Power

9.5 Power generation in April-December, 2002 at 397.6 billion kwh, showed a growth of 3.7 percent over the same period of the previous year (Table 9.2). This was primarily based on growth of 6.3 percent of thermal generation. Nuclear generation showed a slower growth of 0.6 percent, and hydel dropped by 9.6 percent due to poor South West Monsoon causing reduced inflows of water in major reservoirs of the country. Over the period from April to December, 2002, 1,819 MW of generation capacity was added, taking the total capacity to 1,06,812 MW. As on March 31, 2002 thermal plants account for 71 percent of capacity and 82 percent of generation.

9.6 The 'Plant Load Factor' (PLF) is a important measure of the operational efficiency of thermal power plants. The PLF of the overall system has improved significantly from 64.7 percent in 1997-98 to 71.1 percent in 2002-03, implying a secular improvement in the efficiency of generation. Table 9.3 shows that the PLF of central power plants was higher than that of SEBs. However, the average for SEBs as a whole masks substantial variation across states. If the PLF for the eastern states were excluded, the PLF of SEBs is not substantially different from that of central utilities. This table also shows that the private sector is able to obtain a much higher PLF of 82 percent.

9.7 While the efficiency of generation has gone up in recent years, end-consumers of electricity continue to experience serious problems. From the viewpoint of households and firms in the country, the power sector has been delivering unsatisfactory performance in terms of reliable access to electricity. The energy and peak shortages of power have been around 7.5 percent and 12.1 percent, respectively, leading to brownouts and blackouts across the country. Scheduled power cuts, unscheduled outages and incorrect voltages are common in most states, leading to enormous disruptions in all aspects of economic life. This has led to operational inefficiencies for firms across the country, and a substantial wastage of capital that is blocked in the voltage stabilizers, inverters, generators, and in replacing burnt-out motors.

9.8 If the power sector could work in a reliable manner, it would serve to increase the efficiency of capital utilization in the country. The government has drawn up an ambitious program to address these problems. This entails new generation capacity of 1,00,000 MW (which would roughly double the existing generation capacity), and substantial investments in transmission and distribution. It is estimated that these efforts would require investments of Rs.8,00,000 crore, or roughly 40 percent of current GDP. Of this, roughly 40 percent of the new generation capacity is envisaged

Table 9.2 : Trends in the power sector (utilities only)

			April-December*		Change over previous year		
	2000-01	2001-02*	2001	2002	2001-02	2001-02@	2002-03@
1	2	3	4	5	6	7	8
	(Billion kwh)				(percent)		
1 Power generation**	499.5	515.3	383.3	397.6	3.1	2.8	3.7
(i) Hydro-electric	74.5	74.0	57.1	52.1	-0.7	-3.6	-9.6
(ii) Thermal	408.1	422.0	311.4	331.1	3.4	3.5	6.3
(iii) Nuclear	16.9	19.3	14.3	14.4	14.2	17.1	0.6
2 Plant load factor of Thermal plants (percent)	69.0	69.9	68.4	71.1	NA	NA	NA

*** Provisional. @ April-December**

**** Excludes generation from Captive and Non-Conventional Power Plants**

Source : Ministry of Power.

in the Xth plan, and the remainder in the XIth plan.

9.9 One major aspect in the future investment plans of the power sector is the hydel sector. Hydel generation has low recurring costs, and is free of the host of problems associated with fossil fuels such as dependence on imported fuel, CO_2 emissions, and pollution. Yet, the share of hydel generation has dropped from 38 percent to 25 percent over the last 20 years. Hydro generation contributes only 14 percent of generation as of today. Only 17 percent of the enormous hydel potential of the country (of 1,50,000 MW) has as yet been tapped. However, hydel plants are capital intensive. Hence, the existing plans of the government envisage devoting 60 percent of the budgetary support in the Xth plan to hydel projects.

