

5.1. Introduction

The power position in the State was very comfortable during 2003-04 and 2004-05. There was a sizeable increase in the installed capacity and power availability during the period. While more than 1000 MW capacity was added to the State grid during this two-year period, gross power availability had witnessed a significant increase of 6.7 per cent in 2003-04 and 5.8 per cent

in 2003-04 gaining 1060.0 MW (12.7%) additional capacities from almost all the sources. The incremental increase at the Central Sector Projects was the highest (763.0 MW), State's own projects (101.0 MW) and captive power sets (0.8MW). During 2004-05, aggregate power generating capacity of the State rose to 9531.17 MW, increasing by 2.3 per cent over that of the previous year. Additional capacities accrued at the Central Sector projects to the tune of 253.00 MW was the main factor behind this status.

Table 5.1. Profile of Power Sector

Sl. No.	Details	2002-03	% Change	2003-04	% Change	2004-05	% Change
1.	Installed Capacity (MW)	8268.80	4.3	9318.70	12.7	9512.00	2.1
2.	Power Generation (mu)	24929	(-) 2.5	24114	(-) 3.3	26450	9.7
3.	Power Purchases (mu)	21460	16.9	25384	18.3	25895	2.0
4.	Gross Power Availability (mu)	46389	5.6	49498	6.7	52345	5.8
5.	Total Power Consumption (mu)	36077	2.9	38374	6.4	40298 (P)	5.0
6.	Per Capita Consumption (kwh / unit)	740	4.5	780	5.4	815	4.5

P : Provisional

Source : Chief Engineer (planning) Tamil Nadu Electricity Board, Chennai-2

in 2004-05. The net power availability and total in consumption in the State also rose significantly boosting the per capita power availability to 780 units in 2003-04 and 815 units in 2004-05. The State has been assigning high priority to power development to ensure stability and availability of power so that Tamil Nadu remains a favoured destination for investment.

5.2. Performance of State Sector, 2004-05

Installed Capacity

The installed power generating capacity of the State which was at 8268.80 MW in 2002-03 rose to 9318.70 MW

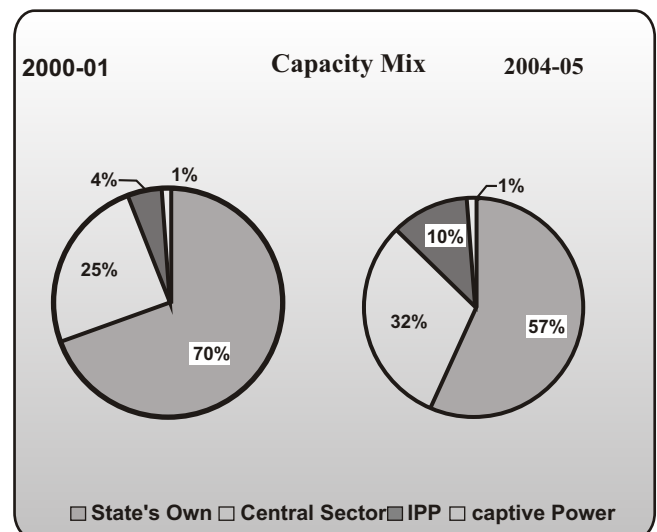


Fig. 5.1 Performance of State Sector, 2004-05

Table 5.2. Installed Capacity : At the Command of TNEB

Sl.No.	Item	2002-03	2003-04	2004-05
1.	State's own Projects	5308.14	5401.04	5401.04
2.	Central Sector Projects	1903.00	2852.00*	3065.00**
3.	Independent Power Projects	988.16	988.16	988.16
4.	Captive Power Plants	69.50	77.50	77.50
5.	Total Capacity	8268.80	9318.70	9531.70

Note : Includes *400 MW** 360MW from external assistance from Eastern Region, Kayangulam

5.3. State's Own Projects

Installed Capacity of the State's own projects from various sources like hydel, wind, thermal and gas rose up 5401.04 MW in 2003-04 from 5308.14 MW in 2002-03, registering an increase of 1.8 per cent which remained the same in 2004-05.

