ENERGY

CHAPTER VII

Power infrastructure is a critical ingredient for accelerating a sustained growth of the economy. Power input is a pivot around which all economic activities revolve. It drives the State's agricultural, industrial, commercial, social and overall economic growth. Availability of affordable, reliable and quality power is a basic requirement for the State. Power projects are capital-intensive by nature with a long gestation period. Adequate participation of private sector is being encouraged to augment power resources. For an industrialized State like Tamil Nadu, the demand for quality power increases exponentially and moves in tandem with the rate of economic and population growth. As a result, the demand-supply gap is bound to persist.

Box No.7.1 Energy Sector: Twelfth Plan – An Overview

- Make Tamil Nadu a power surplus State
- Improve energy efficiency
- Provide access to electricity to all rural households
- Reduce aggregate technical and commercial losses to below 15 percent
- Achieve greater consumer satisfaction by IT enabled services
- Total outlay Rs.27517 crore — Conventional sources: 97%, Non-conventional sources: 3%.
- 13% of the total Plan Outlay
- Capacity addition:
  a. Conventional Sources – 15504.5 MW
  b. Non-conventional Sources – 10650.0 MW
- Sub-stations – 325
- EHT lines – Circuit Km 4500

Source: Twelfth Five Year Plan Document 2012-17, State Planning Commission, Chennai-5.

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.

The Southern power grid is the third largest in terms of power consumption among the five power grids. The integration of Southern power grid with the national power grid fulfills a long-felt need of the consumers and the power-scarce State Electricity Utilities in the South. It is conditioned by early completion of the commissioning process of the Raichur-Solapur line and synchronization of Southern grid with the others.

7.1 Power Scenario in 2013-14:

Reliable supply of electricity is essential for achieving a higher economic growth and social development of the State. The performance of the energy sector during the year 2013-14 was rated as good. Thanks to good inflows, the hydel sources which was at a low ebb in the beginning of the year had picked up subsequently and complemented the thermal sources. The thermal plants were put into function to their full capacity inspite of minimum

technical problems. There was a significant contribution from the wind power projects this year even beyond its season.

The State is taking several steps to improve uninterrupted quality power to the consumers; despite the fact that it had faced a number of difficulties – growing number of consumers and their consumption pattern, delay in commissioning of project, acute corridor constraint for transmission of power and inadequate tie up with long-term sources of power generation. The State ensured uninterrupted supply of coal to thermal power stations. With the concerted efforts of the State, the commissioning of thermal power projects viz., TNEB – NTPC joint venture project at Vallur with a capacity of 500 MW (of which the state's share - 350 MW) in August 2013, Mettur Thermal Power Project with a capacity of 600 MW in October 2013, , North Chennai Thermal Power Station stage – II, Unit-I 600 MW in March 2014; and hydel projects viz., Bhavani Kattalai Barrage – III with the capacity of 30 MW, creation of additional capacity by taking up Renovation, Modernization and Uprating works in Periyar Power House (7 MW) had helped to improve the total installed capacity in the State at the command of TNEB from 10515 MW in 2012-13 to 11884 MW in 2013-14, registering an increase of 13.0 percent.

Box No.7.2 Energy Sector - Vision 2023

The heart of the Tamil Nadu Vision 2023 is to make good the shortage of peak power and energy shortage that Tamil Nadu faces at present through expeditious addition to conventional and non-conventional power generation capacity and modernization of transmission and distribution infrastructure with a massive public and private investment of Rs.4,50,000 crore over the next eleven years and projects the Energy sector as the bedrock for an efficient and competitive economy. The focus of the investments for energy sector is detailed below:

Projects	Rs. Crore
Ultra Mega Power Projects	50,000
Case 2 bidding	60,000
Wind power	25,000
Solar power	55,000
LNG terminal	20,000
Gas Grid	20,000
Transmission and Distribution	2,00,000
Investment in Smart Grid	20,000
Total	4,50,000

Source: Vision 2023, Government of Tamil Nadu

Thanks to the constant encouragement of the State towards the promotion of non-conventional sources of energy, the total installed capacity of this source improved from 7,999 MW in 2012-13 to 8076 MW in 2013-14 (Upto July 2013) and also lent its supporting hand to augment the power supply during the current year. Kuttalam gas turbine station was brought back to service from repair and made it to function efficiently to ensure maximum power generation. Apart from this, to bridge the gap between supply and demand, the State's initiatives by way of effecting short term (tenure less than 1 year) purchase of power from the local generators in Tamil Nadu had paid rich dividends in quick time. In addition to this, procurement of 500 MW power from other States through medium term (tenure 1 to 7 years) purchase agreements came in very handy in right time. The State Government has also encouraged domestic consumers to set up solar power installations by providing incentives. Establishment of solar power plants in all industrial estates, solar lights in green houses, usage of solar heater and promotion of solar power street lights in all local bodies are being encouraged.

With all these measures, the gross power availability in the State increased from 74872 MU in 2012-13 to 85830 MU in 2013-14. As a result, the State was able to meet the all-time high peak demand of 12,764 MW in March 2014. During the year, the maximum grid consumption was also attained at 279 million units in the fag end of March 2014. Taking the favourable power scenario during the year 2013-14, the power shortage in the State had been significantly reduced and supply of quality power throughout the State was ensured. The State resorted to some restriction and control measures to bridge the gap between demand and supply. Consequently, the load shedding in the State during the year 2013-14 was minimal and infrequent.

Table No. Overall Profile of Power Sector

Details	2012-13	2013-14
Installed Capacity (MW)	10515	11884
Generation (MU)	25301	31276
Purchases (MU)	49571	54554
Gross Availability (MU)	74872	85830
Peak demand (MW)	11283	12764
Net Consumption (MU)	72670	83381

Source: Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

7.2 Power Situation in 2012-13:

The overall power situation in the State during the year 2012-13 was challenging, eventhough the installed capacity rose from 10365 MW during 2011-12 to 10515 MW during 2012-13. Coupled with the rise in the number of consumers and their consumption, the demand for power also steadily increased. The peak demand for power during the year had crossed the mark of 11000 MW. The average availability of power during the year stood at 8,500 MW. The State faced power shortage due to the increased demand. To manage the shortfall in power supply, the State adopted several demand and supply side management strategies on a war footing. On the supply side, the constraints were delays in commissioning of Central Sector and join sector projects, acute corridor constraint for transmission of power, inadequate tie-up with long term sources of power generation, poor water realization in hydro stations and a fall in the generation by gas turbines. The shortfall was managed by resorting to increase in power purchases from 48592 MU in 2011-12 to 49571 MU (2%) in 2012-13 and utilizing alternate sources of generation. On demand side management, the State imposed restriction and control measures which include load shedding for urban and rural feeders, 9 hours three phase supply to agricultural services, restrictions on High Tension (HT) industrial and commercial establishment to drawn not more than 10 percent during peak hours.

Table No. 7.2 Installed Capacity and Peak Demand

Year	Installed Capacity MW	Peak Demand MW
2005-06	10031	8209
2006-07	10098	8803
2007-08	10122	8969
2008-09	10214	9459
2009-10	10214	10046
2010-11	10237	10670
2011-12	10365	10713
2012-13	10515	11283

Source: Tamil Nadu Generation and Distribution Corporation Limited, Chennai - 2

Table No. 7.3 Profile of Power Sector : Tamil Nadu

Details	2011-12	% increase	2012-13	% increase
Installed capacity (MW)	10365	1.3	10515	1.4
Generation (MU)	27942	9.0	25301	(-) 9.5
Purchases (MU)	48592	(-) 3.7	49571	2.0
Gross availability (MU)	76535	0.6	74872	(-) 2.2
Peak demand (MW)	10713	0.4	11283	5.3
Net Power Available for Sale within the State (MU)	60987	4.3	58622	(-) 3.9

Source: 1. Statistics at a Glance, 2012-13, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2

There was a marginal fall in power generation from 27942 MU during 2011-12 to 25301 MU (-9.5%) during 2012-13, gross power availability from 76535 MU to 74872

MU (-2.2%) and net power available for sale within the State from 60987 MU to 58622 MU (-3.9%).

