligence with which a large number of officers and staff of the APSEB who worked to enable the Committee to complete the report in time.

Hiten Bhaya

N. Tata Rao

D. Sankaraguruswamy

T.L. Sankar

M.C. Mahapatra

K. Balarama Reddi

SUMMARY OF RECOMMENDATIONS

Strategy to meet the Demand:

The Committee has listed below the main recommendations. These may be read with the main report and in the context of paragraphs indicated against each item.

1. To meet the supply-demand gap in the immediate/short term (i.e., upto the end of 9th plan), following steps be taken.
 - a. Projects under construction by Andhra Pradesh State Electricity Board and projects entrusted to private power generators and NTPC should be expedited.
(3.5.03), (5.2.01)
 - b. Large consumers may be permitted to take up captive generation plants.
(3.5.03), (5.2.01)
 - c. Improvements in plant availability and Plant Load Factor in the existing generating units.
(5.2.01).
 - d. Reduction of system losses
(5.2.01)
 - e. Since there may be delays in completion of projects on hand by the private generators, APSEB may purchase power from private generators to fill the gap. Proposals for such generating stations should be evaluated on the basis of unit cost of electricity supplied equal to or less than those agreed to in the recent PPAs and the period in which the project will be commissioned. Suitable penalties should be built into the agreements to ensure completion within the agreed time frame.
(5.3.01) (10.1.03)
2. Cogeneration, particularly, by use of industrial wastages should be encouraged.
(3.5.04), (5.2.02)
3. Use of non-conventional and renewable resource based projects should be freely encouraged.
(3.5.04), (5.2.02)

4. Energy conservation measures as detailed in the report should be promoted.

(5.2.02)

5. During the Tenth Plan Period (2002-2007) and beyond new generation capacity would be almost entirely by Independent Power Producers (IPPs). The IPPs will enter into power purchase agreements directly with Zonal Distribution Companies (ZDCs). Investments in power sector should be treated as investment in any other industry.

(4.2.04), (5.4.01)

6. Andhra Pradesh State Electricity Board (residuary body) may act as a facilitator to enable the Independent Power Producers (IPPs) and the Zonal Distribution Companies (ZDCs) to conclude agreements quickly.

(4.2.04),(5.4.02),(6.2.06)

Restructuring of APSEB

7. A.P.S.E.Board should be restructured on a functional basis by creating wholly owned subsidiaries, viz.,

1. Andhra Pradesh Power Corporation (APPC)
2. Andhra Pradesh Transmission Corporation (APTC)
3. Zonal Distribution Companies (ZDCs)

(6.2.02)

8. A.P.Power Corporation should be responsible for the following functions:

- i. Generation of power from all existing generating stations and those under construction by APSEB
- ii. Purchases of power from Central Sector Generators and the joint venture generating company (APGPCL)
- iii. Purchases of power from those private generators with which APSEB has already entered into Power Purchase Agreements.

- iv. Purchase of power from other States.

- v. All major hydro stations that may come up in future.

(6.2.03), (10.2.02)

9. A.P. Transmission Corporation should be responsible for the following functions:
 - i. Management of the entire Transmission System - 132 KV and above including inter-state lines.
 - ii. Expansion and upgradation of the existing transmission system.
 - iii. Load Despatch.

(6.2.04), (10.2.02)
10. Zonal Distribution Companies should be responsible for the following functions:
 - i. Sale of power to the Consumers.
 - ii. Management of the existing distribution system below 132 KV including 132 KV substations.
 - iii. Expansion and upgradation of the existing distribution system.
 - iv. Extension of supply to new consumers.

(6.2.05), (10.2.02)
11. A.P. Power Corporation, A.P. Transmission Corporation and Zonal Distribution Companies should function as commercial entities.

(6.2.02)
12. A.P. Power Corporation may also put up new generation stations using its own resources and by borrowing from the capital market.

(10.1.05)
13. A.P. Transmission Corporation should remain a public sector company.

(5.5.01)
14. A.P. Transmission Corporation should work in close coordination with the Power Grid Corporation Limited and formal institutional arrangements made to achieve the same.