9.10 The eastern region of the country has a comparative advantage in coal-fired plants and in hydel generation. This emphasises the need for a national power grid, which can transport this electricity from producing regions in the east to customers elsewhere in the country. The present inter-regional connectors are capable of transferring 5,700 MW. This is slated for augmentation to 30,000 MW by year 2012.

9.11 These directions for development of the power sector involve enormous requirements of capital, and motivate the quest for private and foreign investment. In the early 1990s, there was a concerted effort to attract private investment into electricity generation. Many contracts were signed with potential Independent Power Producers (IPPs). However, this approach encountered hurdles owing to the financial difficulties of SEBs. These contracts envisaged that SEBs would be monopoly buyers of electricity from IPPs. The financial difficulties of SEBs cascaded into financial difficulties for IPPs.

9.12 It now appears that the financial difficulties of the SEBs lie at the heart of the problems of the power sector. The financial position of all the State Electricity utilities has deteriorated quite rapidly in the past decade. Barring Himachal Pradesh State Electricity Board (HPSEB) and Maharashtra State Electricity Board (MSEB), all other SEBs have recorded losses (excluding subsidy booked in the accounts) between 1992-93 and 2001-02 ranging from Rs.4 crore to Rs.3,682 crore. A highly disturbing feature is that losses have been rapidly increasing over the decade of the 1990s.

Table 9.3 : Thermal plant load factor

(percent)

	1997-98	1998-99	1999-00	2000-01	2001-02*	April-December* 2002-03 Target	April-December* 2002-03 Actual
I State Electricity Boards	60.9	60.7	64.3	64.3	67.0	66.7	67.5
II Central Sector	70.4	71.1	72.5	72.2	74.3	72.7	75.7
III Private Sector	71.2	68.3	68.9	76.4	74.7	76.4	82.0
IV Region							
Northern	66.7	67.2	71.0	72.0	75.1	73.3	74.8
Western	70.3	70.5	72.3	72.1	74.2	73.9	75.2
Southern	77.1	75.4	79.6	79.7	82.3	79.1	84.6
Eastern	43.0	44.3	46.1	47.0	48.7	50.6	50.6
North Eastern	21.3	18.7	18.3	18.2	16.8	16.7	14.4
All India	**64.7**	**64.6**	**67.3**	**67.7**	**69.9**	**69.3**	**71.1**

*** Provisional**
Source : Ministry of Power.

9.13 The Planning Commission has estimated that during the last financial year alone, i.e. year 2001-02, the commercial loss (excluding subsidy) was of the order of Rs.24,063 crore (Table 9.4). Such huge losses have adversely affected operations, and the ability of the electricity utilities to reliably supply electricity to the consumers. Owing to inadequate revenues, all state utilities have defaulted in payments to Central PSUs including NTPC, Power Grid Corporation, NHPC, Coal India Limited, Railways, and have accumulated substantial arrears.

9.14 A central source of the financial crises of SEBs is losses in transmission and distribution (T&D losses). T&D losses correspond to electricity produced but not paid for. T&D losses of SEBs rose from 24.8 per cent in 1997-98 to 26.5 per cent in 1998-99 and further to 30.9 percent in 1999-2000 (provisional).

9.15 T&D losses are caused by a variety of problems, including energy sold at low voltage, sparsely distributed loads over large rural areas, inadequate investments in the distribution system, improper billing and theft. Indiscriminate grid extension despite low load densities (as measured by demand in MW divided by the length of the T&D system) has resulted in inefficiencies.

9.16 The hidden gross subsidy for agriculture and domestic sectors increased from Rs.7,449 crore in 1991-92 to Rs.34,587 crore in 2001-02. However, provisional estimates for 2001-02 and 2002-03 by the Planning Commission indicate a marginal decline in the subsidy incurred on sales to agricultural consumers as well as gross subsidy in 2002-03 compared with the previous year (Table 9.4). This could be possibly due to two reasons. The first is a realistic assessment of aggregate technical and commercial losses, which were earlier partly camouflaged under electricity consumption in agriculture sector. The other reason could be a gradual increase in tariff to agricultural consumers through tariff awards given by the various State Electricity Regulatory Commissions (SERCs) during the past three years. The level of commercial losses also indicates a declining trend. This could be due to the efficiency improvement measures initiated by various states/SEBs as part of reform process in the Power sector. The measures initiated include efforts to reduce technical as well as commercial losses in the power system, rationalisation of tariff to various consumers by the tariff awards given by respective SERCs and efforts to improve the collection efficiency.