Table 5.3. Installed Capacity of State's Own Projects (MW)

Sl.No.	Item	2002-03	2003-04	2004-05
1.	Hydel	1995.90 (37.6)	1987.00 (36.8)	1987.00 (36.8)
2.	Thermal	2970.00 (56.0)	2970.00 (55.0)	2970.00 (55.0)
3.	Gas	322.88 (6.1)	424.28 (7.9)	424.28 (7.9)
4.	Wind	19.36 (0.4)	19.36 (0.4)	19.36 (0.4)
5.	Total	5308.14 (100.0)	5401.04 (100.0)	5401.04 (100.0)

Note : Figures in bracket indicate percentage share to total.

All the 32 hydro electric projects put together have an installed capacity of 1987.4 MW by the end of the year 2004-05. The capacity which remained at 1995.90 MW since 2000-01 had actually dropped to 1987.4 MW in 2003-04 due to the closure of 11.0 MW capacity at Pykara Hydro Project. This dip was narrowed down following the commissioning of two units of Aliyar Small with 1.2 MW each in September 2004. This position was unaltered till the end of 2004-05.

The capacity of thermal power projects remains steady at 2970 MW since 1995-96. However, overhauling is done periodically to rejuvenate the generation level. Similar is the case with wind farms under the State fold. It may be stated that establishment of wind farms is concentrated with private sector.

The gas turbines in the State are contributing to increase in capacities. The total capacity of gas turbines at 227.88 MW in 2001-02 had increased to 322.88 MW in 2002-03 and further to 424.28 MW in 2003-04: the latest addition being one unit of 101 MW of Kuthalam Project in March 2004.

The share assigned to the State from the mega projects of the Central Sector had witnessed significant increases with the addition of 549 MW to the State grid in a single year. Neyveli-I Expansion undertaken in May 2003 and September 2003 with two units of 420 MW had offered 240 MW to the State. Likewise, two units of Talcher Super Thermal Station (2 x 500 MW) commissioned in August 2003 and March 2004 with 1000 MW also augmented 270 MW in 2003-04. From the Madras Atomic Power Project (Kalpakkam), 39 MW additional capacity was added to the State grid. These additions at the capacity level raised the overall Central sector share from 1903 MW in 2002-03 to 2452 MW in 2003-04 and further to 3065 MW in 2004-05. The overall share of Central sector projects to the total capacity accounted for 26 per cent in 2003-04 had also risen to 32.0 per cent in 2004-05.

5.4. Power Generation

Increase in capacity creation could not be reflected in power generation. The quantum of power generation from the various State's own projects had declined from 24929 mu in 2002-03 to 24114 mu in 2003-04, due to poor rainfall in catchment areas and with smaller reductions in thermal sources. However the generation from hydro and gas picked up taking aggregate quantum of 26451 mu to the State Grid

during 2004-05; increase by 9.7 per cent over the preceding year. To the overall generation, the thermal sources offered 75 per cent, while 17 per cent came from hydel sources and 8 per cent from gas and wind sources put together.

Table 5.4. Power Generation : Source-wise

(mu)							
Sl. No.	Source	2002-03	% Change	2003-04	% Change	2004-05 (P)	% Change
1.	Hydro	2724	(-)44.6	2067	(-)24.1	4426	114.1
2.	Thermal	21080	23.4	20430	(-)3.1	20004	(-)2.1
3.	Gas	1107	27.2	1593	43.9	2003	25.7
4.	Wind	18	5.9	24	33.3	17	(-)25.0
	Total	24929	12.6	24114	(-)3.3	26450	9.7

5.5. Hydel Generation

Hydel generation which accounted for about one-fifth of the total generation in 2000-01 had drastically fallen to 8.6 per cent in 2003-04. However, the earlier situation was revived in the next year followed by sufficient rainfall. The hydel generation peaked at 5450 mu in 2000-01, slid gradually to a low level of 2067 mu in 2003-04. Poor rainfall over the past three successive years had adversely affected the performance of hydel power projects. Of the 32 projects, only two have accelerated the generation while others suffered. This led to the reduction of overall hydel Plant Load Factor (PLF) to 12 per cent in 2003-04 against 16 per cent in 2002-03 and 25 per cent in 2001-02. It is heartening that there was significant revival in hydel generation during 2004-05. Thanks to the normal rainfall and raising of the storage position of the reservoirs. The hydel output in comparison with 2003-04 given below reveals the better performance of the projects in all the four quarters especially in second and third quarters of the year (July-December).