To match the generation capacity addition and load growth, the State has an efficient network facilitating free flow of power across regions and increasing the transmission voltage from 230 KV to 400 KV to 8,244 High Tension (HT) consumers and 2.44 crore Low Tension (LT) consumers. The State also took concerted efforts to minimize transmission and distribution losses by erection of new sub-stations and Extra High Tension link lines and strengthening of distribution lines etc., The total number of sub–stations of various voltage categories increased from 1,320 in 2011-12 to 1,341 in 2012-13, transformers from 2.13 lakh to 2.21 lakh and strengthening of Extra High Tension (EHT) lines from 1.80 lakh CKT kms to 1.84 lakh CKT kms and Low Tension (LT) lines from 5.67 lakh kms to 5.78 lakh kms. The transmission and distribution loss in the State is estimated at around 17.2 percent as against 27 percent at all India. A total of 17 enforcement squads and one flying squad had detected 27,186 power theft cases and 7,326 malpractice cases and levied provisional assessment and compounding charges amounting to Rs.13,432.27 lakhs. These efforts also had minimized the transmission and distribution loss to a considerable extent in the State. However, the line loss in the State was estimated at around 13860 MU. Of the total loss, distribution line loss in LT lines forms the major part. Hence, this may be properly addressed through conversion of low voltage lines to high voltage line along with feeder separation.

All these measures helped the State to effect new service connections to 12.13 lakh new consumers inspite of facing power crisis. On an average, the percapita electricity consumption in the State during the year worked out to 1065 units. At this level, it was higher than the National average of 734 units.

7.3 Power Requirement and Availability 2012-13: By Major States

The State-wise comparison of the power requirements and power availability during the year 2012-13 reveals the following inferences:

- All Major States in the Country had experienced power deficit during 2012-13. The deficit at all India was 8.7 percent.
- The power deficit among the States varied between 0.7 percent (West Bengal) and 17.7 percent (Tamil Nadu).
- The Power deficit in the 6 States Tamil Nadu (17.7%), Andhra Pradesh (17.6%), Bihar (16.7%), Uttar Pradesh (16.6%), Karnataka (13.9%) and Madhya Pradesh (12.9%) were higher than the all India.
- Only in the State Chhattisgarh, the availability of power exceeds the requirement.
- In Tamil Nadu, as against the estimated requirement of 91113 MW, the availability at 74972 MW was short by 17.7 percent.

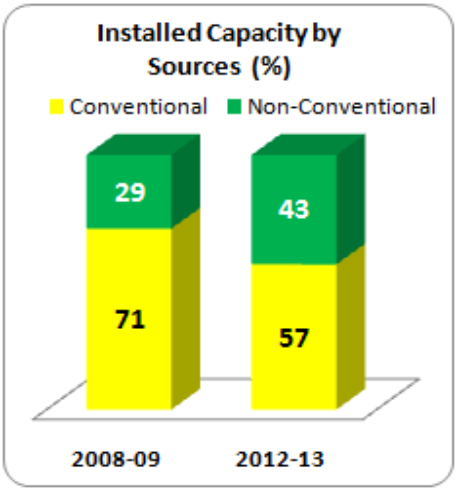
Table No.7.4 Power Requirement, Availability 2012-13 by Major States				
States	Power requirement (MW)	Power availability (MW)	Power deficit (MW)	Power deficit/ surplus (%)
Andhra Pradesh	99,713	82,192	(-)17,521	(-)17.6
Assam	6,503	6,056	(-) 447	(-) 6.9
Bihar	15,406	12,832	(-)2,574	(-)16.7
Chhattisgarh	17,251	23,036	5,785	33.5
Gujarat	93,475	88,902	(-)4,573	(-) 4.9
Haryana	41,407	38,209	(-)3,198	(-)7.7
Karnataka	66,280	57,050	(-)9,230	(-)13.9
Kerala	21,232	20,379	(-)853	(-) 4.0
Madhya Pradesh	51,425	44,811	(-)6,614	(-)12.9
Maharashtra	123,493	119,480	(-)4,013	(-)3.2
Orissa	25,349	24,547	(-)802	(-)3.2
Punjab	48,554	45,949	(-)2,605	(-)5.4
Rajasthan	55,530	53,861	(-)1,669	(-)3.0
Tamil Nadu	91,113	74,972	(-)16,141	(-)17.7
Uttar Pradesh	91,691	76,453	(-)15,238	(-)16.6
West Bengal	42,414	42,098	(-)316	(-)0.7
India	996,277	909,349	(-)86,928	(-)8.7
Source: Regional Monitoring Services, Centre for Monitoring Indian Economy (CMIE), Mumbai				

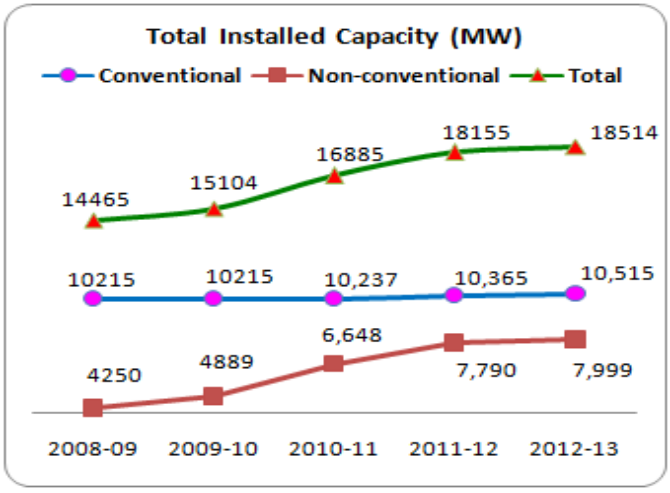
7.4 Installed Capacity:

7.4.1 Overall:

Table No.7.5 Total Installed Capacity – (MW)					
Sources	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**
Conventional	10215	10215	10,237	10,365	10,515
Non-conventional	4250	4889	6,648	7,790	7,999
Total	14465	15104	16,885	18155	18514
Source: 1. Various Issues of Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2 2. Tamil Nadu Energy Development Agency, Chennai-6.					

The demand for energy has been growing rapidly with the growth of the economy, changes in the demographic structure, swelling urbanization, socio-economic development and the desire for attaining and sustaining self reliance in core sectors of the economy. With the objective of managing the ever-increasing demand for





electricity in the State and to make it power surplus, capacity addition programmes have been undertaken by initiating new power projects. Initially, the main thrust was laid on power generation through tapping of hydel potential because of its cost-effective nature. The State has already fully exploited the hydro electric potential available in the State. The hydro generation in the State mainly depends on monsoons and water releases by neighbouring States. Such dependence makes hydro stations less reliable. As a result, towards enhancing installed capacity, the focus of the Government has shifted from hydel to thermal power

plants and renewable sources viz., wind, and solar over a period of time. The total installed capacity had gone up from 14,465 MW in 2008-09 to 18,514 MW in 2012-13. The contribution of non-conventional sources to the net addition in installed capacity in recent years was remarkable. Eventhough, the contribution of conventional sources was also substantial, it's share in the total installed capacity had gradually come down from 71 percent in 2008-09 to 57 percent in 2012-13. On the other hand, the relative contribution of non-conventional sources viz., wind, solar, biomass and co-generation plants gradually picked up from 29 percent to 43 percent during the above mentioned periods.