9.17 In the ultimate analysis, the basic problem being faced by the sector is the gap between user charges and the cost of supply. Despite reform efforts, the gap between the cost of supply and average tariff (Table 9.5) has actually worsened over recent years, from a level of 23 paise in 1992-93 to about 110 paise in 2001-02. Revenues dropped from 82.2 percent of costs in 1992-93 to 68.6 percent in 2001-02. This suggests that as of yet, reforms in the functioning of SEBs have not yielded the desired results, and motivates a prime focus upon the functioning of SEBs in power reforms.

9.18 Box 9.2 shows a summary status of institutional reforms at the State level. In the area of tariff rationalisation, the independent regulatory authorities of 13 states have made progress on improving the structure of tariffs, Tariff authorities across the country are now working on problems of cross subsidies in tariffs.

9.19 One of the most important development in the power sector of the recent years has been the privatization of distribution in Orissa and Delhi. It is hoped that these private distribution companies will emulate the success of private sector distribution in Mumbai, Kolkata and Ahmedabad. However, they are as yet nascent efforts, and it is not yet clear that such privatization will succeed in obtaining more effective enforcement of user charges.

9.20 In order to address the issues of outstanding dues of SEBs, an Expert Group

Table 9.4 : Financial performance of the state power sector

(Rs. Crore)

		1991-92	2001-02*	2002-03 (RE)	2003-04 (AP)
A.	**Gross Subsidy involved**				
	(i) On account of sale of electricty to				
	(a) Agriculture	5,938	24,013	24,759	23,936
	(b) Domestic	1,310	10,347	8,383	8,112
	(c) Inter-State Sales	201	227	142	382
	Total	**7,449**	**34,587**	**33,283**	**32,429**
	(ii) Subventions Received from State Govts.	2,045	8,680	10,762	8,626
	(iii) Net Subsidy	5,404	25,907	22,521	23,803
	(iv) Surplus Generated by sale to other sectors	2,173	3,698	4,908	8,065
	(v) Uncovered Subsidy	3,231	22,209	17,613	15,738
B.	**Commercial Losses**				
	i) Commercial Losses (excluding subsidy)@	4,117	24,063	24,614	21,260
	ii) Commercial Losses (including subsidy)	NA	15,383	13,851	12,634
C.	**Rate of Return (ROR %) #**	**-12.7**	**-32.8**	**-35.4**	**-28.4**
D.	**Revenue Mobilisation**				
	Additional Revenue Mobilisation from achieving				
	(a) 3% ROR	4,959	26,266	26,699	23,506
	(b) From introducing 50 paise per unit from Agriculture/Irrigation	2,176	1,078	1,002	764

RE: Revised Estimates * Provisional
AP : Annual Plan Projection # for losses without subsidy.
@ Commercial losses are different from uncovered subsidy because they include financial results of other activities undertaken by the SEBs.

Note : 1 The information relating to the subsidy for Agriculture, Domestic and Inter-state sales for the years 2001-02, 2002-03 and 2003-04 in respect of Orissa and Delhi is not available, as the distribution is entrusted to the Private Companies. The information regarding commercial losses pertains to GRIDCO of Orissa and Transmission Company of Delhi only.
2 Information in case of Andhra Pradesh, Haryana, Rajasthan, Uttar Pradesh and Karnataka states is relating to transmission and distrbution companies set up after the reforms.
3 The resources discussion in respect of Andhra Pradesh is yet to be held and hence the estimates used are tentative figures which may change after the discussion.
4 The estimates for net fixed assets of the utilities in respect of Jharkhand and Uttaranchal have not been furnished and hence the ROR calculated for all the SEBs may not reflect the correct picture.