Table 5.5. Performance of Hydel Projects

(mu)

Period	2003-04	2004-05
I Quarter	347	648
II Quarter	585	1472
III Quarter	734	1396
IV Quarter	401	910
Total	2067	4426

Source : Monitoring of State Economy, SPC, Chennai-5.

5.6. Thermal Generation

Power generation from the State's own thermal power plants also marginally suffered during 2003-04. Total thermal generation which was 21080 mu in 2002-03 came down to 20430 mu in 2003-04 (by -3.1%). The performance of all the four thermal plants were affected in varying degrees. But it was acute in Ennore where drop in generation was 27.4 per cent. In 2004-05, thermal generation further went down to 20004 mu. Tuticorin (TTPP) was the only project which had fared better while other three showed decline. Taking into account the per unit consumption of coal, TTPP continued to occupy a better place in terms of efficiency in power generation also.

Table 5.6. Thermal Generation : Source-wise

(mu)

Thermal Power Station	2003-04			2004-05		
	Generation (mu)	% change	Consumption of coal per unit (kg.)	Generation (mu)	% change	Consumption of coal per unit (kg.)
Tuticorin	8083	(-)1.3	0.66	8178	1.2	0.68
Ennore	1264	(-)27.4	0.94	1223	(-)3.2	0.95
Mettur	6735	(-)0.04	0.73	6685	(-)0.7	0.73
North Chennai	4348	(-)1.3	0.71	3918	(-)9.9	0.73
Total Thermal Generation	20430	(-)3.1	0.71	20004	(-)2.1	0.72

5.7. Gas and Wind Power Generation

There is a significant increase in the power generation by gas turbines during 2003-04 and 2004-05. The production from the gas turbines at 1107 mu in 2002-03 had risen to 1593 mu in 2003-04 and further to 2003 mu in 2004-05 by 25.7 per cent. However, the performance of individual units varied. While generation from Basin Bridge was sluggish, others performed well. Good performance by unit at Kuttalam contributed for the gain during 2004-05. The wind mills under the State fold, acting as demonstration units were able to add 17 mu in 2004-05 to the State grid against 24 mu in 2003-04.

Table 5.7. Power Generation from Gas Turbines

Gas Turbines	(mu)		
	2002-03	2003-04	2004-05
1. Basin Bridge	276	89	41
2. Kovilkalappal	227	724	763
3. Valuthur	104	672	558
4. Kuttalam	-	108	641
Total	1107	1593	2003

5.8. Power Consumption

The auxiliary consumption, sales to other States and line losses accounted for 23 per cent (11274mu) of the gross availability of power of the State. Eventually, 40298 mu

was made available to various categories of consumers in the State during 2004-05. In spite of the deceleration in the net power availability, the State managed to meet an all-time high peak level demand of 7473 MW in 2004-05. There was a moderate rise in the number of consumers and connected load during the year. The number of power consumers in the State as on 31.3.2005 was 170.34 lakh against 163.38 lakh recorded in the previous year, the increase being 4.2 per cent. Likewise, the connected load had also moved up from 29406.41 MW in 2003-04 to 31556.06 MW, by 7.3 per cent. The power demand arose due to increasing number of consumers and quantum of demand was met by the State without imposing any restrictions to the consumers of various categories is the aspect to be highlighted.

It may be noted that out of the 170.34 lakh consumers, domestic category accounted for 67.3 per cent (114.60 lakhs), followed by commercial segment (19.93 lakhs). Of the total power consumption, industrial (33.6%), domestic (27.5%) and agricultural (24.2%) together takes away 85.0 per cent of the net availability. The 'Commercial' consumption is rising faster in terms of both the number of consumers and actual consumption owing to the bulging growth of services sector.