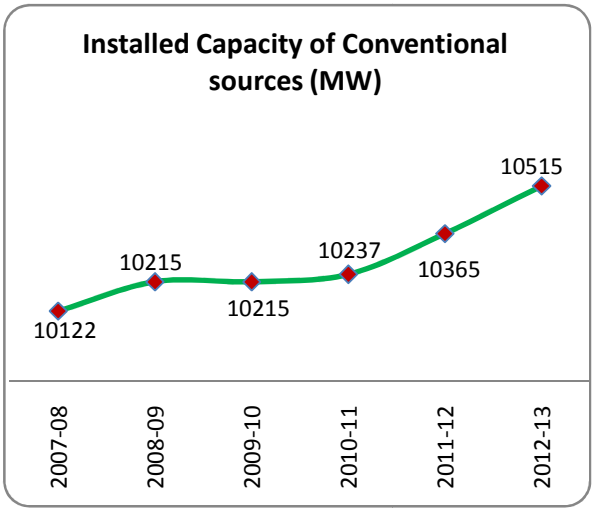
7.4.2 Conventional Sources:

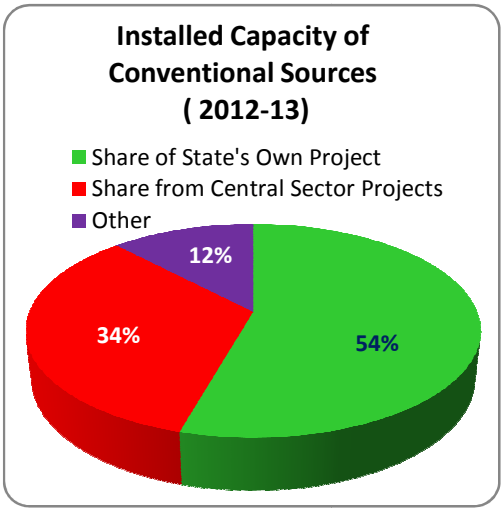
The conventional sources of energy in the State includes hydro, thermal, gas, including the share from Central sector projects (thermal and atomic), private power projects and external assistance projects. With the concerted efforts of the State there was a steady increase in the installed capacity of conventional sources. Increasing installed capacity under conventional sources is not only capital intensive but also has a longer gestation period. As a result, the net addition in installed capacity of conventional sources was limited. The total installed capacity of conventional sources at the command of Tamil Nadu Electricity Board (TNEB) crossed 10,000 MW mark in 2005-06. Between 2011-12 and 2012-13, total installed capacity of the conventional sources at the command of TNEB increased from 10,365 MW to 10,515 MW (1.5%). The major part of the net increase had come as State's share from Central sector projects. The limited net addition to the installed capacity was due to delay in commissioning of new projects. Of the total installed capacity, the share of State's own projects (54.4%) and share from Central sector projects (33.5%) together claimed a lion's share of 88 percent. The remaining emanated from independent power projects, external assistance projects and others.

Table No.7.6 Total Installed Capacity – Conventional Sources (MW)

Year	Installed Capacity	% Change
2008-09	10215	0.9
2009-10	10215	0.0
2010-11	10237	0.2
2011-12	10365	1.3
2012-13	10515	1.4

Source: Various Issues of Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.





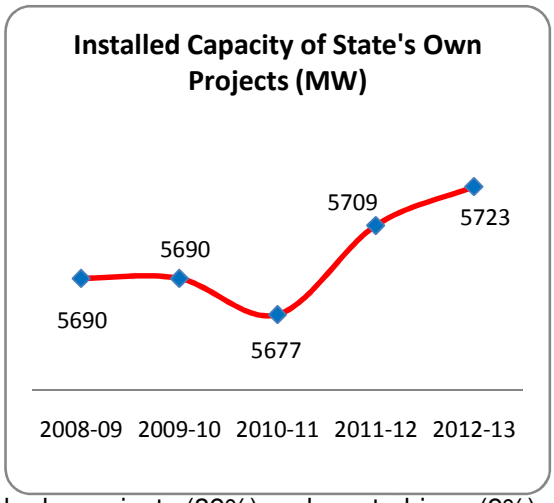
7.4.3 State's Own Projects:

The installed capacity of State's own projects increased from 5,709 MW in 2011-12 to 5,723 MW in 2012-13 (0.2%). The net addition of the MW mainly came from hydro. The renovation, modernization and uprating works of unit - I and II of Periyar Power House resulted in the net addition. Among the hydro projects the installed capacity in the State varied between 0.7 MW (Mukurthy Mini PH) and 400 MW (Kadamparai PH). There was no addition in the installed capacity of four State's thermal projects - Mettur Thermal Power Stations 840 MW, Tuticorin Power Thermal Station 1050 MW, North Chennai Thermal Power Station 630 MW and Ennore Thermal Power Station 450 MW. In the case of gas turbine plants, the installed capacity remained at 516 MW in the State in both the years. Of the total installed capacity of the State's own projects, thermal projects accounted for a sizeable share of 52 percent, followed by hydro projects (39%) and gas turbines (9%).

Table No.7.7 Installed Capacity – At State's Own Projects (MW)

Projects	2010-11	2011-12	2012-13
1. Hydro	2,191	2,223	2,237
2. Thermal	2,970	2,970	2,970
3. Gas Turbine	516	516	516
Total	5,677	5,709	5,723

Source: Various Issues of Statistics at a Glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.



7.4.4 Share from Central Sector Projects:

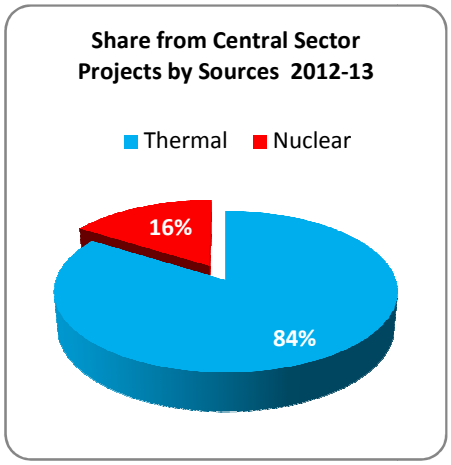
7.4.4.1 Thermal Projects:

The State Government receives an assigned share of the installed capacity of Central sector power projects in Tamil Nadu as well as in neighbouring States. The thermal stations viz., Neyveli - I and II, Ramagundam (Andhra Pradesh), Talcher stage II, Simhadiri II, Vallur and the two nuclear projects viz., Madras Atomic Power Project and Kaiga (Karnataka) Atomic Project offer a share of their capacities to the State. Between 2011-12 and 2012-13, the total installed capacity of the State's share in Central projects had gone up from 2,956 MW to 3,520 MW (19.1%). Of the total net additions of installed capacity from the Central sector projects of 564 MW between these two years, the contribution from thermal power projects was 543 MW (96%) and the rest from atomic power stations (4%). Of the total net additions in installed capacity from thermal power projects, the net addition from TNEB-NTPC project Vallur was 375 MW and from Simhadri stage II was 134 MW.

Table No.7.8 Installed Capacity – At Share of Central Projects (MW)

Projects	2010-11	2011-12	2012-13
1. Thermal	2324	2419	2962
2. Nuclear	537	537	558
Total	2861	2956	3520

Source: Various Issues of Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.



