*Research Paper*
*Impact Factor: 3.996*
*Peer Reviewed & Indexed Journal*

*IJMSRR*
*E- ISSN - 2349-6746*
*ISSN* -2349-6738

# POWER SECTOR IN TAMILNADU: A FUTURISTIC PERSPECTIVE

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***Abstract***
*Power is one of the infrastructures which is necessary for the sustained growth of any economy. The states and nations are becoming more and more industrialized and urbanized implying increasing demand for power. In this context there is a need for a critical look on status of generation, distribution, consumption and shortage of power in a state like Tamil Nadu so as to find out the solution to the crucial issue of power crisis. In the present analysis two issues are taken up: to analyse the trends in power generation and the demand for and supply of power in Tamil Nadu to find out the ground reality. Published data for a period of 15 years (ie from 2000–2014) were examined and it was found that the rate of power generation has been slowing down and due to this the gap between demand and supply gap is widening.*

## Introduction

Power is one of the most critical components of infrastructure for the economic growth and welfare of nations. The State like Tamil Nadu, which is one of the most industrialized and urbanized states in India and also it attracts more FDI from many countries. Tamil Nadu obtains FDI, for various sectors, particularly in the Automobile sector which warrants adequate power supply to these sectors. Over the last few years, Tamil Nadu has been facing massive power deficits. The government has decided to lift power cuts for high tension industrial and commercial users. The impact of this power shortage is being felt mainly by the industries, leading to a loss in efficiency and production.

The government's decision to provide uninterrupted power to these segments will benefit several thousand units, especially in the western belt where industrial production declined drastically over the past five years (ie from 2011) due to the power crisis. The shortfall had also affected domestic consumers in rural areas and TNEB did not spare even Chennai from load shedding when the situation was critical. But even with the government deciding to lift power cuts in industrial and commercial sectors, domestic consumers may have to live with outages in the form of frequent maintenance if there is a dip in wind energy or thermal plants are shut for maintenance.

## Sources of Power Generation in Tamil Nadu

The state's power comes mainly from two sources: Conventional sources like TANGEDCO's own generating stations Thermal, Hydel and Gas (natural gas, or liquid like oil), Private Sector (IPP), Share from Central Generating Stations, External assistance and apart from these conventional sources it also produces from Non-Conventional Renewable sources like Wind, Solar and Bio-Mass Co-generation, Bio-mass power, Small Hydro and Waste to energy.

## Institutional Structure of the Power Sector in Tamil Nadu

Tamil Nadu Electricity Board came into existence in the year 1957 and remained the solo energy provider and distributor in the state till 2008. Post 2008, as per the mandatory requirements of the Electricity Act 2003, Government of Tamil Nadu has re-organized TNEB by the establishment of a holding company by the name of TNEB Ltd and two subsidiary companies, namely Tamil Nadu Transmission Corporation Ltd (TANTRANSCO) and Tamil Nadu Generation and Distribution Corporation Ltd (TANGEDCO). TANTRANSCO in engaged in electricity transmission, TANGEDCO was engaged in both electricity generation and distribution and is the successor to the erstwhile Tamil Nadu Electricity Board. TANGEDCO operates four large thermal power stations – Ennore Thermal Power Station (ETPS), Mettur Thermal Power Station (MTPS), North Chennai Thermal Power Station (NCTPS), Tuticorin Thermal Power Station (TTPS).

## Researchable Issue

Power is one of the infrastructure which is necessary for the sustained growth of any economy. This becomes even more important for a state like Tamil Nadu, which is one of the most industrialized and urbanized states in India. In this background a study on generation, distribution, consumption and shortage of power in Tamil Nadu has been felt as necessary. Hence the present study.

## Objectives

1. To analyse the trends in power generation in Tamil Nadu.
2. To study the demand for and supply of power in Tamil Nadu to find out the gap.

**Data and Methodology**

The required secondary data for the study were collected from Annaul Reports of Tamil Nadu Generation and Distribution Corporation Ltd (TANGEDCO) and Central Electricity Authority (CEA). The study covered a period of 15 years (ie from 2000 to 2015). The collected data were analysed with the help of Percentage, Annual Growth Rate (AGR) and Compound Growth Rate (CGR).

