

Chapter 9

Power

9.0 General

The Cauvery (Kattalai) - Vaigai - Gundar link canal off takes from the Kattalai barrage and flows as gravity canal till outfall into Gundar river. Hydro power generation through canal power house is not possible as canal falls are not proposed under this link canal project. The power scenario of Tamil Nadu State is discussed in this Chapter.

9.1 Status of power development in Tamil Nadu

9.1.1 Available generating capacity (MW) in Tamil Nadu.

Tamil Nadu is the third largest power generating state in India with an installed generation capacity of 30,479 MW (as on 01.01.2019). It comprises 18,300 MW of conventional sources and 12,179 MW of Non- conventional sources. The energy requirements of the state are supplied from the power plants of the Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO), Central Generating Stations, Independent Power Plants (IPP), Captive Power Plants, Third Part Generator, Long Term Open Access (LTOA), Medium Term Open Access (MTOA) and Non-conventional Energy. TANGEDCO is the major generation utility in the state with a total installed generation capacity of 7171 MW comprising of hydro capacity of 2315 MW, thermal generation capacity of 4320 MW, gas-based capacity of 516 MW and wind power capacity of 20 MW. The category wise/ location wise break-up of installed capacity of Tamil Nadu State is given in **Table 9.1**.

Table 9.1
Category wise/ location wise break-up of installed capacity
of Tamil Nadu state (As on 01.04.2019)

	Name of Power Station	Units and Size (MW)	Capacity in MW
I	Conventional		
A.	Hydro:		
1	Kundah PH I	3x20 MW	60
2	Kundah PH II	5x35 MW	175

Sl.No.	Name of Power Station	Units and Size (MW)	Capacity in MW
3	Kundah PH III	3x60 MW	180
4	Kundah PH IV	2x50 MW	100
5	Kundah PH V	2x20 MW	40
6	Kundah PH VI	1x30 MW	30
7	Pykara PH	(3x7)+(1x11)+ (2x13.6 MW)	59.2
8	Moyar PH	3x12 MW	36
9	Aliyar PH	1x60 MW	60
10	Kadamparai PH	4x100 MW	400
11	Suruliyar PH	1x35 MW	35
12	Poonachi Mini PH	2x1 MW	2
13	Maravakandy Mini Micro PH	1x0.75 MW	0.75
14	Mukurthy Mini PH	2x0.35 MW	0.70
15	Pykara Micro PH	1x2 MW	2
16	PUSHEP	3x50 MW	150
17	Kodayar PH I	1x60 MW	60
18	Kodayar PH II	1x40 MW	40
19	Sarkarpathy PH	1x30 MW	30
20	Sholayar PH-I	(1x42MW) + (1x35 MW)	77
21	Sholayar PH-II	1x25 MW	25
22	Mettur Dam PH	4x12.5 MW	50
23	Mettur Tunnel PH	4x50 MW	200
24	Bhavani Kattalai Barrage PH –I	2x15 MW	30
25	Bhavani Kattalai Barrage PH- II	2x15 MW	30
26	Bhavani Kattalai Barrage PH- III	2x15 MW	30
27	Lower Mettur Barrage PH-I	2x15 MW	30
28	Lower Mettur Barrage PH-II	2x15 MW	30
29	Lower Mettur Barrage PH-III	2x15 MW	30
30	Lower Mettur Barrage PH-IV	2x15 MW	30
31	Lower Bhavani Micro Hydel PH	4x2 MW	8

Sl.No.	Name of power station	Units and size (MW)	Capacity in MW
32	Lower Bhavani RBC	2x4 MW	8
33	Sathanur Dam PH	1x7.5 MW	7.5
34	Periyar PH	4x42MW	168
35	Papanasam PH	4x8 MW	32
36	Servalar PH	1x20 MW	20
37	Vaigai Small PH	2x3 MW	6
38	Thirumurthy Mini PH	3x0.65 MW	1.95
39	Aliyar Mini PH	2x1.25 MW	2.5
40	Amaravathi	2x2 MW	4
41	Perunchani	2x0.65 MW	1.3
42	Periyar Vaigai Mini PH-I	2x2 MW	4
43	Periyar Vaigai Mini PH-II	2x1.25 MW	2.5
44	Periyar Vaigai Mini PH-III	2x2 MW	4
45	Bhavani Barrage 2 PH	2x5 MW	10
46	Bhavani Barrage 1 PH	2x5 MW	10
47	Periyar Vaigai Mini PH – IV	2x1.25 MW	2.5
	Total hydro		2314.90
B.	Thermal:		
1	Mettur Thermal Power Station-I	4x210 MW	840
2	Tuticorin Thermal Power Station	5x210 MW	1050
3	North Chennai Thermal Power Station –I	3x210 MW	630
4	Mettur Thermal Power Station II	1x600 MW	600
5	North Chennai Thermal Power Station –II	2x600 MW	1200
	Total thermal		4320
C.	Gas:		
1	Basin Bridge	4x30 MW	120.00
2	Thirumakottai (Kovilkalappal)	1x107.88 MW	107.88
3	Valuthur Phase -I	95.0 MW	
	Phase-II	92.0 MW	187.00
4	Kuttalam	1 X 101 MW	101.00
	Total gas		515.88