Table 5.8. Category-wise Number of Consumers and Consumption of Power

Category	No. of Consumers (lakhs)		Connected Load (MW)		Consumption of Power (mu)	
	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05
1. Domestic	109.81 (67.2)	114.60 (67.3)	10787 (36.7)	11764 (37.3)	9719 (25.3)	11083 (27.5)
2. Commercial	18.66 (11.4)	19.93 (11.7)	2563 (8.7)	2952 (9.4)	3498 (9.1)	3769 (9.4)
3. Industries						
a) HT (Number)	4925	5278 (0.03)	3938 (13.4)	4305 (13.6)	13496 (35.17)	3769 (9.4)
b) LT	3.90 (2.4)	4.06 (2.4)	4600 (15.6)	4894 (15.5)		
4. Agriculture	17.03 (10.4)	17.37 (10.2)	6662 (22.7)	6745 (21.4)	9588 (25.0)	9766 (24.2)
5. Public Lighting and Water works	2.69 (1.6)	2.92 (1.7)	596 (2.0)	616 (2.0)	1080 (2.8)	1103 (2.7)
6. Others	11.26 (6.9)	11.41 (6.7)	260 (0.9)	280 (0.9)	993 (2.6)	1007 (2.5)
Total	163.33	170.34	29406	31556	38374	40298

Note : Figures in brackets indicate percentage share to total.

5.9. Renewable Energy Sources

The problem of rapidly growing demand for power is compounded by the fast depletion of fossil fuel deposits, and high price for the fuels. Further, there is environmental pollution due to the use of conventional sources. Hence, harnessing of non-conventional sources of energy becomes inevitable. Tamil Nadu has played a prominent role in promoting and harnessing these sources especially wind and biomass including bagasse. To encourage the use of alternative sources of energy and various renewable sources of energy, the Tamil Nadu Energy Development Agency (TEDA), has been playing a catalytic role. The capacity additions made under power generation from Renewable Energy Sources during 2003-04 and 2004-05 in Tamil Nadu are given below.

Table 5.9 Renewable Energy Sources during 2003-04 and 2004-05 in Tamil Nadu

Renewable energy source	Capacity added during 2003-04	Total capacity as on 31.3.04	Capacity added during 2004-05	Total capacity as on 31.3.05
Wind	371 MW	1361 MW	679 MW	2040 MW
Bagasse based co-generation	52 MW	275 MW	-	275 MW
Biomass power	-	12 MW	18 MW	30 MW
Small Hydro (Upto 25 MW)	2 MW	80 MW	1 MW	81 MW
Total	425 MW	1728 MW	698 MW	2426 MW

5.9.1. Wind Energy

Tamil Nadu ranks first in the country in terms of wind power generation. Based on the wind assessment studies conducted in 67 sites, 41 places in 8 districts with average wind speed of 18 kmph and above were identified as suitable for wind power projects. Out of these in 8 locations, demonstration units for a total capacity of 19 MW were set up and following the success of the same private sector came in a big way and set up wind power projects covering 19 sites for a total capacity of 1361 MW as on 31.3.04 which increased to 2040 MW as on 31.3.05 covering 20 sites. The demonstration wind mills installed under the State fold,

where able to add 19 mu each in 2003-04 and 2004-05 against 18 mu in 2002-03.

Table 5.10. Rural Electrification Status : Southern States

Details	Andhra Pradesh	Karnataka	Kerala	Tamil Nadu
Percentage of Electrification	All except 21 Village	All except 294 Village	100%	100%
Rural HHlds having electricity	37.50%	41.75%	41.95%	44.95%

Source : Ministry of Power, Govt. of India (website)

5.9.2 Solar Energy

Solar energy comprises of two components namely light and heat energy. The light component of solar energy is harnessed as electric power through solar cells called Photovoltaic (SPV) systems which are used for various lighting applications and also water pumping. Solar thermal systems harness the heat energy through solar thermal collectors using specially coated black metal plates for heating of water or air or for cooking food.