7.4.4.2 Atomic Projects:

Atomic energy is an important source of electric power which has environmental advantages and is likely to be economical in the longer run. The State is offered a share from the two projects Madras Atomic Power Project and Kaiga Atomic Power Project. Of the total installed capacity of conventional sources in the State, the share of nuclear power projects was 9.6 percent. The total installed capacity assigned from these two projects increased from 989 MW in 2011-12 to 1011 MW in 2012-13 (2.2%). Of the net addition of 22 MW, Kaiga Nuclear Power Project alone contributed 20 MW (91%).

7.4.4.3 Other Power Projects:

The other power projects include 7 Private Power Projects (Basin Bridge GMR, Samalpatti DEPP, Pillaiperumalnallur GTPP, Madurai Power Corporation, ST-CMS, LANCO Tanjore Power Co. Ltd, Penna Power Limited), external assistance projects and captive power projects. This source contributed 12.1 percent of the total installed capacity at the command of TNEB. There was a decline in the total installed capacity gathered from these projects. The fall was from 1699 MW in 2011-12 to 1272 MW in 2012-13 (-25.1%). The decline was much pronounced in the installed capacity of the external assistance projects from Eastern region as well as captive power projects. As a result, the contribution of these projects to total installed capacity at the command of the TNEB had come down from 16.3 percent to 12.1 percent. Of the total installed capacity of these projects, the share of private sector was 91 percent. It was followed by captive power projects 5 percent and external assistance project from Eastern region (4%).

Table No.7.9 Contribution of Other Power Projects to Installed Capacity at the command of TNEB (MW)

Projects	2010-11	2011-12	2012-13
1. Private Sector	1180	1180	1154
2. External Assistance	305	305	50
3.Captive Power Projects	214	214	68
Total	1699	1699	1272

Source: Various Issues of Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

7.5 Non-Conventional Sources:

Renewable energy which is sustainable produces little or no waste products such as carbon-dioxide or other chemical pollutants and helps in lessening green house effect. With the commitment to mitigate climate change effects, the State Government has made several policy initiatives to promote renewable energy generation. The State is the pioneer in promoting renewable energy and it accounts for 27 percent of the total renewable energy installed capacity at the all India level (29989.21 MW). It contributes 43 percent of the total installed capacity (conventional and non-conventional) of the State.

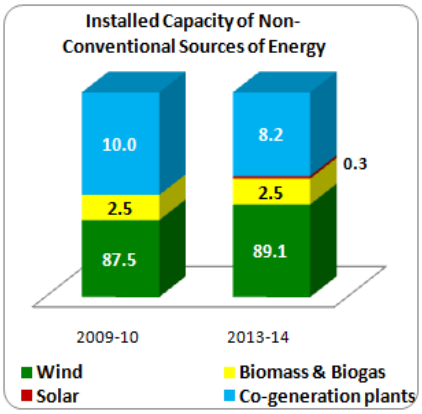
Table No.7.10 Installed Capacity under Non-conventional Sources of Energy in Tamil Nadu (MW)

Sources	2011-12	2012-13	2013-14 Upto July2013
Wind	6970.63	7145.23	7192.13
Biomass & Biogas	169	177.4	203.4
Solar	15	17	21
Co-generation plants	635.4	659.4	659.4
Total	7790.03	7999.03	8075.93

Source: Tamil Nadu Energy Development Agency, Chennai-6.

There was a steady increase in the total installed capacity under non-conventional sources in the State in recent years. Between 2012-13 and 2013-14, the increase was from 7999.03 MW to 8075.90 MW (0.96%). Of the net addition of 76.8 MW in the installed capacity, the relative contribution of wind (61%) and biomass (34%) together accounted for 95 percent. Of the total installed capacity of renewable energy sources, the contribution from the wind energy was high at 89 percent followed by bagasse based co-generation plants in

sugar industries (8%). Tapping of solar energy which commenced from 2010-11 has gradually picked up and accounts for 0.3 percent of the total installed capacity of renewable energy in the State. Tamil Nadu tops in harnessing wind energy as it constitutes about 38 percent of the total all India installed capacity for wind mill generation (19051.46 MW) in 2012-13.



7.5.1 Challenges:

The following are the challenges that confronted thermal (conventional) and non- conventional sources of energy which need to be properly addressed:

7.5.2 Thermal:

- Requires higher maintenance and operational cost,
- Pollution of atmosphere,
- Huge requirement of water,
- Handling of coal and disposal of ash is quite difficult.

7.5.3 Non-conventional source of energy:

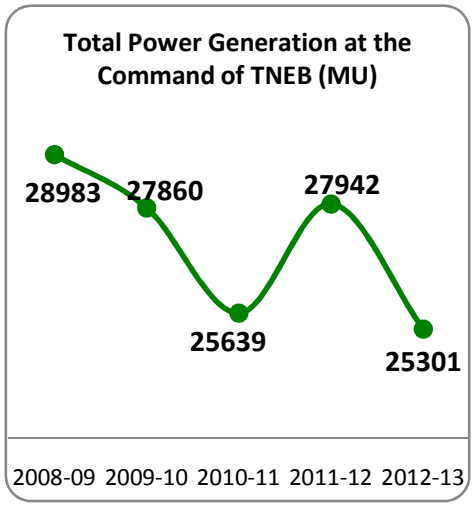
- Difficult to generate the quantities of electricity that are as large as produced by conventional sources.
- Reliability of supply is questionable as it is depended on weather for its source of power which is unpredictable and inconsistent.

7.5.4 The Way Forward:

To meet the growing demand for power and to achieve power surplus status, the following measures are proposed:

- Policies may be evolved that would ensure completion of ongoing projects quickly and to add new capacity in an efficient and cost effective manner,
- Renewable sources which can be set up in short time may be encouraged,
- Conventional (hydro) sources may be rehabilitated so as to yield additional peaking capacity,
- Captive capacity may be harnessed to meet the power deficit,
- Thermal stations may be made efficient through renovation and modernization so as to augment generating capacity and plant load factor,
- Availability of fuel such as coal and natural gas for new plants may be assured.
- Use of covered cables in the areas prone to theft of electricity.
- Setup fast track courts to prosecute persons guilty of theft of electricity.
- Inter-State transmission system of adequate capacity needs to be build up to transfer power from one region to another region.
- Distribution system must be made efficient which alone can ensure financially viable expansion.
- Conversion of low voltage line and high voltage line along with feeder separation may be taken up on a priority basis so as to reduce line losses to a greater extent.

- Segregation of feeders i.e., agricultural loads from industrial, commercial and domestic loads.



7.6 Power Generation:

7.6.1 Overall:

The State has taken various strategic steps to provide quality and uninterrupted power supply to meet the ever increasing demand of all sectors by executing and expediting new and ongoing projects and also by maximizing the utility of existing two principal resources, viz., hydel and thermal. Between 2011-12 and 2012-13, there was a fall in total power generation of the State's own projects from 27,942 MU to 25,301 MU (-9.5%). The total generation at the command of the State during the year 2012-13 was rated as the lowest during the recent 10 year period. The fall in the total generation was mainly on account of the decline in power generation from hydro stations (45.7%) and gas based stations (23.6%). One redeeming feature is that the power generation by the thermal stations had increased by 1.7 percent during the year, although this did not compensate adequately for the loss in generation from hydro and gas based stations. The share of hydro, thermal and gas resources in the total generation changed from 19:73:8 percent in 2011-12 to 11:82:7 percent in 2012-13.