(6.2.02)

15. APSEB the residuary statutory body would function like a holding company and perform the following functions.
- i. Plan and oversee the total power development in the State;
 - ii. Publish forecast of demand and the outlines of plan projections at preferred sites;
 - iii. Advise the Government as required on all power related matters;
 - iv. Oversee the working of the subsidiaries mentioned in item 7;
 - v. Oversee the implementation of restructuring and privatisation process in distribution till it is complete;
 - vi. Coordinate the functioning of all the new entities in the power sector to ensure smooth functioning of the system;
 - vii. Approve schemes proposed by the Zonal Distribution Companies costing more than Rs. 5 Crores and below Rs. 100 Crores.

(6.2.06),(10.2.05)

16. To implement restructuring and privatisation as proposed, thorough planning and preparation should be done. Training of managers and key personnel is essential.

(6.3.01)

17. Restructuring should be carried out through suitable legislation so that all the new entities come into being simultaneously.

(6.3.02)

18. Since no new functions are being added the staff strength should be as of date.

(6.3.04)

19. In structuring the assets and liabilities of the new companies, care should be taken with a view to their viability and creditworthiness.

(6.3.05)

20. An Implementation Committee with experts drawn from Government, A.P.S.E.B. and such other experts should be constituted to assist the State Government and guide the APSEB in carrying out the detailed work of restructuring and privatisation.

(6.3.06)

21. The distribution system should be reorganised into five zones each in charge of a Zonal Distribution Company.

(6.2.02), (7.6.02)

22. To even out the differences arising out of variations in the load-mix of the different zones, the charges for supply of power to different ZDCs may be adjusted by APPC without affecting its average cost of supply or an **Equalisation Fund**, may be created to be administered by APSEB, by levying an extra charge on the consumers in all the zones and payments made to ZDCs to even out the differences arising out of variations in the load-mix.

(7.6.03)

Privatisation of Distribution

23. The possibility of inducting the private sector in ZDCs should be explored from the beginning.

(7.7.03)

24. If need be, privatisation of ZDCs may be preceded in the first phase by management contract followed by leasing or hiring.

(7.7.03)

25. Induction of private sector in distribution should be through a bidding process outlined in Chapter 7.

(7.7.03)

26. In case the State Government feel that there would be inadequate or no response, if they were to go in for a bid, the private generators with whom power purchase agreements have been already signed by APSEB may be asked to take up distribution for a zone. Even here an element of competition should be built into the process of selection and allocation to safeguard the interests of the State Government. The

private generator shall in no case be allowed to choose a distribution zone or a part thereof.

(7.8.03)

Tariff Policy

27. Tariff policy should promote the development of the sector, encourage inflow of resources and increased efficiency in the supply and consumption of electricity. Tariffs which are too low will lead to wasteful consumption.

(8.1.12)

28. In fixing the retail tariff, the following elements should be taken into account:

- a. The cost of power and wheeling charges based on established norms.
- b. The cost of supply by the licensee which will include employee costs, operation and maintenance charges, depreciation, interest charges and return on investment based on norms to be established.
- c. Tariff should be fixed to yield a reasonable rate of return on equity.
- d. Tariff may also contain an element (eg. surcharge) to provide for technically desirable investments in the long term development of the distribution system as approved by the Regulatory Commission.
- e. Tariff should send the right signals both to the licensee and to the consumer so as to promote efficiency in the provision of the services by the licensee and greater efficiency in the use of energy by the consumers.

(8.1.13)

Regulatory Commission

29. An autonomous, judicial Regulatory Commission should be set up through suitable legislation urgently, in any case before the induction of the private sector into the ZDCs,

(4.1.06)

Duties

30. Its duties and responsibilities should be:
- i. promote efficiency and economy in the generation, transmission and distribution of electricity,
 - ii. promote competition in the generation and supply of electricity;
 - iii. enable the licensees to carry on their activities in accordance with the terms and conditions of their licence;
 - iv. collect and record information concerning generation, transmission and distribution and utilisation of electricity and like matters;
 - v. carry out studies relating to cost of generation, transmission and distribution of electricity, efficiency, losses in the power system, utilisation of electricity and like matters;
 - vi. publish information collected under iv & v;
 - viii. advise the State Government on any matter on which its advice is sought
 - ix. make recommendation to the State Government on any matter, which in its opinion, would help in better generation, transmission and distribution of electricity.