For a purpose of meaningful analysis the variables taken into consideration were installed capacity, power generation, pattern of consumption of power and power Demand- Supply position of Tamil Nadu.

**Installed Capacity of Power**

Installed capacity, sometimes termed peak installed capacity or rated capacity, describes the maximum capacity that a system is designed to run at Capacity is the maximum electric output an electricity generator can produce under specific conditions. Name plate capacity is determined by the generator's manufacturer and indicates the maximum output of electricity a generator can produce without exceeding design thermal limits.

India, Tamil Nadu is the only state in India where one-third of the installed power comes from renewable sources. The present installed capacity of 17,868.37 MW mostly consists of Coal (35%), Hydro (12%) and Renewable Energy (42%). Tamil Nadu's higher percentage of renewable energy comes from the fact that state has geographic conditions that are suitable for harnessing such sources of energy.

**Table 1 Installed Capacity of Power in Tamil Nadu**

| Year | Installed Capacity | AGR | Percentage |
|---|---|---|---|
| 2000-01 | 6520 | - | 4.04 |
| 2001-02 | 8745 | 34.13 | 5.42 |
| 2002-03 | 9319 | 6.56 | 5.78 |
| 2003-04 | 9767 | 4.81 | 6.06 |
| 2004-05 | 10138 | 3.80 | 6.29 |
| 2005-06 | 10031 | -1.06 | 6.22 |
| 2006-07 | 10098 | 0.67 | 6.26 |
| 2007-08 | 10122 | 0.24 | 6.28 |
| 2008-09 | 10214 | 0.91 | 6.33 |
| 2009-10 | 10214 | 0.00 | 6.33 |
| 2010-11 | 10237 | 0.23 | 6.35 |
| 2011-12 | 10365 | 1.25 | 6.43 |
| 2012-13 | 10515 | 1.45 | 6.52 |
| 2013-14 | 11884 | 13.02 | 7.37 |
| 2014-15 | 23104 | 94.41 | 14.33 |
| **CGR** | **9.26** | | |

Source: Tamil Nadu Generation and Distribution Corporation Ltd. (TANGEDCO)

The Average Growth rate of installed capacity was very high in period 2014-15(94.41%), and then followed by periods 2001-02(34.13%), 2013-14(13.02%) and 2002 -03(6.56 %) respectively. Negative growth rate experienced during the period 2005-06(-1.06%).

It was observed that calculated CGR comes around 9.26 per cent during the study period. The Installed capacity of power in Tamil Nadu power generation shows an increasing trend.

**Power Generation in Tamil Nadu**

Generation is the amount of electricity a generator produces over a specific period of time. For example, a generator with 1 megawatt (MW) capacity that operates at that capacity consistently for one hour will produce 1 megawatt hour (MWh) of electricity. If the generator operates at only half that capacity for one hour, it will produce 0.5 MWh of electricity. Many

generators do not operate at their full capacity all the time. A generator's output may vary according to conditions at the power plant, fuel costs, and/or as instructed by the electric power grid operator.

**Table 2 Power Generation of in Tamil Nadu**

| Year | Generation (GWH) | AGR |
|---|---|---|
| 2000-01 | 25853 | - |
| 2001-02 | 28063 | 8.55 |
| 2002-03 | 28816 | 2.68 |
| 2003-04 | 28288 | -1.83 |
| 2004-05 | 30191 | 6.73 |
| 2005-06 | 32167 | 6.54 |
| 2006-07 | 38508 | 19.71 |
| 2007-08 | 40820 | 6.00 |
| 2008-09 | 41445 | 1.53 |
| 2009-10 | 42544 | 2.65 |
| 2010-11 | 43112 | 1.34 |
| 2011-12 | 45345 | 5.18 |
| 2012-13 | 45923 | 1.27 |
| 2013-14 | 46871 | 2.06 |
| 2014-15 | 47374 | 1.07 |
| **CGR** | **4.33** | |

Source: Tamil Nadu Generation and Distribution Corporation Ltd. (TANGEDCO)

It was observed that overall period generation power sector in Tamil Nadu showed an increasing trend. from the years 2000-01 to 2005-06 the average growth rate was less than 10 per cent, but after that AGR suddenly jumped in to 19.7 per cent during the period 2006-07. During the period 2003-04 the state experienced negative growth rate.