Table No.7.11 Total Power Generation at the Command of TNEB

Year	MU	% Change
2008-09	28983	(-)0.9
2009-10	27860	(-)3.9
2010-11	25639	(-)8.0
2011-12	27942	9.0
2012-13	25301	(-)9.5

Source: Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

7.6.2 Hydel:

The sustained availability of water plays a crucial role in power generation from hydro stations. Supply of water for the hydro stations depends on monsoons and as well as the inflows in to the reservoirs. There are 42 hydro stations are functioning in the State. During 2012-13, the South-West monsoon (June to September) and North-East monsoon (October to December) were deficit. This had resulted in poor inflows to hydel stations. By and large, it was the case all through the year. The total inflows in hydel stations at 2,836 MU (energy equivalent) was lower than the previous year's level 3,783 MU (25%). The State takes all efforts to maximize the utilization of limited hydel resources. Consequently, the total power generation by these hydel stations in the State during the year was 2,905 MU in 2012-13. Despite this, generation was lower than the previous year's level by

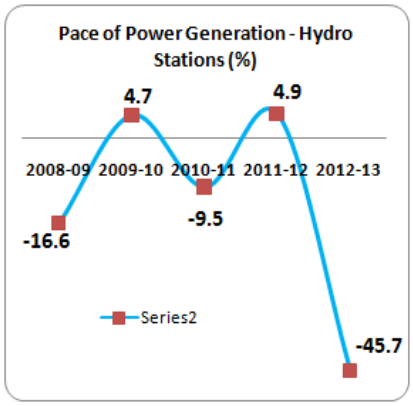


Table No.7.12 Power Generation - Hydro Stations at the command of TNEB (MU)

Year	Hydel Power (MU)	Growth rate	% share to total generation
2008-09	5386	(-)16.6	18.6
2009-10	5640	4.7	20.2
2010-11	5105	(-)9.5	19.9
2011-12	5354	4.9	19.2
2012-13	2905	(-)45.7	11.5

Source: Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

45.7 percent. A look in the trend in the generation of hydel stations in the previous 10 years revealed that it was the second lowest, next only to 2,067 MW in 2003-04. There is a steady decline in the share of the hydro stations to total generation in the State since 2009-10.

7.6.3 Thermal:

There are four State owned thermal stations – Tuticorin, Ennore, Mettur and North Chennai. There was a steady decline in total power generation from the thermal stations in the State during the three year period from 2008-09 to 2010-11. Thanks to the concerted efforts taken by the State, this trend has been turned to be positive in the subsequent two years 2011-12 and 2012-13. There was an increase in power generation from these thermal stations from 20,324 MU in 2011-12 to 20,663 MU in 2012-13 (1.7%). This was mainly contributed by the increases in generation in Tuticorin (4.9%) and North Chennai (16.0%) thermal stations by making good the fall in other two stations viz., Ennore (17.7%) and Mettur (9.4%). The three State owned Stations Tuticorin (40.1%), North Chennai (26.4%) and Mettur (30.0%) together accounted for 96.5 percent of the total generation from the thermal stations in 2012-13. There is a steady decline in generation from Ennore thermal power station since 2007-08 which is causing concern. The relative contribution of the thermal stations to total power generation had varied between 71.4 percent in 2009-10 and 81.7 percent in 2012-13.

Table No.7.13 Thermal Power Generation

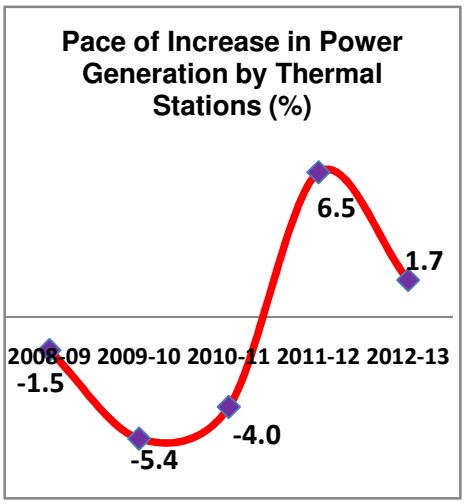
Year	MU	% Change	% Share
2008-09	21023	-1.5	72.5
2009-10	19882	-5.4	71.4
2010-11	19085	-4.0	74.4
2011-12	20324	6.5	72.7
2012-13	20663	1.7	81.7

Source: Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

Table No.7.14 Power Generation By Thermal Power Stations (MU)

Category	2010-11	2011-12	2012-13
Ennore	1396	894	736
Tuticorin	7113	7892	8281
Mettur	6065	6845	6200
North Chennai	4511	4693	5446
Total	19085	20324	20663

Source: Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.



The Plant Load Factor (PLF) is an index to ascertain to what extent the installed capacity of Thermal Power Stations (TPSs) has been effectively put in use. The steady decline in plant load factor in the years from 2008-09 to 2010-11 was arrested and turned around to improvements in the two years 2011-12 and 2012-13. The plant load factor at 77.94 percent in 2012-13 exhibited a marginal improvement over the previous year's level of 77.90 percent. Among the power plants, the ratio was the highest in North Chennai and the lowest in Ennore.

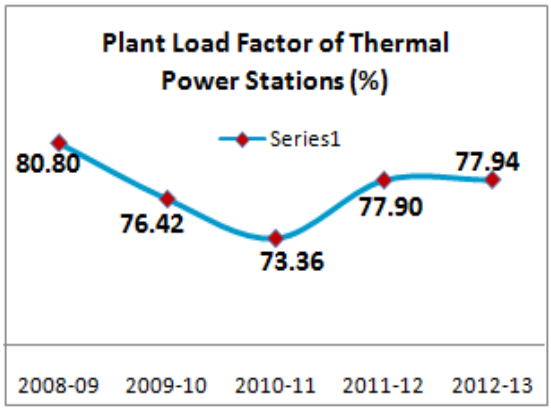


Table No.7.15 Plant Load Factor of Thermal Power Stations (%)

Year	Tuti-corin	Mettur	North Chennai	Ennore	Overall
2008-09	85.35	87.78	86.52	49.17	80.80
2009-10	77.91	86.85	87.43	38.05	76.42
2010-11	77.30	82.42	81.74	35.44	73.36
2011-12	85.60	92.77	84.81	22.61	77.90
2012-13	90.00	84.26	91.68	18.67	77.94

Source: Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

The total quantity of coal required for the existing four thermal power stations is 16 million tonnes per annum. Of the total coal requirements 1.425 million tonnes from Eastern Coalfields Limited and 12.075 million tonnes from Mahanadi Coalfields were received annually under Fuel Supply Agreement and the remaining from imports. One of the major issues is that the percentage realization of coal under Fuel Supply Agreement has been on steady decline year by year. The total coal used for power generation in thermal stations had increased from 14.95 million tonnes in 2011-12 to 15.66 million tonnes in 2012-13 (4.7%). Of which, the total consumption of coal in Tuticorin and Mettur thermal power stations accounted for a sizable share of 72.0 percent. The performance of the thermal stations as estimated by the generation power for utilization of coal indicates that there was a fall in the generation of power per tonne of coal used, from 1359 units per tonne in 2011-12 to 1319 units in 2012-13. Among the thermal stations, except North Chennai, all other stations in the State had experienced fall in the generation of power for per unit of coal used. To address the problems of pollution, the disposal of ash by thermal stations also needs to be taken care of.