(9.2.02), (9.2.04), (9.2.05)

Composition

31. The Regulatory Commission shall consists four members as enumerated below:
- a. One member who is or has been a Judge of a High Court, who shall be its Chairman.
 - b. One member shall be an Electrical Engineer with wide experience and of the rank of a Member CEA/Chairman, SEB.
 - c. One member shall be a person with wide experience in financial matters in the rank of Principal Secretary to the State Government / Member (Commercial), CEA / Director (Finance) in a large Pubic Sector Financial Institution.

- d. One member who is an economist of repute with knowledge of industry.

(9.3.02)

Guidelines

32. \ In fixing retail tariffs, the Regulatory Commission shall have due regard to the following:
 - a. the nature of the supply and the purposes for which it is required.
 - b. the need to promote coordinated development of the supply and distribution of electricity within the State in the most efficient and economical manner;
 - c. the simplification and standardisation of methods and rates of charges for such supplies;
 - d. the need to protect the interests of the consumers while enabling the licensees to earn a reasonable profit;
 - e. In approving the tariff proposals the Commission shall not show undue preference to any consumer;
 - f. Tariffs should be viewed as an instrument to foster the rapid and balanced development of the power sector and promote efficiency in the supply and consumption of power;
 - g. Tariffs should be so fixed as to yield a reasonable return on investment;
 - h. The tariff may also contain an element (eg. surcharge) to provide for technically desirable investments in the long term development of the distribution system as approved by the Regulatory Commission.
 - i. Interests of the consumers should be protected and costs of supply should be evaluated in the light of norms and standards fixed by the Regulatory Commission.
 - j. Tariffs should be reviewed periodically or on request from distribution companies; and/or a category of consumers.

k. In the event of the State Government desiring that certain categories of consumers should be supplied power at rates lower than the cost of supply fixed by the Commission, then it will be for the Commission to decide the manner in which the burden should be shared between the Government, the producers, the distributors and the consumers.

(9.2.07)

Powers

33. The Regulatory Commission shall have the powers to call for documents, summon witnesses, cause research studies to be carried out in regard to any matter of concern to it.

(9.3.04)

34. It shall have the powers to secure compliance with its orders by levy of penalties.

(9.3.04)

35. The Regulatory Commission shall have the powers to raise the funds needed by it through suitable levies on the generators, transmission agency and the distributors.

(9.3.05)

36. Consumer Redressal Forum should be set up as outlined in Chapter 9.

LIST OF ABBREVIATIONS

Adm.	Administration
Agl.	Agricultural
APGPCL	AP Gas Power Corporation Limited
APPC	Andhra Pradesh Power Corporation
APSEB	Andhra Pradesh State Electricity Board
APTC	Andhra Pradesh Transmission Corporation
Avg.	Average
A.P	Andhra Pradesh
BSES	Bombay Sub-urban Electricity Supply Company
CEA	Central Electricity Authority
CESC	Calcutta Electric Supply Company
Ckm	Circuit Kilometers
Ckt Km	Circuit Kilometers
Crs.	Crores
Dom.	Domestic
DSM	Demand Side Management
e.g.	Example
HP	Horse Power
HT	High Tension
HV	High Voltage
HVDC	High Voltage Direct Current
HVDS	High Voltage Distribution System
IPP	Independent Power Producer
KM	Kilometer
KTPS	Kothagudem Thermal Power Station
KV	Kilo Volt
KW	Kilowatt
KWH	Kilo Watt Hours
LPG	Liquefied Petroleum Gas
LT	Low Tension
LV	Low Voltage
LVDS	Low Voltage Distribution System
Misc	Miscellaneous
MKwh	Million Kilo Watt Hour

MU	Million Unit
MW	Mega Watt
NLC	Neyveli Lignite Corporation Limited
No.	Number
NPC	Nuclear Power Corporation
NTPC	National Thermal Power Corporation
O & M	Operation and Maintenance
PCRA	Petroleum Conservation Research Agency
PLF	Plant Load Factor
PPA	Power Purchase Agreement
ps.	Paise
ROR	Rate of Return
Rs	Rupees
RTPP	Rayalaseema Thermal Power Project
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SEB	State Electricity Board
SF6	Sulphur Hexa Flouride
SPV	Solar Photo Voltaic
TV	Television
T&D	Transmission and Distribution
UK	United Kingdom
vs.	Versus
Yr	Year
ZDC	Zonal Distribution Company