**Demand for Power**

Due to the astronomical increase in energy demand in recent years, the demand for power has increased from 7131 MW in 2000-01 to 13594 MW in 2014-15. That is, within 15 years the demand has doubled.

**Table 3 Demand for Power in Tamil Nadu**

| Year | Demand (MW) | AGR |
|---|---|---|
| 2000-01 | 7131 | - |
| 2001-02 | 7158 | 0.38 |
| 2002-03 | 6942 | -3.02 |
| 2003-04 | 7455 | 7.39 |
| 2004-05 | 7647 | 2.58 |
| 2005-06 | 8209 | 7.35 |
| 2006-07 | 8803 | 7.24 |
| 2007-08 | 8969 | 1.89 |
| 2008-09 | 9459 | 5.46 |
| 2009-10 | 10046 | 6.21 |
| 2010-11 | 10670 | 6.21 |
| 2011-12 | 10713 | 0.40 |
| 2012-13 | 11283 | 5.32 |
| 2013-14 | 12764 | 13.13 |
| 2014-15 | 13594 | 6.50 |
| **CGR** | **4.62** | |

Source: Tamil Nadu Electricity Board (TNEB)

The demand for power in Tamil Nadu as analyzed from the data obtained from reports of TNEB. The Annual Growth rate of Demand for power was very high in the year 2013-14 (13.13 %). The demand for power in Tamil Nadu has shown as increasing trend. The calculated CGR for demand for power in Tamil Nadu was 4.62 per cent.

**Supply for Power**

The Government of Tamil Nadu is giving topmost priority for development of power infrastructure in the State. Strategic steps are being taken to provide quality and uninterrupted power supply for all the sectors in the State by improving the efficiency of Transmission and Distribution networks and thus reducing losses in the system. Tamil Nadu has one of the better power utilities in the country and the power sector in the State has grown manifold in capacity generation. All the villages and the towns are fully electrified. The State has a healthy per capita power consumption of 1065 units. The plant load factor, an important measure of efficiency, is higher in Tamil Nadu when compared to other States. Transmission and Distribution loss in Tamil Nadu is very low when compared to most of the other States due to its efficient network.

**Table 4 Supply of Power in Tamil Nadu**

| Year | Supply | | Supply | |
|---|---|---|---|---|
| | Required (MU) | AGR | Available(MU) | AGR |
| 2000-01 | 46702 | - | 39462 | - |
| 2001-02 | 46232 | -1.01 | 42951 | 8.84 |
| 2002-03 | 42130 | -8.87 | 39395 | -8.28 |
| 2003-04 | 45665 | 8.39 | 45042 | 14.33 |
| 2004-05 | 47872 | 4.83 | 47570 | 5.61 |
| 2005-06 | 47872 | 0.00 | 47570 | 0.00 |
| 2006-07 | 54194 | 13.21 | 53853 | 13.21 |
| 2007-08 | 61499 | 13.48 | 60445 | 12.24 |
| 2008-09 | 65780 | 6.96 | 63954 | 5.81 |
| 2009-10 | 69668 | 5.91 | 64208 | 0.40 |
| 2010-11 | 76293 | 9.51 | 71568 | 11.46 |
| 2011-12 | 80314 | 5.27 | 75101 | 4.94 |
| 2012-13 | 85685 | 6.69 | 76705 | 2.14 |
| 2013-14 | 86163 | 0.56 | 81275 | 5.96 |
| 2014-15 | 86256 | 0.11 | 83559 | 2.81 |
| **CGR** | **4.39** | | **5.39** | |

Source: Tamil Nadu Electricity Board. (TNEB)

The Annual Growth rate of required supply was very high in 2007-08(13.48%) but at the same time available supply was very high in 2003-04(14.33 %). Required and Available supply experienced a negative growth rate in 2002-03(-8.28 %). The study observed that CGR of required supply was 4.39 per cent whereas the CGR available supply was 5.39 per cent.

**Power Consumption-Tamil Nadu**

The Government of Tamil Nadu is according topmost priority for development of power infrastructure in the State. Strategic steps are being taken to provide quality and uninterrupted power supply for all the sectors in the State by adding to installed capacity, giving thrust to development of non-conventional energy sources, resorting to purchase of power from other sources, enhancing performance in the working of thermal power plants, improving the efficiency of transmission and distribution networks and thus reducing losses in the system.