Source : Planning Commission.

was constituted under the Chairmanship of Montek Singh Ahluwalia, the then Member (Energy), Planning Commission, to recommend a one-time settlement of dues payable by State Electricity Boards (SEBs) to Central Public Sector Undertakings (CPSUs) and dues from the CPSUs to the State Power Utilities. The recommendations of the Expert Group have been accepted by the Government of India. The scheme would facilitate the settlement of outstanding dues of Rs.41,852 crore of the SEBs payable to CPSU's as on September 30, 2001 after writing off Rs.9,610 crore.

9.21 The Accelerated Power Development and Reforms Programme (APDRP), which

Table 9.5 : Recovery of cost through tariff

Year	Average Cost/Unit (paise)	Average Tariff/Unit (paise)	Per cent Recovery of cost
1992-93	128.2	105.4	82.2
1993-94	149.1	116.7	78.3
1994-95	163.4	128.0	78.3
1995-96	179.6	139.0	77.4
1996-97	215.6	165.3	76.7
1997-98	239.7	180.3	75.2
1998-99	263.1	186.8	71.0
1999-00	305.1	207.0	67.8
2000-01	327.3	226.3	69.1
2001-02	349.9	239.9	68.6

Source : Ministry of Power.

Box 9.2 : Reforms in power sector

1 The Government of India has been signing MOU with States reflecting the joint commitments of the Centre and the States to undertake reforms in a time bound manner. The MOUs are now being fleshed out into MOAs with clearer and more specific milestones as the reform programme in the States is acquiring concrete shape. Twenty five States have been covered by this exercise till now. Rating of States by CRISIL and ICRA on behalf Ministry of Power with reference to reforms initiatives, is going to bring into focus specific thrust areas of improvement and action.

2 Nine States (Andhra Pradesh, Delhi, Haryana, Karnataka, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and Uttranchal) have enacted their State Electricity Reforms Acts, which provide, inter alia, for unbundling/corporatisation of SEBS, setting up of SERCs, etc. The SEBs in these States have been unbundled/corporatised. Distribution has been privatized in Orissa, and recently in Delhi. The States of Andhra Pradesh, Karnataka, Madhya Pradesh, Uttar Pradesh and West Bengal have enacted and Maharashtra has drafted, anti theft legislations making penal provisions regarding theft of electricity stringent wheras Government of India has given approval to the ordinance of Maharashtra Government in this regard. The State of Kerala has also drafted a similar ordinance. Twenty two States have constituted SERCs and 13 of them have passed tariff orders.

3 These reform measures were initiated by the States at a time when the status of metering was not very encouraging, the billing and collection efficiency was very poor and T&D losses were very high. Consequent on reform initiatives, signs of improvement on these and other operational levels are visible. The States have been taking concrete steps towards installation of meters. There has been a improvement in terms of billing and collection in many States, especially in Andhra Pradesh and Haryana. The tariff orders passed by the Regulatory Commissions reflect a trend towards tariff rationalization. Punjab has recently introduced a tariff on agricultural consumption. Madhya Pradesh has also restricted free supply to the small and marginal farmers of SC/ST category.

has an outlay of Rs.3,500 crore, has been designed to assist reforms in the distribution sector. It seeks to target 63 distribution centres, and develop them as “centres of excellence”. It seeks to obtain 100 percent metering, energy audit, better HT/LT ratio, replacement of distribution transformers, and IT solutions relating to power flow at critical points to ensure accountability at all levels. During 2002-03, 332 projects covering concentrated load centres with capital cost of Rs.13,703 crore have been cleared till December, 2002.

9.22 The Electricity Bill, 2001 was introduced in the Lok Sabha in August, 2001 and subsequently referred to the Standing Committee on Energy for examination. The Committee has submitted its report to the Lok Sabha on December 19, 2002. Action has already been initiated on this report. The Bill seeks to provide a legal framework for enabling reforms and restructuring of the power sector, it would result in simplification of administrative procedures by integrating the Indian Electricity Act, 1910, the Electricity (Supply) Act, 1948 and the Electricity Regulatory Commissions Act, 1998, into a single Act.