Table No.7.16 Performance of Thermal Power Stations

Stations	Coal Consumption (MT)		Units Generated (MU)		Units per Tonne (Average)	
	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13
Tuticorin	5.94	6.65	7892	8281	1329	1245
Mettur	4.89	4.56	6845	6200	1400	1360
North-Chennai	3.06	3.48	4693	5446	1534	1565
Ennore	1.06	0.97	894	736	843	759
Total	14.95	15.66	20324	20663	1359	1319

Source: Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

The performance of the thermal stations is assessed by studying the two indicators viz., outage rate (plants not available for generating power during a given period) and availability factor (plants engaged in generation of power during a given period). During the five year period from 2008-09 to 2012-13 in the State, the outage rate of thermal power stations was on the increase. The steady increase of the forced outage of the Ennore thermal power station was the reason behind it. Among the other thermal plants, it varied from 6.48 percent (North Chennai) to 14.08 percent (Mettur). On the other hand, the availability factor was on the decline. This needs to be reversed.

Table No. 7.17 Overall Performance of the Thermal Power Stations (%)

Year	Outrage	Availability
2008-09	13.90	86.10
2009-10	17.34	82.66
2010-11	18.35	81.65
2011-12	21.89	78.11
2012-13	23.05	76.95

Source: Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

7.6.4 Gas Turbines:

Table No. 7.18 Power Generation from Gas Turbines (MU)					
Gas Turbines	2008-09	2009-10	2010-11	2011-12	2012-13
Basin Bridge	179	82	52	29	1
Kovilkalappal	708	534	650	706	726
Valluthur	953	1065	562	1104	937
Kuttalam	724	646	173	413	56
Total	2564	2327	1437	2252	1720
Source: Statistics at a glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.					

Gas turbines under the control of the State are functioning in Basin Bridge, Kovilkalappal, Valluthur and Kuttalam and their share in total power generation from gas turbines was in the ratio of 3:32:45:20 during the five year period ending 2012-13. Between 2011-12 and 2012-13, power generation by the gas turbines witnessed a fall from 2252 MU to 1720 MU (-23.6%). Except the gas turbines in Kovilkalappal, the decline in generation in other stations was the reason behind it.

7.6.5 Wind Mills:

The number of wind mills functioning under the State sector was limited and the output of the same depends on the unpredictable force of wind. The total power generation by these wind mills had hovered around 12 MU. It's share in total generation was negligible at 0.5 percent.

7.7 Energy Purchases:

Energy is being purchased by the State from two important sources viz., Central Sector Power Generating Stations (CGS) and Independent Power Projects (IPP). During the five years ending 2012-13, the total power purchases made by the State had witnessed an annual average growth of 6.0 percent. This had mainly come from the increases in the purchase from independent power projects (12%) rather than from the Central sector generating stations (0.5%). In the year 2009-10, the quantum of power purchases from independent power projects had outweighed that of the purchases made from the Central sector generating stations and continued subsequently. As a result, the share of Central sector generating power stations and independent power projects had changed from 57:43 in 2008-09 to 44:56 in 2012-13. Between the last two years 2011-12 and 2012-13, the total quantum of power purchase in the State registered an increase from 48,592 MU to 49,571 MU (2%). This increase was mainly triggered by the higher purchases made from independent power projects.

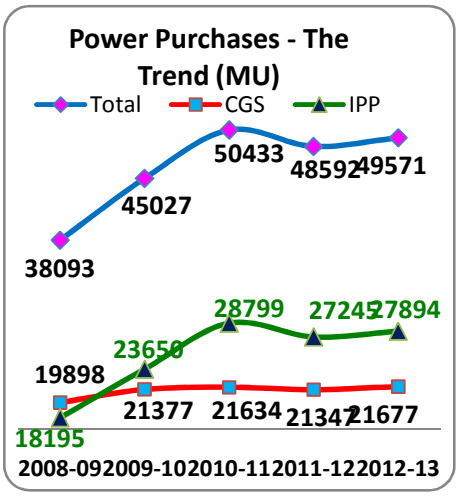


Table No.7.19 Power Purchases (MU)			
Year	**Central Sector Generating Stations**	**Independent Power Projects***	**Total**
2008-09	19898	18195	38093
2009-10	21377	23650	45027
2010-11	21634	28799	50433
2011-12	21347	27245	48592
2012-13	21677	27894	49571
Note - * Includes Non-conventional Energy sources, Open purchases and others. ***Source: Statistics at a Glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.***			

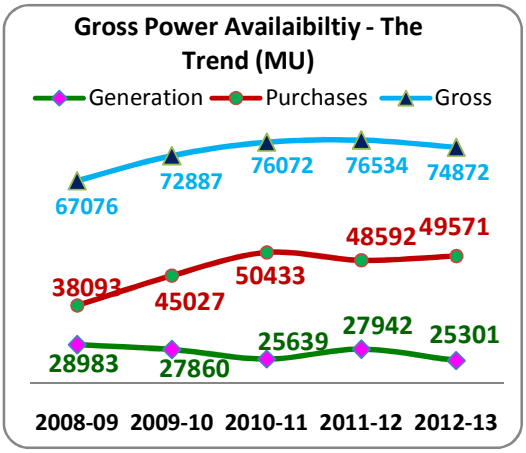
7.8 Gross Power Availability:

The gross power availability includes generation at the command of TNEB and total power purchases. With the steady increase in the purchases made, the quantum of gross power availability in the State registered an average annual growth of 2.4 percent during the five year period ending 2012-13, despite the generation at the command of TNEB declining by 2.6 percent. As a result the ratio of quantum of power generated and power purchases had changed from 43:57 in 2008-09 to 34:66 in 2012-13. The gross power availability in the State had declined from 76,534 MU in 2011-12 to 74,872 MU in 2012-13 (2.2%). The increase in the purchases (2%) did not anyway help to make good the fall in generation.

Table No. 7.20 Gross Power Availability – The Trend (MU)

Year	Generation	Purchases	Gross
2008-09	28983	38093	67076
2009-10	27860	45027	72887
2010-11	25639	50433	76072
2011-12	27942	48592	76534
2012-13	25301	49571	74872

Source: Statistics at a Glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.



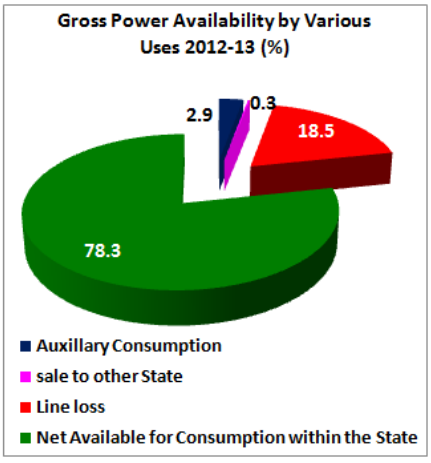
7.9 Net Power Availability:

The quantum of net power available for within the State is arrived at by deducting auxiliary consumption, sales effected to other States and line losses from the gross power availability. There was a steady increase in the net power availability for consumption within the State. The increase was from 52,489 MU in 2008-09 to 60,987 MU in 2011-12. During 2012-13 there was a fall in the net power availability for consumption within the State to 58,622 MU (3.9%). The fall was mainly caused by the decline in generation. During the five year period 2008-09 to 2012-13, the net power available for consumption within the State registered an annual average growth of 2.4 percent. Its share in gross power availability during this five year period varied between 76.8 percent in 2010-11 and 79.7 percent in 2011-12, the average being 78.3 percent. Line losses take away a sizable quantum of power from gross power availability in the State. The estimated line losses ranged between 11,759 MU in 2008-09 and 14,756 MU in 2010-11, the average being 13,151 MU during the five year period ending 2012-13. On an average its share in gross power availability worked out to 17.9 percent during this period. At this level, it was lower than that of all India (22%). However, this needs to be

Table No.7.21 Net Power Availability for Consumption within the State (MU)

Year	Gross Power Availability	Auxiliary Consum-ption	Sale to other State	Line loss	Net Power Availability
2008-09	67076	2252	576	11759	52489
2009-10	72887	2430	684	12681	57092
2010-11	76072	2458	412	14756	58446
2011-12	76534	2448	400	12699	60987
2012-13	74872	2202	188	13860	58622

Source: Statistics at a Glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.



reduced considerably by revamping and strengthening the network on a war footing so as to enable the power lost in transmission being made available for consumption within the State. The share of auxiliary consumption and sale to others in Gross power availability was meagre.