Sl.No.	Name of power station	Units and Size (MW)	Capacity in MW
D.	Central generating stations (share)		
1	NTPC Ramagundam Stage - I	3x200 MW	} 624
	Stage – II	3x500 MW	
	Stage - III	1x500 MW	
2	Talcher STPP –Stage II	4x500 MW	487
3	Simhadri Stage II	2x500 MW	211
4	NTECL-Vallur units I, II & III	3x500 MW	1066
5	NLC – TPS 1 Expansion	2x210 MW	226
6	NLC TS-II Stage 1	3x210 MW	189
7	NLC TS-II Stage 2	4x210 MW	283
8	Neyveli TS 2 Expansion units I & II	2x250 MW	270
9	NTPL- Tuticorin units I & II	2x500 MW	414
10	MAPS	2x220 MW	331
11	KAPS –Unit 1 to 4	4x220 MW	226
12	Kudankulam NPP (KKNPP)	2x1000 MW	1151
13	Kudgi STPS- Stage I	3x800 MW	323
14	External Assistance from ER		35
	Total		5836
E.	Power purchases		
	Independent power plants (IPP)		
1	Pillaiperumalnallur GTPP	1x 330.50 MW	330.50
2	TAQA Neyveli Power Company	1x250 MW	250.00
3	LANCO Tanjore Power Company	1x113.20 MW	113.20
4	Pioneer Power Limited	1x 52.80 MW	52.80
	Total IPP		746.50

F. Captive power plants:				
SI. No	Name of the captive generator	Installed capacity in MW	STOA approved quantum on 01.04.19 (MW)	MTOA approved quantum as on 01.04.19 (MW)
1	Coromandal	26.19	25.9	
2	India Cements	48	24.672	
3	Sairegency	58	44.503	
4	Seshasayee	20	4	
5	Kamachi Industries	70	17.504	10.37
6	OPG Energy	17.5	3.767	4.571
7	SriVenkatramana Papermills	7.8	6.775	
8	Kaveri Gas	6.79	4.82	
9	Arkay Energy Rameswaram	149.18	145.946	
10	SreeRengarajIspat Industries (P) Ltd	30	26.362	
11	ChemplastSanmar Limited	48.5	6.308	4.962
12	ARS	62.8	52.964	
13	OPGPowerGen Unit 1	81	49.316	20.352
14	OPGPowerGen230KV (Units 2,3,4)	341	229.363	
15	MMS Steels And Power Pvt ltd	21.7	6.565	
16	Kamachi Industries	70	12.097	
17	TCPL	63	48.659	
18	Suryadev	162	126.754	
19	Saheli	8.81	1.328	
20	Tulsyan	70	54.083	
21	Bhatia Coke	22.5	16.593	
	Total CPP	1384.77	908.279	40.255
G. Third party generator				
1	Rajkumar Impex (Third party)	6	3.25	0
2	K G Denim (Third party)	9.925	4.979	0
3	Alten (Third party)	7.5	6.27	0
4	Birlacarbon (Third party)	33.7	10.827	12.321
	Total third party	57.125	25.326	12.321
	Grand total (CPP + Third party)			986.181

H.	Long term open access (LTOA):	
Sl.No.	Traders / generators	Quantum (MW)
1	OPG (Intra-state)	74
2	Coastal Energen (Intra-state)	558
3	IL&FS (Intra-state)	540
4	Jindal Power Ltd.	400
5	DB Power	208
6	Balco	200
7	KSK Mahanadhi	500
8	GMR /EMCO	150
9	Dhariwal	100
10	Athunik	100
	TOTAL	2830
I.	Medium Term open access (MTOA):	
1	Jindal	200
2	PTC (Through IL & FS)	550
	Total	750
Total installed capacity (Conventional), MW		18,299.46
II	Non-conventional energy:	
Sl.No.	Name	Capacity in MW
1	Wind	8,468.11
2	Solar	2,724.55
3	Biomass - Combustion	265.59
4	Bagasse	721.40
	Total installed capacity (Non-conventional)	12,179.65