Box 9.3 : Delhi Vidyut Board privatisation

Distribution was privatised in Delhi in July 2002. The business valuation method was adopted for valuation of assets of Delhi Vidyut Board (DVB). This method had been adopted earlier by the Government of UP for the Kanpur distribution company. The essence of this valuation methodology is to set targets for five years in terms of efficiency gains, make assumptions about plausible retail tariff increases and all heads of expenses, and then calculate the value of the liability which can be met through the earnings projected, provided efficiency targets are met. The key to a turnaround in the distribution business lies in controlling theft, improving collections and reducing technical losses. The bidding process in Delhi was therefore based on efficiency gains measured through the AT&C (Aggregate Technical and Commercial) loss reduction path. Prior to privatisation, the AT&C loss levels as approved by the Delhi Electricity Regulatory Commission for the three distribution zones taken together were at 50.7 percent. A loss reduction path of 17 percent has been charted out for the private distribution companies for the next five years. The efficiency gains have been incentivised by providing that extra revenue collected over and above the prescribed AT&C reduction path would be shared equally between the consumer and the distribution companies.

Box 9.4 : **Status of power sector reforms in states**

State	Status
Andhra Pradesh	SERC constituted, functional, two tariff orders issued Reform law enacted, SEB unbundled Distribution privatization strategy being finalized MOU signed with Government of India
Arunachal Pradesh	SERC notified (yet to be constituted)
Assam	Chairperson of SERC appointed; SERC functional MOU signed with Government of India
Bihar	MOU signed with Government of India SERC constituted Members yet to be appointed
Chhatisgarh	MOU with Madhya Pradesh adopted SERC constituted Members yet to be appointed
Delhi	SERC constituted and functional Tariff order issued Reform law enacted DVB unbundled and distribution privatized
Goa	MOU signed with Government of India SERC constituted
Gujarat	SERC constituted and functional Tariff order issued Reform law approved by Government of India and introduced in the Assembly MOU signed with Government of India
Haryana	SERC constituted and functional Two tariff orders issued Reform law enacted, SEB unbundled MOU signed with Government of India
Himachal Pradesh	Single-Member HPSERC constituted Tariff order issued and implemented MOU signed with Government of India
Jammu & Kashmir	Reform bill passed by State Assembly MOU signed with Government of India
Jharkhand	MOU signed with Government of India
Karnataka	SERC constituted, functional, tariff order issued Reform law enacted, SEB unbundled MOU signed with Government of India Distribution privatization in progress, after unbundling into four separate companies, which have started functioning from June 1, 2002
Kerala	State does not envisage unbundling of State Electricity Board. Working of Board to be re-organized into three profit centers. MOU signed with Government of India,SERC constituted
Madhya Pradesh	SERC constituted Tariff order issued Reform law passed by the Assembly and notified SEB functionally unbundled MOU signed with Government of India
Maharashtra	SERC constituted and functional Tariff order issued MOU signed with Government of India

State	Status
Orissa	SERC functional Four tariff orders issued Reform law enacted; SEB unbundled Distribution privatized MOU signed with Government of India
Punjab	SERC constituted Tariff order issued MOU signed with Government of India
Rajasthan	SERC constituted and functional Tariff order issued Reform law enacted SEB unbundled – one generation, one transmission and three distribution companies created MOU signed with Government of India
Tamil Nadu	SERC constituted MOU signed with Government of India
Uttar Pradesh	SERC constituted and functional Tariff order issued Reform law enacted and SEB unbundled Distribution privatization strategy to be finalized MOU signed with Government of India
Uttaranchal	MOU signed with Government of India SERC constituted
West Bengal	SERC constituted Tariff order issued MOU signed with Government of India
Nagaland	Has expressed willingness to constitute Joint Electricity Regulatory Commission.