Industrial and Commercial users are the only two segments in the state that currently face power cuts, Tamil Nadu Electricity Board (TNEB) officials said. These consumers are forced to draw 80% of their required power during the day and restrict consumption to 10% of their requirement during the peak hours between 6pm and 10pm.

**Table 5 Power Consumption in Tamil Nadu**

| Year | Domestic | AGR | Public Lighting | AGR | Industries | AGR | Agriculture | AGR | Commercial | AGR | Others | AGR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000- | 3.43 | - | 4.19 | - | 3.46 | - | 5.57 | - | 4.12 | - | 6.12 | - |
| 2001- | 3.81 | 11.08 | 5.22 | 24.58 | 3.6 | 4.05 | 5.75 | 3.23 | 4.2 | 1.94 | 5.2 | - |
| 2002- | 4.26 | 11.81 | 5.55 | 6.32 | 3.66 | 1.67 | 5.4 | -6.09 | 4.52 | 7.62 | 5.48 | 5.38 |
| 2003- | 4.75 | 11.50 | 5.66 | 1.98 | 4.28 | 16.94 | 5.61 | 3.89 | 3.35 | -25.88 | 5.53 | 0.91 |
| 2004- | 5.32 | 12.00 | 5.97 | 5.48 | 5.26 | 22.90 | 5.84 | 4.10 | 4.69 | 40.00 | 5.66 | 2.35 |
| 2005- | 4.92 | -7.52 | 5.97 | 0.00 | 6.28 | 19.39 | 5.94 | 1.71 | 4.98 | 6.18 | 5.79 | 2.30 |
| 2006- | 5.9 | 19.92 | 6.44 | 7.87 | 6.85 | 9.08 | 6.19 | 4.21 | 5.55 | 11.45 | 5.92 | 2.25 |
| 2007- | 6.24 | 5.76 | 6.96 | 8.07 | 7.19 | 4.96 | 6.41 | 3.55 | 7.83 | 41.08 | 6.64 | 12.16 |
| 2008- | 6.48 | 3.85 | 7.16 | 2.87 | 7.5 | 4.31 | 6.3 | -1.72 | 7.94 | 1.40 | 6.66 | 0.30 |
| 2009- | 6.68 | 3.09 | 7.27 | 1.54 | 8.05 | 7.33 | 7.15 | 13.49 | 8.81 | 10.96 | 7.26 | 9.01 |
| 2010- | 7.97 | 19.31 | 7.65 | 5.23 | 8.33 | 3.48 | 7.55 | 5.59 | 8.87 | 0.68 | 7.49 | 3.17 |
| 2011- | 9.03 | 13.30 | 7.74 | 1.18 | 8.39 | 0.72 | 7.72 | 2.25 | 9.06 | 2.14 | 7.64 | 2.00 |
| 2012- | 9.55 | 5.76 | 7.89 | 1.94 | 8.78 | 4.65 | 7.93 | 2.72 | 9.9 | 9.27 | 7.74 | 1.31 |
| 2013- | 10.4 | 8.90 | 8.12 | 2.92 | 8.98 | 2.28 | 8.2 | 3.40 | 10.12 | 2.22 | 7.95 | 2.71 |
| 2014- | 11.3 | 8.65 | 8.22 | 1.23 | 9.39 | 4.57 | 8.46 | 3.17 | 10.76 | 6.32 | 8.92 | 12.20 |
| **CGR** | **8.70** | | **4.83** | | **7.24** | | **2.97** | | **6.95** | | **2.67** | |

Source: Ministry of Power

Power consumption in Tamil Nadu is reported in table 5. It was observed from the table that CGR of power consumption was very high in Domestic, that is., 8.70 per cent and then followed by industries (7.24 %), Commercial (6.9%), public lighting (4.83 %), agriculture (2.97%) and others (2.67 %). Over all power consumption shows an increase in the consumption by all the sectors over the years.

**Suggestions**

To cover the gap in supply the state has to invest more in the power sector. Wherever power for agriculture has been free, it has an impact on the overall financial viability of the state utility. Some sort of cross subsidization is acceptable, but when it is totally free there is no economics and optimal utilization. Some thought has to be given on this issue.

Renewable form of energy can be widely used. Solar panel both for domestic as well as industrial purpose can be subsidized.

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