7.10 Transmission Network in the State:

The net power available in the State is distributed to various consumers in the State through a well built transmission network – 1,341 Extra High Tensions (EHT) and High Tension (HT) sub stations, 2.21 lakh transformers and 7.62 lakh k.m transmission lines. With the help of this network, all the 561 Town Panchayats and 15,979 villages had been electrified. As against the existing habitation numbering 79,361 habitations, 79,263 (99.9%) were electrified. The remaining 98 habitations in remote forest areas could not be electrified due to the problems of long distance and forest clearance etc,. The electrification of these habitations has been undertaken using solar power. In addition 26,764 Adi Dravidar colonies were covered.

Table No. 7.22 Transmission Network in the State

Category	2009-10	2010-11	2011-12	2012-13
1. EHT & HT Sub Stations (Nos)	1309	1343	1320	1341
2. Transformers (Lakhs)	1.93	2.04	2.13	2.21
3. Transmission Lines (Lakh k.m)	7.08	7.33	7.47	7.62
a. EHT & HT Lines	1.69	1.77	1.80	1.84
b. L.T Lines	5.39	5.56	5.67	5.78

Source: Statistics at a Glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

7.11 Pattern of Consumption of Power:

The State is catering to the requirements of the all consumers. There was a steady increase in the total power consumers in the State over the years. It was from 203.9 lakh in 2008-09 to 243.5 lakh in 2012-13. The annual average growth registered in the number of power consumers in the State was 4.7 percent during this period. Of the total consumers Low Tension (LT) consumers accounted for a larger chunk of 99.97 percent.

Table No.7.23 Consumers by Type (lakhs)

Year	High Tension	Low Tension	Total
2008-09	0.07	203.81	203.88
2009-10	0.07	212.69	212.76
2010-11	0.08	223.36	223.44
2011-12	0.08	231.72	231.80
2012-13	0.08	243.43	243.51

Source: Statistics at a Glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

Between 2011-12 and 2012-13, the total number of consumers in the State increased from 231.80 lakh to 243.51 lakh, the net addition being 11.71 lakh. Of the total net addition, the domestic (68.5%) and commercial (23.1%) segments together contributed 91.6 percent. During 2012-13, as high as 72.7 percent were domestic consumers, followed by commercial (30.4%), agriculture (8.3%), industries (2.4%), public light and water supply (2.3%) and others (0.9%).

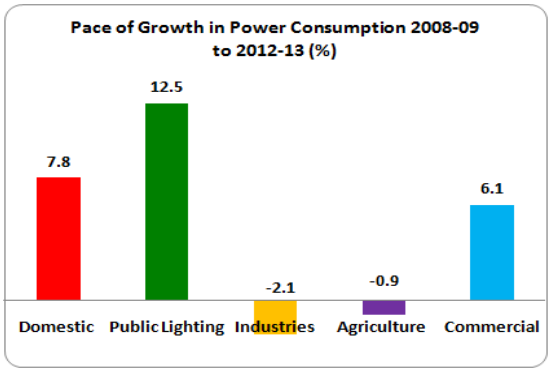


Table No. 7.24 Number of Consumers (lakhs)

Segments	2011-12	2012-13
Domestic	168.96	176.98
Public Lighting*	5.08	5.64
Industries	5.60	5.85
Agriculture	20.18	20.33
Commercial	29.81	32.51
Others	2.17	2.20
Total	231.8	243.51

***Note** –* Includes water supply*

Source: Statistics at a Glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

Going by the pattern of consumption of power, the share of domestic consumers steadily increased from 25.6 percent in 2008-09 to 31.0 percent in 2012-13. Increasing the number of nuclear families and the usage of electrical gadgets in the households was the reason behind it. There was a steady increasing trend in consumption of power by commercial establishments. As a result, its share in total power consumption in the State had gone up from 9.8 percent to 11.7 percent. The proliferation of advertisement industry and its influence had direct impact on power consumption. The agriculture sector which enjoys free power supplies had attracted a little more than 21.0 percent of the total power consumption in the State in 2008-09 and 2009-10. With the decline in cultivable area in recent times its share gradually dwindled to 17.2 percent. The share of industrial sector had slipped from 38 percent in 2010-11 to 31.4 percent in 2012-13. The growing urbanization had its own impact on the consumption of power for lighting and water works. Its share in total power consumption had gone up from 2.4 percent in 2008-09 to 2.9 percent in 2012-13.

Table No. 7.25 Pattern of Consumption of Power – The Trend (%)

Segments	2008-09	2009-10	2010-11	2011-12	2012-13
Domestic	25.9	26.9	27.8	28.7	31.1
Public Lighting*	2.4	2.6	2.8	2.8	2.9
Industries	36.7	34.8	38.0	35.5	31.4
Agriculture	21.7	22.3	16.1	16.6	17.2
Commercial	9.8	10.0	10.8	10.6	11.7
Others	3.4	3.3	4.5	5.9	5.7
Total (MU)	52489 (100%)	57092 (100%)	58446 (100%)	60987 (100%)	58622 (100%)

Note –* Includes water supply
Source: Statistics at a Glance, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2.

7.12 Power Generation from Renewable Sources of Energy:

The impact of global warming and subsequent climate changes made the whole world to think of harnessing renewable sources of energy. Tamil Nadu is in the fore front in tapping of various renewable sources of energy viz., wind, solar, biomass and other farms. The Tamil Nadu Energy Development Agency had taken early steps to tap the potential from this source. The total number of renewable power plants in the State steadily increased from 9204 in 2009-10 to 11616 in 2013-14 (upto July 2013). The entire net addition of 2412 power plants emerged from private sector. The number of power plants in Government fold remained at 110. Out of the total number of renewable power plants, private sector accounted for 99.0 percent. As high as 99.4 percent of the existing renewable power plants were belonged to wind energy. The share of bio-mass and bio-gas, solar and co-generation plants was negligible.

Table No. 7.26 Number of Renewable Power Plant in Tamil Nadu

Year	Govern -ment	Private	Total
2009-10	110	9094	9204
2010-11	110	10302	10412
2011-12	110	11317	11427
2012-13	110	11463	11573
2013-14 (Upto July 2013)	110	11506	11616

Source: Tamil Nadu Energy Development Agency (TEDA), Chennai-6.

Table No.7.27 Renewable Power Plants by Sources (No.)

Year	Wind	Bio-mass & Bio-gas	Solar	Co-generation	Total
2009-10	9160	18	--	26	9204
2010-11	10364	20	1	27	10412
2011-12	11370	22	7	28	11427
2012-13	11511	24	9	29	11573
2013-14 (Upto July 2013)	11548	26	13	29	11616

Source: Tamil Nadu Energy Development Agency (TEDA), Chennai-6.