5.9.2.1. Solar Photovoltaic Systems

Solar light Energy is converted into electricity through solar cells/modules and is used for operating various lighting systems and water pumps. For the year 2003-04, TEDA got a special sanction from MNES, Government of India and installed, 3387 Nos SPV street lights in 609 panchayats in 28 districts and six Municipal Corporations, availing 50% Central Financial Assistance during 2003 -04 & 2004-05. 500 SPV home lights were also installed in Group houses constructed under IAY and other households. 23 Nos solar water pumps were also installed for lifting water for minor irrigation and drinking water supply. Totally TEDA has distributed/installed 16398 Nos SPV lanterns, 5565 Nos SPV street lights, 1300 Nos SPV home lights and 285 SPV pumps as on 31.3.05.

5.9.2.2 Solar Thermal Energy

Solar thermal energy is utilized for the water heating system, air heating/drying system and as solar cookers. The

installation of solar water heating system is done in houses, hotels, and hospitals for bathing and washing utensils/equipment. The Central subsidy was provided till 1993. For the year 2003-04, the State Government sanctioned a subsidy of Rs.11.94 lakhs and for the year 2004-05 Rs.15.00 lakhs was sanctioned. The solar energy is used for drying agricultural produces like grains, fruits, tea etc and leather. For this purpose, a total subsidy of Rs.4.61 lakhs was sanctioned for the year 2003-04. The Central subsidy for the solar cooker has been discontinued since 1995-96 however the usage is promoted through soft loans from banks.

5.9.3 Bio Energy

The schemes for producing gas and electricity from biomass and other bio-waste to meet the energy requirements of industries and supply to the State grid being implemented in Tamil Nadu are the following:

5.9.3.1 Co-generation

The co-generation schemes implemented in the State have a total capacity of 274.6 MW as on 31.03.2005 under this scheme, steam is produced from bagasse in sugar mills and electricity is generated from the steam of which surplus is exported to the TNEB grid. Later, the low pressure steam is used for processing of sugar. The capacity under co-generation accounts for about 40 percent of the total capacity in the country (exportable surplus is 165 MW).

5.9.3.2 Biomass based generation

A biomass based power generator project of 12 mw capacity is in operation at Palyaseevaram, Kancheepuram District from 1997. State Government has taken efforts to encourage new power generation projects using wood and other agro residues and wastes. TNEB has issued consent for 13 power projects with a total capacity of 123 MW out of which one power plant 18 MW has been commissioned in Ramanathapuram district during 2004-05. Further taluk level Biomass assessment studies were carried out in 49 taluks followed by District level studies. Taluk level studies provide information regarding biomass potential in select

taluks in the State based on which promoters have come forward to setup power plants. The reports on District level studies have not yet been finalised by MNES.

5.9.3.3 Bio-mass gasifiers

To meet thermal and electrical energy requirements of industries and other organizations a new scheme of installing gasifiers is being promoted by MNES Thermal use gasifiers are given CFA @ 10 % while electrical applications were given subsidy @ 50% till 2004-05. Several village panchayats have come forward to install gasifiers for water pumping. The programme is being monitored and the scheme will be expanded after assessing the performance.

5.9.3.4 Toilet linked bio-gas plants

Biogas is clean, and cheap fuel produced from cattle dung, nightsoil, vegetable waste etc. Based on the success of toilet linked biogas plants installed on a pilot basis in Kolathur (Salem), Perundurai (Erode) and Periyakulam (Theni) a total of 82 Nos. were installed under subsidy of Rs.63.50 lakhs from State Government for educational institutions and women sanitary complexes in panchayats during 2003-04 and 2004-05. The biogas so generated is used for cooking, lighting and operating small capacity motors to pump water.

5.9.3.5 Power generation from waste

Biomethanation plants for producing gas and electricity using tapioca/sago waste water, poultry litter, vegetable wastes etc. are under implementation in Tamil Nadu in Pappireddipatty (from tapioca waste) in Namakkal district (from poultry waste) and in Koyambedu wholesale vegetable market (using vegetable waste) etc. Projects for energy recovery from MSW are eligible for subsidy from Govt. of India and urban local bodies could avail of the above benefit.

5.10. References

1. Economic Appraisal 2003-04, 2004-05, Evaluation and Applied Research Department, Government of Tamil Nadu.