Source: Chief Engineer, (Planning and Resource Centre), TANGEDCO, Chennai

9.1.2 Available generating capacity in the state (from different sources category wise)

Total electricity generated (including renewable energy sources) in the State was 1,13,790 Million Units (MU) during 2018-19 which is 6.52% higher than that during the Previous year. The share of TANGEDCO, Central share and Private in total electricity generation during 2018-19 was 29.3 per cent, 26.9 per cent and 43.8 per cent respectively. During 2018-19, the State

received 30583 MU electricity as share from the Central Sector. The category wise generation details of Tamil Nadu during 2018-19 is given in **Table 9.2**.

Table 9.2
Category wise electricity generation in Tamil Nadu during 2018-19

SI.No.	Category	Generation in MU
1	Hydro	5472
2	Thermal	25978
3	Gas	1875
4	Wind (TANGEDCO)	3
	Sub – Total (own Generation)	33328
5	Share of Central Generating Stations	30583
6	Independent Power Plants (IPP)	2225
7	Non- Conventional Energy Sources (wind + solar)	16153
8	Other (CPP, Co-gen, Bio-mass)	378
9	Open purchase (Generation, Traders and Exchange) including swap and wheeling	31123
	Sub-total (Purchase)	80462
	Grand Total	113790

Source: Chief Engineer, (Planning and Resource Centre), TANGEDCO, Chennai

9.1.3 Present status of utilisation of power

Aggregate consumption of electricity in the State during 2018-19 was 91,781 MU as against 85,694 MU in 2017-18 which shows an increase of 7.1 per cent in consumption. During the year 2018-19, the consumption of electricity by the industrial sector was the largest (38.3 per cent) followed by the domestic sector (29.4 per cent) and the agriculture sector (14.2 per cent) in the State. These three

sectors put together accounted for 81.9 per cent of the total electricity consumption. The per-capita electricity consumption in the State during 2016-17 was 1847 KWh/year. Sector wise electricity consumed during the years 2016-17, 2017-18 and 2018-19 are given in **Table 9.3**.

Table 9.3
Sector wise electricity consumption by different user groups

Unit: MU

SI.No.	Sector	Electricity consumption			Percentage change in	
		2016-17	2017-18	2018-19	2017-18 over 2016-17	2018-19 over 2017-18
1	Domestic	24530	25815	26996	5.2	4.6
2	Commercial	9300	9916	10282	6.6	3.7
3	Public Lighting and water works	2405	2248	2282	(-)7.0	1.5
4	Cottage industries	271	282	296	4.1	5.0
5	Industries	30769	32383	34836	5.2	7.6
6	Agriculture	11733	11250	13064	(-)4.3	16.1
7	Traction (Railways)	832	839	896	0.8	6.8
8	Bulk supplies to licensees	10	11	14	10.0	27.3
9	Miscellaneous sales	3002	2950	3115	(-)1.8	5.6
	Total	82852	85694	91781	3.4	7.1

Source: Chief Engineer, (Planning and Resource Centre), TANGEDCO, Chennai

9.2 Power requirement

There is no power requirement for the proposed Cauvery (Kattalai) - Vaigai - Gundar link project as the link canal flows as gravity canal.

9.2.1 Anticipated requirement of energy (MU) and peak load (MW)

The 18th Electric Power Survey of India conducted by Central Electricity Authority (CEA) has estimated anticipated electrical energy requirement and peak electricity load at power station bus bars for Tamil Nadu state for the years 2021-22, 2026-27 and 2031-32. The details are furnished in **Table 9.4**.

Table 9.4
Anticipated electrical energy requirement and peak demand

State/ Year	Electrical energy (MU)			Peak electric load (MW)		
	2020-21	2026-27	2031-32	2020-21	2026-27	2031-32
Tamil Nadu	17178	244703	337491	29975	43044	59827

Source: Central Electricity Authority

9.3 Future plans of power development in the state

The TANGEDCO executes one hydro-electric project with an installed capacity of 500 MW which is expected to be commissioned in 2022-23. In addition, five numbers of thermal projects with an installed capacity of 5700 MW are under various stage of execution. Thus, the total installed capacity of ongoing projects works out to 6200 MW. The category wise / location wise break-up of installed capacity of ongoing projects of Tamil Nadu are furnished in **Table 9.5**.