The total power generated from the above renewable power plants in the State witnessed a steady growth from 43,116 MW in 2009-10 to 78,942 MW in 2013-14 (upto July 2013). Of the total power generated, 99 percent was wind energy. Among the two agencies, the share of private sector in the total power generation from renewable power plants was as high as 99 percent.

Table No.7.28 Power Generated from Renewable Power Plants (MW)

Year	Wind	Bio-mass & Bio-gas	Solar	Co-generation	Total
2009-10	41549.4	440.6		1125.9	43115.9
2010-11	50269.5	745.5	1.8	1763.5	52780.3
2011-12	60032.5	556.2	11.3	1428.5	62028.6
2012-13	72980.8	588.8	25.9	1653.8	75249.3
2013-14 (Upto July 2013)	78225.5	234.5	9.0	473.3	78942.3

Source: Tamil Nadu Energy Development Agency (TEDA), Chennai-6.

7.12.1 Outlook and Challenges:

The following of the main challenges the development of renewable energy in the State:

- Wind energy totally depends on nature and the power generation from this source is subjected to wide fluctuation,
- There is no mandatory requirement for consumers to push for green renewable power projects,
- Financial barriers act as a critical constraint for the private entrepreneurs to take up these resources on a large scale.
- Although subsidies are given liberally, these technologies are marginalized in the overall energy scenario.
- Lack of adequate financial resources has been a chronic problem for commercialization of renewable energy source.
- Another barrier to growth and popularization of renewable energy is that there are no universities offering exclusive degree and diploma in renewables. Even in schools, these renewables are not given due importance.
- In the bio-mass sector, the availability of waste in large quantities, which can be transported to a plant at an acceptable cost, is proving to be the primary obstacle faced by the project developers.
- Identification and exploitation of off-shore wind is yet to gain momentum.
- There is a limitation of grid infrastructure for evacuating or transmitting wind energy.

Box No. 7.3 Tamil Nadu Solar Energy Policy 2012 – Salient Features

- Envisage for establishing 3000 MW solar plant in the State in 3 years through utility solar projects (1500 MW) rooftops (350 MW) under Renewable Energy Certificate (REC) (7980 MW).
- Solar Purchase Obligation (SPO) 3 percent in the calendar year 2013 and 6 percent from calendar year 2014 onwards has been made mandatory for all HT and LT commercial consumers.
- Domestic consumers, huts, cottage and tiny industries, power looms LT industrial consumers and agriculture consumers are exception from SPO.
- Promotion of solar rooftop installation by networking.
- Installation of rooftop solar power generation in all Government building/local bodies.
- Energisation of all street lights and water supply install in Local Bodies through solar power.

Source: Policy Note 2013-14, Energy Department, Government of Tamil Nadu

- Solar photovoltaic is possible almost in the entire State but works only during daylight hours. It needs battery support to provide power during dark.

7.12.2 The Way Forward:

- Large scale awareness campaign on renewable energy is the need of the hour.
- Waste to energy potential in the sago industry cluster, food processing industry, hotels, hostels, education institutions/colleges needs to be tapped.
- Identifying more suitable area to promote off-shore wind power development calls for immediate attention.
- There is an urgent need to strengthen to evacuation infrastructure for wind energy. Otherwise, supply would have been lax.
- Promoting repowering of wind mills.
- Encouraging public-private partnership (PPP) in renewable energy projects in a sustainable manner.
- Encouraging incentivized renewable energy generation programme.
- Towards meeting the needs, the bio-mass power plants interruptedly, dedicated energy plantations in locations other than forest areas needs to be explored.
- Encouraging the usage of the solar power generation in domestic purposes and street lights.
- The concession extended to wind energy in the form of sop – accelerated depreciation (wind energy projects can reduce the assessed value of their equipment on their financial balance sheets over a shorter period of time than other real assets) may be put in place on a permanent basis which will help to tide over financial crisis and will give the sector a fresh lease of life.
- To accelerate development of wind energy, the Government of India may consider for exemption of construction activities involved in the installation of wind power projects, operation and maintenance work in the specified infrastructure from service tax.

7.13 On Going and Proposed Projects:

With a view to attain power surplus status, the State Government has taken concerted efforts to execute various projects which are in different stages of progress. Taking into account the future requirements new projects are have also been identified to be taken up. The details are presented in Table 7.29 and 7.30.

Table 7.29 Proposed Projects/ Programme			
Proposed projects	**Proposed investment (Rs.Crore)**	**Proposed projects**	**Proposed investment (Rs.Crore)**
North Chennai Thermal Power Project (Stage III)- 800 MW	4,800	Kundah Pumped Storage 500 MW	1500
North Chennai Thermal Power Project (Stage IV) -600 MW (2 x 800 MW)	11,155	Sillahalla Pumped Storage HEP -2000 MW	6,914
Ennore Thermal Power station Expansion -660 MW	3,135	Vellimalai Pumped Storage HEP (200 MW)	1,200
Tuticorin Thermal Power Project -800 MW	4,800	Programme Solar Power Generation 200 MW	50,000
Upper (Thiruvadanai) Thermal Power Projects -1600 MW (2 x 800 MW)	9,600	Programme –Offshore Wind Generation Programme (200 MW)	2,500
Udangudi Super Critical Power Project 1600 MW (2X800 MW)	9,083	Programme –Wind Generation Programme (10000 MW)	60,000
Udangudi Expansion -800 MW	4,800	Identified Project –TAN TRANSCO	16,000
Ennore Thermal Power station Replacement – 660 MW	3,600	Identified Project –CTU (PGCIL)	18,000
Cheyyur UMPP – 4000 MW (TN Share – 1600 MW)	19,200	Proposed Programme –TAN TRANSCO	54,000
New project – 800 MW	4,800	Proposed Programme –CTU (PGCIL)	12,000
New project – 800 MW	4,800	Distribution infrastructure – LT and HT lines and transformers	15,000
Chattisgarh – MTMTEL – 2000 MW (TN Share – 1000 MW)	4,800	Feeder Separation Project	16,000
Jayamkondan Lignite Power Plant (1500 MW)	6,000	Programme – Smart Grid	20,000
Private Sector Power generation projects	10,000	Development of a State Gas Grid and City Gas Networks in select cities	10,000
R –LNG based Gas Turbine Power Plant -1000 MW	4,000	Provision of Solar Home Lights	900
Small Hydro –Periyar Vaigai (5 to 17) -30 MW	240	Energizing Street Lights with Solar Power	250
Kollimalai Hydro –electric project -20 MW	258	Total	389,335
Source: Vision 2023, Phase II, Government of Tamil Nadu			

Table No. 7.30 On-going and New Projects		
Project	**Capacity / Share (MW)**	**Cost (Rs. in crores)**
I. On-going Projects		
TNEB-NTPC JV at Vallur (3 x 500 MW)	1050	8444
Mettur Stage-III (1x600 MW)	600	3565
North Chennai stage-II (2x600 MW)	1200	5814
Small & Mini Hydro (5 Projects)	57	944
Modification of Sugar Mills	183	1241
TNEB-NLC at Tuticorin JV (2 x 500 MW)	387	6541
Kudankulam (2 x 1000 MW)	925	*
PFBR Kalpakkam (1x500 MW)	167	*
Neyveli TS – II Expansion (2 x 250 MW)	230	*
ETPS Expansion Project (1x660 MW)	660	4000
Ennore SEZ (2x660MW)	1320	8000
Udangudi Super Critical Power Project (2x660 MW)	1320	9000
Note: * - Central Government Schemes.		
Source: Statistics at a Glance, 2012-13, Tamil Nadu Generation and Distribution Corporation Limited, Chennai – 2. Page 30		