Table 9.5
Category wise / location wise ongoing projects of Tamil Nadu

SI. No.	Power Station	Units and size (MW)	Installed capacity (MW)	Date of commissioning
A	Hydro projects			
1	Kundha pumped storage	4x125	500	2022-23
B	Thermal			
1	ETPS Expansion	1x660	660	2022-23

2	Ennore SEZ	2x660	1320	Unit I: 31.08.2020 Unit II: 31.10.2020
3	North Chennai Stage-III	1x800	800	2019-20
4	Uppur	2x800	1600	2022-23
5	Udangudi Stage - I	2x660	1320	2012-22
	Total		6200	

Source: Chief Engineer, (Planning and Resource Centre), TANGEDCO, Chennai

New projects with an installed capacity of 10,050 MW is being contemplated by the TANGEDCO in Tamil Nadu. In addition to the state power projects, the Government of India has proposed an Ultra Mega Power Project at Cheyyur with an installed capacity of 4000 MW of which the share of Tamil Nadu is 1600 MW. The category wise / location wise break-up of installed capacity of future projects are given in **Table 9.6**.

Table 9.6
Category wise / location wise break - up of installed capacity of proposed projects.

Sl. No.	Power Station	Units and size (MW)	Installed capacity (MW)
A	Hydro		
1	Sillahallah pumped storage		
	Stage - I	4 x 250	1000
	Stage - II	4 x 250	1000
B	Thermal		
1	Ennore replacement	1 x 660	660
2	Udangudi expansion		
	Stage - II	2 x 660	1320
	Stage - III	2 x 660	1320
3	Kadaladi	5 x 800	4000
4	Cheyyur (Central Ultra Mega Project – Tamil Nadu share)	2 x 800	1600
C	Solar		
1	Kadaladi Photo Voltaic power	500	500

	park		
2	Floating Solar PV power projects in Salem, Theni and Erode	250	250
	Total		11650

Source: Chief Engineer, (Planning and Resource Centre), TANGEDCO, Chennai

9.4 Demand and supply of electricity

The capacity addition by various sources, improvement in the network infrastructure, reduction in transmission and distribution losses and energy conservation measures undertaken by the state have improved supply position and helpful in gradual reduction in the supply - demand gap over the years. During the year 2018, the average peak demand of TANGEDCO was 13844 MW. There was no load shedding for the past 3 years from 2016. The supply and shortfall of electricity at average peak demand for the period from 2011 to 2018 is furnished in **Table 9.7**.

Table 9.7
Supply and Shortfall of Electricity at Average Peak demand

Year	Average peak demand (MW)	Supply (MW)	Shortfall (MW)
2011	9674	9674	0
2012	9057	7496	1561
2013	10346	9634	712
2014	11572	11418	154
2015	11857	11815	42
2016	13385	13385	0
2017	13351	13351	0
2018	13877	13844	33

Source: Chief Engineer, (Planning and Resource Centre), TANGEDCO, Chennai

9.5 Impact of link project on power scenario of the state

The Cauvery (Kattalai) - Vaigai - Gundar link project, in isolation, is free of any pumping. However, the link project is dependent on Himalayan rivers and river Mahanadi for its source of intended diversion and pumping will be an essential component in the overall development of Phase II of peninsular component which will be known only after finalization of the same.

There are no plans for generation of hydro power either. However, there will be capacity addition to the solar power potential as described below.

The canal top/ banks of the 256.82 km long link canal are proposed to tap the solar power. The Gujarat Energy, Research and Management Institute (GERMI), Gandhinagar has been assigned with the consultancy study for setting up of grid connected solar (PV) power plant on canal top/canal banks and to assess possible solar power potential along the 426.54 km long Wainganga (Gosikhurd) - Nalganga (PurnaTapi) link canal in Vidarbha region of Maharashtra. The study assessed the solar potential of the link project as 1884 MW. Considering 6 hours of sunshine on average in a day, about 3768 MU of energy can be generated per annum. The corresponding power and energy per km length work out to 4.4 MW and 8.8 MU respectively.

The solar potential of the Cauvery (Kattalai) - Vaigai - Gundar link project is estimated on the same lines. Thus, the solar energy is worked out to be 2260 MU with an installed capacity of 1130 MW along the link canal as shown in **Table 9.8**.

Table 9.8
Solar energy potential of the C-V-G link project

Wainganga (Gosikhurd) - Nalganga (PurnaTapi) link project			Cauvery (Kattalai) - Vaigai - Gundar link project		
Canal length	Installed capacity	Energy generated	Canal length	Installed capacity	Energy generated
426.54 km	1884 MW	3768 MU	256.82 km	1130 MW	2260 MU

The solar power can be uploaded to the grid and will be a direct benefit to the country. However, the benefits from the solar power plants are treated as additional benefits and these are not considered while evaluating the link project for its economic viability.